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COMMISSION STAFF WORKING DOCUMENT

EVALUATION

Interim Evaluation of the Digital Europe Programme

Accompanying the document

REPORT FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS

The Digital Europe Programme: Main findings of the interim evaluation

{COM(2025) 771 final}

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Glossary

Term or acronym	*Meaning or definition*
5G	Fifth-generation wireless
AI	Artificial Intelligence
CEF	Connecting Europe Facility
CfE	Call for Evidence
Chips JU	Chips Joint Undertaking
CNECT	Directorate-General for Communications Networks, Content and Technology
CoR	European Committee of the Regions
CSA	Coordination and support action
DDPP	Digital Decade Policy Programme
DESI	Digital Economy and Society Index
DG	Directorate-General
DG DIGIT	Directorate-General for Digital Services
DG GROW	Directorate General for Internal Market, Industry, Entrepreneurship and SMEs
DG JUST	Directorate-General for Justice and Consumers
DG RTD	Directorate-General for Research and Innovation
DG SANTE	Directorate-General for Health and Food Safety
EC	European Commission
ECCC	European Cybersecurity Competence Centre
EDIC	European Digital Infrastructure Consortium
EDIH	European Digital Innovation Hub
EDMO	European Digital Media Observatory
EMI	European Monitor of Industrial Ecosystems
ENISA	European Union Agency for Cybersecurity
ERDF	European Regional Development Fund
EESC	European Economic and Social Committee
EuroHPC JU	European High-Performance Computing Joint Undertaking

GDP	Gross Domestic Product
HaDEA	European Health and Digital Executive Agency
HPC	High-Performance Computing
ICT	Information and Communications Technology
IPCEI	Important Projects of Common European Interest
JRC	Joint Research Centre
JU	Joint Undertaking
MFF	Multiannual Financial Framework
MS	Member State of the European Union
NCC	National Cybersecurity Centre
R&I	Research and Innovation
RRF	Recovery and Resilience Facility
SME	Small and Medium-sized Enterprise
SO	Specific Objective

1. INTRODUCTION

1.1. Purpose and scope of the evaluation/fitness check

The **Digital Europe programme (Digital Europe)** provides **strategic investments into the deployment of digital infrastructures and technologies, contributing to the EU's digital transformation,** and to building the EU's digital autonomy and competitiveness on the global stage.

This evaluation has been prepared in line with Article 26 of the Digital Europe Regulation 2021/694[1] which stipulates that an interim evaluation of the programme be conducted at the latest four years after the start of implementation, i.e. at the latest by November 2025. The interim evaluation analyses the design of the Digital Europe programme, its implementation, and the first results achieved from **November 2021 to December 2024**. It covers all specific objectives (SOs) implemented under direct and indirect management. Due to the recent launch of the sixth objective supporting chips and semiconductor technologies, this report mainly explores the trends and developments in this area. The evaluation follows the Better Regulation Guidelines[2] and measures the effectiveness, efficiency, relevance, coherence, and EU added value of the programme. The objective of the evaluation report is to inform stakeholders and policymakers on the progress achieved, guide the design of future initiatives in digital deployment and adjust funding priorities to maximise the impact of EU investment.

The evaluation responds in total to 38 evaluation questions, structured around five evaluation criteria. The evaluation matrix can be found in Annex III.

1.1.1. Methodological approach

The evaluation used a broad mix of qualitative and quantitative data collection and analysis methods (see Annex II). The main sources of qualitative information included desk research, interviews, focus groups, workshops and case studies. Quantitative information was gathered through secondary data collection, a public consultation questionnaire and a Call for Evidence (CfE), as well as targeted surveys for beneficiaries, applicants, end users and stakeholders of the national cybersecurity centres (NCCs). The quantitative data was analysed using descriptive statistics and extrapolation. The main types of secondary data used for the evaluation includes programme data from the financial management system (eGrants), data gathered manually on the implementation of procurements, and contribution agreements, contextual data (Digital Decade policy programme indicators[3],DESI[4], EMI[5]), and data on the progress made towards the key performance indicators and supporting indicators. Triangulation of evidence gathered through different methods was performed for all research questions to ensure the consistency and relevance of the findings.

[1] Regulation (EU) 2021/694 of the European Parliament and of the Council of 29 April 2021 establishing the Digital Europe programme and repealing Decision (EU) 2015/2240
[2] Better Regulation: guidelines and toolbox
[3] Decision (EU) 2022/2481 of the European Parliament and of the Council of 14 December 2022 establishing the Digital Decade Policy Programme 2030: Decision - 2022/2481 - EN - EUR-Lex
[4] Digital Decade DESI visualisation tool
[5] What is the EMI Data Dashboard? | European +Monitor of Industrial Ecosystems

The evaluation leveraged the findings of an evaluation support study carried out by Technopolis Group and Ramboll[6] (hereinafter: 'evaluation study' or 'study'). In the scope of this study, over 100 interviews, 5 surveys (1 756 participants), one public consultation (789 responses to the survey and 103 general comments on the call for evidence), 6 focus groups, 3 case studies (Annex XIII) and a cost-benefit analysis (Annex IV) were conducted. This evaluation also takes into account stakeholder consultations[7] carried out by DG CNECT, such as the stakeholder workshops on the implementation of the programme at the 'From Research to Reality – digital solutions for European challenges' event[8] and at the conference on the 'Future of Digital Investment in the EU'[9],the workshop with representatives of the European Digital Innovation Hubs (EDIHs) at the EDIH summit[10] and the policy workshop organised to validate the findings of this evaluation. The findings of the stakeholder consultations are analysed in the synopsis report (Annex V). In addition, this report refers to several other sources, such as feedback to policy reports, preparatory documents for the draft impact assessment of the new MFF, a spending review, programme performance statements, annual activity reports, as well as beneficiary reports. The evaluation also considers feedback from diverse working groups and comments made by the Member States' delegates to the Digital Europe programme Committee. Furthermore, it refers to two opinions on the programme conducted by the Fit4Future platform[11] and the European Economic and Social Committee[12], as well as other related evaluations, such as the Interim Evaluation of the InvestEU programme[13].

1.1.2. Limitations

Even though the interim evaluation of the Digital Europe programme offers important insights into its implementation and progress, certain limitations need to be recognised. **Firstly, it is too early to assess the economic and digital impacts.** The full benefits from investments will take time to materialise, with long-term gains in productivity, innovation, and competitiveness becoming clearer in subsequent years. Assessing the programme's full cost-effectiveness is challenging due to its early stage, as it has primarily focused on new infrastructure investments that are expected to generate substantial benefits only later. Secondly, there is a **lack of micro-level data on end users.** Due to restrictions related to data protection rules, and a lack of formal obligations for beneficiaries to track data related to end users, granular micro-level data on end users, (e.g. SMEs, researchers, public administrations, and individuals benefiting from Digital Europe-supported infrastructures and services) could not be collected. To receive some insights into the perspectives of end users, surveys for end users in four work strands were conducted. Thirdly, there is **limited aggregated data on procurement**. The availability of detailed data on procurement outcomes, cost-effectiveness, and supplier participation remains limited, constraining the ability to evaluate whether procurement processes have been efficient. Gathering these data across different DGs and services at a granular level, requires IT tools, such as the ones currently used for grants. Finally, there is **limited information on financial**

[6] Interim Evaluation of the Digital Europe programme, Technopolis Group & Ramboll (2025).
[7] Including a Public Consultation, which was published on the European Commission's 'Have your say' portal from 27 June to 20 September 2024. The summary report is accessible at Digital Europe programme – interim evaluation
[8] From Research to Reality – digital solutions for European challenges | Shaping Europe's digital future
[9] Conference | The Future of Digital Investments in the EU
[10] EDIH Network Summit 2024 | European Digital Innovation Hubs Network
[11] Adopted opinions - European Commission
[12] opinions - Filtered results | EESC
[13] Interim evaluation of the InvestEU Programme - European Commission

instruments (debt, and equity-based financing). There is a lack of detailed information on the final recipients of financing and investment operations at the moment, but this information will become continuously available as intermediary organisations offer financing to the final recipients. While more information is expected to be available as the operations reach the market, it is particularly difficult to assess the sectoral composition and distribution across Member States.

2. WHAT WAS THE EXPECTED OUTCOME OF THE INTERVENTION?

2.1. Background and objectives of the intervention

Numerous far-reaching hurdles in the digital transformation of the EU required the European Commission to invest in a systematic digital deployment programme. In its 2018 impact assessment for Digital Europe[14], the Commission stressed that, to keep pace with the US and China, the Commission urgently needed to support the development of advanced digital capabilities in computing, AI, cybersecurity, and digital skills.

- In 2020, the EU accounted for only 5% of global HPC facilities while consuming one third of HPC resources[15].
- The limited availability of high-quality data restricted the development of effective AI systems, which were crucial for training AI models and their optimal performance. It was estimated that there was a EUR 10 billion annual AI investment gap[16].
- With regards to cybersecurity, in 2018, only four EU Member States were in the top tier of the ITU Global Cybersecurity Index, and only eight Member States reached a score higher than 85[17]. To be 'cyber-ready' in five years, the EU planned to co-invest in cybersecurity infrastructure and scale up existing capabilities.
- In addressing the digital skills gap, the Commission aimed to boost the growth of ICT specialist employment from 3.3% in 2016 to 4.3% annually, increasing the total number of specialists from 8.2 million in 2016 to 12.3 million by 2027[18].
- European businesses were slow to adopt digital innovations, leading to uneven progress across Member States, sectors (high-tech vs. traditional), and types of companies (large companies vs SMEs)[19].
- The EU also faced a semiconductor shortage in 2022. While the global demand for the technology surged, the EU's own capacities were not enough to meet its needs, as in 2022, the EU accounted for about 10% of the global market and relied heavily on third country suppliers.

The need to address these challenges strategically across Member States led to the adoption of the Digital Europe programme Regulation[20] in April 2021. Addressing the

[14] Commission Staff Working Document: Impact Assessment Accompanying the document Proposal for a Regulation of the European Parliament and of the Council establishing the Digital Europe programme for the period 2021-2027
[15] Briefing European Parliamentary Research Service
[16] Commission Staff Working Document: Impact Assessment Accompanying the document Proposal for a Regulation of the European Parliament and of the Council establishing the Digital Europe programme for the period 2021-2027
[17] Member States among the top 10 of the Global Cybersecurity Index were France (3), Lithuania (4), Estonia (5), Spain (7) in 2018. Member States who had scored higher than 85 were France (91.8), Lithuania (90.8), Estonia (90.5), Spain (89.6), Luxembourg (88.6), Netherlands (88.5), Finland (85.6), Denmark (85.2). Source: Global Cybersecurity Index (GCI) 2018, Studies & research, ITU Publications, International Telecommunication Union, 2018.
[18] DESI indicators - Digital Decade DESI visualisation tool
[19] Technopolis Group & Ramboll (2025) Interim Evaluation of the Digital Europe programme
[20] Digital Europe programme (2021–2027) | EUR-Lex

semiconductor issue led to the introduction of the **Chips Act** in 2022, adding another specific objective to the Digital Europe **intervention logic**.

2.2. Intervention logic

The Digital Europe programme has a total budget of EUR 8.16 billion[21] to foster the deployment of key digital technologies and infrastructures, their best use for critical sectors, and the related advanced digital skills development contributing towards the overall goal of achieving increased strategic autonomy, security and competitiveness across the EU.

Figure 1 presents the intervention logic of the Digital Europe programme, highlighting the different SOs in terms of their main activities, outputs and outcomes. Together these outcomes address many of the key challenges related to the lagging and untapped potential of the digital transformation of SMEs, larger firms and public authorities across the EU. Digital technologies, as highlighted in the Draghi report[22], are not only the drivers for productivity, innovation and a well-functioning single market but also essential to enhancing the EU's strategic autonomy.

For instance, currently approximately 70% of foundational AI models since 2017 were developed in the United States, and three major US 'hyperscalers' dominate over 65% of both the global and European cloud markets, compared with the leading European cloud providers, which hold less than 2% of the EU market. As highlighted in the Draghi report, the EU's lag in key digital technologies is the main reason for the productivity gap between the EU and the US. Excluding this sector, EU productivity growth over the past 20 years would be broadly comparable to the US.[23]

Digital technologies are central to securing strategic autonomy, particularly in a landscape marked by rising geopolitical tensions and systemic vulnerabilities. The EU's dependence on third countries for critical digital infrastructure—such as semiconductors, AI systems, and cloud computing—combined with a significant 'data value loss' (an estimated 90% of EU data flowing to non-EU countries)[24], underscores the urgent need to strengthen the EU's digital infrastructures and capabilities. The European Economic Security Strategy[25] explicitly identifies risks from technology security gaps and leakage as core threats to economic resilience, with 10 critical technology areas[26] listed as priorities. Notably, eight of these areas are directly tied to digital technologies and infrastructure (semiconductors, AI, quantum computing, advanced connectivity, robotics and autonomous systems, and advanced sensing technologies), illustrating how digital sovereignty is inseparable from economic and strategic autonomy. By securing leadership in these domains, the EU can mitigate external risks, protect innovation ecosystems, and ensure long-term competitiveness in a technology-driven global economy.

[21] Digital Europe programme (2021–2027) | EUR-Lex

[22] See, for instance, in The Future of European Competitiveness ('Draghi Report' 2024), as one of the main three transitions underpinning competitiveness. Digitalisation and advanced technologies are discussed as important elements to the EU's open strategic autonomy.

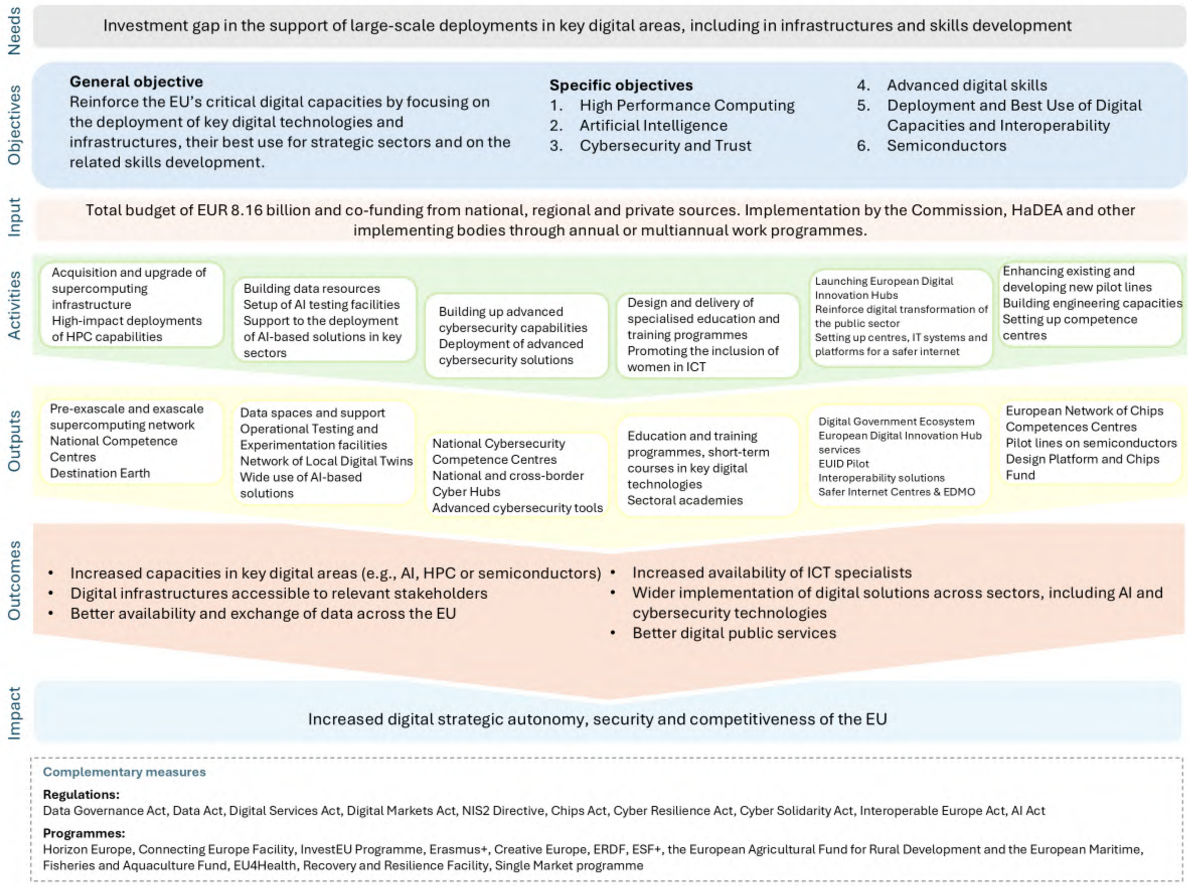
[23] Ibid.

[24] While transfer of data can also be mutually beneficial, this argument is framed by the data value chain, and the added value created through data collection, processing, analysing and monetisation of the rapidly expanding volume of digital data, which concentrates value in a few platforms and multinational enterprises (see: Digital Economy Report).

[25] EUR-Lex - 52023JC0020 - EN - EUR-Lex

[26] C_2023_6689_1_EN_ACT_part1_v8.pdf

Figure 1. Intervention logic of the Digital Europe programme



Under **SO1 – High Performance Computing**, Digital Europe supports the acquisition of new supercomputing infrastructure, including exascale, post-exascale, and quantum computing facilities, the upgrade of the existing HPC infrastructures with AI capabilities, the establishment of HPC competence centres and the deployment of highly accurate digital twins of the Earth. As a result of these activities, the EU will have an integrated network of supercomputers providing increased computing and data capacities and services (e.g. weather, climate) to businesses and research organisations across the EU, contributing to a full EU ecosystem that provides the necessary HPC and data capabilities for Europe. In addition, as an outcome of this SO, the Destination Earth initiative provides digital models of the earth of groundbreaking accuracy, making it possible for users to timely predict and simulate extreme weather events provoking environmental disasters. <u>These tools, combined with AI capabilities, are likely to revolutionize Copernicus services and the use of Earth observations.</u>

> The activities related to this SO are implemented through the EuroHPC Joint Undertaking, except for Destination Earth, which is implemented through contribution agreements with the European Space Agency (ESA), the European Centre for Medium-Range Weather Forecasts (ECMWF) and the European Operational Satellite Agency for Monitoring Weather, Climate and the Environment from Space (EUMETSAT).

SO2 –AI supports the deployment of EU-wide common data spaces in key areas based on federated cloud-to-edge infrastructure and services. It helps with setting up AI testing and experimentation facilities (TEFs) and supports the adoption of AI-based solutions in specific sectors. It also aims to establish an ecosystem of networked local digital twins across the EU and to develop open-source language foundation models. These activities aim to improve the availability and exchange of data across the EU, improve the AI uptake though increased access to testing facilities and through specialised applications in key sectors. This SO is therefore expected to strengthen the EU's AI capacities, enable better decision-making based on combined data sources and patterns, as well as the development of new data-driven products and services.

> The activities related to this SO are managed directly by the Commission and implemented with the support of the Health and Digital Executive Agency (HaDEA). The Research Executive Agency (REA) supports the agency in the contractualisation process of beneficiaries.

SO3 – Cybersecurity and Trust builds advanced cybersecurity capabilities, including threat detection and cyber incident analysis ecosystems and quantum secure communication infrastructure, and strengthens the uptake of cybersecurity solutions and the sharing of best practices. Key activities include setting up NCCs to provide research and technological expertise, and National and Cross-border Cyber Hubs to detect and warn about cyber threats, also through the setting-up of the Cyber Emergency Mechanism. The increased availability and accessibility of advanced cybersecurity solutions and know-how and the increased capacity of public and private bodies to detect and respond to cyber threats improves the EU's resilience against cyberattacks and helps to protect critical infrastructures.

> The specific objective on cybersecurity is implemented through the European Cybersecurity Industrial, Technology and Research Competence Centre (ECCC) and the Cybersecurity Competence Network. The implementation of the Incident Response Support and Preparedness of Key sectors in the area of cybersecurity has been entrusted to the European Union Agency for Cybersecurity (ENISA).

SO4 – Advanced Digital Skills supports the design and provision of specialised education and training programmes in key digital technologies, such as HPC, cybersecurity, and AI, supporting the skilling, reskilling and upskilling of the European workforce. Specific activities also target the inclusion of women in ICT related courses and careers. The increased availability of education and training opportunities aims to improve academic excellence and give access to better jobs. This SO also aims to improve the access for organisations to ICT specialists and expertise, supporting the development and uptake of advanced digital technologies.

> The activities related to this SO are managed directly by the Commission and implemented with the support of the HaDEA and REA.

SO5 – Deployment and Best Use of Digital Capacities and Interoperability covers a wide range of activities, from deploying solutions supporting the digital transformation of public administrations and services, through developing and piloting blockchain infrastructures to promoting an inclusive and trustworthy digital space with the help of Safer Internet Centres and targeted online tools, resources and services. This SO aims to accelerate the wider adoption of digital technologies through facilitating the digital transformation and interoperability of areas of public interest (e.g. public administration, health, judiciary, smart cities, or energy) while ensuring that the uptake of digital technologies is aligned with EU values. This SO also includes the establishment of a network of EDIH providing services to support companies, ensuring the digital transformation of European private organisations.

The activities related to this SO are mainly managed directly by the Commission and implemented with the support of the HaDEA and REA. The development of the Joint Investigation Teams Collaboration Platform[27] (JITs CP) will be implemented by the European Union Agency for the Operational Management of Large-Scale IT Systems in the Area of Freedom, Security and Justice (eu-LISA) via contribution agreements.

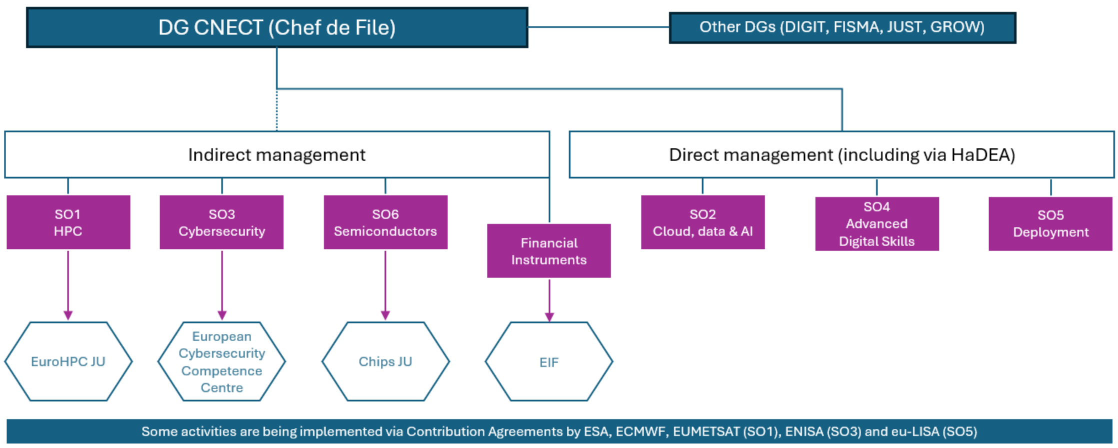
SO6 – Semiconductors builds up advanced design and manufacturing capacities for integrated semiconductor technologies by improving existing and developing new advanced pilot lines across the EU and a design platform to enable the development and deployment of cutting-edge and next-generation semiconductor technologies. This SO builds engineering capacities to accelerate the development of cutting-edge quantum chips and to establish a network of competence centres across the EU. Through these activities, it contributes to European leadership in semiconductor technologies and applications and increases the resilience of the EU's supply chain for semiconductors.

SO6 on semiconductor technologies and applications is implemented by the Chips Joint Undertaking.

The programme is also implemented through **financial instruments**. This includes financial support to innovative digital start-ups and SMEs through equity and quasi-equity (Investment Platform for Strategic Digital Technologies) and support to SMEs in the field of semiconductor technologies, offering venture debt and equity-based financing (Chips Fund).

The financial instruments, the Investment Platform for Strategic Digital Technologies and the Chips Fund, are implemented through indirect management with the European Investment Fund under InvestEU.

Figure 2. Management structure of Digital Europe



2.3. Point(s) of comparison

[27] Joint Investigation Teams (JITs) collaboration platform - European Commission

The main points of comparison for this analysis are based on the Digital Europe impact assessment of 2018 (see Section 2.1). The challenges identified in that impact assessment represent the baseline scenario against which the progress made within the Digital Europe programme can be compared to. In addition, the Digital Economy and Society Index (DESI), Digital Decade policy programme indicator data[28], and Eurostat data provide a robust foundation for monitoring the EU's progress towards the 2030 digital objectives. For instance:

- Before the launch of the Digital Europe programme, in 2021, 55% of enterprises faced challenges filling ICT vacancies, and 70% reported inadequate digital skills. From 2020 to 2024, the EU experienced a 21.7% increase in ICT specialists. The share of ICT specialists within total employment increased from 4.3% in 2020 to 5% in 2024, with 19.5% of ICT specialists being women in 2024.
- Digitalisation among businesses saw progress, with SMEs' digital intensity increasing from 54.8% in 2021 to 57.9% in 2023. Moreover, AI adoption among all enterprises rose from 7.7% in 2021 to 13.5% in 2024[29].
- Regarding public digital services for citizens, the share of the population of the EU who use the internet to interact with public authorities grew from 50.6% in 2022 to 56.2% in 2024[30].

In addition to these contextual indicators, the KPIs in the Regulation and the additional supporting indicators (see Annex IX) set out the baseline in the main work strands and the expected trends, which are also taken as a point of comparison in this analysis.

3. How has the situation evolved over the evaluation period?

3.1. State of play of implementation

The Digital Europe programme has been implemented through the following work programmes[31] (WPs) in the 2021-2024 period:

- two Main Digital Europe WPs (2021-2022 and 2023-2024);
- two Cybersecurity WPs (2021-2022 and 2023-2024);
- four High-Performance Computing WPs (2021 to 2024);
- one Chips Multiannual WP (2023-2027)[32];
- one EDIH WP (2021-2023).

These WPs have been implemented under direct and indirect management, as described in Section 2.2.

[28] Source: Digitalisation dashboard
[29] Source: Digitalisation dashboard
[30] Source: Digitalisation dashboard
[31] Digital Europe Work Programmes
[32] This multiannual WP is updated via a series of annual work programmes in appendices.

The Digital Europe Regulation[33] was adopted late in April 2021, leading to the subsequent late adoption of the first Digital Europe work programmes in November 2021. The 2023-24 work programmes ensured the continuity and sustainability of actions already started in the previous WP (notably the testing and experimentation facilities, data spaces, or the Destination Earth initiative). In addition, the Digital Europe programme also had to be restructured to respond to new geopolitical developments and to the related new EU policies. To address the semiconductor supply shortage following the COVID-19 pandemic, a **new capacity area on semiconductors (SO6)** was added in September 2023, which mobilised an additional EUR 1.58 billion funding under the Chips Act. For this purpose, EUR 800 million was transferred from other EU programmes to Digital Europe. On the other hand, funds were transferred from Digital Europe to the Secure Connectivity Programme (IRIS2) and to ENISA to respond to an ever-growing cybersecurity threat landscape and in line with the Cyber Solidarity Act put forward in 2023[34]. As a result, the programme's budget saw an overall increase from EUR 7.6 billion to **EUR 8.16 billion**.

Most projects started during this period will end by 2025 and 2026, with all ending by 2031 at the latest. By the end of 2024, Digital Europe had been funding a total of **601 grant and procurement projects in addition to several contribution agreements, financial instruments and programme support actions**[35] amounting to a **total committed budget of EUR 3.02 billion**[36] **(37% of the total budget)**.

For the full breakdown of the EU contribution and the number of beneficiaries, including per SO, by type of action and by type of participant see Table 1.

Table 1. Total EU contribution and number of projects per SO under Digital Europe, as of 31 December 2024

SO	Grants				Other instruments (procurements, contribution agreements, financial instruments, programme support actions)				Grand total			
	N	EU Contribution (EUR)	Av EU Contribution (EUR)	% of total funding	N[37]	EU Contribution (EUR)	Av EU Contribution (EUR)	% of total funding	N	EU Contribution (EUR)	Av EU Contribution (EUR)	% of total funding
SO 1	7	80.664.812	11.523.545	3%	9	516.975.558	10.136.776	17%	16	597.640.370,01	10.304.144,31	20%
SO 2	56	462.430.902	8.257.695	15%	17	135.702.297	7.982.48	4%	73	598.133.198,66	8.193.605,46	20%
SO 3	168	480.479.512	2.859.997	16%	1	45.699.668	9.139.934	2%	169	526.179.179,63	3.041.498,15	17%

[33] Regulation (EU) 2021/694 of the European Parliament and of the Council of 29 April 2021 establishing the Digital Europe programme and repealing Decision (EU) 2015/2240

[34] The Cyber Solidarity Act

[35] In addition to the grants and procurements, in terms of other instrument types, 11 venture capitals were supported to help companies involved in digital activities to reduce their financial risk. There were 3 Contribution Agreements with the European Space Agency (ESA), the European Centre for Medium-Range Weather Forecasts (ECMWF), and the European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT) to implement Destination Earth. In addition there was a contribution agreement with ENISA to support cybersecurity incident and preparedness in key sectors and a contribution agreement with eu-LISA to support cross-border investigations and prosecutions in the EU by funding an IT platform that supports safe and quick exchanges of information.

[36] This figure includes budget committed for grants, procurements, contribution agreements, support actions and financial instruments (individual commitments). It does not include global commitments and the administrative budget.

[37] The number of projects includes grants and procurements

SO 4	50	211.171.429	4.223.429	7%	1	3.717.090	3.717.090	0%	51	214.888.518,64	4.213.500,37	7%
SO 5	253	484.571.353	1.915.302	16%	28	252.173.196	8.695.627	8%	281	736.744.549,49	2.612.569,32	24%
SO 6	3	33.609.501	11.203.167	1%	8	230.475.310	20.952.301	8%	11	264.084.811,20	18.863.200,80	9%
NA				0%		78.386.334	6.532.194	3%		78.386.334,24	6.532.194,52	3%
Total	**537**	**1.752.927.507**	**3.596.181**	**58%**	**64**	**1.263.129.455**	**10.024.837**	**42%**	**601**	**3.016.056.962**	**4.549.106**	**100%**

Source: Technopolis Group & Ramboll, 2025.

There were in total 6 388 participations in the programme from all 27 EU Member States, three fully associated EEA-EFTA countries (Norway, Iceland and Liechtenstein), nine associated third countries (Albania, Bosnia and Herzegovina, Kosovo, Moldova, Montenegro, North Macedonia, Serbia, Türkiye and Ukraine) and eight non-associated third countries[38]. Most of the grant funding (EUR 1.69 billion) was received by Member States. Associated countries received an EU contribution for grants of EUR 63.2 million across 24 projects.

The 50% funding rate[39] for Digital Europe grants has had a significant leverage effect. The 537 grants signed by the end of 2024 received a EUR 1.75 billion EU contribution but had a total cost of EUR 3.17 billion (an effective 55% EU contribution rate for the grant component, direct leverage ratio of 81%). Leverage is therefore much higher in Digital Europe compared with Horizon Europe Cluster 4 (91% EU contribution rate)[40]. Of the EUR 1.41 billion co-funding, EUR 185 million has been covered by large companies, and EUR 200 million by SMEs[41], meaning that the private sector covers 27% of the total co-funding, or 12% of the total Digital Europe grant costs. This co-funding is sourced from both private and public funding triggered by Digital Europe, with some Member States setting up specialised funds to co-finance projects. Some projects, such as the EDIHs, also leveraged combined funding with the ERDF and RRF funds. In addition to the official direct co-funding, beneficiaries also report additional indirect leverage effects on mobilising additional internal and external funding related to the projects, including during and (where already relevant) for the follow-up of the projects. An extrapolation analysis estimates the total leverage factor of Digital Europe at 225%-305% for grants through co-funding of projects and additional funding at national, regional or local levels[42]. Blended operations between Digital Europe and InvestEU also had a leverage and mobilising effect. Through the EU guarantee support to equity investments by the European

[38] Among which only the UK has received funding through Digital Europe (The European Centre for Medium Range Weather Forecasts, one of the three implementing entities of Destination Earth, is registered in the UK).

[39] Grants under Digital Europe generally cover 50% of the total eligible costs for all beneficiaries. Certain types of grants may have a higher funding rate, such as the SME support grants (75%), coordination and support actions (100%) or grant for financial support (100% for the consortium).

[40] European Commission: Directorate-General for Research and Innovation, Viscido, S., Lotito, A. and Boekholt, P., Horizon Europe and the digital & industrial transition – Interim evaluation support study – Final report ('Phase 2' study), Viscido, S.(editor), Lotito, A.(editor) and Boekholt, P.(editor), Publications Office of the European Union, 2024, https://data.europa.eu/doi/10.2777/845650

[41] Including EUR 17m of unknown company size, here counted as SME. Please also note that this is not necessarily private co-funding, as some companies receive support through national or regional support programmes. Hence, this is to be interpreted as 'co-funding through private actors' rather than 'co-funding from private actors'.

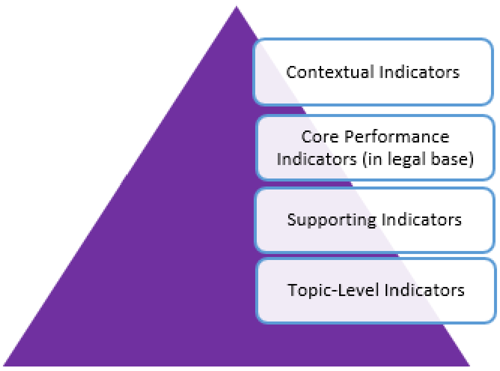
[42] Based on additional funding at national, regional or local levels exceeding the existing co-funding arrangements (and considering the risk of double counting), including internal investments in follow-up projects.

Investment Fund, EUR 83.63 million has been committed to support strategic digital technologies and EUR 67 million for investments in semiconductor technologies. These equity investments are expected to mobilise 14.77 times the amount committed, facilitating access to finance for key companies across Europe[43]

3.2. Monitoring and performance strategy

In early 2024, CNECT published a comprehensive monitoring and evaluation framework describing in detail different types of indicators (see Annex X):

Figure 3. Indicator Framework



- **14 core performance indicators** from the Digital Europe Regulation covering SO1 to SO5;
- **9 indicators in the Chips Regulation** relevant for SO6, added to the programme in September 2023 after the adoption of the Chips Act;
- **10 additional performance indicators** for the programme's midterm and *ex post* evaluations that were added after the first year of implementation.

6 contextual indicators provide relevant insight into Europe's digital performance and progress towards the high-level digital policy goals.

4. Evaluation findings

4.1. To what extent was the intervention successful and why? An analysis of the effectiveness and efficiency of the programme

4.1.1. Achievements per Specific Objective

In the past years, the Digital Europe programme has launched a wide range of activities to boost the digital transformation in Europe and has already reached numerous key milestones. Due to the late adoption of the legal basis and the application of some provisions for the first time in an EU funding programme (e.g. security-related restrictions on third-country participation), its implementation was initially delayed but has since accelerated. Table 2 presents the main implementation of activities and outputs, as well as the first evidence of the outcomes achieved by Digital Europe by the end of 2024, in line with the intervention logic. Reference has also been made to the monitoring and supporting key performance indicators[44], which typically align with the materialisation of results at the beneficiary level, whereas the outcome level represents the end-user perspective. Digital Europe is on track or ahead of schedule with its main anticipated results in terms of activities and outputs (for more detail, see Annexes VIII and IX),

[43] Interim evaluation of the InvestEU Programme - European Commission.
[44] (* is behind schedule, ** is on track or ahead of milestones, *** if target fully achieved).

with the first benefits at outcome (end-user) level now emerging as the infrastructures are increasingly operational. As Digital Europe, as a new programme, introduced novel infrastructures, tools and services, the baseline for each indicator is zero with the exception of high-performance computing, as the EuroHPC JU had funded seven HPC systems before the launch of Digital Europe.

Table 2. Effectiveness of the Digital Europe programme per SO[45]

Specific Objective /Current committed budget	**Activities (funding, procurement, establishment of networks/hubs/centres).**	**Outputs (beneficiary level: availability of services through the networks/hubs/centres)**	**First evidence of outcomes (end-user level[46]: use of and benefits for end-users)**	**Expected Milestones/targets of indicators**
SO1: HPC EUR 598m	Acquisition and Upgrading of Infrastructure: - 19/21 HPC infrastructure procured**	Increased access to new/better HPC infrastructure - HPC upgrades carried out - First exascale HPC JUPITER - 33 National Competence Centres	Increased use of exascale and post-exascale: - First researchers use JUPITER - Too early to measure benefit for end-users - Over EUR 170 million co-invested by MS in HPC systems - .JEDI, the first module of JUPITER ranks top of Green500 list[47] - JETI, the second model of JUPITER ranks 18th in the TOP 500 list.[48] (2 EuroHPC JU systems funded in the previous MFF are in the top 10 of the fastest supercomputers in the world)	- 21 HPC systems by 2026 (baseline 7 HPC systems) - 100% usage of exascale supercomputers by 2027 - 10% of computing power of top 500 systems in EU by 2026
	High-impact deployments of HPC capabilities: - Destination Earth launched	- Two digital twins of the earth system launched - Destination Earth Service Platform with 20 services - Destination Earth Data Lake with 170 distinct data sets and 18 thematic areas - -25 Destination Earth use cases, including visualisation of urban heat, and monitoring of air pollutants[49] - 7 AI Factories[50]	- 1 936 users of Destination Earth (of which 194 private sector users) - Degree of benefit unknown so far	- 15 distinct categories or thematic areas from which data are made available to the DestinE user community by 2024 - 15 ready-to-use functions and applications available to users by 2024 - 25 DestinE use cases by 2024
SO2: AI, Cloud and Data EUR 598m	Co-investment in sites for testing and experimentation: - EUR 189.7 m co-invested***	World class testing facilities: - 4 AI TEFs - -TEF for edge AI are currently being set up	Deployment of AI due to Digital Europe - 311 users supported** (out of which 53 SMEs supported) - No data yet for uptake**	- EUR 180 million-co investment in TEFs by 2027 - 100 Cases for which organisations decide to integrate artificial intelligence in their product, processes or services by 2030 - 1 600 users of common European libraries or
	Support to the deployment of AI-based solutions in key sectors	- Common European data spaces in seven sectors	- 77 users supported to obtain high quality data in European health data space (mostly research organisations and hospitals)	

[45] by the end of 2024
[46] For a table with the number of end users see annex VII
[47] Green500 | TOP500
[48] Home - | TOP500, data in 2024, in 2025 Jupiter enters the list of the fastest supercomputers in the world at 4th place
[49] Use Cases Catalogue Archive - Destination Earth
[50] 6 further AI factories in February 2025

		- EU Cloud Marketplace launched - Simpl, the open-source middleware platform, deployed to operate data spaces - AI on demand platform launched	- 26 users to obtain verified cloud services**	interfaces to libraries of algorithms, European Data Spaces and TEFs by 2030
SO3: Cybersecurity and Trust EUR 526m	Building up advanced cybersecurity capabilities	- 27 National Cybersecurity Coordination Centres - 26 cybersecurity infrastructures procured (cross border and national CyberHubs)**	Better deployment of cybersecurity and trust solutions: - 90 user communities getting access to national and cross border Security Operation Centres**	- 165 cybersecurity infrastructure and/or tools deployed by 2027 - 400 Users and communities getting access to European cybersecurity facilities by 2028
	Deployment of advanced cybersecurity solutions	- 12 cybersecurity tools deployed **	- 13 user communities getting access to advanced tools**	
SO4: Advanced Digital Skills EUR 215m	Design and delivery of specialised education and training programmes	Available Training Programmes - 52 master's programmes - 530 short term courses Launch of Digital Jobs and Skills Platform Launch of Digital Skills and Jobs Coalition with over 15 000 stakeholders	People trained: more workers with better digital skills - 20 713 people trained**, perceived value 6.5k-14.4k per SME - 30,308 users of the Digital Skills Job Platform - Improved employment: no data collected in time	- 65 000 persons to receive training in advanced digital skills by 2027
	Promoting the inclusion of women in ICT	- Workshops and events to make girls interested in ICT related careers	- 33% of master's students are women. Too early to measure impact of activities to attract women	- N/A
SO5: Adoption and use of key digital technologies EUR 737m	Launch of European Digital Innovation Hubs	Availability of services: - 151 EDIHs offering Test before invest and other services.	Digital Transformation of European organisations: - 54 610 businesses and public sector organisations use EDIH services[51] - Over 29 000 services offered - Perceived value of EUR 8.0k-15.3k value per organisation - Over 5 700 events with more than 800 000 attendees reached	- 191 400 businesses and public sector entities that have used the European digital innovation hubs' services by 2027 - 19 140 Entities that have been supported by the European Digital Innovation Hubs showing a significant increase in their digital maturity by 2024
	Boosting the digital transformation of the public sector	Interoperability solutions - Interoperability Test Bed - Interoperable Europe Portal - EU Digital Identity Wallet Large-scale pilots: 4 pilots - European Blockchain Sandbox Live, 18 countries with production-grade EBSI nodes, 25 pilots**	- 12 576 participants trained through Interoperable Europe Academy - More than 1 million individuals reached on Interoperable Europe Portal offering more than 2 900 reusable interoperable solutions. - Around 360 public and private organisations piloting 11 use-cases for the EU Digital Identity Wallet - 406 organisations supported on blockchain implementation (EBSI pilots and sandbox)*** - Over 240 000 distinct data validations and 16 000 conformance test sessions via Interoperability Testbed (in 2024)[52]	- take-up of digital public services by 2029 (210 projects reusing eTranslation by 2027, 41 projects reusing eDelivery by 2026, 90 projects reusing the interoperability testbed by 2027, 27 Member States connect to the OOTS by 2026, 28 countries enabled to exchange the new digital identity credentials by 2024, full completion of digitalisation of justice and eLab by 2027)

[51] Out of which 15 062 SMEs and 1 727 public organisations (registered organisations), the remaining is an estimation of organisations participating in networking events (38 700).

[52] Research and reports | Better Internet for Kids

	Setting up centres, IT systems and platforms for a Safer Internet	- 25 Network of Safer Internet Centres Live - EDMO Live (14 hubs)	- 65 million citizens reached by Safer Internet Centres, together with the BIK portal (2023-2024) and 60 million reached in 2021-2022 - 390.8 thousand website visitors to EDMO	n/a
SO6: Semiconductors EUR 264m	Enhancing existing and developing new pilot lines	Availability of Pilot lines, centres, investment: - Chips Fund Launched	Strengthened capabilities in the semiconductor sector: - Too early to measure results	- The number of users or user communities seeking, or obtaining, access to design capacities and pilot lines under the Initiative[53]. - The total amount co-invested by the private sector in design capacities and pilot lines under the Initiative[54]
	Building engineering capacities	Preparation of Design Platform	Expected to go live in 2025, too early to measure results	- The number of design tools developed or integrated[55]
	Setting up competence centres	- European Network of 27 Chips Competence Centres launched	Too early to measure results	-The number of businesses, which have used the services of national competence centres[56].

SO1 focused on the acquisition and upgrading of the HPC infrastructure, and on facilitating high-impact deployments of HPC capabilities. In terms of infrastructure, 19[57] out of a total of 30 planned procurements (by 2029) have taken place, meeting the set milestone. Among these is **JUPITER, the first European exascale computer**, which has been fully installed by European companies and ranks among the most powerful supercomputers in the world[58]. By the end of 2024, JUPITER had already been made available to some research labs for experimental use, but its full computational power is expected to be deployed by 2025, substantially increasing the number of its users. It is also a pioneer in energy efficiency, with its first module, JEDI, ranked as the most energy efficient supercomputer in the world[59]. Given the rapid rate of digitalisation, efficient computing has become increasingly essential. JUPITER uses a highly efficient hot water-cooling system, which requires much less energy than traditional air cooling while allowing the generated heat to be re-used, for instance, for heating the buildings on the Jülich campus.

[53] The pilot lines and the Design Platform are still being set up, their grant agreements being prepared, and therefore they do not have any users yet.
[54] Private investment is expected once the pilot lines are operational and for several future Work programme topics on design capacities.
[55] The Chips Joint Undertaking Work programme 2025 includes call for the development of open-source EDA tools, results are expected in 2027.
[56] The Competence Centres are still being set up, their grant agreements being prepared, and therefore they do not have any users.
[57] First exascale supercomputer Jupiter in Germany, second exascale supercomputer Alice Recoque in France, one precursor-to-exascale supercomputer in Spain, two mid-range supercomputers in Sweden and Greece, an upgrade of 1 petascale in Bulgaria and 1 precursor-to-exascale in Italy, six quantum computers in the Netherlands, Luxembourg, Spain, Germany, Czechia and France.
[58] TOP500 List - June 2025 | TOP500
[59] European Exascale Supercomputer JUPITER Sets New Energy Efficiency Standards with #1 Ranking in GREEN500 - EuroHPC JU

In total, 33 National Competence Centres[60] have been launched to bridge the existing HPC skills gaps while promoting cooperation across Europe. These centres are the first entry point at national level across Member States for SMEs, other organisations and researchers to receive support and access to HPC resources in their native language. There were also activities to help the EU's SMEs make the best use of advanced HPC services.

There have been two main activity lines to facilitate high-impact deployments. The first are the AI Factories, seven[61] of which were selected in 2024[62] to offer start-ups and researchers cutting-edge AI-optimised infrastructure and related services (training new AI models, programming and training facilities, access to large national data spaces, etc.).

The second is the Destination Earth initiative that has launched two digital twins of the Earth system, and related services, such as a platform[63] of 20 services (advanced 3D rendering technologies), and 170 distinct data sets on the data lake[64]. The Destination Earth system can produce climate simulations with a resolution of up to five kilometres, compared to previous resolutions of between a few tens and one hundred kilometres. So far, 1 936 researchers have used these services. The EU funded supercomputers LUMI, Leonardo, MareNostrum 5 and MeluXina have been **instrumental to the modelling** of Destination Earth's digital twins.

Box 1. Success Story: Destination Earth

Due to climate change, weather-induced extreme events are becoming more frequent and intense, posing an increased risk to society. Digital Europe has invested over EUR 300 million into Destination Earth, which has developed digital models of the earth of groundbreaking accuracy, which are revolutionising the simulation and monitoring of natural phenomena, hazards, and related human activities thanks to unprecedented resolution and interactivity. It is possible for users to timely use forecast and data to predict and simulate extreme weather and climate events provoking environmental disasters. This is essential to help save lives, protect property, infrastructure and reduce socio-economic impact. Destination Earth also supports Europe in its role as a global leader in adapting to and mitigating the impact of climate change. Destination Earth contributes to key EU initiatives, such as EU Adaptation Strategy[65], the related European Climate Resilience and Risk Management to help Member States prevent and prepare for the growing impacts of climate change, and the EU Mission on adaptation to climate change supporting over 150 European regions and communities.

Overall, SO1 investments have been effective in creating more competitive HPC capacity for the EU. The new supercomputers funded by the programme support a wide range of European end-users, spanning from the scientific community to industry and the public sector, thereby fostering research and innovation. These efforts contributed to developing a world-leading, secure, and interconnected supercomputing ecosystem, broadening HPC usage, and cultivating essential skills for European science and industry. While the main user base has primarily been research organisations, the recently launched AI Factories and competence centers will also target AI start-ups and SMEs, as well as organisations from the public sector. They will thus bring in more public and private sector use cases and benefits[66], which will be important for

[60] EuroHPC – Our Supercomputers
[61] An additional set of six AI Factories were selected in January 2025 and another six AI factories in October 2025 (AI Factories | Shaping Europe's digital future).
[62] Further 6 were selected in February 2025
[63] DestinE Platform – Your gateway to a sustainable future
[64] DestinationEarth DataLake
[65] EUR-Lex - 52021DC0082 - EN - EUR-Lex
[66] Interim evaluation of the European High Performance Computing Joint Undertaking

these investments to contribute effectively to the overall objectives of Digital Europe (competitiveness and resilience).

Box 2. Example of project supporting HPC adoption in EU SMEs and start-ups

Through the Fortissimo FFplus project, SMEs are developing unique products, innovative business opportunities and becoming more competitive by using European high-end HPC services. The project supported the uptake of HPC by SMEs to address specific business challenges and the adoption of large scale HPC resources for the development of generative AI models.

SO2 aims to support the uptake of AI, Cloud and Data opportunities in the public and private sector. As in SO1, there is a dual focus on building key infrastructures as well as on concrete deployment acceleration. In terms of infrastructures, four AI Testing and Experimentation Facilities (TEFs) have been set up. These facilities provide large-scale, real-world environments to test and refine AI models, ensuring that they are validated, optimised, and prepared for deployment. The existing TEFs operate in the areas of health, manufacturing, smart cities (including transport and mobility), agriculture and energy[67]. The Agrifood TEF, for instance, offers more than 200 AI services[68] that can help develop, test and roll out AI and robotic products. So far, more than 311 users in total have been supported by TEFs. While no systematic data is available yet on the benefits obtained by these users, an example is provided in Box 2. As an example of deployment acceleration, the OpenEuroLLM project [69] will foster AI adoption by developing a high-performing, open-source European large language model, covering all official EU languages and freely available to European industry.

Box 3. A French SME that delivers AI based radiology solutions received support from TEF-Health[70]

Median Technologies is a medium-sized French SME with around 250 employees that combines medical images and AI to provide innovative solutions to increase the accuracy of diagnosis and treatment of cancers, while also contributing to the emergence of new therapies for patients. Median Technologies were looking to test out the quality of their AI/ML-based solutions and improve the robustness of their processes in compliance with the increasing level of requirements of the European Regulation on AI systems (AI Act).

The service provided by TEF-Health partner LNE consisted of an assessment of the process used by the SME to develop and evaluate their AI data-based systems. The TEF assessed the documentation describing the process, such as conception documents, the risk analysis matrix or the evaluation plan. This first review allowed LNE to identify parts of the process where information was lacking. This has helped the SME to progress towards the certification of their AI systems.

Source: Testing and Experimentation Facility for Health AI and Robotics. Success story – First Service delivered by TEF-Health to an SME 2024: Link

In addition, Common European Data Spaces have been deployed in seven areas/sectors (cultural heritage, health, language, mobility, media, manufacturing and smart communities), while data spaces for energy, tourism, skills, agriculture, and one to support the Green Deal are still in development. The data spaces enable trustworthy data transactions between participants and allow data users to create innovate products, and services or to develop AI tools. They were set up in line with EU rules and values, personal data and consumer protection. The first 77

[67] Sectorial AI Testing and Experimentation Facilities under the Digital Europe programme | Shaping Europe's digital future
[68] Catalogue of Services
[69] Open Euro LLM
[70] Source: Testing and Experimentation Facility for Health AI and Robotics. Success story – First Service delivered by TEF-Health to an SME. 2024. Link

academic, public and private user communities have benefited from the European Health Data Space.

Box 4. Success story – Health Data Space

The European Federation for Cancer Images project[71] is part of Europe's Beating Cancer Plan to prevent and cure cancer. It deploys a pan-European digital infrastructure for cancer-related images and related clinical data. It has made available a public catalogue of 46 medical imaging datasets (including 200 000 images of around 20 000 patients) for nine cancer types for the development of AI-based solutions shaping the future of cancer diagnosis and treatment. The project feeds directly into the European Health Data Space (EHDS) regulatory framework by promoting the secondary use of health data for research, innovation, policymaking, and regulatory activities in cancer. Specifically, it provides data holders with the necessary functional, operational, and legal support to enable secure, controlled, and legally compliant access to data, in line with the EHDS regulation[72].

Simpl[73], an open-source middleware platform, has been developed by the Commission with an overall budget of EUR 156 million to support the technical implementation of the data spaces and other data initiatives. The first version of Simpl middleware was made available to data spaces in late 2024. Beyond data spaces, Simpl will also underpin the technical functions of EuroCloud, the emerging European public sector cloud federation, allowing Member States to share their computing infrastructure with each other.

By the end of 2024, 26 companies offered cloud services on the EU Cloud Marketplace (DOME project)[74]. The AI on Demand Platform (AIoD), a central toolbox for AI innovation, set up to empower start-ups, SMEs, and public services with trusted AI tools, expertise, and market-ready solutions. By connecting developers with AI assets, testing capabilities, and Europe's AI ecosystem through the **business navigator**, the platform accelerates the deployment of secure, sovereign and trustworthy AI. The platform therefore plays/will play a central role in the implementation of the AI Continent Action Plan.

Overall, SO2 has managed to effectively implement the planned activities and outputs and is on track with its milestones. With the infrastructure now starting to be in place (with further roll-out expected in 2025), the first end-users have started to see benefits. The final extent of the benefits to users and the direct effect on these users (e.g. increased productivity) will start to become visible in the next few years.

SO3 is focused on building advanced cybersecurity capabilities, as well as the deployment of advanced cybersecurity solutions. In terms of capabilities, 27 NCCs have been set up, 26 cybersecurity infrastructures successfully procured (CyberHubs), including two cross-border CyberHubs, in line with the targets. Stakeholders of the NCCs indicated that the most tangible benefits gained so far from EU activities in cybersecurity include the standardisation of practices, enhanced cybersecurity and improved cross-border collaboration. By the end of 2024, 90 organisations had gained access to these facilities, although none have been helped yet to strengthen their preparedness (first milestone planned for next year). In terms of the deployment of solutions, 12 cybersecurity tools have been deployed in line with the targets, with 13 user communities in the health sector getting access to these tools (including seven SME

[71] EUCAIM | EIBIR
[72] Regulation - EU - 2025/327 - EN - EUR-Lex
[73] Simpl: Cloud-to-edge federations empowering EU data spaces | Shaping Europe's digital future
[74] DOME Marketplace

communities). Benefits for these participants include support to improve their cybersecurity procurement practices, skills and staff awareness, while also developing key services such as infrastructure and application vulnerability scanning, phishing mitigation services, DDoS mitigator, among others. Overall, investments under SO3 have been effective in setting up the planned infrastructures, with the first benefits already generated for end users.

SO4 focuses on the design and delivery of advanced education and training programmes, as well as promoting the inclusion of women in ICT. The activities include specialised education programmes, job placements, short term training courses, skills in semiconductors, the cybersecurity skills academy and activities to boost digital skills in young people, in particular girls. In terms of outputs, it has developed 52 master's programmes and 530 short courses, launched the Digital Jobs and Skills Platform (DJSP) and the Digital Skills and Jobs Coalition with over 15 000 participating stakeholders. By the end of 2024, 20 713 people had been trained (ahead of milestones), and an additional 30 308 people had used the DJSP.

Box 5. Success Stories: training programmes in key digital areas

> The project ManagiDiTH[75] offers a free online joint master's programme preparing students for the digital transformation in the health sector. It teaches students data science and information system resources to improve processes and clinical approaches (over 180 students have enrolled so far). The diploma is issued by three universities in Portugal, Greece and Finland.
>
> The REBOOT skills project[76] offered 44 short courses to over 2 000 employees in the manufacturing industry. Examples include AI for managers, Internet of Things (IoT), in the manufacturing industry, cybersecurity for manufacturing, and basic programming skills.

The support study shows that individuals value these training activities (beyond user contributions) at EUR 650-1 000, with SMEs valuing these at EUR 6 500 – 14 400, showing that these courses do have a perceived value for users. In addition, specific events such as the EU Code Week have been organised to promote interest in ICT education and employment. No data are available yet on improved employment outcomes. To promote the inclusion of women in ICT, targeted workshops and events were organised. In the master's programmes, 33% of students were women, which is higher than the percentage of women currently employed in Europe's ICT sector, which stands at 20%. In addition, activities in SO4 have set up a wide ecosystem of more than 430 universities and training providers across Member States, paving the way for cross-border accreditation, industry cooperation and student and teacher mobility. Overall, the investments have been successful: the planned activities were carried out, the number of people that received training exceeds the target, and there is an indication that the courses are valued. However, an assessment of the actual benefits at (higher-order) outcome level cannot yet be made.

Box 6. EU Code Week

> The EU Code Week[77] encompassed over 70,000 activities relating to coding and algorithmic thinking in 2024. These attracted 2 million young participants from all over Europe, of which 48% were girls. The EU Code Week also provides teachers with ample training resources they can subsequently integrate into their lessons.

[75] ManagiDiTH – Master of Managing Digital Transformation in the Health Sector
[76] https://shorturl.at/esEOV
[77] Join EU Code Week – Learn, Create, & Have Fun with Coding

SO5 focuses on promoting the adoption and use of key digital technologies, with three main work strands: launching the European Digital Innovation Hubs (EDIHs), boosting interoperability and the digital transformation of the public sector, and setting up centres, IT systems and platforms for a safer internet. By the end of 2024, 151 EDIHs had been set up, offering test before investing and other services. The EDIHs have reached over 800 000 attendees through 5 794 events, delivering over 29 000 services to over 54 600 companies related to training (30%), networking (27%), technology testing (25%), and funding (17%). Users are positive about the level and quality of the services received and perceive the value of these services at EUR 8 000 – 15 300 per organisation. The number of end users is expected to increase rapidly as more EDIHs become active in offering their services. In 2023, the JRC developed a Digital Maturity Assessment Tool (DMAT), which was made available to companies via the EDIH network so that they could assess their own level of digitalisation independently. The DMAT reveals that firms' digitalisation processes follow a structured path, with digital business strategy driving development and human-centric digitalisation and data management becoming central at higher levels of maturity. The comparison of DMAT scores before and after EDIH activities reveals that **90% of firms showed an increase in their digital maturity**. This is particularly true for the levels of **AI adoption & automation,** which had the largest relative increase of 35%[78].

Box 7. Example of an end-user benefit

Established in 2022, the AI & Robotics Estonia (AIRE) EDIH has supported SMEs in the EU with their digital transformation and AI adoption. A good example of its impact is MindChip OÜ, a company that develops robotic vessels and situational awareness solutions to enhance the cost-effectiveness of the maritime industry. Their robotic vessels are five times cheaper than manned ships, require no onboard crew, and can operate continuously. MindChip OÜ faced the challenge of integrating AI systems for reliable detection of other ships and buoys to ensure safer navigation.

The EDIH worked with MindChip OÜ to develop an AI model trained on high-resolution imagery captured by four strategically placed cameras, integrated into the Robot Operating System (ROS). The system reliably detects small boats within a range of 100 to 150 metres. Consequently, MindChip OÜ has grown significantly in turnover (13-30%). Additionally, the EDIH helped MindChip OÜ to secure funding from other public sources and connect with other specialised EIDHs in other countries. MindChip OÜ is now collaborating with the Artificial Intelligence Centre Hamburg and the Northern Netherlands EDIH to develop similar robotic vessels.

Source: AI Algorithms and Sensor Integration for Robotic Vessels | European Digital Innovation Hubs Network

Several notable achievements have been made in supporting the digital transformation of the European public sector. Investments in interoperability, among others through the Interoperable Europe Portal helped to support 12 576 participants in the Interoperable Europe Academy[79] and disseminate more than 2 900 interoperability solutions on the Interoperable Europe Portal[80]. With the help of Interoperability Test Bed[81], an IT solution offering services and components for conformance testing and validation over 240 000 validations and 16 000 test sessions were conducted (in 2024). A Framework Partnership Agreement (FPA) - GovTech4all[82], was established, strengthening cross-border collaboration, supporting GovTech actors from the private sector and academia to innovate and experiment while enabling governments to develop

[78] European Digital Innovation Hubs Network's activities and customers / State of Play Report 2024 - JRC
[79] by the end of 2024
[80] In 2024, the Interoperable Europe Portal received more than 1 million visits
[81] Interoperability Test Bed | Interoperable Europe Portal
[82] GovTech4All | Interoperable Europe Portal

interoperable, citizen-centred digital public services. The European Blockchain Sandbox Initiative (EBSI) set up production-grade nodes in 18 countries, and pilots in 21 countries and across 10 sectors, such as mobility and education, which is ahead of the planned milestones. Over 400 public organisations have been supported with the design of applications for the issuance, storage, exchange, verification, traceability and property of data and information and a secure and stable network.

Other notable initiatives include the **EU Digital Identity Wallet**[83], with around 360 public and private organisations from 26 Member States as well as Ukraine, Iceland and Norway involved in testing the wallet across11 use-cases (including identification for government services and bank account opening, payments, mobile driving licence and electronic signatures). Over 230 consumer protection inspectors across the EU are benefiting from *eLab*, an IT tool helping to identify misleading discounts, fake reviews and other dark patterns. However, there are no data yet on the extent of benefits for end users arising from the support provided through these work strands.

In terms of creating a safer internet infrastructure and capabilities, the network of **Safer Internet Centres** (SICs) together with the Better Internet for Kids (BIK) Portal and the European Digital Media Observatory (EDMO) work to ensure a safe digital environment for children and to combat disinformation. The network of SICs[84] and the BIK portal continue to be successfully deployed, reaching over 125 million citizens[85]. Beyond the website, the SIC helplines offer advice and support to underage users and their caregivers, reaching 54 000 young people in 2024 alone. In the same year, the hotlines processed over 2.5 million child sexual abuse reports, of which 65% were found to be illegal and were subsequently taken down by national law enforcement agencies. The **European Digital Media Observatory,** with over 390 800 website visitors so far, has also helped to increase trust in digitalisation by monitoring the integrity of the information space. EDMO has started to actively monitor election campaigns such as those in Romania in 2024.

Overall, SO5 has been quite effective in setting up the required infrastructures to promote the adoption and uptake of digital technologies. The number of end-users reached in this SO is already sizeable and growing fast, with the first concrete benefits provided for end-users.

SO6 aims to strengthen the EU's semiconductor capabilities. Under this SO, state-of-the-art facilities to test, experiment, and validate leading-edge chip technologies and designs were set up. These pilot lines represent a EUR 3.7 billion investment and cover a wide variety of technologies from leading edge node chips to heterogeneous integration. Moreover, **27 competence centres**, one per Member State, were set-up to enhance technical expertise and develop a skilled workforce for the semiconductor sector. They will provide businesses, especially SMEs and start-ups, with essential resources to develop semiconductor solutions, including support, training, and access to large-scale infrastructure facilities, such as the pilot lines and the future design platform.

Box 8. Success story: Pilot Lines

Digital Europe supports the roll-out of pilot lines, or state-of-the-art facilities to test, experiment, and validate semiconductor technologies and design concepts. The FAMES - FD-SOI[86] (Fully Depleted Silicon On Insulator) Pilot Line is one such selected pilot line. Specifically, it will focus on improving FD-SOI technology,

[83] EU Digital Identity 3Home - EU Digital Identity Wallet -
[84] A European strategy for a better internet for kids (BIK+) | Shaping Europe's digital future
[85] cumulative figure for 2021-2024, Research and reports | Better Internet for Kids
[86] FD-SOI - FAMES Pilot Line

to create energy-efficient and high-performance semiconductors. This improvement will be achieved by adding sophisticated power management capabilities and enhancing the overall functionality of the chips. Such advancements will, for instance, enhance communication technologies with 5G/6G chips and advance the Internet of Things (IoT) through improved sensors and edge AI chips.

Finally, the Chips Fund was launched to provide financial support through equity and quasi-equity. In total, EUR 67 million has been committed by the end of 2024 to support 19 small organisations and start-ups. One example is Qualinx[87], a Dutch company specialised in tracking and connectivity solutions.

Box 9. Example of an SME supported by the Chips Fund[88]

An equity investment from Forward.One (a Dutch venture capital firm supported by the Chips Fund) enabled Qualinx to develop single-chip tracking solutions, which are universally applicable. Most tracking solutions have one chip for Bluetooth connectivity, another for satellites, another for radio etc. Compared to multi-chip solutions, this single-chip solution is smaller in size, has lower power consumption and is cheaper.

A specific legal instrument, the European Digital Infrastructure Consortia (EDICs), was introduced by the Digital Decade Policy Programme decision, to expand the array of tools to implement multi-country projects. EDICs are flexible and relatively quick to set up, they help pool resources between Member States and the EU. The first EDICs were set up in February (Alliance for Language Technologies EDIC: ALT-EDIC and the local digital twins towards the CitiVERSE EDIC: LDT EDIC) and May 2024 (EUROPEUM EDIC).

By the end of 2024, the Digital Europe programme had dedicated EUR 142 million in funding to actions for setting up, or taking into account the potential creation of EDICs, or to projects implemented by EDICs, for instance by the ALT-EDIC, or LDT EDIC). Efforts are underway for new EDICs to be set up in areas of cybersecurity skills or, digital commons, agrifood, or mobility and logistics data.

Across all SOs, beneficiaries have noted significant advantages in areas such as market positioning, networking and organisational development. For instance, 58% enhanced their institutional reputation, 55% strengthened strategic partnerships at EU and international levels, 53% gained access to new academic partners, 46% to new industry partners, 44% expanded their workforce, and 38% launched innovative products or services.

Box 10. Perceived benefits of the Digital Europe programme across SOs

SO1: Organisations have mainly benefited from new academic partners and deepening partnerships within the EU and beyond.

SO2: Benefits generated include the deepening of EU and international partnerships, improving reputation, and acquiring new technical knowledge or skills.

SO3: Many respondents have seen significant benefits across different types of organisations, such as deepening EU partnerships, improving reputation, and accessing new academic or industrial partners. However, there were fewer benefits in certain areas, such as developing new organisational processes and gaining a stronger international market position, notably for NGOs.

SO4: Beneficiaries reported deepened EU partnerships, improved reputation of their organisations, and new technical knowledge or skills. However, limited benefits were generated in strengthening international market positions and improving organisational processes.

SO5: The benefits generated included improved access to industrial and academic partners, enhanced reputation, and the development of technical skills and knowledge. Many beneficiaries, in particular public

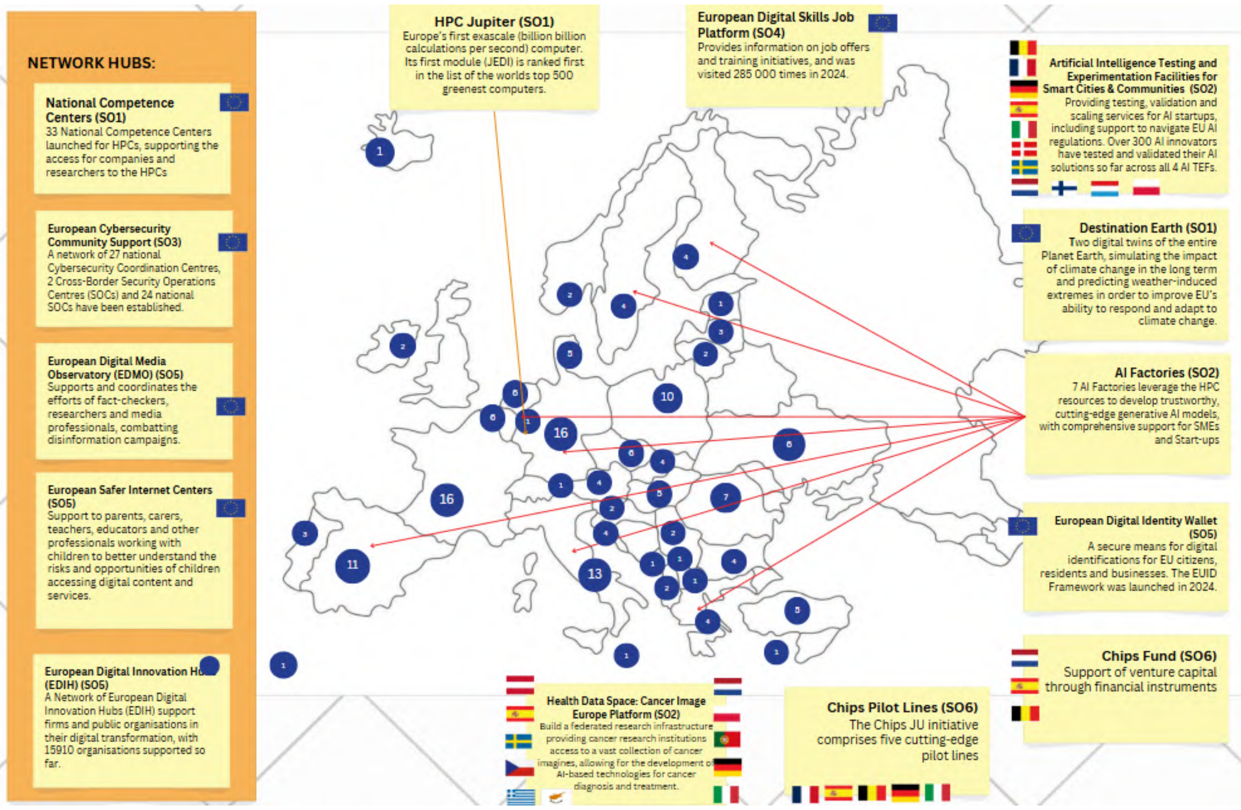
[87] Qualinx – High-Tech Fabless Semiconductor Company

[88] Success Stories - EIF InvestEU Update

bodies and private businesses also reported strong results in deepening EU partnerships and creating new products or services.

SO6: As the implementation has only recently started, only a few organisations have experienced benefits to date, primarily in areas like new partnerships and product development.

Figure 4. Flagship projects of Digital Europe defined by the European Commission and Member States



Source: Technopolis Group & Ramboll, 2025

The results achieved so far are already activating the pathways set out in the programme's intervention logic. With cutting-edge infrastructures now operational—ranging from high performance computing, AI testing environments and trusted data spaces to semiconductor facilities for industry to test, experiment and validate new breakthrough technologies — European public and private organisations are able to innovate more quickly[89], lower the costs by adopting advanced technologies[90], and reduce dependence on non-EU providers[91]. These effects are amplified by the programme's integrated approach, which combines technical capacity with skills development, interoperability frameworks, and secure digital environments, which ensures that new infrastructures are effectively used. As these capabilities become embedded across sectors, they strengthen Europe's collective innovation potential, help to create cross-border digital services, and build resilience against external dependencies, thereby

[89] For instance, 56% of organisations using the services of the EDIH, and 52% of beneficiaries reported increased innovation and productivity growth rates.

[90] For instance, 39.1% of EDIH users and 48.1% of beneficiaries reported lower costs due to digitalisation as result of participating in the programme.

[91] For instance, 16% of EDIH end-user and 41.7% of beneficiaries report decreased dependencies on non-EU providers.

moving the EU closer to the intended impact of greater competitiveness, security, and strategic autonomy.

4.1.2. Awareness and outreach

The EESC opinion on Digital Europe[92] that investigated the programme's implementation in Malta, Sweden, Germany, Poland, and Portugal, concluded that awareness is still low among stakeholders, and there is unequal access to information in Member States. For instance, German stakeholders, in general, assessed the programme more positively than Portuguese stakeholders. In the public consultation, new beneficiaries also cited lack of awareness as a major barrier to applying for funds (101/647 respondents).

Awareness is generally high among past recipients of EU funds, such as beneficiaries of Horizon Europe and CEF. Some flagship initiatives[93] are also well known amongst stakeholders, such as EDIHs, which play a crucial role in fostering engagement at regional and national levels. However, due to the program's novelty, there is sometimes a lack of understanding of its full scope.

Specific Digital Europe initiatives have been instrumental in expanding outreach and dissemination efforts, such as the **National Contact Points (NCPs)**[94], which at the end of 2024 already included 133 NCPs from all Member States and associated countries. These initiatives leverage networks with a place-based approach, engaging directly with SMEs within their local ecosystems. The network was set up in 2023 and has received EU funding only as of September 2024, which could be the main reason why surveys show low overall satisfaction with the NCP network[95], with a 42% satisfaction rate. With regards to the different **support services offered by the NCPs**, a large share of beneficiaries (40-55%) did not use or had limited knowledge of their services, highlighting that the NCP network needs strengthening. The Commission has consistently invested in building the NCPs' capacity through dedicated information sessions; therefore, wider outreach and high-quality services can be expected in the coming years.

In contrast to the NCPs, communication activities were rated positively with a satisfaction rate of 55-60% for the Digital Europe website, information events organised by the Commission, and the Q&A on the Funding and Tenders portal.

The study shows that **Financial Support to Third Parties** (FSTP) schemes could promote outreach to a wider range of beneficiaries and end-users but have only been incentivised to a limited extent under Digital Europe. Stakeholders suggested expanding its use in the next phase of the programme. The FSTP scheme is a mechanism to distribute public funding to assist beneficiaries, such as start-ups, scale-ups, SMEs and/or mid-caps, develop or adopt digital innovations.

[92] Evaluation of the Digital Europe programme | EESC
[93] Large scale initiatives key to the success of Digital Europe
[94] EU Funding & Tenders Portal
[95] Note that 10-20% of respondents had no opinion, while only 5-12% were dissatisfied.

Box 11. Examples of Digital Europe calls including FSTP

A few calls within Digital Europe 23-24 WP encourage the use of FSTP for broader outreach. Some examples:

- The **Common European Mobility Data Space** supports cross-border use cases in mobility and logistics data sharing, promoting interoperability and best practices, especially for innovative mobility services, data-driven transport planning and policy making.
- The **Networked local digital twins** allocates at least EUR €17 m via cascading grants to help cities develop and expand local digital twin services and AI-driven use cases.
- The **Alliance for Language Technologies** funds language data collection and the adaptation of large language models, particularly assisting SMEs to adopt and customise advanced language technologies.

Source: Technopolis Group & Ramboll, 2025

4.1.3. Barriers to participation

Interviews, surveys and focus groups, other evaluations of Digital Europe (in particular, the ones of the Fit for Future Platform and of the European Economic and Social Committee), feedback from HaDEA and regular consultations with the Digital Europe programme committee have provided crucial insights into the issues faced during the first phase of the implementation.

Barriers pertaining to certain SOs:

- **Security restrictions** as defined by Articles 12(5) and 12(6) are key to protecting the EU's security[96] require a heavy workload in the implementation, leading to delays and changes in grant agreements**.** The time-consuming nature of the approval of security guarantees was in particular highlighted in the opinion of the Fit for Future platform on Digital Europe[97], which suggested streamlining the approval of security guarantees between Digital Europe and Horizon Europe. Feedback from the Digital Europe programme committee of Member States representatives and the evaluation study[98] suggests that ownership control assessments constitute a high administrative burden for the applicants and in certain cases can lead partners to drop out of the consortia or delay the grant agreement signature process. Beneficiaries mentioned difficulties with regard to the declaration of ownership control, in particular for larger multinational companies and challenges with regard to receiving letters of support from Member States.

Barriers to participation across SOs:

- **Co-funding requirements:** the widely used 'simple grant', with a 50% co-financing rate, is an important tool to leverage digital funding from Member States and stakeholders across the EU but has presented a challenge for some types of stakeholders, such as public administrations, universities and SMEs. In addition, in some work

[96] Feedback from stakeholders indicates a tension between strategic autonomy and international collaboration. To stay competitive, the EU must act as a global hub for talent while protecting strategic sectors. Many stakeholders find the current safeguards justified, however, they also highlight the need for global collaboration.

[97] Fit for Future Platform opinion on Digital Europe programme

[98] The evaluation study highlights that only a few projects were concerned, but the impact on these has been medium to high. From the perspective of beneficiaries, in the small number (7%) of cases where there was an impact, around half of respondents reported a medium or large impact on their ability to engage long-standing partners (48%) or new partners (43%). Around a third indicated an impact on the resources required to prepare applications. Finally, the main issue raised by beneficiaries is the delays involved with getting the safeguarding measures (such as getting the support of Member States).

strands, for instance, the European Digital Media Observatory, the inclusion of big players to pool the private co-funding may jeopardise the neutrality of these organisations when monitoring compliance with codes of practice and legal obligations under the Digital Services Act.

- **The combination of national, regional, and European funds** presents legal complexities, including the need to comply with different rules, which creates uncertainty for stakeholders and hampers national co-investments.
- Member States and other stakeholders also highlighted the difficulties faced by applicants in the use of **cumulative funding**, i.e. leveraging funding from other funding programmes such as the ERDF or the RRF in combination with Digital Europe. The strict *ex ante* cost delineation requirement to implement a combination of funding between the RRF and other directly managed programmes has made it impossible to reconcile in practice with Digital Europe, where the beneficiaries receive a specific share of the eligible costs (cost-based approach). The complexities of combining Digital Europe funding with the ERDF are linked to the coordination with managing authorities and the application of different rules under the two programmes (e.g. on the submission of costs).
- **Timing and predictability:** The Fit for Future platform opinion and several Member States advocated for more predictability under the programme, in particular as regards the adoption and publication of new WPs and the opening of the calls.
- Predictability was also emphasised in the context of national co-funding mechanisms. Numerous stakeholders (EU-level policy stakeholders, beneficiaries) also highlighted **the lack of alignment of EU and national funding instruments** (different rules, timelines, etc.) making it challenging for applicants to navigate the different funding landscape leading to administrative burden and delays in project starts.

The Commission has already invested considerable efforts in addressing these challenges. To facilitate national co-funding, it has introduced the most favourable funding rates in the 2025-2027 WP to bring more clarity into the possible aid intensity by Member States on top of Digital Europe support. In addition, in order to further help applicants and national authorities understand the particularities of security restrictions, several outreach activities, training courses and workshops including, for instance, workshops for the programme committee, NCPs and appointed national security experts have been organised. Due to the very strict conditions required for having Digital Europe and RRF pay for the costs of the same project on a pro rata basis[99], combining Digital Europe and RRF funding will no longer be provided for. Though complex, combining Digital Europe and ERDF funding is possible. The Commission has been organising seminars for Member States and beneficiaries, and discussions with the managing authorities of the ERDF to make it easier to combine funding. The Strategic Technologies for Europe Platform (STEP) was set up by the Commission to facilitate access to funding across 11 EU programmes, for instance, through the STEP seal, a label for high-quality projects.

[99] Each programme pays parts of the costs of the project up to 100% of the eligible costs. This approach is deemed to be double funding by the European Court of Auditors. The pro rata approach has been allowed in a few cases which have remained exceptional.

4.2. Contribution to EU horizontal policy priorities

Several actions in the Digital Europe programme contribute to **climate change mitigation or adaptation**.

- The **Destination Earth** (DestinE) initiative provides a significant contribution by enabling the visualisation, monitoring and forecasting of indicators for climate risk assessment and adaptation.
- The **EU Energy Saving Reference Framework** will help conserve electricity when there are shortages of energy. It will help consumers and businesses to improve energy efficiency by, for example, recommending when to increase or decrease energy usage based on regional demand and usage patterns, and providing personalised guidance for eco-friendly consumption integrating data from smart meter.
- The **Green Deal Data Space** will offer access to a variety of data related to the environment and the EU's climate objectives, for instance, by providing detailed data on geospatial systems, soil and air pollution, energy supply and consumption.
- The **Agricultural Data Space** will enable the agriculture sector to transparently share and access data, thereby promoting its economic and environmental performance.
- Similarly, the **Energy Data Space** will provide access to data to foster the development of innovative energy services to optimise the electricity grids and improve energy efficiency.

Between 2021 and 2024, over EUR 360 million were committed for activities related to climate change mitigation or adaptation. A further EUR 96 million is estimated to be committed until end of 2027[100]. While these topics are expected to make a contribution, the full impact will only materialise once these activities are fully deployed and have reached a wider number of users in the course of the upcoming years.

As demonstrated by the study, stakeholders view the contribution to environmental benefits as relatively modest at the moment and highlight the importance of better linking sustainability and digital technologies[101].

In line with Article 7 of the Digital Europe Regulation, **gender balance** has been taken into account when designing actions to promote advanced digital skills under SO4 (Skills). The work programme 2023-2024 introduced two new actions of EUR 8 million in total whose main focus is to tackle the gender aspect in the ICT field by boosting the development of digital skills from an early age, in and investigating the reasons for the gender gap in ICT professions.

26% of participants in the different education and training opportunities were women. The share of women is higher in longer and more advanced training programmes: 33% of participants in master's programmes are women. Both of these shares are higher than the percentage of women currently employed in Europe in the ICT sector (20%).

To ensure that these programmes are accessible, financial support has been offered in the form of fee waivers and scholarships. By the end of 2024, 455 participants benefitted from financial support in 52 master's programmes, 39% of which were women.

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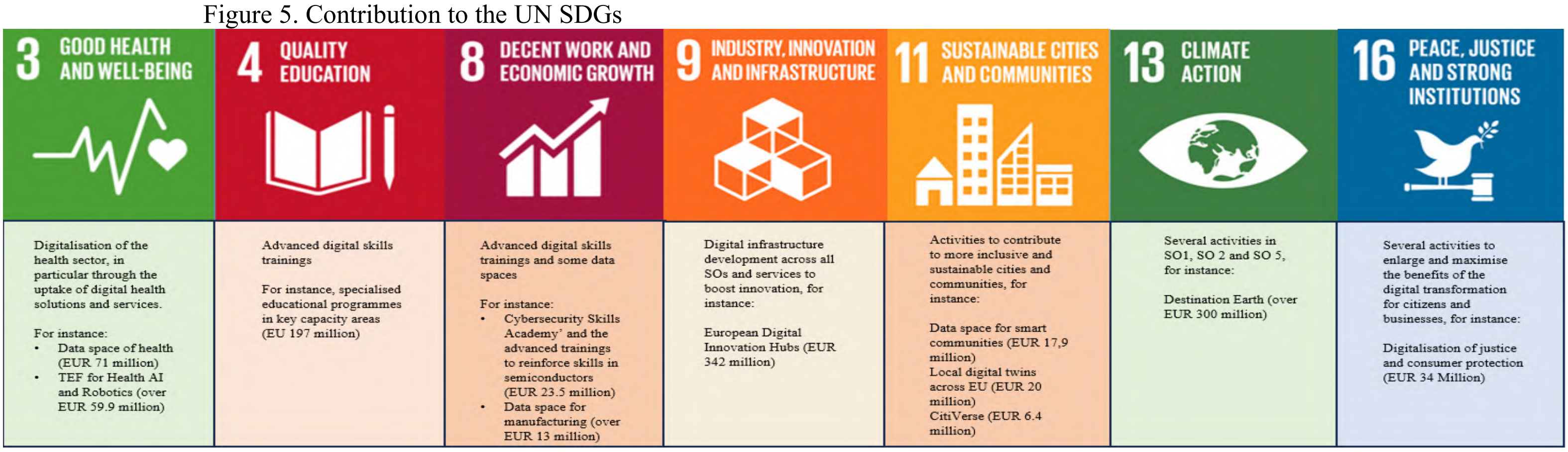
[100] Digital Europe Programme - Performance - European Commission

[101] The public consultation shows that all stakeholders underlined the potential of the programme to contribute to the green and digital transition, and 77% of the respondents believed that Digital Europe should in the future include sustainability and green transition.

The programme's contribution to the **UN Sustainable Development Goals** is consistently tracked on the basis of the Commission's KnowSDGs Platform[102]. SDG 9 (Industry, Innovation and Infrastructure) is by far the most relevant SDG, as most projects contribute to technology development, setting up digital infrastructures, promoting innovation and upgrading technological capabilities in the industrial sector. Other notable contributions include the contribution of SO4 to SDG 4 (Quality Education), specific activities to create more inclusive and sustainable cities contributing to SDG 11, the contribution of climate related activities, such as Destination Earth to SDG 13, and the digitalisation of justice and consumer protection is relevant for the SDG 16.

Figure 5. Contribution to the UN SDGs



4.3. Implementation modes

The implementation bodies and their responsibilities were described in Section 2.2. The study has shown that the choice of management modes was strategic, flexible and appropriate for the first phase of Digital Europe, and enabled all activities and outputs to be achieved in line with the milestones in a relatively short period of time. It also enabled the programme to operate across a large number of work strands that are highly heterogenous in terms of stakeholders involved, the nature of investments, funding methods and governance. This conclusion is also supported by the views of stakeholders. However, continued efforts are needed to mitigate some of the disadvantages of the relatively complex management structure.

The study also acknowledges the advantages of different management modes, for instance, the expertise and well-established processes of HaDEA and REA, or JUs' clear place in investments in infrastructure, where certain Member States have a higher willingness to invest. However, EU policy stakeholders highlighted throughout consultations the complexity of the arrangements of Digital Europe, which makes it difficult to have a complete overview of the programme.

The actions under Digital Europe cover a wide range of instruments. Simple grants represent the highest share among all the instruments with 41% of the total EU contribution distributed across all specific objectives. They are followed by procurements with a share of 24% distributed across all the SOs. Contribution agreements are used only in SO1, SO3 and SO5

[102] Home | KnowSDGs.

with a share of 13%. 6% of funds are allocated via SME support actions, 5% via coordination and support actions, 3% via financial instruments. Grants for procurements represent 3%, while grants for financial support to third parties and programme support actions represent 2% of Digital Europe funding. Lump sum grants have a share of only 1% and have been used only in SO4. implementing bodies perceive the preparation time of calls for grants (as opposed to other funding instruments) to be relatively fast, and there are standard communication, selection and management procedures already in place. Procurement is typically more costly, as detailed terms of reference need to be drawn up, at times with the use of specialist expertise, and continuous support is required throughout the implementation. The sustainability of these activities also needs to be ensured. For instance, while using procurement to a greater extent has allowed the Commission to quickly launch a number of (soft) infrastructures, the ownership of all project deliverables also creates expectations and exploitation duties for the future, for which currently no comprehensive sustainability strategy exists. Nevertheless, the most complex arrangements are joint procurements and contribution agreements, which require extensive negotiations and alignment.

Overall, stakeholders acknowledge that the Commission and the implementing bodies of the programme **have made significant progress in setting up processes, systems and governance** for managing the heterogeneous landscape of instruments.

4.4. Management of calls

The **overall success rate** for grants (see Table 3) was around one in two (49%), which is high compared with the overall rates for Horizon Europe (12.9-15%[103]). Digital Europe partly targets similar types of stakeholders as Horizon Europe, with similar grant processes in place. The success rate of Digital Europe is more comparable to smaller national schemes, such as the Dutch Eureka funding, which has a success rate of 45%. There is significant variation across SOs, with SO4 having a 26% and SO6 a 91% success rate. EU policy stakeholders indicate this as a sign of a well-targeted programme, as well as the relatively concentrated capabilities in some areas such as semiconductors. However, the relatively high rates may also signal limited visibility for some of the calls[104] and therefore possibly lower levels of competition than what might be desirable.

The success rates in financial terms, rather than application numbers, are even higher. The oversubscription rate based on the budget requested versus the budget granted is at 58%[105], meaning that the requested budget of eligible proposals is 158% of the budget of funded projects.

There is a slight variation between success rates per organisation type (see Annex VI), with SMEs being the least successful (51%) and large companies (61%) and public organisations being the most successful (65%). In total, 12.5% of the proposals were inadmissible due to low quality or missing information. Digital Europe projects are often large scale and complex, requiring highly specialist expertise which can limit the number of applicants.

[103] Evaluation support study on Horizon Europe's contribution to a resilient Europe
[104] Based on an internal HaDEA feedback to policy report.
[105] Oversubscription rate is calculated as the ratio between the EU contribution to successful proposals over the EU contribution requested by eligible proposals.

With regard to procurements, on average 3-6 proposals were received, with only a small number of requests receiving more than 7 proposals. The success rate indicates an overall appropriate balance of competitiveness and applicant burden for procured projects.

Table 3. Success rates per SO (grants)

SO	Successful Proposals (N)	Eligible Proposals (N)	Success Rate (N) (%)	Oversubscription Rate (EUR) (%)	Av EU Funding (EUR)
EDIH	147	320	46%	47%	2,128,835
SO1	9	12	75%	86%	9,609,421
SO2	68	158	43%	66%	8,324,022
SO3	171	318	54%	58%	2,820,751
SO4	45	176	26%	36%	4,123,017
SO5	86	118	73%	83%	1,737,319
SO6	32	35	91%	91%	3,999,662
Grand Total	**558**[106]	**1,137**	**49%**	**58%**	**3,424,265**

Source: Technopolis Group & Ramboll, 2025. Based on Digital Europe Dashboard Data (reference date 08/01/2025).

The **time-to-grant** (TTG) is calculated by subtracting the project signature date and the call deadline date. Digital Europe commits itself to a 9-month maximum TTG, which the Commission has reached for all SOs *on average*, with the only exception being a call to launch the EDIH in 2023 followed by a TTG of 11 months (341 days)[107]. Overall, EDIH and SO6 have the highest TTG of 9 months (272 and 271 days, respectively), while SO1 has the lowest TTG of 6 months (185 days). The TTG for the first EDIH calls was affected by the **complex co-funding situation** (new possibilities for the use of **synergy funds**) and the many issues and questions it raised, relating in particular to how funds with differing eligible cost rules could be successfully combined as well as questions on **State aid rules**[108]. Consequently, the share of calls that did not meet the TTG target was rather high at first (48% in 2022) but steadily decreased to 26% in 2024 following the resolution of these issues. In CEF[109], the average was 249 days and for Horizon Europe, 273 days in the first two years (with 41% within target). This shows that Digital Europe is performing as well as comparable programmes on this indicator. The related administrative costs are discussed in Section 4.5. In Terms of Time to Inform, the average ranged from 110.6 days in 2022, 93 days in 2023, to 99 days in 2024.

The level of **satisfaction of beneficiaries** varies across different aspects**Error! Reference source not found.**. The clarity of the scope and description of the calls for proposals/invitations

[106] The time period had more proposals than grants. These were the projects that had already been awarded but had not yet signed.

[107] EDIH call for associated countries requiring a longer contractualisation due to unfamiliarity of processes

[108] In the final policy event stakeholders mentioned among others the difficulties of applying 'de minimis' in cross-border initiatives, of assessing whether free services can be offered to companies, and of applying the appropriate GBER articles. For EDIHs, in particular, there was unclarity on how to determine the costs to include in aid calculation, and how to calculate the aid element for the services.

[109] Midterm evaluation of the Connecting Europe Facility (CEF)

for tender received the widest satisfaction (71% of respondents reported being satisfied or very satisfied). The clarity of rules of participation and eligibility criteria and clarity of application instructions and administrative requirements also scored well in terms of (high) satisfaction (66% and 64% respectively). The timing and scheduling of calls for proposals was also considered appropriate by 59% of respondents. The areas that attracted fewer positive responses relate to the proportionality of the effort required compared with funding levels with 29% being (very) dissatisfied with the funding rate available. Higher education institutes and research organisations were relatively more negative on these aspects compared to companies, as such organisations benefit from 100% funding rates in other programmes such as Horizon Europe. **Unsuccessful applicants** showed a similar pattern across the different process aspects, albeit about twice the share of respondents reported that they were dissatisfied about the proportionality between the effort and chances of securing funding compared with successful applicants (with 41% being (very) dissatisfied). Additionally, 29% of applicants were (very) dissatisfied with the clarity of feedback and evaluation compared with 9% of beneficiaries. More information regarding specific bottlenecks is provided in the section on cost-effectiveness (Section 4.5). There was only one procedural European Ombudsman complaint on Digital Europe (2023/1434), which was settled and not ruled on, highlighting an absence of substantial complaints on Digital Europe's processes.

Error! Reference source not found. Overall, most of the beneficiaries (58-70%) was satisfied w ith the administrative arrangements of Digital Europe, from reporting requirements to audit principles. In most cases, a minority (10-20%) was critical of the implementation arrangements. In terms of the clarity of the cost calculation rules, responses were more mixed. While 60% of respondents (strongly) agreed that the rules are clear, 18% (strongly) disagreed and 18% neither agreed nor disagreed. About 60% of beneficiaries felt that the project reporting requirements are reasonable in terms of effort and cost. The standard templates provided for project reporting were generally seen as helpful, with 58% of respondents (strongly) agreeing that they facilitate the reporting process. The user-friendliness of IT tools and resources received mixed reviews. While 50% of respondents (strongly) agreed that these tools are user-friendly, a significant proportion, 19%, expressed dissatisfaction.

4.5. Analysis of costs and benefits

To analyse the benefits and costs of the programme, the following different cost categories were factored in (detailed cost calculations[110] available in the Annex IV):

- funding amounts: a committed EU contribution of EUR 3.016 billion[111] (37,5% of total budget) between 2021 and 2024;
- administrative costs and expenses: EUR 41.7 million related to studies, IT tools, communication, meetings and experts;

[110] Note that cost effectiveness is carried out at programme-level, as administrative cost data at SO-level is not fully available

[111] Including grants, procurements, support actions, financial instruments and contribution agreements (actual commitments of implementing entities are considered and not commitments from DG CNECT to implementing entities, which can be committed by the implementing entities within a certain time frame)

- administrative staff costs[112] (preparation): estimated EUR 18.3 million related to policy strategy and programme preparation;
- administrative staff costs[113] (implementation): estimated EUR 93.9 million related to the implementation of the initiatives, contracting and performance monitoring, including the implementation of security restrictions and the drawing up of association agreements;

For applicants/beneficiaries

- extrapolated costs and expenditures for preparing an application for all successful and unsuccessful applicants (by the end of 2024): EUR 520 million;
- total co-funding amounts by beneficiaries of grants to complement the Digital Europe co-funding: EUR 1.41 billion.

In total, the administrative costs for the Commission and implementing bodies amount to 4.9% of the total programme costs. Annex IV presents the overview of total funding and administrative costs for Digital Europe between 2022 and 2024. It also shows the distribution of the administrative costs (HR costs) among the different implementing bodies, highlighting that HaDEA and the EuroHPC JU faced the highest implementation costs.

In terms of administrative costs for stakeholders, the analysis distinguishes between the application phase (borne by both successful and unsuccessful applicants), and the implementation phase for successful applicants. For the application phase, based on extrapolated results of the beneficiary survey[114], applicants spend between 1.86-2.5 person-months and around EUR 7,100 for additional expenses (e.g. consulting fees, travel) for each proposal, with coordinators spending between 3.12-3.85 person months and EUR 31 100 for additional expenses (see Annex IV, for more details)[115]. This compares to 0.6-1.2 person months for partners and 1.8-2.2 person months for coordinators in Horizon Europe. This suggests that Digital Europe is relatively burdensome in terms of application costs compared with Horizon Europe. This is also reflected in the beneficiary survey, where only 41% of the respondents feel that their efforts in the grant or procurement process are proportional with their chance of securing Digital Europe funding. It must be considered that Horizon Europe is a well-established programme, and applicants might invest less time due to their likely familiarity with the programme.

For the implementation phase, the analysis of costs and benefits also included an extrapolation of total management costs for beneficiaries[116]. This ranged from an average of 2.7-3.5 person months for partners to 9.4-10.4 person months for the coordinator. In total, this represents a sum of EUR 147 million to 184 million for the total project implementation period, representing a beneficiary-level overhead of between 7-9% of grant costs (see Annex IV for more calculation details). This is similar to the 6-10% for Horizon Europe[117]. However, given the lower funding rate compared with Horizon, beneficiaries see the administrative costs as relatively high.

[112] Costs related to EC staff and staff of all implementing bodies of Digital Europe
[113] Costs related to EC staff and staff of all implementing bodies of Digital Europe
[114] Limited to grants only.
[115] Note that preparation costs for tenders are not included, as the commercial logic of the market dictates that these costs are reflected on average in the tenderer's final price. Preparation costs for other types of instruments (contribution agreements, financial instruments) are covered by the staff expenses of the implementing bodies.
[116] As these costs are eligible project costs and therefore funded, they are not listed separately in the benefits and cost table.
[117] Evaluation support study on Horizon Europe's contribution to a resilient Europe, Section 6.6

Beneficiaries often seek additional EU, national, or regional funds to complement the 50% funding rate of Digital Europe, resulting in duplicated administrative effort.

4.5.1. Inefficiencies

While projects reported several unexpected positive outcomes, such as greater-than-anticipated demand for basic generative AI training, widespread interest in AI across business sectors, lucrative synergies with national and regional programmes or new partnerships, several inefficiencies were also reported. Based on interviews, open questions in surveys, as well as observations by HaDEA based on their direct experience managing Digital Europe grants[118], the following main implementation inefficiencies were identified.

- The **application process** itself was described as challenging due to the extensive administrative requirements by some applicants. A **small minority** (14%) highlighted the difficulty of navigating the Commission's IT tools. In particular the **EU Funding and Tenders Portal**[119] was described as user-unfriendly, by some respondents, such as first-time applicants and small organisations.
- The lack of **alignment between EU and national funding** led to considerable delays. Many organisations struggled to secure **national co-funding,** citing changes in rules, scope, and responsible authorities as significant obstacles. Several respondents reported long delays in **obtaining approval for national co-funding**, in rare cases up to 22 months. Furthermore, many respondents pointed to the need for **double reporting** – both to the European Commission and to national authorities.
- **Eligibility requirements**, such as covering at least some EU Member States, are sometimes perceived as too specific, requiring particular combinations of consortia, which takes time to form. This has led to lower submission rates (e.g. in SO4) or extensions of call deadlines (EU Digital Identity Wallet in SO5)[120].
- Stakeholders report uncertainty concerning the **funding rules linked to the SME status**, with some organisations assuming that SME status always results in higher funding rates, while this is only the case for specific SME support actions.
- Challenges in **working with partners** were frequently mentioned**. Large consortia** struggled to maintain consistent communication and governance and beneficiaries suggested limiting the size of project consortia. Furthermore, the need for more flexible rules for project teams (including subcontracting and the use of financial support to third parties) was voiced, as changes in consortia are often burdensome.
- Many organisations, particularly non-profit and research organisations, reported that the **7% indirect cost allocation** was insufficient to cover actual administrative and operational costs.

4.5.2. Simplification measures

[118] HaDEA (2024). Feedback to Policy Report 2024 Digital Europe programme
[119] EU Funding & Tenders Portal
[120] HaDEA (2024). Feedback to Policy Report 2024 Digital Europe programme

In terms of **simplification measures**, Digital Europe has implemented several simplification measures for grants. These include the use of **unit costs** for certain personal cost categories, a 7% flat-rate for indirect cost rate, as well as a single audit principle. More recently, **lump sum actions** were introduced. First launched in 2024, they represent only 1% of actions but are expected to increase in the future. These simplification measures were perceived by a substantial share of beneficiaries (43-54%) as being effective in reducing the burden.

The Commission is also introducing other types of simplification by providing better user experiences in the online applications environment (EU Funding and Tenders Portal). At this time no quantitative assessment can be made regarding the potential monetary benefits of these measures.

In terms of further suggestions for simplification[121], stakeholders argue that the use of unit costs and lump sum funding should be further extended in Digital Europe, and to investigate a further simplification of the safeguarding measures. Another important aspect of simplification would be to align and consolidate monitoring and reporting requirements with national funding schemes. Moreover, the increased use of digital tools, such as for budget preparation, application entry and real-time tracking of reports would reduce the administrative burden on beneficiaries.

Box 12 Stakeholder Feedback Digital Europe programme simplification

Application Process

- Use lump-sum funding with clearer reporting requirements and a one-page Lump-Sum Reporting Guide focused on deliverables (Beneficiaries)[122].
- Introduce voucher-based mechanisms as a way to lower entry barriers for SMEs, particularly in service-oriented projects (e.g. EDIHs). Vouchers would allow SMEs to access services or funding more flexibly, with reduced administrative overhead compared to full participation in large, complex consortia (Policy Workshop).
- Automate and digitise the process: budget auto-builder, application auto-fill, automated error checks, live report tracker, standardised forms, electronic signatures, and a fully digital application flow (Beneficiaries; Applicants).
- Adapt the Funding & Tenders Portal to the programme's specifics: reduce duplicate data entry and improve onboarding for newcomers (Policy workshop).
- Simplify applications and reviews: reduce the maximum number of pages in the application form and simplify the review process (Applicants).
- Make call texts more homogeneous and precise: define eligible activities and funding conditions consistently across calls (Policy workshop).
- Reassess 50% funding rate and indirect-cost rates (7% flat rate) to reflect real overheads—especially where national co-funding is not available (Policy workshop).
- Coordinate better between national and EU rules, especially regarding co-financing, and provide clearer guidance on co-funding opportunities; coordinate with national authorities to speed up Seal of Excellence follow-up (Beneficiaries; Applicants).
- Coordinate with Member States to identify and publicise the responsible ministry/authority for Digital Europe co-funding and their rules up-front (Policy workshop).
- Clarify Ownership Control Assessment (OCA) up-front: publish required documentation, eligibility criteria, and indicative timelines to reduce 2–3-month delays (Policy workshop).

[121] Question 21 of the beneficiaries' survey: Do you have any suggestions for how the administrative burden for applicants and participants could be further reduced (regarding application process, reporting requirements, cost calculation etc.)?

[122] Lump sum funding also represents challenges, for instance, SMEs may be discouraged from participating as payments are only made once (often lengthy) tasks are completed. It also tends to discourage the inclusion of newcomers, as -- if such partners fail to deliver on a task-- the entire payment is jeopardised. As a result, consortia are more inclined to work only with established partners.

Project management:

- Reduce the frequency and complexity of reporting with clearer guidelines and better use of standardised templates (Beneficiaries).
- Improve stability and usability of Sygma/Funding & Tenders during implementation; reduce data re-entry and ambiguity in instructions (Policy workshop).
- Enable data re-use between proposals, grant agreements, and reporting; add a live status/progress tracker to cut cycle time (Policy workshop).
- Allow more flexibility in amending grants and restructuring projects to adapt to fast-moving digital technologies (amendments are often lengthy); streamline processes and **keep the work programme flexible to respond quickly to new needs** (Beneficiaries; Focus Group SO1; Focus Group SO3).
- Apply proportionality to change management: fast-track minor administrative changes (e.g. vetted partner legal-name updates) without triggering full OCA (Policy workshop).
- Mitigate SME cash-flow exposure under lump-sum schedules by using shorter milestones and staged acceptance procedures (SMEs join at a later stage). Create agile structures that allow SMEs to exit or adjust roles without destabilising consortia. Use shorter tasks, milestones, hybrid models (lump sum + unit cost), and vouchers to lower risks and barriers for SMEs (Policy Workshop).
- Align EU and national reporting where feasible and align timelines (Policy workshop).
- Clearly articulate the distinct missions and impacts of HE (research) and Digital Europe (deployment). Develop joint calls or phased mechanisms that integrate both streams and simplify participation (Policy workshop).
- Strengthen NCP capacity and training to Horizon-like levels to improve early-stage support. (Policy workshop. NCPs should be equipped with specific training on Digital Europe's legal and financial aspects so they can provide more comprehensive support to beneficiaries during the project lifecycle (Beneficiaries).

Source: Technopolis Group & Ramboll, 2025

4.5.3. Cost effectiveness

Overall, the analysis (see relevant cost categories, including funding amounts, in Section 4.5) showed that the total cost of Digital Europe (including direct co-funding) in the evaluation period until the end of 2024 was EUR 4.9 billion[123]. In terms of benefits, only very few indicators could be monetised, limiting the comparison of costs and benefits at this stage[124]. Furthermore, Digital Europe is a relatively new programme, which has for now primarily focused on investments in new infrastructures, with use and deployment and related benefits being expected only in the years ahead. A strongly positive cost-effectiveness result can be expected if the medium to long-term technology productivity spillovers materialise, as assumed by the Rhomolo model. As such, a picture emerges of a programme that is delivering meaningful but limited early economic impacts with the potential to generate much greater value for users and the economy as a whole, which could be realised in the coming years as user engagement reaches scale.

4.6. Coherence

4.6.1. Coherence with the wider policy context

[123] Excluding the EUR 1.1billion budget committed by DG CNECT to implementing agencies, which has not yet been allocated to economic actors via grants or procurement.

[124] This includes EUR 115 million-222 million perceived values by the private sector, and EUR 6.4 million-13.3 million by public end-users. The JRCs Rhomolo GDP model shows a projected EUR 11-25 billion of cumulated GDP impact by 2030 with the most likely scenario amounting to 18 billion of cumulated GDP impact.

Digital Europe is embedded in the broader framework of the Digital Decade[125], contributing to the priorities set by the Digital Decade Policy Programme (DDPP)[126]. Key achievements of the programme[127] contribute directly to the four pillars of the DDPP, namely digital skills, digital transformation of business, secure and sustainable digital infrastructures and digitalisation of public services[128,129]. Additionally, Digital Europe contributes, for instance, to the EU's Digitalisation of Energy Action Plan[130], European Skills Agenda and the Digital Education Action Plan (2021–2027) and the EU's environmental sustainability objectives, such as those outlined in the European Green Deal, through projects like the Destination Earth initiative.

Digital Europe supports the **implementation of EU Regulations** adopted in recent years. The programme's actions support an array of regulatory measures aiming to eliminate barriers in several critical technological areas, for instance, to incentivise business-to-business and business-to-government data sharing across the EU (Data Governance Act, Data Act), the creation of a safer and fairer online environment for users and businesses (Digital Services Act, Digital Markets Act), the improvement of the level of security of network and information systems across the Union (NIS2 directive), and the application of cybersecurity standards safeguarding consumers and businesses buying software or hardware products with a digital component (Cyber Resilience Act). Furthermore, the programme strengthens public sector interoperability (Interoperable Europe Act) and ensures that AI in the EU is safe, respects fundamental rights and democracy (AI Act). Actions under SO5 contribute to the implementation of regulatory frameworks and to the **simplification and burden reduction agenda**, including the European Digital Identity Wallet, the Once Only System under the Single Digital Gateway Regulation, and Regulation (EU) 2022/850 of the European Parliament and Council, which establishes the e-CODEX system for the cross-border electronic exchange of data in judicial cooperation for civil and criminal matters. In SO6 the programme has been supporting the implementation of the Chips Act[131] through large-scale technological capacity building across the semiconductor value chain. The programme has contributed to the deployment of the Cybersecurity and Cyber Solidarity Acts through the development of Security Operation Centres/Cyber Hubs. It has facilitated compliance with the AI Act by advancing AI testing and experimentation facilities and by supporting an innovation accelerator, an EU database on stand-alone high-risk AI systems and innovation regulatory and testing mechanisms (regulatory sandboxes and Union testing facilities). The alignment of Digital Europe with, and support for, relevant EU Regulations was generally viewed positively, with 37.8% of beneficiaries indicating that the programme was fully coherent.

4.6.2. Internal coherence

[125] Europe's digital decade: 2030 targets | European Commission
[126] Decision - 2022/2481 - EN - EUR-Lex
[127] SWD (2024) 260 final, Digital Decade in 2024: Implementation & Perspective, July 2024
[128] The Digital Decade Framework. Available here.
[129] https://publications.jrc.ec.europa.eu/repository/handle/JRC134647
[130] COM/2022/552 final - Digitalising the energy system - EU action plan
[131] Regulation - 2023/1781 - EN - EUR-Lex

The study has shown that the programme demonstrates strong internal synergies and complementarities, both within individual work strands and specific objectives (SOs), and across different SOs. Several types of synergies by design were identified:

1. **Explicit links between initiatives** by design in the work programmes

   Links among work strands and SOs in the work programmes to promote synergies, for instance, among blockchain and EU Digital Identity Wallet, EDMO and Safer Internet Centres and EDMO and EDIH

2. **Sequencing of actions within a portfolio of projects** ensuring that technological deployment is supported by the necessary expertise and infrastructure

   For instance, in SO1, infrastructure acquisition and deployment were followed by the setting up of competence centres, the establishment of support services, continuous training initiatives, and recently the AI Factories. This phased approach ensures that technology deployment is accompanied by the necessary expertise and capacity-building efforts

3. **Technological integration across SOs, with synergies emerging as different digital technologies interact and strengthen one another**

   For instance, HPC as an essential building block for Destination Earth, which needs intensive use of high -performance computing to run highly complex simulations of the earth, the integration of the smart middleware into the data spaces to support data access and the interoperability and upgrade of HPC to include AI and AI Factories.

4. **Function of networks to foster bridges between technology blocks**

   For instance, the EDIHs have created cross-SO synergies, particularly with competence centres in SO1 (HPC), in SO3 (Cybersecurity), and in SO6 (Semiconductors). EDIHs also collaborate with TEFs and data spaces under SO2.

5. **Function of instruments to exploit synergies**

   Several coordination and support actions (CSA), such as the Data Space Support Centre ensure alignment and coordination among data spaces, set common requirements and establish best practices. The Testing and Experimentation facilities CSAs create synergies among all sectorial testing facilities and support the ecosystem’s sustainability connecting them to other relevant initiatives, such as the EDIH, data spaces, AI on demand platform, etc. In SO4, a CSA supports the roll-out of skills initiatives by gathering inputs on the existing education offers/gaps in digital areas and the related needs of the labour market. The digital transformation accelerator supports the synergies of the EDIHs with other relevant initiatives and the monitoring of their activities.

In addition, several **collaboration mechanisms** are in place to ensure coherence among actions implemented in direct and indirect management mode.

Direct management

The work programmes are coordinated and discussed by a dedicated senior management forum inside DG CNECT and with representatives of Member States in a dedicated (comitology) committee, the Digital Europe Programme Committee. Furthermore, coherence is ensured by means of cross-unit working groups (such as the Digital Europe Implementation Group (DEIG)), cross-DG working groups (such as collaborations with DG DIGIT, DG JUST and DG GROW to ensure strategic alignment of the work programme, with DG DIGIT on the interoperability work strand, with DG SANTE and DG RTD for health-related initiatives, or with several DGs and services, such as DG GROW, DG MOVE, DG AGRI, DG EAC, SCIC and DGT for sectorial data spaces). HaDEA also played a role in fostering synergies, acting as a coordinator and orchestrator to improve alignment. For example, in SO3 (Cybersecurity) and SO5 (in the context of the digitalisation of public administration work strand), HaDEA facilitated collaboration between projects addressing digital identity, security frameworks, and public sector digitalisation[132].

Indirect management

Indirect management modes foster specific types of synergies in Digital Europe by leveraging domain-specific capabilities and networks of specialised organisations, providing a more direct engagement with the relevant industrial, research and public sectors community. Specific coordination mechanisms ensure coherence within all Digital Europe work programmes, such as the participation of DG CNECT in working groups with the Joint Undertakings and ECCC, the representation of DG CNECT in the Governing Boards of the EuroHPC JU, Chips JU and the ECCC and in the InvestEU steering board[133].

Indirect management modes introduce a certain degree of complexity and fragmentation, and stakeholders have raised concerns about the challenges posed by the combination of direct and indirect management modes, when the same SOs are implemented under different structures. For example, while HaDEA manages the advanced digital skills component of SO3 and the Cybersecurity Skills Academy, the ECCC oversees other cybersecurity-related activities, leading to potential fragmentation. Similarly, the coordination of financial instruments under SO6 with the Chips JU remains limited, as InvestEU/EIF operate outside the standard governance framework of the Chips JU, making structured collaboration more challenging.

4.6.3. External coherence

Synergies with **Horizon and CEF Digital** are anchored into the **design of the work programmes** as shown in the overview of synergies between funding calls of Digital Europe and funding calls of Horizon and CEF Digital that support multi country projects (see Annex XI). Synergies by design are specifically evident in SO1 (HPC), SO2 (cloud to edge solutions,

[132] A concrete illustration of this approach is the EU Digital Identity Wallet pilots, where large-scale testing of use cases generated valuable feedback for the Architecture Reference Framework and the reference wallet implementation. Regular meetings coordinated by the European Commission, in cooperation with HaDEA, enabled projects to collectively tackle technical challenges and ensured the coherence of the portfolio

[133] DG CNECT collaborates with DG GROW, which is coordinating the implementation of the financial instruments, on a bilateral basis and under the framework of InvestEU governance structures.

data spaces, AI), SO5 (technologies/solutions to support circularity) and SO6 (semiconductors). For instance, all sectorial data spaces benefit from Horizon funded projects, that among others support digital technologies, methods, architectures and processes for safe, trustworthy, transparent, and environmentally sustainable collection, storage, and processing of data.

Box 13. Example of the synergies with Horizon 2020

- The EUCAIM (Europe Cancer Imaging) project funding under Digital Europe makes cancer imaging datasets available on a secure platform to boost the development and testing of new tools for diagnostics and treatment. The project builds on the outputs of several linked projects funded under Horizon 2020 in the '**AI for Health Imaging' (AI4HI) cluster**. These projects brought together over 80 institutions in 20 countries that develop Artificial Intelligence algorithms to detect cancer from imaging[134].

In addition, the Digital Europe work programmes clearly indicate possible complementarities with other actions and projects as well as key outcomes, networks or stakeholder communities supported under other initiatives.

In SO1 and SO6, these synergies are magnified by the governance structure of the programme. The EuroHPC JU draws funds from Digital Europe, Horizon Europe, and the Connecting Europe Facility (CEF-2), which have been exploited to be complementary and mutually reinforcing. For instance, the recently launched AI Factories[135] are funded by Digital Europe, which supports the acquisition and upgrade of AI specialised computational resources, and by Horizon Europe, which funds not only the set-up and operation of the AI Factories, but also the alignment of European and national initiatives in this area. The combined support from Digital Europe and Horizon Europe is expected to drive the growth of AI Factories, enabling the EU to become a leader in AI innovation. Similarly, the Chips JU pools resources from Horizon Europe and Digital Europe, ensuring the transfer of research to innovation platforms in semiconductors, such as pilot lines. This will enable European companies to prototype devices on cutting-edge semiconductor manufacturing processes.

In addition, several working groups have been set up to ensure coherence across funding schemes. For instance, the **Digital Europe programme Sherpa Group** gathers representatives from the relevant Commission services and HaDEA.

The study also showed that at European level, Digital Europe is seen as fully coherent with other EU funding instruments by 38.9% of respondents and about 30% of respondents indicated that it was at least partially coherent. It also shows that Digital Europe-funded infrastructures such as the EDIH, TEFs, data spaces, and pilot lines (for semiconductors) **play an important role in linking research outcomes with practical applications**. These initiatives facilitate collaboration across varying technology readiness levels and offer valuable feedback to researchers based on industry needs.

Box 14: Example of synergies between Digital Europe and Horizon Europe

The DEEP project series[136] is a prominent example, beginning with the initial DEEP and extending through DEEP-ER, DEEP-EST, and DEEP-SEA. Funded under Horizon, these projects contributed to innovative software components, such as 'software bricks', which enable dynamic modularity of applications on multi-partition systems. These components are being deployed in EuroHPC systems, including JUPITER at Jülich financed through Digital Europe. Similarly, there are synergies between R&I activities related to data spaces

[134] https://digital-strategy.ec.europa.eu/en/policies/cancer-imaging
[135] AI Factories | Shaping Europe's digital future.
[136] DEEP – DEEP-Projects

and data sharing under Horizon 2020 and Digital Europe and the sectorial data spaces deployed under Digital Europe.

Source: Technopolis Group & Ramboll, 2025

Digital Europe benefits from established networks, where beneficiaries have previously collaborated on other EU-funded initiatives or worked as consortium partners**.** There is substantial **overlap of** beneficiaries **between Digital Europe, Horizon Europe and Horizon 2020**, with 1 601 organisations (representing 46% of all unique Digital Europe grant beneficiaries) participating in both Digital Europe and Horizon Europe, and 1,763 (51%) participating in Digital Europe and Horizon 2020. The overlap of beneficiaries does not necessarily indicate the existence of synergies. A closer look into 130 Digital Europe projects, which shared beneficiaries with Horizon Europe, Horizon 2020, CEF or Erasmus+ and which had applications with links to these programmes, revealed that 40% of them indeed created concurrent or sequential synergies with one of these programmes. Similarly in the beneficiary survey, 41% (n=477) of respondents mentioned that their activities directly build on activities funded in other EU funding programmes. Respondents also indicated that previous collaboration had led to the use of the acquired knowledge in Digital Europe projects as well as the exchange of findings and best practices. Moreover, at proposal stage, 90% of respondents stated that they explicitly indicated how their project would foster synergies, and about 40% of the respondents to the targeted synergy survey communicated with the Commission or other authorities on ways to exploit synergies before the start of the project. This figure increases to 63% during the project implementation.

Digital Europe also has complementarities with **CEF Telecom[137] and CEF2 Digital,** as the latter supports the high capacity broadband and 5G corridors necessary to deploy digital services and technologies across the EU[138]. A cross-participation analysis indicates existent but more limited overlap of targeted stakeholders. Only 3% of all individual organisations that participate in Digital Europe participate also in CEF-funded projects. Some complementarities between activities can be observed between the programmes as, for instance, the first eight EDMO regional hubs (under SO5) and operations were initially funded and supported by the CEF before receiving Digital Europe funding.

Digital Europe also complements **Erasmus+** which supports education and training, and which has concrete synergies with SO4. **Cross-participation analysis shows an overlap of targeted stakeholder groups between Digital Europe and Erasmus+** with about 856 individual organisations (representing 25% of the individual Digital Europe beneficiaries) in common. Participants in the focus groups pointed to potential avenues for further collaboration by **exploring synergies with Erasmus+ Centres of Vocational Excellence (CoVE).** Many CoVEs are involved in digital projects, and combining these efforts through joint calls could increase the involvement of VET institutions in shaping Europe's digital future.

To avoid any potential overlaps that could exist with digital skills initiatives supported by Erasmus+ and other programmes, Digital Europe integrated more **specialised trainings** in specific areas of significant advanced skills gaps to increase competencies in cybersecurity and semiconductor technologies.

[137] Several projects funded under SO5 are the continuation of projects funded by CEF Telecom in the previous MFF.
[138] SWD (2024) 37 Final Performance and Evaluation Framework for Digital Europe

In the field of quantum communication, Digital Europe also has synergies with the **Secure Connectivity programme.** This programme is setting up an Infrastructure for Resilience, Interconnectivity and Security by Satellite (IRIS²), a multi-orbital constellation of 290 satellite providing ultra-fast and highly secure communication services. The first work programme of Digital Europe (WP 2021-2022) funded activities to build the foundation for a a fully functional and harmonised quantum communication infrastructure for the EU (EuroQCI).

4.6.4. RRF and ERDF

The RRF supports the digital transition as one of its main pillars. By the end of 2024, EUR 296.6 billion in RRF funding was disbursed as grants and loans[139]. The RRF Regulation requires that at least 20% of the total allocation support digital objectives. The reforms and investments proposed by Member States have exceeded the target, with around 25% of the total allocation of the plans contributing to the digital transformation. 21.37% of funding (EUR 64.1 bn EUR) supports the digital transition as a primary pillar, a further 4.04% (EUR 12.0 bn EUR) as a secondary pillar[140].

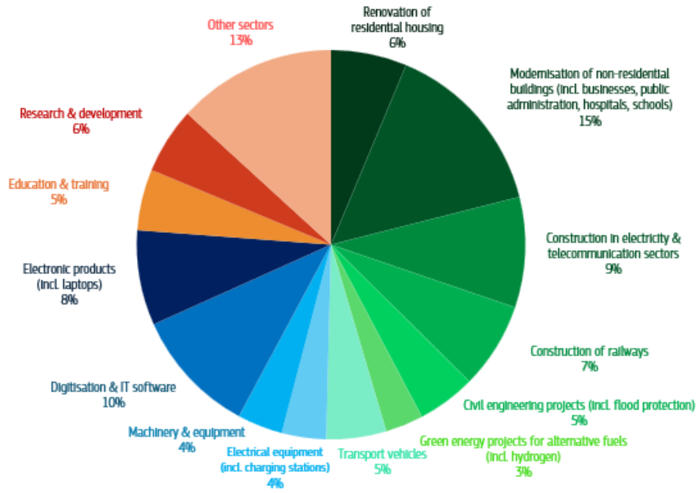
A mapping[141] of the distribution by economic activity of the reforms and investment measures of the RRF across the 27 Member States (taking into account EUR 655.5 billion, the RRF budget for the whole 2020-2026 implementation period) shows that the reforms target numerous sectors supporting the digital transformation. These include investments in IT software services (10% of overall investments), telecommunication infrastructure, electronic products, and electrical equipment. These sectorial distributions vary significantly among Member States with Germany, Greece and Matla investing higher amounts in digitalisation and IT software.

Figure 6: Overall Distribution of investment measures by key sectors, in % of total RRF budget

[139] Half-yearly report on the implementation of borrowing, debt management and related lending operations pursuant to Article 13 of Commission Implementing Decision C(2023)8010, 1 July to 31 December 2024.

[140] https://ec.europa.eu/economy_finance/recovery-and-resilience-scoreboard/index.html?lang=en, 'Share of RRF funds contributing to policy pillars', retrieved 20 August 2025

[141] Economic Impacts of the Recovery and Resilience Facility: New Insights at Sectoral Level and the Case of Germany - Economy and Finance



Source: Economic Impacts of the RRF: New Insights at Sectoral Level and the Case of Germany[142]

The RRF funding in the area of digitalisation has typically been used for specific, nationally oriented infrastructures and tools in areas such as e-health, e-government services, and connectivity roll-out, frequently at a smaller or medium scale, tailored to each Member State's context. The projects are generally focused on achieving immediate and medium-term national recovery objectives, modernising public services, and bridging domestic capability gaps. In contrast, Digital Europe takes a strategic, cross-border perspective, focusing on EU-wide infrastructures and capacities that require Member States to collaborate and pool resources. Digital Europe investments are designed to enable secure, interoperable, and globally competitive digital capabilities, funding specialised large-scale deployment projects such as high-performance computing, large-scale AI testing and experimentation facilities, cybersecurity networks, semiconductor pilot lines, and European data spaces. Unlike the RRF, which has a broader national and regional impact, Digital Europe specifically supports strategic sectors essential for technological sovereignty and competitiveness on the global stage while ensuring that the EU's essential security interests, strategic autonomy, and critical infrastructure are protected from threats, including technology leakage and control by non-EU entities.

There have also been instances where RRF and Digital Europe funding was combined. In these cases, the RRF supported individual national infrastructure or services, while Digital Europe set up a cross-border network as well as facilities to coordinate and monitor these infrastructures in the EU and beyond.

For example, RRF cumulative funding was received by the EDIHs (48 grants in 9 Member States), as well as other digital areas, such as TEFs (5 grants), the Network of National Coordination Centres (1 grant), and European Quantum Communication Infrastructure – EuroQCI (6 grants). Despite these synergies, the strict *ex-ante* cost delineation requirement to implement the combination of funding between RRF and other funding instruments has been challenging. Some of the projects above chose to combine funding from the two instruments

[142] Economic Impacts of the Recovery and Resilience Facility: New Insights at Sectoral Level and the Case of Germany - Economy and Finance

based on the pro-rata approach (included in the updated guidance on the recovery and resilience plans C/2024/4618).

From 2024 onwards, synergy funding of a given action between RRF and Digital Europe will not be supported anymore under the Digital Europe WP. This marks a shift where RRF and Digital Europe can no longer combine funding for specific actions, separating RRF's focus on broad digital transformation from Digital Europe's focus on EU-wide digital capabilities in strategic technologies.

Digital activities also have a strong presence in the Member States' national and regional Smart Specialisation Strategies (S3) that form the basis for support from the ERDF under SO1. In contrast to combination with RRF funding, Digital Europe funding can still be combined with the ERDF support. For example, due to the very strong regional dimension of the EDIHs, 8 Member States opted to co-fund in total 38 EDIHs using funds from ERDF, in some cases combined with national funds. Support for EDIH from the ERDF was also in line with the objectives of the ERDF programmes (such as competitiveness, uptake of digital technologies, or smart growth) for a number of Member States. Nevertheless, the implementation of this cumulative funding has been burdensome mostly due to differences between cost eligibility rules and complex coordination with the shared management side[143]. Challenges also arise from the perception among ERDF managing authorities **that co-funding with programmes like Digital Europe reduces their control over budgets of their respective programmes, creating resistance.** The Commission has been organising seminars for Member States and beneficiaries, and discussions with the managing authorities recently linked to STEP[144] to facilitate the combination of funding. One example of the simplification of procedures is the opportunity to directly fund projects awarded with a STEP seal without additional selection procedures.

4.6.5. A more systematic approach

As highlighted in stakeholder consultations, systematic synergies and development trajectories can only fully emerge through the development of a strategic vision across programmes. Better alignment and coordination between funding instruments, such as Digital Europe, Horizon Europe, and the Horizon Europe's European Innovation Council is necessary to ensure a seamless pathway of projects from research to deployment. In addition, beneficiaries highlighted the mismatch between the long duration of EU programming and the rapid pace of technological advancement when it comes to the uptake of digital applications and the scaling up of innovative solutions.

4.6.6. Coherence with national and regional initiatives

Some initiatives co-funded through the Digital Europe programme show **by design** a greater alignment with national and regional priorities and strategies. This is notably the case for

[143] Specificities of the relevant Member States operational programmes need to be understood and considered, coordination with the managing authorities and timing of the calls

[144] Strategic Technologies for Europe Platform - European Union (STEP)

EDIHs and Competence Centres, such as the European Cybersecurity Competence Centres and National Coordination Centres (SO3) which are being implemented at the Member State level and contribute to promoting alignment between European, national, and regional priorities. Extensive efforts are deployed in the set-up phase to draw up national roadmaps, ensuring that competence centres operate with a national mandate from their respective countries.

Several **structural specifications** support coherence with national initiatives. Besides the **Digital Europe programme Committee** composed of representatives of the Member States and Digital Europe associated countries, numerous other groups support the dialogue with national and regional stakeholders, for instance:

- the Destination Earth Coordination Group, which gathers representatives of Member States to discuss their needs regarding the implantation of Destination Earth;
- the European Alliance for Industrial Data, Edge and Cloud, which brings together businesses, Member States' representatives and relevant experts;
- the EuroQCI Sherpa Group, which represents the Member States' views on the implementation of EuroQCI;
- the 'AI and digitalisation of businesses' expert group, which monitors the level of digitalisation of businesses in Europe and decides how the network of EDIHs should develop to best meet the Digital Decade targets;
- the European Blockchain Partnership for investments in blockchain;
- the Interoperability expert group, which advises DG DIGIT on issues related to public sector interoperability;
- the eIDAS expert group, where representatives from the Member States and European Economic Area exchange good practices and initiatives in the area of electronic identification and trust services.

Furthermore, **networks and European partnerships** play a role in ensuring alignment between European, national and regional priorities. The tripartite nature of the JUs and the presence of representatives of participating states within the governing board of the JUs as well as during the elaboration of the Strategic Research and Innovation Agenda (SRIA) also contribute to ensuring that European initiatives are aligned with national priorities.

As part of SO3, organisations such as the (private) European Cyber Security Organisation (ECSO) foster partnerships between companies and regions. Nevertheless, the need for a comprehensive cybersecurity industrial roadmap to clarify Europe's strategic goals and align efforts across various cybersecurity initiatives was highlighted.

4.6.7. Co-funding mechanisms with Digital Europe

In practice, co-funding mechanisms for Digital Europe vary significantly among EU Member States (see Annex V). While some countries have structured frameworks in place to complement Digital Europe funding, others rely on ad hoc measures or do not have specific systems for Digital Europe support. In four countries, the **Netherlands, Denmark and Austria**

and Norway, there are established mechanisms specifically tailored to align with Digital Europe priorities, offering clear pathways for applicants to secure complementary national funding. These mechanisms often set priorities that are aligned with their national priorities. In contrast, numerous countries provide ad hoc support through ministries or existing programmes. For example, in Belgium, funding decisions are made on an ad hoc basis by ministries and agencies (e.g. for HPC projects and semiconductor related initiatives). Variation in co-funding availability at the national level underscores the differing levels of readiness among Member States to co-fund Digital Europe initiatives.

Box 15. Danish National Fund provides co-funding for Danish beneficiaries in Digital Europe

The Danish National Fund was set up in April 2024 as part of a national digitalisation strategy; The total budget amounts to DKK 30 million (EUR 4 million) in 2024-2025. It co-funds up to 25% of the total costs. It is possible to apply for co-funding for all Digital Europe calls, however in 2024 priority was given to projects in EU data spaces, cybersecurity and AI. The Danish Board of Business Development[145] co- finances EDIHs. A decentralised effort for business growth and development will ensure a more focused effort, e.g. by concentrating on the needs of the enterprises and the regional differences in order to increase business growth and development in Denmark. The Board also has the task of ensuring that the decentralised business initiatives are coherent across different sectors, states and municipalities.

Source: Digital National Fund

The targeted survey for beneficiaries showed that most respondents were not aware of the level of complementarity of Digital Europe with similar activities in their country. In addition, alignment between Digital Europe and national/regional strategies remains a key challenge.

Box 16. SO-specific differences in coherence

- SO1, SO2, SO5 and SO6 showed particular external coherence with Horizon and CEF Digital.
- SO4 through its focus on Digital Skills is by design highly cross-cutting and synergistic, but implementation of this synergy and avoiding overlaps of parallel skills initiatives in other SOs deserves attention.
- EDIHs (SO5) have substantial synergy with the ERDF.

4.7. How did the EU intervention make a difference and to whom?

EU added value is an intrinsic element of the programme as its actions aim to **improve digital competitiveness** and **boost strategic autonomy** across the EU. Digital Europe has demonstrated strong added value by supporting complex large-scale deployments that Member States could not bring about on their own, ensuring cooperation across Member States to tackle cross-border challenges and by offering comprehensive services across the EU through its networks. There are numerous examples of such investments.

- Investment in supercomputing has allowed the EU to become one of the top regions in the world in terms of available high-performance computing power. By collaborating across Member States, Europe has achieved pre-exascale and exascale systems much faster than individual Member States could have done independently. Further investments in quantum computing will enable a first European computer with quantum acceleration by 2025, paving the way for cutting edge quantum capabilities in the Union by 2030.
- Marking a significant step towards creating a robust AI ecosystem, the EU and Member States have invested around EUR 1.5 billion into seven **AI Factories** in 2024, which

[145] Danish Board of Business Development | Danmarks Erhvervsfremmebestyrelse

will offer access to AI-optimised high-performance computers, AI training, and technical expertise to promote cutting-edge research and applications in Europe.

- Digital Europe provides funding to mechanisms for coordination and investment across the EU. The above mentioned **European Digital Infrastructure Consortium (EDIC)** helps deploy joint infrastructure and deliver services by bringing together public entities, private entities, final users and industry. Through EDICs, Member States invest in scale in key digital issues of general and common interest and remove barriers for organisations to collaborate on solutions that require a large scale or that need to be cross-border.
- EDIHs are present in 90% of the European regions but cover 100% of the EU, bringing together public and private entities, including research organisations, universities, industry associations, regional development agencies, and private sector companies.
- TEFs offer their services to technology providers from across the EU to test at scale, improve solutions and bring them to the market, thereby increasing AI uptake in Europe.
- Access for public administrations across Europe to critical interoperability solutions, enables user-centric cross-border digital public services to be built.

The study examined EU added value via **financial, behavioural and output additionality**.

4.7.1. Financial additionality

Digital Europe most prominently provides **financial additionality** by addressing gaps in national funding. It pools and leverages resources at a scale that is neither readily available to Member States nor prioritised at the national level, particularly for cross-border initiatives and large-scale projects. This is particularly pertinent to the investments that were made to promote HPC capacities, the deployment of a quantum network, and the co-investment in EDIHs. By creating interlinked EDIHs, TEFs, HPC and quantum infrastructures, investments are centralised and scaled up to increase the EU's competitiveness vis-à-vis global leaders.

With regard to the financial instruments, the crowding-in effect, mobilising both public and private investment under InvestEU, also adds to this aspect. EUR 1 of the budgetary guarantee is able to mobilise 14.7 times of the investment made facilitating access to finance to key companies across Europe. The applicant survey shows that a large number of participants (65.5%) believe to a large or very large extent believe that Digital Europe provides financial means at a scale that is not provided by national and regional schemes. The public consultation supports this, with respondents indicating Digital Europe's greatest added value is due to the financing of projects that could not otherwise be supported at national or regional level[146].

Box 17. Case study on the combination of funding

> The dual-funding approach – combining EU and national contributions – is an effective way of pooling resources, enabling large-scale investments in strategic technologies and digital ecosystems that benefit all Member States. Investments such as in EuroHPC supercomputers and Chips pilot lines represent significant financial commitments that individual Member States would unlikely undertake independently. The dual-funding approach adds a strong European dimension, while ensuring that Member States can retain ownership over identifying infrastructure needs by acting as 'problem owners'. This allows Member States to adapt infrastructures to their ecosystems and provide services tailored to the specific demands of their industries,

[146] 43% rate these benefits as having high or very high EU added value, while 20% perceive medium added value, and only 8% see them as having low EU added value.

particularly benefiting SMEs and start-ups. At the same time, this model promotes broader access to European collaborations, enabling researchers and stakeholders across Europe to access these infrastructures.

Source: Technopolis Group & Ramboll, 2025

4.7.2. Behavioural additionality

The behavioural additionality[147] of Digital Europe is taking shape and is expected to increase as the programme's activities are implemented further.

EDICs are by definition focused on cross-border cooperation, as at least three Member States must submit an application to set up an EDIC. The EDICs also have a clear aim to coordinate funding, promote common standards and interoperability. Besides EDICs, several activities funded under the programme have cross-border collaboration as their primary objective. For instance, the Network of National Coordination Centres (NCCs) which is being built up with the aim of boosting research excellence and the competitiveness of the EU in the field of cybersecurity.

While **EDIHs** are designed first and foremost to serve the needs of customers in their region, having a regional specialisation, through their networking, it is hoped that customers with other needs can be supported by hubs in other regions and countries with the necessary expertise. However, hubs are unable to a large extent to provide services to customers in other countries as it is prohibited by national funding rules. Reflecting this, while those EDIHs that were interviewed value the potential for collaboration with hubs from other countries, current exchanges are relatively limited and mostly take place within the same country or with neighbouring regions. 21% of EDIHs' customers receive services from hubs located outside of the customers' region. Cross-border service delivery accounts for 2% of both services and customers[148]. In the future, EDIH projects from both EU Member States and associated countries that receive the **STEP seal** - under the Strategic Technologies for Europe Platform (STEP) – will be eligible to access EU cohesion funding, enabling strategic investments in critical technologies and value chains beyond EU borders, without additional selection procedures. The STEP seal's mechanism is specifically designed, among other aims, to **boost collaboration across frontiers**. Additionally, the focus group on the implementation of the EDIHs held during the EDIH annual summit in 2024 recommends adopting a **unified communication approach** at both national and EU level and fostering future collaboration with other AI-focused initiatives to enhance their AI services.

Joint Undertakings also play a significant role as network builders. They adopt a long-term structural approach to bring stakeholders together across the value chains, sectors and countries, going beyond what would be possible at the level of Member States. Joint Undertakings also provide a single legal and financial instrument to coordinate and pool resources from public and private actors in a specific field of technology or application in the EU, which can help shape entire ecosystems and value chains.

Box 18. Example of initiative supporting cross border collaboration

The **EU Digital Identity Wallet** is a good example of cross-border cooperation and pooling resources. Large-scale pilot projects have been launched across 11 important use cases (including identification for government

[147] The positive impact of Digital Europe on the behaviour of the supported organisations.

[148] JRC Publications Repository - European Digital Innovation Hubs Network's activities and customers.

services and bank account opening, payments, mobile driving licence and electronic signatures) involving over 360 public authorities and private entities. The EU Digital Identity Wallet aims to offer a universal, trustworthy and secure way for citizens to identify themselves when accessing public and private services, digital documents and have control over how their data is handled by both private and public organisations. Thus, cross-border interoperability and collaboration are required to ensure the smooth implementation of the EU Digital Identity Wallet. Digital Europe enables the pooling of resources for this purpose. For example, the EU Digital Identity Wallet (EWC) Consortium is a collective of stakeholders from across the EU, each contributing their unique strengths to driving the development and implementation of the EU Digital Identity Wallet.

In addition, **Safer Internet Centers (SICs)** and the **European Digital Media Observatory** ensure that the digital environment is safe for children and fight disinformation. Their hubs have been set up in a network spanning the whole EU providing their services to all citizens. SICs collaborate among one another but also with likeminded organisations around the world in a dedicated programme supporting capacity building and the exchange of ideas and resources.

In the field of interoperability, behavioural additionality has been in focus from the start, and interviewees highlight the added value of dealing with cross-border issues in a coordinated manner, harmonising and ensuring that solutions can be reused by Member States.

The case study on **technology infrastructures** highlights an existing example of behavioural additionality, namely the development of EU-level strategies in strategic sectors that ensure that the participation of major players while influencing smaller countries to prioritise the same objectives. **Larger Member States** and key industrial players, often with already existing strategies and infrastructure in place, align with European initiatives (e.g. Belgium IMEC's and Germany's Fraunhofer participation in the Chips for Europe Initiative), leverage legal frameworks such as the European Chips Act to strengthen their national goals. At the same time, **smaller Member States** are influenced by these European frameworks to make specific critical technologies a priority. For instance, in the context of the Chips Act, Croatian and Greek Competence Centres for Semiconductors were initiated by Croatia and Greece respectively in 2023, aligning their efforts with the EU's semiconductor targets[149]. Similarly, Czechia implemented the European Chips Act by setting up the Czech National Semiconductor Cluster, which has led to significant progress, such as producing 3 million wafers annually[150]. Malta, through Malta Enterprise, has set up a microchips competence centre to attract industry players and innovators in this strategic sector[151].

Furthermore, the stakeholder consultations (Annex V) showed that the programme has helped to boost cooperation among Member States, with over 60% of beneficiaries stating that Digital Europe **improves access to and cooperation with partners from other countries** across the EU and beyond to a large or very large extent. Similarly, over 60% affirm that Digital Europe supports the creation of **European ecosystems for digital technologies**. The same holds true for applicants (65.5% and 63.8% respectively).

A study on Digital Europe conducted on behalf of the Swedish Agency for Digital Government[152] has shown that the programme has demonstrated EU added value by enabling new activities that beneficiaries would not have carried out otherwise and by enabling initial

[149] DESI Report 2024 – Country Report Croatia.
[150] DESI Report 2024 – Country Report Czechia.
[151] DESI Report 2024 – Country Report Malta.
[152] Halvtidsutvärdering av det svenska deltagandet i Programmet för ett digitalt Europa.

data exchanges among countries. It also concluded that benefits are materialising at **system level** rather than at the level of beneficiaries, and that the programme is increasing the competitiveness and digital transformation of companies.

4.7.3. Output additionality

Since beneficiaries set up services, tools and infrastructure that benefit citizens and organisations across the EU, the benefits **widely transcend the organisations receiving funds from the Commission.** This **output additionality** is taking shape, but since in the first project phase beneficiaries have invested mainly in setting up and making large-scale infrastructures and services operational, or in designing new master's courses in key technological areas, the bulk of end users still needs to be reached in the upcoming years.

While participants have reported numerous benefits for their organisation (see Section 4.1.), the benefits of the activities of the programme are experienced primarily not at the level of the beneficiaries but by the organisations and individuals across the EU (and beyond), which are benefiting from the infrastructure, tools and services developed under the programme, such as the over 20 000 individuals taking part in one of the training courses designed within the programme to increase advanced ICT skills.

A survey for end users covering four work strands (EDIH, TEF, skills trainings and HPC) shows that 54% of end users (strongly) agree that the services they received are unique in terms of their scope/quality in the EU and moderately agree they are unique in their country (65%) compared with similar international, national or regional initiatives. Similarly, end users agree that services are more affordable (61%) or that services are more accessible (53%) than alternative options. EDIH users mirror these average numbers, while participants and students in Digital Europe-funded skills trainings and HPC end users are (much) more positive. For instance, around 47% of respondents strongly agree that the advanced digital skills training courses funded by Digital Europe are unique within the EU and 64% strongly agree they are more affordable than the alternatives.

Box 19: SO specific differences in EU added value

> Financial additionality is quite prominent in large-scale infrastructures, such as HPC (SO1), where individual MS would be slower in achieving results.
>
> EUDI, SICs and EDMO (SO5) are good examples of behavioural additionality, where cross-border cooperation is intrinsically performant. However, EDIHs (SO5) are still mostly focused on their own regional or national clients.

4.8. Is the intervention still relevant?

In the course of the implementation of the programme, the sociopolitical and technological landscape has undergone significant transformation, amplifying the criticality of economic security and technological sovereignty in addition to competitiveness.

The current context is shaped by three interwoven factors:

- post-COVID digital acceleration, which has embedded digital transformation into the fabric of economic and societal resilience;
- rising geopolitical tensions, including renewed warfare in Europe, shifting US-EU relations, and the weaponisation of dependencies in global supply chains;
- the emergence of generative AI, which has unlocked unprecedented technological capabilities but also introduced complex policy challenges, from ethical governance to workforce disruption.

In this new context, the imbalances highlighted in the 2021 Impact Assessment[153] have become more critical. Key areas like supercomputing, artificial intelligence, semiconductors, and cybersecurity are no longer optional priorities but existential imperatives for securing the EU's strategic autonomy.

The recent Generative AI and Large Language Model (GenAI/LLM) revolution has underscored the strategic importance of the digital infrastructure investments made by the EU's Digital Europe programme: Supercomputing, Cloud and Data spaces, and AI testing and experimentation facilities.

In addition, developing a collective cybersecurity resilience, capacity to anticipate, identify and react to increasingly more sophisticated cyberattacks has become essential to our future in the new geopolitical context.

However, the EU is still lagging behind. As highlighted in the Draghi report[154], the EU depends on foreign countries for over 80% of its digital products, services, infrastructures and intellectual property. While the US and China have been transitioning their economic models towards ICT since the early 2000s, Europe has not kept pace. The EU's share of the global ICT market, for instance, dropped by 11 percentage points (from 21.8% to 10.8%) between 2013 and 2023, while the US' global ICT market share increased from 26.8% to 38% over the same period[155].

The EU is significantly behind the US and China in terms of industrial investment in ICT research and development in both ICT software and hardware[156]. The US invests 12 times more than the EU in ICT software. The US also leads in terms of numbers of companies in ICT software, with 54.3% US companies, 22.7% of Chinese companies and only 8% of companies based in the EU[157].

As highlighted in the impact assessment **accompanying the proposal for a regulation of the European Competitiveness Fund (ECF)**[158]**,** the EU suffers from a '**financing and investment gap in the latter stages of innovation, development and scaling up of companies**[159] in strategic sectors essential for supporting the competitiveness of the EU economy, including the

[153] EUR-Lex - 52018SC0305 - EN - EUR-Lex
[154] The Draghi report on EU competitiveness
[155] Global market share of the ICT market from 2013 to 2024 | Statista.
[156] JRC Publications Repository - The 2024 EU Industrial R&D Investment Scoreboard
[157] JRC Publications Repository - The 2024 EU Industrial R&D Investment Scoreboard
[158] The EU Startup and Scaleup Strategy Choose Europe to start and scale: EUR-Lex - 52025SC0555 - EN - EUR-Lex.
[159] For example, pilot production lines for advanced chips.

'valley of death' scaling-up problem[160].' European start-ups frequently face two critical 'valleys of death.' The first arises when innovations cannot transition into marketable products, and the second, which is especially challenging in Europe, occurs when companies struggle to scale[161].

Europe has a flourishing early-stage start-up ecosystem with the number of founders starting companies even surpassing the US. In 2015, there were less than 8 000 early-stage tech companies in Europe, while in 2024, this number has more than quadrupled to 35 000+[162], highlighting a dynamic entrepreneurial landscape. However, this growth coexists with structural challenges. Complex regulations, bureaucratic hurdles, and a fragmented EU market continue to undermine Europe's attractiveness as a place to start and scale a tech company[163]. In the start-up phase, companies in the EU are slightly more likely to obtain funding than companies in the US. However, as companies acquire more capital, the investment gap widens drastically. US companies are twice as likely as their European counterparts to secure funding of USD 15 million or more[164]. This disparity is reflected in unicorn[165] numbers: Europe had 286 unicorns in 2024, compared with nearly 400 in China and over 1 600 in the US. Across Europe, there are also substantial disparities in the concentration of unicorns, with Germany, France, Sweden, and the Netherlands having the highest concentrations[166].

The EU's financial markets, marked by fragmentation coupled with a general risk-averse culture, continue to impede investment in sectors with high growth potential and innovation. Furthermore, the EU's precautionary approach based on *ex-ante* regulation may also hamper innovation. The Draghi report states that there are around 100 tech-focused laws and 270 regulators involved in digital networks. These put European companies at a disadvantage in a technology market driven by 'winner-takes-most dynamics'[167]. However, the EU's proactive stance on regulatory standards in emerging fields like AI and data governance presents a strategic opportunity. By harmonising rules and fostering globally recognized frameworks, the EU could position itself as a leader in shaping the future of technology, turning regulatory rigor into a competitive advantage rather than a constraint.

Another challenge to tackle is the growing dependence of the EU's digital future on consistent energy supply. Data centre electricity use is projected to nearly double to 945 terawatt-hours (TWh) by 2030, slightly exceeding Japan's current total electricity consumption, primarily driven by AI and rising demand for digital services[168]. Europe's elevated energy expenses

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160 The 'valley of death' is commonly known as a market failure. Here we refer to the 'second valley of death' where companies find it hard to obtain the required growth finance. Private investors are deterred by unproven ability to scale up rapidly and generate cash flow. The 'first valley of death' is associated with the pre-commercial development of a product, with still high technical risks and unproven ability to generate revenue. In both cases investments are seen as too risky by private investors, and are, therefore, often not funded.

161 The EU Startup and Scaleup Strategy Choose Europe to start and scale, COM(2025) 270 final.

162 State of European Tech 24: soet2024_report.pdf.

163 Ibid.

164 Ibid.

165 A privately owned start-up company, which has reached a valuation of USD 1 billion or more.

166 State of the Digital Decade 2025 report | Shaping Europe's digital future.

167 E.g. The Draghi report on EU competitiveness

168 Energy and AI – Analysis - IEA

impede expansion in specific digital sectors, increasing the costs of digital infrastructure investments and delaying the pace of digital transformation.

In addition, the rising complexity of the challenges we confront — such as criminal abuse of digital technologies, disinformation, cyberattacks, deepfakes, and manipulation through algorithms — underscores the urgent need for widespread digital literacy and a competent ICT workforce. Only slightly more than half of Europeans (55.6%) possess basic digital skills, which are critical for competitiveness and societal resilience against online threats, such as those targeting information integrity, mental health, and the safety of minors. The supply of ICT professionals with advanced expertise remains limited, exacerbated by a significant gender disparity[169].

Consequently, a 'transformative shift in investment landscape'[170] is required to meet the EU's digital objectives. For the next MFF, the investment gap in digital technologies has been estimated in the Draghi report at EUR 150 billion per year. The report emphasises that such a gap can only be addressed with a much higher leverage of private investment. This also raises the challenge of taking into consideration economic security and technological sovereignty challenges in more market-driven financing.

While digital technologies are key to unlocking the EU's competitiveness, digitalisation also presents potential systemic risks. These risks include the impact on the climate and the environment, the violations of citizens' and workers' rights and privacy, the protection of children, the impact of digitalisation on the physical and mental health, as well as a corrosion of a fair, well informed and unified society.

For instance, people's perspectives are increasingly shaped by personalised sources based on algorithms, which increases division and limit collective democratic debate[171].

With the EU's goal of becoming an AI continent and its planned investments to stay competitive in the global AI race, the demand for energy is growing rapidly, outpacing the advancement of sustainable energy systems along with robust grid capacity throughout the EU. This not only presents an obstacle for companies in scaling key digital technologies as mentioned above but this colossal electricity demand also comes at a steep cost for the environment.

The swift implementation of wireless, mobile, and advanced technologies — coupled with their expanding use in professional settings — calls for a more thorough investigation into workers' exposure to optical radiation and electromagnetic fields, as well as the potential health risks linked to the increasing power of such devices[172]. At the same time, it needs to be ensured that children and adolescents can use digital tools in a safe way and that negative impacts on mental health are mitigated.

In addition, new and comprehensive risks linked to data privacy need to be addressed. For instance, new advancements in neurotechnology, which process highly sensitive neural data - information from the brain and nervous system - pose significant threats to data privacy.

[169] 2025 State of the Digital Decade package | Shaping Europe's digital future
[170] State of the Digital Decade 2025 report | Shaping Europe's digital future
[171] Strategic Foresight Report 2025 - European Commission
[172] eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52021DC0323

To address these potential systemic risks, the EU needs to adopt leadership guided by ethics and scientific evidence in developing thoughtful, cautious strategies for emerging technologies with the goal of empowering people to harness technology to reach more autonomy, prosperity and control.

4.8.1. Alignment of the objectives with current and emerging needs

The six specific objectives of the Digital Europe programme remain well aligned with the challenges that emerged during this period and that continue to pose difficulties for the EU's digital transformation. The importance of investment in a **more competitive HPC ecosystem** remains relevant as the global supercomputer market is projected to grow at a compound annual rate of 7.5% between 2023 and 2030[173] and market turnover is expected to rise from USD 41 billion in 2020 to USD 66.5 billion by 2028[174], while the aggregate performance of European machines still remains below the US[175]. **HPC capacities are key for the establishment of the AI Factories and of the AI Gigafactories recently announced**, which will support the training and finetuning of advanced foundation models[176]. This is essential, as Europe's share of **cutting-edge AI resources** remains limited in comparison with the US and China with roughly 70% of foundational AI models since 2017 having been developed in the US[177]. In 2024, AI adoption in EU companies increased from 8.1% to 13.5%, yet remains far below the 2030 Digital Decade target of 75%. Large firms (41.2%) far outpace SMEs (12.6%) in AI use, reflecting a 29-point gap[178].

Access to cloud computing and big data is critical for training advanced models, yet Europe remains dependent on limited and expensive cloud computing resources. Several factors still hinder the EU's data economy, such as the availability of data for re-use (including for the development of AI systems), data interoperability or the imbalances in market power[179]. The Draghi report[180] highlights the untapped potential of health data as a main root cause for the competitiveness gap in the pharma sector. Digital Europe has been funding the deployment of European health data spaces to ensure secure exchange, use and reuse of health data to benefit patients, health professionals, researchers, regulators, and innovators.

Digital Europe's focus on **cybersecurity** through a dedicated SO remains highly relevant in the face of the increased cyber risks and threats stemming from recent geopolitical tensions, the emergence of new technologies, such as AI or quantum, the reliance of society on digital services and the dependence of essential services and infrastructures in the EU on ICT[181] and the reliance of the EU on foreign technologies. According to ENISA's analysis of cybersecurity incidents and cyber threats from 2023-2024, there is a significant cybersecurity threat in the

[173] Draghi M., The future of European Competitiveness, Part B, a competitiveness strategy for Europe, September 2024
[174] Europe's Quest for Technological Power. Available here.
[175] Top 500 – Development over time – continents performance share, available online
[176] Second wave of AI Factories set to drive EU-wide innovation
[177] Large AI Models for Germany – Feasibility study 2023
[178] 2025 State of the Digital Decade package | Shaping Europe's digital future
[179] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52020DC0066
[180] ec1409c1-d4b4-4882-8bdd-3519f86bbb92_en : (see part 2 p.191)
[181] Council Recommendation of 8 December 2022 on a Union-wide coordinated approach to strengthen the resilience of critical infrastructure (Text with EEA relevance) 2023/C 20/01

EU: cyberespionage campaigns, foreign information manipulation and interference (FIMI) in particular targeting elections and including disinformation with AI content, are persistent threats. Regarding cybercrime, ransomware remains the most relevant threat targeting SMEs more frequently recently[182].

Niinistö's recommendations push for elevating cybersecurity as a common EU priority, scaling up cyber workforce development[183].

The shortage of a skilled workforce[184] remains a barrier also for the widespread uptake of digital technologies. ICT job skill shortages have risen to 4% of total job posts over the past decade. Nearly 60% of EU companies report a lack of skills as a major investment barrier, and many struggle to recruit ICT specialists[185]. The support study found that besides investing in specialised courses for the long-term (e.g. master's programmes), there are acute digital skills shortages to be addressed (e.g. short courses). This suggests that the challenges on digital skills identified at the creation of the programme remain relevant and that **continued support for skilling, upskilling and reskilling** the workforce will be of utmost importance.

To accelerate the best use of technologies, the uneven use and access to digital solutions by citizens and businesses remains to be addressed. The rapid recent technological developments and rising international tensions underscore the need for actions aimed to increase the confidence in the digital transformation in the EU. Disinformation campaigns and foreign interference threaten public trust and the integrity of democratic processes, often exacerbated by new technologies that enable the creation of increasingly convincing fake content that can be disseminated at scale.

Finally, the COVID-19 pandemic, recent trade tensions and geopolitical conflicts have exposed the EU's vulnerability in **semiconductors**[186]. In 2024, the EU's portion of global value chain revenues stood at 10.5%, remaining significantly below the 2030 target of 20%[187]. Continued investment in research, innovation, and capacity-building is needed to reduce Europe's dependency and secure the supply of semiconductors for the digital economy[188].

Overall, stakeholder consultations signalled that the **critical role of the six SOs in driving Europe's digital transformation and maintaining its global competitiveness** are recognised, with all objectives being either **very relevant or mostly relevant both for current and future needs**. This is particularly the case for SO 3 (cybersecurity) and SO4 (digital skills), which are perceived as very relevant across consultations. Beneficiaries also expect all SOs to be very relevant to their future needs with 73% of beneficiaries finding SO3 as very relevant, 72% rating SO2 as very relevant and 70% perceiving SO4 as highly relevant to their future needs.

4.8.2. Alignment with technological developments

[182] 2024 Report on the State of the Cybersecurity in the Union.pdf
[183] Digital Decade – EU Trajectories 2024. Available here
[184] Digital Decade – EU Trajectories 2024. Available here
[185] ICT specialists - statistics on hard-to-fill vacancies in enterprises - Statistics Explained - Eurostat
[186] European Chips Act - Questions and Answers, 30 Novembre 2023. You can access it here
[187] State of the Digital Decade 2025 report | Shaping Europe's digital future
[188] Ibid.

The strategic programming of Digital Europe ensured that the first work programme already laid the ground for the deployment of technologies that could later support emerging technological trends, for instance the development of smart middleware for a European cloud federation and data spaces or HPC systems that could support the development of AI[189]. The 2023-24 WP continued the actions started under the 2021-22 WP, but also introduced new actions, mainly in the field of AI, to follow the latest developments **aligning the programme with technological challenges of stakeholders**.

Digital Europe has facilitated the development and deployment of **AI technologies** by activities such as: (i) providing data resource to the AI community via the European Data Spaces; (ii) procuring new exascale supercomputers and making them accessible to the European research community and AI start-ups[190]; (iii) setting up TEFs for AI innovators to test and experiment state-of-the art AI solutions; and (iv) setting up EDIHs to further diffuse AI technologies across Europe. The EuroHPC JU also launched the AI Factories initiative[191] using its network of supercomputers to deliver computing capacity for AI and support a host of different services for the AI start-ups and the broader AI ecosystem in the training and large-scale development of AI models. The Commission also announced an expansion of this initiative through the creation of AI Gigafactories[192], which will specialise in training the most complex, very large, AI models. They will be the largest public-private partnership in the world for the development of trustworthy AI.

In alignment with the major technological developments during the period in question, Digital Europe funded actions supporting **skills development in emerging key technologies**, such as quantum, AI, semiconductors and cybersecurity and for the use of advanced digital technologies (e.g. AI in healthcare). By the end of 2024, the total EU contribution to SO4 under Digital Europe amounted to EUR 214 million or 7% of the total funding committed.

The rapid pace of technological development that characterised the period under evaluation has brought about an increase in the number and complexity of cyber threats. Digital Europe has invested in **strengthening the cybersecurity capabilities of the EU**, including improving the prevention, detection, analysis and response to cyber threats and incidents. A notable contribution is the EuroQCI initiative: a secure terrestrial and satellite quantum communication infrastructure spanning the whole EU. By the end of 2024, the total EU contribution to SO3 under Digital Europe amounted to EUR 512.7 million, or 17% of the total funding committed.

In terms of alignment with future technological developments, the study found that both beneficiaries and applicants placed **AI technologies** at the forefront, with 80% of beneficiaries and 78% of applicants identifying AI as a top priority. Advanced connectivity, navigation, and digital technologies emerged as significant for both groups (prioritised by 62% of beneficiaries and 66% of applicants), followed by robotics and autonomous systems (considered important by 45% of beneficiaries and 40% of applicants). This signals that while the programme is

[189] EuroHPC Multiannual Strategic Programme 2021-2027
[190] Commission opens access to EU supercomputers to speed up AI (europa.eu).
[191] EU boosts European AI developers with the AI Factories call for proposals | Shaping Europe's digital future (europa.eu).
[192] EU launches InvestAI initiative to mobilise EUR 200 billion of investment in artificial intelligence.

sufficiently aligned with technological developments on the short term, stakeholders would also like to see other priorities, such as robotics, emerge as a funding priority.

The preliminary findings of two other studies on the future investment needs in digital research and deployment[193] also stress the need for investments in technologies critical for resilience, such as:

- **AI, data, cybersecurity** (in particular in trustworthy and explainable AI, agentic AI, AI applications, for example, in smart healthcare, data driven public sector, data driven connected mobility and related cybersecurity solutions),
- **microelectronics** and **photonics** (in particular, 'More-than-Moore', RISC-V, Chiplet and modular architectures, 3D stacking and wafer-level packaging, advanced packaging and 3D integration and green electronics),
- the future deployment of **quantum technologies** (quantum key distribution),
- **the next generation internet,**
- **extended reality** (for simulation in science, training, education and digital twins),
- technologies for interoperability (for example, for secure cross-border data exchange), and
- **cross-technology deployment**, for example combining HPC, AI and quantum computing or Cloud-Edge-IoT, AI and data in automotive applications.

Stakeholders also emphasise that Digital Europe must reduce its reliance on non-European technologies to maximise its strategic benefits. They suggested further harnessing the full power of **open-source**, a public good that allows free use, modification, and redistribution of technologies, and activating the potential of the vibrant open-source community, which could enhance tech sovereignty and reduce reliance on third countries.

While highlighting the economic benefits of the programme, across consultations, stakeholders stress the importance of activities that contribute to the **green transition, addresses the environmental impact of advanced digital technologies and supports the optimisation of their energy efficiency**. EU citizens, companies, and NGOs also advocated for a **more accessible and inclusive** programme fostering citizen **trust** and enhancing **digital literacy.** In their views, prioritising inclusivity, ethical practices, accessibility and the twin transitions could increase Digital Europe's impact, and further consolidate its role as a key driver of Europe's digital future.

A conference on the future of digital investments in the EU organised in the context of the Danish presidency of the Council of the European Union[194] also stressed the importance of public procurements and concluded that future investments in digital deployment need to be more unified, which can be achieved by merging current programmes and applying simplified rules. The event's conclusions echoed the importance of increased private investment highlighted in the Draghi report and emphasised the role of public funding in de-risking private investments.

[193] To be published in Q1 2026
[194] Conference | The Future of Digital Investments in the EU, final report to be expected in October 2025

On 16 July 2025, the European Commission published its proposals for the next MFF. Several of the shortcomings identified in this evaluation were addressed in the design of the future European Competitiveness Fund[195]. One of the four policy windows of the ECF proposal (Digital Leadership)focuses on digital, from research to scale up and deployment. Digital activities will also be supported in different sectors through the other policy windows. The ECF proposal addresses the identified challenges by:

- simplifying the investment lifecycle: ensuring a seamless transition from research and innovation to manufacturing and large-scale deployment;
- enhancing adaptability: providing flexibility to respond to emerging priorities and evolving technological landscapes;
- mobilizing private capital: leveraging loans and equity instruments to attract private sector investment alongside public funds;
- streamlining governance: reducing administrative complexity through a unified rulebook and harmonised funding rules for applicants (e.g. for alternative, combined, and cumulative support).

Furthermore, to support the combination of funding, the ECF proposal permits actions that have received a contribution from another programme to also receive a contribution under ECF funds[196].

4.8.3. Adaptation of the programme with socio-economic and political developments and challenges

Since its design in 2019, the programme was shaped by a poly-crisis and shifting competitive dynamics, demonstrating the need for long-term capacity-building in digital technologies to enhance preparedness and economic recovery in the EU and to reduce dependencies in key digital sectors. Digital Europe adopted an approach that ensures the continuity, progressive development, and long-term viability of the funded actions, while also maintaining sufficient flexibility to address emerging needs. In response to the semiconductor supply shortage, which was intensified by the pandemic, the programme integrated a new objective (SO6) to promote leadership in semiconductor technologies, driven by the adoption of the Chips Act[197]. In addition, the increased cybersecurity threats resulting from Russia's aggression against Ukraine led to the introduction of the Cyber Emergency Mechanism to improve preparedness and response to large-scale incidents. An action was introduced to support the development of consumer applications addressing urgent needs in energy consumption (EU Energy Saving Reference Framework) in response to Russia's full-scale invasion of Ukraine and the accompanying increase in energy prices. In addition, new training initiatives were launched under the main 2023-24 WP to address skills shortages in cybersecurity, semiconductors and HPC.

In light of the intensifying global tensions, the measures introduced in the programme, namely Article 12(5) and 12(6) of the Digital Europe Regulation, remain relevant to safeguard the

[195] EUR-Lex - 52025PC0555 - EN - EUR-Lex
[196] Ibid.
[197] Regulation - 2023/1781 - EN - EUR-Lex

Union's digital security interests. The 2025-27 WP continued to apply participation restrictions to those actions that involved infrastructures with an impact on key sectors.

Digital Europe also incorporates socio-economic considerations in its design. Technologies deployed under digital, notably AI, are required to follow principles of human centricity, transparency and trustworthiness. Activities under SO5 specifically cover the application of digital technologies to increase accessibility, enhance safety (especially for children) or fight disinformation.

The review of online contributions in the context of the study showed that the efforts under Digital Europe to integrate energy-efficient technologies, ethical AI practices and digital accessibility were perceived to sufficiently address current and future societal challenges. Interviewed stakeholders generally acknowledged the programme's flexibility and alignment with emerging trends. At the same time, responses to the public consultation suggest that there is a still a strong demand (77% of respondents, mostly EU citizens, companies and NGOs) for the programme to further address additional areas, including socio-economic aspects such as digital inclusion and the green transition. This was underlined by the results of the applicant survey, emphasising the importance of addressing key societal challenges, such as digital inclusion, climate change, and health.

4.8.4. Alignment of Digital Europe with sector specific needs

Across all SOs, computer programming and consultancy and education emerged as key sectors (see Table 4). The strong presence of industries and the public sector, such as telecommunications and public administration, highlights Digital Europe's role in strengthening Europe's digital infrastructure and the uptake of digital solutions. The study found that SOs show distinct sectoral composition aligned with their focus, although the overall involvement of non-digital sectors is still limited, with the exception of education. SO2 and SO5 engage with a broader range of industries (e.g. manufacturing, construction, telecommunication, financial services, healthcare, cultural industries) illustrating the cross-cutting application of AI & data. SO1's sectorial composition reflects its focus on computational advancement more strongly, while SO3 focuses on sectors critical for digital infrastructure protection (e.g. telecommunication, public administration). SO4 relies mostly on the education sector, reinforcing its role in workforce development.

Table 4. Sectorial distribution of beneficiaries across the 6 SOs of Digital Europe

Sectors	SO1 (n=45)	SO2 (n=189)	SO3 (n=222)	SO4 (n=213)	SO5 (n=362)	SO6 (n=13)	Grand Total
A - Agriculture, forestry and fishing	0,0%	1,1%	0,0%	1,4%	1,9%	0,0%	1,2%
C - Manufacturing	0,0%	4,8%	1,4%	3,8%	4,4%	7,7%	3,5%
D - Electricity, gas, steam and air conditioning supply	0,0%	0,0%	1,4%	0,0%	0,8%	0,0%	1%
F - Construction	2,2%	1,1%	0,5%	1,4%	1,1%	0,0%	1,1%
H - Transporting and storage	0,0%	0,5%	1,8%	0,5%	1,1%	0,0%	1,0%
J.60 Programming and broadcasting activities	2,2%	0,0%	0,0%	0,0%	0,0%	0,0%	0%
J.61 Telecommunications	6,7%	1,6%	11,7%	0,5%	2,2%	0,0%	4%
J.62 Computer programming, consultancy and related activities	26,7%	16,4%	22,5%	8,5%	10,8%	15,4%	15%
J.63 Information service activities	11,1%	5,3%	8,1%	6,6%	5,5%	0,0%	6%
K - Financial and insurance activities	0,0%	1,1%	0,9%	0,5%	0,6%	0,0%	0,7%
M.70 Activities of head offices; management consultancy activities	0,0%	1,6%	0,9%	1,9%	2,8%	0,0%	2%
M.72 Scientific research and development	26,7%	23,3%	12,2%	15,0%	18,0%	30,8%	18%
M.74 Other professional, scientific and technical activities	4,4%	11,6%	5,0%	9,4%	13,0%	7,7%	10%
N - Administrative and support service activities	0,0%	3,7%	2,3%	7,0%	6,6%	0,0%	4,9%
O.84 Public administration and defence; compulsory social security	2,2%	2,6%	11,3%	0,9%	7,5%	7,7%	6%
P.85 Education	15,6%	7,9%	12,2%	34,7%	11,9%	23,1%	16%
Q - Human health and social work activities	0,0%	7,9%	4,5%	1,4%	3,9%	0,0%	4,0%
R - Arts, entertainment and recreation	0,0%	2,1%	0,0%	1,9%	0,8%	0,0%	1,1%
S - Other services activities	2,2%	4,2%	1,8%	3,8%	4,1%	0,0%	3,4%
Grand Total	100%	100%	100%	100%	100%	100%	100%

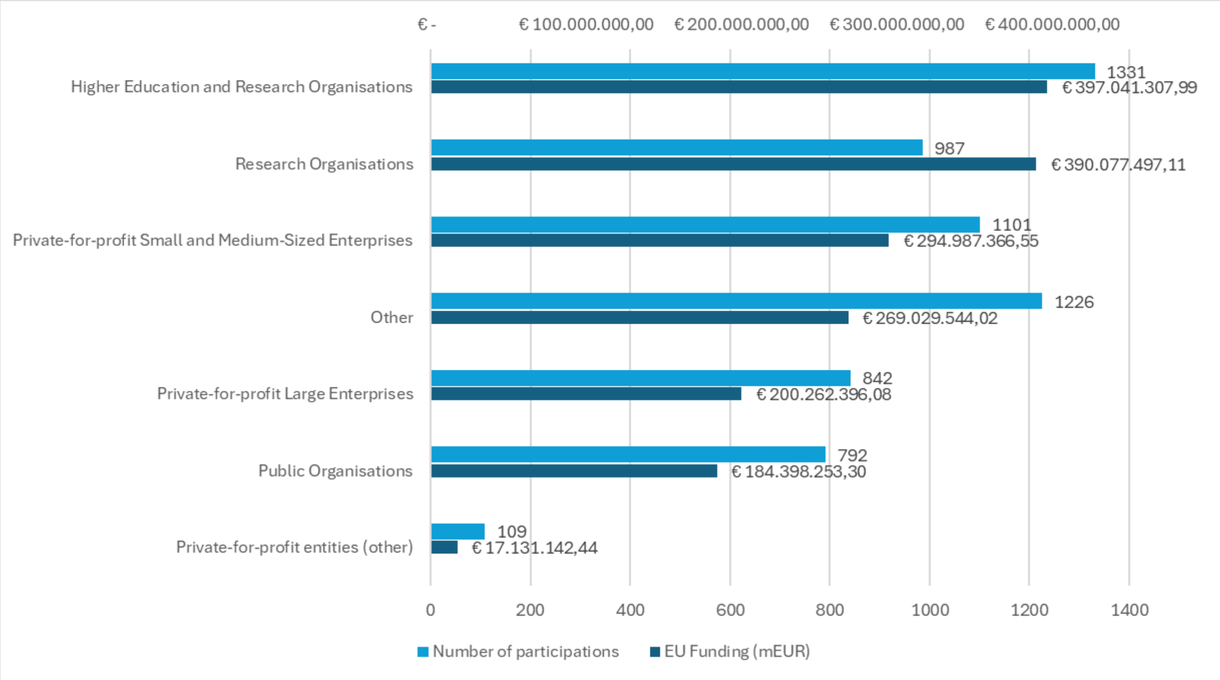
Source: Technopolis Group & Ramboll, 2025. Self-declared sectorial affiliation based on participant survey results (n=1044)

In addition to this analysis of beneficiary organisations' sectors, the study also mapped the main work strands of Digital Europe to the targeted sectors. The mapping shows that there is a **strong sectoral and application orientation** embedded into the **strategic programming**. It found that while a significant part of the programme has focused primarily on ICT sectors, specific attention has also been given to critical sectors of the economy (e.g. communication, energy) and broader application sectors (e.g. health & personalised medicine, manufacturing, agrifood, mobility) that are essential for the wider EU economy and their digital transformation. Digital Europe supports the digital transformation in specific sectors, insofar as the horizontal tools and approaches promoted by Digital Europe (e.g. data spaces) are fit for the specific sectoral requirements.

The study found a high degree of perceived **alignment between the programme's sectorial focus and the needs of participating organisations,** with 64% of beneficiaries considering Digital Europe to be very relevant to their sector's needs. The satisfaction was even higher for applicants to the programme, with a significant majority, 75%, considering the Digital Europe to be very relevant to their own organisational focus.

4.8.5. Alignment of the programme to addressing the needs of stakeholders

Table 5: Participation per organisation type



Source: based on data from support study by Technopolis Group and Ramboll 2025

Higher or secondary education organisations make up the largest share of beneficiaries in the programme, with a relatively balanced participation across SOs, but with SO4 being particularly relevant for these stakeholders. Together with **research organisations** (16%), they represent important stakeholder groups in capacity building especially related to infrastructures such as HPC, Cloud, Data & AI (TEFs). Most of the beneficiaries in SO6 also come from research organisations, with interviewees confirming the strong alignment of the calls for pilot lines and design platform with RTO needs. However, the study also found that there were barriers for the participation of industry players in the pilot lines due to the complexity of compliance with State aid rules.

Private for-profit organisations (both large enterprises and SMEs) are well represented in the programme, together accounting for 36% of the total number of beneficiaries and 1 320 individual beneficiaries. They also receive the most funding, especially as funding goes to large enterprises. While SMEs make up 19%, the design of the programme (25-50% co-funding requirement) did not fully align with their needs (see Section 4.1.3), thus hindering their engagement.

Public organisations accounted for 13% of beneficiaries, with a significant role in SO3 and SO5, where areas of public interest are clearly established. They are also strongly represented in SO1, as the acquisition of public infrastructures makes up most of the EuroHPC budget[198].

Stakeholders considered the programme very relevant to addressing the needs of their own organisation in terms of focus and sectors (Table 5). Higher relevance was reported among research organisations (71%) and SMEs (70%). In contrast, large enterprises (63%) and public

[198] Interim evaluation of the European High Performance Computing Joint Undertaking.

sector organisations (59%) expressed relatively lower levels of satisfaction, indicating some variation in the perceived alignment with organisational priorities.

Table 6. Relevance of the programme for organisations across SOs (n=1044, results for very relevant)

	HES	RTO	PRC-LE	PRC-SME	PUB	OTH	% Very relevant
SO1	62%	50%	0%	40%	100%	80%	**60%**
SO2	70%	85%	80%	80%	68%	66%	**75%**
SO3	57%	69%	55%	67%	48%	50%	**58%**
SO4	75%	55%	100%	67%	62%	55%	**68%**
SO5	61%	69%	60%	73%	61%	62%	**64%**
S06	67%	75%	100%	75%	100%		**77%**
% Very relevant	**67%**	**71%**	**63%**	**70%**	**59%**	**61%**	**66%**

Source: Technopolis Group and Ramboll 2025, only based on respondents declaring their affiliation to an SO (n=1044)

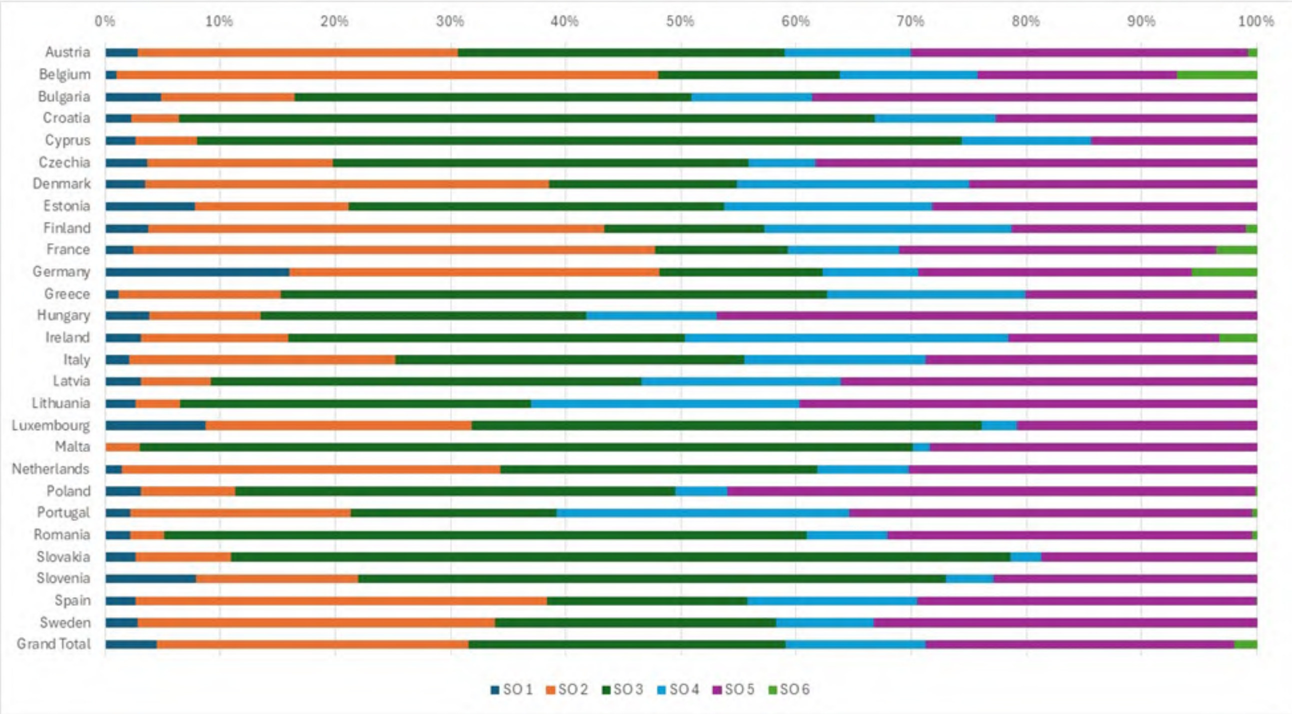
All 27 EU Member States participate in the programme, with most grant[199] beneficiaries coming from Spain (643), followed by Italy (626), France (560) and Germany (472). A small number of beneficiaries also come from EEA-EFTA countries (128), associated third countries (264) and non-associated third countries (45). Based on the share of beneficiaries per 1 000 population, Sweden stands out with a participation rate of 151 per million inhabitants, followed by Luxembourg (125) and Cyprus (100). Other smaller Member States, such as Estonia, Latvia and Slovakia also have a participation rate of around 50 (per million inhabitants).

Four Member States received a significant part of the grant funding: Germany (EUR 237 million), followed by France (EUR 171 million), Italy (EUR 159 million) and Belgium (157 million). This is to be expected due to their strong participation in the programme and their involvement in large-scale infrastructure projects (e.g. pilot lines in IMEC for Belgium, HPC centres etc.). When weighted by population, Luxembourg has the highest Digital Europe funding per capita, followed by Sweden, Belgium, Cyprus and Poland.

Figure 7 shows the participation of Member States across SOs. Overall, SO1 has the lowest number of beneficiaries' actions under this SO, mainly consisting of infrastructure deployments with high-investment needs and a limited number of direct beneficiaries but with large numbers of expected users across the whole Europe. The participation in EDIHs and in SO5 is relatively stable and significant across Member States, while more variations can be observed in the participation in SOs 2-4.

Figure 7: Participation of Member States across SOs

[199] No MS funding allocation is available for procurements, financial instruments, contribution agreements and programme support actions.



Source: Technopolis Group and Ramboll, 2025, reference date 31/12/2025

To increase engagement with the programme, stakeholders highlighted changes to Digital Europe's funding mechanisms. For example, tailored funding mechanisms (e.g. wider use of the SME grants or alignment with industry priorities) and more flexibility in the funding and implementation rules could improve accessibility and participation, especially by the public sector.

Box 20. SO specific differences in relevance

All SOs remain relevant in terms of the alignment of the objectives with current and emerging needs, with advanced computing (SO1), AI (SO2), Digital Skills and Capabilities (SO4 and SO5) as well as Cybersecurity (SO3) having similarly high levels of prioritisation by end-user needs

SO2 and SO5 engage with a broader range of industries than the other SOs, illustrating the cross-cutting application of AI & data. SO1 is more focused on R&D, ICT and the education sector. The telecoms sector is involved to a significant extent in SO3, whereas SO4 relies mostly on the education sector.

Overall, SO1 has the lowest number of beneficiaries, as actions under this SO mainly consist of infrastructure deployments with high investment needs and a limited number of participants. The participation in EDIHs and in SO5 is relatively stable and significant across Member States

5. What are the conclusions and lessons learnt?

5.1. Conclusions

Effectiveness

In the first years of its implementation, the Digital Europe programme has made good progress towards meeting the objectives set out in its Regulation. The programme has achieved key milestones in each specific objective. At midterm, Digital Europe is already delivering tangible benefits across several priority areas. The deployment of HPC capabilities, such as the first exascale system JUPITER and the launch of Destination Earth with its two digital twins and service platform, has significantly expanded Europe's computational capacity for research, innovation, weather climate modelling, big data exploitation and derived services. In artificial intelligence, the establishment of TEFs and the launch of the AI on Demand platform are accelerating the uptake of trusted AI solutions across sectors. In cybersecurity, the creation of 27 National Cybersecurity Coordination Centres and the roll-out of advanced tools are strengthening Europe's resilience against cyber threats. Under the advanced digital skills objective, over 20 000 people have been trained through master's programmes and short courses, supporting workforce readiness for emerging digital jobs. Similarly, the EDIHs are already serving more than 54 000 businesses and public sector organisations, enabling thousands of 'test-before-invest' services and supporting innovation adoption.

Key Performance Indicators are mostly on track or are exceeding the expected milestones. A promising number of end-users (citizens and organisation using the infrastructures, tools and services set up by Digital Europe funded projects) have been reached including approximately 55 100 companies and 25 800 public organisations. These achievements demonstrate that Digital Europe is on track to meet many of its strategic objectives and is already generating benefits for EU citizens, businesses, and public administrations. Beneficiaries and end users have reported concrete benefits such as increased innovation and productivity gains for their organisations and have high expectations concerning future benefits.

Digital Europe has unlocked substantial co-funding (direct leverage EUR 1.41 billion), leveraged by other funding programmes, mainly from participating organisations and funding programmes at national or regional level. Including follow-up investments from private and public sources, the total leverage amounts to EUR 2.3-7.0 billion. In terms of expected wider impacts, Digital Europe is contributing to the digital transformation and has had some impact on digital competitiveness and autonomy, which is expected to increase in the future but is hampered by the programme's relatively small budget.

The programme contributes to EU horizontal priorities and most UN sustainability goals. Nonetheless, the environmental trade-offs of digital technologies, such as significant water and energy demands of data centres, need further exploration and prioritisation. Despite the manifold activities to promote the programme, the complexity of its structure has reduced awareness amongst wider stakeholders. The main hurdle for implementing includes the 50% co-funding rate, which has required organisations to obtain co-funding from other sources. The programme has pioneered the option to combine funding at EU level (Digital Europe and the RRF and ERDF), which has proven to be cumbersome. In addition, hurdles exist regarding national co-funding mechanisms (with regards to divergent national rules, the misalignment of timelines and double reporting burden). The implementation of security restrictions, which are necessary to protect the security of the EU, has proven to be burdensome for a limited number of beneficiaries. To remedy this, the Commission has invested considerable effort in trainings and information material, facilitating its implementation.

The current monitoring and evaluation framework is well suited to monitor the outcome, and results of the programme. However, some indicators, require beneficiaries to gather data from end users via surveys creating additional administrative burden. In addition, the currently used impact indicators measure trends in the digitalisation of the EU in the wider sense and a clear link between activities related to the programme and these trends cannot be established. To better measure the impact of the programme for the final evaluation, IT tools could be deployed to gather data to conduct a counterfactual analysis (see Annex I.).

Efficiency and cost-effectiveness

The management model combined direct and indirect management models. While this increases the complexity of the programme, this combination of management modes has allowed Digital Europe to take advantage of established networks and communities of practice, broadening the programme's reach and leverage to a degree that would not have been possible in a more centralised implementation model.

Digital Europe has seen a relatively high success rate for applicants, due not only to its targeted and highly specialised calls but also to the lower levels of awareness of the programme compared with longer-established programmes. Stakeholders are relatively satisfied with the management of calls (including the timing and clarity of documents), however, they are less satisfied with funding conditions (e.g. funding rate in relation to effort). Applicants currently face relatively high application costs, compared with the scale of the financial support available.

The Commission and its implementing bodies have substantially improved adherence to TTG deadlines, increasing the efficiency of call management. Digital Europe has been implemented relatively efficiently by the Commission with a 4.9% overhead rate. An analysis of the cost-effectiveness of the programme shows that the programme has been implemented at a total cost of EUR 4.9 billion (EU funding and co-funding from beneficiaries). It has been possible to monetise only a few benefits at this stage. As the implementation phase so far has focused on setting up infrastructures, the number of end users is expected to rise significantly against more limited marginal costs in the upcoming years.

Relevance

The programme has remained highly relevant in the face of rapidly evolving political, social, and technological conditions. This is mainly due to the strategic planning underlying the programme, but also to the certain level of flexibility that allowed Digital Europe to respond to emerging challenges. The digital capacities covered by the six SOs have provided a good framework to addressing the deployment of key technologies that remained or became relevant for the EU's digital transformation, particularly the investments made in HPC capacities, AI, data, deployments of digital solutions (for instance, the EU Digital Identity Wallet) or semiconductors.

The programme's SOs show a clear sectoral alignment, with digital sectors having been engaged more. While non-digital sectors (except education) are less present, the impact of targeted sectoral applications of digital technologies, such as healthcare or public administration, can still be identified in the pattern of sectoral participation. Digital Europe has reached a diverse mix of stakeholders covering all Member States and associated countries, with the private sector, and in particular SMEs.

Coherence

The Digital Europe programme is embedded within the broader framework of the Digital Decade Policy Programme, supporting numerous other EU initiatives and priorities. It also supports the implementation of an array of regulatory measures, such as the AI Act, the NIS2 Directive as well as the Digital Services Act and Digital Markets Act. Internal coherence is ensured through explicit links between initiatives by design in the work programmes, the sequencing of actions within a portfolio of project, technological integration across specific objectives, and networks and instruments, such as the EDIH or Coordination and Support Actions. Several collaboration mechanisms (e.g. working groups) are in place to ensure coherence among actions implemented in direct and indirect management mode.

Specific mechanisms have been set up to better foster synergies and ensure complementarities with other EU funding programmes. For instance, this can be achieved through the specific governance structure (the role of DG CNECT in preparing the work programmes in different programmes, the role of Joint Undertakings in pooling resources from different EU funds), working groups across DGs, and interconnected infrastructures with a wide outreach, such as EDIHs. The programme also benefits from established networks, as the number of shared beneficiaries, in particular with Horizon 2020 and Horizon Europe is considerable. While not necessarily evidence for collaboration, there is some evidence linking cross participation to increased information sharing among concurrent projects and the continuation of achievements under the research programmes in Digital Europe (sequential synergies).

Synergies with national and regional programmes are less pronounced. There is a wide variation in co-funding mechanisms complementing Digital Europe at national level, which could increase the digital divide.

EU added value

The programme delivers substantial EU added value by pooling resources from several Member States and enabling investments at a scale that surpasses national capabilities. Key examples include investments in high-performance computing (HPC), quantum networks, and European Digital Innovation Hubs (EDIHs). These efforts scale up critical infrastructure, allowing Europe to better compete globally while addressing shared challenges.

The co-funding model — combining EU and national contributions — has been effective overall, notwithstanding certain implementation challenges, such as long timelines of preparation due to the negotiations with Member States and legal requirements (e.g. related to taxation). Large-scale initiatives like EuroHPC supercomputers and Chips Pilot Lines illustrate the benefits of this approach, enabling Member States to co-invest in projects they would not undertake independently. This model supports strategic technologies and ecosystems, fosters innovation, and enhances industrial competitiveness while reducing reliance on foreign testing infrastructures.

The programme promotes cooperation among Member States by fostering pan-European digital ecosystems and advancing digital transformation. Multi-country initiatives such as European Digital Infrastructure Consortiums (EDICs), EDIHs, and cross border SOCs/Cyber Hubs exemplify this effort. Initiatives, such as the EU Digital Identity Wallet, showcase effective cross-border cooperation to create interoperable solutions.

In conclusion, the benefits, while noticeable at the level of the organisations receiving EU funding, transcend the beneficiaries of the programme as the large-scale infrastructures, services and tools created by the beneficiaries serve individuals as well as public and private organisations in the EU and (in some areas) beyond.

Key conclusions regarding SMEs

Relevance: SMEs are a core target group of the Digital Europe programme's efforts to tackle capability gaps through targeted support measures and to provide access to advanced, shared EU-level infrastructures that individual SMEs could not develop or afford on their own. It also fosters cross-border collaboration and market access, helping SMEs integrate into European value chains and compete globally. While initial participation was skewed towards research organisations, the growing role of EDIHs and sectoral facilities is expanding SME engagement and offering direct benefits to them.

Effectiveness: Digital Europe has begun to deliver tangible benefits for SMEs, particularly through the network of EDIHs and targeted sectoral facilities, such as TEFs. SMEs have been effectively reached in the programme, with over 99% of the 55 100 private end users being SMEs. Evidence from initial monitoring of end users shows improvements in their digital maturity – most notably in AI adoption and automation – alongside business growth, new product development, and access to additional funding opportunities. The programme's EU-wide infrastructures have enabled SMEs to test and deploy advanced technologies they would not have been able to access otherwise. SMEs indicated a value of EUR 8.0k-15.3k for the services of the EDIH and those benefiting from digital skills training courses value them at EUR 6.5k-14.4k. While early results are promising, with infrastructures now set up and operational, the next phase of the programme should prioritise increasing SME participation in future calls to fully maximise its reach and impact in this target group. The main recommendations from the end-user survey include the need for more public awareness activities to ensure that SMEs are informed about available training and resources, as well as simplifying the complexity of application, reporting, and access processes to encourage wider participation. Training programmes should cater to all skill levels, including beginners, and should better address the specific needs of SMEs.

Efficiency/cost-effectiveness: SMEs also play an important – but relatively modest – role in the implementation of the programme, with only 17% of grants funding allocated to SMEs. While the success rate for SMEs is high (51%), their participation is considered below the potential for a deployment-oriented programme. This may be due to the phase of the programme (building large-scale infrastructures, networks etc.) and practical barriers for SMEs to engage in the programme, in particular the co-funding requirements and the perceived high administrative burden and lack of flexibility in consortium models (such as the ease of using subcontracting, or adding partners later on). The analysis of the position papers during the stakeholder consultation confirms that SME participation was limited due to complex funding structures (e.g. funding conditions vary between topics and often require a detailed review of WPs and tender documents, with key information sometimes only available in English), the administrative burden and the 50% co-funding rate.

5.2. Lessons learnt

The Commission has already invested considerable effort in addressing some of the main challenges in the implementation of Digital Europe. For instance, the Commission has introduced the most favourable funding rates in the 2025-2027 WP [200] to help Member States comply with State aid rules. The Commission has also conducted numerous outreach activities to ensure the smooth application of security restrictions. Furthermore, it has been organising seminars for Member States and beneficiaries, and discussions with the managing authorities of the ERDF to make it easier to combine funding. In addition, the STEP was set up by the Commission to facilitate access to funding across 11 EU programmes, for instance, through the STEP seal, a label for high-quality projects.

Further effort may be made in the medium to long term to increase the future impact of the programme on the EU's digital competitiveness and strategic autonomy. These lessons are also relevant for the preparation of the next MFF.

- ***Further vertical alignment of digital initiatives.*** Firstly, there is the need to align EU, national and regional digital initiatives further to ensure that activities at different levels build on and strengthen each other. Secondly, initiatives need to be aligned in such a way that applicants and other stakeholder can easily navigate the complex funding landscape when searching for co-funding, and can apply for and receive national funding without creating an unnecessary administrative burden.

- ***Further horizontal alignment and streamlined programming processes.*** Potential synergies across EU funding programmes need to be addressed in a more systematic manner. For instance, skills initiatives should be aligned with both hard and soft infrastructure investments, scaled up and refocused to prioritise targeted training for stakeholders and operators of critical infrastructures, rather than broad, citizen-focused initiatives. There is also the need to invest in further collaborations across Directorates to increase the potential for synergies, in particular in research and deployment.

- ***Continued efforts to increase the visibility of the programme.*** WPs and calls for proposals could be disseminated beyond the usual communication platforms to reach relevant stakeholders not previously engaged in EU funding programmes. Stakeholders must also be able to see the programme 'as a whole' (rather than its most prominent aspects) to ensure wider participation and foster interconnected activities. Incentives to attract industry stakeholders need to be thoroughly examined.
- ***Addressing the obstacles hindering the participation of additional stakeholders***.
  - The need to create a legal framework that will reduce the current complexities with regard to combining EU funding (e.g. with the ERDF and RRF).
  - The need for continuous efforts to help Member States adhere to State aid rules in co-funding the projects (50% funding rate of the programme).
  - The need to consider an increased co-funding rate (75%), in particular to support SMEs' participation in the programme.

[200] The Digital Europe Europe Programme – Work Programmes | Shaping Europe's digital future.

- ***More flexible and streamlined funding mechanisms.*** An effort must be made to reduce the administrative burden, in particular on small and medium size enterprises, and barriers to applying for funds.
    - The efficiency and relevance of simplified funding mechanisms, such as unit costs and lump sum, need to be assessed. To enhance flexibility, the relevance of the increased use of cascade models of funding needs to be explored.
    - The need to accommodate uncertainties in early-stage projects (where exact needs and partnerships are evolving), for instance, by permitting flexibility to adjust goals, partners, and methodologies as the project progresses.
    - The need to assess the relevance of new mechanisms or to increase currently used funding mechanisms, such as financial instruments and budgetary guarantees, to decrease the administrative burden, increase participation and insure the (financial) sustainability of projects. These funding mechanisms need to consider the specific application-driven challenges that organisation are facing.
- ***Fast track from research to deployment.*** Mechanisms need to be put in place to ensure relevant cutting-edge results are deployed and brought to the market without any further administrative complexities for the companies applying those results, or any delays in subsequent funding.
- ***Applying security restrictions*** in an even more homogeneous manner across programmes while keeping the administrative burden for the Commission and beneficiaries at a minimum. In addition, there is the need to **restrict end user access** to some of the critical infrastructures, in particular those deployed under restricted calls (Articles 12(5) and 12(6)), which need to be restricted to European entities.
- ***Ensuring long-term environmental, economic and social sustainability***. This includes measures to guarantee the sustainability of infrastructures, including robust financial planning, capacity utilisation strategies, and frameworks for ongoing maintenance. It also includes ensuring a more significant contribution to environmental benefits and climate goals, thereby turning sustainability into a competitive advantage.
- ***Developing pan-European incentives to enable companies,*** in particular SMEs, ***and public organisations to access and fully benefit from the developed infrastructures*** while respecting any constraints linked to strategic autonomy. This could include simplified access mechanisms, tailored and easily accessible funding opportunities and support frameworks for capacity building.
- ***Continuing to align with the latest technological developments***, such as AI, and to adapt the programme's structure to socio-economic developments and challenges while keeping implementation simple and functional. Furthermore, there is the need to better cover relevant non-digital sectors.
- Further ***enhancing the monitoring and performance framework*** to better measure the impact of the programme with the help of updated indicators and IT tools (see Annex I) and to assess whether current milestones and targets need to be updated. To assess the impact on competitiveness, business IDs (Organisation Name, VAT number Photonic Integrated Circuits (PIC) number if relevant) need to be collected for end users for a

number of high-profile work strands with a large number of expected private end users (EDIH, TEFs, AI Factories etc.). These business IDs could then be combined with registry data to run an econometric analysis, ideally against a benchmark group source via propensity score matching, which would make it possible to analyse the impacts on turnover, profits and productivity.

- To assess the impact on strategic autonomy, end-user surveys (asking about dependencies, European alternatives etc.) could be used, or novel methods of webscraping and text-based supply chain classification (using LLM techniques). Such an analysis, ideally carried out at several different intervals, could track whether companies (and public organisations) refer more often on their website to EU-based suppliers, EU-based infrastructures (including those directly supported through the Digital Europe programme) rather than to alternatives.

Box 21: Elements from the stakeholder consultations in the lessons learnt[201]

Funding priorities & portfolio

- Focus more on the basic digital transformation needs of smaller institutions and regions, not exclusively on advanced technologies (beneficiaries).
- Consider sector-specific funding for healthcare, education, manufacturing; renewable energy and information-sharing technologies (beneficiaries, applicants).
- Be more forward-looking, supporting projects with long-term impact (beneficiaries).

Skills, inclusion & awareness

- Expand digital literacy programmes to equip all citizens, regardless of age or background (applicants).
- Increase public awareness in underrepresented regions (e.g. outreach via newspapers, TV, radio; for EDIHs) (beneficiaries).

SMEs, start-ups & market uptake

- Greater involvement of the private sector and clearer business development opportunities to turn EU-funded innovations into market-ready solutions (beneficiaries).
- More support for start-ups, especially in the deployment phase; foster digital entrepreneurship via start-up ecosystems and digital innovation labs (beneficiaries; applicants).
- Dedicated funding for digital transformation in SMEs and tailored support for AI and blockchain; (beneficiaries, end users).
- Low-barrier access to testing environments (end users).

Coordination, co-funding & collaboration

- Alignment with national funding schemes to reduce duplication and ensure coherence (beneficiaries).
- Revisit the co-funding model: the 50% rate is a barrier (esp. NGOs/SMEs) and better alignment with Member States with regard to co-funding (beneficiaries, applicants).
- Cross-border cooperation and synergies between Member States and industries; public-private partnerships; international collaboration (beneficiaries, applicants, end users).
- Better communication among the European Commission, national authorities, and participants; newsletters/call calendar; guides with practical examples; clearer State aid rules; funding for travel in cross-border collaborations (beneficiaries, applicants).

Governance, monitoring & continuity

- Recruit and involve long-term expert panels; improve monitoring and evaluation; coaching specialists/programme managers; timely feedback from project officers; increase the number of evaluators (applicants, beneficiaries).
- Better integrate existing results and knowledge from previous projects; ensure continuity of initiatives (e.g. EDIHs) (beneficiaries).
- Long-term funding and collaboration frameworks to sustain and grow the community of users and stakeholders (end users).
- Calibrate risk appetite: the programme is too risk-averse; over-emphasis on risk prevention (privacy, cybersecurity) can overshadow productivity gains and service innovation (beneficiaries).

[201] Process simplification suggestions are included in Box 12

6. ANNEXES

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ANNEX I. PROCEDURAL INFORMATION

This interim evaluation (DECIDE reference: PLAN/2023/1495) was prepared by DG CNECT. D1 under the guidance of an interservice steering group (ISG). The ISG gathered the following DGs and services: AGRI, BUDG, CLIMA, COMP, DEFIS, DIGIT, DGT, EAC, EMPL, ENER, ENV, FISMA, GROW, ECHO, HOME, JUST, MARE, MOVE, REGIO, RTD, SANTE, SCIC, SG, SJ, TRADE, TAXUD as well as HaDEA and the JRC.

The group was consulted to get feedback on all main milestones:

- The first meeting with the interservice steering group was organised on 20 June 2023 to discuss the intervention logic, Call for Evidence and Evaluation Questions.
- The group provided feedback on the draft Terms of Reference for the external study to support the evaluation in September 2023 via written procedure.
- The second meeting took place on 15 April 2024 to discuss the inception report of the study.
- The third meeting took place on 16 September 2024 to provide feedback on the interim report.

The final report was discussed in the fourth ISG meeting 14 April 2025. Subsequently, the report was approved by the ISG on 21 April before its submission to the Regulatory Scrutiny Board on 20 June 2025. A public consultation was published on the Commission's *Have your Say* portal on 27 June 2024 and remained open until 20 September 2024. A questionnaire was published simultaneously with the Call for Evidence.

An external study contracting Technopolis and Ramboll and launched in February 2024, provided key input to this report.

This evaluation was selected for scrutiny by the Commission Regulatory Scrutiny Board (RSB). An upstream meeting took place on 20 January 2025 to discuss with the Regulatory Scrutiny Board how to deliver the best possible report. Table 1 below demonstrates how RSB comments were addressed:

Table 1. RSB upward meeting minutes and study team response

RSB points	Evaluation team response
RSB members advised to reconstruct a thorough **intervention logic** for the programme, which should guide the analysis, help establish causal links between its components, which in turn should allow for the contribution/attribution analysis. They acknowledged its complexity given the programme's breadth but insisted on the importance of putting all the elements coherently together.	A thorough intervention logic with clear causal pathways had already been designed.
The concepts behind the specific objectives, general objectives (i.e. technological sovereignty and competitiveness vis-à-vis Europe's main competitors such as the US and China), the **causal links** between the elements should be operationalised in order to prepare the ground for applying appropriate methodology and harvesting the necessary data.	A more detailed narrative has been added to the intervention logic graph.
RSB members acknowledged that given the interim nature of the programme's evaluation, it would be difficult to collect **evidence** to assess the programme's effectiveness and efficiency. They advised against using the expected values from the JRC model as evaluations should be based on observable data (also implementation data) and results already generated. The values corresponding to the elements (outputs, results, impacts, objectives) of the intervention logic should serve as a baseline to assess/measure the programme's **actual progress and expected achievements** (what the success looks like). In the same vein, the Board members advised to be clear on the funds already spent and analyse the risks associated with implementation of the remainder of the programme.	Evaluation findings are based on observable data. Only a reference is made to the JRC model given that at this stage it is still too early to assess large-scale economic benefits through alternative methods. It has been ensured that the conclusions do not rely on JRC model for expected benefits, but it is presented as a potential range of the size of economic benefits.
Regarding the analysis of **costs and benefits**, RSB members considered that it may not be feasible to do a complete analysis because the benefits have not materialised to be compared against the costs. They advised that the efficiency analyses to be focused on the administrative costs and savings (simplification) be quantified and monetised. It could be useful to compare them with other programmes. All metrics should be consistently used.	Quantification of simplification measures for key initiatives (such as lump sum grants) was not possible at this stage since these have only been recently launched. Benchmarking with other programmes has been included. To ensure that in the final evaluation benefits are consistently monetised the following steps need to be taken: 1. It needs to be ensured that data on the businesses and public entities benefiting from Digital Europe's infrastructures and services (e.g. EDIHs, AI Factories, cybersecurity centres) includes business identifiers (e.g. VAT numbers, national company registers, legal entity identifiers) to enable better tracking of outcomes over time. 2. It needs to be ensured that protocols for **linking programme participation with key business performance** indicators are established (e.g. turnover, employment, productivity growth) while ensuring compliance with GDPR and data protection standards.
The analysis should also discuss the simplification and support for the SMEs, identifying the potential as well **for further simplification and reduction of burdens**.	A list of simplification measures has been compiled, but no monetisation analysis has been conducted at this stage. Simplifications, such as Lump sum have been so infrequently applied that it was not possible

RSB points	Evaluation team response
	to gauge their impact at this stage. To do so in the future, these simplifications need to be applied more systematically, and consultations need to specifically probe for efficiency gains. It also needs to be assessed to what degree these simplifications lead to less administrative burden for the Commission, for instance when assessing staff costs.
RSB members stressed the importance of a comprehensive analysis of the programme's **internal and external coherence**. The former would be important given the programme's broad scope and implementation mechanisms while the latter should capture the programme's positioning amongst other EU funding instruments and programmes, such as the Horizon Europe, the Recovery and Resilience Facility or the structural funds which all have strong digital components. The analysis needs to go beyond declaring coherence, e.g. demonstrating which Horizon outputs or results were scaled.	This analysis of the governance structure has been conducted and included in the report.
The analysis should be supported by the **robust data** and avoid feeding on opinions of the stakeholders and beneficiaries solely. RSB members insisted that the sample for opinion data should be statistically representative with regard to all the key stakeholder groups. opinion-data evidence should be triangulated with observational-data evidence and related limitations correctly reported (e.g. beneficiaries bias, self-reported subjective perceptions, etc.).	The evaluation does not rely solely on beneficiaries' data. The report triangulates findings with end users and other secondary data and supporting indicators. The outcomes have been documented, showing what has have achieved, beyond the KPIs.
For the analysis of the programme's **relevance**, RSB members indicated the importance of going beyond the stakeholders' views, and insisted on assessing the founding needs behind the programme based on available evidence and foresight studies and analyse their evolution in the period under evaluation, venturing also in the future as to their continuous relevance and possible adjustments to the programme (e.g. in terms of the budget distribution, technological and political developments).	The evolution of problems is covered under *Relevance* section.
RSB members advised to describe **roles and responsibilities** of the implementing bodies and their complementarities, risks of redundancies, overlaps, etc.	Such an analysis has been carried out in the context of the Intervention Logic.
The analysis should clarify the **leverage effect** of the EU funding. It should also cover the effects on non-beneficiaries such as the push-out effects.	This is covered under *Effectiveness* and *Relevance* section. Push out effects are discussed in the *State of Play* in the SWD and annexes in the section on participation patterns, highlighting the involvement of major players.
For the analyses of the **EU added value**, RSB members advised that it uses the counterfactual analysis to the extent possible to demonstrate what would have not happened without the programme.	Please see the suggestions below and in the *State of Play* section
RSB members advised to use and, where necessary, further develop the **indicators** already defined in the programme regulation. They recommended to thoroughly discuss whether the current monitoring system is sufficient to collect and assess the evidence needed with the view to the final evaluation.	This has been reflected upon in the lessons learnt section.
Given the programme's implementation stage, RSB members advised against using strong **conclusions** if they are not firmly based on the evaluation findings. Instead, the evaluation should assess to what extent the framework in place is conducive and on track to achieve the programme's objectives by its completion.	This has been taken into consideration.

The analysis of the performance and monitoring framework concluded that the Commission needs to pave the ground for a more thorough analysis of impact for the final evaluation. The following measures have been taken into consideration:

- In **SO1 & SO2**: A specific code could be included in patents, product specifications and publications, if the infrastructure funded by the Digital Europe programme has been used by the researchers and innovators. This would allow the Commission to track the impact achieved through the use of HPC infrastructure, data spaces, TEFs and the AI on demand platform. To ensure that these codes are applied consistently, specific contractual obligations need to be included in the grant agreements and procurement contracts.
- In **SO3**, data of registries of cyberattacks and threats could be linked to actions that financed cybersecurity (staggered roll-out of investment).
- In **SO4**, data of students taking part in training funded by the Digital Europe programme could be shared with social security services. The JRC could run a script to compare the graduates of the trainings with students with similar backgrounds measuring the impact of these trainings. To ensure compliance with data protection rules, beneficiaries need to collect consent from students to transfer this data to social security services. Due to the high administrative burden of such an exercise, this analysis could be performed as a case study for a limited number of Member States.
- Furthermore, DG CNECT should collaborate with colleagues monitoring and evaluating Erasmus+, ESF+, and other programmes implementing skills trainings to work on common graduate tracking mechanisms.
- In addition, DG CNECT could compare companies' financial situation (firm turnover or other balance sheet data) of those that used services of the European Digital Innovation Hubs with organisations, which did not use the services.
- In order to assess the impact on competitiveness, DG CNECT could facilitate the collection of business IDs (Organisation Name, VAT number, PIC number if relevant) for end-users for a number of high-profile work strands with expected large number of private end-users (EDIH, TEFs, AI Factories etc.). These business IDs could then be combined with registry data to run an econometric analysis, ideally against a benchmark group source via propensity score matching and would allow for an analysis of impacts on turnover, profits and productivity.
- In order to assess the impact on strategic autonomy, DG CNECT could either extend the use of end-user surveys (asking about dependencies, European alternatives etc.), or use novel methods of webscraping and text-based supply chain classification (using LLM techniques) if end-user website URLs could be made more systematically available (linking to the registry point before). Such an analysis, ideally carried out at multiple intervals, could track whether companies (and public organisations) refer more often to EU-based suppliers, EU-based infrastructures (including those directly supported through the Digital Europe programme) compared to alternatives.

For this purpose, an expert group needs to be established including the JRC, to define additional impact indicators and lay out a clear data collection strategy.

The RSB issued a positive opinion with reservation on the SWD on 20 June 2025. Consequently, the SWD was revised based on the opinion and the checklist sent by the RSB.

Table 2. Revisions based on RSB opinion

RSB opinion	**Revisions**
The report should operationalise the intervention logic to track the progress of the programme towards the programme's overall goal to increase the Union's strategic autonomy, security and competitiveness. It should assess whether the current performance monitoring framework allows to capture these effects and draw related lessons.	The link between the outcomes and impacts of the programme as described in the intervention logic was set out in more detail. More details were included to assess the suitability of the current monitoring and evaluation framework to capture these impacts
The report should assess the potential to use systematically administrative and other observational data related to beneficiaries and end-users to improve the evidence base and reduce reporting costs	The use of administrative data and observational data to measure impact was described in more detail.
The report should more thoroughly discuss the leveraging potential of the programme, in particular participation of private finance.	The leverage effect of the programme has been set out in more detail.
The report should assess the coherence of the programme with other major EU funding supporting digitisation, in particular the Recovery and Resilience Facility.	Further information on the different scopes and interlinkages of RRF and Digital Europe have been added.
The report should analyse the programme's continuing relevance in the light of recent technological and market developments.	One additional section has been added discussing the relevance of the programme in the current context.

Additional changes based on RSB checklist	A column was added in table 2 including the targets of indicators. Furthermore, the baselines of the indicators were added. The evaluation questions discussed in the annex, were integrated into the main SWD. More examples of how the programme could be simplified were added. Another example of synergies with HE was added. The evaluation (SWD and synopsis report) was updated with findings from the final policy workshop which took place on 11 September An analysis of the performance of SMEs was included The conclusions include more outputs and results of the programme

Furthermore, it was discovered in summer 2025, that there was a problem with duplicates in CORDA at the end of 2024, when the data for the interim evaluation was retrieved from the online dashboard linked to CORDA. This issue was fixed on 6 January, however, it affected the data used for the interim evaluation, which reported a higher amount of EU funding than it was actually the case. Consequently, the data analysis was updated using the correct amounts from the dashboard from 2021-2024.

ANNEX II. METHODOLOGY AND ANALYTICAL MODELS USED BY THE CONTRACTOR

The evaluation follows the Better Regulations Guidelines (2023) and measures the *effectiveness*, *efficiency*, *relevance*, *coherence,* and *EU added value* of the programme.

The study assesses the programme at a holistic level, identifying key differences between specific objectives (SOs) and instrument types, where relevant, without delivering a detailed evaluation for each SO. While conclusions and recommendations are formulated at the SO level, SO-specific assessments of areas such as efficiency, cost analysis, and EC cost structures could not be performed due to their inherent complexity. Thus, a programme-wide perspective has been provided which addresses nuances between specific objectives.

The assessment of **effectiveness** considers not only formal KPIs but also broader current and expected benefits for beneficiaries, end-users, and the wider economy. Contributions to horizontal priorities, such as stakeholder assessments and alignment with Commission priorities, further enrich the analysis. By integrating a cost-benefit approach, the evaluation explores both direct costs and qualitative benefits. However, the interim stage of the programme necessitates reliance on future projections. Additionally, the creation of digital ecosystems, programme awareness, and barriers to implementation are discussed.

In terms of **efficiency**, the evaluation highlights key processes such as the time-to-grant for selections, retention rates, and stakeholder satisfaction with management practices. It also emphasises the implementation of simplification measures and evaluates communication activities. Additionally, the analysis was enhanced through extensive manual reconstruction efforts, providing a more detailed understanding of procurements, financial instruments, and contribution agreements.

Addressing **relevance**, the evaluation considers how the programme's design has evolved to meet the needs of the EU digital ecosystem while addressing past and current challenges. A combination of backward-looking assessments and forward-looking foresight exercises provides insights into the alignment of programme objectives with technological, political, and socio-economic needs. Through stakeholder consultations, surveys, expert focus groups, and desk-based analyses, the report captures key dynamics, although its reliance on stakeholder input limits the granularity of the analysis beyond programme/SO level.

The programme's **coherence** is assessed by examining internal and external synergies. Internal coherence explores alignment within and between SOs and management modes through desk-based reviews and portfolio analyses, while external coherence investigates integration with EU policies, other funding programmes, and national initiatives. Stakeholder consultations, case studies, and mapping exercises reveal actionable insights and highlight successful synergies, particularly with Horizon Europe. The report also covers coherence with national initiatives and provides an overview of national co-funding mechanisms complementing the Digital Europe programme.

The assessment of **EU added value** explores how the programme complements national and regional efforts, fostering cooperation among Member States to promote the digital transition. The analysis distinguishes between financial additionality, behavioural additionality, and output additionality, examining resource pooling, stakeholder behaviour changes, and tangible outcomes. Although financial additionality is assessed using a proxy for leverage and lacks granularity at the Member State level, the findings emphasise the unique contributions of EU interventions and their overarching impact.

Finally, the evaluation adopts a holistic lens, capturing differences between SOs and instrument types without delving into detailed SO-specific assessments. Conclusions and recommendations are structured at the SO level, but the absence of quantified indicators limits the granularity of efficiency and cost analyses. This overarching approach enables the identification of cross-cutting themes and interconnections across the programme, offering strategic insights while addressing the inherent complexity of the evaluation.

Methodological Approach

The evaluation findings summarised in this report build upon a broad mix of qualitative and quantitative data collection and analysis methods, listed in Table 1 below. The coloured cells indicate the relevance of a method for the evaluation questions in the criteria categories (darker shadings stand for a higher degree of relevance).

Table 1. Methods used to address the questions under the evaluation criteria

	Qualitative methods				Quantitative methods				
Topics for investigation	Desk Research	Interviews	Focus Groups	Case studies	Secondary data analysis	Composition & portfolio analyses	CBA	OPC	Survey
State of Play									
Effectiveness									
Attainment of objectives									
Intended effect & benefits									
Enabling factors & barriers									
Efficiency									
Efficiency in implementation									
Cost-effectiveness & simplification									
Coherence									
Internal coherence									
External coherence									
Relevance									

Alignment with emerging needs									
Alignment with technological developments, political & socio-economic needs									
Alignment with stakeholder needs									
EU added value									
Added value compared to national & regional support									
Added value to promote digital transformation									

In the context of the evaluation study, the contractor performed a variety of activities and data collection tools. These includes the following:

- exploit existing programme and relevant contextual data
- technical workshop, a process of data gathering, and validation was set up following the submission of the inception report. This entailed a survey questionnaire to operational units in charge of the work strands, to assess and aggregate topic-specific monitoring data.

The study team collected, collated, analysed, and used four major types of secondary data **directly related to the programme**:

programme data, which predominantly came from the programmes' financial management systems (eGrant). This data was instrumental for better understanding of the portfolios of supported projects under both programmes, and informed several evaluation tasks, such as sampling approaches for primary data collection, final approach to the in-depth evaluations, etc.

Contextual data, which set the evaluation into a relevant policy context, and provided additional information on both policy environment and on economic sectors targeted by the programme. The context was important to better calibrate the evaluation findings. Contextual data included contextual indicators providing detailed information on the wider context and trends related to the higher policy objectives set in the 6 SOs of the programme. In addition to existing contextual indicators, other contextual data stemming from the DESI monitoring, the Digital Decade, but also the European Monitoring of Industrial Ecosystem (EMI, DG GROW), allowed to complement existing information and provide sufficient granular data on the status quo of the different technological areas covered by the different SOs.

Core performance indicators and additional indicators measured whether the programme is delivering on the expected results as outline in the regulation, with a set of 14 KPIs and 10 additional indicators. These served as the basis to assess the progress of the programme set against the targets.

Topic level indicators, which measure detailed progress towards the Digital Europe programme objectives at the level of each work strand, captured the specificities of the activities currently ongoing.

The external contractor, together with the Commission, undertook an in-depth analysis of **complementarities, synergies and potential overlaps** between the Digital Europe programme and other EU funded programmes & initiatives.

In the absence of *ex ante* flagging of topics (indicating potential synergies identified in the calls) and *ex post* project flagging (indicating potential use of synergies during the project), the contractor relied on:

1. The analysis of **cross-participation between Digital Europe programme participants & other programmes.** While cross-participation of organisations does not ensure synergies, it provides a useful proxy of the potential knowledge flow between major funding programmes. It also allows to identify potential stakeholder groups responsible for bridging programmes, hence more able to deploy solutions developed elsewhere. In some cases, it also gives an indication on the adequacy of the targeting of funded actions which address specific stakeholder groups. Among the key limitations is that the cross-participation analysis relies on data at the organisation level (PIC number), which might encompass different departments or units.
2. The **existing mapping of synergies or potential synergies** carried out under specific studies (e.g. Framework programme/Digital Europe) often pointed out potential synergies stemming from projects such as the Quantum Flagship/EuroQCI, and has been considered. Similarly, the study team has looked at infrastructures funded under Joint Undertaking (EuroHPC/Chips JU) and also at the overall instrument landscape level (e.g. EDIHs and TEFs as part of the Technology Infrastructure Study, or EDICs as part of the digital decade monitoring).
3. **Stakeholder consultations** were conducted during interviews (including with implementing bodies) to identify good practices and processes set up during the first period of implementation of Digital Europe. This effort was complemented by a Public Consultation

and a targeted survey to understand the specific use of other programmes to complement Digital Europe (including cumulative/sequential funding, etc.). The study team placed a strong emphasis on further identifying examples of synergies and relevant processes put in place to ensure complementarities between actions.

4. In addition, the Commission identified Digital Europe projects that involve beneficiaries previously or currently engaged in Horizon 2020, Horizon Europe, CEF, or Erasmus+ projects. These Digital Europe project applications were then ranked with the help of CORTEX, based on factors such as the frequency of mentions of the four other EU funding programmes in their applications. After an initial screening of these project applications and identifying the 130 most relevant project pairs, the study team conducted a detailed analysis of these pairs and surveyed the beneficiaries to validate identified synergies.

The contractor consulted a wide range of stakeholders. Four main groups were targeted by the consultation throughout the study: implementing bodies, beneficiaries, end users, and the wider stakeholder community active in the digital field (see Table 2).

Table 2. Overview of stakeholder categories consulted during the evaluation

Stakeholder category	Interviews	Surveys	Public Consultation	Focus Groups	Monitoring data
Implementing bodies	28			X	X
Wider EU stakeholders	14		XX	X	
Beneficiaries	52	XX	X	X	XX
End-users	8	XX	X		
Applicants		X			
NCC		X			

The consultation activities conducted included:

5. **Public Stakeholder Consultation**: An online survey, ran for 12 weeks on the European Commission's website, gathered the views of a broad spectrum of stakeholders, including EU Social partners interested in the evaluation and development of Digital Europe.

6. **Targeted consultation of specific stakeholders**: Here the contractor employed three methods – targeted surveys, interviews, and focus group discussions.

- **Targeted Surveys:** Stakeholders were consulted via survey questionnaires sent to the beneficiaries of Digital Europe funding, including applicants, end users, and the National Coordination Centres.
- **Interviews:** The study team conducted over 100 interviews with various groups of programme stakeholders, including Digital Europe implementing bodies, EU-level stakeholders, and a subset of beneficiaries and end users.
- **Focus Group Discussions:** Six focus group discussions were prepared to consult stakeholders, aligned with the specific objectives (SOs) of the programme. This approach gathered opinions and collected information on the implementation process at both EU and national levels.

The main elements of the stakeholder consultation strategy were aligned with the evaluation questions and covered the six mandatory criteria (state of play, effectiveness, efficiency, relevance, coherence, and EU added value).

To complement the work of the external contractors, this evaluation also considered stakeholder consultations carried out by DG CNECT. This included the stakeholder workshop on the implementation of the programme at the 'From Research to Reality – digital solutions for European challenges' event[202], as well as the workshop with representatives of the European Digital Innovation Hubs (EDIHs) at the EDIH Summit[203]. In addition, this report references a number of other sources, such as internal analysis and performance reviews, including Feedback to Policy reports, preparatory documents related to the draft impact assessment for the new MFF, a spending review, programme performance statements[204], annual activity reports, and beneficiary reports, such as those from coordination and support actions (CSAs). This report also considers feedback from diverse working groups and comments from delegates to the Digital Europe Programme Committee regarding the implementation of the programme. It also refers to two opinions on the programme conducted by the Fit4Future platform[205] and the European Economic and Social Committee[206], as well as other related evaluations, like the Interim Evaluation of the InvestEU programme[207], the evaluation of the EuroHPC JU[208],

[202] From Research to Reality – digital solutions for European challenges | Shaping Europe's digital future
[203] EDIH Network Summit 2024 | European Digital Innovation Hubs Network
[204] Digital Europe programme - Performance - European Commission
[205] Adopted opinions - European Commission
[206] opinions - Filtered results | EESC
[207] Interim evaluation of the InvestEU programme - European Commission
[208] Interim Evaluation of the Horizon Europe Framework Programme for Research and Innovation (2021-2024) - forthcoming

and the ongoing evaluation of EDIH. Moreover, on behalf of the Commission, the JRC conduced a macroeconomic analysis of the impact of the programme on GDP and exports.

Limitations

While the interim evaluation of Digital Europe provides valuable insights into its implementation and progress, several methodological limitations must be acknowledged. These constraints primarily relate primarily to the early stage of the programme, data availability, and challenges in measuring impact on end users.

Too Early to Measure Economic and Digital Outcomes: As an interim evaluation, this assessment is conducted midway through the programme's lifecycle, meaning that many expected economic and digital transformation impacts are not yet fully observable. Investments in HPC, AI, cybersecurity, digital skills, and interoperability require time to manifest their effects. Thus, long-term productivity, innovation, and competitiveness gains will become clearer in subsequent years. There are significant limitations in terms of the ability to assess the full cost-effectiveness of a relatively new programme, which has for now primarily focused on investments in infrastructure, with expected use and deployment and related benefits being expected in the years ahead. Furthermore, while costs are relatively easily monetised, some benefits are hard to quantify or monetise.

No Micro-Level Data on End Users: The evaluation primarily relies on aggregated programme-level data, stakeholder consultations, and secondary sources, lacking granular micro-data on end users such as SMEs, researchers, public administrations, and citizens benefiting from Digital Europe-supported infrastructures and services. Without this detailed end-user data, it is difficult to assess the practical uptake, usability, and effectiveness of Digital Europe-funded initiatives at the individual and organisational level.

No Control Group: Unlike controlled experiments, where an intervention group is compared to a non-participating control group, Digital Europe does not have a structured framework to isolate its impact from other external factors. Many of the areas of intervention—such as AI, cloud, and digital skills development—are also supported by national initiatives, Horizon Europe, and private sector investments. This makes it challenging to attribute observed changes specifically to Digital Europe interventions rather than the broader digital policy ecosystem.

Limited Aggregated Data on Procurements: Digital Europe relies on joint procurement mechanisms (e.g. for HPC, cybersecurity, and AI testing facilities). However, the availability of detailed data on procurement outcomes, cost-effectiveness, and supplier participation remains limited at this stage. This constrains the ability to evaluate whether procurement processes have been efficient, competitive, and aligned with EU strategic priorities.

Limited Information on Contribution Agreements and Financial Instruments: Several funded initiatives operate through Contribution Agreements with EU bodies, Joint Undertakings, and national entities (e.g. Destination Earth) and through financial instruments. However, the lack of detailed information on which economic actors have received funding makes it difficult to assess outreach, sectoral impact, and distribution among member states.

ANNEX III. EVALUATION MATRIX

#EVQ	Evaluation questions	Topics for investigation	Focus of the analysis	Indicators	Tools
EFFECTIVENESS					
Attainment of the objectives					
EFFECT.01.1	What has been the progress towards achieving the expected outcomes, results and impacts, of each specific objective? Have there been any unexpected and unintended outcomes or results?	Attainment of objectives Main outcomes & (expected) results	• Main outcomes & Expected results and impacts of each specific objectives • Progress towards the objectives, in terms of outputs, outcomes, results • Unexpected outcomes or results of the programme funding activities	• Output indicators from Performance and Evaluation Framework for each of five specific objectives; • Result indicators from Performance and Evaluation Framework for each of five specific objectives; • Impact indicators from Performance and Evaluation Framework for each of five specific objectives • Additional supporting indicators and contextual indicators from Performance and Evaluation Framework • Share of stakeholders who agree that the objectives have been achieved / been being achieved; • Share of stakeholders who agree that expected outputs, outcome/results, and impacts have been observed for specific objectives; • Qualitative evidence on outputs, outcomes/results and impacts which can be observed which were not expected;	• Desk study: programme documentation and data • Secondary data analysis • In-depth interviews: Strategic level, EU implementation actors, beneficiary level • Survey: beneficiaries and NCPs and national coordination centres • Public Consultation
EFFECT.01.2	In case intermediate targets have not been met or the expected progress has been delayed, what were the causes? Will it be possible to achieve the objectives on time? Were there any mitigating measures taken?	Attainment of objectives Underlying factors for delays Progress outlook	• Important differences and delays compared to target set • Mitigation measures and processes in place & lessons learnt	• Output, result and impact indicators from Performance and Evaluation Framework for each of five specific objectives• Share of stakeholders (EU and implementing level) who agree on the causes for observed delays• Share of beneficiaries who agree on the causes for observed delays• Qualitative evidence of mitigating measures being implemented	• Desk research: programme documentation and monitoring data.• Secondary data analysis • Interviews: Strategic level, EU implementing actors, beneficiaries.

EFFECT.01.3	To what extent does the programme attract the adequate target groups?	Attainment of the objectives Adequate targeting of the programme	• programme design responding to stakeholder needs	• Secondary analysis of programme documentation on the distribution of use of Digital Europe amongst different target groups • Qualitative evidence of barriers to participating in Digital Europe for specific target groups (Member States, sectors, types of organisations) • Share of stakeholders (EU strategic and implementing level) who feel that target groups are sufficiently reached, • Share of stakeholders (EU strategic and implementing level) who feel that more action is needed to include specific groups in Digital Europe	• Secondary data analysis • Survey EU implementing level, beneficiaries • Interviews EU strategic level • Desk research: programme documentation and reporting
Intended effect and benefits					
EFFECT.02.1	Have any concrete benefits of Digital Europe for public and private organisation and citizens already materialised?	Intended (and unintended) effects Benefits for public & private organisation & citizens	• Drivers for participation of beneficiaries and expected benefits • Type of (expected) benefits identified for end-users (public & private organisations, citizens) Unexpected benefits	• programme documentation describing activities and outputs along the specific areas which are used directly by: • citizens, • public organisations, • and private organisations • Stakeholder perspectives: beneficiary and user level) on concrete benefits generated by Digital Europe activities for:• citizens, • public organisations,• and private organisations• Stakeholder perspectives: representatives of public organisations, private organisations, and citizens	• Desk research: programme documentation• Secondary data analysis• Public Consultation• Surveys: NCP & national coordination centres• In-depth interviews: EU implementation actors, beneficiary level• Case studies
EFFECT.02.2	Could concrete benefits for users of HPC facilities, Testing and Experimentation facilities, Data Spaces, cloud to edge marketplaces, activities to				

	increase cybersecurity, advanced digital skills training initiatives, the European Digital Innovation Hubs, digital solutions, and services in the public and private sectors) already be identified?				
EFFECT.03	To what extent has Digital Europe already contributed to accelerating the digital transformation, increasing the digital competitiveness of Europe, or reinforcing strategic autonomy?	Intended effect Results and impacts on digital transformation, competitiveness & strategic autonomy	• Intended results and impact of the programme on digitalisation, competitiveness, and strategic autonomy	• Impact and contextual indicators from Performance and Evaluation Framework for each of five specific objectives • Share of stakeholder perspectives at EU level who see Digital Europe contribution along these dimensions • Share of stakeholder perspectives: beneficiaries, users, and wider society who see Digital Europe contribution along these dimensions	• Desk research: programme documentation; broader internationally comparative policy literature and documentation. • Interviews: EU stakeholders, EU implementing actors • Survey: NCPs, national contact centres • Case studies • Focus groups • Public Consultation
EFFECT.04.01	How do Digital Europe actions contribute to horizontal priorities, in particular to climate action and environmental sustainability and gender?	Intended effect Contribution to horizontal priorities	• Contribution to climate actions and Sustainable Development Goals• Contribution Gender equality	programme documentation and strategies for Digital Europe• EU programmes, strategies and documentation which contribute to gender priorities• EU programmes and strategies Data on indicators from Performance and Evaluation Framework for each of five specific objectives,• Data on Digital Europe actions relevant to horizontal priorities (via Digital Europe Performance data),• Stakeholder perspectives (strategic, EU implementing) on how Digital Europe contributes to EU 1) sustainability and 2) gender priorities	• Desk research: programme documentation, other policy documentation• Secondary data analysis• Interviews: EU strategic level• Case studies• Focus groups
EFFECT.04.02	Are there any, and if yes which, spill-over effect of actions funded under Digital Europe? (Please identify, describe and quantify (if possible)	Intended effect Intended spillover effect of actions funded under Digital Europe	• Contribution to ecosystem creation and support • Contribution to market creation • Leverage effect of Digital Europe • Positive and negative externalities of the programme	• programme documentation and reporting • Policy, research, or academic documentation • Qualitative information demonstrating spill-over effects from Digital Europe	• Desk research • Interviews: EU strategic level, EU implementing actors, beneficiaries • Focus groups • Case studies
Enabling factors & barriers					
EFFECT.05.01	Have there been any positive or negative external (outside of the implementation of the programme of the Commission	Enabling factors and barriers	• Internal and external enabling factors and barriers to the attainment of the objectives	• programme documentation citing external factors as a reason for delayed implementation of Digital Europe supported	• Desk research: programme documentation, other policy documentation

	and its implementing bodies) factors that have influenced the progress towards achieving the objectives of Digital Europe? How have these factors impacted the programme?		• programme design and policy mix allowing for the deployment of digital technologies	activities • Share of stakeholder perspectives (EU, implementing and beneficiary levels) who feel external factors have affected implementation and progress of Digital Europe	• Interviews EU strategic level, EU implementing actors • Surveys: NCPs, national contact centres. • Focus groups • Public Consultation
EFFECT.05.02	What is the awareness in the public and private sectors and among citizens of the programme, the solutions and services developed under Digital Europe? What is the level of awareness in the public of the synergies and complementarities among Digital Europe and other EU funded programmes with similar objectives?	Enabling factors and barriers• Effectiveness of programme communication and dissemination measures	• Awareness of the programme, solutions and services developed among public, private organisations and citizens• Awareness of the beneficiaries of the synergies and complementarities of the programme with other EU funding programme	• Share of stakeholders (beneficiaries and users) who are aware of Digital Europe• Share of stakeholders (beneficiaries and users) who are aware of the solutions generated via Digital Europe• Share of the wider society who are aware of Digital Europe • Share of wider economy participants who are aware of Digital Europe	• Interviews EU implementing actors• Public Consultation• Surveys NCPs and national contact centres• Interviews: EU strategic level, EU implementing actors, beneficiaries• Focus groups
EFFECT.05.03	To what extent are the activities and implementation arrangement suited to protect the EU's security interest and help reinforce the EU's strategic autonomy?	Enabling factors and barriers • Effectiveness of measures and arrangements to safeguard EU' security interest and reinforce strategic autonomy	• Adequacy of measures put in place to safeguard EU's interest (Art. 12) • International participation • programme design allowing to reinforce EU's strategic autonomy	• Share of stakeholders (EU implementing and beneficiary levels) who consider current implementation modes as sufficient to protect EU security interests • Share of stakeholders (EU implementing and beneficiary levels) who consider current implementation modes as sufficient to protect EU strategic autonomy • Policy, research, or academic reporting on Europe's digital strategic autonomy across the areas of: HPC, AI, CS, digital skills, deployment in economy and society, and chips. • Policy, research, or academic reporting on Europe's security interest across the areas of: HPC, AI, CS, digital skills, deployment in economy and society, and chips.	• Desk research • Survey NCPs and national contact centres, beneficiaries • Interviews: EU strategic level, EU implementing actors, beneficiaries • Focus groups • Case studies

EFFECT.05.04	What are the drivers for participation in the programme? What are the barriers to participation? In case some target groups/ sectors are not reached, what factors are limiting their access and what actions could be taken to remedy this?	Enabling factors and barriers• Drivers and barriers to participation	• programme design responding to stakeholder needs & addressing failures• Enabling factors & barriers to participation, additional measures needed	• Secondary analysis of programme documentation on the distribution of use of Digital Europe amongst different target groups• Qualitative evidence of barriers to participating in Digital Europe for specific target groups (Member States, sectors, types of organisations)• Share of stakeholders (EU strategic and implementing level) who feel that target groups are sufficiently reached,• Share of stakeholders (EU strategic and implementing level) who feel that more action is needed to include specific groups in Digital Europe	• Secondary data analysis • Survey EU implementing level, beneficiaries• Interviews EU strategic level• Focus groups (selections of EU or national implementing organisations?)• Desk research: programme documentation and reporting
EFFICIENCY					
Efficiency in implementation					
EFFIC.01	In which way do the different management modes of the programme allow for an efficient implementation (i.e. direct and indirect management by different implementing bodies) and an efficient achievement of the programme's objectives? How efficient is the implementation of the programme?	Efficiency in implementation	Efficiency in implementation across management modes		

EFFIC.01.1	How efficient is the design of calls for proposals and calls for tender or joint procurement?	Clarity & completeness of the calls design	• Adequacy of processes to design for calls of proposals and calls for tenders or joint procurement	• Satisfaction of applicants with the frequency, clarity & completeness of the information provided in the calls for proposals and tenders or joint procurement• Satisfaction of applicants with search function and publications of calls• Satisfaction of applicants with clarity of rules for eligibility, timeline & administrative & technical requirements of calls for proposals and tenders or joint procurements• Proportion of eligible/non eligible applications across the programme, the main work strands & calls• Average frequency of calls• Proportion of low-quality applications (clarity of calls)	• Secondary data analysis• Desk research: programme documentation, work programmes, guidelines for applicants & calls specifications • Public Consultation• Interviews with EU strategic level, EU implementing actors, beneficiaries• Surveys: NCPs, national contact centres, beneficiaries

EFFIC.01.2	How efficient is the application process? (19) How efficient is the management of calls? (20)	Application & selection processes programme design	• Application processes and time to inform & grant • Funding distribution and success rates over objectives, strands of activities and action types	• Satisfaction of applicants and participants with application & selection processes, including tools and resources• Mapping of the application & selection processes• Average Time-to-Inform across strands of work/calls• Average Time-to-Grant/Contract across strands of work/calls (time- elapsed between call deadline & contract)• Satisfaction of applicants with feedback from evaluator, appeal procedures • Case of complaints for maladministration to ombudsman• Level of budget appropriation of the programme • Funding distribution over specific objectives, main strands of work, stakeholder types, geographical areas & Member States• Funding distribution over implementation modes (action types, funding modalities), stakeholder types, geographical areas & Member States• Funding distribution over the Commission policy priorities and cross- cutting issues (policy flags)• Average funding per project, actions/measures, stakeholder types• Success rate of high-quality proposal vs funded proposal	• programme monitoring data• Review of programme documentation, work programmes, guidelines for applicants & calls specifications, review of complaints to EU ombudsman• Public Consultation• Interviews with EU strategic level, EU implementing actors, beneficiaries• Surveys: NCPs, national contact centres, beneficiaries• Secondary data analysis• Interviews with EU strategic level, EU implementing actors, beneficiaries• Surveys: NCPs, national contact centres, beneficiaries

EFFIC.01.3	How efficient are the implementation modes (grants, procurement, contribution agreements) to reach the objectives?	management of calls, projects, monitoring & reporting	• Responsiveness to flexibility needs in implementation processes • Satisfaction with project management, monitoring & reporting processes and proportionality of requirements • Satisfaction with tools and support provided	• Average time-to-pay across strand of work• Satisfaction of programme participants and beneficiaries with project management, monitoring & reporting processes, including support provided by Commission services, tools and resources• Frequency and severity of fraud detected and corrected• opinion of managing bodies on the effect of specific implementation modes• opinion of Commission and managing bodies on the level of transparency of specific delegated management modes such as contribution agreements or FSTP funding	• Secondary data analysis• Desk research: review of programme documentation, work programmes, guidelines for applicants & calls specifications • Public Consultation• Interviews with EU strategic level, EU implementing actors, beneficiaries• Surveys: NCPs, national contact centres, beneficiaries• Focus groups
EFFIC.01.4	How have the various communication activities contributed to increasing the visibility of the programme at EU level and supporting potential applicants? How have National Contact Points been supporting the participation in the programme?	Information & communication flow	• Contribution to communication activities to the programme visibility and uptake • Support of EU implementing actors to programme participation	• Mapping of communication and information channels of the programme available at EU level • Mapping of communication activities and support actions organised by National Contact Points • Satisfaction of applicants and participants with the level of information provided about the programme • opinion of participants on the support and information received by National Contact Points • Identified factors to facilitate and improve information and communication flow.	• Secondary data analysis • Desk research: review of programme documentation, work programmes, guidelines for applicants & calls specifications • Public Consultation • Interviews with EU strategic level, EU implementing actors, beneficiaries • Surveys: NCPs, national contact centres, beneficiaries • Focus groups
Cost-effectiveness & simplifications					

EFFIC.02	To what extent has the programme been cost-effective for the different stakeholders involved and implementing bodies? How can the programme be further simplified? (new umbrella question)	Cost-effectiveness	Cost-effectiveness of the programmes for EC, implementing bodies, applicants and participants	See below	See below
EFFIC.02.1	What is the extent of the administrative and financial burden on the Commission (including costs for eGrants and other IT tools, procurement-related costs, costs of external experts, costs related to contribution agreements, reporting requirements) and its implementing bodies (HaDEA, EuroHPC, ECCC and (future) ChipsJU)? Has any unnecessary administrative burden for the Commission been identified?	Cost-effectiveness of Digital Europe for the EC and implementing bodies	• Administrative and operational cost for EC and implementing bodies • Measures to reduce unnecessary burden	• Identified factors that facilitate and hinder programme implementation • Administrative vs. operational budget of the EC and implementing bodies and comparison with other EU programmes (Horizon Europe, KDT JU, SNS JU) • Share of administrative budget in the total programme budget • Share of administrative budget in total agency budget • Ratio of actual administration budget to actual operational budget of the programme • Operational and administrative budget per FTE • cost of external experts and evaluators • opinion of commission officials and implementing bodies on potential measures for the reduction of administrative burden	• Desk research: mapping existing information on other programme costs • CBA • Interviews with EU strategic level, EU implementing actors, • Desk research: mapping existing information on other programme costs

EFFIC.02.2	Were the administrative costs and level of financial investment for the Commission justified given the changes/effects which have been achieved?	Proportionality of costs	• Proportionality of administrative costs and financial investment versus programme benefits • Direct leverage effect of the programme	• Mapping of benefits/changes achieved (or expected too) vs costs• opinion of commission officials and implementing bodies on the adequacy of the level of financial investment compared to the changes/effects achieved• Direct leverage effect of project including in-kind contribution to operational objectives of	• Desk research: mapping existing information on other programme costs• CBA• Interviews with EU strategic level, EU implementing actors, • Desk research: mapping existing information on other programme costs
EFFIC.02.3	What is the extent of the administrative costs and financial burden on the different stakeholders involved in the implementation? What are the costs of applying to the programme and of participating in the programme (including reporting requirements)? Are these costs proportionate to the associated benefits?	Cost-effectiveness of Digital Europe for applicants and beneficiaries	• Cost for applicants and beneficiaries • Proportionality of costs of application and implementation versus programme benefits	• Mapping of administrative requirements (incl. security screening, financial reporting etc.) • Satisfaction of applicants and participants with the simplification measures (e.g. lump sum funding) • Application writing costs (resources spent/time) for applicants & participants • Direct costs for administration & project management of participants and beneficiaries (FTEs) • opinion of participants regarding the proportionality of costs of project management, monitoring & reporting compared to programme benefits • opinion of stakeholders on simplification measures related to application process, project management, monitoring & reporting	• Secondary data analysis • Desk research: mapping existing information on other programme costs • CBA • Interviews with EU strategic level, EU implementing actors, beneficiaries • Surveys: NCPs, national contact centres, beneficiaries
EFFIC.02.4	Have any inefficiencies in the overall implementation of the programme been identified? How could the programme's management be further simplified? How could costs and burdens be reduced?	Measures for cost and burden reduction	• Potential measures to decrease management and application costs and burdens	• Mapping of benefits/changes achieved (or expected too) vs costs and burdens• opinion of commission officials and implementing bodies on the adequacy of the level of financial investment compared to the changes/effects achieved• Mapping of benefits/changes achieved (or expected too) vs costs and burdens	• Desk research: mapping existing information on other programme costs• CBA• Interviews with EU strategic level, EU implementing actors
RELEVANCE					
Alignment of objectives with technological, political & socio-economic needs					

REL.01.1	How well do the original objectives of the programme correspond to the past current and emerging needs (21) within the EU? Is the programme future-proof?	Alignment of Digital Europe with current and emerging needs	• Alignment with failures and needs • Flexibility in the design of the programme	• Policy, research, or academic report and documentation which describe past, current and future needs in Europe across 9evolving needs): HPC, AI, CS, digital skills, interoperability and uptake, and chips • Share of beneficiaries who feel that Digital Europe supports their current and future needs • Share of stakeholders (EU implementing level) who feel that the Digital Europe programme support current and future needs in the EU	• Desk research • Secondary data analysis of monitoring data • Interviews: EU implementing actors, beneficiaries • Surveys: NCPs, National Contact Centres, beneficiaries • Focus groups • Public Consultation
REL.01.2	To what extent has Digital Europe adapted to recent technological developments that have occurred during the implementation of the programme?	Alignment of Digital Europe with technology development	• Trends in Technological development • Flexibility of Digital Europe versus technology developments occurring during the implementation of the programme	• Stakeholder agreement (EU strategic level, EU implementing level) on the most important technological developments have been affecting Digital Europe programme implementation • Policy, research, or academic reports and documentation on key technological developments • Share of beneficiaries who feel Digital Europe has adapted well to key technological challenges	• Desk research • Secondary data analysis of monitoring data • Interviews: EU implementing actors, beneficiaries • Surveys: NCPs, National Contact Centres, beneficiaries • Focus groups
REL.01.3	To what extent has the programme responded to relevant political, economic, and societal developments?	Alignment of Digital Europe with political, socio-economic developments and challenges	Trends in political, socio-economic challenges	• Policy, research, or academic reports and documentation on key political, economic, and societal developments• programme documentation, data and reports describing how Digital Europe and supported projects reacted to relevant developments• Share of beneficiaries and users who feel Digital Europe adapted well to relevant challenges.• Share of stakeholders (EU strategic and EU implementing actors) who feel the Digital Europe programme adapted well to relevant challenges.	• Desk research• Secondary data analysis of monitoring data• Interviews: EU implementing actors, beneficiaries• Surveys: NCPs, National Contact Centres, • Focus groups
Alignment with stakeholder needs					
REL.02.1	Which sectors or areas (based on NACE codes) are benefiting from Digital	Alignment with stakeholder needs	• Alignment of Digital Europe with sector specific needs	• Quantitative data on which sectors make most use of Digital Europe • Share of stakeholders (EU strategic level, EU implementing level) who feel that other	• Secondary data analysis programme data • Interviews EU strategic level, EU

	Europe? Should other sectors/areas also be addressed?		• Demand articulation & cross-sectorality of the programme	sectors can make more use of Digital Europe. • Share of stakeholders who feel other sectors should be more actively addressed to use Digital Europe.	implementing actors • Focus groups
REL.02.2	What are the main stakeholder groups benefiting from Digital Europe? Should other stakeholder groups also be addressed?		• Stakeholder profile of beneficiaries and applicants • Appropriate stakeholder groups involved in Digital Europe	• Quantitative data on which stakeholder groups make most use of Digital Europe • Share of stakeholders (EU strategic level, EU implementing level) who feel that other stakeholders can make more use of Digital Europe. • Share of stakeholders who feel other stakeholder groups should be more actively addressed to use Digital Europe.	• Secondary data analysis programme data • Interviews EU strategic level, EU implementing actors, beneficiaries • Focus groups
REL.02.3	How does Digital Europe address the needs of its main stakeholders?		• Adequacy of the targeting of the programme in view of objectives• Adequacy of Digital Europe programme activities & tools in view of stakeholder groups needs		
REL.02.4	What is the level of participation in the programme (What is the level of participation of Member States and public authorities in the programme? What is the budget consumption and level of subscription to calls?)		• Participation patterns and budget absorption across EU27	• Quantitative and qualitative data on the participation of Member States and their budget share when using Digital Europe	• Secondary data analysis of programme data
REL.03.1	What could be improved to ensure wide participation of relevant stakeholders?	Measures to ensure broad stakeholder participation	hindering factors and barriers to participation	• programme documentation, data, and reports providing insight on the use and the reasons for not using Digital Europe • Share of stakeholder perspectives (EU strategic level, EU implementing level) who agree on main reasons for main stakeholders not using Digital Europe • Share of beneficiaries who agree on the main obstacles preventing stakeholders from using Digital Europe • Stakeholder perspectives on how identified obstacles could be remedied to improve participation	• Desk research programme documentation and reports. • Surveys: NCPs, national contact centres, beneficiaries • Interviews: EU implementing actors, beneficiaries • Survey national implementing level • Focus groups
COHERENCE					
Internal coherence					

COH.01	To what extent are Digital Europe topics complementary or overlapping and what synergies have been created within the programme? Is there any potential for further complementarity within the programme?	Internal coherence in & between Digital Europe parts	• Complementarities & synergies in & between programme parts• Measures and mechanisms to foster complementarities & avoid duplications	• Mapping of objectives and assessment of the policy mix in relation with the programme intervention logic• Identified good practices to foster synergies• Identified gaps, overlaps and duplication & processes to address them• Mapping of the processes for strategic programming allowing for the identification of complementarities across topics• opinion of participants & stakeholders on synergies created within the programme	• Secondary data analysis• Desk research: programme strategy, calls and monitoring reports• Public Consultation• Interviews EU strategic level, EU implementing actors
COH.02	To what extent are the actions implemented under direct and indirect management complementary and have created synergies?	Internal coherence in & between Digital Europe parts under direct & indirect management modes	"• Complementarities & synergies in & between programme parts under different management modes • Measures and mechanisms to foster complementarities & avoid duplications "	• Mapping of synergies between different work strands under specific management modes • Identified processes to ensure the identification of complementarities and the creation of synergies across different management modes • Identified gaps, overlaps or duplication across activities funded under different management modes • Assessment of the division of labour between different management modes • Mapping of the portfolio of Multi-Country Projects • Identified processes to foster a coherent portfolio of multi-country projects	• Secondary data analysis • Desk research: programme strategy, calls and monitoring reports • Public Consultation • Interviews EU strategic level, EU implementing actors
External coherence					

COH.03	To what extent is Digital Europe coherent with wider EU policies and priorities?	External coherence with wider EU policies & priorities	External coherence - alignment with EU policy priorities	• Mapping of objectives assessment of the intervention logic against main EU priorities • Identified synergies & overlaps between policy framework (Research & Innovation, Single Market, Cohesion policy, Digital decade) • Views of participants and programme beneficiaries on the alignment of the programme with EU policy priorities	• Secondary data analysis• Desk research: programme strategy, calls and monitoring reports• Public Consultation• Interviews EU strategic level, EU implementing actors• Case studies

COH.04	To what extent is Digital Europe coherent with actions funded under EU programmes listed in Annex III of the Digital Europe Regulation, the Recovery and the Resilience Facility, the Digital Decade Policy programme objectives, and targets (22) and other EU programmes with similar objectives? Have synergies materialised? In which areas should synergies be fostered?	External coherence with actions funded under other EU programmes	Alignment with other EU programmes and funded actions	• Mapping of EU funding programmes and initiatives with similar objectives and their foreseen links with Digital Europe and their sequencing, downstream and upstream potential synergies• Share of project identified throughout the programme monitoring as synergetic with other EU programmes • Identified processes to ensure the identification of complementarities and the creation of synergies across different programmes• Identified rules and instruments facilitating the creation of synergies (funding rules & co-funding rates, rules of participation, identification of promising results, joint programming activities) • Assessment of the division of labour between different EU programmes • Mapping of the portfolio of Multi-Country Projects • Identified synergies with other EU programmes through MCPs • opinion of stakeholders on synergies between specific work strands and other EU programmes (Horizon, Space programme, CEF etc.) • opinion of participants & stakeholders on synergies created with other EU programmes	• Secondary data analysis • Desk research: programme strategy, calls and monitoring reports • Public Consultation • Interviews EU strategic level, EU implementing actors • Surveys NCPs, national contact centres • Case studies

COH.05.1	To what extent is Digital Europe coherent with other national or regional initiatives with similar objectives? To what extent have synergies been achieved?	External coherence with national & regional initiatives	Alignment with national or regional initiatives with similar objectivesPotential synergies achieved with MS & regional initiatives	• Identification of main regional and national funding programmes and initiatives with similar objectives and their foreseen links downstream and upstream potential links • Identified processes to ensure the identification of complementarities and the creation of synergies at different level • Identified rules and instruments facilitating the creation of synergies (cumulative funding, synergy grants etc.) • Assessment of the division of labour and sequencing with regional and national programmes • Identified synergies with other national and regional programmes through MCPs• opinion of stakeholders on synergies between specific work strands and regional and national programmes and policy • opinion of participants & stakeholders on synergies at regional and national level	• Secondary data analysis • Desk research: programme strategy, calls and monitoring reports • Public Consultation • Interviews EU strategic level, EU implementing actors • Surveys NCPs, national contact centres • Case studies
COH.05.2	What could be done to improve the coherence with other related national or regional initiatives to better contribute to EU digital policy objectives?	Measures to improve coherence with related national & regional initiatives	Measures to improve coherence with other related national or regional initiatives contributing to EU digital policy objectives		
EU ADDED VALUE					
EAV.01	Which benefits were achieved so far that go beyond what Member States could achieve on their own? Which concrete benefits does Digital Europe offer that go beyond the benefits of other existing national or regional initiatives with similar objectives? (23)	EU added value compared to national and regional support	• Public & private contribution for EU priorities mobilised (expected leverage effect) • Additionality of the FP compared to national and regional support (input, output, and behavioural additionality)	• Policy documentation and reports describing national or regional initiatives regarding digital technologies • Stakeholders (EU implementation level) indicate that comparable national or regional instruments exist and provide evidence on the concrete benefits these initiatives yield.• Perspectives of beneficiaries and users indicating that the Digital Europe programme has helped to achieve more concrete benefits than comparable national or regional initiatives	• Desk research: national level policy documentation on comparable initiatives• Secondary data analysis• Surveys NCPs, national contact centres, beneficiaries• Interviews EU implementing actors, beneficiaries• Case studies
EAV.02	To what extent does Digital Europe promote cooperation among Member States to achieve its objectives?	Added value to promote the digital transition	• Policy directionality • Creation and support to digital ecosystems • mechanisms and actions	• Policy documentation on the Digital Europe programme and the cooperation mechanisms it facilitates • Secondary analysis of programme data on size and nationalities in project consortia	• Desk research: national level policy documentation on comparable initiatives • Secondary data analysis • Surveys NCPs, national contact centres, beneficiaries

			promoting cooperation among MS	• Share of stakeholders (EU strategic and EU implementing level) who confirm that the Digital Europe programme cooperation mechanisms contribute to achieving programme objectives • Share of beneficiaries who indicate that the Digital Europe programme has promoted more cooperation between Member States than if they had not used it.	• Interviews EU implementing actors, beneficiaries • Case studies

Annex IV. Overview of Benefits and Costs

Overview of Costs and Benefits

Methodology

In order to arrive at a systematic overview of costs and benefits, the Better Regulation Toolbox #18 was followed to identify the main costs and benefits from the programme's logic – considering different objectives and expected impacts - and from a stakeholder perspective. These identified benefits and costs were structured in line with BR Tool #56, taking into account the Digital Europe-specific programme logic, with benefits falling into three levels: beneficiaries, end-users, and wider benefits, and costs in two levels: the European Commission (EC) and applicants/beneficiaries.

For each type of benefit and costs, relevant monetised, quantitative and qualitative evidence was gathered. Due to the nature of the programme, the relatively recent start of the activities (in engagement with end-users still being to some degree limited) and the interim character of the evaluation, monetised indicators were only available for a select number of benefit categories. In contrast, as expected, costs were relatively straightforward to monetise. A direct like-for-like comparison between costs and benefits is challenging, particularly because Digital Europe has largely consisted of infrastructure investments, whose benefits will emerge later, when end-users start to engage in larger numbers. As such, it is important to bear into account also the qualitative evidence, which has been incorporated along the quantitative evidence into a final judgement by the evaluator. The table below provides the main overview, with subsequent sections providing more detail regarding specific calculations.

<u>*Cost Table*</u>

Costs (see Table 1 below) were calculated by a number of different sources.

- **Funding Costs:** Calculated as actual until December 2024 (grants until 2 December 2024), based on EC's monitoring of budget commitments.
- **Staff Costs:** All implementation units estimated the total number of person-years over four years, dedicated to the preparation and implementation of Digital Europe, segmented by staff category. These staff costs were multiplied by the average staff cost per staff category to derive a total.
- **Expenses:** Provided directly in EUR.
- **Funding Costs Participants:** Based on project data.

- **Applicants: Staff cost & Expenses for preparing the application:** Based on the beneficiary survey combined with grant data. In the beneficiary survey, all participants were asked how many person months the preparation of their proposal took, as well as any additional expenses (e.g. travel, consultancy cost). Staff time was converted to total cost in EUR by multiplying with an assumed average staff rate of 125% of the EU average wage (EUR 31.8 per hour * 1.25 = EUR 39.75 per day, with 22 days making EUR 6,998 per month). Ranges were obtained from the lowest to the highest responses received for each question. Separate estimates were calculated for coordinators and partners. The total cost was achieved by multiplying the cost by the total number of applicants to date, for both partners and coordinators[209]. Additional details are provided later in this annex under 'administrative cost analysis'**.**

[209] Note that the analysis does not include application costs for procurement, financial instruments, or contribution agreements. For procurements, these application costs are generally integrated into the total price/cost of an offer through market forces. For financial instruments and contribution agreements, 'application costs' are accounted for as staff preparation time within the costs incurred by the European Commission or implementing bodies.

Table 1. Overview of Costs

Category	Type		Total Cost	Share
Funding Costs	Total spent on Grants (EC)	€	1.752.927.507	55,30%
	Contribution Agreement	€	382.716.200	12,07%
	Financial Instrument	€	91.693.750	2,89%
	Procurement	€	720.796.561	22,74%
	Programme Support Actions	€	67.922.943	2,14%
	Total	€	*3.016.056.962*	*95,14%*
Administrative Costs - Expenses	Experts	€	741.800	0,02%
	Studies	€	2.017.783	0,06%
	IT Tools	€	28.477.522	0,90%
	Communications	€	9.487.508	0,30%
	Meeting/Committee Representations	€	1.009.849	0,03%
	Total	€	*41.734.462*	1,32%
Administrative Costs- Staff Costs - Preparation	Policy strategy formulation Policy/programme strategy preparation costs	€	17.003.230	0,54%
	Programme implementation preparation costs: Designing application procedures for funding calls (including assessment criteria and processes); establishing DEP website etc.	€	1.337.328	0,04%
	Total	€	*18.340.558*	0,58%
Administrative Costs - Staff Costs - Implementation	Implementation of direct funding calls (Grants & Procurements): design of calls, communication of calls, application assessment, contracting, management of implementing bodies	€	54.757.625	1,73%
	Implementation management: Performance management, Compliance, Audit and Control, Monitoring and Reporting, agency supervision	€	33.473.070	1,06%
	Programme management overheads: programme-level monitoring & management, IT-costs, IT developers, general communication costs etc	€	1.626.000	0,05%
	Costs associated with Articles 12.5 and 12.6 (LE of associated countries under SO1, 2, 3 & 6) and other restrictions	€	2.667.333	0,08%
	Costs associated with association agreements	€	1.375.633	0,04%
	Total	€	93.899.661	2,96%
Total EC	Total EC Cost	€	3.170.031.642	100,00%
	Total Overhead %		4,857%	
Co-Funding Costs: Beneficiaries	Total co-funding costs for grants	€	1.413.458.579	
Administrative Cost of Application & Participation: Accessing and using the DEP	Staff Costs for preparing an application/proposal	€	414.593.813	21%
	Expenditure for preparing an application/proposal	€	105.082.878	5%
Total Beneficiaries / Applicants	*Total Beneficiary Costs*	€	*1.933.135.270*	39%
Grand Total	*Grand Total Costs*	€	4.949.192.232	100%

Benefits

The benefits are presented in table 2 below. Information regarding the calculation method is provided in the calculation notes table.

Table 2. Overview of benefits

Stakeholder and Benefit type	Benefit	Type of Benefit	Qualitative overall judgement	Key Quantitative KPIs	Calculation Notes
programme beneficiaries					
Beneficiaries: Leverage of Funding	Co-funding unlocked from other funders	Economic	(++)	(++) EUR 1.41 billion direct leverage; EUR 2.3-7.0 billion total leverage from Digital Europe funding on grants (including direct leverage)	See Leverage Analysis
Beneficiaries:	Stronger networks	Economic	(+-++)	Access to new industry partners (36.7% of beneficiaries), new academic partners (28.2%)	Beneficiary survey data
	New products/services	Economic	(+-++)	Products/services already developed (38.6%), or expected (38.0%)	Beneficiary survey data
Stakeholder and Benefit type	**Activities**	**Type of Benefit**	**Qualitative overall judgment**	**Key Quantitative KPIs**	**Calculation Notes**
End-users					
Firms: total perceived value of services	Willingness to pay	Economic	(+-++)	EUR 115m – EUR 222m	8.0k-15.3k value per organisation (EDIH mini-survey); 14289 EDIH firms supported so far; Digital Skills: 6.5k-14.4k per SME; 219 SMEs supported so far; 2.7k-3.7k per Large Company; 157 large companies supported
Firms: Increased Productivity	Higher productivity	Economic	(++)	est. 10.5k- 11.1k firms indicating medium or high impact	47.9% (EDIH end-user), 55.6% (beneficiary assessment); 19910 firms supported so far
	Lower costs	Economic	(++)	est. 7.8k-9.6k firms indicating medium or high impact	39.1% (EDIH mini-survey); 48.1% (beneficiary assessment); 19910 firms supported so far
	Number of employees trained in the organisation (by gender)	Economic	(+)	20 713 individuals trained	From Performance Indicators
	Increased quality of work	Societal/Economic	(++)	est. 9.8k-11.4k firms indicating medium or high impact	49.7% (EDIH end-user); 57.0% (beneficiary) 19910 firms supported so far

Firms: Better Market Position	Increased exports for affected products/services	Economic	(+)	est. 4.1k-4.5k firms indicating medium or high impact	20.71% (EDIH end-user mini-survey), 22.7% (beneficiary assessment); 19910 firms supported so far
	Faster scale-up of start-ups	Economic	(+)	est 5.3k - 6.6k firms indicating medium or high impact	26.6% (EDIH end-user mini-survey); 32.9% (beneficiary assessment)
	Wider Service Offering	Economic	(++)	est. 7.8k firms indicating medium or high firms	39.1% of firms responding to EDIH end-user mini-survey; 19910 firms supported so far.
	Avoided costs of cybersecurity damages	Economic	(+)	est 3.0k-6.9k firms indicating medium-high impact	15.0% of firms responding to EDIH end-user mini-survey; 34.4% of beneficiaries
Governments/public organisations: perceived value of Digital Europe	Willingness to pay	Economic	(+)	EUR 6.4m - EUR 13.3m	3.96k - 8.21k value per organisation (EDIH-mini survey) 1621 public organisations supported
Governments/public organisations: better and safer public service delivery	Better public services	Economic/Societal	(+)	37.7% of beneficiaries indicated a medium or high impact	
	Lower cost of service	Economic/Societal	(+)	28.6% of beneficiaries indicated a medium or high impact	
Stakeholder and Benefit type	**Activities**	**Type of Benefit**	**Qualitative overall judgment**	**Key Quantitative KPIs**	**Calculation Notes**
Wider society and economy					
Wider economic benefits	Increased innovation and productivity growth rates	Economic	(++)	56.8% (EDIH end-user mini-survey) 52.4% (beneficiary assessment); 12-22bn EUR cumulated GDP impact by 2030 (Rhomolo)	
	Increased labour productivity and wages	Economic/Societal	(+)	20.71% (EDIH end-user mini-survey); 26.9% (Beneficiary assessment)	
	Reduced reliance on international suppliers / higher strategic autonomy	Economic	(0/+)	16% (EDIH end-user mini-survey), 41.7% (Beneficiary Assessment); 0.010-0.025% increase in exports by 2030 (Rhomolo)	
	Increased resilience of strategic EU sectors	Economic	(+)	35.5% (EDIH end-user mini-survey); 43.4% (Beneficiary Assessment)	
Wider environmental benefits	Faster Green Transition	Environmental	(+)	30.8% (EDIH end-user mini-survey); 36.5% (Beneficiary Assessment)	

Leverage analysis

The co-funding and leverage ratios for Digital Europe projects are based on grant data and the beneficiary survey. The grant data provides information on direct co-funding ratios within the total project cost envelope. The beneficiary survey data (see Table 3) offers insights into leveraged funding beyond the originally identified project costs (indirect leverage). This funding includes both internal as well as external investment to increase the scope, scale or duration of the project activities, and are a measure of perceived effectiveness and investment sustainability. This indirect leverage, based on the survey data is calculated per SO, is then extrapolated to the total portfolio using the grant data per SO (see Table 4).

Please note that leveraged funding (including direct leverage co-funding or indirect leverage) does not directly translate to insight on the ultimate source of the funding. For instance, SMEs or public authorities providing direct co-funding to Digital Europe may have been able to source some of that funding through national co-funding schemes.

Note that we excluded the limited responses received for SO6 (which has only recently launched) from this calculation. When respondents indicated uncertainty or found it too early to provide data, we assumed 0 leverage/co-funding for that specific category, as we are aiming to measure the currently known co-funding, and it is highly unlikely that task leaders are unaware of substantial co-funding for their organisation for a specific project.

To address potential double counting of external leverage and an organisation's own co-funding to the project, we report two leverage calculations: one including full double counting and one without it, presenting the final result as the ranges between them. We also reviewed the sensitivity to outliers. A distribution analysis reveals that there are no clear statistical outliers for each of the categories. We do note that the top three values for MS/Regional funding account for a large share (~16%) of the total, but from the desk research it is understood that some projects indeed have substantial local co-funding. We therefore elect to not remove outliers from the analysis.

Table 3. Aggregated responses from the beneficiary survey, per SO, on co-funding

Row Label	Count of National/Regional/Local Public Funding:	Average of Int. Add. Leverage (min)	of Int. Add. Leverage (max)	Average of MS/Regional/Local (max)	Average of MS/Regional /Local (min)	Average of Int Pub Leverage (min)	Average of Int Pub Leverage (max)	Average of Private Leverage (min)	Average of Private Leverage (max)	Average of EU Leverage (min)	Average of EU Leverage (max)
SO1	45	9,91	16,78	€ 450.000,00	€ 175.000,13	€ 11.111,13	€ 24.444,44	€ 4.444,49	€ 26.666,67	€ 68.888,89	€ 144.444,44
SO2	189	14,06	23,25	€ 703.816,79	€ 296.183,30	€ 2.645,51	€ 14.285,71	€ 22.222,30	€ 66.137,57	€ 94.179,93	€ 249.735,45
SO3	222	13,08	21,33	€ 605.161,29	€ 257.419,41	€ 450,46	€ 3.153,15	€ 1.801,83	€ 12.162,16	€ 50.450,46	€ 120.270,27
SO4	213	11,06	18,73	€ 559.440,56	€ 211.188,92	€ 23.474,20	€ 60.563,38	€ 35.680,80	€ 89.671,36	€ 57.746,50	€ 129.107,98
SO5	362	12,36	20,40	€ 503.891,05	€ 201.556,56	€ 11.049,74	€ 29.005,52	€ 12.154,76	€ 46.685,08	€ 72.375,73	€ 183.701,66
Grand Total	**1031**	**12,45**	**20,62**	**€ 570.891,36**	**€ 231.615,70**	**€ 9.796,33**	**€ 27.061,11**	**€ 16.294,92**	**€ 50.824,44**	**€ 68.477,23**	**€ 169.156,16**

Table 4. Calculations to extrapolate total co-funding/leverage

SO	EU Contribution (Av)	Direct : Av Participant Co-funding	Indirect: Additional (follow-up) leverage	Indirect: MS/Local/ Regional Leverage	Indirect: Other EU Funding Leverage	Indirect: Int. Pub. Leverage	Private Leverage	Total Leverage
SO 1	€ 504.155	€ 285.412	€ 67.277	€ 312.500	€ 106.667	€ 17.778	€ 15.556	€ 805.189
SO 2	€ 362.976	€ 294.577	€ 67.727	€ 500.000	€ 171.958	€ 8.466	€ 44.180	€ 1.086.907
SO 3	€ 492.295	€ 367.967	€ 84.688	€ 431.290	€ 85.360	€ 1.802	€ 6.982	€ 978.089
SO 4	€ 267.306	€ 197.056	€ 39.820	€ 385.315	€ 93.427	€ 42.019	€ 62.676	€ 820.312
SO 5	€ 153.637	€ 140.800	€ 25.168	€ 352.724	€ 128.039	€ 20.028	€ 29.420	€ 696.177
Average	€ 274.710	€ 221.511	€ 45.427	€ 401.254	€ 118.817	€ 18.429	€ 33.560	€ 838.996

SO	Leverage Factor 1	Total leverage (excluding double-counting	Total leverage (excluding double-counting	Number of Participations	Total	Total (excluding double counting)
SO 1	160%	€ 519.777	103%	160	€ 128.830.251	€ 83.164.286
SO 2	299%	€ 792.330	218%	1.274	€ 1.384.719.116	€ 1.009.428.318
SO 3	199%	€ 610.122	124%	977	€ 955.593.306	€ 596.089.673
SO 4	307%	€ 623.257	233%	791	€ 648.867.142	€ 492.995.971
SO 5	453%	€ 555.378	361%	3.159	€ 2.199.224.604	€ 1.754.438.070
Average	305%	€ 617.486	225%	6361	€ 5.336.855.371	€ 3.927.827.002

Administrative costs analysis

In order to estimate the administrative costs both during the application phase and the project implementation (the latter not added to the CBA as it overlaps with funding costs but is included for efficiency analysis), we rely on data from the beneficiary survey. This data is then projected across the entire portfolio using grant data. We start with the reported average person-months spent on proposals and project administration as presented in the beneficiary survey, which had a high coverage of all beneficiaries. These efforts are monetized based on an assumed average daily cost of 125% of the minimum wage (https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Wages_and_labour_costs) translating to EUR 6 998 per month. This estimate was chosen as it is assumed that staff working on Digital Europe proposals are typically more skilled and paid higher wages than the EU average. We then multiply these costs by the total number of applicants, separately for coordinators and other partners, after which we present a total aggregate.

From a point of sensitivity, we observe linear sensitivity to the labour rate assumption. Moreover, we note sensitivity to outliers in the data. When removing the three highest values for each type of indicator, we note a particular sensitivity in application expenses (cash), whereas the other values stay within a 5% range of the original estimate. We recognise that some proposals might have incurred very large application expenses due to the size of some of the grants, though there is a risk of overreporting. We therefore present the original values for all estimates, except for application expenses. For these, we present the middle value between the value without and including outliers. The adjusted value for application expenses is therefore EUR 12.9k for Coordinators and 31.3k for other Participants.

Table 5. Background Data

Cost per month	6996	Total AdminPartners	5839
Total number of applicants	9758	Total Admin Coordinators	549
Total number of coordinators	1137	Total	6388

Table 6. Analysis of Cost for Applicants (Partners)

	Average of ApplicationCostPMLow	Average of ApplicationCostPMHigh	Average of AdminCostMin	Average of AdminCostMax	Average of ApplExpenses
Person Months	1,86	2,50	2,71	3,52	9732,77
Monetised	€ 13.036,72	€ 17.506,90	€ 18.957,41	€ 24.619,10	€ 9.732,77
Estimated total	€ 127.212.362	€ 170.832.316	€ 113.687.606	€ 147.640.735	€ 94.972.376

Table 7. Analysis of Cost per Applicants (Coordinators)

	Average of ApplicationCostPMLow	Average of ApplicationCostPMHigh	Average of AdminCostMin	Average of AdminCostMax	Average of ApplExpenses
Person Months	3,12	3,85	9,49	10,42	49837,05
Monetised	€ 21.825,68	€ 26.925,39	€ 66.407,83	€ 72.905,50	49837,04938
Estimated total	€ 237.790.772	€ 293.352.176	€ 35.063.332	€ 38.494.102	€ 542.974.653

Table 8. Totals Summed across coordinators and applicants (without outliers)

Total ApplicLow	€	365.003.134
Total Applic High	€	464.184.492
Average Application cost total	€	414.593.813
Total Apll Expenses	€	637.947.029
Total Appl Expenses (adjusted for outliers)	€	105.082.878
Total Admin Low	€	147.150.231
Total AdminHigh	€	183.776.034

Willingness to Pay Analysis

In order to calculate the value delivered for end-users, a willingness to pay analysis was carried out based on the end-user survey data, in particular for EDIH and Digital Skills. For HPC, the number of users so far supported under Digital Europe is too low (and as such the value cannot be attributed to Digital Europe but rather to predecessor programmes), for TEFs the number of responses was too low to generate reliable estimates. The number of users comes from the end-user data provided by the EC. The results are presented in the table below. Note that these represent the total value perceived, subtracted by any payments made to receive the service (as asked for in the survey to the end-users), thus representing the surplus/additional value generated by Digital Europe.

Table 9 below shows the extrapolation of the total willingness to pay based on the end-user surveys for EDIHs and the digital skills training. In line with the sensitivity analysis principles (see below), the range of benefit per user is based on the average of survey responses, where the low estimate corresponds to the situation where all responses are on the lower end of the answer ranges presented in the questionnaire, whereas the higher range responds to the higher range. The average is the midpoint between these two. The figures are multiplied with the total number of users (per 1 Jan. 2025) in order to arrive at the total estimates (for the three different estimates) in order to arrive at portfolio-level figures.

Table 9. Willingness to pay analysis

EDIH Added Value	**Total Users**	**Minimum Range**	**Average Range**	**Maximum Range**	**Lower Total**	**Average Total**	**Higher Total**
Public Organisations	1621	€ 3.960	€ 6.085	€ 8.210	€ 6.419.290	€ 9.863.461	€ 13.307.632
SMEs	14289	€ 7.972	€ 11.638	€ 15.304	€ 113.913.600	€ 166.292.703	€ 218.671.806
Total	15910				€ 120.332.890	€ 176.156.164	€ 231.979.437
Total Contribution/Total Cost	322.902.157	619.699.238					
Digital Skills Training Added Value		**Minimum Range**	**Average Range**	**Maximum Range**	**Lower Total**	**Average Total**	**Higher Total**
Individuals	20713	€ 656	€ 836	€ 1.015	€ 13.596.790	€ 17.311.537	€ 21.026.284
SMEs	219	€ 6.464	€ 10.422	€ 14.380	€ 1.415.689	€ 2.282.501	€ 3.149.314
Large Companies	157	€ 2.675	€ 3.212	€ 3.749	€ 419.975	€ 504.315	€ 588.656
Academic Institutes	329	€ 1.342	€ 1.684	€ 2.026	€ 441.587	€ 554.019	€ 666.450
Total	21418				€ 15.874.041	€ 20.652.373	€ 25.430.704
Total Contribution/Cost	273.787.470	€ 421.056.311					

Robustness and Sensitivity Approach

In order to ensure the robustness of the estimates produced in the cost-benefit analysis, we implemented the following approaches:

1. **Reported Data Ranges**: When data is collected in **ranges** (in particular in the surveys), we report the aggregate upper and lower bounds, as well of the middle of the range.
2. **Scenario Testing for Key Assumptions**: For key **assumptions**, such as the level of spillover in the Rhomolo-analysis, the study team/JRC worked with multiple **scenarios** to test the sensitivity of outcomes to various parameters. These ranges are transparently reported in the report.
3. **Addressing Survey Overreporting Risks:** For areas where there was a risk of **misinterpretation** or **overreporting** by the survey respondents (in particular in the leverage analysis), we reported both the aggregated direct results and a conversative estimate that accounts for maximal overreporting. This provides a comprehensive total result range.

ANNEX V. STAKEHOLDERS CONSULTATION – SYNOPSIS REPORT

Introduction

This document summarises and analyses the key findings from all consultation activities carried out for the interim evaluation of the Digital Europe programme (hereafter referred to as Digital Europe).

Overview and method of stakeholder consultation strategy

The consultation strategy encompasses numerous activities targeting stakeholders, applicants and beneficiaries of Digital Europe, as well as end users of infrastructures, tools, and services funded by Digital Europe.

The following consultation activities took place:

- **Public Consultation** on the Commission's 'Have your Say' Portal, alongside the simultaneous publication of the Call for Evidence.
- **Targeted stakeholder surveys** with beneficiaries, applicants, end users and stakeholders of the cybersecurity National Coordination Centres (NCCs).
- **Interviews** with implementing bodies of the programme, beneficiaries, end users and other stakeholders.
- **Focus groups and workshops**
- A policy **event** with stakeholders to validate and concretise the findings of the evaluation.

Triangulation was performed across all consultation activities to ensure consistency and relevance of the findings from stakeholder views.

Call for Evidence and Public Consultation

The Commission published a Call for Evidence from 27 June to 20 September 2024 on the 'Have your say' portal to gather citizens' and stakeholders' views on the scope and planned methodology of the interim evaluation. A public consultation was launched simultaneously[210]. A total of 103 online contributions and 35 position papers were submitted in response to the Call for Evidence, and 790 questionnaires were received in response to the public consultation. A report summarising the findings of this public consultation is available on the 'Have your Say' portal (Digital Europe programme – interim evaluation).

Through the analysis, a campaign by the Free Software Foundation Europe was identified promoting the use of free and open-source software. Manual review of these individual answers revealed that several messages were either duplicated or very similar, repeatedly emphasising

[210] This survey included 11 identification questions, 64 closed questions with branching sub-questions, and 17 open-text sections.

funding challenges and community support.

Targeted Stakeholder Surveys

All surveys were launched on the EU Survey portal[211].

Survey	Date	Responses
Beneficiary Survey	July 12 – Sept.13, 24	1 159
Applicant Survey	July 12 – Sept.13, 24	58
NCC Survey	July 30 – Sept. 30, 24	78
End User Survey[212]	Oct. 10, 24 – Jan. 10, 25	431
Synergy Survey	Nov. 13- Dec. 4, 24	30

Interviews

A total of 102 interviews were conducted, categorised as follows:

- Beneficiaries: 52 interviews,
- Implementing Bodies: 28 interviews
- EU Level Stakeholders: 14 interviews
- End Users: 6 interviews
- Other: 1 interview

The interviews included the following categories of stakeholders:

Types of organisation	Number of Interviews
public bodies	40
research organisations	23
private businesses	14 (13 SMEs and 1 large enterprise)
higher education institutions	10
non-governmental organisations (NGOs)	8
intergovernmental organisations	3
non-profit organisations	2
international financial institution	1
other	1

[211] EUSurvey - Welcome

[212] The survey covered four services (Advanced Digital Skills, Testing and Experimentation Facilities, European Digital Innovation Hubs, and High-Performance Computing).

Focus groups

In November 2024, six focus groups were conducted, each focusing on one of the six objectives of the Digital Europe programme. Participants were identified through desk research, stakeholder mapping, scoping interviews, surveys, and expert recommendations. In total, **49** participants contributed to these focus groups.

Workshops

The Commission gathered input on the programme's performance through several workshops with overall more than 100 participants:

- A workshop at the conference on the future of digital investments in the EU organised in the context of the Danish presidency of the Council of the European Union[213],
- a stakeholder workshops on the implementation of the programme at the 'From Research to Reality – digital solutions for European challenges' event[214] in the context of the Belgian presidency and
- a workshop with representatives of the European Digital Innovation Hubs (EDIHs) at the EDIH summit[215].

Policy workshop

On 11 September 2025, a final online policy workshop was held to concretise the recommendations of this evaluation. The workshop focused on three recommendations where input from beneficiaries and Member States representatives was beneficial:

1.) vertical alignment between the Digital Europe programme with Member States with regards to co-funding mechanisms,
2.) clarification of state aid rules,
3.) simplification measures at both the application and project management phases.

Participants included Member States' representatives as well as beneficiaries, representatives of network organisations and National Contact Points. In total, 60 participants contributed to the policy workshop.

To analyse the feedback numerous **quantitative and qualitative methods** were applied. The data was, for instance, synthesised and analysed with the findings coded and categorised using the text analysis software NVivo and the analysis of individual responses was conducted using RamGPT, an AI proprietary tool developed by Ramboll. Profiling of respondents, including geographic distribution and stakeholder types, as well as analysis of closed questions, was completed through descriptive statistics.

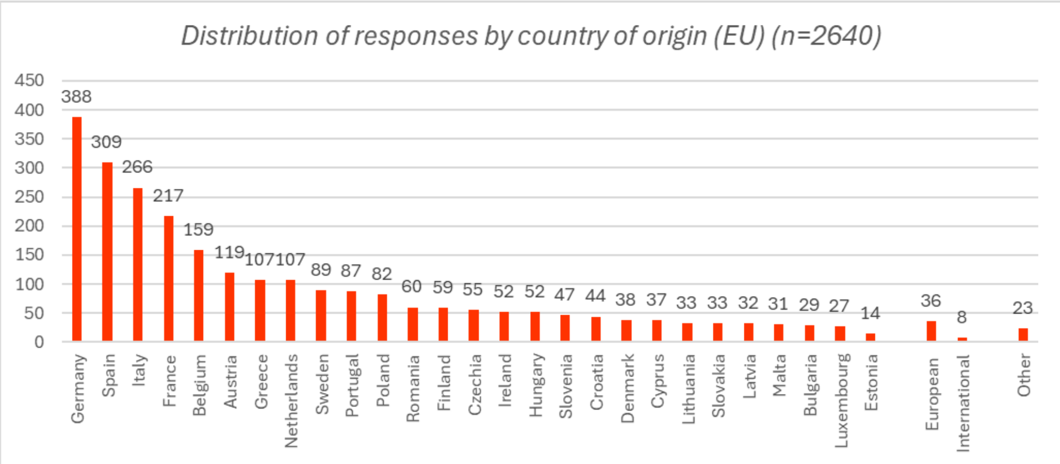
[213] Conference | The Future of Digital Investments in the EU, final report to be expected in October 2025
[214] From Research to Reality – digital solutions for European challenges | Shaping Europe's digital future
[215] EDIH Network Summit 2024 | European Digital Innovation Hubs Network

Participating stakeholder groups

This section provides an overview of the stakeholder groups involved in the various consultation activities[216]. **Error! Reference source not found.** and **Error! Reference source no t found.** below illustrate the distribution of responses by country of origin.

The majority of respondents (96%) came from **EU countries**. The most represented country was Germany (15%), followed by Spain (12%) and Italy (10%). Among non-EU countries, Norway had the highest representation (24%), followed by United Kingdom (10%) and the United States (9%). Both Liechtenstein and Turkey participated with 8% of participants each.

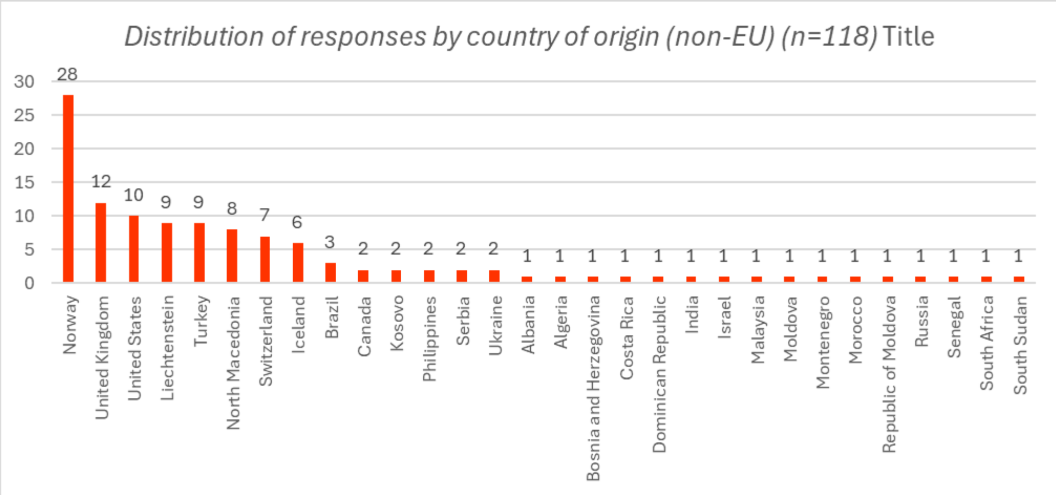
. Figure 1. Distribution of responses by country of origin (EU) (n=2640)[217]



[216] Participant data was not collected at the workshops organised by the Commission as participants could move freely among different sessions.

[217] Includes data from surveys and policy workshop. The 22 participants who selected the option 'Other' are specific to the end-user survey, where further specification of their geographical origin was not possible. Additionally, the label 'EU/international' refers to stakeholders operating across multiple Member States or within European/international institutions and agencies.

Figure 2. Distribution of responses by country of origin (non-EU) (n=118)[218]

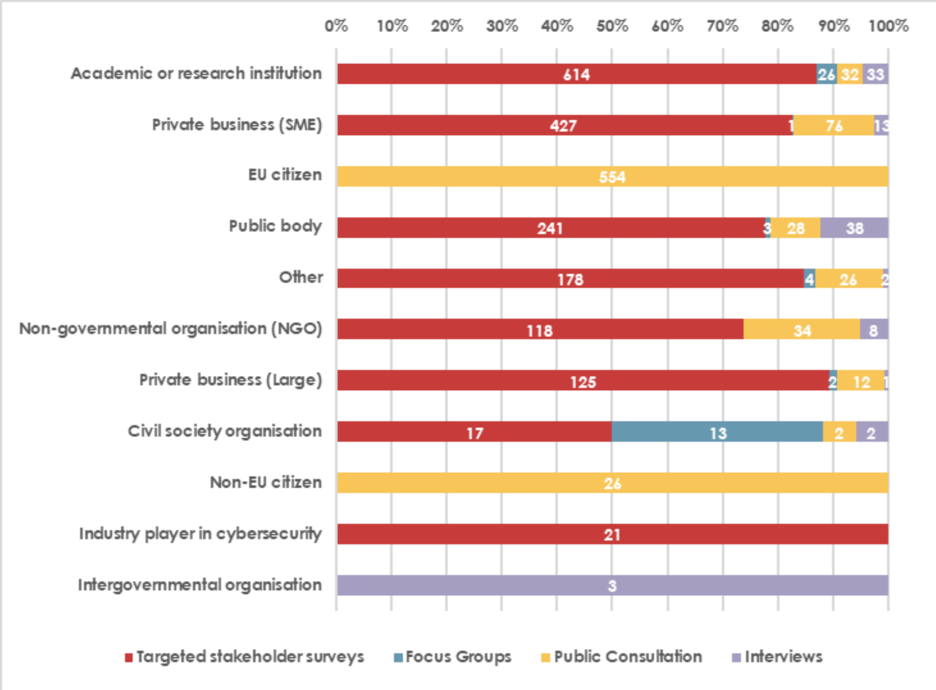


The stakeholder groups involved in the consultation included private businesses (both SMEs and large enterprises), academic or research institutions, public bodies[219], civil society organisations, non-governmental organisations (NGOs), and intergovernmental organisations. Additionally, in the context of the NCC survey, participants included other stakeholder categories, such as industry players in cybersecurity.

As shown in **Error! Reference source not found.**, the most represented stakeholder categories w ere **academic or research institutions** (26%), followed **by EU citizens** (22%), and private businesses (**SMEs)** (19%)[220].

[218] Includes data from surveys and policy workshop
[219] Excluding research organisations and education establishments.
[220] In the Public Consultation, EU citizens were the largest group of respondents. Therefore, the distribution of the responses was mainly driven by the perspectives of EU citizens, rather than by those of businesses and other groups of stakeholders.

Figure 3. Distribution of responses per type of respondent (n=2680[221])



Main findings of the consultations

Effectiveness

The public consultation showed that Digital Europe has already been effective in boosting the **EU's global competitiveness** and in digitally transforming public organisations. In the future, Digital Europe is expected to contribute even more to enhancing the EU's global competitiveness and driving the digital transformation of EU governments and public organisations. Initial results show **increases in the EU's competitiveness on a global scale** and **digitally transforming EU governments and public organisations.** On the other hand, **inadequate knowledge** of the programme and a lack of resources to prepare proposals hindered participation.

- 61% of respondents in the **public consultation** (mostly research institutions, companies and NGOs) were aware of the programme but lacked detailed knowledge of its objectives and priorities. Meanwhile, 26% had in-depth knowledge (mostly EU citizens and companies), and 14% were not very familiar with the programme or its objectives.
- **Beneficiaries** particularly valued the programme's dual focus on SMEs and the public

[221] The total is higher than the total of participants per country of origin (including both EU and non-EU countries) because the questionnaire for Advanced Digital Skills (as part of the end user survey) was open to a broader group of participants, including individuals who are not currently employed. Respondents had the opportunity in an earlier question to specify whether they were individuals not currently employed (e.g. full-time students, individuals between jobs), company managers/owners whose employees benefited from the training. Not all respondents were directly affiliated with organisations or institutions.

sector, however, highlight several challenges, such as coordination between partners and Member States, clarity on implementation modalities, and the 50% funding rate. These issues particularly affect publicly funded organisations (higher education and research organisations) and SMEs without access to additional co-funding at national levels.

Furthermore, beneficiaries have noted significant advantages in areas such as networking, organisational development, and market positioning. For instance, 53% gained access to new academic partners, 58% enhanced their institutional reputation, 53% strengthened strategic partnerships at the EU and international levels, 44% expanded their workforce, and 35% launched innovative products or services.

Respondent who selected the option 'other' mentioned benefits such as building a **large network**, **increased competitiveness** and **increased awareness of current capabilities**.

- Interviewees noted that universities and research organisations struggle to **co-finance the 50% co-funding rate,** as not all Member States have established co-funding mechanisms in place. Companies are also sometimes hesitant to co-finance Digital Europe projects due to uncertainties regarding market readiness and the potential long-term value of the supported technologies.
- **EU-level stakeholders** saw the programme as an important enabler of cross-border ecosystem development and highlighted progress in the use of advanced digital infrastructure.
- **Implementing bodies** pointed to the successful rollout of initiatives such as the extensive EDIH network as evidence of the programme's effectiveness in laying a strong operational foundation.
- Stakeholders in the **policy workshop** reported difficulties securing national co-funding, due to unclarity regarding the identification of responsible authorities at national level, and duplicated burden to apply and report at EU and national levels. Beneficiaries in Member States with structured co-funding frameworks experienced smoother project starts, while fragmented or ad hoc arrangements in some Member States constrained accessibility.
- The analysis of the **position papers** highlights that the programme has significant potential for **driving the digital transformation** and fostering skills development. However, its effectiveness is hindered by **limited participation of SMEs**, due to complex funding structures (e.g. funding conditions vary between sub-programmes and often require a detailed review of work programmes and tender documents, with key information sometimes only available in English), administrative burden, and insufficient funding rates. Public bodies also face barriers, further limiting the programme's reach. Furthermore, **aligning Digital Europe with national co-funding mechanisms** could enhance efficiency, reducing delays and leading to better overall outcomes.
- An analysis of the online contributions to the **Call for Evidence** highlighted the programme's effectiveness in **fostering innovation** and **sectoral transformation**, particularly in areas such as agriculture, health, and manufacturing. While the

programme's focus on **digital literacy** and **accessibility** has helped to bridge the digital divide, supporting free and **open-source solutions** could further promote technological autonomy[222].

- The **surveys for end-users**[223] revealed several **benefits** for users of infrastructures, services, and IT tools funded by Digital Europe, including:
  - **Strengthened Collaboration and Networking Opportunities** with 69% of respondents rating it as having at least a medium impact.
  - **Improved Access to Technology Testing and Innovation Support** with 68% of respondents rating it as having at least a medium impact.
  - Respondents who selected the option 'other', mentioned additional benefits, such as **improved research infrastructure**, **improved knowledge of new technologies**, and **increased awareness of how digital technologies can optimise day-to-day operations and give strong insights for future decisions**.
- When asked about how much end users would be willing to pay for the services provided by the programme, responses varied significantly. The most highly valued work strand was High-Performance Computing (HPC), with a maximum willingness to pay EUR 39 504, and a minimum of EUR 14 942, whereas the European Digital Innovation Hubs have a maximum value for SMEs of EUR 11 936 and a minimum value of EUR 7 972. Students benefiting from advanced digital skills trainings value these trainings between EUR 656 and EUR 1 015.

  Many **stakeholders consulted rated the ease of accessing the services and infrastructures positively**, with 87% considering them at least moderately easy to access. In contrast, 5% found the services difficult or very difficult to access. Access difficulties were attributed to **administrative barriers**, **registration challenges**, **unclear roles** in certain situations, as well as **difficulties in accessing and utilising HPC systems**, **technical failures**, **language barriers**, and **lack of experience**.

Different **drivers** and **bottlenecks** for the **implementation** of Digital Europe were identified during the **focus groups**, as summarised in the table below.

Table 1. Drivers and bottlenecks identified during the focus groups

Focus group	Drivers and bottlenecks	Participants
HPC	Need for **streamlined processes and flexible funding** due to lengthy timelines of EU programmes	Academic or research institutions
Cloud, Data, and AI	*The need for*: • **creating best-in-class products and platforms** to generate a 'fear of missing out' among companies. It is challenging for the industry to engage with Digital Europe without a specific market pull embedded in the programme as companies usually are risk averse.	Academic or research institutions Civil Society Organisations

[222] Insight produced by a concerted campaign of stakeholders.

[223] The results presented here primarily focus on aggregate responses across all four services. A more detailed analysis, segmented by service type, is available as an annex to the SWD (Digital Europe interim evaluation), including selected insights from individual surveys where noteworthy findings emerge.

	• **reinforcing capabilities and partnerships** between the public and private sectors. • reducing **consortium size** to two to three players with high execution power, as large consortiums comprising multiple partners do not necessarily lead to expected outcomes.	
Cybersecurity and Trust	*The need for:* • **enhanced coordination and strategic alignment** among Member States, industries, and institutions, particularly regarding talent retention, infrastructure development, and cross-border collaboration. • enhanced collaboration among companies and regions (among others with the help of the **European Cyber Security Organisation (ECSO))** • better **alignment between the European Defence Fund and Digital Europe.**	Private businesses (SMEs), Academic or research institutions, Civil Society Organisations
Advanced Digital Skills	*The need for:* • a **unified help desk** at the European level to centralise relevant information for easier use access. • **synergies** between the Erasmus+ Centres of Vocational Excellence (CoVE) and Digital Europe. • development of '**AI for Good'** initiatives to establish a positive EU brand around AI for education. • Digital transformation training for SMEs and long-term initiatives for skills development[224].	Academic or research institutions, Civil Society Organisations
Deployment and Best Use of Digital Capacities and Interoperability	*The need for*: • **coherence in legal frameworks and policy objectives.** • aligning actions with **long-term strategic objectives[225].**	Academic or research institutions, Civil Society Organisations, Public bodies
Semiconductors	*The need for*: • the **EU Semiconductor's Board** to align national and EU priorities. • **streamlined processes and lump-sum funding for SMEs**. • **long-term and proactive planning.**	Academic or research institutions, Public bodies, Private businesses (large), Civil society organisations

During the focus group on HPC, representatives from a Joint Undertaking suggested the need for **more agility and increased funding for high-risk, high-gain projects**, including support for disruptive ideas through **cascade funding**. Additionally, they criticised traditional procurement practices that take 8-10 years, instead of adopting off-the-shelf solutions.

[224] Participants from civil society organisations and academic or research institutions agreed on the role of the **ERASMUS+** programme, while the need for **training for SMEs** was suggested by academic and research institutions.

[225] Although participants were representatives of civil society organisations, public bodies, and academic or research institutions, these suggestions were provided mainly by civil society organisations.

Efficiency

- Interviewees mentioned **delays in application processes**, attributed to negotiations with Member States, security restrictions, and due diligence requirements related to the mutual insurance mechanism.
- From the perspective of the Commission, interviewees noted that **procurement processes were lengthy** due to the need to source external expertise. The long selection and contractualisation process is particularly challenging for fast-moving technology areas, such as AI.
- Several stakeholders commented on the lack of instruments specifically focused on exploiting results, such as vouchers or Financial Support for Third Parties (FSTP) and criticised the relatively standardised co-funding approach. They instead advocate for a shareholder model, commonly used in research infrastructures, where multiple partners jointly invest in and govern an initiative, enabling long-term sustainability, shared ownership and more effective exploitation of outcomes beyond the typical project lifecycle.
- The beneficiary and applicant surveys revealed satisfaction with process-related aspects of grant and procurement management, but dissatisfaction with the conditions.

    - Among beneficiaries, 71% reported being satisfied or very satisfied with the **clarity of the scope and description of calls,** a sentiment echoed by 64% of applicants. Similarly, 66% of beneficiaries and 69% of applicants were satisfied with the **clarity of rules and eligibility criteria**. Satisfaction with the **clarity of application instructions** was slightly higher among applicants (69%), compared to beneficiaries (64%). **Timing and scheduling** were also approved by 59% of beneficiaries and 58% of applicants.

    - Dissatisfaction levels were generally aligned for both beneficiaries and applicants, with some exceptions. There was a notable discrepancy regarding the **clarity of feedback received and level of detail of the evaluation of the proposal,** with 9% dissatisfaction among beneficiaries versus 29% for applicants. Higher dissatisfaction rates were observed in the perceived adequacy of the **funding rate proposed in relation to the scope, objectives and requirements of the call of proposals** (29% for both beneficiaries and applicants), **proportionality between the costs and the volume of funding requested in the proposal** (23% for beneficiaries; 31% for applicants), and the **proportionality between the efforts and the chances of securing Digital Europe funding** (21% for beneficiaries; 41% for applicants).

    - Feedback on the support services provided by the **National Contact Points (NCPs) during the planning, application, and implementation phases** was mixed. **Assistance with finding partners through matchmaking events** was generally underutilised by beneficiaries (27%), with only 21% being satisfied. Among applicants, 24% remained neutral, while 22% were dissatisfied or very dissatisfied. Notably, beneficiaries expressed higher dissatisfaction rates (dissatisfied/very dissatisfied) with **guidance on legal, financial, and implementation issues**, with 13% of beneficiaries and 24% of applicants reporting dissatisfaction. Both groups valued the NCPs' **explanations on the scope and modalities of Digital Europe actions**, with 47% of applicants and 34% of beneficiaries expressing satisfaction. However, high percentages of neutrality were observed across both groups, with more than 20% reporting neutrality in every aspect. The policy workshop participants observed inconsistent interpretations of rules and slow turnaround for clarifications, resulting in delays. NCPs have limited knowledge on legal and financial aspects and in turn cannot advice beneficiaries effectively.

  - Many beneficiaries emphasised the need for **flexibility in project implementation** to accommodate technological advances or market changes.
  - Applicants, on the other hand, expressed discontent with the lack of transparency in evaluation processes and the application of state aid rules, including the de minimis regulation, which created uncertainty. They also noted a lack of support for Seal of Excellence projects at the national level. Both beneficiaries and applicants shared concerns over high administrative burdens and emphasised the need for simplified procedures and greater funding flexibility.

- The workshop held at the conference on the future of digital investments in the EU[226] stressed the importance of **public procurements** and concluded that future investments in digital deployment need to be more unified merging current programmes and applying simplified rules. The event's conclusions echoed the importance of increased private investment highlighted in the Draghi report and emphasised the role of public funding in de-risking private investments.
- The workshop at the EDIH summit called for **a unified communication strategy** involving national players and the opportunity to share best practices across EDIHs.
- During the **policy workshop** participants stated that in case of national co-funding, duplicated reporting to the EU and national authorities, the additional State aid assessment and unclear points of contact at national level led to delays. This was also emphasised at the workshop at the EDIH summit.
- Specific **suggestions** from all stakeholders included the development of **ensured access** for **smaller organisations and underserved regions to fully benefit** from the programme's initiatives, **alignment with national co-funding mechanisms**, enhanced awareness raising at national levels (EDIH), increased **predictability** in call planning, faster implementation of **security restrictions**, more **flexibility** in project planning and implementation (e.g. faster amendments), reduced duplicated data entry in the portal, and a more user-friendly application portal.

[226] Conference | The Future of Digital Investments in the EU, final report to be expected in October 2025

- With regards to **cost-effectiveness**, procurement processes were described as particularly resource-intensive, and establishing security restriction processes required a heavy learning curve for all parties involved.
- The beneficiary survey results indicated that application costs typically require between 1.86-2.5 person months, with approximately EUR 7.1k in additional expenses per proposal. Coordinators spend between 3.12 and 3.85 person months and incur EUR 31.3k in additional expenses.

<u>Relevance</u>

- In the public consultation, respondents widely agreed that Digital Europe is highly relevant for addressing current and future challenges, particularly in the areas of **cybersecurity** and **advanced digital skills**.
- Additionally, 77% of respondents believed that Digital Europe should cover additional areas in the future. Some of the most frequently mentioned aspects included: a concerted approach to a **free and open-source software**[227], the **promotion of digital skills and inclusion** and the **sustainability and green transition.**
- The analysis of the position papers highlighted that the programme aligns closely with Europe's strategic priorities, such as **improving digital skills**, supporting **SMEs**, promoting **digital sovereignty**, and driving the **green transition**. To increase its relevance, business associations suggested that the programme should become **more accessible** and **inclusive**. Stakeholders, mostly NGOs and associations, emphasised the need for more **accessible training** opportunities for underserved groups and smaller organisations. They also called for a stronger focus on **basic digital skills** alongside advanced skills, to bridge the digital divide. **Open-source initiatives**, which EU citizens and business associations see as promoting innovation and sovereignty, remain underrepresented**,** and the programme is urged to prioritise technologies 'made in the EU'.
- The review of online contributions in the public consultation[228] showed that efforts to integrate energy-efficient technologies, ethical AI practices, and digital accessibility in the programme address current and future societal challenges. Contributors furthermore suggested involving underrepresented groups in shaping digital policy to ensure diverse stakeholder needs across sectors and communities are better addressed.
- Across the six specific objectives (SOs) of Digital Europe, there is a broad recognition of the role of the programme in driving Europe's digital transformation and maintaining its global competitiveness, with all objectives being either mostly or very relevant both for current and future needs in both beneficiary and application surveys. Interviewed stakeholders support this view.
    - Both the beneficiary and applicant surveys highlight the relevance of **Cybersecurity and Trust**

[227] Insight produced by a concerted campaign of stakeholders.
[228] NB. although this section relates to the Call for Evidence, none of the responses specifically addressed the methodology of the Digital Europe. Stakeholders focused on providing general feedback on the programme through position papers and online contributions.

(SO3), with 91% of applicants and 86% of beneficiaries rating it as mostly/very relevant for current needs. In terms of sectoral and technological relevance, 64% of beneficiaries found the programme very relevant, and 31% moderately relevant. Applicants showed an even stronger alignment, with 75% rating it as very relevant and 23% as moderately relevant.

- When considering technical priorities for the future, AI technologies were at the forefront both groups, with 80% of beneficiaries and 78% of applicants identifying AI as the top priority. Advanced connectivity, navigation and digital technologies were prioritised by 62% of beneficiaries and 66% of applicants, followed by robotics and autonomous systems, considered important by 45% of beneficiaries and 40% of applicants.
- **Interviewed stakeholders** recognise the importance of data and data infrastructures and find the programme's design relevant, though some stakeholders, such as SMEs, Edtech and VET providers, have not been as sufficiently engaged. They generally acknowledge the programme's flexibility and alignment with emerging trends, such as adapting to AI's growing prominence and introducing initiatives like the AI Factories. Stakeholders also acknowledge the importance of integrating quantum technologies into Digital Europe initiatives. However, they also highlight future complexities, such as adapting HPC infrastructures for AI use cases and addressing security, data management, and energy efficiency. Public bodies emphasise the programme's alignment with governance goals, interoperability needs, and broader political objectives. Research organisations see Digital Europe as relevant for advancing cutting-edge technologies like AI and quantum computing but identify gaps in the coordination, accessibility, and integration of digital infrastructure. NGOs and SMEs focus on Digital Europe's relevance to practical deployment, accessibility, and the establishment of clear standards. Interviewed stakeholders also expressed concerns that persisting skill gaps hinder the exploitation of HPC infrastructure for AI.
- Many **end-users** perceived the role of the **service funded by Digital Europe in addressing the needs** of the respondents or their organisation as at least somewhat effective (89%). Meanwhile, 6% found it not effective at all or considered it as not very effective. With regards to the main obstacles organisations that took part in the end-user survey currently are facing or expect to face, 88% of respondents highlighted the lack of **access to advanced computing resources and AI applications which can drive innovation and improve services in various sectors** as somewhat or highly relevant**. Lack of advanced digital skills and capabilities,** and **cybersecurity and trust in digital systems** follow closely, with 86% of respondents for each, identifying them as somewhat or highly relevant. When asked to specify, those who selected the option 'other' cited a **lack of skilled personnel**, **insufficient funding for code development**, the **need for clear and practical programmes**, the **digital impact in daily work routines,** and **reliance on open-source-minded consortia**[229].
- The workshop at the EDIH summit highlighted the need for more **flexibility of EDIHs to adapt to new technological challenges**, and a more holistic perspective on the different types of services offered. The workshop at the 'Research to Reality' event suggests aligning local, regional, and EU strategies for coherent digital governance.

[229] Insight produced by a concerted campaign of stakeholders.

- The focus groups highlighted key **future developments** and **recommendations**, as summarised in Table 2 below.

Table 2. Insights from the focus groups

Focus group	**Future developments and recommendations**	**Stakeholder categories participating**
HPC	*Need for:* - **a holistic approach** to sovereignty, encompassing the entire value chain rather than advancements in isolated technologies. Europe needs to develop integrated systems to reduce reliance on external suppliers - mechanisms to **scale education and training**, to increase the number of skilled professionals - **structured, industry-aligned programmes** that can deliver sustained expertise **- more inclusivity**, with calls to increase **female representation** **- investments in high-speed storage solutions**[230]	Academic or research institutions
Cloud, data and AI	*Need for:* **- investments** in areas such as agentic AI for human labour augmentation, augmented reality, shared and synthetic data, interoperable data spaces, automated material design through experiment and computation - improvement of **EU competitiveness** through availability of regulatory sandboxing, access to testing and experimenting facilities, innovative public procurement and pre-commercial procurement - an **update** of the **GDPR** and **EU copyright regulation**	Academic or research institutions, Civil Society organisations
Cybersecurity and Trust	*Need for:* - a **highly skilled workforce** - **centralised identity solutions** through 'zero architecture' approaches - better alignment of **Digital Europe** with **Horizon Europe** - **'**certificates **of provenance**' for software libraries to improve software quality, including dependency on external libraries and the lack of understanding regarding their origin and usage - introducing **more flexible project scopes** to accelerate innovation[231]	Private businesses (SMEs) Academic or research institutions Civil Society organisations
Advanced Digital Skills	*Need to:* - include **training** promoting cross-domain competence but **- avoid excessive focus on multidisciplinary approaches**, which could dilute the unique characteristics of individual disciplines[232] **- broaden participation** (e.g. women), through dedicated measures and KPIs **- establish industry-education partnerships**	Academic or research institutions Civil Society Organisations
Deployment and Best Use of Digital Capacities and Interoperability	*Need to:* - assess and address the **environmental impact** of advanced digital technologies - increase accessibility, citizen trust, and digital literacy	Academic or research institutions Civil Society

[230] As nearly all participants in the Focus Group on HPC were from academic or research institutions, insights primarily reflect the perspectives of these types of stakeholders.

[231] While the majority of insights came from academic or research institutions and civil society organisations without substantial differences in terms of perspectives, the need for **more flexibility and efficiency in project management** was suggested by private businesses specifically.

[232] The majority of insights came from academic or research institutions, and no substantial differences in perspectives across stakeholder categories were identified.

		- **raise awareness and foster a cultural shift** towards digital-first approaches - **accelerate innovation and foster collaboration between public and private** stakeholders, along with a balanced approach combining **top-down coordination with bottom-up** innovation[233]	organisations Public bodies
Semiconductors	*Need for:*	- **quantum computing as a long-term strategic priority** - **a highly skilled workforce** across diverse industries - **strengthening EU competencies in areas like advanced functionality, semiconductor-based photonics and new memory architectures** - **reducing fragmentation and focusing on market-driven research** - **ensuring the effective application of new technologies by addressing software quality and security**[234] - addressing **sustainability concerns** related to the growing demand for processing power and high-volume production.	Academic or research institutions Public bodies Private businesses (large) Civil society organisations

- During the HPC focus group, representatives from EuroHPC JU also provided insights. In terms of future developments and recommendations, a key theme was the need for a **robust software stack** in tandem with hardware advancements such as GPU-QPU integration. Additionally, there was a call for consistent **support for start-ups**, **better alignment of quantum initiatives**, and **pan-European collaboration** to maintain competitiveness in skills and innovation and reach critical mass. In terms of understanding current stakeholder needs, the representatives from EuroHPC JU advocated for a **holistic approach**, including training on energy efficiency, user support and efficient software. Additionally, energy efficiency was suggested as a unique selling point promoting 'energy-efficient cycles'. A recommendation was to focus on **fewer, high-quality models** rather than high quantities.

Coherence

- Interviewed stakeholders highlighted the complementarities and synergies within Digital Europe's different Specific Objectives (SOs) and within work streams. Complementarities are evident in areas like AI, cybersecurity, HPC and skill development, with EDIHs playing a key role in connecting organisations to other services funded by Digital Europe, such as TEFs and data spaces. However, some stakeholders pointed out the lack of **systematic structural collaboration**.
- According to more than 50% of respondents in the public consultation, including EU citizens, companies and research institutions, Digital Europe is partially coherent with other national and regional funding instruments, with **Horizon Europe** being the most complementary. This view was also confirmed by interviewees.
- In the consultation, mostly EU citizens and small companies identified a **lack of alignment** with regional/local funding opportunities and international instruments, while 39% of respondents (e.g. academic institutes, businesses, and EU citizens)

[233] Such balanced approach was suggested by public authorities, as well as the **challenges related to co-financing**, with some suggesting 100% financing from public funds.
[234] More specifically, private businesses suggested having a **long-term vision,** while academic or research organisations stressed that the Digital Europe should try to **diminish fragmentation.**

acknowledged at least partial coherence with international funding opportunities/instruments.

- The analysis of the **position papers** highlighted challenges related to **fragmented funding processes** and **inconsistent eligibility rules** across funding programmes. These issues hinder collaboration, complicate long-term planning, and make it especially difficult for resource-constrained stakeholders- such as SMEs and smaller research organisations- to understand the requirements for participation. Mostly small businesses and industry associations emphasised the need to **align timelines**. They noted that late changes to work programmes- such as shifting call deadlines or modifying priorities after planning had begun-—combined with insufficient coordination between EU and national funding structures have disrupted predictability and undermined effective planning.
- Other recommendations include the better integration with related initiatives, such as the Digital Education Action Plan and the use of tools, such as the Local and Regional Digital Maturity Assessment. Strengthening cross-sectoral **partnerships** and clearer coordination between EU and national funding structures can maximise synergies and increase the overall impact.
- The review of online contributions[235] highlighted **gaps** in the coherence of Digital Europe funding mechanisms with other **EU funding programmes**. Mismatched deadlines, different co-financing requirements, were reported mainly by some academic institutions and business associations, lead to **fragmentation**. Recommendations to harmonise funding conditions, simplify application procedures, and align objectives across EU programmes could improve the integration and effectiveness of the programme.
- When assessing the extent to which Digital Europe was perceived as complementary and synergistic with other instruments, 35% of beneficiaries indicated that Digital Europe is fully coherent with **other Digital Europe projects**. However, perceptions of coherence were more mixed in relation to **regional** and **national funding opportunities aimed at building capacity and skills in key digital areas**, with respondents seeing the programme as only partially aligned (32% for regional and 36% for national funding). At the European level, Digital Europe was seen as fully coherent with **other EU funding instruments** by 34% of respondents. Alignment of Digital Europe with relevant EU regulations was generally positive, with 38% indicating full coherence, while coherence with **national regulation** was perceived differently, with 28% of respondents indicating partial coherence. A significant share of respondents (41%) reported that their Digital Europe-funded projects directly built upon activities previously supported by other European funding instruments, highlight strong potential for continuity and synergy across EU programmes.
- Participants in the policy workshop described coherence gaps when combining Digital Europe with national and regional co-funding. They reported fragmented national arrangements (from structured frameworks to ad hoc solutions), producing uneven

[235] N.B. although this section relates to the Call for Evidence, none of the responses specifically addressed the methodology of the Digital Europe. Stakeholders focused on providing general feedback on the programme through position papers and online contributions.

beneficiary experiences across Member States and regions. Examples raised included combination of funding with the ERDF, which is challenging, misaligned calendars between Digital Europe calls and national budgeting cycles, and inconsistent rates, eligible cost rules, and templates. On the legal side, divergent State-aid interpretations (de minimis/GBER vs notification) created timeline variability and uncertainty.

- The synergy survey suggests that Digital Europe holds a strong position in fostering collaboration and integration with other programmes within **the R&I landscape**. Its projects often build on prior efforts funded by **Horizon 2020, Erasmus+, the Connecting Europe Facility (CEF)**, and various national or regional initiatives. Additionally, projects under Digital Europe **incorporate knowledge and results from other programmes**, such as analysis methods, metadata, data sources, and skills gap analyses, with higher or secondary education institutions and research organisations being primary users. Capacity-building programmes or (digital/research) infrastructures developed under other initiatives are similarly leveraged by Digital Europe projects, with public bodies and education or research organisations leading the way.
- Digital Europe project managers agreed that the programme is well-placed within the **knowledge network**, with 93% indicating they had collaborated with their current partners in previous projects- partnerships that now inform and strengthen ongoing initiatives. Many projects also operate within networks of similar efforts, sharing findings and best practices. Beneficiaries suggested that **organising more meetings to exchange results and experiences** could further enhance these synergies.

<u>EU added value</u>

The public consultation showed that Digital Europe has provided significant added value by financing projects, leveraging public funding for digital activities, and fostering international cooperation.

- Interviewed stakeholders confirmed that collaborative efforts across Europe have accelerated the development of pre-exascale and exascale HPC systems much faster than individual Member States could have done independently.
- Among the factors contributing to the development of **large cross-border digital ecosystems** under the programme, 19% of respondents- most of them EU citizens- indicated the importance of fostering cross-border partnerships and increasing overall funding. Additionally, 18% of respondents- mainly companies and research institutions) emphasised the value of funding interconnected activities, mutually reinforcing projects, and/or **multi-country projects (MCPs)**.
- Digital Europe has also played a crucial role in promoting the **EU's digital autonomy**, yet more targeted efforts are needed to increase participation, particularly among **smaller organisations**, and to streamline administrative procedures.
- Position papers highlighted significant added value by fostering **pan-European collaboration** in critical digital areas, such as AI, cybersecurity, HPC, and cloud

computing. These investments enhance Europe's competitiveness, resilience and strategic autonomy, while supporting societal and economic goals. However, stakeholders (mostly business associations and NGOs) emphasise the need for Digital Europe to **reduce reliance on non-European technologies** to maximise its strategic benefits. Prioritising inclusivity, accessibility and the twin transitions can increase Digital Europe's impact, and further consolidate its role as a key driver of Europe's digital future.

- Interviewed stakeholders from the EDIHs also pointed out the value in cross-border collaboration but highlight that the limited existing exchanges are mostly intra-country rather than across Member States.
- The review of online contributions[236] showed that the programme's contributions to **digital sovereignty, sustainability and cross-border** collaboration bring significant added value to the EU. Aligning **sustainability metrics and ethical practices** with digital innovation will further strengthen Digital Europe's role in creating a resilient and inclusive digital ecosystem.
- Among beneficiaries, 64% indicated that Digital Europe **improved access to and cooperation with partners from other countries in the EU and beyond** to a large or very large extent, compared to 66% of applicants. In addition, the **creation of a European ecosystem for digital technologies** was seen as bringing added value by 62% of beneficiaries and 64% of applicants. A total of 52% of beneficiaries indicated that Digital Europe delivered EU added value in terms of **Digital Europe's provision of financial means on a scale and consistency not available in national and regional schemes.** This perception was even more pronounced among applicants (66%).
- Conversely, the programme was not viewed as having **better funding conditions compared to national/regional instruments by both applicants and beneficiaries.**
- When asked whether there were other funding schemes or programmes at national or international level with **similar objectives** to Digital Europe, 65% of NCCs survey respondents said that there were no such programmes, while 35% confirmed the existence of other similar funding schemes. Those who recognised other funding opportunities mentioned initiatives such as the National Innovation Funds, Horizon Europe and the Cohesion Fund. National Cybersecurity Coordination Centres identified **standardisation of practices, enhanced cybersecurity capabilities** (22%), **improved cross-border collaboration** and **access to funding and resources** (both selected by 21-21%) as tangible benefits gained from EU interventions in cybersecurity (28%)[237]. A smaller portion (7%) identified other benefits, including **networking and new collaborations** and **more information about cases and solutions**.
- However, **lack of communication channels** (35%), **funding constraints** (29%), and **regulatory differences** (26%) were seen as significant challenges, with one respondent specifically noting that different legal and regulatory frameworks in different countries

[236] N.B. Although this section relates to the Call for Evidence, none of the responses specifically addressed the methodology of the Digital Europe. Stakeholders focused on providing general feedback on the programme through position papers and online contributions.

[237] The sum of benefits (33+31+31+41+11=147) exceeds the number of respondents because respondents had the option to select more than one answer.

can create complexity and make it difficult to identify appropriate points of contact. Among the challenges identified, some participants from the NCCs survey highlighted a **lack of human resources** and **difficulties in sharing information about incidents involving classified systems or items.**

- Furthermore, NCCs emphasised the need for increasing efforts to **educate the public about cybersecurity threats** and **best practices**, as well as creating **more job opportunities** in the public sector. They also suggested that NCCs should focus on **reaching out to CEOs** to raise awareness of the importance of cybersecurity and encourage a top-down approach, rather than relying solely on bottom-up initiatives. Additionally, there was a call to **make it easier for community members to access opportunities in cybersecurity**. More **focus should be placed on AI and its associated risks and threats**, while exploring ways to **increase efficiency** using AI.
- 86% of respondents to the NCCs survey rated **cross-border collaboration in cybersecurity efforts** as very important/important. To better support to cross-border cooperation, recommendations included the **exchange of information**, the **need for public authorities to initiate or improve cross-border communication with companies within the same sector** and **the establishment of efficient communication channels** among teams in different locations.
- The end-user survey revealed that around 65% of respondents at least moderately agree, that **the services are unique in terms of their scope/quality in their country compared to similar national/regional initiatives.** More positively, around 74% of respondents at least moderately agree that **the services are unique in terms of their scope/quality in the EU.** These figures drop to 22% and 24% respectively when we consider those who strongly agree that the facilities are unique.
- There is more widespread support for the notion that these services offer other types of added value, specifically relating to costs and ease of access. 319 respondents (74%) at least moderately agree that Digital Europe services are **more affordable for their organisation than alternative options, while** 296 (69%) at least moderately agree that they are **more accessible.** For those who selected the option 'other', the services **provide added value due to their ability to foster collaboration, innovation and business growth**. Respondents suggested that clearly communicating how these services compare with alternative options- alongside involving a broader range of participants- could further increase their perceived value.
- Main recommendations from the end-user survey included the need for **more public awareness activities** to ensure that people and SMEs are informed about available training and resources, as well as simplifying the **complexity of application, reporting, and access processes** to encourage wider participation. Programmes should cater to all skill levels, including beginners, and better address the specific needs of SMEs. Training should include **practical examples, hands-on sessions,** and **industry-specific applications**. **Continuous learning opportunities**, post-training resources, personalised plans, and supporting materials were also highlighted as essential for retention and practical implementation.
- **Harmonising HPC-use policies** and interfaces across EuroHPC sites would enhance usability, and more opportunities for cross-industry and cross-border collaboration,

such as through EIT Manufacturing, should be created. Furthermore, respondents called for **long-term funding and collaboration frameworks** to sustain user communities, **improved technical support for HPC** streamlined infrastructure and offering **low-barrier access to testing environments and small-scale R&D projects. To remain competitive with commercial cloud services, HPC should reduce administrative burden**, **standardise documentation**, and **tailor initiatives** to the needs of specific industrial sectors. Finally, **tracking productivity, certifying participation and ensuring transparent use of funds were seen as essential to maximise impact**.

Conclusion

The consultation process for the interim evaluation of the Digital Europe programme engaged a wide range of stakeholders, and provided a detailed assessment of the programme's progress. Stakeholders confirmed the programme's relevance in addressing Europe's digital priorities. Nevertheless, there remains scope for improvement in streamlining administrative processes and refining funding structures. While Digital Europe is fostering collaboration and delivering added value at EU level, improvements in coherence, accessibility, and support for smaller organisations could enhance its impact further.

Insights gathered through this process will inform the design of a future digital deployment programme, ensuring that future initiatives are more inclusive, efficient and aligned with evolving digital needs.

Annex VI. State of Play of Programme Implementation

Glossary

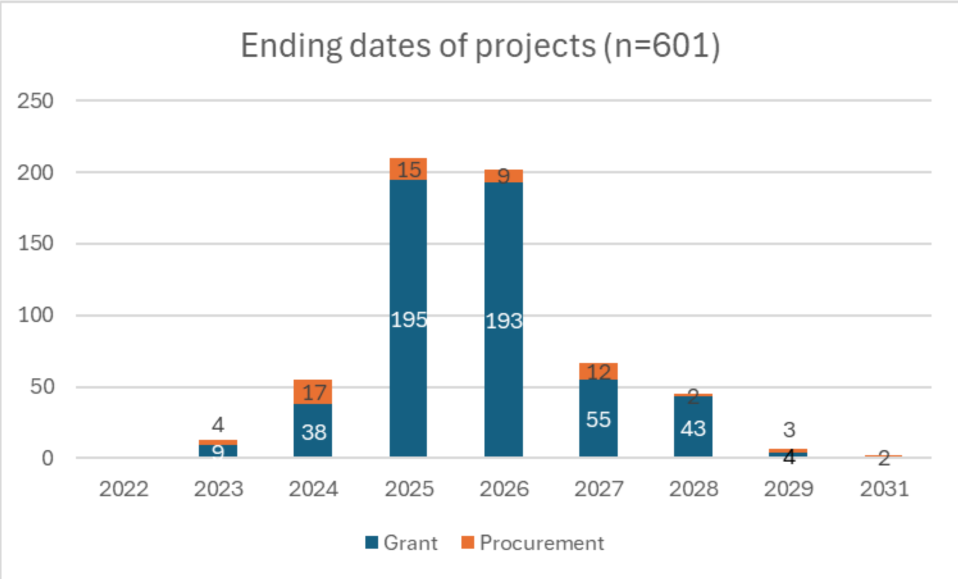
Abbreviation	Definition
CA	Contribution Agreement
CSA	Coordination and Support Action
GP	Grant for Procurement
GFS	Grant for Financial Support to third parties
HES	Higher or Secondary Education organisations
OTH	Other types of organisations
PRC	Private organisation
PRC_LE	Private For-Profit Large Enterprises
PRC_SME	Small and Medium-Sized Enterprises
PSA	Programme and Support Action
PUB	Public organisation
REC	Research organisations
SIMPLE	Simple Grant
SME (grant)	SME support grant

This annex provides an overview of the implementation of Digital Europe activities. It includes grants, procurements, financial instruments, Contribution Agreements (CAs), and Programme Support Actions. The analysis is based on data on Digital Europe projects and proposals as of the cut-off date, 31 December 2024.

The activities are categorised by Specific Objectives (SO), with the European Digital Innovation Hubs (EDIHs) reported as a separate category. Programme Support Actions that do not fall under any SO, are presented as an additional category in the different analyses.

A total of **601 projects**, have been funded through grants and procurements. In addition, other instruments (Contribution Agreements, Financial Instruments and programme support actions) were used. These projects account for total EU funding of **EUR 3.02 bn**, spanning from 2022 to 2025. Most projects are expected to conclude by 2025 and 2026, with reaming projects ending by 2031 at the latest.

Figure 1: Ending dates of projects

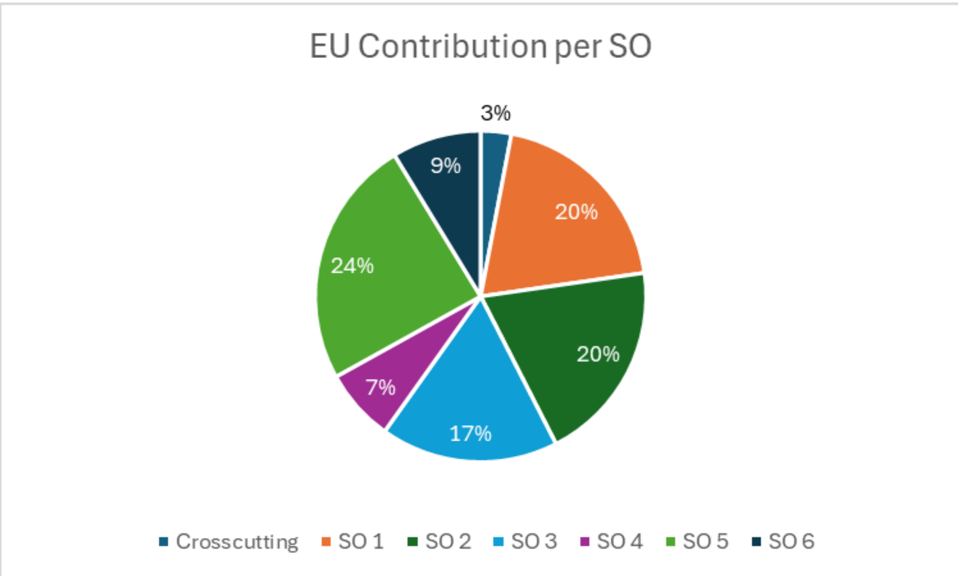


Source: Technopolis Group 2025, based on data received from the client (cut-off date 31/12/2024).

Distribution across SOs

In terms of SOs, the main **EU contribution** – from both grants and other instruments (procurement, CA, financial instruments, and Programme Support Actions) – has been made to SO5 with a total EU funding of EUR **736.7 m**. The lowest contributions were assigned to SO4 with EUR 214.9m. Four Programme Support Actions relevant for different specific objectives summed up to EUR 78.4 m. The total committed amount sums up to EUR 3.016b.

Figure 2: EU contributions per SO



Source: Technopolis Group 2025, based on data received from the client (cut-off date 31/12/2024).

The number of funded projects varies significantly from one SO to the other. SO5 has mainly due to the EDIHs the highest number of projects with 281 projects, followed by SO3 with 169. Next, there are 73 projects in SO2, and 51 projects in SO4. SO1 and SO6 present the lowest number of projects with 16 and 11 projects, respectively. In addition to the grants and procurements, in terms of other instrument types, 11 venture capitals were supported to help companies involved in digital activities to reduce their financial risk. There were 3 Contribution Agreements with the European Space Agency (ESA), the European Centre for Medium-Range Weather Forecasts (ECMWF), and the European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT) to implement Destination Earth. In addition there was a contribution agreement with ENISA to support cybersecurity incident and preparedness in key sectors and a contribution agreement with eu-LISA to support cross-border investigations and prosecutions in the EU by funding an IT platform that supports safe and quick exchanges of information.

Table 1: Distribution of projects and funding across the SOs

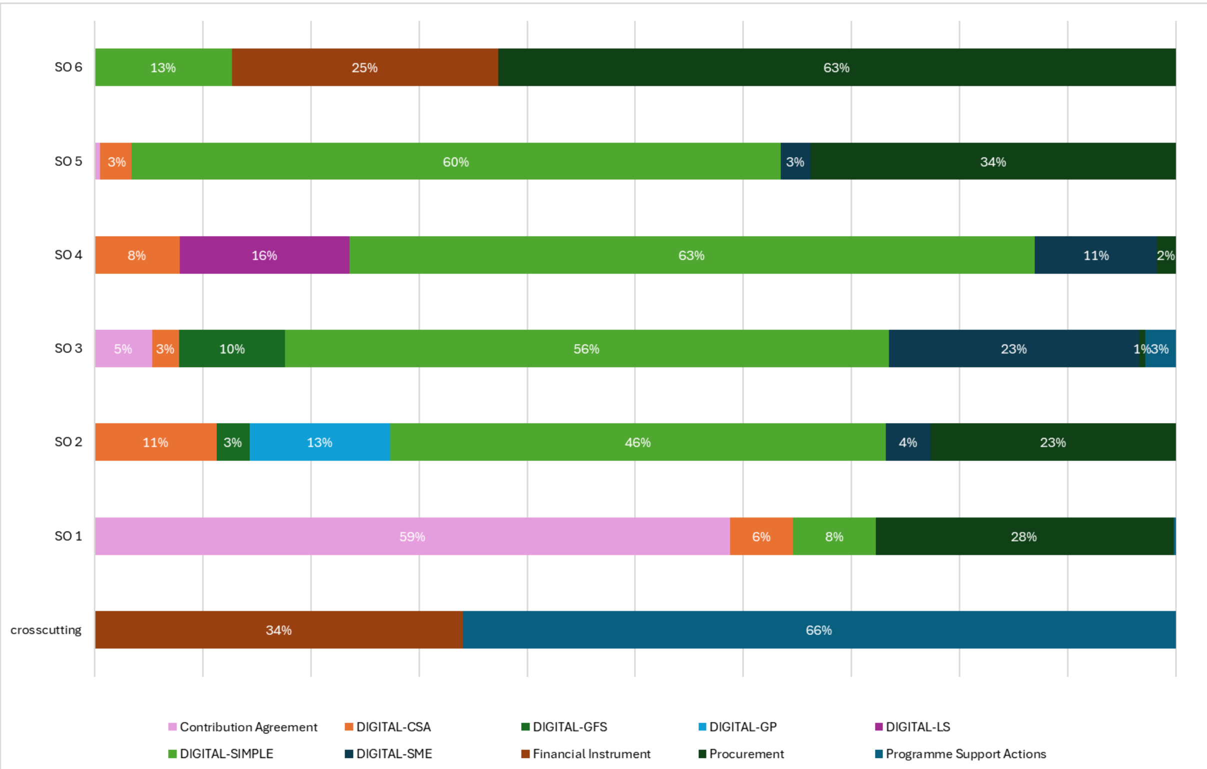
	SUM OF EU CONTRIBUTION BY INSTRUMENT TYPE							**TOTAL SUM OF EU CONTRIBUTION (EUR)**	**TOTAL SUM OF # OF PROJECTS**
SO	**Contribution Agreement (EUR)**	**Financial Instrument (EUR)**	**Grant (EUR)**	**Procurement (EUR)**	**Programme Support Actions (EUR)**	**Number of Grants**	**Number of Procurements**		
Cros-s cutting		26.693.750,00			51.692.584,24			78.386.334,24	
SO 1	351.108.200,00		80.664.811,58	164.636.999,51	1.230.358,92	7	9	597.640.370,01	16
SO 2			462.430.902,33	135.702.296,33		56	17	598.133.198,66	73
SO 3	28.000.000,00		480.479.511,63	2.699.668,00	15.000.000,00	168	1	526.179.179,63	169
SO 4			211.171.428,64	3.717.090,00		50	1	214.888.518,64	51
SO 5	3.608.000,00		484.571.352,61	248.565.196,88		253	28	736.744.549,49	281
SO 6		65.000.000,00	33.609.500,70	165.475.310,50		3	8	264.084.811,20	11
Grand Total	**382.716.200,00**	**91.693.750,00**	**1.752.927.507,49**	**720.796.561,22**	**67.922.943,16**	**537**	**64**	**3.016.056.961,87**	**601**

Distribution across Types of Action

When looking at the **funding distribution across types of action**, Simple Grants (SIMPLE) represent the highest share of the total Digital Europe EU contribution with 41% (EUR 1 227 m) distributed across all SOs. It is followed by Procurement with a share of 24% (EUR 721 m) distributed across all the SOs. Meanwhile, Contribution Agreements (CAs) are distributed only in SO1, SO3 and SO5 with a share of 13% (EUR 383 m). DIGITAL-SME, DIGITAL-CSA and Financial Instruments have a share of 6% (EUR 191 m), 5% (EUR 154 m) and 3% (EUR 92 m) respectively. These are followed by DIGITAL GP (3%, EUR 78 m) DIGITAL-GFS (2%, EUR 69 m) and Programme Support Actions (2%, EUR 68 m). DIGITAL-LS had the least share of funds (1%, EUR 34 m), directed only to SO4, while DIGITAL-FPA was not used across any SO.

In terms of other instruments, 11 venture capitals were supported to help companies involved in digital activities to reduce their financial risk. There were 3 Contribution Agreements with the European Space Agency (ESA), the European Centre for Medium-Range Weather Forecasts (ECMWF), and the European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT) to implement Destination Earth. In addition, there was a contribution agreement with ENISA to support cybersecurity incident and preparedness in key sectors and a contribution agreement with eu-LISA to support cross-border investigations and prosecutions in the EU by funding an IT platform that support safe and quick exchanges of information.

Figure 3: Distribution of funding across types of actions over the SOs



Source: Technopolis Group 2025, based on data received from the client (cut-off date 31/12/2024).

Distribution across types of beneficiaries

In terms of **stakeholders**, there has been a total of **6 388 participants** in Digital Europe grants. Higher or Secondary Education Organisations (HES) accounted for the highest number of participants[238] with 1 331 participations (21% of the total number), followed by other organisations (1 226 participations, 19%). While SMEs (PRC_SME) account for 1 101 organisations (17%), private for-profit Large Enterprises research organisations (REC) accounted for 987 participants (15%). (PRC_LE) accounted for 13% (842 participations) of the total participations. Public Organisations (PUB) accounted for 12% (792 participants). Finally, A remaining share of 2% (109 participations) corresponds to PRC entities where information on whether they are SMEs or LE was not identified.

In terms of **project coordination** (excluding procurements), HES organisations (together with OTH organisations) accounted for the highest number of coordinated projects, with 121 projects (20%). PUB and REC follow with 119 and 106 coordinated projects (20% and 17%), respectively. Meanwhile, PRC-SME and PRC-LE accounted for 13 and 9% of the total projects (82 and 57 projects). The remaining 1% (4 projects) are PRCs where information on whether they are SMEs or LE was not identified.

In terms of **funding distribution across the beneficiaries**, HES were the highest receiver of EU funding with a share of 23% (EUR 397.0 m), closely followed by REC organisations with 22% (EUR 390.1 m). PRC_SME organisations had 17% (EUR 295.0 m), and PRC_LE and PUB had 11% (200.3 m) and 11% (184.4 m) respectively. OTH organisations have attracted 15% (269.0 m) of the funding. The remaining 1% (EUR 17.1 m) corresponds to the PRC entities where information on whether they are SMEs or LE was not identified.

Table 2: Distribution of funding across different types of organisations

Row Labels	Sum of EU Contribution (EUR)	Average of EU Contribution (EUR)	Sum of Participants
HES	397.041.308	€ 298.751,92	1.331
OTH	269.029.544	€ 219.975,10	1.226
PRC	17.131.142	€ 157.166,44	109
PRC_LE	200.262.396	€ 237.841,33	842
PRC_SME	294.987.367	€ 267.926,76	1.101
PUB	184.398.253	€ 233.120,42	792
REC	390.077.497	€ 395.616,12	987
Grand Total	**1.752.927.507**	**274.710**	**6 388**

***NA**: *'Type of Stakeholder' information not available for 'Other' instruments.*
Source: Technopolis Group 2025, based on data received from the client (cut-off date 31/12/2024).

Distribution of funding per type of beneficiary across the SOs

238 Participants refer to the number of unique participants. The number of participations take into account also when an organisation takes part in multiple projects.

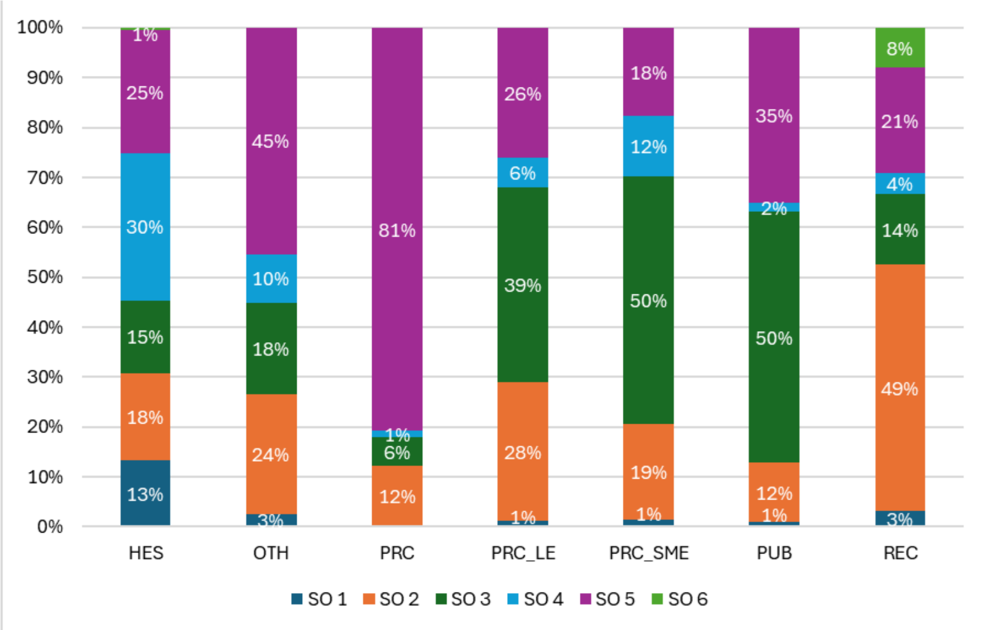
When looking at the **distribution of funding** per type of beneficiary across the SOs, it is noticeable that all beneficiary groups are participating and receiving EU funds in all SOs for grants. Differences are nevertheless wide. HES organisations received the highest amount of EU funding across all SOs than any other beneficiary group, with a significant share allocated to SO4 (31% of the total funding received by this stakeholder group). REC organisations received the highest amount of EU contribution in an individual SO – in SO2 with EUR 192.3 m (40% of the total funding allocated to the stakeholder group). PRC_SME received the highest contribution in SO3 (EUR 146.5 m or 50% of the total stakeholder group's allocation), while HES received the highest one in SO4 (EUR 117.4 m or 28% of the total stakeholder group's allocation). OTH received 22% of their share on SO5 (EUR 122.1 m). Finally, in SO6, funding was directed to HES and REC, being this last group, the one receiving the highest share (EUR 31.4 m).

Table 3: Distribution of funding across types of beneficiaries over the SOs (grants only)

Type of Stakeholder	SO 1	SO 2	SO 3	SO 4	SO 5	SO 6	Grand Total
HES	52.533.902	69.635.217	57.790.199	117.432.230	97.449.214	2.200.546	**397.041.308**
OTH	7.052.898	64.466.720	49.205.111	26.210.088	122.094.727	-	**269.029.544**
PRC		2.108.050	954.144	236.079	13.832.869	-	**17.131.142**
PRC_LE	2.430.700	55.402.380	78.432.365	11.815.219	52.181.732	-	**200.262.396**
PRC_SME	4.384.319	56.395.278	146.482.343	35.509.283	52.216.143	-	**294.987.367**
PUB	1.918.686	21.729.992	92.849.406	3.102.458	64.797.710	-	**184.398.253**
REC	12.344.306	192.693.265	54.765.944	16.866.071	81.998.957	31.408.955	**390.077.497**
Grand Total	**80.664.812**	**462.430.902**	**480.479.512**	**211.171.429**	**484.571.353**	**33.609.501**	**1.752.927.507**

PRC: PRC entities where information on whether they are SMEs or LE was not identified
Source: Technopolis Group 2025, based on data received from the client (cut-off date 31/12/2024).

Figure 4: Distribution of funding across types of beneficiaries over the SOs (grants only)



Source: Technopolis Group 2025, based on data provided by the client (reference date 31/12/2024).

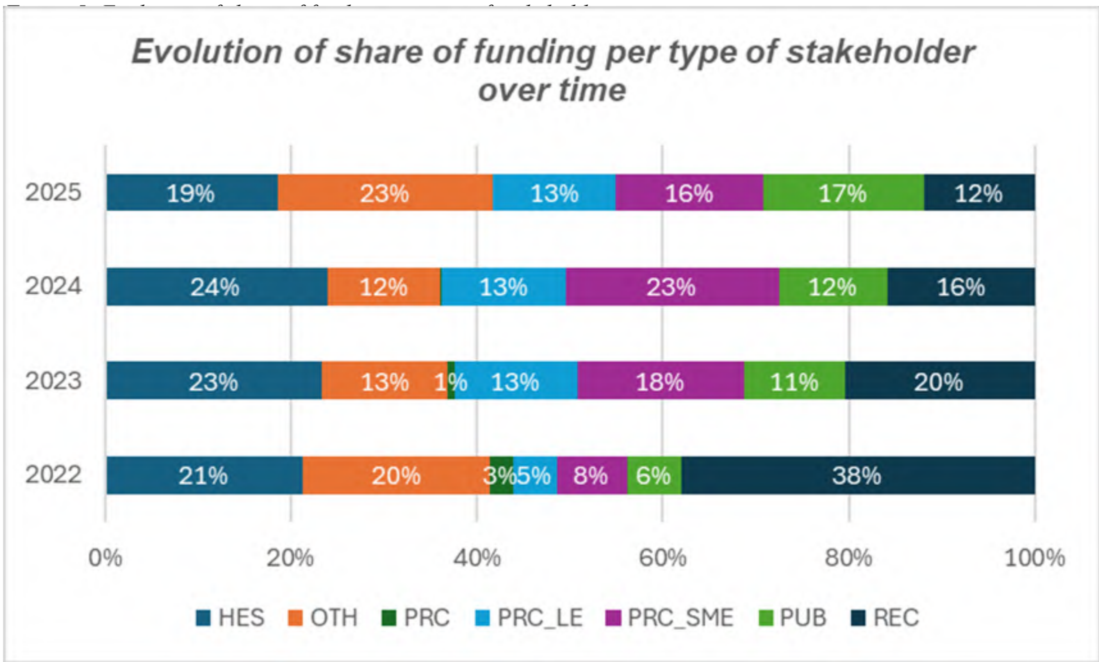
Evolution of share of funding per type of beneficiary over time

When looking at the **evolution of EU funding per type of beneficiary over time**, it is evident that at the starting stages of the programme, in 2022, REC received the most Digital Europe funding of that year, this share getting gradually smaller in the subsequent years, reaching 12% in 2025. PRC_SME started receiving funding in 2022 with a share of 8%, increasing up to 23% in 2024 and decreasing again to 16% in 2025. HES started receiving funding in 2022 with a share of 21%, and remained around this percentage in the subsequent years. PUB funding started in 2022 with merely 6% of the funds allocated that year, but rose steadily to 17% in 2025. The PRC entities for which information on whether they are SMEs or LE is not identified still represented 3% of the funding in 2022, but decreased to 0% from 2024 onwards.

Table 4. Share of EU funding across type of stakeholder over time

Type of Stakeholder	2022	2023	2024	2025	Grant total
HES	21%	23%	24%	19%	23%
OTH	20%	13%	12%	23%	15%
PRC	3%	1%	0%	0%	1%
PRC_LE	5%	13%	13%	13%	11%
PRC_SME	8%	18%	23%	16%	17%
PUB	6%	11%	12%	17%	11%
REC	38%	20%	16%	12%	22%
Grand Total	**100%**	**100%**	**100%**	**100%**	**100%**

PRC: PRC entities for which information on whether they are SMEs or LE is not identified.
Source: Technopolis Group 2025, based on data received from the client (cut-off date 31/12/2024).



Source: Technopolis Group 2025, based on data provided by the client (reference date 31/12/2024)

Distribution across countries (grants)

Not surprisingly, Member States have participated by far the most in Digital Europe, receiving EUR 1 687.8 m of the total programme funding across 5 951 participating organisations. Associated Countries have a more prominent role than Non-Associated Third Countries, with an EU contribution of EUR 63.3 m across 392 participations, while the latter received and EU contribution of EUR 1.9 m across 45 participations.

Table 5: Distribution across country groups

	Grants	
Country Group	**N**	**EU Contribution (EUR)**
Associated Countries	392	63.260.406
Member States	5.951	1.687.752.837
Non-Associated-Third Countries	45	1.914.265
Grand Total	**6.388**	**1.752.927.507**

Source: Technopolis Group 2025, based on data provided by the client (reference date 31/12/2024)

Distribution of funding across country groups over the SOs

When looking at the **distribution of funding across participating countries per SO**, overall Member States have a varied distribution over the SOs. SO3 is the one with the highest share of EU funding with 28%. Although individual Member States present also a varied distribution, some of them present a higher concentration of EU funding in specific SOs. Slovakia presents the highest concentration of EU funding in a specific SO; 68% in SO3. It is followed by Malta, Cyprus, and Croatia which concentrate 60% or more of their funding also in SO3. Germany stands out in SO1 concentrating 16% of the total funding allocated to the country. Similarly, France and Belgium have over 45% of their funding in SO2.

Regarding, SO4, 25% of Portugal's Digital Europe funding and 28% of Ireland's funding is directed towards this SO, while regarding SO5, Hungary holds 47% of its total funding on this SO. SO6 funding has only been distribute to Belgium (7%), Germany (6%), France (4%), Ireland (3%), Austria (1%) and Finland (1%).

In terms of associated countries, 51% of their funding is directed to SO5, distributed mainly between Kosova, Liechtenstein (both 100%), Albania (90%) and Ukraine (80%). SO3 follows with 25% of the total associated countries' funding, specifically for Iceland (45%) and Norway (40%). 22% of Türkiye's funding is for SO4, while for SO1, the totality of the funding for Bosnia & Herzegovina is for this SO. Finally, the only two Non-Associated Third Countries receiving funding are Aruba and the United Kingdom with a 100% share directed to SO2.

Table 6. Funding distribution across participating countries over the SOS

Country Group / Country	SO 1	SO 2	SO 3	SO 4	SO 5	SO 6
Associated Countries	**7%**	**5%**	**25%**	**11%**	**51%**	**0%**
Albania	0%	10%	0%	0%	90%	0%
Bosnia and Herzegovina	100%	0%	0%	0%	0%	0%
Iceland	10%	1%	45%	6%	38%	0%
Kosova	0%	0%	0%	0%	100%	0%
Liechtenstein	0%	0%	0%	0%	100%	0%
Montenegro	35%	0%	0%	0%	65%	0%
North Macedonia	26%	0%	0%	0%	74%	0%
Norway	3%	8%	40%	10%	38%	0%
Serbia	24%	0%	0%	12%	64%	0%
Türkiye	8%	6%	0%	22%	64%	0%
Ukraine	0%	1%	0%	20%	79%	0%
Member States	**5%**	**27%**	**28%**	**12%**	**27%**	**2%**
Austria	3%	28%	28%	11%	29%	1%
Belgium	1%	47%	16%	12%	17%	7%
Bulgaria	5%	12%	34%	10%	39%	0%
Croatia	2%	4%	60%	10%	23%	0%
Cyprus	3%	5%	66%	11%	14%	0%
Czechia	4%	16%	36%	6%	38%	0%
Denmark	3%	35%	16%	20%	25%	0%
Estonia	8%	13%	33%	18%	28%	0%
Finland	4%	40%	14%	22%	20%	1%
France	3%	45%	12%	10%	27%	4%
Germany	16%	32%	14%	8%	24%	6%
Greece	1%	14%	47%	17%	20%	0%
Hungary	4%	10%	28%	11%	47%	0%
Ireland	3%	13%	34%	28%	18%	3%
Italy	2%	23%	30%	16%	29%	0%
Latvia	3%	6%	37%	17%	36%	0%
Lithuania	3%	4%	31%	23%	40%	0%
Luxembourg	9%	23%	44%	3%	21%	0%
Malta	0%	3%	67%	1%	28%	0%

Netherlands	1%	33%	28%	8%	30%	0%
Poland	3%	8%	38%	4%	46%	0%
Portugal	2%	19%	18%	25%	35%	0%
Romania	2%	3%	56%	7%	32%	0%
Slovakia	3%	8%	68%	3%	19%	0%
Slovenia	8%	14%	51%	4%	23%	0%
Spain	3%	36%	17%	15%	29%	0%
Sweden	3%	31%	24%	8%	33%	0%
Non-Associated-Third Countries	**0%**	**100%**	**0%**	**0%**	**0%**	**0%**
Aruba	0%	100%	0%	0%	0%	0%
United Kingdom	0%	100%	0%	0%	0%	0%
Grand Total	**20%**	**20%**	**18%**	**8%**	**24%**	**9%**

Source: Technopolis Group 2025, based on data provided by the client (reference date 31/12/2024)

Table 7. Funding (EUR)/1000 citizens across Member States

Member States	Digital Europe Funding (EUR)	Population (N)	Digital Europe Funding / 1000 Citizens (EUR)
Austria	48.414.631	9.120.813	5.308
Belgium	157.275.860	11.738.763	13.398
Bulgaria	20.641.792	6.757.689	3.055
Croatia	29.242.234	3.875.325	7.546
Cyprus	36.306.783	1.358.282	26.730
Czechia	34.224.654	10.735.859	3.188
Denmark	39.944.679	5.977.412	6.683
Estonia	15.229.833	1.360.546	11.194
Finland	48.793.868	5.617.310	8.686
France	171.776.509	66.548.530	2.581
Germany	236.695.163	84.552.242	2.799
Greece	85.839.185	10.047.817	8.543
Hungary	26.879.917	9.676.135	2.778
Ireland	52.689.827	5.255.017	10.027
Italy	159.485.733	59.342.867	2.688
Latvia	16.149.910	1.871.871	8.628
Lithuania	18.948.684	2.859.110	6.627
Luxembourg	27.606.316	673.036	41.018
Malta	11.484.226	539.607	21.283
Netherlands	78.769.089	18.228.742	4.321
Poland	58.762.979	38.539.201	1.525
Portugal	37.861.802	10.425.292	3.632
Romania	48.458.828	19.015.088	2.548
Slovakia	37.495.834	5.506.760	6.809
Slovenia	22.106.419	2.118.697	10.434

Spain	**118.984.844**	**47.910.526**	**2.483**
Sweden	**47.683.238**	**1.060.699**	**44.955**

Source: Technopolis Group 2025, based on data provided by the client (reference date 31/12/2024)

Distribution of participations across participating countries

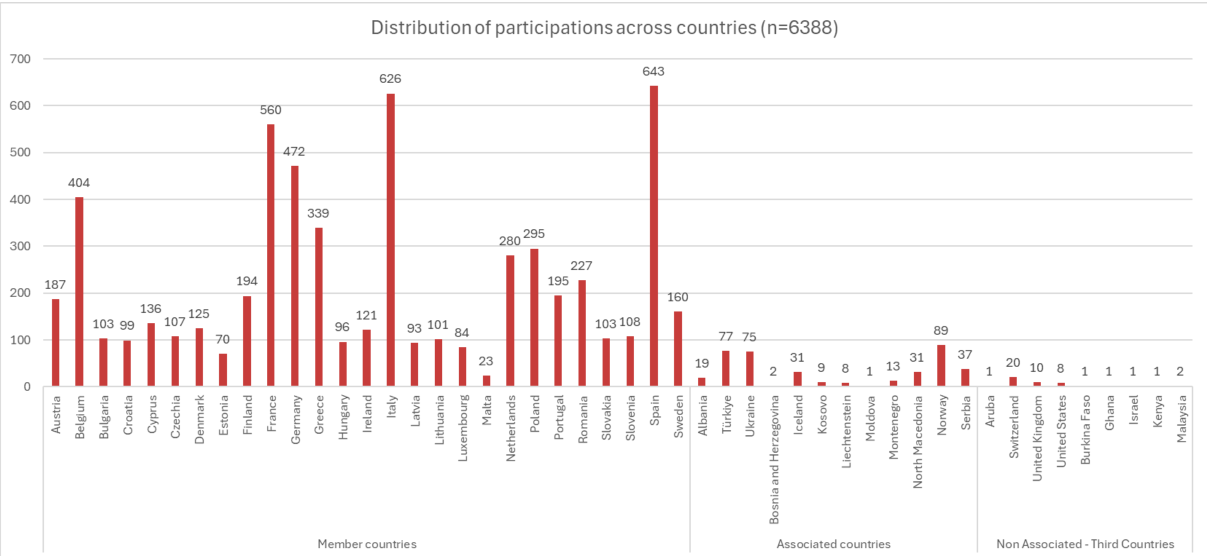
Table 8. Distribution of participations across country groups

Country Group	SO1	SO2	SO3	SO4	SO5	SO6	Grand Total
Associated Countries	28	22	25	40	277	-	392
Member States	132	1.237	952	738	2.865	27	5.951
Non Associated-Third Countries	-	15	-	13	17	-	45
Grand Total	160	1.274	977	791	3.159	27	6.388

Source: Technopolis Group 2025, based on data provided by the client (reference date 31/12/2024)

With regards to the **number and distribution of participations across participating countries**, within Member States, Spain and Italy stand out as the countries with the highest number of participations with 643 and 626 participations, respectively. They are followed by France and Germany with 560 and 472 participations, respectively. Regarding associated countries, Norway has the highest number of participations of this country group (89 participations), while for Non-Associated Third Countries, Switzerland, United Kingdom, and United States reported 20, 10, and 8 participations, respectively.

Figure 6: Number and distribution of participations across countries



Source: Technopolis Group 2025, based on data provided by the client (reference date 31/12/2025).

Table 9: Participation per 1 million citizens across Member States

Row Labels	Sum of Participation	Population (N)	Participations per 1000000 citizens
Austria	187	**9.120.813**	20,50
Belgium	404	**11.738.763**	34,42
Bulgaria	103	**6.757.689**	15,24
Croatia	99	**3.875.325**	25,55

Cyprus	136	**1.358.282**	100,13
Czechia	107	**10.735.859**	9,97
Denmark	125	**5.977.412**	20,91
Estonia	70	**1.360.546**	51,45
Finland	194	**5.617.310**	34,54
France	560	**66.548.530**	8,41
Germany	472	**84.552.242**	5,58
Greece	339	**10.047.817**	33,74
Hungary	96	**9.676.135**	9,92
Ireland	121	**5.255.017**	23,03
Italy	626	**59.342.867**	10,55
Latvia	93	**1.871.871**	49,68
Lithuania	101	**2.859.110**	35,33
Luxembourg	84	**673.036**	124,81
Malta	23	**539.607**	42,62
Netherlands	280	**18.228.742**	15,36
Poland	295	**38.539.201**	7,65
Portugal	195	**10.425.292**	18,70
Romania	227	**19.015.088**	11,94
Slovakia	103	**5.506.760**	18,70
Slovenia	108	**2.118.697**	50,97
Spain	643	**47.910.526**	13,42
Sweden	160	**1.060.699**	150,84

Source: Technopolis Group 2025, based on data provided by the client (reference date 31/12/2025).

Success and oversubscription per SO (grants)

Table 10 below gives an overview of the **success rate of proposals and oversubscription rates** (i.e. amount of funding requested vs amount granted) per SO. **SO6** has the highest success rate among all the SOs (91%), followed by **SO1** and **SO5** with a 75% and 73% success rates, respectively. **SO4** has the lowest success rate (26%) and, not surprisingly, it also has the lowest oversubscription rate (36%), meaning that this SO received the least percentage of funding that was requested by eligible proposals. **SO6** has also the highest oversubscription rate (91%), followed by **SO1** (86%) and **SO5** (83%).

Table 10: Success rates per SO

SO	Successful Proposals (N)	Eligible Proposals (N)	Success Rate (%)	Oversubscription Rate (%)	Av EU Funding (EUR)
EDIH	147	320	46%	47%	2.128.835
SO 1	9	12	75%	86%	9.609.421
SO 2	68	158	43%	66%	8.324.022
SO 3	171	318	54%	58%	2.820.751
SO 4	45	176	26%	36%	4.123.017
SO 5	86	118	73%	83%	1.737.319
SO 6	32	35	91%	91%	3.999.662
Grand Total	**558**	**1.137**	**49%**	**58%**	**3.424.265**

Source: Technopolis Group 2024, based on data provided by the client (reference date 08/01/2025)

Success and oversubscription rates per Types of Action (grants)

When looking at the success and oversubscription rates per types of action (Table 11), proposals under **Framework Partnerships** and **Specific Grants** have both an average success rate of 100%, meaning that all the eligible proposals were retained. This could be expected given that these types of action received only one and two eligible proposals, respectively. On the other hand, proposals for **budget-based grants** have an average success rate of 50%, while proposals for **lump sum grant** have the lowest success rate (22%).

Table 11: Success rates per types of action

Row Labels	Eligible Proposals	Successful Proposals	Unsuccessful Proposals	Success Rate	Av EU Funding (EUR)	Oversubscription Rate (%)
DIGITAL Action Grant Budget-Based	1.111	551	560	50%	3.414.982	59%
DIGITAL Framework Partnership	1	1	0	100%	-	NA

DIGITAL Lump Sum Grant	23	5	19	22%	5.695.818	19%
DIGITAL Specific Grant	2	2	0	100%	3.150.734	100%
Grand Total	**1.137**	**558**	**579**	**49%**	**3.424.265**	**58%**

Source: Technopolis Group 2024, based on data provided by the client (reference date 08/01/2025)

Success rates per Type of Applicants (grants)

If we look at Table 12, we see that there are some notable differences of the success rates between stakeholder groups over the SOs. Overall, *Public Organisations* (PUB) and *Research Organisations* (REC) have the highest success rates across all SOs; with PUB having a particularly higher rates for SO1 (100%) and SO5 (91%), and REC for SO5 (98%) and SO6 (94%). *Other* (OTH) type of organisations has higher success rates for SO5 (90%) and SO6 (89%), and same is the case for *Higher or Secondary Education Institutions* (HES) for SO1 (89%) and SO5 (88%). *Private For-Profit Organisations* (PRC) follow the same pattern with higher rates in SO5 (88%) and SO1 (86%). Finally, it is noteworthy that SO4 has the lowest success rates across all the stakeholder groups, being particularly low in PUB (30%).

Table 12: Success rates over the SOs per Type of Applicants

SO	HES	OTH	PRC (SME)	PRC (LE)	PRC (Unknown)	PUB	REC	Grand Total
EDIH	49%	49%	37%	43%	38%	46%	51%	46%
SO 1	89%	83%	80%	89%	100%	100%	88%	88%
SO 2	62%	66%	55%	64%	70%	73%	75%	66%
SO 3	73%	54%	60%	51%	69%	76%	79%	67%
SO 4	37%	30%	32%	29%	38%	30%	34%	33%
SO 5	88%	90%	81%	92%	91%	91%	98%	90%
SO 6	87%	89%	55%	100%	80%	83%	94%	89%
Grand Total	**56%**	**55%**	**51%**	**61%**	**54%**	**65%**	**65%**	**57%**

Overall success rate is different given that we count all the applicants participating in proposals and not unique proposals.

Source: Technopolis Group 2024, based on data provided by the client (reference date 08/01/2025)

Success rates per Geography of Applicants (grants)

Lastly, Table 13 indicates the success rates per SO over the geography of applicants. All registered countries are Member States, from which France has the highest success rate (76%)

– with particularly higher rates for SO5 (96%) and SO1 (92%) – followed by Denmark and Latvia (each with a success rate of 72%). SO1 presents success rates of 100% for several countries including Bulgaria, Croatia, and Cyprus, and so is the case for SO6 for countries including Austria, Czechia, Finland, and Hungary. In congruence with the previous analyses, all the countries report the lowest success rate for SO4, with Latvia being the lowest of all (15%).

Table 13: Success rates per SO over the geography of applicants

Country	**EDIH**	**SO 1**	**SO 2**	**SO 3**	**SO 4**	**SO 5**	**SO 6**	**Total**
Austria	40%	91%	66%	73%	19%	85%	100%	56%
Belgium	56%	83%	67%	72%	39%	93%	94%	63%
Bulgaria	31%	100%	45%	47%	20%	48%	100%	38%
Croatia	73%	100%	37%	71%	18%	65%	100%	55%
Cyprus	46%	100%	50%	93%	44%	67%	NA	65%
Czechia	81%	80%	64%	64%	32%	75%	100%	66%
Denmark	65%	100%	76%	84%	50%	100%	100%	72%
Estonia	100%	100%	61%	48%	20%	95%	100%	57%
Finland	71%	80%	81%	71%	35%	100%	100%	67%
France	84%	92%	82%	62%	39%	96%	86%	76%
Germany	50%	86%	78%	67%	43%	90%	85%	66%
Greece	24%	100%	46%	85%	27%	95%	100%	50%
Hungary	76%	100%	54%	59%	30%	90%	100%	63%
Ireland	37%	75%	57%	86%	50%	85%	86%	61%
Italy	22%	87%	64%	60%	32%	93%	71%	39%
Latvia	100%	100%	75%	42%	15%	100%	100%	72%
Lithuania	100%	100%	62%	69%	34%	82%	100%	71%
Luxembourg	89%	100%	59%	76%	33%	81%	NA	67%
Malta	100%	NA	20%	43%	40%	57%	100%	51%
Netherlands	97%	33%	66%	64%	25%	98%	100%	69%
Poland	54%	89%	58%	53%	20%	100%	69%	54%
Portugal	18%	100%	68%	76%	48%	96%	100%	43%
Romania	58%	100%	46%	60%	26%	100%	75%	54%
Slovakia	51%	100%	35%	71%	28%	88%	100%	57%
Slovenia	62%	93%	53%	81%	37%	91%	100%	67%

Spain	53%	80%	68%	53%	32%	94%	70%	58%
Sweden	43%	57%	72%	48%	43%	91%	100%	58%
Grand Total	**46%**	**88%**	**66%**	**67%**	**33%**	**90%**	**89%**	**57%**

Overall success rate is different given that we count all the applicants participating in proposals and not unique proposals.
Source: Technopolis Group 2024, based on data provided by the client (reference date 08/01/2025)

Time to Grant per SO over time (based on Signature Year)

The time-to-grant (TTG) is calculated subtracting the project signature date and the call deadline date. Digital Europe commits itself to a 9-month maximum TTG. On average, all SOs are within this maximum commitment on average, demonstrating that Digital Europe is reaching is TTG target. The only exception was EDIH in 2023 when its TTG was 11 month (341 days). Over time, EDIH and SO6 have the highest TTG of 9 months (272 days and 271, respectively), while SO1 has the lowest TTG of 6 months (184 days). The rest of SOs (SO2, SO3, SO4 and SO5) have on average a TTG of 8 months (226 – 249 days).

Table 14: Time-To-Grant (TTG) per SO over time

SO	2022		2023		2024		Total Av TTG (Days)	Total Av TTG (Months)
	Av TTG (Days)	Av TTG (Months)	Av TTG (Days)	Av TTG (Months)	Av TTG (Days)	Av TTG (Months)		
EDIH	264	9	341	11	216	7	272	9
SO 1	175	6	237	8	177	6	184	6
SO 2	223	7	249	8	270	9	242	8
SO 3	244	8	239	8	243	8	241	8
SO 4	228	8	222	7	227	8	226	8
SO 5	240	8	261	9	232	8	249	8
SO 6					271	9	271	9
Grand Total	**246**	**8**	**262**	**9**	**243**	**8**	**250**	**8**

Table 15: Number of projects TTG > 9 months

SO	2022		2023		2024		Grand Total	
	N	% of Total	N	% of Total	N	% of Total	N	% of Total
EDIH	82	64%	12	55%		0%	94	59%
SO 1		0%	1	50%		0%	1	17%
SO 2	6	22%	3	43%	7	44%	16	32%
SO 3	22	49%	26	30%	5	29%	53	36%
SO 4	4	18%	5	38%	1	8%	10	21%
SO 5	14	36%	5	38%	11	28%	30	33%

SO 6					1	100%	1	100%
Grand Total	**128**	48%	**52**	36%	**25**	26%	**205**	41%

ANNEX VII. NUMBER OF END-USERS REACHED BY THE PROGRAMME

	Citizens	No. Academia/ Research Org Users	No. Public Organisation Users	No. Private Company Users (SMEs)[239]	No. Private Company Users (Large Companies)	No information on type of organisation	Website Users	Website Visitors	Total (excl. website users/ visitors)
HPC									4[240]
Digital Skills	20 713	329	25	366 (218 SMEs)	157		30 308	1.13 m	21 590
Destination Earth		600	329	194		813			1 936
Data Space (health)		59	5	10		3			77
TEF		226	20	53					311
Cybersecurity		5	1	7		90			103[241]

[239] In 101 instances there was no company size classification available. We assumed companies were SMEs.
[240] Type of users unknown. Note that the HPC infrastructure funded by CEF, Horizon 2020, Horizon Europe and Digital Europe has more users. Jupiter is the first HPC system directly funded by Digital Europe (not taking into consideration the Digital Europe funded upgrades of HPC systems), and this system was open to researchers for experimental use in 2024 and is expected to substantially extend usage to more stakeholders in 2025
[241] Data on types of organisations available for 13 users.

European Digital Innovation Hubs			1 621	14 289					15 910[242]
Digitalization of Public Services			360				21 884		36
Safer Internet								125 million[243]	0
EDMO								390 816	0
Blockchain									406
Justice	1 027 392		10 774	40 643		33	1.1 m		1 078 809
Interoperability			12 576					1 m	12 576
Cloud to Edge				26					26
Total	1 048 105	998	25 815	55 169	157	939	115.2 m	127.5 m	1 119 208

[242] An additional estimated 38 700 people participated in events (unknown distribution per user type). This explains the difference between the 54,610 value for the legal indicator on EDIH participants.
[243] A substantial part of this figure includes citizens supported by the activities of the Safer Internet Hubs

Annex VIII. Progress made on various Indicators

SO	Indicator (DESI LINK)	Baseline	Final Target	Milestone for end of 2024	Current Status (end of 2024)	Progress against final target and milestones
1*	Output: HPC infrastructures jointly procured (**DESI Connectivity**: Gigabit for everyone (VHCN connectivity))	7	21 in 2026	19	19	90.4% (on track with milestones)
1*	Result: Usage of the exascale and post-exascale computers in total and by various stakeholder groups (universities, SMEs etc.) (**DESI Connectivity:** 5G coverage)	0	10% in 2025	7%	7%	70% (on track with milestones)
2*	Result: Co-investment in sites for experimentation and testing (**DESI Integration of Digital Technology:** Cloud & AI adoption)	0	EUR 180 million in 2027	EUR 50 million	EUR 189,7 million	>100%
2*	Result: Usage of common European libraries or interfaces to libraries of algorithms, usage of common European data spaces and usage of sites for experimentation and testing related to activities under this regulation (**DESI Integration of Digital Technology:** AI, Cloud, Big data adoption)	0	1 600 in 2030	140	414	26% (on track with milestones)
2*	Result: Cases for which organisations decide to integrate AI in their product, processes or services, as a result of the programme (**DESI Integration of Digital Technology:** AI, Cloud, Big data adoption)	0	100 by 2030	0	No data yet	(on track with milestones, first results expected in 2025)

SO	Indicator (DESI LINK)	Baseline	Final Target	Milestone for end of 2024	Current Status (end of 2024)	Progress against final target and milestones
3*	Output: Cybersecurity infrastructure and/or tools jointly procured (**DESI Human Capital:** ICT specialists)	0	15 by 2027	0	0	0% (on track with milestones)
3*	Output: Cybersecurity infrastructure and/or tools deployed (**DESI Human Capital:** ICT specialists)	0	165 by 2027	0	38	23% (on track with milestones)
3*	Result: Users and communities getting access to European cybersecurity facilities	0	400 in 2028	0	103	26% (on track with milestones)
4*	Result: People who have received training to acquire advanced digital skills (**DESI Human Capital:** Advanced digital skills)	0	65 000 in 2027	11 880	20 713	31.9% (on track with milestones)
4*	Result: People reporting an improved employment situation after the end of the training supported by the programme (**DESI Human Capital:** ICT (female) specialists)	0	26 200 in 2027	125	No data	No data collected in time[244]
4*	Impact: Enterprises having difficulty recruiting ICT specialists (**DESI Human Capital:** ICT specialists)	55.4% (2020)	NA	66.4%	57.5%	on track with milestones[245]
5*	Result: Take-up of digital public services (**DESI Digital Public Services:** Public services for citizens and businesses)	0	1 progress scale	0.25	0	(on track)

[244] The data received from training participants was incomplete. No data could be reported on time.

[245] In the evaluator's view this indicator is not a good proxy for direct programme at this stage of the programme, given the scale of the current implementation vs. the scale of the EU economy. However, as an official legal indicator this has been included for sake of completeness.

SO	Indicator (DESI LINK)	Baseline	Final Target	Milestone for end of 2024	Current Status (end of 2024)	Progress against final target and milestones
5*	Enterprises with a high digital intensity score (**DESI Integration of Digital Technology:** Digital intensity in businesses)	15.9% (2021)	21% by 2029	17.6%	34.3% (32.2% old methodology)	(on track)
5*	Result: Businesses and public sector entities that have used the European digital innovation hub (EDIH) services (**DESI Integration of Digital Technology:** Digital intensity in businesses)	0	191,400 in 2027	47,400	54 610	28,5% on track with milestone
6	The number of legal entities involved (subdivided by size, type and country of establishment) in the actions supported by the Initiative[246].	N/A	N/A	N/A	19 legal entities of which 12 are RTOs and 7 are Universities	N/A
6	The number of design tools developed or integrated under the Initiative[247].	N/A	N/A	N/A	0	N/A
6	The total amount co-invested by the private sector in design capacities and pilot lines under the Initiative[248].	N/A	N/A	N/A	0	N/A
6	The number of users of semiconductors or user communities seeking, and the number of users of	N/A	N/A	N/A	0	N/A

[246] More beneficiaries are expected until 2027 with new calls and the signature of a number of grant agreements.
[247] The Chips Joint Undertaking Work programme 2025 includes call for the development of open-source EDA tools, results are expected in 2027.
[248] Private investment is expected once the pilot lines are operational and for several future Work programme topics on design capacities.

SO	Indicator (DESI LINK)	Baseline	Final Target	Milestone for end of 2024	Current Status (end of 2024)	Progress against final target and milestones
	semiconductors or user communities obtaining, access to design capacities and pilot lines under the Initiative[249].					
6	The number of businesses, which have used the services of national competence centres supported by the Initiative[250].	N/A	N/A	N/A	0	N/A
6	The number of active competence centres in the Union in the context of the Initiative.[251]	N/A	N/A	N/A	0	N/A
6	The number of start-ups, scale-ups and SMEs that have received venture capital from the Chips Fund activities and the total amount of capital investments made.	N/A	N/A	N/A	Digital Europe **EUR 67 million top-up** of InvestEU leading to investment by EIF financial partners in **19 EU semiconductor start-up companies.**	N/A

[249] The pilot lines and the Design Platform are still being set up, their grant agreements being prepared, and therefore they do not have any users yet.
[250] The Competence Centres are still being set up, their grant agreements being prepared, and therefore they do not have any users.
[251] Grant agreements for the Competence Centres are still being prepared. It is expected that by end 2025 Competence Centres will be in place in all Member States and Norway.

2. HPC: Percentage of computing power of top 500 systems installed in the EU[252] (SO1)	
Indicator Type	Result
Definition	Share of the total computing power of top 500 systems corresponding to systems installed in the EU.
Unit of Measurement	Percentage of total computing power (expressed as a fraction)
Data Source	www.top500.org
Data provider and responsible for data collection	CNECT.C2
Frequency of Data Collection	Biannually (June and November)
Baseline	0. The indicator is strictly linked to the implementation of Digital Europe
Target	10% by 2026 (for supercomputers funded by Digital Europe) Estimation is based on the fact that EuroHPC supercomputers made 10.77% of the total TOP500 list (Rmax performance) in November 2022.
Underlying definitions and concepts	The Top500 list uses as a yardstick of performance the `best' performance as measured by the LINPACK Benchmark. LINPACK was chosen because it is widely used and performance numbers are available for almost all relevant systems. More information on: https://www.top500.org/project/linpack/
Milestone September 2024	**10.87% in Rmax for all EuroHPC funded computers** (9.66% in Rpeak) 0% for Digital Europe funded supercomputers First Rank, Name, Site 3, LUMI, EuroHPC/CSC 4, Leonardo, EuroHPC/CINECA 8, MareNostrum 5 ACC, EuroHPC/BSC 19, MareNostrum 5 GPP, EuroHPC/BSC

[252] Funded by Digital Europe credits.

	36, MeluXina - Accelerator Module, LuxProvide 100, Leonardo-CPU, EuroHPC/CINECA 71, Karolina, GPU partition, IT4Innovations National Supercomputing Center, VSB-Technical University of Ostrava 76, LUMI-C, EuroHPC/CSC 91, Discoverer, Consortium Petascale Supercomputer Bulgaria 189, JEDI, EuroHPC/FZJ 219, Deucalion, FCT 106, VEGA HPC CPU, IZUM 134, VEGA HPC GPU, IZUM 149, Karolina, CPU partition, IT4Innovations National Supercomputing Center, VSB-Technical University of Ostrava 230, MeluXina - Cluster Module, LuxProvide

3. Number of operated services available on the Destination Earth (DestinE) Core Service Platform (SO1)	
Indicator Type	Output
Definition	DestinE Core Service Platform services are ready-to-use functions and applications with reliable performance levels (formal service-level agreement), available for users. Examples include modelling, visualisation and collaboration services.
Unit of Measurement	Absolute Number (services)
Data Source	The data are collected and reported from the DestinE Core Service Platform Registry
Data provider and responsible for data collection	European Space Agency (ESA)
Frequency of Data Collection	Annually
Baseline	0. The indicator is strictly linked to the implementation of Digital Europe.
Target	15 at the end of Phase 1[253] (June 2024).
Underlying definitions and concepts	The indicator is used to measure the coverage of DestinE services, their attractiveness and adoption by users.
Other methodological comments	The number of services includes those operated on the DestinE Core Service Platform and those funded by third-parties or other EU programmes.

[253] Destination Earth is to be implemented in 3 phases.

Milestone February 2025	20 services

4. Number of different data types available from the DestinE Core Service Platform (measures data providers) (SO1)	
Indicator Type	Output
Definition	Number of distinct categories or thematic areas from which data are made available to the DestinE user community. This refers to the number of data types belonging to different categories / domains / fields. The indicator is used to demonstrate the diversity of data resources available for end users.
Unit of Measurement	Absolute Number (data types)
Data Source	DestinE Data Lake Data Portfolio and DestinE Core Service Platform Service Portfolio
Data provider and responsible for data collection	European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT)
Frequency of Data Collection	Annually
Baseline	0. The indicator is strictly linked to the implementation of Digital Europe
Target	15 at the end of Phase 1
Underlying definitions and concepts	The indicator is used to measure the level of diversity of the categories of data available to end users. The objective is to measure the variety of data resources to be used, and the list will grow as DestinE moves to new areas and fields. The value expressed in this indicator refers to and includes multiple categories or thematic areas.
Milestone September 2024	18 thematic areas (weather, satelite, Eurostat etc.), 170 distinct data sets/types (Services – DestinE Platform).

5. Number of agreed Destination Earth partnership project plans and use cases (SO1)	
Indicator Type	Output
Definition	A partnership project plan is a document describing the planned work of the third party (partner) and the contributions of the European Centre for Medium-Range Weather Forecasts

	(ECMWF), the European Space Agency (ESA) and/or the European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT). It is agreed via the process described in the Joint Partnership Plan. A use case is outsourced work on a specific application contracted by one of the three implementing entities under DestinE. This can be a specific contract or a work package under a larger contract. The indicator measures the progress of user uptake at different levels and in various formations and setups.
Unit of Measurement	Absolute Number (project plans and use cases)
Data Source	DestinE Partnership Plan (updated annually) Reports by ECMWF and ESA and EUMETSAT on partnership activities.
Data provider and responsible for data collection	ECMWF, ESA, EUMETSAT
Frequency of Data Collection	Annually
Baseline	0. The indicator is strictly linked to the implementation of Digital Europe
Target	20 at the end of Phase 1, including partnerships or use cases with institutions at national, EU, and possibly local levels. Partnerships and use cases should demonstrate the added value of DestinE and cover a variety of high impact sectors, e.g. energy, water and public health management, and corresponding stakeholders and workflows. Estimates are based on Phase 1 planning and interest received in user engagement activities. Phase 2 estimates are contingent on budget availability for Phases 2 and 3.
Underlying definitions and concepts	DestinE User Partnerships are structured work relations with policy institutions from EU services, EU Member State services (national, regional, local levels) and, possibly, global institutions. They aim to help design and implement sustainable services throughout the lifetime of DestinE in a way that corresponds to the specific needs of the users. Use Cases are an effective way of involving stakeholders in the development and initial operations of DestinE. They serve to:

	a. demonstrate key features of DestinE capabilities, b. address a key challenge affecting a user of DestinE with a view to improving the situation substantially. c. involve active domain users in exploring and contributing to advanced features of DestinE. Such use cases may concern a variety sectors, including forestry, water management, air quality management, urban development, maritime or air transport, biodiversity and disaster risk mitigation.
Milestone September 2024	25 use cases (Link: Use Cases Catalogue Archive - Destination Earth) and 2 partnerships

6. Number of entities supported in strengthening preparedness for and response to major cybersecurity incidents (SO3)	
Indicator Type	Result
Definition	The indicator measures the number of penetration tests, incident response support actions and mutual assistance support actions provided.
Unit of Measurement	Absolute number (of entities participating in preparedness actions, and entities supported in the context of incident response and mutual assistance actions)
Data Source	ECCC
Data provider and responsible for data collection	ECCC and CNECT.H1 will collect this data when conducting preparedness actions and responding to requests for mutual assistance and incident response.
Frequency of Data Collection	Annually
Baseline	0. The indicator is strictly linked to the implementation of Digital Europe
Milestones and Target	300 (2025)
Underlying definitions and concepts	‘Preparedness actions’ are collective and individual actions to prepare for and tackle cyberattacks or security breaches. Such actions include coordinated collective testing, penetration

	tests, individual exercises, risk monitoring and training. ‘Incident response’ is an organised approach to addressing and managing the aftermath of a security breach or cyberattack. ‘Mutual assistance’ means addressing and managing the aftermath of a security breach or cyberattack with the help of the authorities of another country.
Milestone	Data not yet available

7. Number of cities and communities developing smart digital solutions as a result of Digital Europe funding (SO2)	
Indicator Type	Result
Definition	Number of cities, towns, villages, and communities that have developed a digital strategy or have developed smart digital solutions like local digital platforms or local digital twins as a result of Digital Europe funding.
Unit of Measurement	Absolute number (cities and communities)
Data Source	Reporting by beneficiaries
Data provider and responsible for data collection	Reporting by beneficiaries, figure computed by unit CNECT.C3
Frequency of Data Collection	Biannually (June and November)
Baseline	0. The indicator is strictly linked to the implementation of Digital Europe
Target	20 by 2027
Underlying definitions and concepts	This indicator covers cities, towns, villages and communities that (i) have a strategy in place to develop a local digital platform, (ii) have developed a platform, and (iii) use a Local digital Twin with associated visualisation, modelling and prediction capabilities.
Other methodological comments (if relevant)	Numbers arrived at using this methodology will exclude those projects involving cities developing data and modelling solutions unless they associate these solutions to EU algorithmic registers and EU data spaces. The number arrived at may not reflect all contributing projects as some will be difficult to track.
Milestone February 2025	66 cities so far have been provided with implementation roadmaps for Local Digital Platforms and/or Local Digital Twins (i)

	5 cities/communities have been involved in 2 pilots from the DS4SSCC-DEP cascading fund action funded by Digital Europe (European Data Space for Smart Communities)

8. Usage of the European Blockchain Service Infrastructure and of the European Blockchain sandbox (SO5)	
Indicator Type	Result
Definition	Number of users (including public and private organisations and members of the public) participating in the EBSI ecosystem and accessing and using services provided through the European blockchain service infrastructure (EBSI). The indicator will further include the number of sectors/areas covered and of countries using the EBSI. Finally, it will include the number of users (including start-ups and other projects) accessing and engaging with the European blockchain sandbox.
Unit of Measurement	Absolute number (estimated organisations and individuals) Further breakdown: Type of beneficiary (member of public, enterprise, SME, public administrations), sector or areas, location.
Data Source	European Blockchain Partnership (2024) and Europeum-EDIC monitoring combined with EC funded projects and external input
Data provider and responsible for data collection	European Blockchain Partnership (till 2024) and Europeum-EDIC, facilitator of the European Blockchain sandbox, data computed by CNECT. E3
Frequency of Data Collection	Every two years (2023, 2025, 2027)
Baseline	0. The indicator is strictly linked to the implementation of Digital Europe.
Target	EBSI: Number of countries hosting an EBSI node (25 by 2027) Number of sectors/areas covered: 15 (2027) Estimated number of organisations benefiting from EBSI services: 500 (2027) Number of individuals benefiting from EBSI services: 200 000 (by 2025) Number of projects involved in the regulatory sandbox: 60 (by 2025).
Underlying definitions and concepts	Digital Europe actions will support the further development and deployment of the infrastructure

	and of use cases or applications to be implemented as part of EBSI. This will include services used by individuals, businesses and public administrations. Special attention will be paid to cross-border applications supported by Digital Europe, but local applications will also be supported where appropriate (as EBSI can contribute to them). For instance, sharing validated diplomas on EBSI can involve individuals, enterprises and universities, and can be cross-border for mobility purposes but also local in individual Member States. EBSI should help track the number of transactions for reporting purposes. For the European blockchain sandbox, the number of start-ups or projects participating in its activities will be monitored. (The sandbox activities will be organised in cohorts with a specific number of participants). Other aspects, e.g. the participation of regulators from a given number of countries, number of guidelines developed, etc., can be easily monitored.
Other methodological comments (if relevant)	There may be difficulties in obtaining relevant data as well as discrepancies in data collection in various Member States when EBSI is used for local services.
Milestone February	EBSI: Number of countries hosting an EBSI node: 21 in pilot network and 18 for the production grade network. Number of sectors/areas covered: (at pilot level): 10 Estimated number of organisations benefiting from EBSI services: more than 346 organisations contributing to or participating in pilots Number of individuals benefiting from EBSI services: n/a at this stage Number of projects involved in the EU blockchain regulatory sandbox: 60

9. Number of European Digital Innovation Hubs, their geographical distribution and their specialisations (SO5)	
Indicator Type	Output
Definition	Number of EDIHs that have received a Digital Europe grant and an overview of their

	specialisation and geographical distribution (according to the NUTS 2 classification).
Unit of Measurement	Absolute number, with associated features, made visible through an interactive map (catalogue).
Data Source	https://www.edihnetwork.eu - EDIH catalogue
Data provider and responsible for data collection	EDIH, Responsibilities for data collection: Digital Transformation Accelerator (procurement contract), figure computed by DG CNECT.A4
Frequency of Data Collection	At time of contracting
Baseline	0. The indicator is strictly linked to the implementation of Digital Europe
Target and how the target was estimated	
Underlying definitions and concepts	EDIHs provide technological expertise and experimentation facilities to enable the digital transformation of the industry and the public sector
Milestone February 2025	151 EDIHs, in addition 18 hubs from associated countries from Albania, Montenegro, North Macedonia, Serbia, Türkiye, Ukraine and Kosovo (set up in 2025). Main technologies covered: Artificial Intelligence & Decision Support 90%, Cybersecurity 70%, Internet of Things 64%, High performance computing 54%, Big data 53%, etc. Main sectors covered: Manufacturing 64%, Health 47%, Public Administration 44%, Energy 38%, Transport and Mobility 37% (among others)

10. Entities that have been supported by the European Digital Innovation Hubs showing a significant increase in their digital maturity (SO5)	
Indicator Type	Result
Definition	Cumulative number of entities having benefited from EDIH services that have increased their digital maturity score from 0 to 1 in the Digital Maturity Assessment tool (DMAT) representing significant progress.
Unit of Measurement	Absolute number (unique entities)
Data Source	https://www.edihnetwork.eu - DMAT questionnaire
Data provider and responsible for data collection	EDIH, Unit A4/ Digital Transformation Accelerator (procurement contract)

Frequency of Data Collection	Annually
Baseline	0. The indicator is strictly linked to the implementation of Digital Europe
Target and how the target was estimated	19.140 – cumulative number of entities that until 2024 that have used EDIHs' services and have increased their digital maturity score
Underlying definitions and concepts	Digital maturity will be determined through the DMAT questionnaire, which assesses digital business strategy; digital readiness; human-centric digitalisation; data management; automation & intelligence; and green digitalisation[254].
Milestone Feburary 2025	90% of firms having used one of the four services

[254] JRC (2023). Digital Maturity Assessment Framework & Questionnaires for SMEs/PSOs. A guidance document for EDIHs. JRC133234.

ANNEX X. MONITORING AND EVALUATION FRAMEWORK FOR THE DIGITAL EUROPE PROGRAMME

Introduction

This Monitoring and Evaluation Framework sets out the monitoring and evaluation strategy for the 2021-2027 Digital Europe Programme. It is mainly based on core performance indicators listed in the Digital Europe Programme Regulation (EU) 2021/694 [255]. Additionally, supporting, contextual[256] and topic-level indicators are also used when gathering data for the interim and final evaluations, as they provide information on the wider policy landscape in which actions carried out under the Digital Europe Programme take place or to help measure progress made on specific actions.

This framework, which sets out in detail the monitoring and evaluation strategy for the Digital Europe Programme, is intended to be used as a tool to better account for the programme's spending, as requested by the European Court of Auditors and the European Parliament, provide evidence for the evaluation of the programme, inform policymaking and facilitate communication on the programme's achievements.

The data collected will ensure that progress towards the objectives outlined in the Digital Europe Programme Regulation is continuously monitored. It will also enable regular assessment as to whether the programme is on track to deliver its expected results.

The Monitoring and Evaluation Framework provides indicators to monitor the inputs, outputs, results and impact of the Digital Europe Programme:

- The **core performance indicators** set out in the Regulation aim at providing information on progress towards the Digital Europe Programme objectives. Such information is to be included in obligatory reporting activities, such as the Programme Performance Statement annexed to the draft annual budget.

- **Additional supporting indicators** are designed to collect additional data for the midterm and final evaluations. They provide data to measure the effectiveness of specific work strands of the programme.

- Other indicators: **Contextual indicators** set out by the Digital Decade Policy programme in January 2023[257] are aimed at providing information on progress towards wider policy objectives, in particular the Digital Decade targets (e.g. the number of ICT specialists in the EU). **Topic-level indicators** provide detailed insight into progress made on a specific topic.

[255] Regulation (EU) 2021/694 of the European Parliament and of the Council of 29 April 2021 establishing the Digital Europe Programme and repealing Decision (EU) 2015/2240 (Text with EEA relevance): Publications Office (europa.eu)

[256] See Better Regulation Toolbox, EUR-Lex - 52021DC0219 - EN - EUR-Lex (europa.eu), which states that 'contextual information should also be collected. Contextual information refers to developments that are not intentionally related to the individual initiative, although they may influence it or be influenced by it, such as the economic growth, break-through (emerging) technologies, new behavioural patterns etc.' (p. 361).

[257] Decision (EU) 2022/2481 of the European Parliament and of the Council of 14 December 2022 establishing the Digital Decade Policy Programme 2030: EUR-Lex - 32022D2481 - EN - EUR-Lex (europa.eu).

All indicators described above will inform the **interim and final evaluations** of the Digital Europe Programme, based on the evaluation criteria **effectiveness, efficiency, relevance, coherence** and **EU added value.** These evaluation criteria and the general principles for monitoring and evaluation are described in the Commission's Better Regulation guidelines, which inform this document. The data gathered on these five evaluation criteria will help analyse whether EU funds are efficiently managed, whether the Digital Europe Programme is coherent with other EU funding programmes, and whether it is still relevant in this time of rapid technological change. This insight will inform the design of future work programmes and the adjustment of funding priorities, if necessary, to maximise the impact of EU investment.

This document also introduces a mechanism to consistently provide data on progress towards Digital Europe Programme's objectives, which will highlight any potential bottlenecks or challenges to its implementation. In doing so, it functions as an early warning system signalling any deviations from the objectives and ensuring that mitigating measures can be taken on time.

The gathered data will contribute to identifying the concrete benefits of this EU initiative for individuals, companies and society at large and will inform communication on the success of the programme.

The framework significantly contributes to EU digital policy as it helps to: (i) deliver on reporting requirements; (ii) provide evidence in support of policy decisions; and (iii) ensure visibility of the role EU investments play in meeting EU digital policy goals and providing concrete benefits to people across the EU. The gathered data will guide policymaking and help ensure that investment under the Digital Europe Programme remains effective, efficient, relevant, coherent and adds EU value.

The Digital Europe Programme should remain flexible and respond to technological, societal, or economic developments and address pressing challenges. Milestones and targets of indicators need to reflect these changes in priorities. The Digital Europe Programme has already demonstrated its flexibility responding to several urgencies, for instance, by reacting swiftly to the major supply shortage of semiconductors exacerbated by the COVID 19 pandemic by introducing a new specific objective to promote leadership in semiconductor technologies. In addition, Russia's war of aggression against Ukraine and the ensuing heightened risk of large-scale cybersecurity threats led to the support for the EU Cyber Solidarity Act, which introduced the Cyber Emergency Mechanism into the Digital Europe Programme to increase preparedness and response to large-scale cybersecurity incidents. This framework reflects changes in priorities of budget spending due to immediate urgencies or recent developments.

Legal provisions

The provisions for monitoring, reporting, and evaluation of the Digital Europe Programme are set out in Articles 25 and 26 of **Regulation (EU) 2021/694** of the European Parliament and of the Council of 29 April 2021 establishing the Digital Europe Programme:

Article 25 requires the monitoring and reporting of the programme based on measurable indicators, a methodology to assess progress towards the achievements of the objectives and a reporting system to ensure that data are collected 'efficiently, effectively and in a timely manner'.

Article 26 requires an interim evaluation 'no later than four years after the start of the implementation of the Programme' and a final evaluation of the programme by the end of 2031 as well as an efficient and effective evaluation reporting system.

Annex II lists the 14 key performance indicators to monitor the implementation and to report on the progress of the programme towards the achievement of its specific objectives.

Intervention Logic of the Digital Europe programme (2023)

The Digital Europe Programme shapes the digital transformation of Europe. It is based on the Regulation (EU) 2021/694 of the European Parliament and of the Council of 29 April 2021 establishing the Digital Europe programme and repealing Decision (EU) 2015/2240. The programme's objective is to support the digital transformation of industry and public administration to enhance the EU's open strategic autonomy and competitiveness and to reinforce EU critical digital capacities. It focuses on the key areas of (i) high performance computing, (ii) cloud-to-edge infrastructure, (iii) data spaces and artificial intelligence, (iv) cybersecurity, (v) the necessary upskilling to provide a workforce for these advanced technologies; (vi) the deployment of these technologies and their best use for critical sectors like energy or climate; (vii) and support to industry, small and medium-sized enterprises and public administrations in their digital transformation.

The programme is complemented by an array of regulatory measures aimed at eliminating barriers to digital innovation in several critical areas. These measures aim, for example, at incentivising business-to-business and business-to-government (B2B and B2G) data sharing across the EU (Data Governance Act[258], Data Act[259]), creating a safer and fairer online environment for users and businesses (Digital Services Act[260], Digital Markets Act[261]) and increasing the level of security of network and information systems across the EU (NIS2 Directive)[262].

[258] Regulation (EU) 2022/868 of the European Parliament and of the Council of 30 May 2022 on European data governance and amending Regulation (EU) 2018/1724 (Data Governance Act): EUR-Lex - 32022R0868 - EN - EUR-Lex (europa.eu)

[259] Proposal for a Regulation of the European Parliament and of the Council on harmonised rules on fair access to and use of data (Data Act): EUR-Lex - 52022PC0068 - EN - EUR-Lex (europa.eu)

[260] Regulation (EU) 2022/2065 of the European Parliament and of the Council of 19 October 2022 on a Single Market For Digital Services and amending Directive 2000/31/EC (Digital Services Act): EUR-Lex - 32022R2065 - EN - EUR-Lex (europa.eu)

[261] Regulation (EU) 2022/1925 of the European Parliament and of the Council of 14 September 2022 on contestable and fair markets in the digital sector and amending Directives (EU) 2019/1937 and (EU) 2020/1828 (Digital Markets Act): EUR-Lex - 32022R1925 - EN - EUR-Lex (europa.eu)

[262] Directive (EU) 2022/2555 of the European Parliament and of the Council of 14 December 2022 on measures for a high common level of cybersecurity across the Union, amending Regulation (EU) No 910/2014 and Directive (EU) 2018/1972, and repealing Directive (EU) 2016/1148 (NIS 2 Directive): EUR-Lex - 32022L2555 - EN - EUR-Lex (europa.eu)

Main challenges and needs

The EU has been facing harsh global competition and needs to continue to act to invest in digital technologies and ensure Europe's strategic autonomy and competitiveness. The impact assessment of the Digital Europe Programme[263] published in June 2018, identified, in particular, the following challenges:

The investment gap of the EU in digital by comparison to the US and China hampered deployment of digital capacities and uptake of advanced digital technologies. In 2016, Europe invested 3 to 4 billion USD into Artificial Intelligence while Asia invested 8 to 12 billion USD and North America 15 to 23 billion USD[264]. Investments in HPC in the EU represented 60% of US investment[265]. The same lack of investment has been identified in the area of cybersecurity, with a study for the Dutch government estimating that the US invested 10 times as much as the EU in cybersecurity[266].

This investment gap was linked to inadequate capacities in key technological areas. High Performance Computing (HPC) capacity, for instance, was described as 'fragmented and underdeveloped'[267], not meeting the high demand for these advanced computing systems. This lack has impeded EU's success in the data economy. Similarly, the lack of high-quality data, limited AI competences, and absence of AI competence centres hampered the development of Artificial Intelligence (AI) 'ecosystems' bringing together AI developers, users and financers.

The impact statement further highlights the EU's unpreparedness to tackle cybersecurity attacks on its critical infrastructure. In 2017 the ITU Global Cybersecurity Index[268] revealed that only 2 EU member states, Estonia and France, were among the top 10 countries with regard to their cybersecurity commitment. In particular, main weaknesses existed with regard to cybersecurity in the areas of HPC and quantum technologies.

Another important challenge identified before the implementation of the Digital Europe Programme, was the slow and uneven uptake of digital solutions in the public sector by member states. A factor impacting the slow uptake was the lack of interoperability. In the field of judiciary, for instance, the absence of electronic communication between courts and legal authorities hampered law enforcement across EU.

[263] Commission Staff Working Document Impact Assessment, Accompanying the document Proposal for a Regulation of the European Parliament and of the Council establishing the Digital Europe programme for the period 2021-2027: EUR-Lex - 52018SC0305 - EN - EUR-Lex (europa.eu)
[264] Artificial intelligence the next digital frontier?, McKinsey Global Institute, 2017
[265] IDC study: HPC in the EU, SMART 2014/0021
[266] Dutch investments in ICT and cybersecurity: putting it in perspective, The Hague Centre for Strategic Studies, Dec 2016
[267] Commission Staff Working Document Impact Assessment, Accompanying the document Proposal for a Regulation of the European Parliament and of the Council establishing the Digital Europe programme for the period 2021-2027: EUR-Lex - 52018SC0305 - EN - EUR-Lex (europa.eu)
[268] Global Cybersecurity Index 2017: https://www.itu.int/dms_pub/itu-d/opb/str/D-STR-GCI.01-2017-PDF-E.pdf

Equally, the uneven and inadequate digitalisation of businesses represented a main challenge, with SMEs lagging behind large enterprises and significant divergence among member states.

Furthermore, in stakeholder consultations conducted prior to the implementation of Digital Europe, the most cited obstacle for lack of investment in digital was the lack of staff with the needed skills[269]. In 2017, 47.5 % of companies stated that they found it hard to recruit ICT specialists[270].

Challenges

- Meet growing demand for access to world-class digital infrastructures - European businesses, public sector and researchers are forced to access and process the computing, data, or AI resources outside the EU.
- Overcome legal and technical barriers to data sharing by establishing secure, accessible, interoperable and privacy-preserving data spaces in key sectors/areas respecting EU rules and values.
- Enhance cybersecurity in view of frequent and complex cyberattacks on critical infrastructures.
- Narrow the digital skills gap, especially in the area of advanced digital skills through training and reskilling and upskilling of the workforce.
- Tackle the inadequate uptake of digital solutions in areas of public interest, uneven adoption of digital solutions among Member States and lack of their interoperability.
- Ensure the digital transformation leaves no one behind; foster the take-up of digital skills and digital solutions by businesses (in particular SMEs).

In recent years several achievements in the areas mentioned above have been made. The EuroHPC pre-exascale supercomputer LUMI, for instance, has been ranked in first place as the fastest supercomputer in Europe for the third time in a row and has been ranked third fastest in the world. The pre-exascale supercomputer Leonardo, another EuroHPC system, also made the list of world's most powerful supercomputers.

Recent development, however, have further stressed the importance of accelerating the digital transformation. The COVID-19 pandemic, for instance, has highlighted the critical role of data, digital technologies and infrastructures and has demonstrated how our societies and economies can further benefit from digital solutions. Data has an ever-growing impact on how we produce, consume and how we live our lives. To speed up the development of the European economy and to harness the value of data for the benefit of European society, common European data spaces in strategic economic sectors and domains of public interest are necessary. Indeed, data and its socio-economic potential play an essential role both in Europe's digital transformation and in economic recovery plans. EU-wide common, interoperable data spaces in strategic sectors will contribute to overcoming technical barriers to data sharing by combining the necessary tools and infrastructures and addressing issues of trust by way of common rules[271].

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[269] Commission Staff Working Document Impact Assessment, Accompanying the document Proposal for a Regulation of the European Parliament and of the Council establishing the Digital Europe programme for the period 2021-2027: EUR-Lex - 52018SC0305 - EN - EUR-Lex (europa.eu)

[270] Eurostat 2017 survey on ICT usage and e-commerce in enterprises

[271] See Staff working document on data spaces | Shaping Europe's digital future (europa.eu)

Russia's war of aggression against Ukraine has further highlighted the importance of being able to protect the EU's critical infrastructures and the public services that depend on them. Malicious cyber activities threaten our economies, our way of life, and our freedoms and values, and can even potentially undermine the cohesion and functioning of our democracy.

The rapid acceleration of digitalisation has exacerbated the systemic gap between market needs and available skills on the use of advanced digital technologies in the workplace. Currently, the EU faces a shortage of digital experts who can develop cutting-edge technologies. In 2022, 62.8% of enterprises that recruited or tried to recruit ICT specialists reported difficulties in filling vacancies[272]. In key areas, such as cybersecurity and data analysis, there are constantly hundreds of thousands of vacancies. A strong digital economy powered by workers with digital skills is vital for innovation, growth, jobs, and competitiveness in the EU, in particular, in the context of the twin green and digital transitions.

Over the past ten years, online public services have become more and more frequent, a trend which has been accelerated by the COVID-19 pandemic. The Digital Decade's target is for public services to pr.vide all key services for businesses and individuals online by 2030. A few Member States, such as Estonia, Finland and Malta, are already on a good track to achieving this target. However, several other Member States, such as Romania, Greece, Bulgaria and Slovakia are still lagging behind. While Member States are steadily increasing their offer of basic digital service, further investment is needed in areas of advanced public services using AI, robotics and big data[273]. Furthermore, a satisfactory level of interoperability has not yet been achieved, which impedes the potential for wider adoption.

In the private sector, the uptake of digital solutions by businesses remains uneven among Member States, sectors (particularly between high-tech and traditional areas), and between large companies and SMEs. The 'Digitalisation in Europe 2022-2023' report by the European Investment Bank shows that the digitalisation gap between the US and Europe has been decreasing in the past four years. Investment in digital as a response to the Covid 19 pandemic has been higher in the US, however, mainly due to the low investment in digital of EU micro and small enterprises[274].

Eurostat data confirm that 29.7% of the EU's large enterprises[275] had a very high Digital Intensity Index (DII) and 54% a high level, while only 10.2% of medium-sized companies[276] registered a very high-intensity level and 46% a high DII. Only 2.3% of small enterprises[277] reached a very high digital intensity, with only 24.1% scoring a high DII[278].

In addition, European Union is engaged on its path towards climate neutrality by 2050, and the digital transition plays an important role in achieving this objective. For instance, digital technologies allow for higher efficiency and productivity across industries,

[272] Analyse one indicator and compare countries — Digital Scoreboard - Data & Indicators (digital-agenda-data.eu)
[273] Digital Economy and Society Index (DESI) 2022, Thematic Chapters: The Digital Economy and Society Index (DESI)
[274] Digitalisation in Europe 2022-2023: Evidence from the EIB Investment Survey
[275] Large enterprises = 250 and more employees and self-employed persons
[276] Medium-sized enterprises = 50-249 employees and self-employed persons
[277] Small enterprises = 10-49 employees and self-employed persons
[278] Statistics | Eurostat (europa.eu)

including within the area of green technologies, with positive effects on growth and competitiveness. They also help change the energy and environmental stance, by reducing dependence on foreign fossil fuels and supporting the deployment of renewable energies. Digital technologies further open new opportunities for social progress and economic development in the context of the twin green and digital transitions.

Objectives

To address the above-mentioned challenges in a systematic way, the Digital Europe Programme is designed to boost the digital transformation of the economy and society bringing much needed benefits to individuals and businesses. The programme focuses on:

- building essential capacities and advanced skills in key digital technology areas, contributing to Europe's technological sovereignty;
- accelerating their deployment and best use in areas of public interest and the private sector.

To pursue these goals, the Digital Europe Programme comprises five specific objectives. An additional specific objective to boost Europe's competitiveness and resilience in semiconductor technologies and applications was proposed in February 2022[279]. The European Chips Act that complements the Digital Europe Programme with this new specific objective on semiconductors, entered into force on 21 September 2023[280].

Specific Objective 1- High Performance Computing (HPC)

This specific objective will pursue the following operational objectives:

- deploy, coordinate at EU level and operate an integrated demand-oriented and application-driven world-class exascale supercomputing and data infrastructure that shall be easily accessible to public and private users, in particular SMEs, irrespective of the Member State in which they are located, and easily accessible for research purposes, in accordance with Regulation (EU) 2018/1488[281];
- deploy ready to use operational technology resulting from research and innovation in order to build an integrated EU HPC ecosystem, covering various aspects in the scientific and industrial value chain segments, including hardware, software, applications, services, interconnections and digital skills, with a high level of security and data protection;
- deploy and operate post-exascale infrastructure, including integration with quantum computing technologies and research infrastructures for computing

[279] Proposal for a COUNCIL REGULATION amending Regulation (EU) 2021/2085 establishing the Joint Undertakings under Horizon Europe, as regards the Chips Joint Undertaking.

[280] Regulation (EU) 2023/1781 of the European Parliament and of the Council of 13 September 2023 establishing a framework of measures for strengthening Europe's semiconductor ecosystem and amending Regulation (EU) 2021/694 (Chips Act): EUR-Lex - 32023R1781 - EN - EUR-Lex (europa.eu).

[281] Council Regulation (EU) 2018/1488 of 28 September 2018 establishing the European High Performance Computing Joint Undertaking: EUR-Lex - 32018R1488 - EN - EUR-Lex (europa.eu).

science and encourage the development within the EU of the hardware and software necessary for such deployment.

Specific Objective 2 - Artificial Intelligence

The EU's financial contribution under this specific objective shall pursue the following operational objectives:

- build up and strengthen core AI capacities and knowledge in the EU, including building up and strengthening quality data resources and corresponding exchange mechanisms, and libraries of algorithms, while guaranteeing a human-centric and inclusive approach that respects EU values.
- make the capacities referred to in point above accessible to businesses, especially SMEs and start-ups, as well as civil society, not-for-profit organisations, research institutions, universities and public administrations, in order to maximise their benefit to the European society and economy;
- reinforce and network AI testing and experimentation facilities in Member States; develop and reinforce commercial application and production systems in order to facilitate the integration of technologies in value chains and the development of innovative business models and to shorten the time required to pass from innovation to industrial production and foster the uptake of AI-based solutions in areas of public interest and in society.

AI-based solutions and data made available shall respect the principle of privacy and security by design and shall fully comply with data protection legislation.

Specific Objective 3 - Cybersecurity and Trust

The financial contribution from the EU under this specific objective shall pursue the following operational objectives:

- support the building-up and procurement of advanced cybersecurity equipment, tools and data infrastructures, together with Member States, in order to achieve a high common level of cybersecurity at European level, in full compliance with data protection legislation and fundamental rights, while ensuring the strategic autonomy of the EU;
- support the building-up and best use of European knowledge, capacity and skills related to cybersecurity and the sharing and mainstreaming of best practices;
- ensure a wide deployment of effective state-of-the-art cybersecurity solutions across the European economy, paying special attention to public authorities and SMEs;
- reinforce capabilities within Member States and private sector to help them comply with Directive (EU) 2016/1148 of the European Parliament and of the Council[282] including through measures supporting the uptake of cybersecurity best practices;

[282] Directive (EU) 2016/1148 of the European Parliament and of the Council of 6 July 2016 concerning measures for a high common level of security of network and information systems across the Union (OJ L 194, 19.7.2016, p. 1).

- improve resilience against cyberattacks, contribute towards increasing risk-awareness and knowledge of cybersecurity processes, support public and private organisations in achieving basics levels of cyber security, for example by deploying end-to-end encryption of data and software updates;
- enhance cooperation between the civil and defence spheres with regard to dual-use projects, services, competences and applications in cybersecurity, in accordance with a Regulation establishing the European Cybersecurity Industrial, Technology and Research Competence Centre and the Network of National Coordination Centres (the 'Cybersecurity Competence Centre Regulation').
- increase the preparedness (*ex ante*) and response (*ex post*) to large-scale cybersecurity incidents through the testing of essential entities and the gradual set-up of an EU-level cyber reserve with services from trusted private providers that would be ready to intervene at Member States' request in cases of significant cross-border incidents. These activities will support the EU Cyber Solidarity initiative proposed in April 2023.

<u>Specific Objective 4 - Advanced Digital Skills</u>

The financial contribution from the EU under this specific objective shall support the development of advanced digital skills in areas covered by the programme in order to contribute to increasing Europe's talent pool, bridge the digital divide and foster greater professionalism, especially with regard to high performance and cloud computing, big data analytics, cybersecurity, distributed ledger technologies (e.g. blockchain), quantum technologies, robotics, AI, while taking gender balance into account. In order to tackle skills mismatches and to encourage specialisation in digital technologies and applications, the financial contribution shall pursue the following operational objectives:

- support the design and delivery of high-quality, long-term training and courses, including blended learning, for students and for the workforce;
- support the design and delivery of high-quality, short-term training and courses for the workforce, in particular in SMEs and in the public sector;
- support high-quality on-the-job training and work placements for students, including traineeships, and the workforce, in particular, in SMEs and in the public sector.

<u>Specific Objective 5 - Deployment and Best Use of Digital Capacities and Interoperability</u>

The financial contribution from the EU under this specific objective shall pursue the following operational objectives:

- support the public sector and areas of public interest, such as health and care, education, judiciary, law enforcement, consumer protection, single market, customs, transport, mobility, energy, environment, cultural and creative sectors, including relevant businesses established within the EU, to effectively deploy and access state-of-the-art digital technologies, such as HPC, AI and cybersecurity;

- deploy, operate and maintain trans-European interoperable state-of-the-art digital service infrastructures across the EU, including related services, in complementarity with national and regional actions;
- support the integration and use of trans-European digital service infrastructures and of agreed European digital standards in the public sector and in areas of public interest to facilitate cost-efficient implementation and interoperability;
- facilitate the development, update and use of solutions and frameworks by citizens, public administrations and businesses, including of open-source solutions and the re-use of interoperability solutions and frameworks;
- offer the public sector and the industry, in particular SMEs, easy access to testing and piloting of digital technologies and increase the use thereof, including in particular their cross-border use;
- support the uptake by the public sector and the EU industry, in particular SMEs and start-ups, of advanced digital and related technologies, including in particular HPC, AI, cybersecurity, other leading edge and future technologies, such as distributed ledger technologies (e.g. blockchain);
- support the design, testing, implementation, and deployment and maintenance of interoperable digital solutions, including digital government solutions, for public services at EU level which are delivered through an open data-driven reusable solutions platform aiming to foster innovation and establish common frameworks in order to unleash the full potential of the public administrations' services for citizens and businesses;
- ensure the continuous capacity at EU level to lead digital development, in addition to observing, analysing and adapting to fast-evolving digital trends, and share and mainstream best practices;
- support cooperation towards achieving a European ecosystem for trusted data sharing and digital infrastructures using, inter alia, distributed ledger services and applications, including support for interoperability and standardisation and by fostering the deployment of cross-border applications based on security and data protection and privacy by design, and by default complying with consumer and data protection legislation;
- build up and strengthen the European Digital Innovation Hubs and their network.

Specific Objective 6: Semiconductors

This new specific objective was integrated into the Digital Europe Programme with the adoption of the Chips Act Regulation[283] and will promote Europe's leadership in semiconductor technologies and applications.

Input

[283] Regulation (EU) 2023/1781 of the European Parliament and of the Council of 13 September 2023 establishing a framework of measures for strengthening Europe's semiconductor ecosystem and amending Regulation (EU) 2021/694 (Chips Act): EUR-Lex - 32023R1781 - EN - EUR-Lex (europa.eu).

Financial Resources

The proposed financial allocation for the Digital Europe Programme stands at EUR 8 638 million. This amount covers all specific objectives, including a new specific objective to promote EU leadership in semiconductor technologies and applications. The budget is implemented in multiannual work programmes. The Digital Europe funds are allocated in the form of grants or procurements and through Contribution Agreements as well as financial support through equity and quasi-equity by combining funding with the InvestEU guarantee, such as the Investment Platform for Strategic Digital Technologies or the Chips Fund.

The Commission directly manages the activities related to specific objectives on artificial intelligence, advanced digital skills and widening the best use of digital technologies. The European Health and Digital Executive Agency (HaDEA) has been entrusted with implementing part of the Digital Europe Programme's budget. The activities related to specific objective on HPC are mainly implemented through the EuroHPC Joint Undertaking and the specific objective on cybersecurity will be mainly implemented through the European Cybersecurity Industrial, Technology and Research Competence Centre and the Cybersecurity Competence Network. The new SO6 – semiconductor technologies and applications – will be implemented by the Chips Joint Undertaking. Actions related to 'Destination Earth' (a flagship initiative in SO1 with the aim to develop a digital twin of the earth), are implemented through contribution agreements by the European Space Agency, the European Centre for Medium-Range Weather Forecasts and the European Operational Satellite Agency for Monitoring Weather, Climate and the Environment from Space. The Investment Platform for Strategic Digital Technologies is implemented through indirect management with the European Investment Fund under InvestEU.

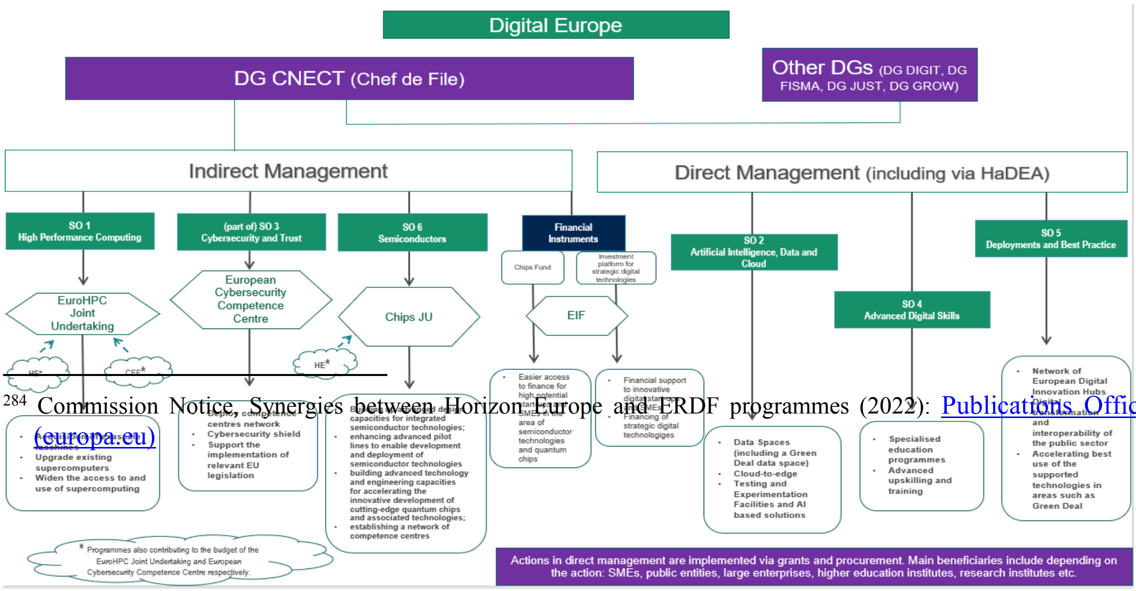
The Digital Europe Programme complements several other funding programmes, in particular Horizon Europe. While Digital Europe Programme focuses on large-scale digital capacity and infrastructure building to support the uptake and deployment of critical existing or tested innovative digital solutions across the EU, Horizon Europe supports research, technological development, demonstration, piloting, proof-of-concept, testing and innovation - including pre-commercial deployment - for innovative digital technologies. The Connecting Europe Facility (CEF2) also complements the Digital Europe Programme as it supports the high capacity broadband and 5G corridors necessary to deploy digital services and technologies across the EU.

The activities under indirect management by the EuroHPC Joint Undertaking and the European Cybersecurity Competence Centre will also reinforce the innovation actions supported by Horizon Europe and the Connecting Europe Facility. The EuroHPC Joint Undertaking will also implement Horizon Europe and CEF2 supported activities in high performance computing. Horizon Europe will provide support for research and innovation underpinned by cybersecurity infrastructures and facilities, including testing, experimentation and demonstration across all sectors and disciplines impacted by cybersecurity. In addition, Horizon Europe will support research and innovation on cyber-secure components and software relevant for areas such as protecting infrastructure or privacy and data protection.

There are numerous other synergies and complementarities with EU funding programmes. For instance, **Erasmus+**, supports excellence in education and training and contributes to the digital transformation of education and training systems, and thus has concrete synergies with specific objective 4 of the Digital Europe Programme (Advanced Digital Skills). **Creative Europe** promotes the digital transition of the cultural and creative sectors and aims to promote skills for audiovisual professionals in support of the digital transition. **EU4Health** supports the deployment of health dataspaces and digital tools and services to accelerate the digital transition in health care. Furthermore, the **Single Market** programme fosters the digitalisation of SMEs and industry, the **Justice** programme funds e-Justice projects, which aim to improve the effectiveness of the justice system. The **European Regional Development Fund** promotes innovative and smart economic transformation and regional ICT connectivity. The **European Social Fund+** aims to mainstream and upscale innovative technologies and solutions in the areas of employment, social security coordination, social inclusion and supports education and training for digital skills. In the context of the **Recovery and Resilience Facility** each Member State must dedicate at least 20% of its recovery and resilience plan to the digital transition. **InvestEU** promotes investments in numerous digital areas, such as AI, quantum technology, IoT, blockchain. Another example are the **Fiscalis and Customs** programmes, which support IT capacity building and innovation with regard to the European Electronic Systems for customs and taxation.

Most actions planned under the programme require co-investments by the public and private sectors. The forms of these co-investments are described in the relevant parts of the various Digital Europe work programmes. For co-investment from other EU funding programmes, in particular the cohesion policy funds, the Commission published a notice on the synergies between Horizon Europe and the European Regional Development Fund (ERDF). This notice also provides a practical example of cumulative funding between ERDF and the Digital Europe Programme. ([284]) The European Digital Innovation Hubs (EDIH) are financed by the Digital Europe Programme with a maximum of 50% of eligible costs, the other part may be financed by the ERDF (or can come from other public or private funding).

The graph below shows the current programme structure of the Digital Europe Programme:



[284] Commission Notice, Synergies between Horizon Europe and ERDF programmes (2022): Publications Office (europa.eu)

Main Activities

The programme includes activities in the following main areas:

- *High Performance Computing (HPC):* Deployment of world-class exascale, post-exascale supercomputing and quantum computing capacities to ensure the widest access to and use of these capacities;

- *Artificial Intelligence (AI):* Deployment of EU-wide common data spaces based on a cloud-to-edge federated infrastructure and promote testing and adoption of Artificial Intelligence-based solutions;

- *Cybersecurity:* Building up of advanced cybersecurity capabilities (including a quantum secure communication infrastructure for Europe); promote the sharing of best practices and ensure wide deployment of the state-of-the-art cybersecurity solutions across the European economy;

- *Advanced digital skills:* Boosting of academic excellence, by increasing the education offer and training in key digital technologies, such as HPC, cybersecurity, robotics, data, extended reality, cloud computing and AI; in various economic sectors and conversion programmes for non-ICT workers.

Adoption and best use of key digital technologies: Reinforcing the European blockchain capacities and the digital transformation of public administrations and services through interoperability solutions, deploying a network of European Digital Innovation Hubs supporting the digital transformation of European public and private organisations[285]; addressing key societal challenges (e.g. environment and climate change) via high impact deployments; and promoting an inclusive and trustworthy digital space.

Expected outputs, results and impact

The outputs emcompasse the main short-term outputs of Digital Europe projects for each Specific Objective. Key outputs include an integrated network of world-class HPC including exascale and post-exascale, EU wide open and interoperable common data spaces in key areas (e.g. Skills, Health, Finance, Agriculture, Mobility, Tourism, Culture and Green Deal data spaces) based on cloud-to-edge federated infrastructure, advanced cybersecurity tools, infrastructures and know-how across the EU economy, specialised education programmes, a network of European Digital Innovation Hubs and interoperable

[285] JRC (2023). Characteristics and regional coverage of the European Digital Innovation Hubs network. JRC Technical Reports, JRC134620.

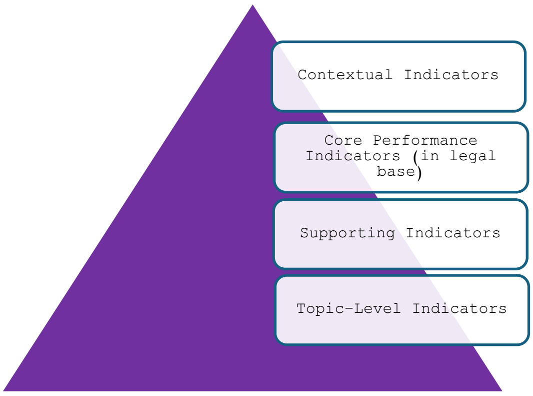
state-of-the-art digital service infrastructures across the EU and related public sector services and services of public interest.

The main expected results encompass the mid-term effects of Digital Europe projects, directly linked to the activities in each specific objective. These include significantly increased processing capacities excellence in HPC applications, the availability and exchange of data across the EU in a trustworthy and secure manner to foster the development of new data driven products and services, EU wide deployment of the state-of-the art cybersecurity solutions, access to advanced digital skills and the digital transformation of European private organisations and the public sector.

The expected impact encompass the long-term effects on businesses, public organisations and society. In particular, Digital Europe actions are expected to ensure the EU's digital strategic autonomy through the reinforcement of its digital capabilities in HPC, AI, cybersecurity and advanced digital skills and their wide use across the economy and society.

Types of Indicators

This framework focuses on the core performance indicators listed in the Regulation. It also presents supporting indicators that will close monitoring gaps that became visible after the first year of implementation. Two other types of indicators - contextual and topic-level indicators - will in some areas complement these performance indicators in order to collect contextual information and obtain detailed data on progress in specific actions.



Contextual indicators provide information on Europe's digital performance and progress towards the higher-level digital policy goals. They have a much wider scope than the other indicators and there is no direct causality between programme-specific actions and the measured changes. While Digital Europe actions and the contextual data are not intentionally linked, Digital Europe actions may have an influence on these data or be influenced by them.

Core performance indicators are indicators listed in the Digital Europe Programme Regulation. They are representative of the programme in that they measure progress towards the objectives of the main work strands across the multiannual financial framework and inform annual reporting on EU spending.

Supporting indicators are designed to ensure that essential information on the progress of specific work strands is collected for the interim and final programme evaluation.

Topic-level indicators have been developed in some specific areas. Data on the progress of specific actions within a specific timeframe is particularly useful in areas where the higher-level performance indicators measure the impact of several work strands in one single indicator. These indicators will provide detailed performance information available in the first years of programme implementation.

LIST OF INDICATORS

This chapter provides details on the data and indicators outlined in the previous chapter, supporting evidence for monitoring the implementation of the Digital Europe Programme and progress in achieving its objectives, in accordance with the Commission Communication on Better Regulation.

Core performance indicators

Annex II of the Digital Europe Programme Regulation lists the 14 core performance indicators that measure progress in achieving the specific objectives of the Digital Europe Programme. This progress is reported annually in the context of the Programme Performance Statement annexed to the Annual Management and Performance Report for the EU budget (AMPR). In the interim and final evaluations, which will cover the effectiveness, efficiency, coherence, relevance and EU added value of the Digital Europe Programme, these indicators will be mainly used to report on the effectiveness of the programme. Some of these indicators (1.2, 2.2, 2.3, and 4.3) in addition will indicate how relevant the actions are to the main stakeholder groups. The targets of these indicators have been estimated in the context of a DG CNECT corporate decision-making process based on committed budget, targets defined in the impact assessment, an extrapolation of requirements in the first work programmes or call texts. Targets depend on financial allocation and funding priorities in the Work Programmes, and for this reason may require revision.

See also Annex IIIX, which sets out the progress made on all indicators below.

1.1. The number of jointly procured HPC infrastructures (SO1)	
Indicator Type	Output
Definition	Number of mid-range (pre-exascale), exascale and post-exascale computers, as well as quantum computers procured with Digital Europe funding under joint procurement
Unit of Measurement	Absolute Number
Data Source	EuroHPC Joint Undertaking
Data provider and responsible for data collection	EuroHPC Joint Undertaking, data computed by DG CNECT.C2
Frequency of Data Collection	Annual
Baseline	7 Supercomputers (2 precursors to exascale and 5 petascale supercomputers have been acquired during the 2014-2020 MFF)
Target	21 (2026)
Underlying definitions and concepts	Exascale computing refers to computing systems capable of at least one exaFLOP, or a billion billion (i.e. a quintillion) calculations per second. Pre-exascale systems have close to exascale performance. Post-exascale have performance superior to exascale computers.

1.2 The usage of the exascale and post-exascale computers in total and by various stakeholder groups (universities, SMEs etc.) (SO1)	
Indicator Type	Result
Definition	The indicator measures the share of totally available computing time in %
Unit of Measurement	% of totally available computing time in minutes (expressed as fraction)
Data Source	EuroHPC Joint Undertaking
Data provider and responsible for data collection	Euro HPC Joint Undertaking, data computed by CNECT.C2
Frequency of Data Collection	Annual
Baseline	0. The indicator is strictly linked to the implementation of Digital Europe
Target	10% by 2025
Underlying definitions and concepts	Totally available time is the time for which the infrastructures could theoretically be used. SMEs are enterprises with fewer than 250 employees. Large enterprises have 250 employees or more. Industry corresponds to the NACE sectors.

2.1. Total amount co-invested in testing and experimentation facilities (SO2)	
Indicator Type	Input
Definition.	The indicator measures the total spending on sites for experimentation and testing by Digital Europe and other funding providers, which include Member States, and the private sector.
Unit of Measurement	Euro
Data Source	Reporting of beneficiaries
Data provider and responsible for data collection	CNECT.A1
Frequency of Data Collection	Annual
Baseline	0. The indicator is strictly linked to the implementation of Digital Europe;
Target	EUR 180 000 000 by 2027
Underlying definitions and concepts	A Reference Testing and Experimentation Facility is a technology infrastructure that has specific expertise and experience in testing mature technology in a given sector, under real or close- to-real conditions.

2.2. The usage of common European libraries or interfaces to libraries of algorithms, usage of common European data spaces and usage of testing and experimentation facilities related to actions under this Regulation (SO2)	
Indicator Type	Result
Definition	Comprises four indicators for the three AI high impact deployments: Usage of the Cloud-to-edge marketplace (2.1.3); Usage of the European AI platform (2.2.1);

	Usage of European Data Spaces (2.2.2); and Usage of Testing and experimentation facilities (2.2.3). 2.1.3 Usage of Cloud-to-Edge marketplace: number of user organisations on the ecosystem. 2.2.1. Usage of the European AI on demand platform: Usage of the platform resources (e.g. number of resources put on the platform, downloads of software, linking of end-users and solutions providers). 2.2.2. Usage of European Data Spaces: Number of organisations involved as data providers and data users. 2.2.3. Usage of Testing and experimentation facilities: Number of entities having used the testing and experimentation facilities' services.
Unit of Measurement	Absolute number
Data Source	Reporting of beneficiaries
Data provider and responsible for data collection	CNECT.G1 (data spaces), CNECT.A1 (AI on demand, TEF), CNECT.E2 (marketplace)
Frequency of Data Collection	Annual
Baseline	0. The indicator is strictly linked to the implementation of Digital Europe
Target	1600 users by 2030
Underlying definitions and concepts	The cloud-to-edge marketplace will be an online platform providing businesses (notably SMEs) and national public authorities with the means to access trusted data processing services, notably cloud and edge services. The European AI on demand platform is a single access point to high quality tested AI resources (e.g. safe, robust and transparent AI algorithms; new generation hardware computing; smart robots) Data spaces organise access to and use of data including IT systems, governance frameworks, standards and cloud-based services. A Reference Testing and Experimentation Facility is a technology infrastructure that has specific expertise and experience in testing mature technology in a given sector, under real or close-to-real conditions.

2.3. The number of cases for which organisations decide to integrate AI into their products, processes or services, as a result of the programme (SO2)	
Indicator Type	Result
Definition	Number of new customers acquiring solutions offered by the technology providers having used the Testing and Experimentation Facilities, or the resources from the AI on demand platform.
Unit of Measurement	Absolute number
Data Source	Monitoring by the European Commission (e.g. survey sent to users of the services offered by the programme and the EDIHs)
Data provider and responsible for data collection	CNECT.A1

Frequency of Data Collection	Annually during project implementation and at least once after its completion but could be repeated three years later.
Baseline	0. The indicator is strictly linked to the implementation of Digital Europe
Target	100 by 2030
Underlying definitions and concepts	A Reference Testing and Experimentation Facility is a technology infrastructure that has specific expertise and experience of testing mature technology in a given sector, under real or close to real conditions.

3.1.a The number of cybersecurity infrastructure, or tools, or both jointly procured (SO3)	
Indicator Type	Output
Definition	This indicator measures the number of different categories of cybersecurity infrastructure, and tools (e.g. data resources for cybersecurity; situational awareness tools) jointly procured at EU level with Digital Europe funding.
Unit of Measurement	Number of infrastructures and tools
Data Source	Monitoring by European Commission
Data provider and responsible for data collection	CNECT.H1
Frequency of Data Collection	Annually
Baseline	0. The indicator is strictly linked to the implementation of Digital Europe.
Target	15 by 2027
Underlying definitions and concepts	This indicator measures the number of different categories of cybersecurity infrastructure, and tools (e.g. data resources for cybersecurity; situational awareness tools) jointly procured at the EU level with Digital Europe funding.

The above indicator measures the cybersecurity infrastructures and tools **jointly procured**. As the majority of Cybersecurity actions will be implemented via other implementation modes than joint procurement, the complementary indicator 3.1.b has been created to demonstrate the full extent of infrastructures and tools deployed under SO 3 (via joint procurement and other implementation modes).

Indicator 3.1b[286] (): Cybersecurity infrastructure and/or tools deployed (SO3)	
Indicator Type	Output

[286] This indicator is not in the Digital Europe Regulation but will be reported on in the context of the Programme Performance Statement. As the majority of Cybersecurity actions will be implemented via other implementation modes than joint procurement measured by indicator 3.1a, the complementary indicator 3.1.b has been created to demonstrate the full extent of infrastructures and tools deployed under SO 3.

Definition	This indicator measures the number of different categories of cybersecurity infrastructure, and/or tools (e.g. data resources for cybersecurity; situational awareness tools) deployed at EU level with Digital Europe funding.
Unit of Measurement	Number of Infrastructures, and tools
Data Source	Reporting of Beneficiaries
Data provider and responsible for data collection	CNECT.H1
Frequency of Data Collection	Annually
Baseline	0. The indicator is strictly linked to the implementation of Digital Europe
Target	165 by 2027
Underlying definitions and concepts	An 'Infrastructure' is a research or experimentation infrastructure such as a testbed, cyber range or computing/communication facility. This could be either data and/or software only or involve physical facilities. A ‘Tool' is a physical device and/or software/algorithm used to increase the security of ICT systems. Examples would be intrusion detection software or data resources allowing situational awareness of critical infrastructures.

3.2. The number of users and user communities getting access to EU cybersecurity facilities (SO3)	
Indicator Type	Result
Definition	The indicator measures the number of unique companies/organisations/entities using cybersecurity facilities (cybersecurity infrastructure, services and/or tools as in indicator 3.1b) notably to meet requirements under relevant EU legislation (NIS Directive or other) or to contribute to the European Commission’s cyber policy goals.
Unit of Measurement	Unique companies/organisations/entities
Data Source	Reporting of beneficiaries
Data provider and responsible for data collection	CNECT.H1
Frequency of Data Collection	Annually
Baseline	0. The indicator is strictly linked to the implementation of Digital Europe
Target	400 by 2028
Underlying definitions and concepts	An 'Infrastructure' is a research or experimentation infrastructure such as a testbed, cyber range or computing/communication facility. This could be either data and/or software only, or involve physical facilities. A 'Tool' is a physical device and/or software/algorithm used to increase the security of ICT systems. Examples include intrusion detection software or data resources allowing situational awareness of critical infrastructures. A 'service' is the provision of expertise to help organisations deploy, manage and optimise or access cybersecurity solutions. This indicator is based on an estimate of the number of cybersecurity infrastructures in the pure sense (e.g. cyber ranges or new security operation centres), and

	also on an estimate of tools that strengthen existing infrastructures, such as electricity networks, communication networks, transport infrastructures, etc.

4.1. The number of persons who have received training to acquire advanced digital skills supported by the programme (SO4)	
Indicator Type	Output
Definition	Number of individuals taking part in training activities supported by the Digital Europe programme
Unit of Measurement	Absolute number
Data Source	Reporting of beneficiaries
Data provider and responsible for data collection	CNECT.G2
Frequency of Data Collection	Annually or biannually (depending on the type of courses).
Baseline	0. The indicator is strictly linked to the implementation of Digital Europe
Target	65 000 by 2027
Underlying definitions and concepts	The indicator measures the number of individuals enrolled in training activities supported by the Digital Europe, at the start of the training activities under consideration and as reported by the grant beneficiaries.

4.2. The number of enterprises, in particular SMEs, having difficulty in recruiting ICT specialists (SO4)	
Indicator Type	Impact
Definition	Enterprises reporting hard-to-fill vacancies for jobs requiring ICT specialist skills, as percentage of enterprises that recruited/tried to recruit personnel for jobs requiring ICT specialist skills
Unit of Measurement	Percentage
Data Source	EU survey on ICT usage and e-commerce in enterprises
Data provider and responsible for data collection	DG CNECT.B2 from Eurostat (unit G4)
Frequency of Data Collection	Biannually
Baseline	55,43% (2020)
Target	No target, estimate is 68,4% in 2029 based on the current skills gaps and without taking into account EU action[287].
Underlying definitions and concepts	The indicator is related to hard-to-fill vacancies reported by enterprises during the previous calendar year. Hard-to-fill vacancies refer to a range of situations in which enterprises find it difficult to find

[287] As this is a contextual indicator, its scope is much wider than solely measuring the impact of Digital Europe. There is therefore no defined target. This indicator serves as a compass for monitoring progress towards the digital policy goals.

	individuals with specific skills (hard-to-fill vacancies due to skills shortage).
Risks and Limitations	The indicator is only indirectly linked to the implementation of Digital Europe. It can be assumed that Digital Europe will contribute to improving the trend observed, but the extent of this contribution cannot be estimated. In addition, and importantly, external factors (including business digitalisation, labour market and demographic dynamics) will affect the current trend and could result in deviations from the milestones and targets presented above.

4.3. The number of people reporting an improved employment situation after the end of the training supported by the programme (SO3)	
Indicator Type	Result
Definition	Number of participants enrolled in training activities that found employment or report an improved employment situation six months after completion of those activities.
Unit of Measurement	Absolute number
Data Source	Reporting of Beneficiaries
Data provider and responsible for data collection	Survey sent to participants in training courses, final figure computed by CNECT.G2
Frequency of Data Collection	Biannually
Baseline	0. The indicator is strictly linked to the implementation of Digital Europe
Target	26 200 by 2027
Underlying definitions and concepts	The definition of the indicator depends on the employment status of the participants at the time of enrolment to the training activities supported by Digital Europe. Therefore, two cases can be distinguished: 1. Participants unemployed, inactive or in education at the beginning of the training: improved employment situation means that the participants find employment, including self-employment, six months after completing the training. 2. Participants employed at the beginning of the training: improved employment situation means that the participants transited from precarious to stable employment, and/or from underemployment to full employment, and/or have moved to a job requiring higher competences/skills/qualifications, entailing more responsibilities, and/or received a promotion six months after completing the training.

5.1. The take-up of digital public services (SO5)	
Indicator Type	Result

Definition	This is a composite indicator measuring progress towards the uptake targets for selected digital public services supported by the programme used as proxies. For each solution used as a proxy, sub-indicators will measure its uptake. These sub-indicators use different metrics. One of the sub-indicators, for instance, measures the number of projects reusing eDelivery. Another sub-indicator related to digital services in the area of justice and consumer protection, on the other hand, measures the percentage of the work completed (100% (1) means full completion of work). To compute the average progress on this composite indicator, all sub-indicators are measured in terms of percentage of completed work (for sub indicators using absolute numbers, progress is measure as follows: milestone/target*100). To calculate the overall progress, each sub-indicator is taken into consideration to the same degree. This indicator is composed of the following sub-indicators: • **Common services platform** measuring the number of projects reusing eTranslation, • Number of projects reusing eDelivery, • Number of projects reusing the Interoperability testbed • **Once-only principle** (OOP) implementation measuring the Schedule Performance Index and Cost Performance Index (If score is>1, the performance is on track) • Number of Member States connected by the end of the action to OOP • Support to an **EU electronic identity system** measuring the number of countries enabled by the funded activities to exchange the new digital identity credentials • **Digital services in the area of justice and consumer protection** measuring the achievement of key milestones for three actions (i.e. Maintenance and development of the core EU justice and consumers systems, e-CODEX and EU eLab). Target evaluated against the successful completion of the planned work under each component. A value of 1 = 100% of the objectives were met. Each area of focus has a 25% weight to compute the overall score.
Unit of Measurement	Normalised 0-1 progress scale
Data Source	Monitoring by the European Commission
Data provider and responsible for data collection	Common Service Platform (CNECT.G3/H4, DIGIT.B2 and DG DGT for eTranslation) OOP and Digital Wallet (CNECT.H4) Justice and Consumer Protection (JUST.H4)
Frequency of Data Collection	Annually

Baseline	0. The indicator is strictly linked to the implementation of Digital Europe
Target	1 (full implementation of all work strands) by 2026
Underlying definitions and concepts	For this indicator, digital public services are activities, infrastructures and tools supporting the provision of electronic public services to individuals or businesses, typically over the internet. A public service is an activity of general interest defined, created and monitored by the public authorities (e.g. health and care, justice, etc.). Take-up can refer to several elements, such as the deployment, sectoral coverage and use of services.
5.2. Enterprises with high digital intensity score (SO5)	
Indicator Type	Impact
Definition	Percentage of enterprises[288] in the EU with a digital intensity score of 'high' or 'very high', as measured by the digital intensity index. 'High' means that the company reports to be using at least 7 out of 12 pre-defined digital technologies.
Unit of Measurement	% of EU enterprises (expressed as a fraction)
Data Source	EU survey on ICT usage and e-commerce in enterprises
Data provider and responsible for data collection	CNECT. B2 from Eurostat (unit G4)
Frequency of Data Collection	Annually
Baseline	155% (2020)
Target	No target, estimate is 21% by 2029[289]
Underlying definitions and concepts	The Digital Intensity Index (DII) measures the availability at firm level of 12 different digital technologies. The value of the index ranges from 0 to 12. An index of 7 to 9 is considered high, and of 10 to 12 very high. The list of technologies partially changes every year since 2015.
Risks and Limitations	This indicator is based on a representative sample of all EU enterprises with 10 or more employees and self-employed person in NACE Rev. 2[290] sections C to J, L to N and group 95.1 and thus has a much larger scope than the beneficiaries of the programme. The contribution of the programme is therefore difficult to isolate. Multiple external factors lead to changes in the Index (including the economic context, and other policies). The list of technologies has been adjusted every year since 2015 to reflect technological developments and policy priorities. This reduces comparability between years, with expected fluctuations across years, making projections on future trends very challenging.

[288] See definition of 'enterprise': Glossary: Enterprise - Statistics Explained (europa.eu)

[289] As this is a contextual indicator, its scope is much wider than solely measuring the impact of Digital Europe. There is therefore no defined target. This indicator serves as a compass for monitoring progress towards the digital policy goals.

[290] https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=celex%3A32006R1893

5.3. The extent of the alignment of the National Interoperability Framework with the European Interoperability Framework (SO5)	
Indicator Type	Result
Definition	Average level of implementation of the European Interoperability Framework (EIF) at EU level.
Unit of Measurement	1-4 continuous scale
Data Source	The indicator is calculated from the current EIF monitoring mechanism, showing the mean value of EU level implementation. The data are collected consistently and exhaustively through a detailed survey covering the 27 Member States, combined with measurements from the Commission's secondary data sources such as open data portal indicators.
Data provider and responsible for data collection	DIGIT.B.2
Frequency of Data Collection	Annually
Baseline	3.750 (2020)
Target	3.775 (2025)
Underlying definitions and concepts	The EIF supports European public administrations in their effort to design and deliver seamless European public services to businesses and individuals, which are digital-by-default, cross border-by-default and open-by-default. It is key to establishing the Digital Single Market in that it supports cross-border and cross-sectoral interoperability for the delivery of digital public services in the EU. The methodology is based on the EIF Monitoring Mechanism and consists of a set of meaningful and measurable KPIs to assess the level of implementation of the 47 EIF recommendations. These 47 recommendations are organised under the EIF's three pillars, and 25 thematic areas, each of which is related to at least one EIF recommendation. The results of the 25 thematic areas are then aggregated into the three pillars, which are then aggregated into a single average score per Member State giving an overall indication of the level of implementation of the EIF in that particular country. The mean value of the single score of the individual Member State is the single indicator that will be used.

5.4. Number of businesses and public sector entities that have used the services of European Digital Innovation Hubs (SO5)	
Indicator Type	Result
Definition	Cumulative number of users of the European Digital Innovation Hubs (EDIH), by user category (businesses of different sizes, public sector entities, etc.), sector, and location and by technology involved. This indicator refers to all types of services offered by the EDIHs: test before invest, funding support, skills and training and ecosystem and networking services.
Unit of Measurement	Absolute number (unique entities)
Data Source	Digital Transformation Accelerator
Data provider and responsible for data collection	CNECT.A4

Frequency of Data Collection	Annually
Baseline	0. The indicator is strictly linked to the implementation of Digital Europe
Target	191 400 by 2027
Underlying definitions and concepts	EDIH provide technological expertise and experimentation facilities to enable the digital transformation of the industry and the public sector.

Progress on these indicators is reported in the annual Programme Performance Statement published on Digital Europe programme - Performance (europa.eu).

SO 6

Indicators related to the new SO6 on semiconductors, were introduced by the Chips Act Regulation[291]. Annex II of the Regulation lists the indicators below. These will be defined in more detail once the related work programmes will be available.

1. The number of legal entities involved (subdivided by size, type and country of establishment) in the actions supported by the Initiative. In relation to the Initiative's operational objective 1:

2. The number of design tools developed or integrated under the Initiative. In relation to the Initiative's operational objective 2:

3. The total amount co-invested by the private sector in design capacities and pilot lines under the Initiative. In relation to the Initiative's operational objective 3:

4. The number of users of semiconductors or user communities seeking, and the number of users of semiconductors or user communities obtaining, access to design capacities and pilot lines under the Initiative. In relation to the Initiative's operational objective 4:

5. The number of businesses, which have used the services of national competence centres supported by the Initiative.

6. The number of persons who have successfully concluded training programmes supported by the Initiative to acquire advanced skills and training on semiconductor technologies and quantum technologies.

7. The number of active competence centres in the Union in the context of the Initiative. In relation to the Initiative's operational objective 5:

8. The number of start-ups, scale-ups and SMEs that have received venture capital from the Chips Fund activities and the total amount of capital investments made.

[291] Regulation (EU) 2023/1781 of the European Parliament and of the Council of 13 September 2023 establishing a framework of measures for strengthening Europe's semiconductor ecosystem and amending Regulation (EU) 2021/694 (Chips Act): EUR-Lex - 32023R1781 - EN - EUR-Lex (europa.eu).

9. The amount of investment by companies operating in the Union, including by segment of the value chain in which they operate.

Additional supporting indicators

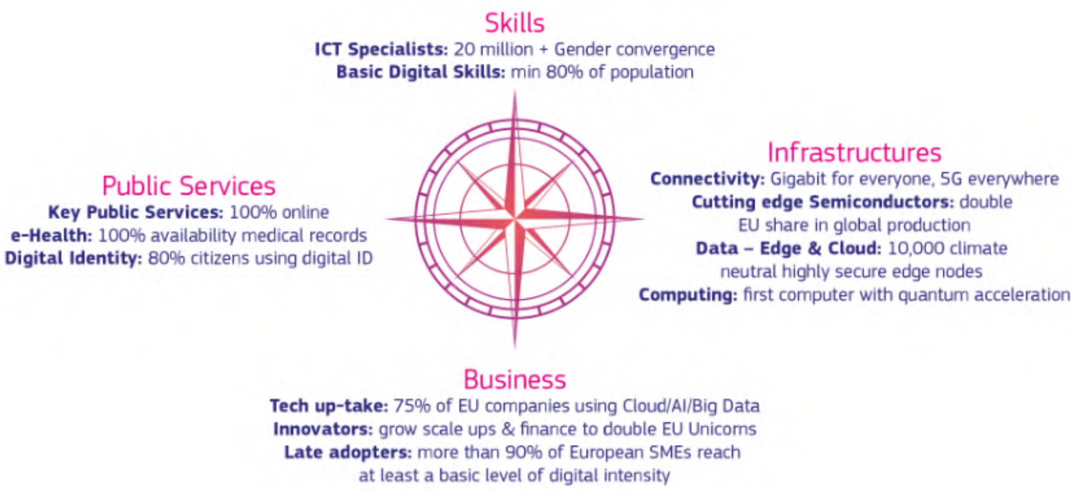
After the first year of implementation of the Digital Europe Programme, an assessment of the monitoring strategy concluded that additional indicators are necessary to ensure a 'deeper analysis of performance in the interim and *ex post* evaluations of the programme', as requested in the Communication on the Monitoring Framework for the EU budget under the 2021-2027 MFF[292]. A mapping of the indicators from the legal basis onto the Digital Europe actions, revealed certain monitoring gaps and led to 10 additional performance indicators being developed. The 10 additional indicators, outlined below, will provide valuable input for the programme's mid-term and *ex post* evaluations.

See annex IX of this document for the full list of additional indicators.

Contextual Indicators

Contextual indicators will provide relevant insight into Europe's digital performance and progress towards the high-level digital policy goals. The contextual information should provide insight into 'developments that are not intentionally related to the individual initiative, although they may influence it or be influenced by it'[293]. The contextual information relevant for the Digital Europe Programme will be gathered through a few Key Performance Indicators (KPIs) from the Digital Decade Policy programme (DDPP)[294], which entered into force on 8 January 2023. This programme sets objectives and targets for 2030 for the EU in four key areas ('Digital Compass'): digital skills, digital

Figure 4: The Digital Decade Compass



292 Communication on the performance framework for the EU budget under the 2021-2027 MFF

293 Better Regulation Toolbox. 2021: p.361: br_toolbox-nov_2021_en.pdf (europa.eu).

294 Decision (EU) 2022/2481 of the European Parliament and of the Council of 14 December 2022 establishing the Digital Decade Policy Programme 2030: EUR-Lex - 32022D2481 - EN - EUR-Lex (europa.eu).

infrastructures, digitalisation of businesses and digitalisation of the public sector to boost the EU's digital transformation.

The observed trends will help to evaluate the relevance of the programme in terms of progress achieved towards the digital transformation, and to identify potential gaps or needs, which could influence future work programmes. Among the DDPP's KPIs, the following are considered to be particularly relevant contextual indicators for the Digital Europe Programme and will be closely monitored:

Percentage of ICT specialists in total employment: ICT specialists, measured as the number of individuals aged 15-74 who are employed as ICT specialists; and gender convergence, measured as the percentage of women and men among those individuals employed as ICT specialists. In accordance with the ISCO-08 code classification. ICT specialists are workers who have the ability to develop, operate and maintain ICT systems, and for whom ICT constitutes the main part of their job, including but not limited to ICT service managers, ICT professionals, ICT technicians, ICT installers and servicers.

Semiconductors, measured as value generated, in the form of revenues, by semiconductor activities in the EU, in all stages of the value chain, with respect to the global market value. For the first year, reporting will be done on the basis of those activities in the EU.

Percentage of European Enterprises adopting Artificial intelligence technologies: Artificial intelligence, measured as the percentage of enterprises using at least one artificial intelligence technology.

SMEs with at least a basic level of digital intensity, measured as the percentage of SMEs using at least 4 of 12 selected digital technologies.

Online provision of key public services for citizens, measured as the share of administrative steps that can be done fully online for major life events. The following life events are considered: moving; transport; starting a small claims procedure; family; career; studying; health.

Access to eID measured as the number of Member States that have issued a wallet in accordance with the Proposal for a Regulation of the European Parliament and of the Council amending Regulation (EU) No 910/2014 as regards establishing a framework for a European Digital Identity[295], once a regulation based on the proposal is adopted and enters into force. In the first 2 years, it will also be monitored based on the number of Member States that have notified at least one national eID scheme in accordance with Regulation (EU) No 910/2014.

Topic-level indicators

For 27 topics in the first work programme (2021-2022)[296] and 18 topics planned in 2023 in the 2023-2024 Work Programme[297], the Commission defined data that will be gathered to comprehensively monitor the performance of specific topics, in particular where the

[295] COM/2021/281 final.
[296] The DIGITAL Europe Programme – Work Programmes | Shaping Europe's digital future (europa.eu)
[297] The DIGITAL Europe Programme – Work Programmes | Shaping Europe's digital future (europa.eu)

performance indicators cover several work strands and are too wide in scope to capture technical details, or where individual topics are not directly covered by higher level indicators. These indicators provide detailed information for the analysis of the evaluation criterium effectiveness (of the interim evaluation). They may also play a role in this context when the analysis focuses on concrete examples where data gathered through these indictors could point to specific challenges, achievements, or best practice. The full list of topic-level indicators can be found in Annex A.

The full design of these indicators (definition, unit of measurement, data source, frequency of data collection, baseline and target and any other relevant information to facilitate data sharing, use and reuse, and aggregation) and their monitoring will be managed by the Commission's operational units in charge. The list will be continuously updated as new topics are being implemented following the adoption of Work Programmes.

Additional benchmarks, indicators and data collection tools for the evaluation

As detailed in Tool #47 of the Better Regulation Toolbox[298], the interim and final evaluations cover five main evaluation criteria: effectiveness, efficiency, coherence, relevance and EU added value. The indicators in Section 5 mainly provide data to assess the evaluation criterium effectiveness and to some degree the criterium relevance. An evaluation matrix, with evaluation questions and all relevant indicators including additional indicators or benchmarks covering the other evaluation criteria (EU added value, coherence, and efficiency) will be developed during the evaluation period and published in the interim evaluation report.

Part of the data on the programme activities implemented through grants will be collected by the Commission through tools in the *eGrants* IT system that supports the project's entire lifecycle (see Section 6.2 for details). Evidence will also be collected through public and targeted stakeholder consultations, from beneficiaries' reports feedback-to-policy reports, project portfolio analyses and other sources to be identified during the preparation of the interim evaluation.

For the part of the programme activities implemented through procurements, the Commission will gather the data from the contractors. In the case of Destination Earth, the data will be collected from the implementing entities, as specified in the Contribution Agreements. Other significant data sources will include a study and surveys obtained from third parties (see Chapter 6. data management for details).

DATA MANAGEMENT

This chapter provides an overview of the main actors in the data collection process, their responsibilities and how data are collected in the online tool eGrants. It also details the responsibilities of the operational units in DG CNECT and topic owners in other DGs in collecting and monitoring data for the performance indicators.

[298] Better Regulation Toolbox, Tool #47, Evaluation Criteria and Questions, br_toolbox-nov_2021_en_0.pdf (europa.eu), p. 402-413.

Main actors

As the lead DG for the Digital Europe Programme, DG CNECT is the main actor involved in data collection. Other DGs are also involved as topic owners of specific work strands. Furthermore, the implementing bodies (HaDEA, the High-Performance Computing Joint Undertaking, the European Cybersecurity Competence Centre and the three entities implementing Destination Earth) play a crucial role in the collection, aggregation and monitoring of performance information.

Operational units in DG CNECT are tasked with carrying out sanity checks on all the performance information obtained from implementing bodies, and with providing the data in aggregated form along with a narrative outlining the progress achieved. DG CNECT will provide clear justifications for delays and are responsible for putting in place appropriate mitigating measures in case of bottlenecks or delays.

Directorate Generals

As the lead DG, **DG CNECT** coordinates the strategic planning, delegation and implementation of the programme's budget. Several other DGs are involved in the implementation of specific work strands:

DG DIGIT is a key partner for actions related to interoperability. DIGIT.B2 contributes to the performance reporting within the annual budget cycle and is in charge of monitoring progress on the Digital Europe Programme Regulation indicator that measures the alignment of the National Interoperability Framework with the European Interoperability Framework. The unit also provides input to the Programme Performance Statement and participates in the budget hearing for the interoperability budget line.

DG JUST (A1) coordinates the actions related to digitalisation of justice and consumer protection. The unit provides data for the composite indicator in the Regulation on the update of digital public services and regular updates on the performance of this work strand.

DG HOME[299], **DG FISMA** (unit C1, financial data space) and **DG GROW** (unit G4, public procurement data infrastructure) are involved in the implementation and monitoring of the programme as topic owners. These units are in charge of developing the monitoring framework at topic level and for monitoring the topics under their responsibility. They will provide aggregated data on progress on their work strands upon request.

DGs associated to specific topics, e.g. to sectoral data spaces, will be consulted on topic-specific indicators.

DG ENV (unit 01), for instance, is coordinating the definition of use-cases regarding the Green Deal Data Space in cooperation with DG ENV policy departments as well as other concerned DGs. DG MOVE contributes to the mobility data space and DG DGT is responsible for providing services and resources for the Language Data Space.

Executive Agency (direct management)

[299] Currently no Digital Europe actions are being implemented by DG HOME

HaDEA is entrusted with implementing part of the Digital Europe Programme's budget. In particular, it implements selected topics under Specific Objective 2 (artificial intelligence), Specific Objective 4 (advanced digital skills) and Specific Objective 5 (deployment, best use of digital capacities and interoperability). HaDEA is responsible for monitoring and reporting on projects falling under its responsibility. It will provide contributions to the programme's midterm and *ex post* evaluations upon request.

Other implementing bodies (indirect management)

The High-Performance Computing Joint Undertaking (EuroHPC-JU) is responsible for implementing a set of tasks in the areas of HPC and quantum computing under specific objective 1. The JU monitors actions for topics under its responsibility. It reports performance information on the progress of these actions (legal, additional and topic-level indicators) to CNECT.C2 for annual reports as well as the midterm and *ex post* evaluations. CNECT.C2 is the main interface with the JU and closely follows its work.

The European Cybersecurity Competence Centre (ECCC) will be the single implementation body for selected work strands under the Digital Europe Programme's specific objective 3 on cybersecurity. This EU body will become autonomous in 2024. The ECCC will be responsible for collecting information and monitoring progress on the Digital Europe Programme's performance indicators, and for providing input to its midterm and final evaluations. Unit CNECT.H1 will be the main interface with the ECCC for the programme and will ensure that they apply appropriate monitoring activities.

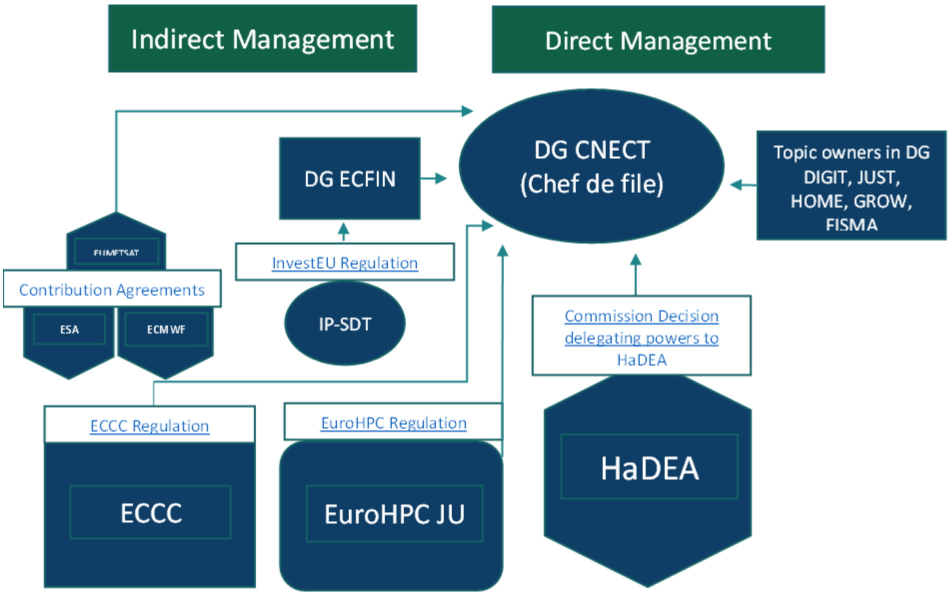
The European Space Agency (ESA), the European Centre for Medium-Range Weather Forecasts (ECMWF) and the European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT) are independent entities entrusted with implementing the topics underpinning the Destination Earth initiative through the signature of Contribution Agreements. CNECT.C1 is the topic owner, and in this capacity, it liaises with the relevant stakeholders and implementing bodies. These entities are in charge of monitoring progress on Destination Earth based on a range of technical KPIs detailed in the Contribution Agreements. CNECT.C1 is responsible for providing aggregated data for the evaluation of the programme.

The Investment Platform for Strategic Digital Technologies (indirect management)

The Investment Platform for Strategic Digital Technologies (IP-SDT) is a financial instrument intended to provide financial support to eligible projects through equity and quasi-equity by combining funding from the Digital Europe Programme with the InvestEU guarantee. The IP-SDT is implemented in indirect management under the InvestEU programme, more specifically, by the European Investment Fund (EIF). The DG responsible for setting up a monitoring strategy for the platform is DG ECFIN, who is in charge of financial and organisational matters, as well as monitoring and reporting tasks, including financial reporting.

Overview of main actors and flow of performance information

Figure 5: Actors responsible for data collection, legal basis and flow of information



Data Collection

Data linked to the performance indicators set out in this Monitoring and Evaluation Framework are in principle collected from beneficiaries or from contractors. In addition, some of the data for the mid-term and ex-post evaluations will be collected through surveys or acquired from third parties.

For procurements, the monitoring and reporting requirements and responsibilities are specified in the contracts signed by the winning tender. For procurements not managed by DG CNECT, the topic owners in other DGs and the implementing bodies are responsible for gathering the data from the contractors, aggregating them and reporting on them to DG CNECT. For procurements managed by DG CNECT, the operational units in charge will provide the data to CNECT.D.1.

For grants, beneficiaries are the main source of data. They provide data for the core performance indicators and additional indicators as part of their mandatory reporting obligations. These include regular technical, progress and/or interim as well as final reports. Their reporting obligations are detailed in Article 21 of the grant agreements. These include the continuous reporting on the progress of an action and the related deliverables. In addition, prefinancing reports (if prefinancing payments are requested) and periodic reports (to request interim and final payments) must be provided. These reports contain a technical and financial part. The technical part provides an overview of the implementation of an action. The financial part includes a financial statement, explanation on the use of resources and certificates on the financial statements.

The data are collected through submission forms and reports are gathered in the corporate 'eGrants' IT system, which is a single gateway for all exchanges with the beneficiaries throughout the project lifecycle. The project officers/call coordinators in the involved DGs and the implementing agency will check the reliability of data and verify that the information provided by the beneficiaries is coherent across all submission forms and corresponds to the produced deliverables.

To collect information related to some of the core performance indicators, a specific submission form (form C) has been designed and is available to beneficiaries in eGrants. Beneficiaries are obliged to complete form C when submitting reports, as specified in their grant agreements. This form will gather data for the following indicators in the Digital Europe Programme Regulation:

- 2.2. The usage of common European libraries or interfaces to libraries of algorithms, usage of common European data spaces and usage of testing and experimentation facilities related to actions under this Regulation
- 3.1. The number of cybersecurity infrastructure, or tools, or both jointly procured.
- 3.2. The number of users and user communities getting access to European cybersecurity facilities
- 4.1. The number of persons who have received training to acquire advanced digital skills supported by the programme.
- 4.3. The number of people reporting an improved employment situation after the end of the training supported by the programme.

The submission form C will also collect data for the following additional indicator:

- 9. EBSI: Usage of the European Blockchain Service Infrastructure and of the European Blockchain sandbox

The submission form C will take the gender dimension into account with regard to Specific Objective 4 and will collect, where possible, sex aggregated data on participants of the training courses funded by the Digital Europe Programme and the completion rate.

In addition to data for core performance indicators, relevant management data and statistics will be collected through eGrants as well. Several interlinked IT tools have been integrated into the eGrants portal, each coming into play at a different stage of the project lifecycle. For example: SEP for experts to evaluate and rank project proposals; REDRESS to manage complaints on the evaluation procedure; SYGMA to manage grants and monitor funded projects during their entire life cycle, including capturing information and data on the dissemination and use of their results; and COMPASS to manage grants, experts and audit management. Some of this data will be visible on the **Digital Europe Dashboard**, which allows users to explore and visualise data to prepare statistics on funding implementation and outcomes, for reporting, analysis, monitoring or decision-making purposes. The Digital Europe Dashboard has been made available to members of the Digital Europe Programme Committee, gathering representatives of all member states and associated countries.

Responsibilities in DG CNECT

The data on the core performance indicators is needed for the annual reporting (Programme Performance Statement to be attached to the annual draft budget). Data on all indicators as well as management data, will feed into the Digital Europe Programme's midterm and final evaluations. For all indicators, the responsibility for the timely collection, aggregation and quality checks lies with the operational units in charge. An overview of the responsibilities for monitoring the different types of indicators in DG CNECT is provided below.

Level	Purpose	Scope	Lead	Tasks
Contextual Indicators	Provide detailed information on the wider context and trends related to the higher-level digital policy goals	6 contextual indicators relevant for the specific objectives of Digital Europe	B2	B2: monitoring of and reporting on contextual indicators
Core performance Indicators	Measure whether Digital Europe is delivering the expected results, remains relevant and meets the objectives outlined in the Regulation.	14 KPIS in the legal base	D1 and operational units	D1: coordination Operational units: Continuous monitoring of and reporting on KPIs in legal base
Additional indicators	Supplement the core performance indicators and provide important data on the progress of the programme for the interim and final evaluations	10 additional indicators	D1 and operational units	D1: coordination Operational units: Continuous monitoring of and reporting on additional indicators R5 and R3: Provision of statistical data on the implementation of projects and other relevant data retrieved mainly from eGrants to gather input to respond to the evaluation criteria, in particular, efficiency and relevance.
Topic-Level indicators	Measure detailed progress towards Digital Europe objectives at topic-level	27 topics for the first work programmes	Operational units	Operational units: design and monitoring of indicators

TOPIC LEVEL INDICATORS

SO1

Topic	**Indicator (title)**

National Competence Centres for High Performance Computing	Number of SMEs that have been supported by EuroHPC CCs Number of companies (not SMEs) that have been supported by EuroHPC CCs Number of academic and public research institutions that have been supported by EuroHPC CCs Number of projects involving at least 2 EuroHPC CCs Number of training projects involving collaboration among NCCs, Centres of Excellence and/or between the NCC and CoE networks Number of exploitation and dissemination projects involving collaboration among NCCs, Centres of Excellence and/or between the NCC and CoE networks Number of HPC application projects involving collaboration among NCCs, Centres of Excellence and/or between the NCC and CoE networks
Topics related to quantum computing	Several KPIs were published to monitor and evaluate the progress of quantum technologies in Europe for the following technological pillars: Ecosystem, Quantum Communication, Quantum Computing, Quantum Simulation, Quantum Sensing and Metrology, and Education. The KPIs measure impact of Digital Europe funding but also other funding programmes, most notably, Horizon Europe: https://qt.eu/about-quantum-flagship/newsroom/key-performance-indicators-2030/
Destination Earth- Core Service Platform and Data Lake	Indicators defined in the Contribution Agreements and provided by the three implementing bodies: • Number of operated services available on the DestinE Core Service Platform •Number of data types available for retrieval from the DestinE Core Service Platform • Number of participants in the DestinE open reviews • Number of agreed partnership project plans involving ESA • Number of active users in the last 3 months (active is defined as ‘having established a connection to the DestinE Core Service Platform’) •Number of users having retrieved Digital Twin generated data •Overall user satisfaction •Number of applications in the DESP marketplace making use of Al Technology •DestinE Core Service Platform data retrieval API availability •DestinE Core Service Platform data volume retrieved at the user side

	•DestinE Core Service Platform Services Performance (Average percentage of time of the DESP services within the maximum performance range interval) •First-call resolution rate •Incident response time •SLA compliance rate •Overall user satisfaction from help desk and support activities •Number of operated data retrieval APIs towards external data sources •Volume of data retrieved from external sources •Overall availability of Data Lake infrastructure •Overall availability of Data Lake access services •Data set timeliness •Amount of data sets available in Data Lake •Number and volume of datasets ingested •Volume of data circulated within the DestinE Data Lake infrastructure •Ingestion, data access & retrieval information on Data Lake •Ingestion performance of data sets stored in the Data Lake •end-to-end data availability in Data Lake (amount, content, completeness)
Destination Earth - Digital Twins	**Number of:** • Hydrology applications •Energy applications •Food applications •Health applications •Trans-continuum **km/area:** •Spatial resolution/coverage of monitoring and prediction DT Extremes datasets •Spatial resolution/coverage of monitoring and DT improvement over prediction DT Climate datasets **hours:** •Temporal availability/timeliness of DT output for continuous production mode •Temporal availability/timeliness of DT output for on- demand production mode **per cent:** •Availability of decision- ready information derived from DT output

	Number or CPU hours •Number of (service level) applications using DT-Extremes output •Number of (service level) applications using DT-Climate output •Number of (service level) applications using full-resolution, high frequency output •Number of (service level) applications using critical-path output •Number of applications producing candidate models to be added to DT Engine •Number of new datasets created from DT output **Number:** •Amount of data sets pushed into the Data Lake(s) •Ingestion, access & usage of Earth observation data **Node-hours/day:** •Actual HPC node allocation for continuous production mode •Actual HPC mode allocation for on-demand product mode **Per cent:** •Sustained vs peak performance **Number:** •Extreme-scale software component uptake •machine learning software component uptake **Per cent:** •HPC efficiency gains in DT production •Data exploitation gains in DT production and use in application

S02

Topic	Indicator (title)
Marketplace for federated cloud-to-edge based services	•Design and offer an EU marketplace for federated cloud-to-edge based services: •Number of European cloud-to-edge based services offered on the marketplace. •Number of functionalities offered by the marketplaces: (a) catalogue, (b) brokerage, (c) transaction and (d) delivery of federated cloud-to-edge based services). •Number of unique user organisations on the marketplace. •Average frequency of use of the marketplace by client organisations. •Diversity of stakeholders involved: (i) public entities, (ii) companies, (iii) SMEs and (iv) actors of Common Data Spaces. •User satisfaction

Secretariat for the Alliance on Processors and Semiconductor technologies	•Number of Alliance members engaged and active in the network and contributing to the thematic working groups as well as attending the General Assembly, and their satisfaction level as measured by survey; •Number of Member States covered by the Alliance; •Number of alliance members engaging in strategic activities in relation to the objectives of the Alliance
Preparatory actions for the Green Deal data space	•Number of data spaces/ecosystems/communities contributing to the roadmap for the future EU Green Deal data space
Preparatory actions for the data space for smart communities	•Number of cities or communities (geographical coverage) involved/supporting the established governance scheme •Number of priority data sets agreed as part of the data space •Number of validation workshops including a wide range of EU and Member States organisations representing smart cities and communities, EU standardisation bodies as well as public and private data owners at local level
Data space for smart communities (deployment)	•Number of cities or communities (geographical coverage) involved in the pilots •Number of priority data sets validated as part of the cross-sectoral pilots •Number of reusable services made available to wide range of cities and communities in the EU
Preparatory actions for data spaces for manufacturing	•Number of relevant stakeholders involved/supporting the governance scheme set up by the CSA •Number of validation workshops with industry decision makers •Number of technology and data space service providers offering middleware based on the solutions identified by the network/supporting the blueprint. •Number of data providers offering data sets based on the standards and conditions identified by the network.
Data spaces for manufacturing (deployment)	•Percentage increase in number of organisations participating in the Data Space based on shared governance since project start •Number, and geographic distribution, of connected data providers offering data sets based on the standards and conditions identified by the network. •Data volume shared in the network, volume of data effectively used multiple times •Number of data generating assets effectively connected to data spaces •Number of data space service providers offering analytics based

	on the solutions identified by the network. •Share of SMEs among data providers and data users
Preparatory actions for the data space for agriculture	•Effectiveness of the participatory approach in terms of appropriate representativeness of associations of farmers and other private sector actors, advisers, potential 'third parties'[300] public administration and/or governmental bodies •Quality and credibility of the proposed design approaches for the data space (as confirmed by stakeholders and external experts) •Soundness of the multi-stakeholder governance scheme (as confirmed by stakeholders and external experts)
Data space for media (deployment)	• Number of relevant media stakeholders, including SMEs, coming from different EU and associated countries participating in the media data space initiative • Number of media sub-sectors represented by stakeholders (target should be at least 2) • Number of datasets (content, data and metadata) available to produce new products and formats, in different EU languages and EU markets
Preparatory actions for the financial data space	Indicators in **ESAP regulation**: (a) the number of visitors, searches and downloads; (b) the types of information viewed and downloaded by percentage; (c) the fees referred to in Article 8(2) and amounts charged by ESMA; (d) the percentage of searches that lead to a view or a download per type of information and access; (e) the amount and percentage of machine-readable information accessible on ESAP and the amount and percentage of machine-readable views and downloads; (f) the proportion of notifications pursuant to the automated validations referred to in Article 10(2); (g) any significant malfunction or incident affecting the operation or overall performance of ESAP; (h) an assessment of the accessibility, quality, usability, reliability and timeliness of the information on ESAP; (i) an assessment of whether ESAP meets its objectives, taking into account the evolution of its use and information flows within the Union; (j) an assessment of end-user satisfaction;

[300] 'third parties' in the context of the Common European Data Spaces

	(k) a comparison with similar systems in third countries.
Data Spaces Support Centre	(a)Number of stakeholders engaged in the network. (b): Number of identified standards. (c): Number of identified technical specifications. (d): Number of identified building blocks. (e): Number of technology providers offering new middleware based on the solutions identified. (f) Satisfaction of preparatory actions for sectorial data spaces with the coordinating role of the DSSC

SO 4

Topic	Indicator title
Promoting European innovation in education	• Effectiveness of the pan-European network to: • maximise the number of EdTech stakeholders coming from at least 14 Member States actively involved in the pan-European network connected with all relevant actors and linked with other existing pan-European networks, initiatives and programmes; • exchange good practices, market trends and insights of the EU EdTech start-up/SME landscape identified in each Member State; • set up relevant network activities to increase the opportunities of the EdTech companies on the European and global EdTech market in the long run; •promote European excellence in educational innovation. •Quality and relevance of the support provided to EdTech companies by offering them relevant business and educational mentoring and training services. •Quality and robustness of the developed guidelines, roadmap and skills toolkit.

SO 5

Topic	Indicator (Title)
Governance of the Living-in.eu community	•Number of signatory cities and communities that sign the Join Boost Sustain Declaration (using the EU Survey tool); •Number of new supporters joining the movement; •Number of specifications and assets further developed or created and their reuse by cities and communities; • Number of plenary meetings with signatories and with supporters per year; and of meetings of all sub-groups; •Number of commitments in the 'Join Boost Sustain' Declaration

	implemented; •Number of events organised by Living-in.eu movement; •Number of living-in.eu web site visits •Number of events relating to smart and sustainable cities and communities to which living-in.eu contributed.
Digital solutions in support of the New European Bauhaus initiative	•Number of stakeholders involved in the network; •Number of best practices/ use cases/ digital tools/lessons learnt/, presented for reuse and upscaling though the means identified in the 'scope' section; •Number of meetings, workshops and conferences organised by the Network per year; •Number of events relating to smart and sustainable cities and communities to which the Network on digital solutions for the New European Bauhaus has contributed •Number and nature of gaps and challenges identified.
Core EU Justice and Consumers IT Systems	•Number of simple searches in BRIS through the European Access Point search engine on the e-Justice Portal •Number of deployments of the eEvidence Digital Exchange system (eEDES) •Number of visitors to the ODR platform/consumer redress web space
Digitalisation of justice	•Number of requests/cases handled via the decentralised IT system in the context of the Regulations on Service of Documents and Taking of Evidence (recast) (as of the date of entry into force) •Number of requests submitted through the decentralised IT system, in accordance with Article 3(1) of the Regulation on digitalisation of judicial cooperation (as of the date of entry into force) •The number of submissions made through the European electronic access point hosted by e-Justice Portal in accordance with Article 4(1) of the Regulation on digitalisation of judicial cooperation
Common platform for online investigations and law enforcement (EU eLab)	•Number of onboarded public authorities for the purposes of consumer protection cooperation or market surveillance •Number of individual users •Number of authorities and businesses reached through the supporting activities
Security (law enforcement): AI-based pilots	•Number of tools made available to Member State law enforcement agencies through Europol repository for tools or through EACTDA repository for tools

Better Internet for Kids (BIK) platform - EU coordination	Number of EU and EEA countries associated with the programme participating in each Safer Internet Day (SID) Number of people reached through events and training activities: Capacity building: number of trainings organised for the network; number of MOOCs organised and number of participants. Youth participation: number of children involved divided by age group and gender; number of events with youth participation; number of awareness-raising activities targeting children in vulnerable situations. Cooperation with international partners: number of non-EU countries and international organisation participating in the Safer Internet Forum (SIF); number of countries involved in exchanges and mentoring.
Safer Internet Centres (SICs)	•Number of new or updated online resources made available by the Safer Internet Centres (e.g. training courses, videos, online events, online tools and apps). The minimum target is 1,100 resources uploaded combined by all EU co-funded Safer Internet Centres per year. •Number of requests handled by the co-funded helpline services. The minimum target is 63,000 requests every year combined by all EU co-funded helplines. •Number of reports received by the co-funded hotlines. The minimum target is 200,000 reports every year combined by all EU co-funded hotlines.
IT system supporting the removal of online child sexual abuse material (CSAM)	•Average number of days per year to take down illegal content (e.g. child sexual abuse material) by Internet service providers and Law Enforcement Agencies upon reporting from hotlines.
Initial Network of European Digital Innovation Hubs	•Number of businesses and public sector entities that have used the European Digital Innovation Hubs' services, by user category (businesses of different sizes, public sector entities, etc.), sector, location and type of support received. Where relevant, this will include a description of which Digital Europe programme capacities have been used.

	•For access to finance: amount of additional investments successfully triggered (e.g. through venture capital, bank loan, etc.) •Number of collaborations planned with other EDIHs and stakeholders outside the region at EU level, and description of jointly shared infrastructures / joint investments with other EDIH. A set of additional impact indicators will be collected and analysed with the support of the Digital Transformation Accelerator: •Increase in digital maturity of organisations that have used the services of the EDIH network. Digital maturity will be defined on the basis of a questionnaire assessing the categories digital strategy and readiness, intelligence and automation, data and connectedness, green and human-centric digitalisation. The green digitalisation category will focus on the use of digital technologies to improve environmental sustainability and the inclusion of circularity in value chains. •Market maturity[301] and market creation potential of innovations[302], as defined in the JRC's Innovation Radar methodology: https://joint-research-centre.ec.europa.eu/innovation-eu-funded-research-innovation-projects-innovation-radar_en

2023 topic level indicators

SO1

Topic	Indicator (title)
Destination Earth	•Number of agreed partnership project plans and use cases. •Number of operated services available on the DestinE Core Service Platform.

[301] JRC (2018). Innovation Radar: Identifying the maturity of innovations in EU-funded research and innovation projects. JRC111160.

[302] JRC (2020). Market Creating Innovations in the EU Framework Programme. Methodology behind the Innovation Radar's Market Creation Potential Indicator. JRC Technical Reports, JRC121066.

	•Number of different data types available from the DestinE Core Service Platform.

SO2

Topic	Indicator (title)
Cloud IPCEI Exploitation Office	•Yearly number of IPCEI cloud-to-edge results exploited. •Number of yearly IPCEI Exploitation Office's social media campaigns and content produced. •Number of total participants in events, activities organised by the IPCEI Exploitation Office per: (a) IPCEI participants and (b) non IPCEI-participants. •Yearly environmental impact of the IPCEI-CIS at aggregated level.
Highly Secure Collaborative Platform for Aeronautics and Security Industry	•Successful management of Restricted EU information •Number of proof-of-concept / use-cases
Data space for Skills	•number of participants of the data space •amount of data available via the data space •number of data sharing transactions
Data Space for Tourism	•Maturity, reliability and security of the technical infrastructure deployed. •Number of relevant stakeholders including SMEs participating actively in the data space. •Amount and variety of data types accessible through the data space. •Geographical coverage of the available data sets. •Number of pilots successfully launched and accomplished.
Federated European Infrastructure for Intensive Care Units' (ICU) data	•number of different ICU databases connected to the European ICU data infrastructure – at least 15 from at least 10 different eligible countries by the end of the project; •number of registered users (including for example researchers, healthcare professionals, clinicians, innovators) actively accessing the European ICU data

	infrastructure in operation and utilising its resources – at least 100 by the end of the project; •volume and number of data points, as well as types of ICU datasets and corresponding patient information accessible through the European ICU infrastructure by the end of the project; •demonstration of ICU datasets integration and use with 'virtual human twin' multi-scale, multi-disciplinary computational models in at least 4 (four) different clinical domains, including for example infectious diseases, cancer, cardiovascular disease, brain disorders, with clear evidence of enabling computational model-based tool development and validation in these domains by the end of the project.
Genome of Europe	•number of different national reference genome databases connected – at least 10 from at least 10 different eligible countries; •number of whole genome sequences with the corresponding phenotypic information included in the European reference genome – for at least 100.000 citizens; •European reference genome established and supported by appropriate software – in at least two different use cases.
The European Single Access Point (ESAP) for EU capital markets ([303])	Indicators in **ESAP regulation**: (a) the number of visitors, searches and downloads; (b) the types of information viewed and downloaded by percentage; (c) the fees referred to in Article 8(2) and amounts charged by ESMA; (d) the percentage of searches that lead to a view or a download per type of information and access; (e) the amount and percentage of machine-readable information accessible on ESAP and the amount and percentage of machine-readable views and downloads; (f) the proportion of notifications pursuant to the automated validations referred to in Article 10(2); (g) any significant malfunction or incident affecting the operation or overall performance of ESAP; (h) an assessment of the accessibility, quality, usability, reliability and timeliness of the information on ESAP;

[303] **Consolidated text: Regulation (EU) 2023/2859 of the European Parliament and of the Council of 13 December 2023 establishing a European single access point providing centralised access to publicly available information of relevance to financial services, capital markets and sustainability**: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:02023R2859-20240725

	(i) an assessment of whether ESAP meets its objectives, taking into account the evolution of its use and information flows within the Union; (j) an assessment of end-user satisfaction; (k) a comparison with similar systems in third countries.
Digital Product Passport	•Identifications of further needs for standardisation and specifications to ensure interoperability, security, and acceptance by all the stakeholders •Concrete and experienced benefits and challenges in using DPP for each of the stakeholders •Number of value chain actors including the number of actors including consumers. •Number of interactions, speed and usability of the system, in particular for SMEs, interoperability performance and cyber security tests; There will be a survey to measure consumer satisfaction.
Coordination of AI sectorial Testing and Experimentation Facilities	<u>To be confirmed by consortium</u> •Impact of common communication campaigns across all relevant sectors. •Number/size of the mentoring/twinning programs for innovators •Number of common resources and services across the TEFs, and impact on the overall TEFs' offer. •Efficiency gain (qualitative or quantitative) in TEFs in offering centralised support for common activities. · Number of exchanges with other relevant initiatives (e.g.: EDIHs, national competence centres). · Number of regulatory sandboxes set up by sectorial TEFs that received support by the CSA. · Number of total assets enabled in the AI-on-demand platform.
Developing CitiVerse	•Number and identification of CitiVerse solutions using MIMs Plus-compatible solutions. •Number and identification of the different use cases addressed. •Number and identification of the different Local Digital Twins expanded. •Number and identification of recommendations for an interoperable and open CitiVerse platform.

	•Number and identification of cities/regions/communities involved in the use cases. •Number of citizens potentially involved in each use case and in total.

SO 4

Topic	Indicator (title)
Advanced digital skills analysis	•Number of analyses, surveys conducted; •Number of collaboration and support activities for DIGITAL-SO4 actions conducted; •Number of recommendations provided on how to best support education and training opportunities in the area of advanced digital skills (related to specific technologies and specific sectors); •Number of communication and dissemination activities carried out.
Reinforcing Skills in Semiconductors	•Number of communication initiatives delivered toward the public. •Number of persons attending physical events and number of visitors or dimension of the audience for online events. •Number of events targeting secondary schools' students, including for example a summer/winter schools, introductory seminars, on-the-job experiences, and visits to business facilities and number of involved students. •Number of training events for secondary school teachers. •Number of partners from countries where semiconductors skills levels are low, according to the Digital Economy and Society Index.
Cybersecurity Skills Academy	•Number of relevant players cooperating in support of the Cybersecurity Skills Academy and contributing to its goals; •Relevant initiatives to promote cyber skills identified; •Number of promotion activities for relevant cyber skills initiatives; •Degree of reach out of awareness campaigns conducted; •Number of respondents (target audience) reached through the communication performed; •Degree of support to strategies on cybersecurity skills from public and private players and contribution to

	alignment of these strategies achieved by the cooperation network.
Boosting digital skills of young people, in particular girls	Indicators for scaling up EU Code Week: •Number of activities registered on the EU Code Week website (minimum target in year 1: 70 000, minimum target in year 2: 100 000); •Number of participants (minimum target in year 1: 2.5 million, minimum target in year 2: 3 million), share of female participants, and age of participants reported on the EU Code Week website; •Number of teachers and school leaders successfully completing a Code Week training (minimum target per year: 2 000); •Number of teachers in the EU Code Week Facebook group for teachers (minimum target: 35 000); •Number of EU Code Week ambassadors (minimum 1 in each EU Member State) and active leading teachers (minimum 500); •Number of community events at EU level, including number of participants (minimum 1 in-person meeting per year taking place in Brussels and at least 1 in-person meeting per year taking place in another EU Member State, as well as a minimum of 2 online events per year); •Number of events at national level, including number of participants, strengthening the national collaboration between ambassadors, leading teachers and correspondents in Ministries of Education or other educational authorities and organisations. Indicators for increasing the pool of young people, particularly girls, who would be interested in studying STEM and ICT and/or embarking on a digital career: •Number of Member States reached with the different activities, ensuring inclusivity by putting the focus on those Member States that lag behind regarding the number of women in ICT and percentage of female ICT students; •Number of courses or camps delivered during holidays, evenings or weekends; •Number of extracurricular activities organised; •Number of career days organised; •Number of study guidance/information events organised; •Number of pupils visiting higher education institutions, e.g. state-of-the-art laboratories, experiencing campus facilities and/or following seminars; •Number of awareness raising campaigns conducted

Network of Safer Internet Centres (SICs)	•Number of new or updated online resources made available by the Safer Internet Centres (e.g. online trainings, videos, online tools, apps, etc.). The minimum target is 1,100 resources uploaded combined by all EU co-funded Safer Internet Centres per year. •Number of people reached through events and training activities. The minimum target is 500,000 people reached through events and trainings per year combined by all EU co-funded Safer Internet Centres. •Number of awareness-raising activities targeting children in vulnerable situations. The minimum target is 20% of the total awareness raising activities organised every year combined by all EU co-funded Safer internet Centres to target children in vulnerable situations. •Number of active youth participants. The minimum target is 1,250 youth participants per year combined from all EU co-funded Safer Internet Centres. The turnover rate of youth participants is at least 30% per year, compared to the previous year. •Number of requests handle by the co-funded helpline services. The minimum target is 63,000 requests every year combined by all EU co-funded helplines. •Number of reports received by the co-funded hotlines. The minimum target is 200,000 reports every year combined by all EU co-funded hotlines.
IT system supporting the removal of online child sexual abuse material (CSAM)	•number of reports inserted: •number of classified files per year.
Support to Dissemination and Exploitation (D&E)	• Clarity of the conceptual and operational framework for D&E. • Feasibility for the EC to put the conceptual and operational framework for D&E into practice. • Feasibility for stakeholders to buy into the framework and actions proposed. • The degree to which the diversity of the programme has been considered (Programme specific objectives, implementing bodies, implementing instruments, technologies and stakeholders) • Number of actors actively involved in the delivery of the framework • Number of activities from the framework delivered within the lifetime of the project.

Supporting the Network of National Contact Points (NCPs)	• Number of NCPs support services provided to stakeholders in each participating country and specific objective; • Variation in total number of applicants in proposals broken down per countries and specific objective respect to work programme 2021/22 calls for proposals; • The number of dedicated promotion events overall and the distribution for each participating country. • The participation in dedicated promotion events overall and for each participating country.

Overview of synergies: Digital Europe/Horizon Europe/CEF Digital in support to multi-country projects – 2021-2022

Multi-country-projects	Activities and Budget under EU Programme		
	Digital Europe WP 2021-2022	**Horizon Europe WP 2021-2022**	**CEF Digital WP 2021-2023**
European Common data infrastructure and services	2.1.1 Smart middleware for a European cloud federation and for the European data spaces 2.1.2 Large scale pilots for cloud-to-edge-based services 2.1.3 Marketplace for federated cloud-to-edge-based services 2.2.2.1 Data Spaces Support Centre 2.2.2.2 Public Sector Open Data for AI and Open Data Platform 2.2.1 All the topics in section data spaces (i.e. all sectorial data spaces covered by this Work Programme) DIGITAL-2021-CLOUD-AI-01-PREP-DSMOB Data Space for Mobility (CSA, 1 M€)	HORIZON-CL4-2021-DATA-01-01: Technologies and solutions for compliance, privacy preservation, green and responsible data operations (AI, Data and Robotics Partnership) (RIA, 52 M€) HORIZON-CL4-2021-DATA-01-03: Technologies for data management (AI, Data and Robotics Partnership) (IA, 30 M€) HORIZON-CL4-2021-TWIN-TRANSITION-01-08 Data-driven Distributed Industrial Environments (Made in Europe Partnership) (IA: 24 M€) HORIZON-CL4-2022-DATA-01-04: Technologies and solutions for data trading, monetizing, exchange and interoperability (AI, Data and Robotics Partnership) (IA, 52 M€) HORIZON-CL4-2022-DATA-01-01: Methods for exploiting data and knowledge for extremely precise outcomes (analysis, prediction, decision support), reducing complexity and presenting insights in understandable way (RIA, 33 M€)	EF-DIG-2021-TA-PLATFORMS: Preparation of works for Operational digital platforms (CSA, 4M€) Backbone networks for pan-European Cloud federation

Multi-country-projects	Activities and Budget under EU Programme		
	Digital Europe WP 2021-2022	Horizon Europe WP 2021-2022	CEF Digital WP 2021-2023
	DIGITAL-2021-PREPACTS-DS-01-AGRI Preparatory actions for the data space for Agriculture (CSA, 2 M€) DIGITAL-2022-CLOUD-AI-DEPLOYMENT-DS-MOB Data Space for Mobility (Simple Grant, 8 M€)	HORIZON-CL4-2022-DATA-01-05: Extreme data mining, aggregation and analytics technologies and solutions (RIA, 30 M€) HORIZON-CL4-2021-HUMAN-01-06: Innovation for Media, including extended Reality (IA, 26 M€) HORIZON-CL4-2021-DATA-01-05: Future European platforms for the Edge: Meta Operating Systems (RIA, 54 M€) HORIZON-CL4-2021-DATA-01-07: Coordination and Support of the 'Cloud-Edge-IoT' domain (CSA, 3 M€) HORIZON-CL4-2021-DATA-01-08: Roadmap for next generation computing and systems technologies (CSA, 2 M€) HORIZON-CL4-2022-DATA-01-02: Cognitive Cloud: AI-enabled computing continuum from Cloud to Edge (RIA, 50 M€) HORIZON-CL4-2022-DATA-01-03: Programming tools for decentralised intelligence and swarms (RIA, 40 M€) HORIZON-CL5-2021-D3-01-12: Establish the grounds for a common European energy data space (IA 32 M€)	

Multi-country-projects	Activities and Budget under EU Programme		
	Digital Europe WP 2021-2022	**Horizon Europe WP 2021-2022**	**CEF Digital WP 2021-2023**
		HORIZON-CL5-2021-D3-01-13: Reinforcing digitalisation related know how of local energy ecosystems (CSA 4 M€) HORIZON-CL6-2021-GOVERNANCE-01-20 – Data economy in the field of agriculture – Effects of data sharing and big data (4 M€) HORIZON-CL3-2021-FCT-01-04: Improved access to fighting crime and terrorism research data (IA: 16 M€)	
	TOTAL WP 2021-22: 330 M€	TOTAL WP 2021-22: 416 M€	TOTAL WP 2021-23: 140 M€
Secure quantum communication infrastructure (EuroQCI)	3.1.1 Create a European Industrial Ecosystem for Secure QCI technologies and systems 3.1.2 Deploying advanced national QCI systems and networks 3.1.3 Coordinate the first deployments of national EuroQCI projects and prepare the large-scale Quantum Key Distribution (QKD) testing and certification infrastructure 3.1.4 Deploy a large-scale testing and certification infrastructure for QKD devices, technologies and systems enabling their accreditation and rollout in EuroQCI	HORIZON-CL4-2021-DIGITAL-EMERGING-02-19: Framework Partnership Agreements in Quantum Communications (FPA) 'OTHER ACTION': 12. HORIZON-CL4-QUANTUM-04-SGA - Quantum encryption and future quantum network technologies (SGA, 25 M€)	European Quantum Communication Infrastructure (call 2022) • Cross-border connections • Interconnection space segment • Links with SOCs • Management of encryption keys • (procurement of the first generation of satellites – via ESA)

Multi-country-projects	Activities and Budget under EU Programme		
	Digital Europe WP 2021-2022	Horizon Europe WP 2021-2022	CEF Digital WP 2021-2023
	TOTAL WP 2021-22: 170 M€	TOTAL WP 2021-22: 25 M€	TOTAL WP 2021-2023: 200 M€
Genome of Europe	2.2.1.7.1 Health data space - Federated European Infrastructure for Genomics data	HORIZON-HLTH-2022-STAYHLTH-01-04-two-stage: Trustworthy artificial intelligence (AI) tools to predict the risk of chronic non-communicable diseases and/or their progression (60 M€) HORIZON-HLTH-2021-DISEASE-04-04: Clinical validation of artificial intelligence (AI) solutions for treatment and care (60 M€) HORIZON-HLTH-2021-DISEASE-04-07 Personalised medicine and infectious diseases: understanding the individual host response to viruses (e.g. SARS-CoV-2) (60 M€)	N/A
	TOTAL WP 2021-22: 20 M€	TOTAL WP 2021-22: 180 M€	N/A
Processors and semiconductors chips	2.1.5 Testing and Experimentation Facility for Edge AI	1) KDT JU: 460 M€ in 2021-2022 2) Cluster 4 WP: HORIZON-CL4-2021-DIGITAL-EMERGING-01-01: Ultra-low-power, secure processors for edge computing (RIA, 26M€)	N/A

Multi-country-projects	Activities and Budget under EU Programme		
	Digital Europe WP 2021-2022	Horizon Europe WP 2021-2022	CEF Digital WP 2021-2023
		HORIZON-CL4-2021-DIGITAL-EMERGING-01-05: Open-Source Hardware for ultra-low-power, secure processors (CSA, 2M€) HORIZON-CL4-2021-DIGITAL-EMERGING-01-31: Functional electronics for green and circular economy (RIA, 35M€) HORIZON-CL4-2022-DIGITAL-EMERGING-01-38: International cooperation in semiconductors (CSA, 3M€) HORIZON-CL4-2022-DIGITAL-EMERGING-01-03 Advanced multi-sensing systems (RIA, 48 M€) HORIZON-CL4-2021-DIGITAL-EMERGING-01-07 Advanced Photonic Integrated Circuits (RIA, 39 M€) HORIZON-CL4-2021-DIGITAL-EMERGING-01-06 Advanced optical communication components (IA, 26 M€)	
	TOTAL WP 2021-22: 77 M€	TOTAL HE WP 2021-22: 460€M+179 M€	N/A
Connected public administration	5.3.1 European Digital Government Eco System (EDGES) 5.3.2 Justice and consumer protection	N/A	N/A

Multi-country-projects	Activities and Budget under EU Programme		
	Digital Europe WP 2021-2022	Horizon Europe WP 2021-2022	CEF Digital WP 2021-2023
	2.2.1.12 Data spaces for Public Administrations		
	TOTAL WP 2021-22: 184 M€	N/A	N/A
European Blockchain Services Infrastructure	EBSI has the ambition to become an EDIC to strengthen the European nature, MS cooperation and co-financing as well as supporting its legal framework for operating services in a pan-European network with public and private organisation managing and operating nodes. 5.2 European Blockchain Services Infrastructure (EBSI) and Regulatory Sandbox Pilot project(s) are also expected to leverage EBSI as part of the 5.4. EuID topic (toolbox)	N/A	N/A
	TOTAL WP 2021-22: at least 38 M€ (5.2 budget)	N/A	N/A
High-tech partnerships for digital skills and specialized education	4. Advanced Digital Skills	N/A	N/A
	TOTAL WP 2021-22: 166 M€	N/A	N/A

Multi-country-projects	Activities and Budget under EU Programme		
	Digital Europe WP 2021-2022	**Horizon Europe WP 2021-2022**	**CEF Digital WP 2021-2023**
Supercomputing and Quantum	Jointly investing in acquiring and operating: • Petascale Supercomputer • Pre-exascale and/or Exascale supercomputers • Quantum computers (as standalone machines or as accelerators of supercomputers) • Connecting with the EuroHPC extreme-bandwidth communication network Investing and cooperating in HPC national competence centres and HPC & Quantum skills	EuroHPC JU - cf WP EuroHPC for details	Tbc
	TOTAL WP 2021-22: 566 M€	TOTAL 243 M€ from Horizon in 2021-2022	
5G corridors	N/A	The SNS JU is the main vehicle to coordinate the MCP on 5G Corridors. While there is no funding from Horizon Europe for corridor deployment (see column on CEF), the SNS JU is tasked to provide guidance to and coordination of 5G deployment activities funded under CEF and other EU and national programmes such as the RRF. This will contribute to consistency and best practice exchange among the projects, setting-up project pipelines and community building in particular for CEF and RRF. A dedicated SNS Working Strategic Group is currently delivering this task and it will be supported by a CSA funded under CEF Digital.	5G coverage along transport corridors: Priority set on cross-border sections of 5G corridors under the 1st WP covering the early wave (2022) and first big wave (2023-24) of deployment works. Proposals to be endorsed by Member States concerned, and support may include as well regional and local authorities. Public bodies can participate in the project consortium, e.g. public road

Multi-country-projects	Activities and Budget under EU Programme		
	Digital Europe WP 2021-2022	Horizon Europe WP 2021-2022	CEF Digital WP 2021-2023
			authorities, road operators or rail companies. Under Call 1, 'Early wave' 8 projects co-funded under CEF Digital kick-started at the beginning of 2023, 7 Works and 8 Inception studies projects, for a combined amount of EUR 41.6 M€ (grants). The consumed budget for the 2021-2023 period, depending on the outcome of Call 2 (7 projects selected, final validation pending) and Call 3 – that will be based on the 8 Inception Study projects under Call 1 and possibly more under Call 2, currently stands at EUR 229.6 M€.
	N/A		TOTAL WP 2021-23: 346 M€
European Digital Innovation Hubs	The establishment of the network will be supported from the Digital Europe Programme, to be matched by a similar investment from Member States.	HORIZON-CL4-2022-TWIN-TRANSITION-01-06, ICT Innovation for Manufacturing Sustainability in SMEs (I4MS2) (Made in Europe Partnership) (IA: 30 M€)	N/A
	TOTAL WP 2021-23: 329,3 M€	TOTAL HE WP 2021-22: 30 M€	N/A

Multi-country-projects	Activities and Budget under EU Programme		
	Digital Europe WP 2021-2022	Horizon Europe WP 2021-2022	CEF Digital WP 2021-2023
Security Operation Centres (SOC)	The creation, interconnection and strengthening of Security Operations Centres (SOC) can improve cybersecurity resilience with faster detection and response to cybersecurity incidents at national and EU level by leveraging disruptive technologies and sharing of information leading to increased situational awareness and stronger EU supply chains. A key element will be capacity building, e.g. by leveraging artificial intelligence and dynamic learning of the threat landscape.	HORIZON-CL3-2021-CS-01-03 AI for cybersecurity reinforcement (RIA, 11M€) HORIZON-CL3-2022-CS-01-01 Improved monitoring of threats, intrusion detection and response in complex and heterogeneous digital systems and infrastructures (RIA, 21M€) HORIZON-CL3-2021-CS-01-04 Scalable privacy-preserving technologies for cross-border federated computation in Europe involving personal data (RIA, 17M€)	
	TOTAL WP 2021-22: 110 M€	TOTAL WP 2021-22: 49 M€	N/A
[AI synergies – not an MCP]	Testing and Experimentation Facilities on AI (WP21-22 in sectors: healthcare, agri-food, manufacturing, smart cities and communities). Deployment of the AI on Demand Platform (one-stop shop to access AI tools for the European industry and for public administrations).	(AI, Data and Robotics topics developing solutions that can be tested and validated in the TEFs) AI on Demand Platform - maintenance and necessary developments and services provision for the AI-on-demand-platform, with a focus on supporting the research community.	N/A
	TOTAL WP 2021-2022: 1139 M€	TOTAL WP 2021-22: 9M€	N/A

Multi-country-projects	Activities and Budget under EU Programme		
	Digital Europe WP 2021-2022	**Horizon Europe WP 2021-2022**	**CEF Digital WP 2021-2023**
Europe Start-ups Nations Alliance (ESNA)	The Access to Finance standard (one 8 "EU Start-up nation standards" that ESNA will support EU countries in implementing) will benefit from the €50m Strategic Digital Technologies (SDT) that Digital Europe is supporting. SDT will provide an investment Platform focusing on aims to mobilize private co-investment on a scale that addresses the financing gap in the market. The SDT will also be accompanied by an investment support programme for this purpose.	The Europe Start-up Nations Alliance (ESNA) was established in Dec 2021 under Portuguese law to support the 27 countries (26 EU MS & Iceland) that signed the Europe Start-ups Nations Standard declaration (declaration launched in March 2021 at Digital Day 4). ESNA will support these countries in implementing the best practices that underpin a growth friendly environment for start-ups. ESNA has the ambition to become an EDIC and so strengthen the European nature of its vocation. ESNA is financed by the European Commission (€1m Horizon Europe grant) and the Portuguese Resilience and Recovery Plan (€7,5m). ESNA's goals are also supported by the €4m HE funding for a tech due diligence and venture building pilot (launching Q1 2022). This is highly relevant to the tech transfer standard of the EU Start-up Nations Standard for which ESNA is also supporting MS.	
		TOTAL WP 2021-22: • ESNA: 1 M€ • Tech Due Diligence and venture Building pilot: 4 M€	N/A

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Multi-country-projects	Activities and Budget under EU Programme		
	Digital Europe WP 2023-2024 – actions in 2023[304]	**Horizon Europe WP 2023-2024**	**CEF Digital WP 2021-2027**
European Common data infrastructure and services	2.1.1 Cloud IPCEI Exploitation Office DIGITAL-2023-CLOUD-AI-04-IPCEI-EXPLOIT (CSA: 3 M€) 2.1.2 Highly Secure Collaborative Platform for Aeronautics and Security Industry DIGITAL-2023-CLOUD-AI-04-AEROSEC (SG: 22 M€) 2.2.1.1 Data Space for Cultural Heritage DIGITAL-2023-CLOUD-DATA-AI-05-CULTHERITAGE (Simple Grant: 4 M€) 2.2.1.2 Data Space for Tourism DIGITAL-2023-CLOUD-DATA-AI-05-DATATOURISM (Simple Grant: 8 M€) 2.2.1.3 Language Data Space (Procurement: 5 M€) 2.2.1.4.1 Federated European Infrastructure for Intensive Care Units' (ICU) data	HORIZON-CL4-2023-DATA-01-02: Integration of data life cycle, architectures and standards for complex data cycles and/or human factors, language (AI, data and robotics partnership) (RIA: 45 M€) HORIZON-CL4-2023-DATA-01-04: Cognitive Computing Continuum: Intelligence and automation for more efficient data processing (AI, data and robotics partnership) (RIA: 28 M€) HORIZON-CL4-2023-DATA-01-06: Coordination and Support of Cognitive Computing Continuum research and policy (CSA: 2 M€) HORIZON-CL4-2024-DATA-01-01: AI-driven data operations and compliance technologies (AI, data and robotics partnership) (Innovation Action: 38 M€) HORIZON-CL4-2024-DATA-01-03: Piloting emerging Smart IoT Platforms and decentralized intelligence (IA:45 M€) HORIZON-CL4-2024-DATA-01-05: Platform Building, standardisation and Up-scaling of the 'Cloud-Edge-IoT' Solutions (Horizontal Activities – CSA: 2 M€)	4.2 Backbone networks for pan-European Cloud federation CEF-DIG-2022-TA-PLATFORMS. Preparation of works for Operational digital platforms. (CEF-PJG CEF Project Grants: 4 M€)

[304] Only actions for 2023 have been considered regarding Digital Europe Programme.

Multi-country-projects	Activities and Budget under EU Programme		
	Digital Europe WP 2023-2024 – actions in 2023[304]	Horizon Europe WP 2023-2024	CEF Digital WP 2021-2027
	DIGITAL-2023-CLOUD-AI-04-ICU-DATA (Simple Grant: 5 M€) 2.2.2 Digital Product Passport DIGITAL-2023-CLOUD-DATA-04-DIGIPASS (SG: 6 M€) 2.2.3.1 Open Data Portal (Procurement: 6 M€) 2.2.3.2 The European Single Access Point (ESAP) for EU capital markets (Procurement: 3 M€) 5.4 EU Energy Saving Reference Framework DIGITAL-2023-DEPLOY-BESTUSE-TECH-04-ENERSAVING - EU Energy saving reference framework (SG: 5 M€)	HORIZON-CL4-2024-DIGITAL-EMERGING-01-21: Open Source for Cloud/Edge to support European Digital Autonomy (RIA: 20 M€) HORIZON-CL4-2024-TWIN-TRANSITION-01-05: Technologies/solutions to support circularity for manufacturing (Made in Europe Partnership) (RIA: 36 M€) HORIZON-CL4-2024-TWIN-TRANSITION-01-38: Hubs for circularity for industrialised urban peripheral areas (Processes4Planet partnership) (IA: 40 M€) HORIZON-CL4-2023-RESILIENCE-01-39: Coordination and knowledge sharing across materials development communities (CSA: 2 M€) KDT JU Coordination of the European software-defined vehicle platform (CSA) -HORIZON-KDT-JU-2023-3-CSA-Topic-3 , (Horizontal Activities – CSA: 2 M€) HORIZON-HLTH-2023-DISEASE-03-06: Towards structuring brain health research in Europe (CSA: 1 M€) HORIZON-HLTH-2023-TOOL-05-09: Developing a Data Quality and Utility Label for the European Health Data Space (CSA: 4 M€) HORIZON-HLTH-2023-IND-06-02: Expanding the European Electronic Health Record Exchange Format to	

Multi-country-projects	Activities and Budget under EU Programme		
	Digital Europe WP 2023-2024 – actions in 2023[304]	Horizon Europe WP 2023-2024	CEF Digital WP 2021-2027
		improve interoperability within the European Health Data Space (RIA: 8 M€) HORIZON-CL2-2023-HERITAGE-ECCCH-01-01: A European Collaborative Cloud for Cultural Heritage (IA: 25 M€) HORIZON-CL2-2023-HERITAGE-ECCCH-01-02: A European Collaborative Cloud for Cultural Heritage – Innovative tools for digitising cultural heritage objects (RIA: 10 M€) HORIZON-CL5-2023-D3-01-15: Supporting the green and digital transformation of the energy ecosystem and enhancing its resilience through the development and piloting of AI-IoT Edge-cloud and platform solutions (IA: 18 M€) HORIZON-CL6-2024-BIODIV-01-2: Digital for nature (IA: 16 M€) HORIZON-CL6-2023-GOVERNANCE-01-17: Data-driven solutions to foster industry's contribution to inclusive and sustainable food systems (RIA: 8 M€) HORIZON-INFRA-2024-EOSC-01-01: FAIR and open data sharing in support of the mission adaptation to climate change (RIA: 16 M€)	

Multi-country-projects	Activities and Budget under EU Programme		
	Digital Europe WP 2023-2024 – actions in 2023[304]	Horizon Europe WP 2023-2024	CEF Digital WP 2021-2027
		HORIZON-INFRA-2023-EOSC-01-04: Next generation services for operational and sustainable EOSC Core Infrastructure (RIA: 10 M€) HORIZON-INFRA-2023-EOSC-01-05: EOSC Architecture and Interoperability Framework (CSA: 3 M€) HORIZON-INFRA-2023-EOSC-01-06: Trusted environments for sensitive data management in EOSC (RIA: 15 M€) HORIZON-INFRA-2024-EOSC-01-05: Innovative and customizable services for EOSC Exchange (28 M€)	
	TOTAL WP 2023-24: 67 M€	Total 2023-24: 422 M€	TOTAL WP 2021-23: 26 M€
Secure quantum and space-based communication infrastructure (EuroQCI)	N/A	HORIZON-CL4-2023-SPACE-01-62: Quantum Communication Technologies for space systems (RIA: 5 M€) ESA.2 2023-2024 Secure Connectivity/GOVSATCOM Space infrastructure: Development and Validation (CA: 28 M€ for EuroQCI)	4.1 Quantum communication infrastructure - The EuroQCI initiative
	N/A	Total 2023-24: 33 M€	Total 2021-27: 90 M€

Multi-country-projects	Activities and Budget under EU Programme		
	Digital Europe WP 2023-2024 – actions in 2023[304]	Horizon Europe WP 2023-2024	CEF Digital WP 2021-2027
Genomics	2.2.1.4.2 Genome of Europe DIGITAL-2023-CLOUD-AI-04-GENOME (Simple Grant: 20 M€)	HORIZON-HLTH-2023-TOOL-05-04: Better integration and use of health-related real-world and research data, including genomics, for improved clinical outcomes (RIA: 35 M€)	N/A
	TOTAL WP 2023-24: 20 M€	Total 2023-24: 35 M€	N/A
CitiVerse	2.3.2 Developing CitiVerse DIGITAL-2023-CLOUD-AI-04-DEVELOPCITI (SG: 15 M€)	HORIZON-MISS-2023-CIT-02-01: Associating Ukrainian cities to the Climate-neutral and smart cities Mission (CSA: 5 M€) HORIZON-CL6-2024-BIODIV-02-2-two-stage: Demonstrating the potential of Naturebased Solutions and the New European Bauhaus to contribute to sustainable, inclusive and resilient living spaces and communities (IA: 10 M€) HORIZON-MISS-2023-CLIMA-CITIES-01-01: Urban greening and re-naturing for urban regeneration, resilience and climate neutrality (IA: 40 M€) HORIZON-CL5-2024-D4-01-02: Smart grid-ready buildings (IA: 10 M€)	N/A

Multi-country-projects	Activities and Budget under EU Programme		
	Digital Europe WP 2023-2024 – actions in 2023[304]	Horizon Europe WP 2023-2024	CEF Digital WP 2021-2027
		HORIZON-CL6-2024-CircBio-01-1: Circular Cities and Regions Initiative's project development assistance (CCRI-PDA) (CSA: 6 M€)	
	TOTAL WP 2023-24: 15 M€	Total 2023-24: 71 M€	N/A
Processors and semiconductors chips	Digital Europe's contribution to Chips JU[305]: 756 M€ in 2023-24 4.2 Reinforcing Skills in semiconductors DIGITAL-2023-SKILLS-04-SEMICONDUCTORS (SG: 10 M€)[306]	HORIZON-CL4-2023-DIGITAL-EMERGING-01-11: Low TRL research in microelectronics and integration technologies for industrial solutions (RIA: 35 M€) HORIZON-CL4-2023-DIGITAL-EMERGING-01-40: Quantum Photonic Integrated Circuit technologies (RIA: 12 M€) HORIZON-CL4-2023-DIGITAL-EMERGING-01-41: Investing in alternative quantum computation and simulation platform technologies (RIA: 20 M€) HORIZON-CL4-2023-DIGITAL-EMERGING-01-43: Framework Partnership Agreement for developing large-scale quantum Computing platform technologies (FPA)	N/A

[305] The contribution to the Chips Joint Undertaking includes capacity building activities on a design platform, pilot lines, quantum chips and associated semiconductor technologies, and competence centres. The contribution to "processors and semiconductors chips" is part of the overall Digital Europe contribution.
[306] This action also contributes to the "High-tech partnerships for digital skills and specialized education" MCP; its corresponding budget has only been considered in the High-tech partnerships for digital skills and specialized education section, to avoid double representation in the total budget.

Multi-country-projects	Activities and Budget under EU Programme		
	Digital Europe WP 2023-2024 – actions in 2023[304]	Horizon Europe WP 2023-2024	CEF Digital WP 2021-2027
		HORIZON-CL4-2023-DIGITAL-EMERGING-01-51: Pervasive photonics – multi-technology integration for digital infrastructure, sensors, and internet of things (RIA: 18 M€) HORIZON-CL4-2023-DIGITAL-EMERGING-01-57: Advanced imaging and sensing technologies (IA: 20 M€) HORIZON-CL4-2024-DIGITAL-EMERGING-01-21: Open Source for Cloud/Edge to support European Digital Autonomy (RIA: 20 M€)[307] HORIZON-CL4-2024-DIGITAL-EMERGING-01-31: Pilot line(s) for 2D materials-based devices (RIA: 33 M€) HORIZON-CL4-2024-DIGITAL-EMERGING-01-54: Smart photonics for joint communication & sensing and access everywhere (RIA: 18 M€) Horizon Europe contribution to KDT JU and Chips JU[308]: 877 M€ in 2023-2024	

[307] This action also contributes to the "European Common data infrastructure and services" MCP; its corresponding budget has only been considered in the European Common data infrastructure and services section, to avoid double representation in the total budget.

[308] The HE contribution to the Chips JU (and its predecessor the KDT JU) includes research and innovation activities on advanced design capacities, pilot lines, quantum chips and associated semiconductor technologies, competence centres, and R&I activities not covered under the Chips for Europe Initiative. The contribution to "processors and semiconductors chips" is part of the overall HE contribution.

Multi-country-projects	Activities and Budget under EU Programme		
	Digital Europe WP 2023-2024 – actions in 2023[304]	Horizon Europe WP 2023-2024	CEF Digital WP 2021-2027
	TOTAL WP 2023-24: 759 M€	Total 2023-24: 1033 M€	N/A
Connected public administration	5.2.1.1 European Digital Identity and Trust Ecosystem (Standards and Sample Implementation) (Procurement: 20 M€) 5.2.1.2 Support to the implementation of the Once Only Technical System under the Single Digital Gateway Regulation (Procurement: 7.5 M€) 5.2.1.3 eProcurement and eInvoicing (Procurement: 3 M€) 5.2.2 Interoperable Europe - Interoperability for the public sector (Procurement: 24.5 M€)	HORIZON-CL2-2024-DEMOCRACY-01-07: Digital democracy (RIA: 9 M€) HORIZON-CL3-2023-CS-01-02: Privacy-preserving and identity management technologies (IA: 15.7 M€)	N/A
	TOTAL WP 2023-24: 52 M€	Total 2023-24: 24.7 M€	N/A
European Blockchain Services Infrastructure	5.1 Blockchain (Procurement 10 M€)	Although not directly contributing to the development of EBSI, multiple actions under HE encourage the deployment of innovative blockchain technologies in areas such as corruption prevention and detection (CL 2), energy sharing (CL 5), forest monitoring, value chain circularity in tourism, manufacturing, waste management	N/A

Multi-country-projects	Activities and Budget under EU Programme		
	Digital Europe WP 2023-2024 – actions in 2023[304]	Horizon Europe WP 2023-2024	CEF Digital WP 2021-2027
		and recycling (CL 6), sensitive data management (INFRA).	
	TOTAL WP 2023-24: 10 M€	-	N/A
High-tech partnerships for digital skills and specialized education	4.1 Specialised Education Programmes in Key Capacity Areas DIGITAL-2023-SKILLS-05-SPECIALEDU (LumpSum: 30 M€) DIGITAL-2023-SKILLS-05-SPECIAL-PROGEDU (CSA: 2 M€) 4.2 Reinforcing Skills in semiconductors DIGITAL-2023-SKILLS-04-SEMICONDUCTORS (SG: 10 M€) 4.3 Cybersecurity Skills Academy (SG: 10 M€) 4.4 Boosting digital skills of young people, in particular girls DIGITAL-2023-SKILLS-04-BOOSTINGDIGIT (CSA: 6 M€)	HORIZON-CL4-2023-DIGITAL-EMERGING-01-56: Photonic Strategies and Skills Development (Photonics Partnership) – Type 2 fostering careers in photonics (CSA: 1 M€) HORIZON-CL4-2023-HUMAN-01-54: Green and digital skills and training needs for a just transition (CSA: 2.4 M€)	N/A

Multi-country-projects	Activities and Budget under EU Programme		
	Digital Europe WP 2023-2024 – actions in 2023[304]	Horizon Europe WP 2023-2024	CEF Digital WP 2021-2027
	TOTAL WP 2023-24: 58 M€	Total 2023-24: 3.4 M€	N/A
Supercomputing and Quantum	EuroHPC WP – Infrastructure actions: • 2nd Exascale system procurement (WP23: 300 M€) • Access IT Platform (WP 23: 600 K€) • 2nd Quantum CFEI (Capex +Opex) (WP23: 20 M€) • Industrial HPC CFEI (WP23: 12.2 M€)	HORIZON-CL4-2023-DIGITAL-EMERGING-01-43: Framework Partnership Agreement for developing large-scale quantum Computing platform technologies (FPA) HORIZON-CL4-2023-DIGITAL-EMERGING-01-41: Investing in alternative quantum computation and simulation platform technologies (RIA: 20 M€) HORIZON-CL4-2024-DIGITAL-EMERGING-01-42: Stimulating transnational research and development of next generation quantum technologies, including basic theories and components (Cascading grant with FSTP: 15 M€) EuroHPC WP – Technology & application actions: • Experimental Platform for European Technology (PCP) (WP23: 24 M€) • HPC Energy efficiency R&I Call (WP23: 29 M€) • Interconnect technologies (Innovation Action) (WP23: 30 M€) • HPC Centres of Excellence (2nd call) (WP23: 20 M€) • Quantum Excellence Centres (WP23: 10 M€)	4.4 Terabit connectivity for High Performance Computing – *implemented through EuroHPC JU*

Multi-country-projects	Activities and Budget under EU Programme		
	Digital Europe WP 2023-2024 – actions in 2023[304]	Horizon Europe WP 2023-2024	CEF Digital WP 2021-2027
		• Quantum application prizes (WP23: 300 K€)	
	Total 2023: 332.8 M€	Total 2023-24: 148.3 M€	Total 2021-23: 200 M€
5G deployment	N/A	HORIZON-CL4-2023-HUMAN-01-65: Support facility for digital standardisation and international cooperation in digital partnerships (CSA: 1.5 M€) HORIZON-CL4-2023-HUMAN-01-66: Promoting EU standards globally (CSA: 2.5 M€)	3.1 5G coverage along transport corridors (WP 21-23) (229,6 M€) 5.6 5G Strategic Deployment Agenda coordination (WP 21-23) (1 M€)
	N/A	Total 2023-24: 4 M€	Total WP 2021-23: 230,6 M€
European Digital Innovation Hubs	(EDIH WP 2021-2023) 1.1 Expression of Interest to designate candidate European Digital Innovation Hubs 1.2 Initial Network of European Digital Innovation Hubs (SG: 321.2 M€) 1.3 Digital transformation accelerator (4 M€)	N/A	N/A

Multi-country-projects	Activities and Budget under EU Programme		
	Digital Europe WP 2023-2024 – actions in 2023[304]	Horizon Europe WP 2023-2024	CEF Digital WP 2021-2027
	TOTAL WP 2023-24: 325,2 M€	N/A	N/A
Security Operations Centres	(CS WP 23-24) 1.1.1 National SOCs (Joint procurement with Member States: 35 M€ and SG: 15 M€) 1.1.2 Cross-Border SOC Platforms (Joint procurement with Member States: 20 M€ and SG: 10 M€) 1.1.3 Strengthening the SOC ecosystem (CSA: 4 M€)	N/A	N/A
	Total WP 2023-24: 84 M€	N/A	N/A

ANNEX XII. RHOMOLO ANALYSIS

The RHOMOLO assessment of the macroeconomic impact of the Digital Europe Programme (2021-2025 data)

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Abstract

This paper presents an assessment of the macroeconomic impact of the Digital Europe Programme, a cornerstone of the EU's commitment to drive digital transformation. Using the RHOMOLO spatial dynamic computable general equilibrium model, the analysis quantifies the effects of the programme's investments on EU economies. The results show a positive impact on GDP, with significant returns on investment, and improved EU competitiveness. The modelling simulations consider different scenarios, including digital spillovers, which enhance the programme's impact. The findings suggest that the programme can have a substantial effect on EU economies, with cumulative GDP multipliers increasing over time. The analysis provides valuable insights for policymakers, highlighting the potential benefits of investing in digital transformation and the importance of considering digital spillovers in policy evaluations.

Keywords: Digital Europe Programme, digital investment, general equilibrium modelling.

JEL Codes: C68, H54, R1

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Disclaimer: The views expressed are purely those of the authors and may not in any circumstances be regarded as stating an official position of the European Commission.

Executive summary

The Digital Europe Programme is a cornerstone of the EU's commitment to drive digital transformation, with a total budget of over €8.1 billion. The programme aims to unlock new opportunities for economic growth, social progress and environmental sustainability by investing in key areas such as infrastructure, innovation and human capital. The programme's objectives are diverse and wide-ranging, covering strategic priorities that will shape the future of Europe's digital economy and society.

An assessment of the macroeconomic impact of the Digital Europe Programme has been carried out using the RHOMOLO model, a spatially dynamic computable general equilibrium model. The results show that the programme can have a positive impact on EU economies, with significant effects on GDP and high returns on investment. The model simulations suggest that the programme can improve EU competitiveness as measured by EU exports to the rest of the world.

The assessment highlights the importance of considering digital spillovers, which can enhance the impact of the programme by facilitating the diffusion of digital innovations and increasing overall economic productivity. The results of the evaluation provide valuable insights for policy makers, highlighting the potential benefits of investing in digital transformation and the importance of considering digital spillovers in policy evaluations. Overall, the Digital Europe Programme is expected to have a significant impact on EU economies, with cumulative GDP multipliers increasing over time.

1. Introduction

The Digital Europe Programme (now DIGITAL) is a cornerstone of the EU's commitment to drive the digital transformation of its Member States, focusing on strategic areas that are vital for technological progress and economic resilience. DIGITAL has a total budget of over €8.1 billion, underlining the EU's commitment to the sector. By investing in key areas such as infrastructure, innovation and human capital, the programme aims to unlock new opportunities for economic growth, social progress and environmental sustainability. The programme's objectives are diverse and wide-ranging, covering a number of strategic priorities that will shape the future of Europe's digital economy and society.

The programme's supercomputing initiatives aim to boost Europe's high-performance computing infrastructure, providing the computing power needed for advanced scientific research, weather forecasting and complex data analysis. Artificial Intelligence is another pillar, where the programme will not only promote the adoption of AI across different industries, but also its ethical application, ensuring that European values are embedded in the digital future. Cybersecurity is a major focus, as the programme works to strengthen the EU's defences against cyber threats, which are crucial to ensuring the integrity and reliability of digital services. Recognising the importance of human capital, the programme invests in advanced digital skills to prepare the workforce for the demands of a rapidly evolving labour market. It also promotes the widespread use of digital technologies to boost productivity and innovation in all sectors of the economy and society. In addition, the recent prioritisation of semiconductors addresses the urgent need to strengthen the EU's manufacturing and technological sovereignty in this key sector, in line with the Chips Act and the Chips for Europe initiative to mitigate the impact of global shortages and supply chain dependencies.

DIGITAL also aims to provide support through a network of European Digital Innovation Hubs (EDIHs). EDIHs act as multipliers in the dissemination of digital innovation to businesses (especially SMEs) and public administrations. The programme is in line with the EU's broader digital policy objectives, including the Digital Compass 2030 and the Roadmap to the Digital Decade. These frameworks set out the EU's vision and objectives for digital transformation by 2030. DIGITAL does not operate in a vacuum; it works with other EU funding mechanisms such as Horizon Europe for research and innovation, the Connecting Europe Facility for digital infrastructure, the Recovery and Resilience Facility for post-pandemic recovery, and the Structural Funds for regional development. DIGITAL is part of the EU's long-term budget for 2021-2027, which provides a structured financial plan to achieve the EU's long-term goals.

This paper presents an attempt to quantify the macroeconomic impact of the investments made under the DIGITAL programme, using data on actual disbursements from 2021 to end of 2024. This is done using the spatial dynamic computable general equilibrium (CGE) model RHOMOLO (built and managed by the European Commission's Joint Research Centre - JRC). RHOMOLO is adept at assessing the impact of EU policies on different regions and sectors, taking into account the intricate web of linkages within European economies. For the mathematical description of the RHOMOLO model, see Lecca et al. (2018), and for an overview of the underlying data used to calibrate the model, see García-Rodríguez et al. (2025).

When assessing the impact of DIGITAL funding through the lens of the RHOMOLO model, it is important to recognise the model's ability to capture spatial spillovers and interregional linkages, which are important components of the EU's integrated economic landscape. Crucially, the results depend on the assumptions made to model the impact of DIGITAL investment, in particular those related to the geographical spread of the effects (spillovers).

The rest of the paper is organised as follows. Section 2 presents the data on the policy interventions and the simulation strategy adopted to study their macroeconomic impact. Section 3 contains the results of the analysis, and Section 4 concludes.

2. DIGITAL fund data and modelling simulation strategy

At the time of writing, the DIGITAL Fund has not been fully deployed. Between 2021 and 2024, the total investment in the EU27 + other countries amounts to almost EUR 5,162 million. This includes funding from DIGITAL (EU-funded) and, in cases where the funding does not cover the full cost of a project, funding from other EU funds (the Recovery and Resilience Facility – RRF, and the European Regional Development Fund - ERDF), Member States or privately invested capital from beneficiaries to make up the difference. This analysis focuses on the EU27 only, and therefore the total amount used in the modelling exercise is EUR 5,037 million. Table 1 shows the investment data by country and by category of expenditure (source: DG CNECT).

These investments are modelled through four specific shocks in the model, meaning that different economic channels are activated by the different types of spending. The shocks are the following: public investment, private investment, training in digital skills for workers, and technical assistance. Table 2 shows the breakdown of the shocks used to simulate the impact of the DIGITAL funds in the RHOMOLO model. In short, private investment temporarily increases the private stock of capital used by firms in production. Public investment temporarily increases the public capital stock available to all firms and generates increasing returns to scale in the production function (in its absence, the combination of private capital and labour is characterised by constant returns to scale). Training in digital skills is modelled as an increase in public current expenditure and an increase in labour productivity. Finally, technical assistance is modelled as a pure demand shock with an increase in public current expenditure.

RHOMOLO is a spatial CGE model and is therefore characterised by interregional linkages that favour the existence of spillovers related to trade flows and the mobility of production factors. However, given the nature of the investment under analysis, it is reasonable to assume that there are additional spillovers that need to be modelled. The reach of digital technologies extends well beyond the information and communication technology (ICT) sector, permeating a wide range of industries (Auboin et al., 2021). Although there is little evidence on the diffusion of digital technologies, we can draw on evidence on the diffusion of ICT, which suggests that as a country improves its ICT capabilities, the productivity of workers in neighbouring countries also increases (Shahnazi, 2021). We refer to these additional spillovers arising from the intrinsically digital nature of the policy as digital spillovers, to distinguish them from the spillovers generated endogenously in the model.

Table 1. DIGITAL investment per category and country (millions of euros)

Country	Public Investment	Private investment/subsidies	Digital skills for workers	Technical Assistance	Total
AL	0.3	0.0	0.0	1.1	1.3
AT	92.5	32.9	16.7	4.9	147.0
BA	0.0	0.0	0.0	0.9	0.9
BE	207.8	58.7	28.9	536.9	832.2
BF	0.0	0.3	0.0	0.0	0.3
BG	25.0	21.4	4.8	2.2	53.3
CY	36.6	5.2	10.9	15.0	67.6
CZ	58.6	14.8	6.0	8.9	88.4
DE	913.6	145.0	49.4	57.4	1165.4
DK	67.3	7.3	17.2	3.2	94.9
EE	16.4	6.0	5.4	7.2	34.9
EL	94.7	19.6	33.2	8.4	156.0
ES	145.3	66.9	29.4	33.0	274.6
FI	81.4	12.9	16.0	12.7	123.0
FR	297.5	97.9	40.3	33.5	469.1
GH	0.0	0.3	0.0	0.0	0.3
HR	21.5	11.0	5.1	9.6	47.2
HU	29.8	11.2	4.2	3.4	48.5
IE	46.3	12.1	29.8	8.8	96.9
IL	0.0	0.5	0.0	0.0	0.5
IS	13.6	4.2	1.2	0.1	19.2
IT	245.3	91.1	45.2	24.0	405.6
KE	0.0	0.0	0.9	0.0	0.9
LI	3.3	0.0	0.0	0.0	3.3
LT	18.1	14.2	9.3	2.7	44.2
LU	62.9	0.0	1.7	33.0	97.6
LV	18.0	6.4	4.9	6.8	36.2
ME	0.0	0.0	0.0	1.1	1.1
MK	1.0	1.1	0.0	2.5	4.6
MT	13.4	5.3	0.2	3.7	22.5
MY	0.0	0.0	0.0	0.1	0.1
NL	112.1	60.2	10.4	46.2	228.9

NO	27.1	12.6	7.7	8.5	55.8
PL	60.4	56.8	4.1	4.5	125.7
PT	48.3	16.9	19.1	3.3	87.6
RO	43.4	25.4	8.3	7.6	84.6
RS	0.0	0.0	0.2	4.5	4.7
SE	75.7	18.2	6.8	17.4	118.0
SI	17.6	10.6	1.5	2.9	32.5
SK	45.7	12.0	1.0	7.0	65.8
TR	0.0	0.0	2.1	2.0	4.2
UA	6.6	1.0	2.3	4.0	13.9
UK	1.3	0.0	0.0	0.2	1.5
US	0.1	0.9	0.0	0.0	1.0
Total	**2,948.5**	**860.9**	**424.2**	**929.2**	**5,161.8**

Source: DG CNECT.

Table 2. Breakdown of the modelling shocks

Description of the intervention	**RHOMOLO Model Shock**	**Raw Amount (EUR million)**	**Simulated Amount (EUR million)**	**Demand-side effects**	**Supply-side effects**
Public investment	Public Investment	2948	2889	Increase in public investment	Temporary increase in public capital stock
Private investment	Total Factor Productivity	861	835	Reduction in the risk premium stimulating private investments	Temporary increase in private capital stock; increase in total factor productivity
Digital skills for workers	Labour Productivity	424	409	Increase in government consumption	Increase in labour productivity
Technical Assistance	Public Current Expenditure	929	904	Increase in government consumption	Increase in government consumption
	Total	**5,162**	**5,037**		

Source: DG CNECT (data) and JRC RHOMOLO (modelling assumptions).

General assumptions about digital spillovers include the concept that digital services and products created in one region have the potential to be consumed in other regions with minimal additional costs. This facilitates widespread benefits across the EU market. In addition, innovations created in one region can be quickly adopted by firms in other regions, a process that is increasingly common in a market characterised by digital interconnectivity. Investments in general purpose technology (GPT) infrastructure are also thought to generate network effects, meaning that the value of the investment increases as more users join the network (Syverson, 2011), potentially bringing benefits to multiple regions. Furthermore, as a public good, digital information is non-competitive and can be reproduced at very low marginal cost (Brynjolfsson and McAfee, 2014), facilitating its widespread global use at minimal cost.

The inclusion of digital spillovers in this RHOMOLO analysis reflects the growing body of evidence highlighting the far-reaching effects of digital investments. As shown by Ren and Lin (2024) in their study of digital spillovers in the internet industry, digital spillovers are multi-dimensional, enhancing production, practices, internal and external competitiveness, and supply chain efficiency. These findings suggest that the diffusion of digital innovations is not confined to the regions where investment takes place; rather, these technologies permeate interconnected industries and regions, increasing overall economic productivity.

The role of spatial spillovers is particularly important in the context of digital technologies. Zou et al. (2024) identify strong spatial spillovers of the digital economy on urban total factor productivity, showing that digital progress in one city can significantly increase the productivity of neighbouring cities. Such evidence justifies the modelling of digital spillovers in this RHOMOLO analysis, ensuring that the impact of digital investment extends beyond regional boundaries, as observed in EU-wide markets.

Moreover, digital knowledge spillovers and local skill endowments are crucial for fostering entrepreneurship and innovation. Colombelli et al. (2024) show that regional digital knowledge and skill endowments drive the creation of innovative digital start-ups. These findings are consistent with the assumption that digital investments generate additional spillovers that stimulate regional entrepreneurial ecosystems, strengthening the case for modelling supply-side digital spillovers.

For this reason, we present the results of three different scenarios:

1. No digital spillover effect;
2. 0.5% supply-side digital spillover effect;
3. 1% supply-side digital spillover effect.

In the second and third scenarios, we model an additional supply-side digital spillover that reflects the impact of the investments in all regions, independently of the investments directly targeted at the regions (the spillover effect is net of the direct supply-side impact of the investment itself). In the absence of evidence on the exact magnitude of supply-side digital spillovers from funds such as the DIGITAL programme, we assume either a 0.5% or 1% digital spillover in Scenarios 2 and 3 respectively. Recognising the limitations of these assumptions, we offer a range of potential impacts across three scenarios, as there is no reliable evidence on the size of these spillovers and the exact mechanism that governs them.

Therefore, the results obtained under the digital spillover scenarios must be treated with caution, as the impact of the policy increases exponentially as we consider higher digital spillovers. The scenario without digital spillovers serves as a baseline, in which the funds are modelled without taking into account the specific digital characteristics of the intervention. The choice of 0.5% and 1% digital spillovers is to illustrate how this baseline assessment changes when digital spillovers are introduced.

The shock-specific assumptions regarding the digital spillover effects are as follows.

In the case of public investment, it is assumed that public spending on digital infrastructure or services in one region will increase productivity (through an increase in the public capital stock - freely available to all firms, although subject to congestion) within that region, leading to increased output and income. There are also expected to be digital spillovers to other regions due to improved connectivity and efficiency gains. These effects are represented as increased efficiency of public capital (essentially increasing firm productivity).

In the case of private investment, it is expected that private investment made as a result of the DIGITAL programme will stimulate innovation and productivity gains in the region where the investment takes place. Digital spillovers to other regions could occur if digital investment facilitates better market access or the diffusion of innovation through supply chains, thereby increasing total factor productivity.

Finally, in the case of digital skills training for workers, it's thought that improving the skills of workers in a given region could improve the overall stock of human capital and increase labour productivity. Digital spillovers in this context could include the transfer of knowledge and best practices across regions, which could occur when workers relocate or collaborate remotely.

Technical assistance, modelled as a shock increasing government current expenditure, has no supply-side digital spillovers since this is a pure demand shock.

Finally, the policy is assumed to be financed by a lump sum contribution that reduces the disposable income of households. The contribution to EU-funded investment is modelled to mimic the functioning of the EU budget, so that regions pay in proportion to their GDP weight in the EU, irrespective of the funds received. This means, for example, that richer regions pay more than poorer regions. On the other hand, the contribution to finance Member States' investment is modelled in such a way that regional investment is fully covered by contributions in the specific region. Thus, for example, the amount needed to finance an intervention in a less developed region has to be financed by a lump sum contribution taken from the income of households in that region (hence the regional macroeconomic impact of the policy should be expected to be lower than an investment largely paid by richer regions contributing to the EU budget).

3. Results

Table 3 shows the impact on GDP at EU level in EUR million for the three scenarios described above. The table includes both the annual and cumulative impact.

Table 3. GDP impact (in million EUR) over 10 years – three scenarios

Year	No digital spillover		0.5% digital spillover		1% digital spillover	
	Year-specific	Cumulated	Year-specific	Cumulated	Year-specific	Cumulated
2021	73	73	78	78	84	84
2022	373	446	527	605	680	765
2023	1406	1852	1952	2557	2496	3261
2024	1567	3419	2293	4850	3018	6279
2025	1402	4821	2206	7056	3010	9288
2026	1334	6154	2196	9252	3056	12345
2027	1307	7461	2219	11471	3129	15474
2028	1288	8750	2245	13715	3199	18673
2029	1272	10022	2267	15982	3260	21932
2030	1254	11276	2283	18265	3310	25242

Source: RHOMOLO simulations.

Table 4 shows the cumulative GDP multiplier, calculated as the cumulative GDP impact divided by the cumulative DIGITAL investment in each year. This can be interpreted as the amount of EUR generated by one EUR invested in the fund. For example, this means that in 2026, according to the no spillover scenario, every euro invested in the policy will have generated 1.22 euros of GDP. Over time, the return on investment (measured as the cumulative impact on GDP) increases, reaching 2.24 in 2030 according to the same scenario. When digital spillovers are simulated (scenarios 2 and 3), the multiplier increases: it is higher than 3.6 in 2030 in the 0.5% spillover scenario and higher than 5 in the same year in the 1% spillover scenario.

The results of the scenario without digital spillovers and the scenario with spillovers limited to 0.5% are closer to previous analyses of other comparable EU funds. For example, Christou et al. (2024), using the same model used here to assess the impact of Horizon 2020 investments, find a nine-year GDP multiplier of 2.46, which is between the 1.99 of the first scenario and the 3.17 of the second scenario of DIGITAL. Of course, the funds analysed are different, but the range of macroeconomic impacts is compatible with the results presented here. On the other hand, the 9-year multiplier of 4.35 in the case of the 1% digital spillover seems high compared to previous analyses.

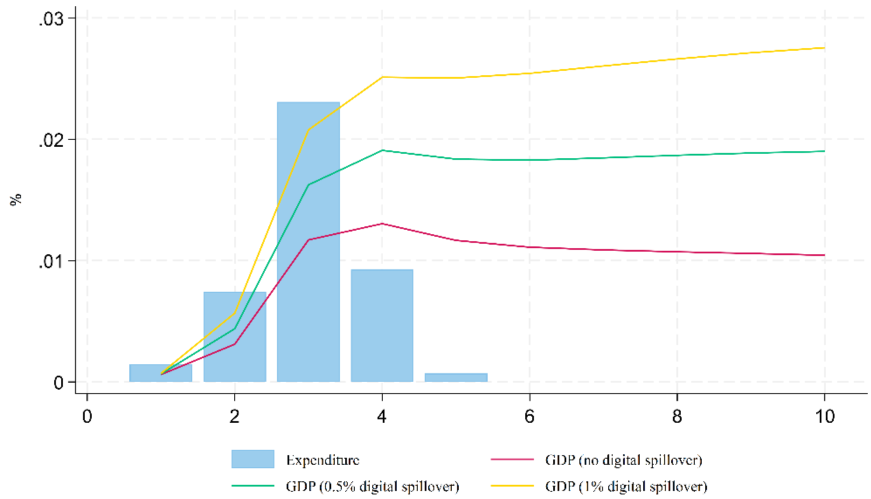
Table 4. EU cumulated GDP multipliers in 10 years – three scenarios

Year	No digital spillover	0.5% digital spillover	1% digital spillover
2021	0.42	0.45	0.49
2022	0.42	0.57	0.72
2023	0.48	0.67	0.85
2024	0.69	0.98	1.27
2025	0.96	1.40	1.84
2026	1.22	1.84	2.45
2027	1.48	2.28	3.07
2028	1.74	2.72	3.71
2029	1.99	3.17	4.35
2030	2.24	3.63	5.01

Source: RHOMOLO simulations.

Figure 1 shows the impact of the funds on EU GDP in the three different scenarios. The impact is expressed as a percentage difference from the base year value of EU GDP. Figure 1 shows that the larger the supply-side digital spill-over assumed in the simulation, the larger and more persistent is the impact of the DIGITAL Fund on GDP.

Figure 1. EU-wide GDP Impact (% deviations from baseline) and size of interventions (% of GDP)



Source: RHOMOLO simulations.

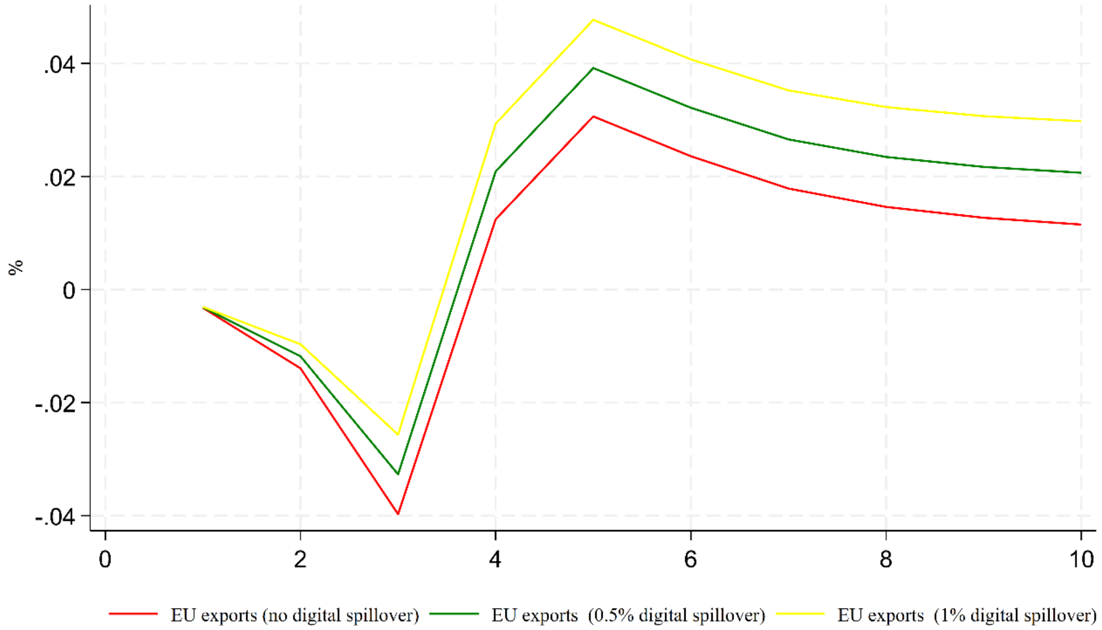
Figure 2 shows the impact of the funds on EU exports in the three different scenarios. The impact is expressed as a percentage difference from the base year value of EU exports. Figure

2 shows that, after an initial decline in exports during the implementation phase of the policy, the policy improves the EU's competitiveness, with lower prices boosting exports to the rest of the world. These effects are sustained over time thanks to the supply-side effects of the policy intervention.

The initial decline in exports reflects the temporary loss of competitiveness due to the price increase caused by the demand shock. At the same time, the increase in household consumption and investment leads to an increase in imports (since not all the demand is satisfied by domestic production). This changes as the demand injection ends and the supply-side effects of the policy begin to take hold, improving competitiveness and eventually lowering prices. Productivity gains increase the efficiency of production, reduce production costs and allow exporters to regain their global competitiveness. The robust rebound in exports reflects the economy's capacity to adjust and reap the longer-term benefits of the policy.

Digital spillovers reinforce this dynamic. Scenarios with higher digital spillovers show stronger recoveries compared to the no-spillover case. These spillovers are likely to facilitate greater technology adoption, streamline production processes and reduce costs.

Figure 2. EU Exports Impact (% Deviations from baseline)



Source: RHOMOLO simulations.

4. Conclusions

The results presented are a modelling assessment of the potential macroeconomic impact of the Digital Europe Programme. They show that the policy can have a positive impact on EU economies, with significant effects on GDP and high returns on investment (measured by cumulative GDP multipliers). The modelling simulations also suggest that the policy can improve EU competitiveness, as measured by EU exports to the rest of the world.

As with any modelling analysis, limitations should be acknowledged. For example, the lack of evidence measuring the exact diffusion and magnitude of digital spillovers related to the investments under analysis makes it difficult to construct a scenario that can accurately estimate the impact, and therefore we rely on three scenarios to demonstrate the uncertainty of the analysis. Moreover, the positive economic impact of the funds could be greater if we take into account their complementarity with other EU policies. The Digital Europe Programme does not address challenges in isolation, but complements the funding available through other EU programmes such as Horizon Europe (for research and innovation) and the Connecting Europe Facility (for digital infrastructure), the Recovery and Resilience Facility and the Structural Funds, to name but a few.

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Appendix

Table A1. DIGITAL investment EU funded per category and country (millions of euros)

Country	Public Investment	Private investment/subsidies	Digital skills for workers	Technical Assistance	Total
AL	0.1	0.0	0.0	0.5	0.7
AT	55.2	14.1	8.4	2.9	80.5
BA	0.0	0.0	0.0	0.5	0.5
BE	139.7	45.0	19.6	265.0	469.3
BF	0.0	0.1	0.0	0.0	0.1
BG	12.9	11.4	2.9	1.2	28.3
CY	19.7	2.7	7.5	8.2	38.0
CZ	30.0	7.4	3.0	4.6	45.0
DE	641.1	74.5	26.8	41.4	783.8
DK	35.9	3.3	8.8	1.9	49.9
EE	8.9	3.0	2.7	5.6	20.3
EL	52.5	9.3	22.2	5.7	89.6
ES	79.3	46.6	17.5	19.9	163.4
FI	45.9	6.5	8.8	9.0	70.1
FR	183.5	41.9	22.3	28.1	275.8
GH	0.0	0.1	0.0	0.0	0.1
HR	11.6	5.3	2.7	5.3	24.9
HU	14.9	5.7	2.5	2.0	25.1
IE	26.5	8.5	16.6	5.7	57.3
IL	0.0	0.1	0.0	0.0	0.1
IS	7.5	2.1	0.6	0.1	10.3
IT	178.5	39.9	25.3	21.1	264.8
KE	0.0	0.0	0.5	0.0	0.5
LI	1.5	0.0	0.0	0.0	1.5
LT	9.8	6.5	4.8	1.4	22.4
LU	42.1	0.0	1.2	17.9	61.3
LV	9.5	3.5	2.6	5.4	21.0
ME	0.0	0.0	0.0	0.6	0.6
MK	0.7	0.5	0.0	1.4	2.7
MT	6.7	2.6	0.2	1.9	11.5
MY	0.0	0.0	0.0	0.1	0.1

NL	53.4	27.9	5.8	28.7	115.8
NO	15.5	6.1	4.4	7.2	33.3
PL	34.8	29.5	2.2	2.6	69.1
PT	23.4	8.5	9.6	1.7	43.3
RO	23.2	12.8	5.0	5.4	46.4
RS	0.0	0.0	0.2	2.4	2.6
SE	39.8	8.5	3.9	8.8	60.9
SI	10.0	5.5	0.9	1.7	18.1
SK	25.9	6.0	0.6	3.5	36.0
TR	0.0	0.0	1.3	1.3	2.5
UA	3.1	0.5	1.3	2.0	6.8
UK	1.0	0.0	0.0	0.2	1.3
US	0.1	0.4	0.0	0.0	0.5
Total	**1844.2**	**446.3**	**242.7**	**522.9**	**3 056.1**

Source: DG CNECT.

Table A2. DIGITAL investment MS/Privately funded per category and country (EUR millions)

Country	Public Investment	Private investment/subsidies	Digital skills for workers	Technical Assistance	Total
AL	0.1	0.0	0.0	0.5	0.7
AT	37.3	18.9	8.3	2.0	66.5
BA	0.0	0.0	0.0	0.4	0.4
BE	68.1	13.6	9.4	271.8	362.9
BF	0.0	0.1	0.0	0.0	0.1
BG	12.1	10.1	1.9	0.9	25.0
CY	16.8	2.5	3.4	6.8	29.6
CZ	28.6	7.5	3.0	4.3	43.4
DE	272.5	70.5	22.6	16.0	381.6
DK	31.4	4.0	8.4	1.3	45.0
EE	7.4	3.0	2.7	1.5	14.6
EL	42.2	10.4	11.0	2.7	66.4
ES	65.9	20.3	11.9	13.1	111.2
FI	35.5	6.4	7.2	3.8	52.9
FR	114.0	56.0	18.0	5.4	193.3
GH	0.0	0.1	0.0	0.0	0.1
HR	9.9	5.7	2.4	4.3	22.3

HU	14.9	5.5	1.7	1.3	23.4
IE	19.8	3.6	13.2	3.1	39.6
IL	0.0	0.4	0.0	0.0	0.4
IS	6.1	2.1	0.6	0.0	8.8
IT	66.8	51.2	19.9	2.9	140.8
KE	0.0	0.0	0.5	0.0	0.5
LI	1.8	0.0	0.0	0.0	1.8
LT	8.3	7.7	4.5	1.3	21.8
LU	20.8	0.0	0.4	15.1	36.3
LV	8.5	2.9	2.3	1.4	15.1
ME	0.0	0.0	0.0	0.4	0.4
MK	0.2	0.5	0.0	1.1	1.9
MT	6.6	2.6	0.0	1.8	11.1
MY	0.0	0.0	0.0	0.1	0.1
NL	58.7	32.3	4.6	17.5	113.1
NO	11.5	6.5	3.3	1.3	22.6
PL	25.5	27.2	1.9	2.0	56.6
PT	24.8	8.4	9.5	1.6	44.3
RO	20.2	12.6	3.3	2.2	38.2
RS	0.0	0.0	0.0	2.1	2.1
SE	35.9	9.7	2.9	8.6	57.1
SI	7.6	5.0	0.6	1.2	14.4
SK	19.8	6.0	0.4	3.5	29.7
TR	0.0	0.0	0.8	0.8	1.6
UA	3.5	0.5	1.1	2.0	7.1
UK	0.2	0.0	0.0	0.0	0.2
US	0.1	0.4	0.0	0.0	0.5
Total	1103.4	414.2	181.7	406.1	2105.5

Source: DG CNECT

ANNEX XIII. CASE STUDY REPORT

Introduction

This report presents three case studies from the *Interim Evaluation of the Digital Europe programme (from now on Digital Europe)*. These case studies provide in-depth, qualitative insights into how specific activities under Digital Europe contribute to achieving its objectives. The report highlights the effectiveness, coherence, and added value of programme at the EU level.

The report is structured into three key sections:

- **Case Study 1**: *Support of digitalisation in SMEs and public administrations*
- **Case Study 2**: *Technology Infrastructures as drivers of technological deployment and innovation*
- **Case Study 3**: *Synergies*

Case Studies 1 and 2 employ impact pathways to trace the links between programme activities and outcomes, offering a clear view of their contributions. Each case study includes detailed descriptions of the methodologies and sources used.

Case Study 1: Support of digitalisation in SMEs and public administrations

Description

This case study explores the initiatives undertaken by the Digital Europe programme (from now on Digital Europe) to support digitalisation in SMEs and public administrations. The case study highlights the actions of the **European Digital Innovation Hubs, EU data spaces**, and the **Deployment of public services** using selected projects**: EDIH AIRE, Data spaces for manufacturing and the health data infrastructures and EU Digital Identity Wallet Large Scale Pilots**. The case study assesses the effectiveness and EU-added value of these actions in relation to the digital transformation of SMEs and public administrations, using the selected projects as examples. The case study is based on desk research, interviews with beneficiaries and surveys with end users.

Table presents an overview of specific objectives, actions, and projects the case study cover and the key data sources.

Table 1. Support of digitalisation of SMEs and public administrations

Support of digitalisation of SMEs and public administrations			
Specific objectives	**Action**	▪ **Project**	**Key Data Sources**
European Digital Innovation Hubs	European Digital Innovation Hubs	EDIH AIRE	Desk research and survey with EDIH end users
SO2	EU Data Spaces	Data spaces for manufacturing and the health data infrastructures	Desk research
S05	Deployment of public services	EU Digital Identity Wallet Large Scale Pilots	Desk research, interviews with Digital Europe beneficiaries

Source: Technopolis Group, 2024

The digitalisation of SMEs and public administrations in Europe

The digital transformation of SMEs and public administrations is key to enhancing the EU's economic competitiveness, increasing technological independence, improving public service, and infrastructure development. There is **a slow and uneven progression of digitalisation among SMEs with** only 20% of SMEs being highly digitised (compared to 58% of large enterprises).[309] The goal of the EU is to have more than 90% of Small and Medium Enterprises (SMEs) reach at least a basic level of digital intensity by 2030 and 75% of companies using Cloud, AI or Big Data by 2030.[310]

SMEs face several challenges when it comes to digitalisation, with common obstacles relating to insufficient digitally skilled workers, finance and access to digital technologies. **Finance is a challenge** as SMEs may face difficulties in accessing finance for intangible digital investments that cannot be used as collateral to secure loans. 24% of small EU non-digital firms mention a lack of available finance as a major obstacle.[311] **Another important challenge to SMEs is access to digital technologies and technical infrastructure that enable digital transformation.** SMEs may not have the resources to invest in the infrastructure required for the use of the advanced technologies such as big data processing and AI. 15% of EU small firms report that securing access to infrastructure is an obstacle.[312]

Similarly, there is a **slow and uneven uptake of digital solutions in the public sector. Less than half of cross-border services are available online.**[313] The EU has set **three key targets** to improve the digitalisation of public services by 2030. The targets are making **100% of key public services digitally accessible**, **enabling 100% of citizens to have access to medical records** and **100% of citizens to have access to digital identity solutions.**[314] The EU's strategy for the digital transformation of public services is centred on enhancing accessibility, efficiency, and user-centricity and aims to promote interoperability among Member States, fostering seamless cross-border interactions. **For public administrations, a major challenge for digital transformation is interoperability,** which is required to ensure the seamless functioning of public services across territorial, sectoral, and organisational boundaries, while preserving the sovereignty of administrations at all government levels. In particular, the promotion of **cross-border and interoperable public services, (the EU Digital Identity**

[309] See https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=SWD%3A2018%3A305%3AFIN
[310] See https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/europe-fit-digital-age/europes-digital-decade-digital-targets-2030_en
[311] See https://www.eib.org/attachments/publications/economic_investment_report_2021_chapter05_en.pdf
[312] See https://www.eib.org/attachments/publications/economic_investment_report_2021_chapter05_en.pdf
[313] See https://www.capgemini.com/gb-en/news/press-releases/20th-edition-of-the-egovernment-benchmark-report-less-than-half-of-cross-border-services-available-online-due-to-language-and-electronic-identification-challenges/
[314] See https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/europe-fit-digital-age/europes-digital-decade-digital-targets-2030_en

Wallets, the Once Only Principle, blockchain), inclusiveness and accessibility. For example, digital identification systems offered by governments in the EU are not available to the whole population; they are often limited to online public services and do not allow for seamless access cross-border. Only 14% of key public service providers across all Member States allow cross-border authentication with an e-Identity system.[315]

Activities

EU actions for SMEs and Public administrations

Digital Europe offers support for SMEs and public administrations to uptake new technologies. It aims to boost the digital transformation through strategic initiatives to build capacity in skills, data infrastructure and technologies, and innovation support through various actions including **EDIHs, EU Data Spaces, and the deployment of public services.** These actions are briefly explained below.

- **EDIHs[316]** provide companies with access to technical expertise and testing and innovation services such as financing advice, training, and skills development needed to improve business/production processes, products, or services using digital technologies. EDIHs play a central role in the Digital Europe to stimulate the broad uptake of artificial intelligence, high performance computing (HPC) and cybersecurity as well as other digital technologies by industry (in particular SMEs and midcaps) and public sector organisations in Europe. There are 227 European Digital Innovation Hubs, of which 151 are funded through the Digital Europe. In addition, 18 new EDIHs offering a wide range of specialised digital transformation services joined in late 2024 the EDIH network from the associated countries Albania, Montenegro, North Macedonia, Serbia, Türkiye, Ukraine and Kosovo. As the EDIH catalogue shows there are currently 69 EU funded hubs with a focus on public administrations, and 83 hubs with a focus on industry. This case study covers the example of the AI and Robotics Estonia (AIRE) EDIH.[317]

> The AIRE EDIH aims to increase the competitiveness of Estonian enterprises by providing a range of services to businesses in the field of AI and robotics. AIRE EDIH offers services such as testing of new technology or software, digital maturity assessments, and AI and robotics trainings.

- **European Data spaces** aim to facilitate data pooling and sharing across Europe in a trustworthy and secure manner, eliminating existing technical barriers. The data spaces will enable EU businesses and public administrations to control their data and unlock data-driven innovation. Digital Europe aims to develop 14 EU data spaces in strategic

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[315] See https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/europe-fit-digital-age/european-digital-identity_en#:~:text=Benefits%20of%20the%20EU%20Digital%20Identity&text=identify%20online%20and%20offline,provided%20by%20trusted%20private%20sources

[316] See https://european-digital-innovation-hubs.ec.europa.eu/edih-catalogue https://www.industriaconectada40.gob.es/Documents/Digital_Innovation_Hubs_in_Digital_Europe_programme.pdf

[317] See https://european-digital-innovation-hubs.ec.europa.eu/knowledge-hub/success-stories/ai-algorithms-and-sensor-integration-robotic-vessels#solutions

economic sectors such as health, agriculture, energy, transport and environment [318]. The European Data Spaces is an action under Specific Objective 2 which is directly managed by the Commission through grants and procurement and supported in some areas by the European Health and Digital Executive Agency (HaDEA). This case study covers the example of the UNDERPIN Data Space for manufacturing[319] and the projects contributing to the European Health Data Space (EHDS).[320]

UNDERPIN Data Space for Manufacturing promotes cross-organisational data sharing while prioritising data sovereignty. The European Health Data Space (EHDS) is a structured environment where health-related data, including both open data and restricted data, can be securely stored, accessed and shared among authorised stakeholders.

- **Deployment of public services** supports the digitalisation of government and public administrations, piloting of AI applications in the law enforcement domain, as well as the digital transformation of justice, health and consumer protection. Work is ongoing to support interoperability of digital public services within the EU including the deployment of the European Digital Identity framework. The deployment of public administration is linked to SO5 which is directly managed by the Commission through grants and procurement and supported by HaDEA. This case study covers the example of 4 large scale pilots being delivered under the EU Digital Identity Wallet.

The EU Digital Identity Wallet is a convenient and secure method for European citizens and businesses to authenticate their identity, using their digital ID for both public and private sector interactions. Four large scale pilots have been launched to test the EU Digital Identity wallet in different use-case scenarios.

Impact pathway

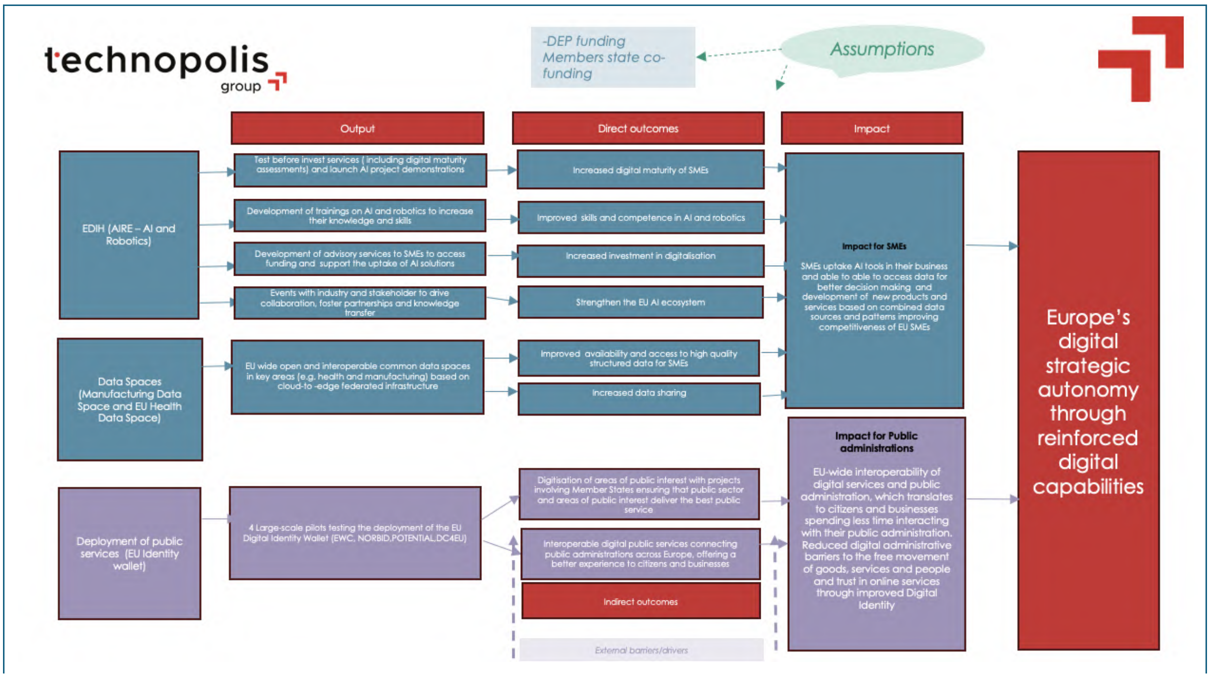
This case study presents specific impact pathways for the digital transformation of SMEs and public administrations based on the actions funded under Digital Europe. The impact pathway serves as the foundational intervention logic, guiding the analysis and in this case, shows the contribution of each of the actions covered in this case study. Figure 6 gives a visual representation of the impact pathway.

Figure 6 Impact pathway for the digital transformation of SMEs and public administrations under Digital Europe

[318] Agriculture, cultural heritage, energy, finance, green deal, health, language, manufacturing, media, mobility, public administration, research and innovation, skills and tourism

[319] See https://underpinproject.eu/#:~:text=Data%20Space%20for%20Manufacturing%20Excellence,innovation%20in%20products%20and%20services.

[320] See https://health.ec.europa.eu/ehealth-digital-health-and-care/european-health-data-space-regulation-ehds_en



Source: Technopolis Group, 2025

In summary, two impact pathways exist for the digital transformation of SMEs and public administrations under Digital Europe: the digital transformation of SMEs and the second is for the digital transformation of public administrations.

In summary, for the digital transformation of SMEs, EDIHs provide SMEs with access to AI infrastructure, skills and finance to uptake of AI technologies in developing products and improving business processes. EDIHs will also provide a platform for engagement and collaboration between SMEs and industry players in the EU that is required for ecosystem development. Data spaces are structured environments designed to enable the efficient, secure and sovereign data exchange and interoperability among diverse stakeholders. They provide data, the infrastructure and governance frameworks required to enable SMEs share and access high quality data for better decision-making and the development of innovative products and services. Ultimately, the intention is that the combination of the services provided by the EDIHs, and the data spaces will improve the ability of SMEs to uptake technologies such as AI and improve their digital capabilities. This will result in strengthening the EU's competitiveness and its digital strategic autonomy through reinforced digital capabilities.

For the digital transformation of public administrations, the four large pilots will test the implementation of the EU Digital Identity Wallet in payments, travel, accessing digital credentials and public services. The successful pilot deployment will enable interoperability of public administrations and ensure smooth cross-border identity authentication for citizens, resulting in improved digital identity, which will reduce administrative barriers and easy access to online services. Still in the area of the public sector' digital transformation, the interoperability chapter of Digital Europe supports the development of interoperability enablers (e.g. solutions, specifications, Interoperable Europe solutions), including innovative solutions, skills and capacity building activities for public administrations, alongside a structured interoperability governance at Union level, thus paving the way towards a reinforced public sector interoperability in the EU[321] and seamless digital public services for the benefit of both

[321] As outlined in Letta's report, full interoperability could boost EU GDP by 0.4% and would increase the number of citizens using online public services by 15%. It would also help businesses to save up to EUR 568 billion.

citizens and businesses. This digital transformation of public administrations will result in strengthening the EU's competitiveness and its digital strategic autonomy through reinforced digital capabilities.

The main assumptions that have to be fulfilled to arrive at the intended impact of digital transformation for SMEs and public administrations are presented in Table. The table also presents external, barriers and drives to the intended outcomes and impact for SMEs and public administrations.

Table 2. Main Assumptions, barriers and drivers

Action	Main Assumptions	External barriers	Drivers
EDIH	• SMEs require regional support to develop more competitive business/production processes, products, or services using digital technologies • Services such as test before investing activities, training, and access to finance are essential for SME digitalisation • AI Infrastructure, access to finance and a digitally skilled work force are important factors for SME digital transformation of SMEs • SMEs are willing to invest in the use of AI technologies and tools • SMEs are willing to invest in the upskilling of staff	• The complex AI regulatory landscape can create compliance issues with varying standards and regulations in Member States and sector specific regulations • Limited resources available to EDIHs may hinder their capacity to support of SMEs especially in regions with fewer financial resources. • EDIHs may lack infrastructure required for the uptake of AI technologies such as high-speed internet and data	• EDHIs stimulate the uptake of AI technologies as a one-stop-shop for technology services • EDIH services are provided at no cost to SMEs • EDIHs combine the benefits of a regional presence with the opportunities available to a pan-European network, providing easy access for SMEs to get support to help them adopt digital technologies
European Data spaces	• Increased data accessibility and sharing will drive innovation and competitiveness for SMEs • The data spaces will provide SMEs with access to high quality data assets for developing innovative services and products • SMEs will be able to participate in data spaces and benefit from the data value chains • Data spaces will provide a secure and trustworthy environment for data exchange, addressing privacy and security concerns • Data spaces will provide a secure and trustworthy environment for data exchange, addressing privacy and security concerns • SMEs have the data literacy and skills required to understand the value of data	• Inconsistencies in data protection laws and regulations across Member States can create obstacles for cross-border data sharing. • Complex regulatory landscape and lack of harmonisation across the EU may create obstacles for SME participation • SMEs may face difficulties in accessing and sharing data due to technical and legal barriers • Data confidentiality in healthcare requires advanced methods and complex frameworks enabling data sharing • Ensuring seamless data exchange across different systems and countries may be a hurdle • Low-quality data can lead to Inaccurate analytics, and poor decision-making	• Data spaces in strategic sectors aimed at serving the EU without restrictions to participation • Common standards for interoperability and automation • Data spaces support centre supports SMEs that want to create sovereign data spaces

Action	Main Assumptions	External barriers	Drivers
	and how it can be used in their businesses		
Deployment of public services (EU Digital Identity Wallet)	• Digital identity authentication will support the digital transformation of public administrations and improve public services • Interoperable infrastructure will facilitate cost-effective and implementable interoperability across the EU • Open-source solutions are beneficial, and Member Stated will use the open-source solutions • Large scale pilots are effective for testing the EU Digital Identity Wallet functionality • Cross-sector and cross-border collaboration will lead to comprehensive testing • EU citizens have the digital skills required to navigate the EU Digital Identity Wallet	• Ensuring interoperability across different national systems and existing infrastructure is a challenge for cross-border services • EU citizens may not adopt the EU Digital Identity Wallet due to privacy and security concerns and usability issues • Incompatibility with existing regulations across different EU member states could hinder implementation • Some EU Members states may lack the technological infrastructure to support the EU Digital Identity wallet	• The consortiums leading the large-scale pilots have expertise in digital identity solutions deployment • The EU Digital Identity Wallet is being tested in real world scenarios

Source: Technopolis Group, 2025

Effectiveness

This section provides an overview of selected projects and initiatives related to digital transformation that have been implemented to date, highlighting their potential to contribute to the anticipated direct outcomes and wider impacts of Digital Europe. It is important to note that most of the actions under Digital Europe are being implemented and first outputs are still being achieved. The Staff Working Document on Common European Data Spaces reports that the data spaces are in different stages of development. Similarly, for the action on Deployment of public services, pilot projects are being implemented for EU Digital Identity Wallet.[322] The EDIHs are still in varying stages of being set up. However, some of them have begun to deliver services to SMEs. Considering this, the effects of the actions towards the digital transformation of SMEs and public administrations highlighted in this case study are currently limited.

SMEs across the EU have access to EDIHs and support for the uptake of AI technologies

The AI & Robotics Estonia (AIRE) EDIH was established in 2022 and is dedicated to enhancing innovation in AI and robotics. The mission of AIRE is to support the digitalisation, automation and competitiveness of Estonian manufacturing companies through the adaptation of AI & robotics-based solutions. AIRE's goal is to foster digital transformation across the EU, aiming to boost digital literacy and create new value chains within Europe, while supporting SMEs' technological and economic readiness for AI investments. AIRE is run by a consortium led by the Tallinn University of Technology, and its partners are the University of Tartu, the Estonian University of Life Sciences, Tehnopol Science and Business Park, Tartu Science Park,

[322] See https://digital-strategy.ec.europa.eu/en/library/second-staff-working-document-data-spaces

and the competence centre IMECC. The hub is supported by other key stakeholders as associate partners. AIRE is co-funded by the European Commission through Digital Europe and the Estonian State through the Ministry of Economic Affairs and Communications.

The AIRE EDIH supports the European mission of advancing digital transformation across the EU by bringing cutting-edge tech (AI, Cloud, Big Data) to European companies and ensuring that companies have a basic level of digital know-how. Table below provides an overview of the services AIRE provides to SMEs.

Table 3. Overview of AIRE services

AIRE Services	Description of services
Digital maturity assessments	AIRE offers digital maturity assessments to help companies evaluate their ability to implement new technologies, evaluate process productivity and organisational capacity
AI suitability assessments	AIRE offers AI consulting services to assess a company's ability to implement artificial intelligence (AI)solutions.
Robotics suitability assessment	A central analysis of a company's processes to assess the feasibility of robotization.
Trainings and courses	AIRE partners with universities (the University of Tartu, Tallinn University of Technology, the Estonian University of Life Sciences, and the IMECC Development Centre) to offer trainings to industrial enterprises. The trainings and courses are aimed at expanding knowledge and skills in AI and robotics.
Demonstration projects	Demonstration projects enable companies to test, experiment or validate AI and robotics technologies before investing. These demonstration projects are targeted at SMEs with up to 250 employees and a turnover of 50m euros.
AIRE pre-accelerator	The pre-accelerator provides companies with mentorship and training to enable them launch of a new product or service based on the technological solution tested in the demo project. The pre-accelerator also provides support for entering foreign markets through direct contacts and knowledge-building.
Financial sources of funding – Public measures	Financial advisory services to help industrial companies secure additional funding through public measures
Financial sources of funding – Private capital	A market-based consulting service to help companies access capital through private equity investment
AIRE club	A series of events for those interested in the field of robotics and AI to share experiences, communicate and network
International partnerships	AIRE promotes collaboration opportunities between industrial companies, researchers, IT and electronics companies, and innovation project funders

Source: AIRE EDIH website, 2024

Based on the evidence available to the evaluation team, the AIRE EDIH has been able to support SMEs in Estonia in their digital transformation journey through its digital maturity assessments, test-before-invest services, demonstration projects and training.

The AIRE EDIH initiates test-before-invest demonstration projects with manufacturing companies to enable companies to test AI technologies before investing in them. The demonstration projects run from 6-9 months and are implemented in collaboration with enterprise and R&D institutions. The enterprise brings forward problem to be solved or an idea to be implemented, and the AIRE Development Team offer a solution and implements it. The demonstration projects also support knowledge transfer from universities to companies. The AIRE EDIH Development Team is comprised of researchers from AIRE partner R&D institutions (the University of Tartu, Tallinn University of Technology, the Estonian University of Life Sciences, and the IMECC Development Centre). The AIRE Development Team provides extensive support for selected demonstration projects, which justifiably leverage AI and AI-enabling technologies. The technical solution used in the demonstration project is either an AI prerequisite[323] or AI technology[324]. Ideas eligible for the demonstration projects include

[323] AI prerequisite technologies - context-aware technologies that create or process data automatically. There is a degree of uncertainty - the technical solution will emerge as the work progresses.

[324] AI technologies - technologies which apply generally accepted AI algorithms and methods

testing and validating automatic guided vehicles in a complex warehouse setup, AI-based prediction models, collaborative robots with some never-before-tested application, AI-based employee training, algorithmic or decision tree-based approaches to customer support and novel computer vision solutions.

The outcome and impact of each AIRE demonstration project is outside the scope of this evaluation. However, it is expected that the technical solutions developed should lead to positive business impacts such as increased sales and efficiency and the results from the demonstration projects conducted by AIRE can be reused by other companies in any sector. So far, AIRE has launched and conducted 30 tests before invest demonstration projects with SMEs.[325] These projects include the testing of audio-based and user experience-driven content based on artificial intelligence technology for the time-critical support of children's mental health and testing of efficient AI models for cost reduction of drone navigation modules.

Furthermore, AIRE holds monthly events known as 'Clubs' which are aimed at creating an environment for those interested in the field of robotics and AI to share experiences, communicate and network with each other.[326] The AIRE club events also serve as a platform to connect with other EDIHs.[327] Over 1000 participants have taken part in the Clubs about AI and robotics use-cases and best practices.[328]

AIRE offers two trainings, which vary in terms of content and duration are tailored to industry needs. First is an intensive course that provides in-depth learning and practical development of skills in AI and robotics. Second are webinars that enable participants listen to expert lectures, ask questions, and share experiences with other attendees. Around 600 people have participated in AIRE trainings. In future, AIRE plans to offer Massive Open Online Courses (MOOCs) that will provide a deeper understanding of AI and robotics principles, applications, and practical skills.

Based on the review of the completed demonstration projects which aimed at testing and validating the use of AI techniques such as machine learning and neural networks to help businesses in areas such increasing efficiency and safety in production processes[329] and ensuring quality control[330], AIRE has been able to make some progress in enabling SMEs in Estonia to leverage AI. This is in line with the experience of users of the EDHIs. Respondents to the EDIH end-user survey highlighted that the use of EDIH services had a high impact on the innovation, productivity and growth of their company (35% n = 249) and 22% stated EDIHs has a medium impact. Additionally, 80% of end-users responded that EDIHs were effective in addressing their needs.

In the next section, the collaboration between AIRE and Mindchip OÜ as an exemplar of the impact of this EDIH is presented

[325]See https://aire-edih.eu/2023/wp-content/uploads/2024/03/aire-visioon.pdf
[326] See https://aire-edih.eu/2023/wp-content/uploads/2024/03/aire-visioon.pdf
[327] See https://aire-edih.eu/en/at-start-up-day-aire-hosted-european-partners-and-shared-inspiring-artificial-intelligence-case-studies/
[328] See https://aire-edih.eu/en/at-start-up-day-aire-hosted-european-partners-and-shared-inspiring-artificial-intelligence-case-studies/
[329] See https://aire-edih.eu/en/project/2024-testing-of-machine-vision-based-workpiece-misplacement-detection-and-quality-check-of-a-collaborative-robot/
[330] See https://aire-edih.eu/en/project/2024-validation-of-a-multi-purpose-quality-control-system-operated-by-artificial-intelligence-for-food-industry-production-lines-at-noo-lihatoostus/

AIRE EDIH collaborates with Mindchip OÜ to develop an AI vision system for autonomous navigation

Mindchip OÜ is an Estonian technology company that specialises in the design and development of autonomous navigation technology for the marine industry. The main challenge Mindchip OÜ faced was integrating an AI system to allow reliable identification of other ships and buoys and ensure safer navigation. The AIRE EDIH worked with Mindchip OÜ to develop an AI model trained on high-resolution imagery captured by four strategically positioned cameras, seamlessly integrated into the robust Robot Operating System (ROS).

AIRE EDIH provided Mindchip OÜ with access to technical expertise and its test-before-invest service which enabled the company to resolve its challenges and advance their product. As a result of working with AIRE, Mindchip OÜ were able to develop an AI-based machine vision system that enhanced the company's capabilities in autonomous navigation.

Mindchip OÜ is an Estonian technology company that specializes in the design and development of autonomous navigation technology for the marine industry. The company makes the maritime industry cost-effective by developing autonomous self-adaptive captains that adjusts to different sea vessels. The main challenge Mindchip OÜ faced was developing and integrating its AI-based machine vision system for autonomous ships to allow reliable identification of other ships and buoys and ensure safer navigation. To solve this challenge, AIRE EDIH provided Mindchip OÜ with access to technical expertise and the test-before-invest service which enabled the company to resolve its challenges and advance their product. The AIRE EDIH worked with Mindchip OÜ on two test-to-invest demonstration projects to develop an AI model trained on high-resolution imagery captured by four strategically positioned cameras, seamlessly integrated into the robust Robot Operating System (ROS). A tailored data set was developed to enhance buoy detection accuracy and enabled the AI system to meet the safety standards required for autonomous ship navigation. The system's validation was tested at sea and able to reliably detect small boats from 100 to 150 metres away and larger vessels from farther distances. As a result of working with the AIRE EDIH, Mindchip OÜ was able to develop an AI-based machine vision system with enhanced its AI detection capabilities and the operational efficiency of its autonomous ships. The potential benefits of the project for Mindchip OÜ include a cost-effective autonomous navigation system that reduces operation expenses and enhances maritime safety and efficiency through the AU-based vision system which reduces the likelihood of accidents.[331]

In terms of wider benefits, the ROS used in the project has potential applications beyond maritime including land-based robotics and smart city infrastructure, underscoring the potential of the project to drive innovation across domains.[332] In terms of digital transformation, the AIRE EDIH reports that as a result of this project, Mindchip OÜ has evolved in 3 categories: Green Digitalisation (up 30%), Digital Strategy and Investments (up 23%), Human-Centric Digitalisation (up 13%).[333] Furthermore, the MindChip team noted that the AIRE EDIH has

[331] See https://european-digital-innovation-hubs.ec.europa.eu/knowledge-hub/success-stories/ai-algorithms-and-sensor-integration-robotic-vessels#solutions

[332] See https://european-digital-innovation-hubs.ec.europa.eu/knowledge-hub/success-stories/ai-algorithms-and-sensor-integration-robotic-vessels#solutions

[333] See https://european-digital-innovation-hubs.ec.europa.eu/knowledge-hub/success-stories/ai-algorithms-and-sensor-integration-robotic-vessels#solutions

been helpful in supporting them to source funds through its public funding service and introducing them to other EDHIS for collaborations.[334]

SMEs leverage data spaces for better decision-making and product development

The UNDERPIN Data Space for manufacturing project aims to develop and deploy a data space in critical manufacturing sectors for dynamic asset management as well as predictive and prescriptive maintenance. The project is being delivered by a consortium of 11 organisations[335] from 5 EU countries and is expected to run from December 2023 to November 2025.

UNDERPIN Data Space for Manufacturing project aims to develop and deploy a data space in critical manufacturing sectors for dynamic asset management as well as predictive and prescriptive maintenance. The project is piloting two use cases in the oil refinery and wind farm domain. Upon the completion, the UNDERPIN Data Space for Manufacturing project is expected to produce cross-organisational and cross-use-case data sharing and exchanging solution that ensures data sovereignty for SMEs and large industry players to improve products and services.

The UNDERPIN project is currently implementing use cases for the data spaces through two real world demonstrators in the oil refinery and wind farm domains.[336] The refinery demonstration aims to improve maintenance processes and decision-making to determine the best time for preventive maintenance scheduling. Thereby minimising downtime and effects on production capabilities. The wind farm demonstration aims to implement a robust predictive maintenance system for wind turbines by developing an advanced Machine Learning model capable of predicting equipment failures and identifying abnormal behaviour trends.[337] These two use cases are expected to validate the benefits of industrial data sharing especially in the area of enhancing operations for SMEs in these sectors. After the demonstrations, the next steps include demonstrating the ability to scale up the UNDERPIN Data Space during production phase, creating a pilot for the first digital product passports (DPPs) and planning the deployment of DPPs for new stakeholders. The consortium is also expected to develop the legal framework for the UNDERPIN data space, a feasible and sustainable business model for the UNDERPIN Data Space and develop actions for commercializing the dataspace service.[338] UNDERPIN Data Space is expected to provide a cross-organisational and cross-use-case data sharing and exchanging solution that ensures data sovereignty, with a strong focus on the interplay of SMEs and large industry players to improve products and services. The benefits of the manufacturing data space for SMEs include optimised operations, enabling industries to leverage data spaces to gain insights into their operations, predict maintenance need and optimize processes. This proactive approach could reduce downtime, cut costs and improve overall efficiency.

SMEs leverage health data for research and development of AI solutions for personalised health treatments

[334] See https://european-digital-innovation-hubs.ec.europa.eu/knowledge-hub/success-stories/ai-algorithms-and-sensor-integration-robotic-vessels#solutions

[335] Motor Oil, Athena, Innov-acts, More energy, Water Meaon Blue Innovation, Tikopro, Semantic Web Company, Ontotext, Austrian Institute of Technology, SPACE and Harokopio University

[336] See https://underpinproject.eu/use-cases/

[337] See https://underpinproject.eu/use-cases/

[338] See https://underpinproject.eu/work-packages/

The European Health Data Space (EHDS) will promote digital transformation and widen the use of health data by making it easier to exchange and access health data at the EU level. The EHDS aims to create a federated, EU-wide data infrastructure for health-related data and address key challenges facing healthcare systems in Europe resulting from lack of access to health data. Digital Europe supports specific aspects of the EHDS through the Genomic Data Infrastructure (GDI) and European Federation for Cancer Images (EUCAIM).

Table gives an overview of the projects.

Table 4. Overview of health data related projects

Digital Europe Action	Project	Objective	Consortium
Federated European infrastructure for genomics data	Genomic Data Infrastructure (GDI)	To enable access to genomic and related phenotypic and clinical data across Europe by establishing a federated, sustainable and secure infrastructure to access the data.	70 project partners across 24 countries and two international organisations
Federated European infrastructure for cancer images data	European Federation for Cancer Images (EUCAIM)	To build a pan-European digital federated infrastructure of FAIR, de-identified, cancer imaging data from daily clinical practice (real world data) that will be used to develop, validate and benchmark AI tools towards precision medicine	79 organisations from 14 countries

Source: Digital Europe programme Work Programme (2021/2022 and 2023/2024), GDI and EUCAIM websites, 2024

The GDI project aims to enable secure cross-border access to genomic and related clinical data to improve research, policymaking and healthcare across Europe in at least 15 countries by the end of 2026. The GDI project began in 2022 and is expected to be completed in 2026. So far, the GDI project has delivered a GDI Starter Kit,[339] which gives countries the technical capability to access more than 2,500 synthetic genomics and phenotypic data sets (including cancer, rare diseases and population genomics) across-borders, and several demonstrators of specific use cases. It is expected that insights from the data will support improved clinical diagnostics, treatments and predictive medicine for European citizens. The project is also expected to lead to better public health measures for citizens, benefit healthcare systems and the economy and create opportunities for personalised medicine, notably through synergies with and infrastructural support for the Genome of Europe project under the Work Programme 2023-2024 of DIGITAL, which was launched in October 2024 and will establish a European reference genome.[340]

The EUCAIM project aims to deploy a pan-European digital federated infrastructure which will facilitate access to cancer images data and related patient data and provide a trusted framework for researchers, innovators and clinicians to develop and benchmark trustworthy AI tools based on imaging data. In terms of outputs, the first version of the Cancer Image Europe Platform launched in September 2023 and featured public catalogue of 46 datasets containing

[339] See https://github.com/GenomicDataInfrastructure

[340] See https://digital-strategy.ec.europa.eu/en/news/genome-europe-project-launched-first-step-towards-european-reference-genome

over 200,000 images covering 9 cancer types (breast, colon, lung, prostate, rectum, liver, glioma, neuroblastoma and glioblastoma).[341] The project's goal is to have at least 30 distributed data providers from 15 countries, more than 100,000 cases and 60 million images available, and at least 50 AI algorithms and prediction models for cancer care by 2026. A first version of the rules for data providers and users and the operational procedures for the Cancer Image Europe platform have been also published on the EUCAIM project website. The EUCAIM project began in 2023 and is expected to be completed in 2026.

The GDI and EUCAIM projects are still in their development phases and delivering early outputs. One EU level stakeholder, mentioned that EUCAIM is enabling the translation from research to deployment with the establishment of state-of-the-art digital infrastructure in cancer imaging leveraging the use of data and AI. Overall, it is expected that the successful implementation of the GDI and EUCAIM projects will help transform healthcare delivery and healthcare research in the EU by providing SMEs with access to large scale data that can be used to develop and test innovative AI tools and solutions in areas such as cancer treatment and diagnosis. In addition, the projects are expected to make it easier for SMEs to access secondary data for research aimed at driving healthcare innovation forward.

In order to create safe and efficient ways to develop and use artificial intelligence as medical devices, the SHAIPED project maps the regulatory landscape for AI medical devices. It also builds practical regulatory sandboxes and methodologies for Health Data Access Bodies (HDABs), developers, authorities and data holders to facilitate the integration and deployment of AI medical devices in clinical settings and healthcare infrastructures. The expected outcomes are operational pathways and guidance for conformity assessment of AI medical devices in alignment with the European health data spaces, AI Act and regulatory standards, feeding into COMPASS-AI[342] and the Medical Device Coordination Group's working groups[343].

Cross-border digital identification through the EU Digital Identity Wallet

The EU Digital Identity Wallet initiative aims to provide European citizens with a secure and interoperable digital identity solution. In 2023, four large-scale pilots (LSP) pilots were launched to evaluate the EU Digital Identity Wallet implementation in travel, payment and education and social security prior to its official introduction to Member States. The LSPs are the EU Digital Identity Wallet Consortium (EWC), POTENTIAL, NOBID and DC4EU. Each pilot is structured as a consortium that merges expertise from both the public and private sectors within the EU, with co-funding provided by grants from the European Commission. Table gives an overview of the LSPs.

Table 5.. Overview of LSPs for the EU Digital Identity Wallet

Large scale pilot	Objective	Consortium
EU Digital Identity Wallet Consortium (EWC)	The European Digital Wallet Consortium aims to leverage benefits of digital identity for travel across the EU	27 EU member states and 76 partners and associated partners

[341] See https://digital-strategy.ec.europa.eu/en/news/europes-beating-cancer-plan-first-prototype-cancer-image-europe-platform-goes-live
[342] Commission launches flagship initiative to increase use of AI in healthcare | Shaping Europe's digital future
[343] Medical Device Coordination Group Working Groups - Public Health

Large scale pilot	Objective	Consortium
POTENTIAL	To foster innovation, collaboration and growth in six digital identity sectors: governmental services, banking, telecommunications, mobile driving licenses, electronic signatures, and health	19 EU member states and 140 public and private partners
NOBID	NOBID pilots the use of the EU Digital Identity Wallet for payments of products and services	6 countries (Denmark, Germany, Iceland, Italy, Latvia and Norway)
DC4EU	Digital Credentials for Europe provides support to public and private sectors in education and social security	22 EU member states, 43 public organisations and 49 private entities

The 4 LSPs are currently in various stages and are assessing the usability of the EUID. EWC is piloting travel use cases to demonstrate how eIDAS will transform the safety, security and convenience of eCommerce. The EWC will create two common building blocks that will support the travel use case in payments and organisational digital identity. The EWC consortium has been able to build and design three travel scenarios into the technical specifications; using the EU Digital Identity Wallet for the automation of the collection of Advanced Passenger Information (APIS) during airline check-in, register for workshops and booking of tickets and for online verification when buying tickets. In addition, two payment scenarios were developed for the use of the EUDI wallet for age verification during online shopping and QR code vending machine age verification when buying products of age[344].

NOBID focuses on digital payments, one of the top priority use cases in the EU Digital Identity Wallet. Its objective is to test the authorisation of payments by wallet holders, as well as examine the issuance of wallets and financial institutions' provision of payment. The NOBID consortium has been able to identify Qualified Electronic Attestations of Attributes (QEAAs)[345] to be tested and is currently planning tests that will demonstrate the ability to issue and revoke QEAAs of national and international interest. This involves ensuring that these attributes are interoperable across-borders and can be used effectively within the European Digital Identity Wallet.[346] QEAAs are required in the EU Digital Identity Wallet to ensure secure, standardised and legally recognised digital attestations. The **DC4EU** project focuses on the development and implementation of four use cases of the EU Digital Identity Wallet for educational credentials, professional qualifications, Portable Documents and the European Health Insurance Card (EHIC) in the fields of Education and Social Security.[347] According to the project timeline, the DC4EU consortium is currently launching LSCs scenarios, which will be followed by a user journey roll out in 2025[348]. **POTENTIAL** seeks to test use cases for the EU Digital Identity Wallet particularly in access to digital public services, opening a bank account online, creating a telephone line using SIM cards, paperless driving licenses, electronic signatures, and digital medical prescriptions. This will allow citizens to quickly and securely prove their identity as part of their online citizenship procedures**.** The POTENTIAL consortium is now working on the national implementations of the EU Digital Identity Wallet across Member States and at the beginning of next year will initiate a proof of concept to demonstrate the feasibility and efficiency of the wallet ecosystem on a broader scale.[349] It challenging to

[344] See https://eudiwalletconsortium.org/wp-content/uploads/2024/11/EWC-P1-Overview-Citizen-feedback-and-end-user-piloting-202410.pdf
[345] QEAAs are issued by a qualified trust service provider that meet specific requirements laid down in eIDAS 2.0 regulation
[346] See https://www.nobidconsortium.com/meet-the-work-packages-discover-wp6s-work-on-qeaa-issuance/
[347] See https://dm158x9fyyzgp.cloudfront.net/wp-content/uploads/2024/02/DC4EU_D1.1_Project_Management_Handbook_v.01.pdf
[348] See https://www.dc4eu.eu/outputs/
[349] See https://www.digital-identity-wallet.eu/assets/files/Potential%20-%20Press%20Release%202.pdf

determine the effectiveness of the four LSPs as they are in their implementation and testing phase. However, it is expected that the successful piloting of the four LSPs will support Member States in meeting their obligation under the upcoming EU Digital Identity Framework Regulation to make an EU Digital Identity Wallet available to citizens and businesses by the end of 2026. An interview with one of the partners involved in the EWC project highlighted that the LSPs provide public administrations in EU members states with the opportunity to collaborate with private companies and build the technical capacity required to test and implement the EU Digital Identity Wallet.[350]

It is intended that the four LSPs will help drive the provisions of EAA/QEAAs to the EU Digital Identity Wallet by providing support for Member States entities taking on the role of EAA/QEAA providers and support public and private replying parties in adapting the EU Digital Identity Wallet as a means for users to authenticate themselves to access public and private services. Furthermore, LSPs are expected to provide feedback on the ARF as they develop and interact with Relying Party services, Qualified or non-qualified Electronic Attestations of Attributes (Q)EAA Providers, Person Identification Data (PID) Providers and Users in meaningful transactions under the proposed use cases.[351]

Coherence

In terms of internal coherence, the EDIHs are supporting the roll-out of the technologies relevant to the EUCAIM, for example, by informing innovators about the legal requirements and testing facilities, offer test before invest services, networking events and training opportunities in advanced digital skill. When the data spaces are completed, they are expected to have synergies with the AI Testing and Experimentation Facilities (TEFs). For example, EUCAIM plans to make cancer image data available to the AI Testing and Experimentation Facility for Health AI and Robotics and enable SMEs who have developed AI solutions for cancer care to test them in real-life environments. Some synergies are expected between the Once-Only-Technical System (OOTS) and the EU Digital Identity Wallet. The EU Digital Identity Wallet provides an additional means for citizens and businesses for authentication and identification purposes when using the OOTS, facilitating and enriching the procedure in a cross-border context.

In terms of external coherence, the actions in this case study have synergies with wider EU policy priorities and projects. For example, the EUCAIM project is coherent with the Europe Beating Cancer Plan, which aims to improve the prevention, detection, treatment and management of cancer in the EU while reducing health inequalities between and within Member States. Furthermore, the EUCAIM project builds on the outputs of Artificial Intelligence for Health Imaging (AI4HI) project cluster. AI4HI is a network of multiple Horizon 2020 research projects currently working on developing cancer imaging data repositories and AI solutions based on medical imaging to improve clinical practice.[352]

Similarly, the GDI builds on the outputs of the Beyond 1 million Genomes (B1MG) project, which was funded by European Union's Horizon 2020 Research and Innovation programme[353]

[350] Interview with EWC project partner
[351] See https://ai4hi.net/
[352] AI4HI | Ai for Health Imaging
[353] Beyond One million Genomes (B1MG) project

and the EU's flagship 1+ million Genomes (1+MG) initiative[354] which aims to enable secure access to genomics and the corresponding clinical data across Europe to support research and health policy making and incentivise personalised healthcare treatments with the potential to improve disease prevention.

As this is an interim evaluation, the impact of the projects covered in this case study in relation to the digital transformation of SMEs and public administration are yet to emerge. Considering this, we highlight the expected EU-added value of the actions and projects where possible.

EDIH

It is important to note that the EDIHs are in varying stages of being set up, therefore, it is too early to state their EU added value to member states. However, in the case of AIRE EDIH, the Digital Europe may complement the country's efforts to provide enterprises with access to AI technologies. Only 5.2% of Estonian enterprises have adopted AI against an EU average of 8%.[355] In this context, the AIRE EDIH is expected to provide SMEs with technological resources to uptake AI. For example, the AIRE EDIH will act as a one-stop-shop in Estonia that provides SMEs with the technical infrastructure and expertise required for the uptake of AI technologies through the test-before-invest service, which reduces risks in adopting new technologies, and trainings on AI to enhance the skills and competency of SMEs.

In terms of finance, Digital Europe allows Member States and the EU to co-invest jointly in the same EDIH, thus stimulating the pooling of resources. The AIRE EDIH is co-funded through Digital Europe and the Estonian government through the Ministry of Economic Affairs and Communication. This funding model allows AIRE to provide its services for free to SMEs in Estonia and contribute to accelerating their digital transformation efforts, thereby helping to bridge the digitalising gap among SMEs in Estonia.

Data spaces

The data spaces are expected to address the unique needs of SME in the manufacturing and health sector by bringing together relevant data infrastructures and governance frameworks to facilitate data pooling, access and sharing. This will enable SMEs in the EU to access and use data for the development of innovative products and services. Digital Europe supports the development of key digital infrastructures for use by EU Member states which can only be achieved at the EU level. For example, stakeholders interviewed commented that the development of digital infrastructures in cancer imaging which permits cross-border access to high quality imaging data requires stakeholders across Europe to develop of AI models for improving detection and screening diagnostics. Similarly, stakeholders commented that the developing a GDI and a representative reference genome set of the European population (Genome of Europe) is again something that can only be achieved at EU level.[356]

EU Digital Identity Wallet

The EU Digital Identity Wallet aim to offers a universal, trustworthy and secure way for citizens to identify themselves when accessing public and private services, digital documents and have control over how their data is handled by both private and public organisations. This

[354] European '1+ million Genomes' Initiative | Shaping Europe's digital future
[355] See https://digital-strategy.ec.europa.eu/en/factpages/estonia-2024-digital-decade-country-report
[356] Interview with EU implementing organisation

implementation of the EU Digital Identity Wallet requires cross-border interoperability and collaboration at the EU level to ensure smooth implementation. Digital Europe enables pooling of resources for this. For example, the EWC Consortium is a collective of stakeholders from across the EU, each contributing their unique strengths to driving the development and implementation of the EU Digital Identity Wallet.

Conclusions

Most projects currently funded under Digital Europe are in their implementation phase, with key activities underway and initial outputs being delivered. The effectiveness of the EU Digital Identity wallet in relation to improving citizens and business access to services, requires further analysis. At this point in time and based on the evidence available, Digital Europe has started to contribute in numerous ways to the digital transformation of SMEs. For example, Digital Europe has provided a platform to enable SMEs to access and leverage AI technologies., e.g. The test-before-invest services have contributed to enabling SMEs address technological challenges and improve their product offering, as can be seen in the examples of MindChip and AIRE EDIH.

Digital Europe has primarily contributed to the digital transformation of public administrations by enabling the development and testing of key technical infrastructure required for the digital authentication of citizens in travel, online payment, verification of educational credentials and accessing public services. Based on the evidence collected in this case study, Digital Europe funded projects are contributing to the development and piloting of tools to ensure open, efficient, user-friendly, end-to-end digital public services to citizens and businesses across-borders. For example, Digital Europe is enabling the procurement and technical infrastructure to support interoperability and implementation of the EU Digital Identity Wallet through the EWC. The EU Digital Identity Wallet framework is open source, ensuring that resources will be accessible to the public, allowing Member States to develop their own wallet. Also, pilot projects have been launched for the deployment of digital identity authentication in public services, in line with the Digital Decade target of ensuring interoperable public services across-borders. Through these projects, public administrations in members states are building the necessary expertise and infrastructure to facilitate provision of the EU Digital Identity Wallet by the end of 2026.

Sources and methodology

This case study was developed using desk research, interviews and the Digital Europe beneficiary survey.

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Survey of Digital Europe beneficiaries

Interview with CIRPASS Consortium Coordinator, 10 October 2024

Interview with EU Digital Identity Wallet Coordinator, 24 October 2024; Interview with EDIH coordinators

Case Study 2: Technology Infrastructures as drivers of technological deployment and innovation

Description

The European Innovation Agenda, released in 2022 with the ambition to support deep tech innovation and the innovation capacity across EU regions, recognises the capacity of Technology Infrastructures 'to underpin national and regional innovation ecosystems'. Specific attention is given to TIs or TI-related activities under a specific 'Flagship on enabling deep tech innovation through experimentation spaces and public procurement'[357]. This notably included the launch of testing and experimentation facilities for AI innovation at a European scale, designed to allow innovators to trial state-of-the-art solutions and products in real-world environments established through Digital Europe and among the activities covered in this case study.

The European strategy on research and technology infrastructures[358] adopted on 15 September 2025 sets out a comprehensive approach to strengthen that infrastructures remain world-class, more accessible, and better aligned with the needs of scientists, innovators and industry.

Furthermore, the European Commission will develop in 2025 a Charter of Access for industrial users to research and technology infrastructures, as planned in the EU start-up and scaleup strategy[359], with the objective to facilitate access for industry including start-ups and scaleups to cutting-edge research, technology facilities, and expertise to rapidly test, scale, and validate new products, accelerating time-to-market and boosting commercialisation success.Insufficient investments in Digital, Research,

[357] https://research-and-innovation.ec.europa.eu/strategy/support-policymaking/shaping-eu-research-and-innovation-policy/new-european-innovation-agenda_en

[358] A European strategy on research and technology infrastructures EUR-Lex - 52025DC0497R(01) - EN - EUR-Lex

359 The EU start-up and scaleup strategy EUR-Lex - 52025DC0270 - EN - EUR-Lex

and Technology Infrastructures have resulted in significant gaps across various digital ecosystems. As an illustration, the Digital Europe Impact Assessment[360] identifies significant challenges in Artificial Intelligence development in Europe, These challenges include the lack of **large-scale datasets and advanced facilities for testing and validating cutting-edge technologies in real-world settings**. While programs, such as Horizon 2020 have achieved some progress, reaching pilot-phase advancements, they remain inadequate for scaling up to fully deploy shared capacities and infrastructures across Europe. Similarly, the EuroHPC Declaration[361] highlights Europe's reliance on **global High-Performance Computing and data infrastructures** to sustain its scientific excellence and industrial competitiveness. The European Chips Act[362] stresses the urgent need to strengthen Europe's semiconductor ecosystem by bridging the gap between research and production to remain competitive. Achieving this goal necessitates coordinated action among Member States and EU financial backing to establish essential infrastructures, such as Pilot Lines, to drive large-scale capacity building and foster ecosystem growth.

Technology infrastructures lie at the heart of this case study, as they play a pivotal role in supporting the digital transformation by offering tailored services, advanced technical expertise, and specialised facilities. They enable industry players, including SMEs and start-ups, to engage in essential activities, such as research, innovation, technology development, testing, and scaling up.

Box 1 Definition of Technology Infrastructure according the 2019 SWD

Technology Infrastructures can be defined as: 'facilities, equipment, capabilities and support services required to develop, test and upscale technology to advance from validation in a laboratory up to higher Technology Readiness Levels prior to competitive market entry. They can have public, semi-public or private status. Their users are mainly industrial players, including SMEs, which seek support to develop and integrate innovative technologies towards commercialisation of new products, processes and services, whilst ensuring feasibility and regulatory compliance'.

This case study will focus on the role of **technology infrastructures in scaling up digital technologies from validation in the testing facilities to early-stagemarket entry across three key digital fields: High-Performance Computing, semiconductors, and artificial intelligence**. By enabling technological capacity building, these infrastructures play a crucial role in supporting the development of European digital ecosystems. The case study will look at the coherence of TIs funded under the Digital Europe with other EU programmes and initiatives and will explore how these infrastructures integrate with national strategies. The analysis will highlight the added value of funding TIs at the European level. By pooling resources and fostering collaboration across Member States, these investments enable the development of pan-European capabilities that no single country could achieve independently.

Activities

Digital Europe over the period 2021-2024 provided financial support for both capital expenditures (CapEx) and operational expenditures (OpEx) to the acquisition and operations of supercomputers, testing and experimenting facilities and pilot lines (among other

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[360] https://commission.europa.eu/strategy-and-policy/eu-budget/performance-and-reporting/programme-performance-statements/digital-europe-programme-performance_en

[361] https://digital-strategy.ec.europa.eu/en/news/european-declaration-high-performance-computing

[362] https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/europe-fit-digital-age/european-chips-act_fr

infrastructures). While sharing common characteristics, these infrastructures differ in nature as they address the requirements of various digital ecosystems. These differences include the technologies they support, the targeted technology readiness levels, the specific digital ecosystems they target and their varying degrees of structuration, and the different types of end-users they cater to. More specifically:

- **The acquisition of supercomputing infrastructure,** including mid-range, exascale, post-exascale, and quantum computing facilities intends to foster the development of an innovative and widely distributed supercomputing ecosystem across Europe. Through the EuroHPC JU, Digital Europe funding has supported the deployment of Europe's first and second exascale supercomputer at the Jülich Supercomputing Centre in Germany and at CEA in France. Other contributions include the procurement of six quantum computers, the development of mid-range supercomputers, upgrades to enhance AI capabilities in existing systems, and the procurement of an industrial supercomputer.
- The establishment of **Testing and Experimentation Facilities**. These facilities serve as **specialised large-scale reference sites**, enabling technology providers from across Europe to test and experiment with **cutting-edge AI solutions** at scale. TEFs encompass both **software and hardware products and services**, including robotics, and are designed to simulate real-world environments for comprehensive testing and validation.
- The establishment and operational activities of **five pilot lines** as critical infrastructures for the semiconductor industry. These pilot lines are designed to enable the **testing, experimentation, and validation** of semiconductor technologies and system design concepts at higher Technology Readiness Levels. SO6 is implemented through the Chips JU. As of 2024, Digital Europe has provided funding for five Pilot Lines aimed at advancing semiconductor and photonic technologies.

Table 6. Technology Infrastructures covered under this case study

Specific Objective	**Digital Ecosystem**	**Implementing body**	**Infrastructure**	**TRL Levels**	**Main users**
SO1	Scientific Research & Academia Artificial Intelligence & Machine Learning	EuroHPC JU	**Supercomputers** Mid-range Exascale Post-exascale Quantum	TRL 1-8	Scientific community (main users) AI start-ups and SMEs Quantum start-ups and SMEs
SO2	Artificial Intelligence & Robotics	European Commission	**Testing and Experimentation Facilities** Health Manufacturing Agrifood Smart Cities & Communities	TRL 6-8	AI start-ups and SMEs SMEs leveraging AI and robotics to innovate / scale operations Large enterprises
SO6	Microelectronics / Semiconductor	Chips JU	**Pilot Lines** Advanced semiconductors at sizes of 2 nm and below Advanced Fully Depleted Silicon on Insulator technologies targeting 7 nanometres Advanced semiconductor devices based on Wide Bandgap materials Heterogenous application	TRL 3-7	Research Institutions Semiconductor Manufacturers Start-ups and SMEs Large enterprises

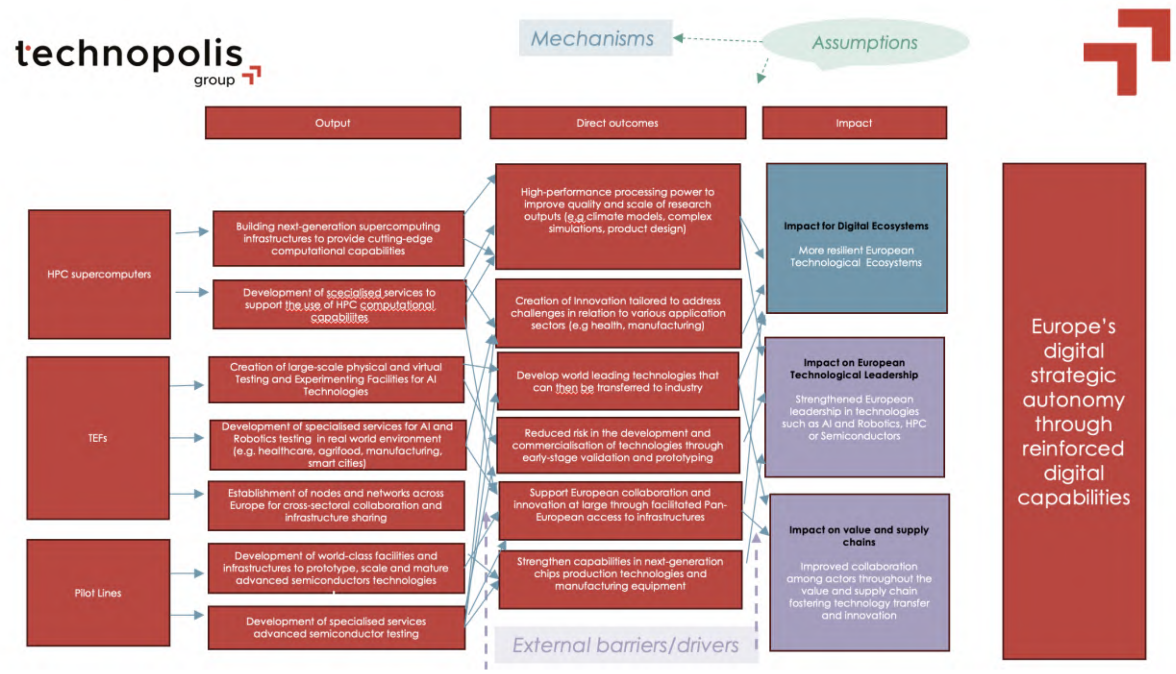
			Photonic Integrated Circuits (PICs)		

Source; Technopolis 2025

Impact pathway

The case study develops specific impact pathways for technology infrastructures funded under Digital Europe. pathways serve as the foundational intervention logic, guiding the analysis of the evaluation.

Figure 7 Impact pathway for Technology Infrastructures funded under Digital Europe



Source: Technopolis Group, 2025

The impact pathways for these infrastructures must consider that each of them serves distinct and highly specialised ecosystems, catering to unique technological and operational needs. Their varying states of deployment also play a critical role, as the assumptions influencing their outcomes differ significantly depending on the maturity of the technology the infrastructures serve. As a result, their assumptions around service relevance, user accessibility, and long-term sustainability are tailored to their unique operational contexts:

Table 7. Main assumptions identified as part of the Impact Pathway

Main assumptions:	Supercomputers	TEFs	Pilot Lines
Infrastructures services	Services are tailored to meet demand-driven applications, finding a balance between **traditional computing,**	Services aligned with demand-driven application Services aligned with specific sectoral needs (e.g. health, manufacturing, agrifood, smart cities)	Services are aligned with **demand-driven applications in the semiconductor industry**

	AI, and quantum computing. Services are designed to meet the needs of both **the scientific community** and ecosystems such as AI, quantum as well as wide range of industrial application sectors.		
Accessibility	**Access modes** are designed to cater to both the **scientific community's needs for high-demand, large-scale computational projects** and the specific requirements of the **AI community, including SMEs and start-ups.** **Competence Centres** play a pivotal role in providing services to SMEs, acting as key connectors to the broader infrastructure	**The added value of services provided to SMEs by the TEFs** is well-recognised by start-ups and small and medium-sized enterprises. **Access modes and tariffs** are designed to be efficient and incentivising, ensuring broad participation and engagement.	**Access modes and tariffs** are designed to be efficient and incentivising, ensuring broad participation and engagement across various ecosystems. Mechanisms facilitate access to cutting-edge pilot lines and testing facilities, allowing start-ups, SMEs, and other stakeholders to leverage advanced resources and drive innovation. **Competence Centres** play a pivotal role in providing services to SMEs, acting as key connectors to the broader infrastructure.
Community Building	**Competence Centres and Hubs** play a vital role in supporting SMEs and start-ups by connecting them with the services offered by HPC Centres. **AI Factories contribute** significantly to fostering innovation among AI start-ups and facilitating access to HPC service **HPC User Forum** further strengthens community building and ensures a user-oriented evolution of HPC resources and application	**Competence Centres and Hubs** play a vital role in supporting SMEs and start-ups by connecting them with the services offered by the TEFs. **Cross-sectoral initiatives** and events play a crucial role in fostering community building across TEFs, enabling collaboration, knowledge sharing, and innovation among diverse stakeholders.	**Competence Centres and Hubs** play a vital role in supporting SMEs and start-ups by connecting them with the services offered by the Pilot Lines. **Collaboration across pilot lines and alignment with user needs** foster a strong community around different semiconductor ecosystems and members of the value chain. Collaboration also allows for the realisation of innovative solutions that combine the different technologies.
Application support	**Robust application support needed for AI and QC integration**	**Application support needed** for industries especially with SMEs	**Application support needed** on the Pilot Lines for industry
Workforce Development	**Steady talent pipeline** with upskilling initiatives	Skilled workforce to handle TEF operations	**Steady talent pipeline** with upskilling initiatives
Visibility and communication	Outreach to scientific community and AI SMEs and start-ups	Effective outreach to SMEs, Start-ups.	Effective outreach to SMEs, Start-ups.
Strategy development	Effective integration of R&I outputs into supercomputing systems	Long-term viability beyond initial funding	Defined pathway from lab innovations to industrial-scale adoption

Source; Technopolis 2025

Effectiveness

This section is structured around key areas and the assumptions influencing the impact pathways of these infrastructures. It provides an overview of selected projects and initiatives implemented to date, highlighting how these assumptions contribute to outcomes and overall impact.

Access to European world-class infrastructures services

Technology Infrastructures funded under the Digital Europe intend to provide a European access to world-class infrastructures enabling wide range of use both from the scientific community and industrial ecosystem.

Table 8. Access modalities of Tis co-funded under Digital Europe

Name of the TI	Access Modes	Countries	User Base
EuroHPC supercomputers	50% of access granted through EuroHPC 50% of access granted by the Hosting Entity	FR, LX, IT, DE, NL, FI, PT, SI, CZ, ES, BG	Scientific community (main users) AI start-ups and SMEs Quantum start-ups and SMEs
Chips JU Pilot Lines	Access through a Single-Entry Point organised by the main pilot lines. Access is also facilitated by the Chips Competence Centres.	FR, DE, FI, IE, AT, ES, PL, BE	Semiconductor start-ups and SMEs SMEs leveraging AI and robotics to innovate / scale operations Large enterprises such as Foundries, Integrated Device Manufacturers (IDMs)
Testing and Experimenting Facilities	Access through a Single-Entry Point	DK, LU, SK, BE, NL, SE, CZ, ES, PT, IT, AT, FR, GR, DE, PL, FI	Research Institutions Semiconductor Manufacturers Start-ups and SMEs Large enterprises

Source: Technopolis 2025

EuroHPC's supercomputers offer different access modes, **extending beyond the scientific community** to include industry, SMEs, start-ups, and public sector entities requiring supercomputing resources for artificial intelligence and data-intensive activities. Access models have been adapted to meet these evolving demands, with innovations such as the modification of 'queue-based' systems to better serve the AI community. **To support this transition, access policies have recently been fine-tuned, with 20% of system capacity now reserved for AI-driven applications, including SMEs/start-ups**. Between 2022 and 2024, the Extreme Scale Access consumes 70% of the total node hours, followed by Regular Access (29%) and AI/Data Access (1%)[363]. EuroHPC's access modes and node hour allocation reflect a prioritisation of **high-demand, large-scale computational projects, underscoring a strong commitment to fostering groundbreaking research and delivering excellence in scientific achievements.**

AI and Data-Intensive Applications Access had the smallest share of both proposals and node hours. While this mode had the lowest allocation, it is specialised for AI and data-intensive tasks, which often require more rapid computation over shorter durations. Nevertheless, to ensure equitable and effective AI access, attention must be given to **designing tailored access models that meet the unique needs of AI users**. As it stands, EuroHPC

[363] Important to note that the data only considers AI / Data Access for the period April-June 2024 while the rest access modes data spans from Dec 2021 to March 2024 for Regular Access and Dec 2022- Apr 2024 for the Extreme Scale Access

provides a bi-monthly cut off for the AI and Data intensive application access. Further analysis and evaluation should be conducted to ensure that the access model effectively provides the appropriate opportunities for the community.

Table 9. EuroHPC Access Call Statistics

Access Call	Proposal Awarded	Node Hours Awarded
Extreme Scale Access[364] (Dec 2022- Apr 2024)	75	63,113,698
Regular Access[365] (Dec 2021-Mar 2024)	189	25,698,394
AI And Data Intensive Applications Access[366] (Apr 2024-Jun 2024)	25	1,033,500
Total	**289**	**89,845,592**

Source: EuroHPC User Days 2024. PPT Day 1. Link

The **Destination Earth (DestinE)** EU flagship initiative launched in 2021 has been developing a highly accurate digital model of the Earth (a digital twin of the Earth) to model, monitor and simulate natural phenomena, hazards and the related human activities. Destination Earth is one of the **initiatives identified as strategic for the Union** in the preamble of the EuroHPC JU Regulation[367].

DestinE provides groundbreaking features assisting users in designing accurate and actionable adaptation strategies and mitigation measures, unlocking the potential of digital modelling of the Earth system at a level that represents a real breakthrough in terms of accuracy, local detail, access-to-information speed and interactivity.

During its first implementation phase (Q4 2021 – Q2 2024), DestinE established the required synergies with EuroHPC, **harnessing its world-leading supercomputing capabilities** and pushing the limits of computing, ML/AI, weather and climate sciences, and leveraging the 'path to the Digital Decade' with hundreds of European research and computational scientists from industry, academia and many European and national institutions involved.

During this period, one of the main achievements was the deployment of the overall DestinE infrastructure and the initial release of its first two Digital Twins, demonstrating their production capabilities **at unprecedented scale on the available EuroHPC systems.**

Box 2. Destination Earth access to EuroHPC supercomputers

The first two high-priority digital twins (DT) are the Weather-Induced Extremes Digital Twin (Extremes DT) and the Climate Change Adaptation Digital Twin (Climate Adaptation DT), powered by the first pre-exascale EuroHPC supercomputers.

The Climate DT is setting a unique capability to produce bespoke, cutting-edge numerical simulations addressing 'what-if' questions related to the impact of certain scenarios or policy decisions on the evolution of our planet, generating km-scale simulations of climate scenarios from global to regional and national levels at a multi-decadal timescale.

The Extremes DT will give tailored access to an information system including, e.g. scenarios, forecasts and visualizations of extreme weather events, natural disaster evolution and climate adaptation approaches. The Extremes DT aims to provide an on-demand workflow with co-design of high-resolution predictions about extreme

364 For high-impact and high gain innovative research applications, with very large compute time, data storage and support needs

365 For research and public sector applications requiring large-scale resources or frequent access to substantial computing and storage resources

366 For industry, SMEs, start-ups, and public sector entities requiring access to supercomputing resources to perform artificial intelligence and data-intensive activities.

367 Council Regulation (EU) 2021/1173 of 13 July 2021 on establishing the European High Performance Computing Joint Undertaking and repealing Regulation (EU) 2018/1488

weather events combined with decision-making support for impact sectors, including hydrology, air quality and energy meteorology.

LUMI is used for the development of the Climate DT and it's also one of the two EuroHPC supercomputers currently used for the Extremes DT's physics-based and data driven model system and computationally intensive dataflow. As part of DestinE and its digital twins, LUMI's computing power will facilitate technological solutions that make societies safer and more resilient against extreme weather events and the impacts of climate change.

Source: Selected LUMI Use Cases. May 2024.

As highlighted in interviewees, the Destination Earth initiative has **accelerated advancements in weather forecasting and climate modelling**. **Tasks that previously required access to US supercomputers can now be performed on a daily basis using European systems.**

The Destination Earth System was inaugurated by the former European Commission Executive Vice-President for a Europe Fit for the Digital Age Margrethe Vestager, on Monday, 10 June 2024 in an official launch event hosted in the LUMI Supercomputer Center in Kajaani, Finland. The work continues in Phase II of DestinE through a network of powerful EuroHPC supercomputer infrastructures (CSC (LUMI), CINECA (Leonardo), BSC (Mare Nostrum 5), LuxProvide (MeluXina)).

Accessibility of Infrastructures services to users

User access is further facilitated through the establishment of **Competence Centres** under both SO6 and SO1 for access to the Chips Pilot Lines and the EuroHPC supercomputers.

Box 3. Finnish Chips Competence Centre

The Finnish Chips Competence Centre is based on a coordinated national network of access points in different regions including Tampere (strong tradition of designing large and complex system-on-chips and optoelectronics), Espoo (leveraging research expertise from VTT and Aalto University, particularly in material science and silicon wafer processing), Oulu (known for its strong history in radio technology, tracing back to Nokia's peak years) and eastern Finland (expertise in specialised knowledge in optics and photonics, which complements chip technology development) is being developed to ensure ease of access for end-users. The Competence Centres serve as a key interface for end-user industries, prioritising demand-driven actions tailored to meet their specific needs. Their primary focus is to support end-user industries while occasionally extending assistance to technology developers.

The Finnish Chips Competence Centre is still in the preparation phase, but its operations are expected to begin in early 2025. The centre aims to recruit the best experts in the field and to excellent support structure for the entire industry in Finland and pushing end-user industries to make greater use of advanced technological resources.

Source: Business Tampere, 2024. An enthusiastic drive accelerated swift cooperation in Finland – Recruitments for the Chips Competence Centre begins. Accessed December 2024. Link

Testing and Experimentation Facilities are structured around **'Nodes'**, which offer the infrastructure and services in their areas of expertise and a network of **'Satellites',** which are smaller testing facilities than nodes to complement the nodes' testing services and/or geographical coverage. Funding supports the creation of one large TEF per sector, typically composed of 4-6 nodes that provide private and public organisations both remote and in-person access to their services. In the context of setting up the TEFs, a single-entry point was established to simplify accessibility. Regarding access, **defining an accessible pricing model for SMEs presents a significant challenge** due to the complexity of parameters, varying node overheads, and the influence of **State Aid Rules** on final pricing (further reinforced in the case of cross-border access). To ensure broad accessibility of TIs to users it is also important to understand the needs and constraints faced by different users, particularly SMEs and start-ups with limited resources.

Tailored Application Support and Sector-Specific Requirements

Technology infrastructure plays a crucial role in bridging research and innovation with practical applications, ensuring sector-specific needs are met while driving the development, application, and commercialisation of future technologies. Technology Infrastructures offer a range of services encompassing both **technological activities** and **business support services**. These include conducting technology feasibility studies and proof-of-concept development, demonstration and prototyping, technology validation, and product testing (e.g. experimenting with new materials or validating innovative processes) but also incubator or accelerator programs, legal and compliance assistance, and facilitating access to financial resources (e.g. grant application support, investor matchmaking).

Examples of specific services delivered to SMEs and start-ups by the TIs covered in this case study include:

Box 4 Quantscient prepares for quantum future with LUMI supercomputer = NCC

Founded in 2021, Quanscient 's technology combines advanced cloud computing and quantum integration. It is expected to bring significant benefits to industrial applications based on, for example, computational fluid dynamics. Quanscient's vision is to make simulations matching reality by building a next-generation Simulation-as-a-Service platform utilising cloud and quantum computing.

Quantum computing has the potential to revolutionise the way businesses process data in a more profound way than AI is currently doing. Quanscient is already preparing for future business needs and developing quantum software with the help of the LUMI supercomputer. The LUMI supercomputer is used to study how the software being developed can be scaled to the more powerful quantum computers of the future.

Source: Selected LUMI Use Cases. May 2024.

Box 5. Median Technologies - a French SME that delivers AI based radiology solutions – received the first TEF-Health service.

Median Technologies were looking to test out the quality of their AI/ML-based eyonis solutions and improve the robustness of their processes in compliance with the increasing level of requirements of the incoming European regulation on AI systems.

The service provided by TEF-Health partner LNE consisted of an assessment of the process used by the SME to develop and evaluate their AI data-based systems. This assessment is based on the study of the documentation describing the process, such as conception documents, risk analysis matrix or the evaluation plan. This first review allowed LNE to identify parts of the process where information is lacking and to better prepare the questions and specific topics to be discussed during meetings with the team developing the AI system.

Source: Testing and Experimentation Facility for Health AI and Robotics. Success story – First Service delivered by TEF-Health to an SME. 2024. Link

Without the adequate support mechanisms, even the most advanced infrastructures risk being underutilised, as users may struggle with integration, adaptation, or workflow optimisation. **Comprehensive support structures are essential not only to improve accessibility but also to maximise the impact of these infrastructures.** Support is required across multiple domains and specialists must be integrated within user communities to drive progress. Interviewees underlined that it should be ensured that **existing infrastructures are fully operational, effectively supported, and capable of delivering their intended outcome.** In the context of SO1, **application support is particularly vital for AI and QC, with users emphasising the need for improved future support**. This is especially important to facilitate the transition to hybrid systems that integrate HPC, AI, and Quantum Computing, ensuring that users can effectively leverage these cutting-edge technologies. In addition to Horizon-funded projects like Excellerat and EPICURE, Digital Europe has launched specific initiatives focused on application support for infrastructures financed under the Digital Europe framework including

MINERVA which aims to which aims to enable AI communities to harness the full potential of EuroHPC systems, accelerating AI research,[368]

Community Building, Communication and Dissemination activities

Community building is essential for making Technology Infrastructures visible and attracting new users. It plays an important role in ensuring that these infrastructures are tailored to the needs of their users by fostering regular dialogue and interaction among stakeholders, including researchers, industry representatives, and infrastructure operators. In the context of High-Performance Computing, the newly established **HPC User Forum** aims to serve as a platform for users and infrastructure providers to exchange insights, share challenges, and identify emerging needs. The forum seeks to ensure impactful representation of current and potential users in the years to come.

As part of the TEFs initiative, over the past two years, substantial progress has been made in community building. This is notably exemplified through the AI. Matters project which **developed a comprehensive service catalogue[369] across the different nodes. This comprehensive repository provides a centralised source of services accessible to any company**. It not only offers detailed information and publishes available services but also streamlines the process of service requests among community members, fostering collaboration and accessibility. Community building was further reinforced through cross-sectorial TEF events, such as the xTEF 2024 event titled 'All TEFs Open for Business', which took place in Berlin in 2024. This event fostered collaboration and engagement across various sectors, strengthening the network and promoting the exchange of ideas and best practices among TEF stakeholders.

Effective communication and dissemination activities also contribute to promoting access to European Technology infrastructures and fostering collaboration among stakeholders. Success stories illustrate the benefits and real-world impact of the services offered by technology infrastructures and can contribute to encouraging broader user engagement. In the context of a European network of Technology Infrastructure, stakeholders highlighted the potential benefits of transitioning from communication and dissemination efforts focused on isolated use cases to promoting collaborative, multi-stakeholder projects supported by the TIs. For example, rather than having a SMEs relying solely on a technology from a single RTO, the goal should be to encourage joint efforts where an SME collaborates with industry partners to leverage technology across multiple RTOs.

Workforce Development

Both the operation of TIs and the development of the surrounding ecosystem require a skilled workforce and a robust talent pipeline. This involves not only upskilling and reskilling existing engineers but also fostering the growth of a European talent pool capable of effectively **operating and leveraging** these infrastructures and their systems. While some initiatives are in progress, stakeholders across different ecosystems agree that workforce development remains a significant challenge for the successful deployment and utilisation of these infrastructures and the successful growth of the ecosystem. For example, the Digital

[368] EuroHPC Minerva project. https://eurohpc-ju.europa.eu/research-innovation/our-projects/minerva_en
[369] https://ai-matters.eu/services-catalog/

Europe project Master4HPC addresses skill gaps in high-performance computing; however, its scalability is limited, with only around 100 students graduating per cohort.

Similarly, the **Joint Education for Advanced Chip Design in Europe (Edu4Chip)** initiative strengthens Europe's chip design capabilities by creating and implementing harmonised study programs at leading European universities. This initiative aims to increase the number of skilled chip design experts.

Several initiatives at the national level are also contributing to workforce development in the semiconductor and digital technology domains, but their fragmented nature limits their collective impact, for example as it is the case for the Spain's **'Cátedras Chip' programme.** This initiative finances the creation of university chairs focused on advancing microelectronics research, aiming to strengthen academic and industrial collaboration in the field. Another example is the **Hellenic Emerging Technologies Industry Alliance,** based in Greece, which is an alliance of 47 industrial members and 28 universities and research institutes dedicated to promoting the adoption of digital technologies and fostering entrepreneurship in emerging technology domains. Further evaluations of the coherence and synergies between different EU and national programmes could help shed light on how the fragmented implementations of various skill and workforce development initiatives affect the potential for creating synergies and achieving the scale necessary for building a competitive and robust workforce at the pan-European level. This question seems particularly relevant in emerging fields, such as AI and quantum computing, where foundational knowledge and skills need to be developed or significantly adapted.

Coherence

- **Internal Coherence**: complementarity with R&D&I activities funded under other EU programmes

The Technology Infrastructures under SO1 and SO6 are implemented by **Chips Joint Undertaking and the EuroHPC Joint Undertaking**[370]**.** Their activities are funded through different European Union's programmes including **Horizon Europe for R&D&I activities**, the **Digital Europe for deployment and capacity building activities** and the Connecting Europe Facility (CEF-2 programme) for EuroHPC to support and catalyse investments in digital connectivity infrastructures of common interest. From a strategic perspective, internal coherence and synergies between funding programmes are primarily guided by **the Strategic Research and Innovation Agenda**. In this context, this strategic document developed by a Joint Undertaking in collaboration with industry and other key stakeholders, has been recognised as a critical tool for aligning priorities and ensuring consistency across the European Union's priorities.

The Strategic Research and Innovation Agenda of the EuroHPC JU[371] was adopted in 2019 by the JU's Research and Innovation Advisory Group (RIAG). The EuroHPC JU builds the Multiannual Strategic programme (MASP) based on the SRIA, and it is currently under revision and in full consultation with advisory groups. The interviewees referred to a very good partnership between the JU with the RIAG and the second advisory group of the EuroHPC JU,

[370] https://eurohpc-ju.europa.eu/index_en
[371] EuroHPC_RIAG_Strategic_Agenda_2019_0.pdf

its infrastructure advisory group (INFRAG). There are exchanges at least once a week, and they are fully involved in the development of the new Multiannual Strategic programme[372]. Through its advisory group experts, the EuroHPC JU has access to information on the latest developments in technology and ideas for focusing its investments. Similarly, the Chips JU (ex-KDT JU) is committed to open and transparent processes for consulting all partners and other relevant stakeholders on the identification of their priorities (which is exemplified in the drafting of the SRIA, involving over 300 experts from industry, RTOs and academia in almost all participating states, and collecting feedback on the draft SRIA from stakeholders in annual Stakeholder Forums).[373]

As part of this evaluation, **several examples demonstrate the integration of R&D&I activities and projects funded under the EU Framework programmes for Research and Innovation** (e.g. FP7, Horizon 2020, and Horizon Europe) within Digital Europe-funded infrastructures. The DEEP project[374] series is a prominent example, beginning with the initial DEEP project (1 December 2011 –31 May 2015) and extending through DEEP-ER, DEEP-EST, and DEEP-SEA. Funded under the EU Framework programmes for Research and Innovation and EuroHPC, these projects contributed to the development of innovative software components, such as 'software bricks', which enable dynamic modularity of applications on multi-partition systems. These components are being deployed in EuroHPC systems, including MELUXINA in Luxembourg and JUPITER at Jülich financed through the Digital Europe.

Box 6. DEEP Project Serie deployment in EuroHPC System JUPITER

JUPITER will be based on a dynamic, modular supercomputing architecture, which the Forschungszentrum Jülich have developed together with European and international partners in the DEEP projects funded by the European Commission and EuroHPC JU. The modular architecture will enable an optimised utilisation of the various computing modules during complex simulations. Such architecture also means that the system will be well prepared for integrating future technologies such as quantum computing. DEEP-SEA latest project of this series (and a EuroHPC one) also supported the development of other tools that are deployed in software stacks of EuroHPC computers.

Following the successful completion of DEEP-EST and the launch of the prototype at the Jülich Supercomputing Centre, the DEEP projects face a new challenge: how to design programming environments that can support future Exascale systems with a wide variety of different workloads.

Source: Link and Link

The European Processor Initiative (EPI)[375] funded through the EU Framework programme for Research and Innovation and EuroHPC, has supported **the development of the RHEA General-Purpose Processor by SiPearl**, which is expected to be integrated into Jülich's JUPITER supercomputer in the near future. The first three-year phase of the project (2018–2021) successfully delivered key technologies aimed at improving European sovereignty, including the RHEA GPP and a proof-of-concept for European accelerator technology. Next steps in the second half of the project notably include finalising the development and deployment of the first generation of low-power processor units, advancing the second generation of the GPP with technological enhancements for European Exascale machines, developing second-generation low-power accelerator test chips for use by the HPC community

[372] EuroHPC Joint Undertaking Multiannual Strategic programme (2021 – 2027)

[373] European Commission: Directorate-General for Research and Innovation, Berrada, K., Viscido, S., Lotito, A., Maroulis, N. et al., *Horizon Europe and the digital & industrial transition – Interim evaluation support study – Phase 2 – Horizon Europe – Institutionalised partnership report – ECSEL & Key Digital Technologies (KDT) joint undertakings*, Viscido, S.(editor), Lotito, A.(editor), Boekholt, P.(editor) and Lebhardt, F.(editor), Publications Office of the European Union, 2024, **https://data.europa.eu/doi/10.2777/71518**

[374] https://deep-projects.eu/

[375] https://eurohpc-ju.europa.eu/research-innovation/our-projects/european-processor-initiative-epi_en

as well as establishing robust industrialisation and commercialisation pathways to ensure long-term economic sustainability.

Another example, still in the pilot stage and not yet a production system, is the **EUPEX project**[376], supported by Horizon Europe. The project focuses **on co-designing a European modular exascale-ready pilot system.** EUPEX brings together results from numerous prior projects while validating processors developed through the European Processor Initiative (EPI). The goal is to create a coherent modular HPC platform, paving the way for a self-reliant European HPC industry capable of manufacturing and delivering exascale-class supercomputers.

Despite existing synergies between R&D&I activities and deployment efforts, stakeholders have expressed concerns about **the pace of technological development,** citing delays in translating research outcomes into tangible applications and scaling up solution. While Europe hosts a significant share of the world's HPC resources, only a small fraction of HPC technology and infrastructure is developed within the EU. This reliance on imports places the European Union at a competitive disadvantage. Currently, the EuroHPC JU relies heavily on off-the-shelf solutions and lacks an integrated pipeline between research and production, unlike models that can be observed in the US where research agencies fund early-stage technology development, and public authorities commit to purchasing first-of-its-kind solutions. This approach provides start-ups with financial security, enabling them to invest in R&D and bring new innovations to market with confidence. This issue is closely linked to **the uptake of EU-funded technological R&D in public procurements**, particularly in encouraging the integration of European technologies in infrastructure projects. Interviewees acknowledged that the High-Performance Computer procurement process is progressing with a clear focus on adopting European technologies when it comes to the acquisition of quantum computers. For instance, the first quantum processors have been acquired from the French start-up Pascal, and EuroHPC is advancing with the procurement of additional quantum machines. These include a photonics-based quantum computer from Quandela, another French company, alongside five additional European quantum solutions.

The Chips Joint Undertaking, a strategic initiative funded by both Horizon Europe and the Digital Europe programme, fosters synergies between the two programmes. R&D activities funded by Horizon Europe fully align with the deployment activities of the Digital Europe programme. In this context (as it is the case for EuroHPC JU), programming coherence ensures that Horizon Europe supports the development of new technologies, while the Digital Europe programme funds the pilot lines needed to implement these innovations and make them available for further testing. Integration and coherence must also be established between R&D&I projects under the Chips Joint Undertaking and the broader Chips for Europe initiative. I The relationship between research infrastructures funded through Horizon Europe and technology infrastructures supported under the Chips Act could be improved by exploring the potential synergies between these two types of infrastructures. Another critical point is the alignment between the five Pilot Lines and other existing TIs in the microelectronics sector. At this stage, coordination is facilitated by the fact that many major Pilot Lines / Cleanrooms in Microelectronics are managed by the same key stakeholders involved in the Chips Act, such as leading RTOs like CEA, IMEC, Fraunhofer and VTT. Having a clear picture of existing

[376] EUPEX project https://eurohpc-ju.europa.eu/research-innovation/our-projects/eupex_en

Research and Technology infrastructure within the field of Microelectronics and potential collaborations at the European level would be highly valuable. This could be facilitated by ongoing initiatives, such as the **RITIFI project**[377], funded under Horizon Europe, which aims to map and support synergies between Research Infrastructures and Technology Infrastructures at European level. Coherence must also be strengthened with ongoing initiatives such as the **INFRACHIP - European Research Infrastructure on Semiconductor Chips**[378] to ensure it fits into the broader pipeline and contributes effectively to a unified European strategy for semiconductor development. Questions regarding coherence with existing national microelectronics centres and their alignment with the broader Chips Act initiative merit further exploration. Examining how the capacities developed under the Chips Act can connect with the activities of a wider network of national technology centres could significantly amplify their contribution to the broader European innovation ecosystem.

- **Internal Coherence: Aligning synergies between EDIHs, Competence Centres and AI Factories to prevent duplications**

All three Technology Infrastructures described in the case studies are organised around Competence Centres (SO1 and SO6) or, in the case of the TEF (SO2) a single-entry point. These Competence Centres or Single-Entry Points (SEP) are intended to connect to European network of Infrastructures, serving as access points to other nodes within the network. **Competence Centres and SEP of the TEFs are also complementarity to other EU initiatives such as the European Digital Innovation Hubs (EDIH).** As a matter of example, TEFs and European Digital Innovation Hubs (EDIHs) play distinct but **interconnected roles in fostering innovation and technological adoption**. **EDIHs** focus on supporting the local economy by helping businesses and organisations adopt digital technologies. EDIH play a key role in linking regional activities to a Europe-wide network within sustainable innovation infrastructure preventing redundancy and lowering costs. They also act as local entry points to European AI initiatives, including TEFs, and emphasise the principle of 'test before invest', allowing users to assess the benefits of mature technologies in their environments before purchasing. **TEFs, on the other hand, serve as centralised resources and toolkits for EDIHs and other AI solution users**. Unlike EDIHs, TEFs focus on validating emerging technologies in real-world environments, through TIs bridging the gap between development and market readiness. The complementarity lies in the pipeline from TEFs to EDIHs: TEFs validate and refine new technologies, and once mature, the validated solutions can be distributed via EDIHs to local users and businesses[379].

As outlined in the Chips Act[380], synergies between **Competence Centres** and existing structures, such as **European Digital Innovation Hubs** established under Digital Europe, should be maximised. As Competence Centres are still being established, some interviewees highlighted that connections with EDIHs have not yet been highly visible. However, the ground for such synergies has been paved with industry players involved in EDIHs recognised as valuable partners for Competence Centres, offering key channels for collaboration. As part of the Finnish Competence Centre, efforts are ongoing to map networks focused on industry digitalisation across Finland, with plans to integrate these existing channels into the Chips

[377] RITIFI project - https://ritifi.eu/
[378] INFRACHIP - https://infrachip.eu/
[379] https://digital-strategy.ec.europa.eu/fr/faqs/testing-and-experimentation-facilities-tefs-questions-and-answers
[380] https://eur-lex.europa.eu/legal-content/FR/TXT/?uri=uriserv%3AOJ.L_.2023.229.01.0001.01.FRA

Competence Centre's operations once active. The distributed 'access point' model of Competence Centres, as outlined in the Chips Act, is specifically designed to leverage these networks, ensuring wide access and effective integration.

As part of SO1, the AI Factories initiative[381], announced in January 2024, aims to support a broad spectrum of European users, including start-ups, SMEs, industry, academia, and the public sector. This initiative seeks to foster a highly competitive and innovative AI ecosystem in Europe by acquiring and upgrading large General-Purpose AI models, supercomputers, and programming facilities. Additionally, it will focus on developing next-generation Graphics Processing Units, including those for quantum computing, to address the global chip shortage[382]. The AI Factories also aim to broaden AI adoption, particularly among start-ups and SMEs, **by offering access to AI solutions while strengthening the European AI research ecosystem.** Interviewees emphasised the initiative's importance in maintaining Europe's competitiveness, not only for public institutions but also for private entities. They highlighted the urgency of acting swiftly and decisively to address the needs of the AI community and demonstrate Europe's commitment to overcoming challenges and seizing opportunities in AI development. **The AI Factories initiative complements the broader strategy of fostering an ecosystem of excellence and trust in AI across the European Union by leveraging initiatives such as the AI Testing and Experimentation Facilities also escribed in this case study**. The synergies between AI Factories and TEFs will improve AI innovation ecosystem, providing pre-market validation for AI innovations developed within AI Factories. Additionally, coherence with other major AI networks, such as CLAIRE (Confederation of Laboratories for Artificial Intelligence Research in Europe) and ELLIS (European Laboratory for Learning and Intelligent Systems), is essential to ensure the alignment of high-investment efforts with Europe's wider AI research and development landscape.

- **Internal Coherence: Synergies between Specific Objectives within Digital Europe**

TIs cannot be decoupled either from the data they utilise and generate. **Effective data management is also an important part of their operation, particularly for Technology infrastructures under Specific Objectives 1 and 2.** Under Specific Objective 1, in the context of exascale resources and AI, which involve enormous training datasets and observational data, **the seamless production, movement, storage, and analysis of data is a growing challenge**. **Data management strategies must ensure that data flows in and out of machines in an integrated, efficient, and secure manner**. According to interviewees, while EuroHPC has made significant strides in this direction, there is an increasing awareness of the need for a data strategy that is linked to the computing strategy. Addressing emerging needs will require a long-term and ambitious vision. **This includes understanding and planning for data growth, particularly in sectors like health and life sciences, where personal data protection requires additional privacy and security measures**.

In that context, the Technology Infrastructures highlighted in the case studies, present opportunities for synergies with other activities under SO2, such as Data Spaces. TIs are expected to establish strong connections with Common European Data Spaces, which make data more accessible for economic and societal applications while promoting interoperability and cross-sector collaboration.

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[381] https://digital-strategy.ec.europa.eu/en/policies/ai-factories
[382] https://digital-strategy.ec.europa.eu/en/policies/ai-factories

- **External Coherence; Complementary IPCEI Industrial Deployment and Joint Undertaking R&D&I and Deployment Activities**

Since 2018, two IPCEIs in the microelectronics value chain have been launched[383]. These IPCEIs comprise 100 projects in 14 Member States including up to €10 billion State aid which is expected to unlock more than €20,2 billion of additional private investment. These projects focus on R&D and First Industrial Deployment of technologies. While IPCEIs focus on strategic value chains with an emphasis on first industrial deployment just before mass production, the Chips JU also supports value chains but operates at a lower TRL, concentrating on research and technology validation as part of the Chips for Europe Initiative. Coherence between the two initiatives is evident in examples such as the ASML EUV projects[384], which demonstrate alignment between IPCEI and Pilot Lines. Synergies between the Chips JU and IPCEI emerge naturally because the same or similar companies participate in both frameworks (e.g. CEA Leti, Silicon Austria Lab), and Member States fund IPCEIs through national co-funding while also co-financing Chips JU projects. A key argument could be that these synergies should be institutionalised to ensure a structured and efficient transition from research to industrial deployment. Further avenues for synergies could also be explored including how pilot lines can eventually evolve into large-scale industrialisation, strengthening the overall semiconductor ecosystem. Moreover, **lab-to-fab accelerator projects** are also being funded within the Chips Joint Undertaking and aim to **industrialise pilot lines** by bridging the gap between research and large-scale production, ensuring that innovations can transition smoothly from research to manufacturing.[385]

- **External Coherence: Synergies Between EU-Funded Initiatives and National and Regional programmes**

Technology Infrastructures discussed in this case study, which are funded 50% at the European level, represent strategic investments that many Member States could not have been able to undertake at the same scale independently. This highlights the added value of European-level financing, enabling the establishment of advanced capabilities that serve the collective needs of the Union. These infrastructures complement existing national and regional facilities, offering European-wide capabilities and access.

At the national level, several initiatives align with and complement European efforts. For example, the French ‘NumPEx’ initiative under the France 2030 program is an exploratory research initiative led by CEA, CNRS, and Inria. It focuses on designing and developing software components for future exascale machines, preparing both scientific and industrial users to fully leverage their capabilities. NumPEx also contributed to the Jules Verne consortium's response to EuroHPC’s call for expressions of interest, with the aim of hosting and operating one of the two planned European exascale machines by 2025 at the Très Grand Centre de Calcul at the CEA DAM Île-de-France centre.

Box 7. The NumPEx programme

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383 IPCEI - https://www.ipcei-me.eu/

384 https://www.asml.com/en/products/euv-lithography-systems

385 See the Decision GB 2024.92 - Annex MAWP - Appendix 6 – CE. DIGITAL-JU-Chips-2025-SG-SSOI. The accelerator for Advanced Strained Silicon on Insulator Substrates will provide the necessary infrastructure to validate SOI substrates on an industrial scale, accelerating their adoption within the European semiconductor ecosystem. By supporting high-volume production, manufacturers can assess the feasibility and cost-effectiveness of SOI in large-scale FD-SOI applications. It will also promote collaboration across the semiconductor ecosystem, working with other pilot lines, as well as connecting to the design platform and competence centres, among others.

The NumPEx programme (NumPEx) is a six-year project with a budget of €41 million which commenced in 2023. The programme stems from an objective analysis of the current state of the HPC/HPDA community at international, European, and national levels. One of the key drivers of the NumPEx program is the ongoing paradigm shift in HPC system architectures, with rapidly emerging new technologies and applications (e.g. the digital continuum and AI). This shift necessitates the development and adaptation of the HPC software stack to prepare for the upcoming Exascale supercomputer. The program also aims to anticipate and prepare for post-Exascale systems and their applications. The programmes aims to:

Contributing to the European Exascale software stack: NumPEx plays a critical role in the European Exascale ecosystem, with a special focus on the Jules Verne project, which will deliver the second European Exascale system in 2025.

Preparing the building blocks for post-Exascale software solutions: In the long term, NumPEx aims to explore and develop innovative software solutions to address the rapid evolution of complex HPC systems, the increasing prevalence of data flow-oriented applications, and the integration of AI approaches

Preparing academic and research applications for the Exascale era

Structuring the French Exascale community

Source: https://numpex.org/wp-content/uploads/2023/11/NumPEx_white_paper.pdf

Synergies between funded infrastructures and national or regional initiatives are also demonstrated through the contribution of regional funds. For instance, the LUMI supercomputer has benefited from additional funding provided by the European Regional Development Fund, allocated by the Regional Council of Kainuu[386].

EU Added Value

The primary EU added value in co-funding the acquisition and operational costs of Technology Infrastructures through Digital Europe lies in the effective pooling of resources, enabling large-scale investments in strategic technologies and digital ecosystems that benefit all Member States. These investments, such as those in EuroHPC supercomputers and Chips Pilot Lines, represent significant financial commitments–amounting to €250 m387 for the former and over €3.6 billion for the latter388–that individual Member States would unlikely undertake independently. This collaborative approach facilitates the acquisition of critical infrastructure across Europe, fostering innovation, enhancing the region's technological and industrial competitiveness, and reducing reliance on foreign testing infrastructures. In the context of SO1 for instance, interviewees note that by working together, Europe has achieved pre-exascale and exascale systems much faster than individual Member States could have done independently. **The dual-funding approach, combining EU and national contributions, adds a strong European dimension to infrastructures hosted in Member States while ensuring they retain ownership over identifying infrastructure needs acting as 'problem owners'.** This allows Member States to adapt infrastructures to their ecosystems and provide services tailored to the specific demands of their industries, particularly benefiting SMEs and start-ups. At the same time, this model promotes broader access to European collaborations, enabling researchers and stakeholders across Europe to access these infrastructures, fostering innovation and cross-border collaboration.

Technology Infrastructures, as presented in this case study, are conceived and structured as interconnected networks, enabling the establishment of pan-European collaborations—a key aspect of the EU's added value. For instance, **Testing and Experimentation Facilities** fund networks of TI providers across at least three countries. EFs enable access to these networked

[386] https://www.lumi-supercomputer.eu/eurohpcju/
[387] https://digital-strategy.ec.europa.eu/en/factpages/digital-success-stories-jupiter-first-european-exascale-supercomputer#:~:text=The%20DIGITAL%20Europe%20programme%20is,boost%20to%20EU's%20AI%20ecosystem.
[388] Includes Digital Europe programme, Horizon Europe and Member States participation.

facilities through a digital single-entry point. These infrastructures are organized into 'nodes' offering complementary services and focus areas, supported by smaller 'satellite'. This approach is further reinforced by a Coordination and Support Action under the Digital Europe 2023–2024, which applies a cross-sector perspective to existing TEFs. High-Performance Computing centres generally collaborate across Europe, but this collaboration is set to deepen with the introduction of two new exascale systems in Germany and France. Additionally, the integration of Quantum Computing and Artificial Intelligence across all HPC systems will create common challenges that further strengthen the need for unified efforts among HPC centres throughout Europe. Complementary initiatives like EuroCC and Castiel (1 and 2) aim to establish a European network of National Competence Centres, facilitating coordinated access to supercomputing networks and promoting collaboration across Member States. As part of SO6, the Pilot Lines are supported by an extended network of connected design centres and Competence Centres. These centres act as hubs to coordinate the supply and demand for competencies across Europe, operating through a single-entry point model to streamline access and strengthen connections between facilities and stakeholders

Finally, developing a strategy at the European level, particularly in strategic sectors (e.g. semiconductor, AI, HPC) ensures the participation of major players while influencing smaller countries to prioritise the same objectives. Large Member States and key industrial players, often with pre-existing strategies and infrastructure, align with European initiatives (e.g. Finland's national strategy, 'Chips from the North' or Belgium IMEC's participation in the Chips for Europe Initiative), leveraging frameworks like the European Chips Act to reinforce their national goals. In that context, Joint Undertakings, which include both Member States and industry stakeholders, play an important role in ensuring coherence and alignment. At the same time, smaller countries are influenced by these European frameworks to make certain critical technologies a priority. In the context of the Chips Act, Croatia, for instance, initiated the Croatian Competence Centre for Semiconductors in 2023, aligning its efforts with the EU's semiconductor targets[389]. Similarly, Czechia implemented the European Chips Act by establishing the Czech National Semiconductor Cluster, which has led to significant progress, such as producing 3 million wafers annually[390]. Malta, through Malta Enterprise, has set up a microchips competence centre to attract industry players and innovators in this strategic sector[391]. These examples illustrate how the European strategy in certain technology sectors can reinforce coherence among major players but also acts as a catalyst for smaller Member States to prioritise certain strategic goals – added value for the EU as such competitive ecosystem across the EU. These examples demonstrate how a European strategy in specific technology sectors can enhance coherence among major players while serving as a catalyst for smaller Member States to prioritise strategic objectives. This approach generates significant added value for the EU by fostering a competitive ecosystem across the entire region.

Conclusions

In conclusion, Technology Infrastructures are instrumental in driving the deployment of technologies, structuring digital ecosystems, and delivering the essential capabilities needed for innovation and growth. They serve as a critical bridge between research and the

[389] DESI Report 2024 – Country Report Croatia
[390] DESI Report 2024 – Country Report Czech Republic
[391] DESI Report 2024 – Country Report Malta

commercialisation of technologies, acting as backbone of digital ecosystems and enabling technological advancements that support economic and societal development.

Investing in Technology Infrastructures at the European level delivers substantial added value by achieving outcomes that no individual Member State could accomplish independently. Such investments guarantee pan-European access and establish a cohesive network of infrastructures, supporting collaboration and innovation across border. However, as demonstrated throughout this report, the ability of TIs to achieve their intended and full impact is contingent on a range of interconnected factors. These factors underline the necessity for a holistic policy framework that integrates TIs within the broader innovation ecosystem. Standalone investments, while valuable, are insufficient to unlock their full potential. To maximise the benefits of TIs, coordinated and comprehensive interventions across policy, funding, and collaboration must be prioritised.

Sources and methodology

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Interview with EU implementing organisation

Case Study 3: Synergies

Objective

The aim of this case study is to provide rich, qualitative data on how and why the activities aimed at fostering synergies between Digital Europe programme (from now on Digital Europe) and other programmes contribute to achieving the **programme's objectives**, with a specific focus on Horizon 2020, Horizon Europe, Connecting Europe Facility and Erasmus+.

The general objectives of Digital Europe are '*to support the digital transformation of industry and to foster better exploitation of the industrial potential of policies on innovation, research and technological development (...) the programme should also aim to better align Union, Member State and regional policies, and to pool private and industrial resources in order to increase investment and develop stronger synergies.*'[392].

Promoting innovative, green and digital economic transformation and fostering excellence in research and innovation (R&I) are among the EU policy priorities. The European R&I ecosystem is a complex web of different European, national, regional and local instruments. All instruments focus on different Technology Readiness Levels (TRLs) – ranging from fundamental research to the deployment of technologies. This creates interlinkages and potential for synergies between the instruments. An integrated approach and strengthening of synergies between the key EU instruments can reinforce the impact of policies and resources through complementarities and promote the effectiveness and efficiency of utilising the European R&I potential.

Considering the above, this case study analyses how and the extent to which synergies with Digital Europe and other programmes are fostered.[393]

Approach

This case study looks at synergies between Digital Europe and other programmes, with a specific focus on Horizon 2020, Horizon Europe, Connecting Europe Facility and Erasmus+. This case study is based on desk study, a mini-survey for selected Digital Europe projects, a general beneficiary survey, interviews with Digital Europe project managers, data analyses of e-grant data and analyses of the Digital Europe Work programmes 2021 - 2022 and 2023 - 2024. 0 presents an elaborate explanation of the methods.

The case-study is divided into three sections:

- **Synergetic actions**: background piece on the rationale behind the synergies and the type of synergies targeted by the EC, a review of the synergies identified in the various regulations of R&I programmes, the data analysis and the Digital Europe interim evaluation survey.

[392] Regulation (EU) 2021/694 of the European Parliament and of the Council of 29 April 2021 establishing the Digital Europe programme and repealing Decision (EU) 2015/2240 (Text with EEA relevance). (14) Retrieved from: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32021R0694

[393] By examining synergies, this case study contributes to the evaluation question COH.04: *To what extent is Digital Europe coherent with actions funded under EU programmes listed in Annex III of the Digital Europe Regulation, the Recovery and the Resilience Facility, the Digital Decade Policy programme objectives and targets (22) and other EU programmes with similar objectives? Have synergies materialised? In which areas should synergies be fostered?*

- **Evaluation criteria**: an assessment of the evaluation dimensions with respect to how Digital Europe fosters synergy with other programmes. This includes six illustrative examples to highlight best practices of targeted, potential and realised synergies.
- **Conclusion**: synthesis of the findings and conclude with best practices.

Limitations

This evaluation is conducted halfway through the programme's implementation and therefore the ability to observe and analyse materialised synergies is limited. Additionally, there is a time-lag between the activities of other European programmes and deployment through Digital Europe. This affects the extent to which synergies already can be achieved. In addition to that, different definitions of synergies exist. This case study is therefore focused on describing some of the expected synergies, using the synergy typology described in the next section, as well as on first indications that these are being realised. However, the study cannot present a complete review of the various ways in which the Commission aims to foster synergies.

Synergetic actions - evidence

This Section introduces the scope and definition of *synergies* in the context of this case study. Secondly, it introduces different mechanisms through which synergies can occur. Following that, it describes references to synergies in Digital Europe Regulation and cross-references to four other programmes and the references to Digital Europe in their respective Regulations[394]. Third, a quantitative and descriptive overview of a selection of Digital Europe projects that potentially have synergies with the previously mentioned four other programmes following the data analyses and two surveys is provided. Finally, this section highlights findings from a HaDEA Feedback to Policy Report on synergies.

The definition of 'synergies'

To ensure a common understanding of '*synergies*', it is important to define the term, as different definitions and interpretations exist. According to the **Better Regulation Toolbox** synergies are closely linked with the evaluation criterium *coherence.* This criterium focuses on synergies or inconsistencies between policies in related fields that are expected to work together, especially if the other interventions have the same or similar objectives.[395]

Similarly, the **evaluation study on the external coherence and synergies of Horizon 2020 within the European research and innovation support system**[396] explains that '*synergy occurs when the sum of (expected) results of programmes/initiatives as a whole is greater than the sum of the parts (1+1>2)*'. Synergies can occur through coordinated policies, a common approach or through common institutions. The report *Research to Reality Digital Solution to European Challenges* defines horizontal and vertical synergies, reflecting the way governments are involved (i.e. within or between). Horizontal synergies occur between funding programmes

394 Horizon 2020, Horizon Europe, Connecting Europe Facility and Erasmus+.

395 Better Regulation Toolbox. Retrieved from: https://commission.europa.eu/law/law-making-process/planning-and-proposing-law/better-regulation/better-regulation-guidelines-and-toolbox_en

396 European Commission: Directorate-General for Research and Innovation, *Evaluation study on the external coherence and synergies of Horizon 2020 within the European research and innovation support system – Final report*, Publications Office of the European Union, 2023, https://data.europa.eu/doi/10.2777/90147

at the same government level with complementary objectives. On the other hand, vertical synergies occur across government levels, such as when regional and national levels align with EU level policies.[397] Finally, a guidance **notice** in the context of synergies between Horizon Europe and the ERDF provides insight on how synergy mechanisms can be operationalised.[398]

In this study, we will use the following **synergy typology** for conceptual clarity (see Table). Fostering of synergies can refer to any of the other types of synergies listed in this table. This synergy typology is based on the different previously mentioned sources[399]:

Table 10. Synergy typology

Synergy type	Explanation
Cumulative funding synergies	Cumulative funding synergies bring together **different funding streams** (including both shared and directly managed funds) in the same project, single action or a group of inter-dependent actions or operations (e.g. an institute receives Digital Europe funding and uses other funding streams to co-finance the project or investments).
Sequential synergies	Sequential synergy refers to collaboration where **projects/initiatives build on each other's results/resources**. Within this type, there is a differentiation between: **Upstream synergy**, which occurs when initiatives **pave the way** for new projects (Digital Europe) (e.g. (national) investments into capacities and infrastructures are to be made available to the deployment of innovative new technologies and solutions). **Downstream synergy** aimed to enhance **the take up** of H2020 and other research results towards the market (e.g. the results of a H2020 project are further developed, prototyped and demonstrated to foster or increase the uptake of the developed technology solution).
Concurrent (or parallel) synergies	Concurrent synergy refers to projects/initiatives that **complement each other**. The positive complementary interactions are contemporaneous rather than sequential (e.g. participants are active in multiple programmes that are complementary, and knowledge spillovers take place).
Strategic synergies	Strategic synergies are characterised as **planned synergies through aligning policy objectives, synergy-enhancing services, implementation rules or requirements** (e.g. award criteria aimed to foster synergies).
Operational synergies	Operational synergies refer to **interactions regarding concrete ways to implement the collaboration, including financial and non-financial aspects**. This collaboration can be intentional or incidental. A special case of operational synergy is substitution synergy which occurs when successfully evaluated H2020 (or Digital Europe) proposals are subsequently funded by other sources (e.g. after receiving the Seal of Excellence).

Synergies (mechanisms) in the Regulation establishing Digital Europe

Digital Europe is embedded within a clear policy framework guided by EU priorities (i.e. the digital transformation) and the Digital Decade Framework. The Regulation establishing Digital Europe states that the programme should aim to support digital industry transformation by aligning EU, national, and regional policies and pooling resources to enhance investment and foster synergies. The Regulation introduces different synergy mechanisms and a wide range of references to other programmes:

The extent to which **a project has** (or explains the) **synergies and complementarities** with other Union programmes is used as **an award criterion** in the selection process of Digital Europe projects (**strategic synergy**).

The implementation of different funding programmes related to one technology by one implementing body, for instance, HPC development by the EuroHPC JU, creates synergies among research and deployment actions (strategic synergies)

397 Research To Reality - Digital Solution to European Challenges link (download)

398 Commission Notice Synergies between Horizon Europe and ERDF programmes 2022/C 421/03 Retrieved from: https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX:52022XC1104(02). The Commission Notice introduces different mechanisms to exploit synergies, including Seals of Excellence, transfers, cumulative funding, support for Teaming and 'upstream/downstream synergies.

399 Including the Evaluation study on the external coherence and synergies of Horizon 2020 within the European R&I support system, the Commission Notice on Synergies, the Better Regulation Toolbox, the Digital Europe Regulation, the Research to Reality Digital Solution to European Challenges-report and the HaDEA Feedback to Policy study.

Collaboration between the Commission and the relevant Member States authorities should aim to create synergies between directly and indirectly managed programmes (**operational synergies**);

The **Seal of Excellence** is introduced as a means to certify and signals the quality of a proposal to other funders, when a project was assessed, complied with the minimum requirements, but was not financed due to budgetary constraints (**operational synergy**);

Arrangements for cumulative/complementary **funding** from Union programmes where the management arrangements allow it (in sequence, in an alternating way, or through the combination of funds), due to the need for co-financing for most actions;

The **European Digital Innovation Hubs** are a means to foster synergies with Horizon Europe and/or other R&I programmes;

Cross-references between the Digital Europe Regulation and the Regulations of the other four Union programmes in scope

There are strong complementarities for synergies between Digital Europe and respectively Horizon Europe, Connecting Europe Facility, Erasmus+ and Horizon 2020 in each legal basis. **Horizon Europe** and Digital Europe address similar themes but target different types of actions. Both have different outputs and intervention logics. Horizon Europe is focused on research and innovation, while Digital Europe focuses on deployment. Both the Digital Europe regulation (Annex III) and the Horizon Europe regulation[400] cross-reference each other. For instance, Horizon Europe has dedicated budget for the cluster 'Digital, Industry and Space', which aims to develop technologies relevant to Digital Europe. Horizon Europe has 'digital' as a cross-cutting theme, and it supports research infrastructures and through the pillar 'Innovative Europe' supports scale-up breakthrough innovations. Conversely, Digital Europe focuses on digital capacity building, national, regional and local deployment of digital capacities and digital technologies in areas of public interest. Digital Europe supports infrastructures access for R&D activities supported by Horizon Europe and gradually implements technologies developed under Horizon Europe.

As for the synergies with the **Connecting Europe Facility**, the Digital Europe regulation highlights that the Digital Europe capacities and infrastructures are to be made available to the deployment of innovative new technologies and solutions in the field of mobility and transport. Furthermore, CEF aims to support the roll-out and deployment of these technologies. The CEF regulation[401] specifies that the CEF should focus on funding the digital infrastructure, whereas Digital Europe focuses more on individual digital services and applications in the context of mobility and transport. Finally, the Digital Europe regulation stipulates that coordination mechanisms are to be established.

The synergies with **Erasmus+** lie mostly at complementing the development and acquisition of the advanced digital skills in all Digital Europe domains and through mobility experiences.

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[400] Regulation (EU) 2021/695 of the European Parliament and of the Council of 28 April 2021 establishing Horizon Europe – the Framework programme for Research and Innovation, laying down its rules for participation and dissemination, and repealing Regulations (EU) No 1290/2013 and (EU) No 1291/2013 (Text with EEA relevance) Retrieved from: https://eur-lex.europa.eu/eli/reg/2021/695/oj

[401] Regulation (EU) 2021/1153 of the European Parliament and of the Council of 7 July 2021 establishing the Connecting Europe Facility and repealing Regulations (EU) No 1316/2013 and (EU) No 283/2014 (Text with EEA relevance) Retrieved from: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex:32021R1153

The Digital Europe Programme does not provide funding for students' mobility experiences, however, the mobility experiences can be funded by Erasmus+, for instance, via the Digital Traineeship Opportunities (DOTs). Double degrees among partners of Digital Europe projects offer another opportunity for mobility outside of Erasmus+.

The project **AI&Health**[402] (101083880), for instance**,** devotes a work package to student and staff mobility using the Erasmus+ digital tools. It is aimed at the creation or renewal of Erasmus+ inter-institutional bilateral agreements among university partners for successful student mobility (for studies, traineeships or a combination of both) and staff mobility. It uses digital Erasmus+ tools, such as the Erasmus+ dashboard, to manage the mobility, and the European student card for the recognition of student status, access to campus, and transfer of student records. In practice, students enrolled in an AI&Health master offered by one participating university can attend an AI&Health master module in another university and obtain a double master degree (each university offers a different specialisation). As the training model is hybrid, students can benefit from Erasmus+ grants to attend lessons abroad at the second university.

The project AI4CI[403] (101123524) introduced a Joint Master Agreement and Erasmus+ agreements to support student mobility between the participating universities. Moreover, double degree agreements are being finalised.

The GreenChips-EDU project[404] aims to foster student mobility by offering Double Degree (DD) programmes. Partners in this project are promoting double degree agreements, which offer students the opportunity to earn two degrees from different institutions. By promoting these agreements, the project aims to enhance student mobility and provide a more comprehensive educational experience.

Horizon 2020 was embedded in a clear policy framework that includes a priority on the digital transformation (e.g. the Digital Agenda for Europe), however, logically, in the Horizon 2020 regulation there are no references to Digital Europe or vice versa[405].

Finally, in all cases, it is highlighted that programming and implementation processes require a strong coordination mechanisms and governance structure.

Beneficiary survey

The results of the beneficiary survey show that large shares of respondents value Digital Europe as being complementary to/ having synergies with other programmes' input on synergies. Similarly, for a large part of the respondents, sequential synergies occur.[406]

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402 Advanced digital skills programme Artificial Intelligence and Health

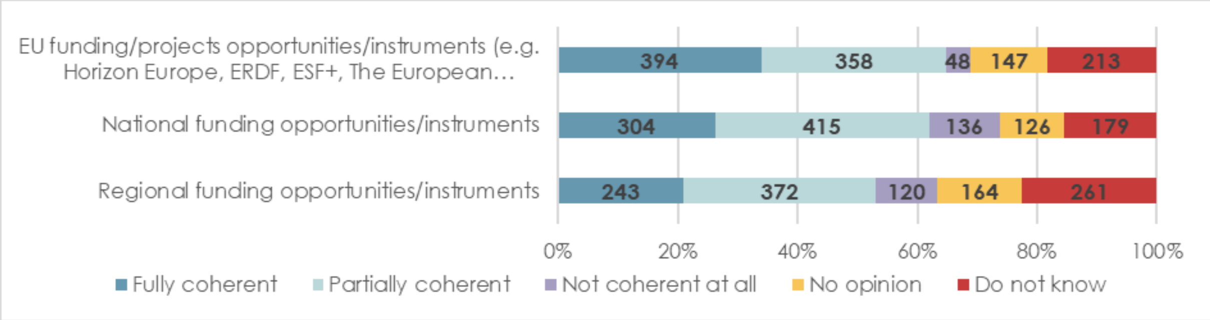
403 Artificial Intelligence for Connected Industries

404 Building a Digitally-Supported Education Ecosystem for Next Generation Microelectronics Experts in Sustainable Chips and Applications for a Green and Circular Economy

405 Regulation (EU) No 1291/2013 of the European Parliament and of the Council of 11 December 2013 establishing Horizon 2020 - the Framework programme for Research and Innovation (2014-2020) and repealing Decision No 1982/2006/EC Text with EEA relevance. Retrieved from: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex:32013R1291

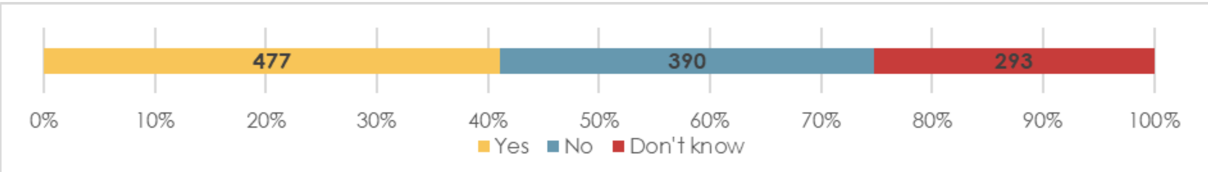
406 For a complete analysis of the beneficiary survey, please see ANNEX C of the Synopsis report.

Figure 8. Beneficiary survey question 35: Please comment whether, and if so to which extent, the Digital Europe is complementary to and/or has created synergies (e.g. collaboration in implementation) with the following type of other instruments: (n=1160):



At the European level, Digital Europe is seen as fully coherent with other EU funding instruments by 38.9% (n=394) of respondents. Perceptions of coherence between Digital Europe and **regional** and **national funding opportunities** are mixed, with several respondents seeing Digital Europe as only partially aligned with these opportunities (34.5% (n=243) for regional and 37.2% (n=304) for national funding) (Figure 8). While the majority of the participants indicated coherence with other EU programmes in an open question, some also indicated that practical challenges (e.g. legal restrictions, administrative barriers, lack of coordination or the integration with national funding sources) hinder the extent to which the synergies can be exploited.

Figure 9. Beneficiary survey question 36: Does your Digital Europe-funded project build directly on activities supported under other European funding instruments, such as Horizon Europe, ERDF, Recovery and Resilience Facility, Digital Decade Policy programme etc.? (n=1160)



As for **sequential synergies**, as much as **41% of the respondents mention that their project builds on the results of another EU funded projects,** which highlights that beneficiaries manage to navigate through different EU funding options further improving or developing previously achieved results. 34% (n=390) did not agree with that statement and 25% (n=293) that did not know (Figure 9).

Data analysis

High-level analysis of cross-participation data

Cross-participation analysis, which can serve as a proxy of potential for knowledge transfer shows an overlap of targeted stakeholder groups between the Digital Europe programme and Horizon 2020, Horizon Europe and Erasmus+. This analysis shows that 71% (2482) **of all unique organisations participating in Digital Europe** (3474) **also participate in Horizon Europe, Horizon 2020, Erasmus+ and/or the Connecting Europe Facility. Furthermore, the data shows that there are multiple organisations that**

participate in more than one Digital Europe project (there are 3474 unique organisations in the dataset and in total there are 5196 project-organisation combinations)**.**

Digital Europe benefits from established networks, where participants have previously collaborated on other EU-funded initiatives or worked as consortium partners. About 1601 unique organisations (representing 46% of all unique organisations that participate in Digital Europe) are common between the Digital Europe and Horizon Europe, 1763 (representing 51%) between the Digital Europe and Horizon 2020 and 856 unique organisations (representing 25% of Digital Europe participants) between the Digital Europe and Erasmus+. There is an existent but more limited overlap of targeted stakeholders between the Digital Europe programme and the Connecting Europe Facility with 94 unique organisation (representing 3% of all unique organisations that participate in Digital Europe).

There is substantial overlap of targeted stakeholder groups between Digital Europe and Horizon Europe and Horizon 2020, with about 1601 unique organisations (representing 46% of all unique Digital Europe grant participants) in common between the Digital Europe and Horizon Europe, and 1763 (representing 51%) between the Digital Europe and Horizon 2020. Key SOs concentrating cross-participation include SO4 (Advanced Digital Skills), SO5 (EDIH) and SO1(High Performance Computing). Cross-participation in the aforementioned areas (EDIH, High Performance Computing including NCCCs, Advanced Digital Skills) is consistent, as it links research outcomes of tested innovative digital solutions with practical applications. It is also important to note that some activities, including the NCCCs and EDIH, were initially funded under Horizon, which further explains the cross-participation.

Digital Europe also complements Erasmus+ which supports education and training, and which has concrete synergies with SO4. **Cross-participation analysis which serves as a proxy of potential knowledge transfer shows an overlap of targeted stakeholder groups between Digital Europe and Erasmus+** with about 856 unique organisation (representing 25% of the unique Digital Europe participants) in common between the Digital Europe and Erasmus+. Key SOs concentrating cross-participation include SO4 (Advanced Digital Skills) and SO5 (Deployment and Best use of Digital Capacities and Interoperability). Other SOs such as SO1 also include synergies with Erasmus+ as part of their training activities. One of the priorities of the Digital Education Action Plan is to support the development of digital skills and competences. HPC Training Activities builds on the successful pilot project 'Digital Opportunity Traineeships', continued under Erasmus+ as part of the Digital Education Action Plan, and it will focus on highly specialised skills, notably in HPC.

The Digital Europe programme also has complementarities with the Connecting Europe Facility (CEF) and the Connecting Europe Facility (CEF2) as the latter supports the high capacity broadband and 5G corridors necessary to deploy digital services and technologies across the EU[407]. Cross-participation analysis indicates existent but more limited overlap of targeted stakeholders. There are 94 unique organisation involved in 228 Digital Europe projects that participate in CEF-funded project as well. The 94 unique organisations correspond to 3% of all unique organisations that participate in Digital Europe. Key SOs that show cross-participation include SO3 (Cybersecurity and Trust) and SO5 (Deployment and Best Use of Digital Capacities and Interoperability) (see Table). Indeed, some complementary

[407] SWD (2024) 37 Final Performance and Evaluation Framework for Digital Europe

between activities are to be observed between the CEF and the Digital Europe as the first eight EDMO regional hubs (under SO5) and operations were initially funded and supported by the CEF before receiving Digital Europe funding.

In all instances, the organisations that cross-participate (i.e. the organisations that are involved in both Digital Europe and Horizon Europe, Horizon 2020, Erasmus+ and/or the Connecting Europe Facility) **account for a disproportionally large share of all possible Digital Europe project-organisation combinations** (e.g. Digital Europe-Horizon Europe: 46% of the unique organisations account for 57% of all possible project-organisation combinations; Digital Europe-Horizon 2020: Digital Europe-Horizon 2020: 51% of the unique organisations account for 60% of all possible project-organisation combinations; Digital Europe-Erasmus+: 25% of the unique organisations account for 34% of all possible project-organisation combinations; Digital Europe-CEF: 3% of the unique organisations account for 4% of all possible project-organisation combinations). **This means that the cross-participating organisations are relatively more involved in Digital Europe projects, than the non-cross-participating organisations. This suggests that these organisations are well positioned to foster and exploit synergies within the Digital Europe programme as well as in combination with any of the other four programmes.**

Table 11. Cross-participations (i.e. project-organisation combinations) across SOs and European programmes

SO / European programme	Connection Europe Facility (CEF)	Horizon 2020	Horizon Europe	Erasmus +
SO1: High Performance Computing	6	121	115	79
SO2: Artificial Intelligence	39	658	661	305
SO3: Cybersecurity and Trust	74	480	474	204
SO4: Advanced Digital Skills	20	359	364	321
SO5: Deployment and Best Use of Digital Capacities and Interoperability	89	1512	1328	856
SO6: Semiconductors	NA	NA	NA	NA
Total Cross-participations	**228**	**2481**	**2942**	**1306**

Table 12. Cross-participations across SOs and European programmes (unique organisations)

	CEF Unique Organisations (n / %)		Horizon 2020 Unique Organisations (n / %)		Horizon Europe Unique Organisations		Erasmus+ Unique Organisations (n / %)		Total Unique Organisations per SO
SO1: High Performance Computing	5	*5%*	94	*88%*	90	*84%*	64	*60%*	107
SO2: Artificial Intelligence	22	*3%*	445	*69%*	447	*70%*	188	*29%*	643
SO3: Cybersecurity and Trust	43	*7%*	353	*61%*	344	*59%*	154	*26%*	582
SO4: Advanced Digital Skills	11	*2%*	276	*59%*	279	*60%*	227	*49%*	464
SO5: Deployment and Best Use of Digital Capacities and Interoperability	56	*2%*	1136	*49%*	987	*43%*	610	*27%*	2297

SO6: Semiconductors	NA	NA	NA	NA	NA

Data analysis of selected Digital Europe projects

To gain better understanding of the dynamics at play, a selection of 120 *Digital Europe project-programme* combinations[408] that have high potential for synergies with *Horizon Europe, Horizon 2020, CEF and Erasmus+* was developed by DG CNECT – based on cross-participation data, a relevance score, and a manual selection process. This sample was chosen based on the purpose and scope of this case study.

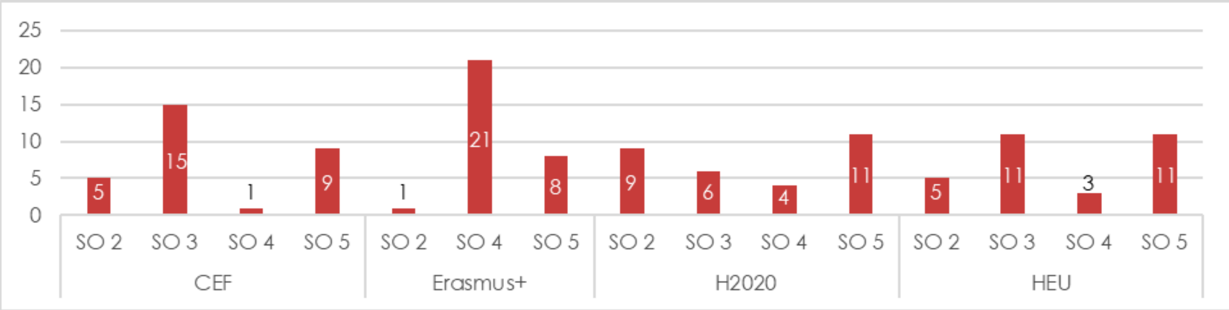
Cross-participation does not necessarily imply that synergies will occur, it can provide an indication of potential synergies. Here, data on cross-participation was used to narrow the amount of the projects to be analysed. The previous sub-section provides an overview of the cross-participation data. After selecting all projects in which beneficiaries also received grants from CEF, Horizon 2020, Horizon Europe or CEF, the sample was further refined[409]. This was done based on references in the Digital Europe proposals to the four EU programmes and their relevance scores – indicating the degree of alignment of the Digital Europe project with one of the four EU programmes (using the indexing software Elasticsearch). Across the four programmes, 1117 out of all 5229 Digital Europe projects received a relevance score comparing them to one of the other programmes. Afterwards, manual selection of the most relevant projects (i.e. the highest relevance score) was conducted based on the description of the planned synergies in the proposals. This approach aims to identify the Digital Europe projects with the greatest potential for synergies. It should be noted that the potential for synergies is higher than the 120 Digital Europe project-programme combinations as shown by the figures on cross-participations in the previous section and the number of projects with high relevance scores. For an elaborate methodological explanation, see Section 0.

The selected sample of 120 *project-programme combinations* signals high potential for concurrent synergies, as knowledge spillovers can be obtained through participation in multiple Digital Europe projects or through the interlinkages between different projects from different programmes. The 120 combinations involve 100 unique Digital Europe projects, indicating that some projects have been identified as having (potential) synergies with more than one of the four programmes. Similarly, there are 1087 unique organisation-project combinations, in which 811 unique organisations participate, indicating that, 22% of the organisations participate in more than one Digital Europe project.

Figure 10. Selection of projects

408 This refers to a combination of a Digital Europe project and potential synergies with either Horizon 2020, Horizon Europe, Erasmus+ and/or the Connecting Europe Facility.

409 As shown in the previous section, there are there are 3474 unique organisations in the dataset and 5196 project-organisations combinations – this means that there are 5196 cross-participations between Digital Europe and any of the four other programmes in the dataset.



The identified *project-programme combinations* show strong thematic complementarity when disaggregating them per SO[410]. The strongest thematic links between the SOs and the other programmes can be observed between **CEF and SO3** (e.g. digital infrastructure, including cybersecurity and SO3: cybersecurity and trust), and **Erasmus+ and SO4** (e.g. skills development and SO4: advanced digital skills). The other two SOs in scope (SO2: artificial intelligence and SO 5: deployment and best use of digital capacities and interoperability) have a more cross-cutting theme and therefore are relevant to both Horizon Europe and Horizon 2020.

A further analysis– based on the provided reasons for selection – was made to grasp how likely these potential synergies are. In some cases, it was not possible to clearly identify what type of (potential) synergy would occur. This resulted in **48 project-programme combinations with clear evidence of a (potential) synergy (including 39 unique projects),** which means that for 40% of the pairs there is a high likelihood of creating synergies among the two funding programmes.

Although in some cases, there was limited evidence how the (potential) synergy would occur, a manual in-depth analysis was performed on the 120 project-programme combinations. Through the manual in-depth analysis, the identified synergies were categorised based on the following synergy categories: concurrent synergies and sequential synergies (including direct follow-up projects). Table provides an overview of the categorisation of all 120 project-programme combinations. From this sample, more than half of the project-programme combinations are performed by consortia that already have worked together, (including, but not limited to the four programmes in scope); around half of the projects use knowledge that has been developed by previous projects, and 13 projects are direct follow-ups from previous projects. When considering the 48 project-programme combinations with clear evidence of a (potential) synergy, 88% of the project-programme combinations have concurrent synergies, 79% for sequential synergies, and 10 projects are direct follow-ups from previous projects.

Table 13. Categorisation synergies for selected project-programme combinations

Type of Synergy	**All project-programme combinations**	
	Count	Unique projects
Concurrent	65	52
Sequential	59	45

[410] The selection of 120 *Digital Europe project-programme* combinations did not contain Specific Objective 1 *High Performance Computing* and Specific Objective 6 *Semiconductors* projects.

Direct follow-up project	19	13

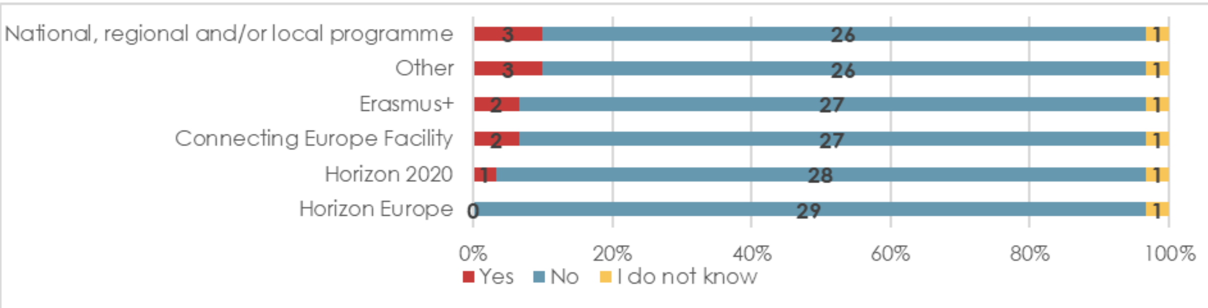
Results mini survey on synergies

To refine and gather insights on the extent to which the 100 identified Digital Europe projects foster synergies, a mini survey was conducted. The objective of the mini survey is to gather information on the extent to which co-funding has occurred, previous collaboration on EU / other projects between participants, whether the project is a direct follow-up project, whether the Digital Europe funded project uses input from other programmes or that its outputs will be used by other programmes, and their general perspective on synergies. 30 projects responded to the survey.

In terms of **co-funding**, according to the respondents of the mini survey, **around half of the projects** (n=16) **were co-funded by other public sources**, while the other projects (n=14) were co-funded from private sources. The majority of the publicly co-financed projects received co-funding from the **Recovery and Resilience Facility** (RRF) or from **national, regional or local funding sources**. In the open questions, respondents refer to Italy and Spain as examples where the RRF was used as a **pre-arranged** source of additional funding[411]. The majority of the projects with national, regional or local funding sources indicated that the co-funding was mostly **self-arranged**, and that this was a difficult process.

The majority of the respondents have **collaborated** on EU funded (or other) projects in the past. For 30% of the respondents (n=9), all consortium members have collaborated in the past, whereas for 63% some consortium members collaborated before (n=19). In terms of **the positioning of Digital Europe in the R&I landscape**, and to what extent Digital Europe is integrated with the other programmes through mutual use of (knowledge) outputs, we notice a strong position for the Digital Europe programme. **Error! Reference source not found.** shows that **some projects are a direct continuation of a previously funded project** – from national, regional or local programme, Erasmus+, H2020 or the Connecting Europe Facility.

Figure 11. Is your Digital Europe funded project a continuation of a project previously funded by any of the following programmes? (n=30)

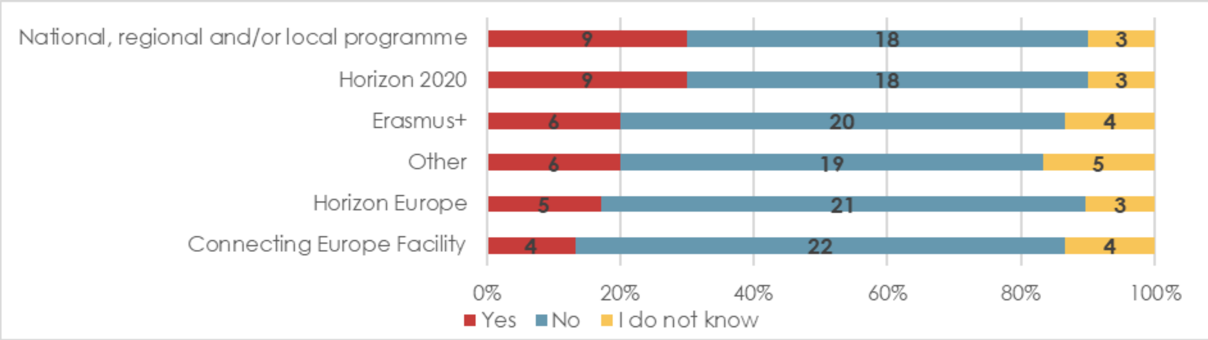


As for the **uptake of knowledge, results or outputs from projects funded by other programmes**, **Error! Reference source not found.** shows that relatively more projects indicate that they use knowledge developed by other programmes (ranging for 4 projects using knowledge from CEF to 9 projects using knowledge from national, regional or local

[411] Please see Section 0 Effectiveness for more information on these examples.

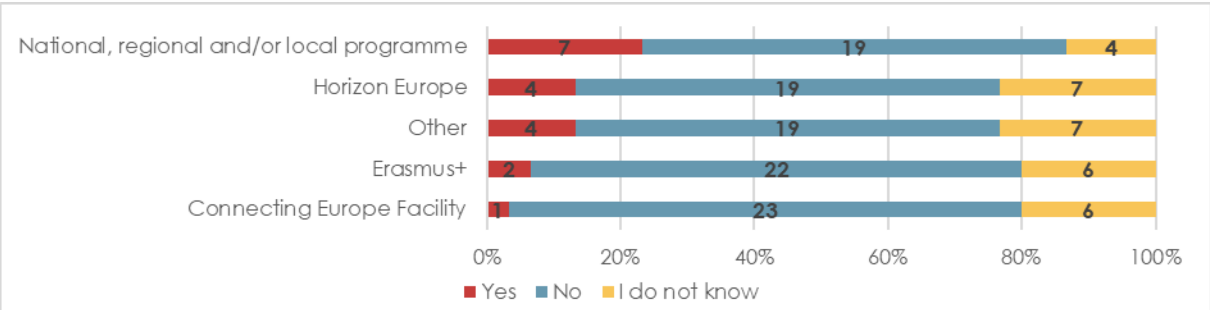
programmes, and Horizon 2020). Examples include analysis methods, standards, metadata and data sources previously developed, experiences in developing test beds and robotic laboratories and other findings, such as skills gap analysis.

Figure 12. Does your Digital Europe funded project use knowledge, results or outputs developed under one of the following programmes? (n=30)



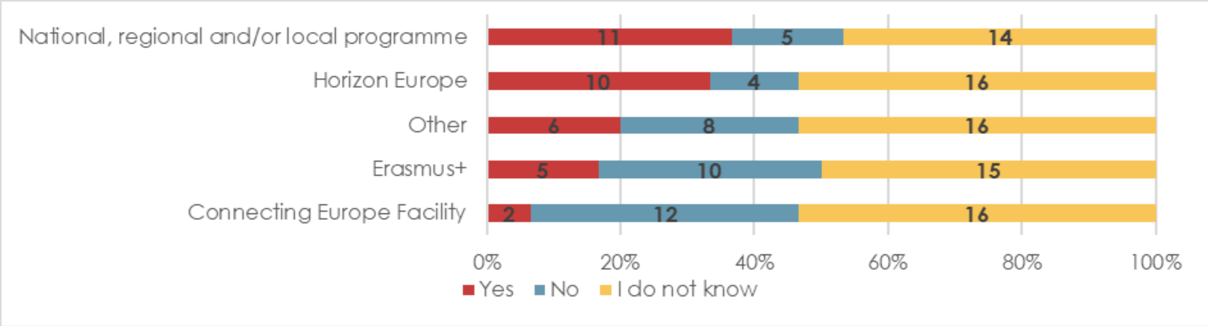
The same holds true for the **use of capability buildings programmes or (digital/research) infrastructures** developed through other programmes by Digital Europe projects (**Error! Reference source not found.**). Examples include digital platforms, test beds, HPC, AI infrastructures and also computing and data storage infrastructures procured in CEF.

Figure 13. Does your Digital Europe project use capability building programmes or (digital/research) infrastructures developed by one of the following programmes? (n=30)



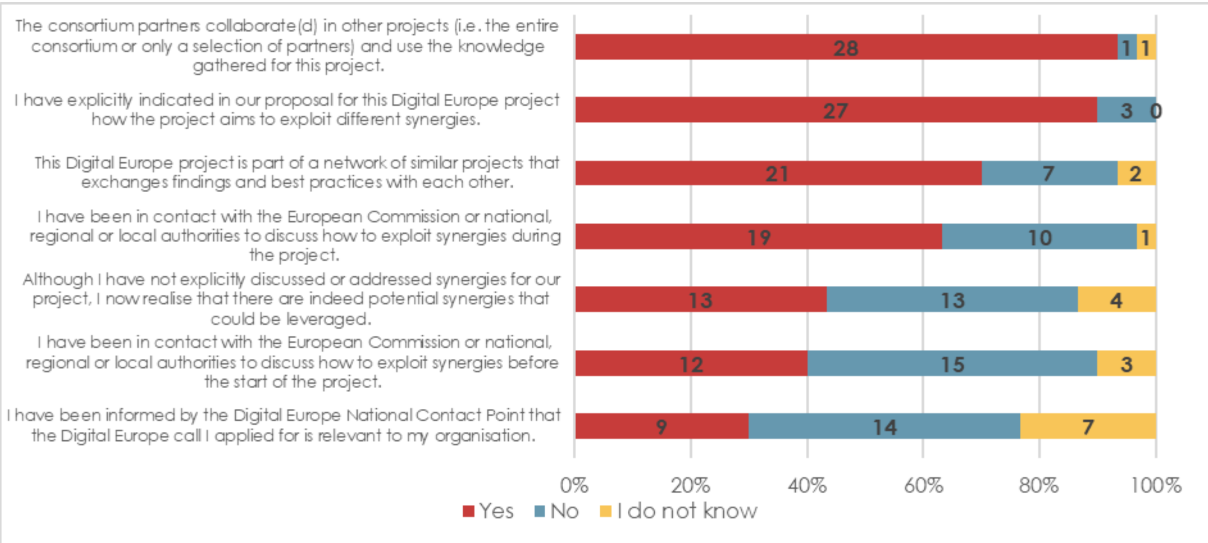
As for **the uptake of Digital Europe project outputs, capacities or infrastructure**, respondents indicate their Digital Europe project indeed will produce outputs, capacities or infrastructures that can be taken up in all the other programmes. Examples include EDIHs that will *Test before* Invest-services, training activities in collaboration with other programmes, online platforms and testing facilities.

Figure 14. Will the outputs, capacities or infrastructures developed by your Digital Europe project be used, complemented by or made available to the following programmes? (n=30)



Digital Europe project managers suggest that the programme is placed well in the knowledge network. Many consortium partners (93%, n=28) have collaborated in previous projects, and use the knowledge gathered for those projects. Similarly, 21 respondents indicate that their project is part of a network of similar projects, and that they exchange findings and best practices. 90% of the respondents (n=27) have explicitly indicated in their Digital Europe proposal how the project would foster synergies. Only 40% of the respondents (n=12) have communicated with the European Commission or other authorities on ways to exploit synergies *before* the start of the project. This figure increases to 63% of the projects (n=19) during the project. Finally, in the final open question, some respondents indicate that meetings where the projects can share experiences and results can be useful to further exploit synergies.

Figure 15. Do you agree with the following statements? (n=30)



HaDEA Feedback to Policy study - synergies

HaDEA has written a Feedback to Policy (F2P) that focuses on the topic *synergies* – as it is responsible for the implementation of around 20% of the Digital Europe budget. HaDEA highlights in the report synergies that they identified as best practices. Synergies with Horizon Europe and Horizon 2020 projects are found, and to a smaller extent with Erasmus+. The main mechanisms identified are complementarity of parallel projects or clustering of projects. Complementary funding are areas of further exploration, as the process of combining funds from different programmes remains complex. Finally, HaDEA indicated that a systematic approach is needed to explore realised synergies and extract meaningful insights for policymaking.

Evaluation criteria

Coherence

Evidence suggests that there is (thematic) complementarity between Digital Europe and the other EU-funded programmes[412]. Digital Europe is embedded in a clear policy framework. The *Communication: 2030 Digital Compass: the European way for the Digital Decade* sets out that the key to the digital transformation is the ability of businesses deploy new key digital technologies and their absorptive capacity to adopt them rapidly –roles that the Digital Europe both fulfils.

There are clear cross-references and direct and indirect provisions in the legal bases of the different programmes, explaining the role and position of the programmes. Whereas Horizon Europe has distinct focus on research and innovation activities (i.e. TRL 4-8), Digital Europe is aimed at the deployment of digital infrastructures and tools and capacity building (i.e. TRL 8-9). The regulations of the different R&I programmes stipulate how these synergies should occur.

A strong thematic similarity between the different programmes can also be observed from the data analysis conducted for this case study and the Digital Europe Regulation and analysis of its work programmes. Digital Europe is thematically coherent and complementary with other programmes. Examples of this thematic similarity are CEF and SO3), and Erasmus+ and SO4 (education and training, see the illustrative examples of AI4CI and GreenChips-EDU).

Illustrative example – CyberSuite[413] (SO3)

The CyberSuite project is a good example of a Digital Europe project that takes up the outputs developed under different EU-funded projects (e.g. Horizon 2020). The objective of CyberSuite is to identify challenges in cybersecurity for SMEs lacking resources. CyberSuite produced a gap analysis for services and helps SMEs access these services through a tailored marketplace for cybersecurity services. It specifically aims to leverage past EU-funded research outcomes, knowledge and innovations by integrating them into the CyberSuite marketplace – this was required by the description of the topic in the Digital Europe Work programme (DIGITAL-ECCC-2022-CYBER-B-03-UPTAKE-CYBERSOLUTIONS).

The services and tools that will be leveraged by CyberSuite stem from more than 15 past EU-funded projects, in which the different consortium partners have participated. Specific examples of the uptake of previously developed outputs are the PUZZLE marketplace that serves as the basis for the CyberSuite Marketplace, *Advanced Cybersecurity Analytics Services (ACAS)*-tool, both developed in the H2020 PUZZLE-project, educational support, and smart virtual assistant for assessing cyber-vulnerabilities and offering cyber-protection of SMEs (developed by the H2020-project GEIGER.) The project will also support the market uptake of these solutions.

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412 Horizon Europe, the Connecting Europe Facility and Erasmus+.

413 Uptake of Innovative Security-as-a-Service Solutions, CyberSuite, Grant Agreement: 101145861, https://cybersuiteproject.eu/.

In terms of direct complementarity between the different programmes, evidence suggests that their programming fosters synergies. This complementarity is also perceived by a large number of respondents of the beneficiaries survey (41%, n=477) –agreeing that their Digital Europe project builds directly on activities supported under other European funding instruments. There are also means through which this complementarity is operationalised. The so-called EU Synergy call grants and procurements are to be linked with other grants funded from any other EU funding programme. For instance, the DIGITAL-2024-BESTUSE-07-MULTICOUNTRY topic (-Support to the implementation of multi-Country Projects (MCPs)) identifies the European Regional Development Fund as the source for additional funding.

Illustrative example – AI4CI[414] (SO4)

The AI4CI project has complementarities with Horizon 2020, Horizon Europe and Erasmus+. During the implementation of different Horizon 2020 projects, the lack of skills of graduates in applying AI to connected industries became apparent (e.g. the programming of robots, distributed AI techniques or integrating AI-based learning loops for network automation). This was the *raison d'être* of the creation of the master's programme currently underdeveloped by AI4CI. Several outputs of Horizon 2020 projects serve as input to AI4CI including teaching and training goals (e.g. AI@EDGE produced use-cases for applied AI in connected industries). Similarly, various Horizon Europe or national projects (e.g. Nexasphere, ANR TREES, ANR NET4AI) involving consortium partners will enable updates to the AI4CI master's syllabus with latest knowledge and offer students opportunities to participate in projects or internship where cutting-edge technologies are used. Finally, a mechanism for mobility between European universities, research centres and industry are part of the design of AI4CI study programme (through established Erasmus+ exchange agreements or national systems (e.g. the French state provides co-funding (tax credits or bonuses) for apprenticeship workers/students from AI4CI master)).

Finally, **the EDIHs can be seen as a means to create coherence between different programmes.** They are specifically referred to in the Digital Europe Regulation as a tool to achieve synergies. Data from the data-analysis of the selected projects and the mini-survey confirm this link between regional, national or Horizon 2020 projects and the Digital Europe EDIH projects. Synergies are achieved through the follow-up of preparatory projects as well as through co-funding opportunities. While participants indicate that co-funding often is difficult, in some countries the government has set-up special schemes to support the co-funding of EDIHs. For instance, in Spain the government published the Royal Decree 174/2023, which regulates the granting of subsidies (EUR 15 million) to EDIHs as well as the Orden ICT/1296/2022, which regulates the granting of aid to SMEs who make use of EDIH services – this second Orden also applies to DIHs that received the Seal of Excellence, but did not receive Digital Europe funding.

Effectiveness

There is a clear funnel of other programmes (inputs) serving as the basis for Digital Europe. Similarly, there is a strong network of beneficiaries in place, as many participants indicate that they have collaborated in the past. However, due to the time lag between preparing and evaluating calls and contractualising beneficiaries, the actual implementation

[414] European AI4CI Master Artificial Intelligence for Connected Industries, Grant Agreement: 101123524 https://ai4ci.eu/

and materialisation of results (the R&I lag) and the timing of this interim evaluation, few projects have been completed (the first Digital Europe project started mid-2022), it is still too early to draw firm conclusions on the amount of actual synergies that have been materialised.

The current evidence indicates that concurrent synergies occur or that there is potential for them to take place. Multiple organisations are involved in various Digital Europe projects, other EU-funded programmes or have previously worked as consortium partners on other projects. The data analysis and the mini survey suggest that Digital Europe participants form a strong network, which subsequently can facilitate the transfer of knowledge. Out of all the 811 organisations that participate in any of the 100 selected projects, 22% participate in more than one Digital Europe project. There is one example of an organisation participating in 10 of the 100 Digital Europe projects. The in-depth analysis of 48 project-programme combinations, showed that 88% of the project-programme combinations showed signs of concurrent synergies. Additionally, in the mini survey on synergies, 93% of the participants (n=28) indicate that the consortium still collaborates or has collaborated in other projects (i.e. the entire consortium or only a selection of partners), and that the knowledge gathered there is being used for the Digital Europe project. Finally, HaDEA's Feedback to Policy (F2P) Synergy report also stated that their analysis showed that most identified synergies stem from complementarity of parallel projects or (informal) clustering of projects.

Similarly, evidence suggests that sequential synergies occur, and that there is ample opportunity for them to be further fostered. 41% of the respondents of the beneficiary survey mention that their Digital Europe-funded project builds directly on activities supported under other European funding instruments (n=477). There are various mechanisms through which synergies can be fostered – differing in the extent to which a synergy can be attributed to Digital Europe. The most direct way of sequential synergies is when a Digital Europe project is a **follow-up project** from a previously funded project. Several examples of such a synergy exist, such as projects following preparatory actions, a follow-up of research results or a continuation of the development of an EDIH. 27% of respondents from the mini-survey state that their Digital Europe project is a direct continuation of another project. The data analysis of the selected Digital Europe projects with high potential for synergies also show that 21% are a follow-up project of a previous project.

Illustrative example – PrePAI and DeployAI (SO2)

The PrePAI and DeplyAI projects are a good example of sequential synergies. The Pre-PAI project is a preparatory action for the development, deployment and launch of an AI-on-demand platform. The deployment of the platform will be completed by the DeployAI project. Both projects make use of knowledge and outputs developed by a vast range of other projects, most notably: the Horizon 2020 AI4EU project. Six Horizon 2020 projects defined and developed services for the platform (AI4Copernicus, AIPLAN4EU, DIH4AI, BONSAPPS and STAIRWAI), four Networks of Excellence (H2020L ELISE, TAILOR, AI4Media and HUMANAI NET) also contribute to the platform, and under Horizon Europe the project AI4EUROPE is funded. All activities combined are a good example of how different project funded by different programmes each play their distinct role in making the AI-on-Demand platform market-ready.

Additionally, in terms of **knowledge uptake** and **creation** (i.e. upstream and downstream synergies), **there is evidence that suggests that Digital Europe well integrates knowledge**

from other EU funding instruments. Furthermore, the evidence suggests that the Digital Europe projects' outputs will provide knowledge bases for other (future) R&I programmes. This was suggested by part of the respondents of the mini survey, the data analysis of selected Digital Europe projects and HaDEA's Feedback to Policy (F2P) Synergy report. The results of the mini-survey show that knowledge, results or outputs, capability building programmes or (digital/research) infrastructures developed through other programmes are all being taken up by the Digital Europe projects – this is the case for national, regional or local projects, or Horizon 2020 and to a much lesser extent the Connecting Europe Facility. Similarly, the results indicate that Digital Europe outputs will be used in other programmes, most notably national, regional or local programmes or Horizon Europe. The data analysis identified sequential synergies for 38 of the 48 Digital Europe projects where synergies were classified. This synergy mechanism is strategically applied in the Work programmes and/or topic texts. For instance, in the Digital Europe Work programme for 2023-2024 in the text on the *European Green Deal Data Space* there is a clear reference that the action should take up the work from a preparatory Digital Europe CSA as well as the results of Horizon Europe projects funded under HORIZON-CL6-2021-GOVERNANCE-01-17. The previously highlighted CyberSuite-project also considers results from previous projects. This highlights the importance of systematic signposting to other related activities in work programmes.

Illustrative example – GreenChips-EDU (SO4)
The GreenChips-EDU project is a good example of the uptake of knowledge created in other programmes and an example of a strong knowledge network. The aim of the GreenChips4EDU project is to meet the microelectronics industry's demand for skills (through the development of education and trainings), attract talent (both staff and students), exploit the benefits of cutting-edge technologies and infrastructures, and establish partnerships between the network of organisations. GreenChips-EDU makes use of the outputs of the Erasmus+ METIS project[415]. METIS developed a need assessment for the microelectronics industry to see what kind of training needs there will be in the future. Based on that assessment, trainings and education programmes for students and for up- and re-skilling people of employees i were developed. The consortium is partially composed of university partners that are also part of the European Universities Alliance 'Unite! -University Network for Innovation, Technology and Engineering'[416] (co-funded by Erasmus+) – in theory this allows for a further exploitation in the future of the results stemming from this project.

It is expected that Digital Europe funding that was allocated to establish infrastructures will, in the future, provide opportunities to exploit synergies. EuroHPC infrastructures will be made available to the sectorial data spaces. In January 2024, the launch of AI Factories integrated into EuroHPC Regulation was announced. The first seven AI factories will be established in 15 member states to deploy new AI-optimised supercomputers and upgrade existing systems, significantly enhancing Europe's AI capabilities.

Some Digital Europe beneficiaries indicate that a factor that slows down the ability to foster synergies is related to co-funding. In some cases, there are public arrangements for

[415] Funded in 2019 under the Erasmus+ Sectors-Skills Alliances: https://erasmus-plus.ec.europa.eu/projects/search/details/612339-EPP-1-2019-1-DE-EPPKA2-SSA-B

[416] https://education.ec.europa.eu/sites/default/files/document-library-docs/european-universities-factsheet-unite.pdf

organisations to use. In other cases, there are no arrangements nor a supporting legislative framework, due to the novelty of the programme**.** Especially for smaller firms or when there are large consortia, the administrative burden is high. There are also examples of countries where there are well functioning mechanisms for co-funding. Italy, for instance, uses the RRF for EDIHs and TEFs[417], and there are specific schemes to provide co-funding to beneficiaries of Digital Europe in Denmark[418] and in the Netherlands[419]. Finally, some respondents from the mini survey on synergies indicate that there should be more opportunities to actively foster synergies through the grouping of similar projects, which would allow them to use the results or best practices or generally network with each other.

EU Added Value

Digital Europe demonstrates strong EU added value due to its strategic approach to digital deployment across the EU to promote its competitiveness and positioning in the EU R&I system – provides a unique position for projects and organisations to exploit the benefits of working together in a multi-national context. EU added value is an intrinsic element of the programme as its actions aim to **improve digital competitiveness** and **reinforce strategic autonomy** across the European Union. The large-scale complex deployment projects cannot be achieved at the level of Member States alone but require strategic EU coordination. The developed digital solutions and services are to be used across borders serving the whole EU Community.

Illustrative example – CloudCamp4SMEs

CloudCamp4SMEs has the objective to support the digital transformation of SMEs through training courses on digital skills for Cloud Technologies. The project is set up to make sure that the trainings will address the needs of SMEs, based independent of the innovation status of a country. There are 5 pilot countries that cover the different levels of innovations (i.e. Innovation Leader, Strong Innovator, Moderate Innovators and Emerging Innovators). After finishing the pilots, the programmes will be scaled across Europe to deliver the trainings that correspond to the actual needs of SMEs.

Evidence from different sources shows that there is a transmission mechanism of knowledge, funding or outputs from Digital Europe to national or regional programmes and vice versa. In multiple cases, projects make use of knowledge prepared under national and/or regional programmes as shown in previous illustrative cases. Three project managers in the mini-survey on synergies indicate that national or regional projects were followed-up by Digital Europe projects. The HaDEa analysis shows eight instances of synergies with national or regional funds or the RRF[420].

Illustrative example – DATAlife (EDIH) (SO5)

The DATAlife project is a good example of how a Digital Europe project can be a follow-up project from previously funded regional projects. The objective of the DATAlife project is to support the deployment of Artificial Intelligence and Data Analytics for Galician primary, biotech and health sector SMEs. In 2019, DATAlife was selected by the Galician Innovation

[417] https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:52023PC0765#footnoteref100
[418] https://digst.dk/digital-transformation/digital-europe/tilskudsfond-for-medfinansiering/
[419] https://www.rvo.nl/subsidies-financiering/digital-europe/aanvraagproces
[420] The RRF should address country-specific challenges that i.e. should support the digital transition.

Agency as a strategic DIH for the region. In an elaborate open call, a mapping exercise was done to see the strengths of the regional innovation ecosystem, a seminar was organised to identify weaknesses for the implementation and a training programme to improve the set-up of the proposed DIH were done. Besides the content of the EDIH, DATAlife was considered strategic based on their contribution to the RIS3. The Galician Innovation Agency provides DATAlife with funds to create the EDIH and develop their services[421]. Following that, DATAlife also obtained funding from the Galician Institute for Economic Promotion (co-financed by ERDF) for the project Obradoiros 4.0 and the HIBA project (Interreg-POCTEP)[422]. Because of this, DATAlife was able to respond to the Digital Europe EDIH call. The Digital Europe project allows DATAlife to further exploit their services.

Digital Europe provides clear EU added value in the context of digital skills and the mobility of students and staff. The programme enables the ability to involve a wider range of expertise, as opposed to internal expertise available to an organisation. One interviewee indicated that this is a real benefit for the students that will participate in new master's programme that are being supported by Digital Europe. This also holds true for the projects AI4CI and GreenChips-EDU as well.

[421] https://www.dihdatalife.com/en/galician_innovation_agency-gain/
[422] https://www.dihdatalife.com/en/hiba-project-hub-iberia-agrotech/ and https://www.dihdatalife.com/en/igape_digitization_workshops/

Conclusions

Digital Europe and efforts by the European Commission to foster synergies play an important role in the *digital transition*. The *digital transition* requires multi- and transdisciplinary research, the inclusion of a wide range of stakeholders and active valorisation of research results into market-ready products.

Digital Europe is guided by, and coherent with, a clear policy framework. Through cross-references and direct and indirect provisions in the legal bases of the different programmes, the (thematic or operational) complementarities of different programmes are outlined, setting the foundations for the materialisation of synergies **This thematic complementarity can also be observed in the cross-participation data analysis and the analysis of the work programmes**.

While the project implementation is still ongoing, it is evident that various conditions are present paving the way for a successful exploitation of synergies. There are different means through which synergies are fostered. **A strong network of implementing organisations is in place** – many participants indicated that they have collaborated in the past**.** At the same time, some interviewees suggested that Digital Europe is new to them and that networking activities with other projects would be beneficial to them. **There is evidence that knowledge developed by other programmes from different levels of the R&I system are being taken up** or will be taken up in the future. The manual in-depth analysis of 120 project-programme combinations showed that more than half of the project-programme combinations are performed by consortia that already have worked together, around half of the projects use knowledge that has been developed by previous projects and more than 10% are direct follow-ups from previous projects. In terms of cumulative funding, there is no evidence whether this has been materialised.

The activities aimed to foster synergies help to create EU-added value for Digital Europe, due to the pan-European nature of the programme, the extent to which Digital Europe takes up national, regional or local knowledge outputs and the mobility of students and staff through its link with Erasmus+.

An EU-wide definition of *synergies* and a systematic way of identifying and an automated tracking mechanisms to monitor synergies are suggestions to improve future identification of synergies. Finally, some respondents indicated that there should be more opportunities for learning, alignment and best-practices sharing between Digital Europe projects, through a repository of projects, results and/or new related calls and meetings to share experiences and networking activities.

Sources and methodology

This case study employs a mixed-methods approach to analyse how and why the activities aimed at fostering synergies between Digital Europe and other programmes contribute to achieving **Digital Europe's objectives**, with a specific focus on Horizon 2020, Horizon Europe, Connecting Europe Facility and Erasmus+.

Data collection was conducted through a variety of methods, including:

- Desk study (incl. the HaDEA report and publicly available information on Digital Europe projects);
- Beneficiary survey;
- Mini survey on synergies;
- Interviews (targeted interviews and beneficiary interviews conducted for the evaluation);
- Data analysis

In this section, we will highlight the mini-survey and the data analysis.

Data analysis

The data was performed on the input provided by DG CNECT following their analysis of Digital Europe project proposals using Cortex tool – based on cross-participation, a relevance score and manual selection. The output of this analysis was a selection of 120 *Digital Europe project-programme* combinations[423] that have high potential for synergies with *Horizon Europe, Horizon 2020, CEF and Erasmus+*. DG CNECT used the following methodology to identify the list of 120 Digital Europe project-programme combinations:

First of all, projects with cross-participations (i.e. at least one beneficiary in the Digital Europe project that also participates in the other programmes (CEF, HE, H2020, or Erasmus+) were identified. Please note that cross-participation does not necessarily results in synergy. This especially holds true for larger research organisations such as universities. The cross-participation information was subsequently used to filter the number of projects that were to be screened in subsequent steps.

Following that, all Digital Europe proposals were screened in Cortex. The projects proposals (part B of the proposal) that have a reference to the four other EU funded programmes 'Horizon Europe', 'H2020', 'CEF' and 'Erasmus+' were listed.

At the same time, all Digital Europe projects received a *relevance score*. The indexing software Elasticsearch analyses Digital Europe project proposals based on their similarity/relevance to the four other EU funded programmes.

DG CNECT then listed Digital Europe projects that have both a common participant and a reference to one of the four programmes in part B and ranked them based on their relevance score.

Following that, a manual selection was performed to identify 30 Digital Europe projects per programme (so 120 *project-programme* combinations in total) where synergies are likely to occur. This manual selection was done through the analysis op part B of the Digital Europe proposal. The analysis consisted of identifying if the Digital Europe project builds on/or complements other projects funded in a different programme (or intends to do so), the name and if available number of these projects, and how this would occur. In case of no concrete evidence other types of potential synergies were checked for (e.g. consortia collaboration before or a large number of similar previous projects in the same area).

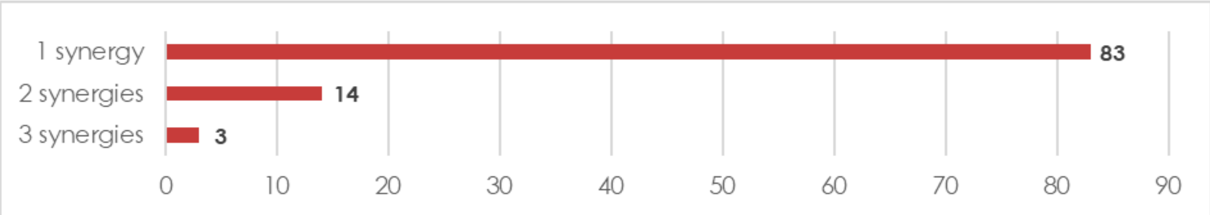
[423] This refers to a combination of a Digital Europe project and potential synergies with either Horizon 2020, Horizon Europe, Erasmus+ and/or the Connecting Europe Facility.

Finally, as part of the analysis of this case study, an additional classification of the 120 *project-programme* combinations was performed. This was done on the basis of the provided reasons for selection. In some cases, there was not enough evidence to clearly identify what type of (potential) synergy would take place. This does not mean that those projects do not foster synergies, merely that for our analysis there was too limited information on the (potential) synergy. In other instance, it was clear in what way and how likely the potential synergies would occur.

Descriptive statistics data analysis

A total of 120 Digital Europe project-programme combinations have been identified through the process described earlier. These 120 combinations involve 100 unique Digital Europe projects, indicating that some projects have been identified as having (potential) synergies with more than one other programme.

Figure 16. Distribution synergies (project-programme combinations) for the selected Digital Europe projects



There are 811 unique organisation that participate in one or more Digital Europe project – there are 1087 unique organisation-project combinations.

Figure 17. Participation in synergetic Digital Europe projects per organisation

Mini-survey on synergies

To refine and gather insights on the extent to which the 100 identified Digital Europe projects (i.e. the 120 project-programme combinations) foster synergies, a mini-survey was shared with the project managers of the selected projects.

The objective of the mini survey is to gather information on the extent to which these projects with a high likelihood of synergies to occur, actually exploited synergies. The survey covered whether co-funding has occurred, previous collaboration on EU / other projects between participants, whether the project is a direct follow-up project, whether the Digital Europe funded project uses input from other programmes or that its outputs will be used by other programmes, and their general perspective on synergies. In the mini-survey, the following definition of synergies was provided: *Synergies can be defined in terms of funding (e.g. cumulative funding), sequential synergies (e.g. Digital Europe projects build on results previously achieved in other programmes , or Digital Europe projects pave the way for other* *projects), parallel (e.g. knowledge spillovers due to involvement in multiple projects), strategic (e.g. synergy-enhancing implementation rules and requirements) or operational synergies (e.g. Seal of Excellence).*

The response rate to the survey was 30% (i.e. 30 responses). Please find below the responses to the survey (excl. the open answers).

Figure 18. What is the current status of the Digital Europe funded project? (n=30)

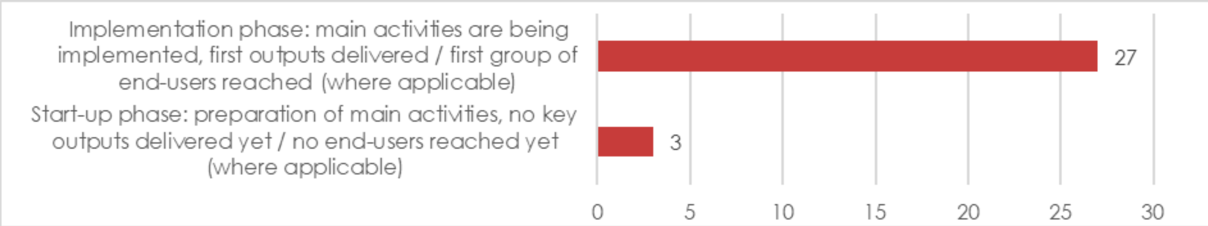


Figure 19. Does or did your Digital Europe funded project make use of additional or complementary funding from another EU, national or regional programme? (n=30)

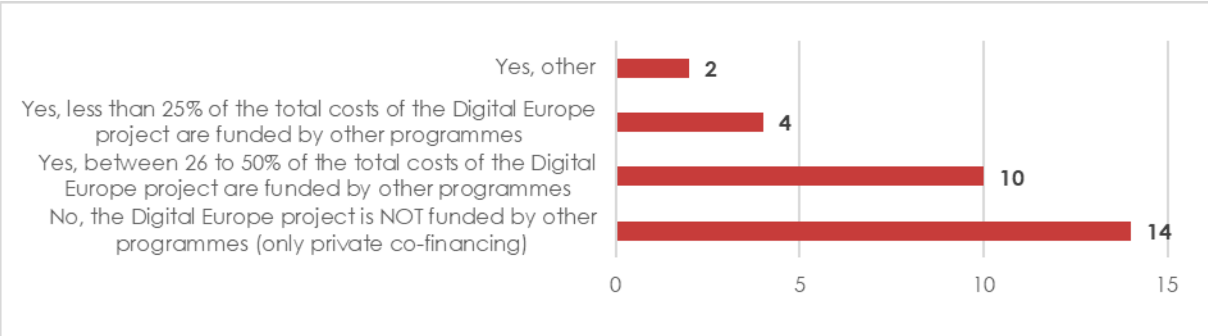


Figure 20. Have the members of your consortium collaborated on EU funded or other projects in the past?

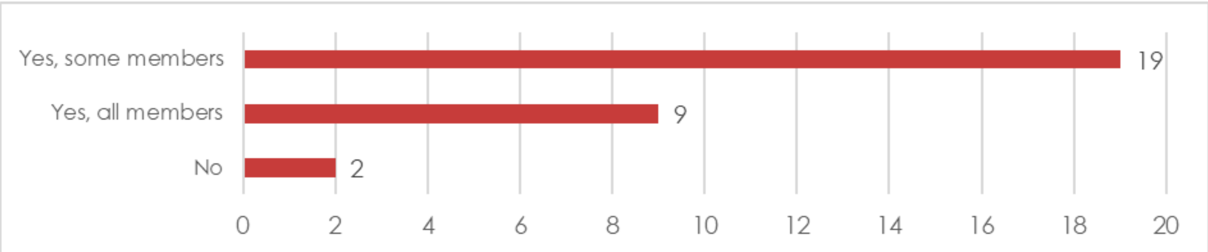


Figure 21 Is your Digital Europe funded project a continuation of a project previously funded by any of the following programmes? (n=30)

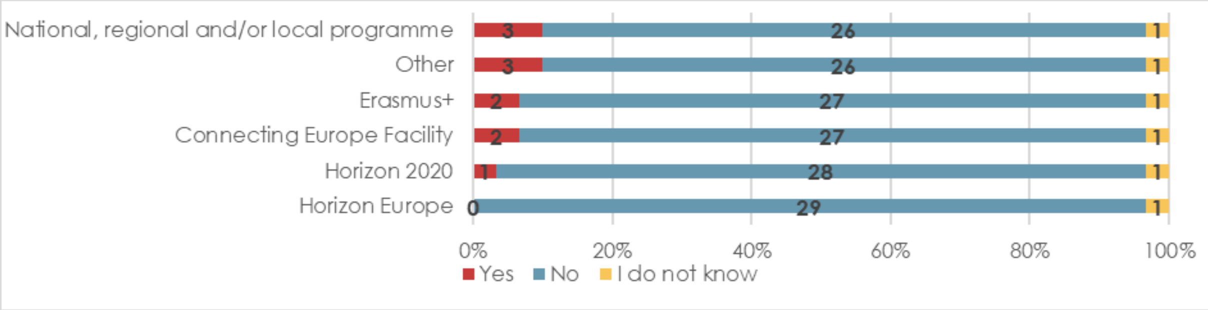


Figure 22. Does your Digital Europe funded project use knowledge, results or outputs developed under one of the following programmes? (n=30)

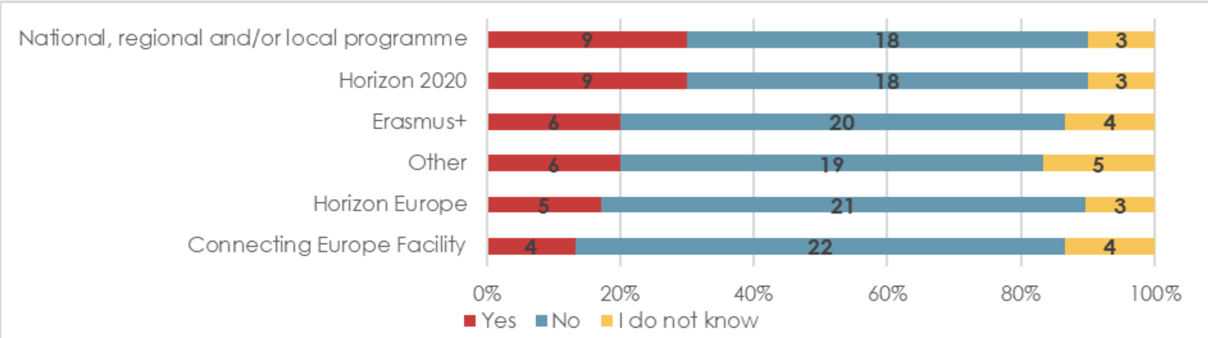


Figure 23. Does your Digital Europe project use capability building programmes or (digital/research) infrastructures developed by one of the following programmes? (n=30)

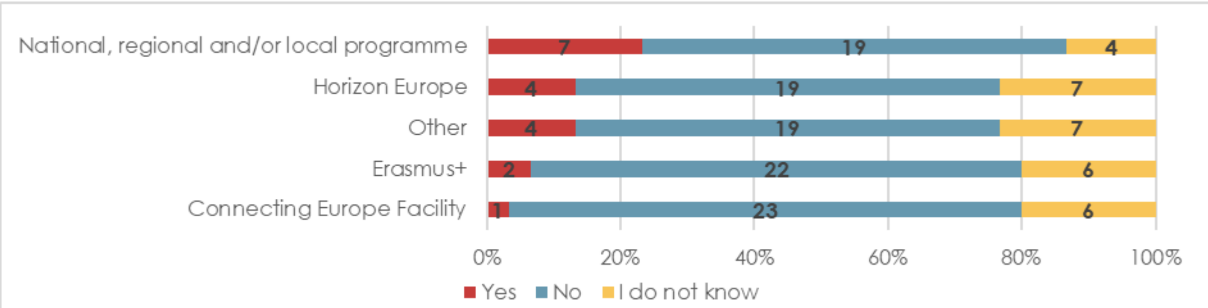


Figure 24. Will the outputs, capacities or infrastructures developed by your Digital Europe project be used, complemented by or made available to the following programmes? (n=30)

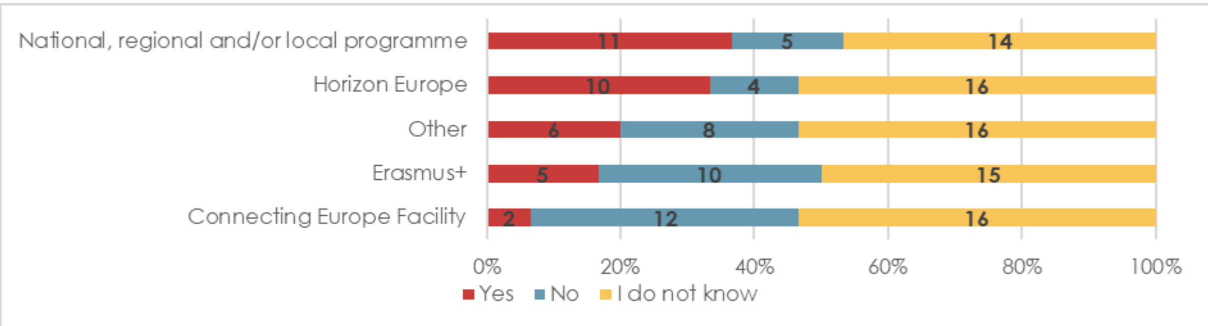


Figure 25. Do you agree with the following statements? (n=30)