COVER NOTE

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To:	Mr Jeppe TRANHOLM-MIKKELSEN, Secretary-General of the Council of the European Union
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Delegations will find attached document SWD(2016) 187 final - PART 4/5.

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PART 4/5

COMMISSION STAFF WORKING DOCUMENT

Europe's Digital Progress Report 2016

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Europe's Digital Progress Report (EDPR)

A report complementing the Digital Economy and Society Index (DESI) [1] country profile

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BELGIUM

Belgium ranks fifth out of the 28 EU Member States according to the European Commission's Digital Economy and Society Index (DESI) 2016[2]. Belgium performs better than the EU average but it has improved at a slower rate than the EU as a whole, which places it in the **lagging ahead** cluster[3] of countries. However, compared with the previous year, Belgium has still improved or maintained its good position in all DESI dimensions. The country is a top performer in connectivity; citizens in Belgium are avid Internet users; and Belgian businesses are second in Europe when it comes to electronic information sharing through business management software. The supply of Digital Public Services improved over the last period.

Belgium's performance in the five DESI dimensions relative to other EU countries
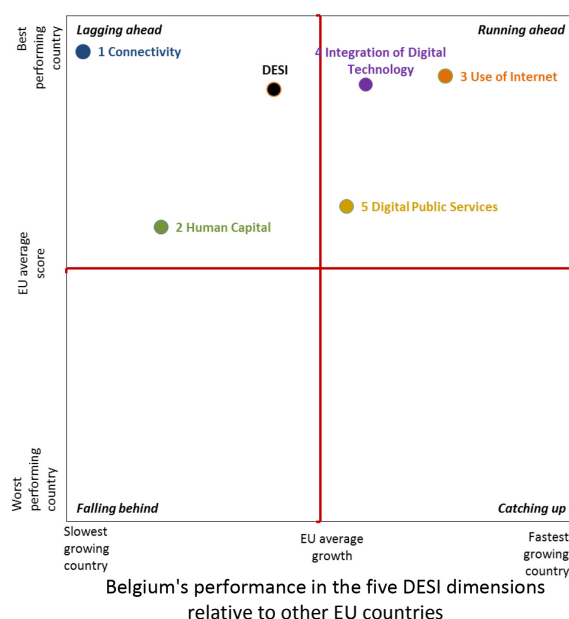
1 – Connectivity

Belgium is one of the leading performers in connectivity in Europe. The country scores second in the EU but progress is slow. The coverage of the country is complete and 99% of the country is covered by fast networks (at least 30 Mbps). 78% of households subscribe to fixed broadband, and three quarters of these are fast broadband subscriptions. Compared with its overall performance, Belgium is slightly lagging behind on the use of mobile internet.

In order to keep its leading position, Belgium needs to address two challenges in the area of fast Internet connectivity: first, to further increase the uptake of mobile broadband as mobile devices are becoming an essential gateway for consumers to communicate, work and shop in the digital economy. Indeed, the uptake of mobile broadband has accelerated recently and Belgium has also engaged in the "surfmobile" campaign to inform citizens about the benefits of mobile broadband.

Secondly, in order to keep its leadership position in connectivity, the country must encourage the deployment of ultrafast broadband connections (above 100 Mbps). Whereas operators have in previous years upgraded their legacy copper and coaxial cable networks, ultrafast networks will require installation of fibre, connecting businesses and households directly at their premises.
The strategy "Digital Belgium" presented in 2015 outlines the digital long-term vision for the country and sets out five priorities[4]. The strategy also covers a Plan for Ultrafast Internet in Belgium. It ambition is that half of all connections in Belgium should achieve Internet speeds of up to 1 Gbps by

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[1] The Digital Economy and Society Index (DESI) is a composite index developed by the European Commission (DG CNECT) to assess the development of EU countries towards a digital economy and society. It aggregates a set of relevant indicators structured around 5 dimensions: Connectivity, Human Capital, Use of Internet, Integration of Digital Technology and Digital Public Services. It clusters countries in four groups: Running ahead, Lagging ahead, Catching up and Falling behind. For more information about the DESI please refer to https://ec.europa.eu/digital-single-market/en/desi

[2] DESI country profile for Belgium: https://ec.europa.eu/digital-single-market/en/scoreboard/belgium

[3] Other countries lagging ahead are: Denmark, Finland, Ireland, Lithuania, Luxemburg, Sweden and the United Kingdom.

[4] Wallonia and Vlaanderen also have "digital strategies", presented in 2015.

Europe's Digital Progress Report (EDPR)

2020. Belgium follows a market-based approach to achieve its connectivity targets. Cable provider Telenet announced an upgrade its network to reach Gigabit connectivity; but these announcements have not yet been matched by operators in other parts of the country.

The government also wants to boost the further roll-out of mobile broadband technologies, such as 4G/LTE and prepare the ground for 5G.

Lowering deployment costs has a positive effect on the business case and encourages operators to make network investments. For instance, according to the Belgian federal authorities, the tax on the use of masts and pylons and certain radiation standards are an obstacle for quicker deployment. The authorities plan to consult the competent bodies to point out the impact of these measures upon investment. Finally, Belgium still has to transpose the Cost Reduction Directive[5] which could help to speed up broadband roll-out.

2 - Human Capital

In terms of human capital, Belgium performs above EU average but progress is slow. Belgium has a significant share of regular Internet users (83%), and 60% of citizens have basic digital skills but 13% of all Belgians between 16 and 74 years have never used the Internet.

The transmission of technology into new ideas and products also hinges on the availability of a vast pool of aptly-skilled workers. While Belgium disposes of an overall qualified workforce with a high participation rate in tertiary education, the country has a low share of graduates in science, technology and mathematics ("STEM"). Shortages in these fields could become a major barrier to growth and innovation, with scarcities already emerging for certain functions which require, for example, digital skills. In 2015, 46% of enterprises with job vacancies requiring specialised ICT skills reported problems in filling these positions. There is thus a shortage of qualified ICT experts which is estimated to rise from about 8,000 persons in 2012 to 30,000 in 2020[6].

To boost digital skills in the population, the Belgian authorities have launched "Digital Champions", a Belgian digital skills coalition. The initiative federates several existing schemes and also experiments with new approaches such as bringing ICT professionals to schools to inspire young people. At community and regional levels, various measures have been taken to tackle the low share of new science and engineering graduates. In Flanders, the STEM action plan aims at increasing the number of students in STEM subjects and a similar initiative is underway in the French-speaking part of Belgium.

Building on these initiatives, for example a stronger dialogue between the educational systems and companies to match graduates and labour market demand can further boost digital skills for all target groups.

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[5] Directive 2014/61/EU of the European Parliament and of the Council of 15 May 2014 on measures to reduce the cost of deploying high-speed electronic communications networks (OJ L155, 23 May 2014, p. 1)
[6] empirica, e-skills in Europe, country report Belgium, study commissioned by European Commission, 2014.

3 - Use of internet

Belgium performs very well regarding the use of internet services. Citizens in Belgium are keen Internet users and engage in a broad range of online activities, like reading news online, listening to music, watching films and playing games online, using the Internet to communicate via video calls or through social networks, and obtain video content using their broadband connections (73% of households subscribe to Video on Demand).

4 - Integration of Digital Technology

Belgium performs and progresses very well concerning the integration of digital technology into business. Belgian businesses increasingly exploit most of the possibilities offered by on-line commerce, social media and cloud-based applications. Electronic information sharing is popular with businesses and Belgian SMEs are relatively strong in selling online cross-border. Almost a quarter of its SMEs sell online and 13% do so cross-border, an important channel to address wider markets.

"Digital Belgium" and the regional action plans rightly identify that more needs to be done, in particular for SMEs, to boost the use of digital technologies. To do so, Belgium and the regions could make good use of the European Structural and Investment Funds for the period 2014-2020,as funding has been earmarked for the digitisation of the economy. To support entrepreneurs, Belgium launched a "tax shelter" for digital startups. It also features a number of initiatives in the area of industry 4.0, such as Made Different, Marshall 4.0 and Make Minds.

5 - Digital Public Services

In the dimension of Digital Public Services, Belgium is performing well and making good progress. There was growth in most of the monitored categories with the exception of the percentage of internet users returning filled forms.

The complexity of Belgium's political governance structures also has implications for this policy area, as many public sector actors share responsibility in this field. For instance, the potential offered by ICT is not being exploited in the judiciary.

However, Belgium is on a promising trajectory with a plethora of different projects[7] delivering their impacts. For instance, in 2015, the Flemish government adopted the "Vlaanderen Radicaal Digitaal" programme. This programme aims to digitally transform regional (and local) government, by using innovative ICT technology. In March 2015, the electronic prescription Recip-e was launched based on a previous study done under the supervision of the federal Public Service of Health. This service is intended to replace paper prescriptions in the mid-term and already accepted by more than 90% of general practitioners.

In July 2015, the Belgian federal government presented its Federal Open Data Strategy 2015-2020 ("Stratégie fédérale 'Open Data'; Federale open data-strategie"). The strategy aims to make all government data open by default, except information that has privacy or security implications. Everybody will be allowed to use public data for non-profit as well as commercial applications, for free.

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[7] For an overview, see: https://joinup.ec.europa.eu/sites/default/files/ckeditor_files/files/eGovernment%20in%20Belgium%20-%20February%202016%20-%2018_00%20-%20v2_00.pdf

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Belgium has a national eID Card which serves for both authentication on most Belgian public administration websites and for eSignature of electronic documents.

Highlight: Fix My Street Bruxelles/Brussel

As of April 2015, all 19 communes of Brussels are active members of **Fix My Street Brussels**, a web and mobile platform that allows citizens and the administration to report incidents in the public space. The website and mobile app were developed and are maintained by the informatics Centre for the Brussels Region (CIRB). The application enables localization and description of the damage, as well as it comprises an update tool that informs citizens and administration at each stage of the handling of the incident. Although an assessment of the impact has not been carried out so far, this is a promising service combining crowdsourcing of data for management of the public space, allowing citizens to track the progress made by public authorities.

Europe's Digital Progress Report (EDPR)

*A report complementing the Digital Economy and Society Index (DESI) [1] country profile*

BULGARIA

Bulgaria ranks 27th out of the 28 EU Member States in the European Commission Digital Economy and Society Index (DESI) 2016[2]. Bulgaria falls into the **falling behind** cluster[3] of countries that score below the EU average and grew slower than the EU as a whole since last year. Bulgarians who use the Internet on a regular basis perform a wide variety of activities online but low levels of digital skills hamper the further use of digital technologies by citizens and by enterprises.

1 – Connectivity

In Connectivity Bulgaria's performance is below the EU average and its progress is limited. While access to fast broadband-enabled services is a necessary condition for competitiveness, the

Bulgaria's performance in the five DESI dimensions relative to other EU countries

development of broadband networks in Bulgaria is lagging behind. The total fixed broadband coverage is 95% of households (97% in the EU) but in rural areas it's considerably below the EU average, 60% of homes compared with 91% in the EU. The coverage of next-generation access (NGA) network is at 72% of homes covered similar to EU average but only 3% in rural areas. On the take-up side, Bulgaria continues to have one of the lowest shares of homes with a fixed broadband subscription, 55% of homes compared with 72% average in EU. This might be due both to a lack of digital skills in the population and to the low availability of broadband infrastructure outside the main cities, leading to a digital divide between urban and rural areas. Furthermore, the lengthy permits procedure for network deployment and low public funding hold back investment in the sector.

Although the coverage of 4G mobile networks still remains quite limited, recent progress made on this front deserve to be mentioned. As of early May the entire harmonized 1800 MHz band had been assigned. Nevertheless while wireless broadband has the potential to bridge the urban-rural divide, the lack of clear and constructive plans for repurposing the bands for mobile broadband (800MHz and the 700 MHz bands) exacerbates the problem. However, there are ongoing efforts to repurpose the 800 MHz that is planned to start by the initial release of 2x5 MHz or 2x10 MHz. Despite the progress made on the 2.5-2.6 GHz band, which the Bulgarian authorities made available for civil use over the entire country in September 2015, the availability of the 800 MHz and 700 MHz for civil use is expected to have the highest impact on raising connectivity.
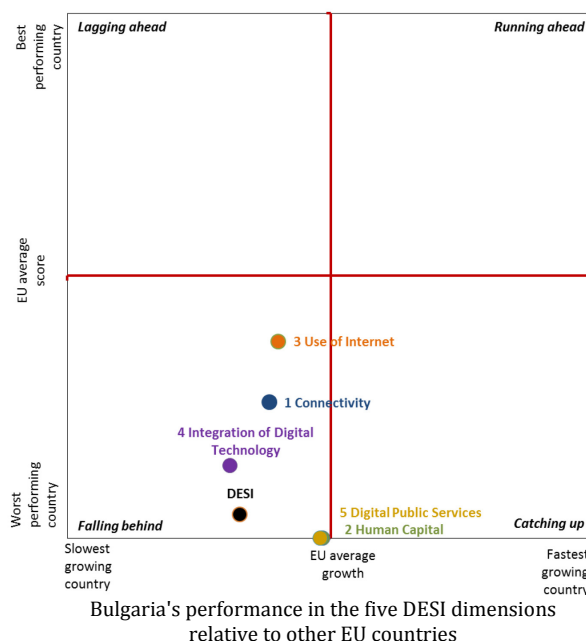
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[1] The Digital Economy and Society Index (DESI) is a composite index developed by the European Commission (DG CNECT) to assess the development of EU countries towards a digital economy and society. It aggregates a set of relevant indicators structured around 5 dimensions: Connectivity, Human Capital, Use of Internet, Integration of Digital Technology and Digital Public Services. It clusters countries in four groups: Running ahead, Lagging ahead, Catching up and Falling behind. For more information about the DESI please refer to https://ec.europa.eu/digital-single-market/en/desi

[2] DESI Country Profile for Bulgaria: https://ec.europa.eu/digital-single-market/en/scoreboard/bulgaria

[3] Other falling behind countries are Czech Republic, Greece, France, Hungary, Poland and Slovakia.

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Bulgaria's broadband strategy, "National Broadband Infrastructure Plan for Next Generation Access," published in 2014 sets targets in line with the Digital Agenda for Europe: 100% coverage with 30 Mbps until 2020, and 50% take-up rate for 100 Mbps. Furthermore, it aims at 80% take-up rate (100 Mbps) for businesses by 2020 and foresees the need for a € 150 Million investment. A roadmap including measures and actions for the effective fulfilment of the plan and the use of funding allocated under the European Structural and Investment Funds RDP has also been developed. In this respect, Bulgaria completed in December 2015 the first NGA broadband network project co-financed by the European Fund for Regional Development (2007-2013) and allocated € 30 Million for the roll-out of further NGA broadband projects under the European Agricultural Fund for Rural Development (2014-2020). It aims at further reducing construction costs by combining them with the costs of road rehabilitation and other infrastructure projects. Moreover, small scale national state aid is also available in cooperation with local authorities, while public-private partnership is an integral part of the national broadband strategy. Lastly, Bulgaria was particularly active and submitted some well advanced projects in the context of Connected Communities Initiative[4] (CCI), a joint European Commission and World Bank initiative.

The lack of availability of sufficient sub-1GHz spectrum (800MHz and 700 MHz bands in particular) in Bulgaria is critical with respect to the nation-wide deployment of high-quality wireless broadband services for economy, society and the expanding Internet of Things on the path to 5G, and in fulfilment of the Union's broadband and spectrum targets. Bulgaria still has to transpose the Cost Reduction Directive[5] which could help to speed up broadband roll-out.

2 – Human Capital

In Human capital, Bulgaria's performance is well below EU average; but Bulgaria's progress is at EU average. Despite the existence of many highly skilled Bulgarian ICT professionals, in Bulgaria there is still a shortage of software specialists. The number of STEM (science, technology and mathematics) graduates slightly increased (1.4% of graduates). However, the digital skills in the overall workforce and population are among the lowest in the EU as only about a third (31%) of Bulgarians possess at least basic digital skills compared with more than half in the EU.

A Bulgarian Digital National Alliance[6] for Digital Jobs was launched as part of the European Commission's Grand Coalition for Digital Jobs initiative. In the field of education the Bulgarian Government adopted a "Strategy for the effective implementation of ICT in Education (2014-2020)". Its main purpose is to provide equal and flexible access to education. By way of implementation, a new law was adopted on pre-school and school education and amendments made to the existing Higher Education Act. The new law on pre-school and school education includes several provisions on ICT teaching in schools. It is envisaged that digital competences will be included in the new school curricula as key competences, with references to specialized training in computer sciences and support for individual development. For higher education, the Ministry of Education and Science is implementing a number of changes, identification of protected specialisations benefiting from new places in universities and state funding that would bring a wider pool of quality ICT professionals in the next years.

The planned education reform will improve ICT related education in schools and universities, which will help the level of digital literacy of cohorts entering the labour market, and will increase the pool of ICT professionals. However, Bulgaria could also benefit from a clear strategy for equipping the

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[4] https://ec.europa.eu/digital-single-market/news/connected-communities-initiative
[5] Directive 2014/61/EU of the European Parliament and of the Council of 15 May 2014 on measures to reduce the cost of deploying high-speed electronic communications networks (OJ L155, 23 May 2014, p. 1)
[6] http://www.digitalalliance.bg

labour force with the required digital skills. Funding for lifelong learning initiatives for workers of all ages can be provided through the European Social Fund, in particular the Human Resources Development Operational programme.

3 – Use of Internet

In Bulgaria Use of Internet services is below EU average (only 55% of the population are Internet users) and progress is slow. The most popular online activity in Bulgaria is making video calls and participating in social networks and young people (16-24 years old) are the most active age group. However Bulgarian Internet users engage the least in online transactions such as online banking (9.4%) and online shopping (31%) most probably due to lack of digital skills and mistrust in the online environment.

4 – Integration of Digital Technology

As regards the Integration of digital technologies by businesses, Bulgaria' performance is below the EU average and its progress is limited. More and more SMEs are selling online but the numbers are low, at only 6% - flat since last year - of SMEs selling online and 3% (up from 2%) for those selling online to other EU Member States.

The silver lining is the emergence of a startup ecosystem in Bulgaria which is evolving significantly. The boom of information-technology outsourcing, hardware and software solutions has attracted many international companies, resulting in the rising of Bulgaria's reputation as an excellent source of bright minds. These developments have in turn stimulated entrepreneurship, as many professionals with years of corporate experience have started their own ventures. The startup ecosystem is growing thanks to co-working spaces such as Betahaus, SOHO and CowOrKing as well as local venture funds – LAUNCHub[7] and Eleven[8] – boosted by investment through the Joint European Resources for Micro and Medium Enterprises (JEREMIE) programme of the European Investment Fund. Several international venture capital funds and strong angel investors backed local companies which have become global success stories today[9].

Bulgarian businesses could more benefit from the possibilities offered by online commerce and the integration of other digital technologies. They could also benefit from an Industry 4.0 strategy.

Highlight: Sofia Tech Park creates a unique environment for innovation

Sofia Tech Park opened its doors at the end of last year. Sofia Tech Park is a state-owned company working to boost innovation, research and technological development through various projects for which it creates partnerships with private and public institutions. Eleven laboratories for information and communications technology (ICT), biotechnology and green energy are located on the territory of the park based on Tsarigradsko Shose Blvd, on the outskirts of Sofia. The Park aims to foster knowledge exchange between academia and business while supporting startups and innovative ideas, thus providing a catalyst for commercialisation of research and making Bulgarian science and entrepreneurship more competitive. The Sofia Tech Park also plans continuing hosting major ICT events in the Balkans.

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[7] http://launchub.com/

[8] http://11.me/

[9] Start-up Manifesto Policy Tracker, Track progress in Bulgaria. http://www.europeandigitalforum.eu/startup-manifest-policy-tracker/country/BG

5 – Digital Public Services

In terms of digital public services, Bulgaria's performance is well below the EU average and it is only making average progress. On the availability side, Bulgaria has progressed but there is room for improvement in re-using information across administrations in order to make life easier for citizens. However, the usage rate of eGovernment services remains one of the lowest in the EU28.

In spring 2014, Bulgaria adopted a Strategy for the development of eGovernment in 2014-2020, and recently, a roadmap for the implementation of the Strategy for the period 2016-2020. This was followed by the adoption of a Strategy for introducing "eGovernance and e-Justice 2014-2020", which aims to improve the efficiency of the e-Justice sector in the country. A number of follow-up steps have been undertaken since then. The government has approved a proposal for the creation of a dedicated eGovernance agency which is tasked with the strategic and budgetary planning of eGovernment policies as well as with the development and maintenance of the technical infrastructure, information centres and the communications network of the public administration. On 11 May 2016, Bulgaria adopted a bill on electronic identification, as a major step in the context of Regulation (EU) N°910/2014 on electronic identification and trust services for electronic transactions in the internal market (eIDAS Regulation). Since some provisions, which foresaw the embedding of a chip in identity documents, were dropped from the final text, a new proposal was put forward to amend and supplement the law on Bulgarian identity documents. It foresees that, as of 1 January 2018, the Ministry of Interior will be able to issue electronic identity documents.

The progress of Bulgaria in the area of digital public services will depend on the speed and quality of implementation of the proposed legislative and structural changes in the state administration. Follow-up of decisions remains crucial. In the area of electronic identification and authentication (eID) Bulgaria has not yet made use of the funding provided by the Connecting Europe Facility (CEF) for building the national eID node which would ensure interoperability with other Member States' notified eID schemes. Bulgaria would benefit from participation in future CEF calls.

Using various platforms and funding mechanisms, the EU contributes to the sharing of best practices between EU Member States. For instance through the Joinup platform https://joinup.ec.europa.eu/ , the ISA progamme http://ec.europa.eu/isa/ and the Connecting Europe Facility (CEF) https://ec.europa.eu/cefdigital.

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A report complementing the Digital Economy and Society Index (DESI) [1] country profile

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CZECH REPUBLIC

The Czech Republic ranks 17th out of the 28 EU Member States in the European Commission Digital Economy and Society Index (DESI) 2016[2], down from 15th place a year before. The Czech Republic is part of the **falling behind** cluster[3] of countries because its DESI score is below the EU average and grew slower than that of the EU over the last year. While performing averagely in Connectivity, progress is slow in terms of human capital and almost the same applies for the integration of digital technology by businesses. Some progress took place in the development of digital public services but performance remains limited both on the supply and the demand side.
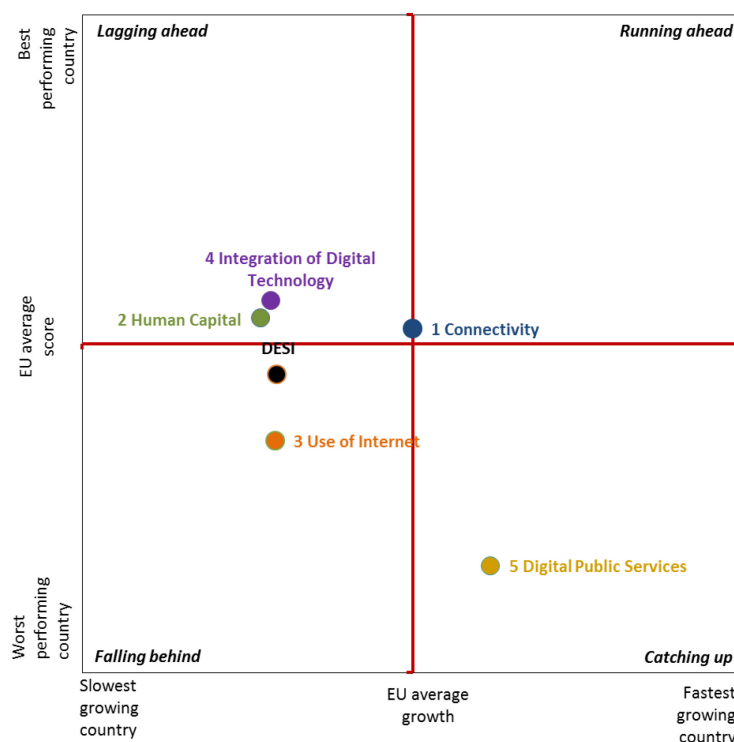
The Czech Republic's performance in the five DESI dimensions relative to other EU countries

1 – Connectivity

In Connectivity, the Czech Republic's performance and progress are at the EU average level. The country maintains its level of fixed broadband coverage of households (98%) and progressed in next generation access (NGA) coverage (73%), slightly better than the EU average (respectively 97% and 71%). However in rural areas only 6% of households are covered by NGA; this is much below the 28% average across the EU. Take-up of subscriptions to fixed fast (>= 30Mbps) broadband is at 31% of subscriptions; so close to the EU average of 30%. On the mobile side, more than 90% of population is covered by LTE networks. However, in terms of assignment of harmonised spectrum, at 55%, the Czech Republic is ranked 23rd in the EU. The tender launched on 3 February 2016 in the 1800 MHz and 2600 MHz bands is expected to raise the level of assignment to 64%; but this is still below the EU average of 69%. Meanwhile, in terms of mobile broadband take-up, the Czech Republic is also below the EU average (respectively 71 and 75 subscribers/100 people).

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[2] DESI Country Profile for the Czech Republic: https://ec.europa.eu/digital-single-market/en/scoreboard/czech-republic

[3] Other falling behind countries are Bulgaria, Greece, France, Hungary, Poland and Slovakia.

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In the 2014-2020 Programming period, the Czech Republic allocated an significant share of its European Structural and Investment Funds to the deployment of broadband infrastructure. In the Operational Programme Enterprise and Innovations for competitiveness (OPEIC), €520 Million are available and should be able to significantly narrow down the gap in rural broadband coverage. However, the initiative has been delayed: the OPEIC was adopted late and the thematic ex-ante conditionality[4] has not been fulfilled yet (end of April).

Deployment of rural broadband is of key importance to businesses and citizens in rural areas. The Czech Republic still has to transpose the Cost Reduction Directive[5] which could help to reduce the infrastructural gap.

2 – Human Capital

In Human capital, the Czech Republic's performance is just above the EU average but its progress is below average. Czechs are relatively digitally skilled with 57% of citizens having at least basic digital skills. The number of STEM (science, technology and mathematics) graduates is stable with 17 per 1000 Czechs aged 20-29 years old holding this type of degree, the same as in the previous year, and slightly below the EU average. STEM graduates are important drivers for the use of digital in the economy including the most cutting-edge technologies.

On 1 July 2015, the government approved the national Digital Literacy Strategy for the period 2015 to 2020, which aims to prepare its citizens to use digital technologies for lifelong personal development and to improve the quality of their lives and societal inclusion. The strategy aims to ensure that the workforce is digitally skilled and supports employees (especially for SMEs and the self-employed) to fully use the potential of digital technologies, lower digital skills gap and increase national competitiveness. The variety of measures included in the Digital Literacy Strategy represents a major step forward in the Czech Republic's digital literacy policy. The Strategy foresees a total financial cost of approximatively €270 Million with the funding coming from the State budget and EU funds.

The Czech Republic will greatly benefit from implementing such a comprehensive plan.

3 – Use of Internet

In the use of Internet services, the Czech Republic's performance is below the EU average and its progress is limited. Czech Internet users engage in a broad range of online activities. Czech Internet users are quite keen on online banking (58%) and online shopping (52%) too. They read the news online, listen to music, watch films and play games online and use the Internet to communicate through social networks. On the other hand, online video calls are much less common.

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[4] Ex-ante conditionality 2.2. concerning Next Generation network (NGN) Infrastructure in the framework of the European Structural and Investments Funds for the Programming Period 2014-2020 is defined as follows: The existence of national or regional NGN Plans which take account of regional actions in order to reach the Union high-speed Internet access targets, focusing on areas where the market fails to provide an open infrastructure at an affordable cost and of a quality in line with the Union competition and State aid rules, and to provide accessible services to vulnerable groups.
[5] Directive 2014/61/EU of the European Parliament and of the Council of 15 May 2014 on measures to reduce the cost of deploying high-speed electronic communications networks (OJ L155, 23 May 2014, p. 1)

4 – Integration of Digital Technology

In Integration of digital technologies by businesses the Czech Republic's performance is above the EU average but its progress is limited. Czech SMEs are among the EU leaders in selling online but they are at risk of losing their position, having fallen from the 2nd place the previous year to the 6th place. Despite a slowdown, Czech businesses are taking advantage of the possibilities and benefits offered by digital technologies, both to improve their efficiency and productivity as well as to access wider markets. 23% of SMEs are selling online (vs 16% in the EU) and 12% are doing so cross border (vs 8% in the EU).

A national Industry 4.0 initiative ("Průmysl 4.0") was adopted on 15 September 2015. The follow-up "Action Plan for the implementation of Industry 4.0" includes measures to support the further development of the digital economy through investment and standardization, applied research, human resources development and continuing education, cyber security and relevant legislation, application of innovative technologies in energy, transport and Smart Cities.

Highlight: "Průmysl 4.0" (Industry 4.0)

On 15 September 2015 the national initiative Industry 4.0 was adopted. This strategy, which takes stock of the baseline condition of the Czech Republic for the implementation of this latest industrial revolution, has been widened and now deals with issues such as technological assumptions and vision, applied research, standardisation, safety, labour market, educational system and regulatory environment. The long-term objective of this initiative is to maintain and boost the competitiveness of the Czech Republic.

The first industrial revolution was the mechanization of production using water and steam power; the second introduced mass production with the help of electricity; the third, the digital revolution, led to the automation of production; the fourth industrial revolution consists of the intelligent networking of product development and production, logistics and customers.

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5 – Digital Public Services

In digital public services the Czech Republic's performance is below the EU average but it's making progress. The Czech Republic has one of the lowest shares of eGovernment users in the EU. In 2015, only 12% of internet users sent forms to the public administration online, compared with an EU average of 32%. The low use of online public services reflects deficiencies in the supply of such services. For instance on average only 70% of the steps in a standard interaction with the public administration can be performed entirely online, compared with an EU average of 81%.

On 2 November 2015, the Czech government approved the "Strategy for ICT Services Development in Public Administration". The document summarises the actual situation in the development of e-government, including current gaps and inefficiencies. Specific measures include a stronger role for the Government Council for Information Society and attributing the role of "watchdog" to the Department of the Chief Architect of eGovernment at the Ministry of the Interior so that it can oversee the efficiency of public spending in public administration in the ICT area. Under the Integrated Regional Operational Programme co-funded by EU funds, significant allocations are envisaged to finance the development of eGovernment services. Another positive policy development is the adoption of a new law for obligatory open data publishing in a machine readable format for all public authorities and the obligatory public administration use of secure Internet domain's names with DNSSEC.

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The Czech Republic will greatly benefit from the implementation of the strategy now in place. Using various platforms and funding mechanisms, the EU is contributing to the sharing of best practices between EU Member States - for instance through the Join-up platform https://joinup.ec.europa.eu/ through the ISA programme http://ec.europa.eu/isa/ and the Connecting Europe Facility (CEF) https://ec.europa.eu/cefdigital.

Europe's Digital Progress Report (EDPR)

A report complementing the Digital Economy and Society Index (DESI) [1] *country profile*

DENMARK

Denmark ranks first out of the 28 EU Member States in the European Commission Digital Economy and Society Index (DESI) 2016[2]. Denmark is part of the **lagging ahead**[3] cluster of countries because it performs better than the EU average but has improved at a slower rate than the EU as a whole. Denmark recorded high performance on all the dimensions measured. Its performance is especially remarkable with regard to use of Internet. In Digital Public Services its growth is above EU average. Although Denmark is progressing slower than the EU average because it is reaching maturity, in the dimension of Human Capital, there is scope for further improvement. Denmark launched in 2012 a 5-year National Investment plan for ICT and Digital Skills[4]. This national strategy aims to increase the use of ICT in support of student learning in Danish schools in the period 2012-2017 in order to grow demand

Denmark's performance in the five DESI dimensions relative to other EU countries

for skilled IT-professionals and strengthen digital skills among students in higher education. All in all, Denmark is a world leader in digitisation[5].
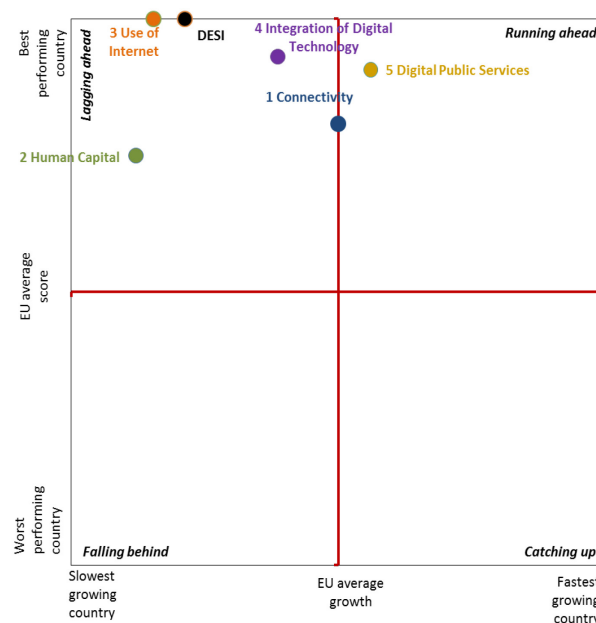
1 – Connectivity

Denmark is performing well and it is making average progress on Connectivity. At international level, however, Denmark's performance is below South Korea and Japan.

Denmark has maintained its high coverage of fixed broadband and Next Generation Access[6] (NGA), available to 99% and 92% of homes, respectively. Despite improvements in upload capacity, in line with the aim of the Danish Government action plan to ensure 100% coverage of 30 Mbps upload speeds, NGA in rural areas is only available to 55% of households. This is well below the national

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[1] The Digital Economy and Society Index (DESI) is a composite index developed by the European Commission (DG CNECT) to assess the development of EU countries towards a digital economy and society. It aggregates a set of relevant indicators structured around 5 dimensions: Connectivity, Human Capital, Use of Internet, Integration of Digital Technology and Digital Public Services. It clusters countries in four groups: Running ahead, Lagging ahead, Catching up and Falling behind. For more information about the DESI please refer to https://ec.europa.eu/digital-single-market/en/desi

[2] DESI Country Profile for Denmark: https://ec.europa.eu/digital-single-market/en/scoreboard/denmark

[3] Other lagging ahead countries are Belgium, Finland, Ireland, Lithuania, Luxembourg, Sweden and the United Kingdom.

[4] An investment of DKK500 Million (approx. €67 Million) have been allocated with a focus in four particular areas, namely (a) develop the market for digital learning resources; (b) gain more knowledge on ICT-based learning; (c) ensure efficient infrastructure in schools and support the use of ICT and digital learning resources through networking and (d) collaboration and knowledge sharing between teachers.

[5] I-DESI: https://ec.europa.eu/digital-single-market/news-redirect/31457

[6] Next generation Access includes the following technologies: FTTP, VDSL and Docsis 3.0 cable.

figure of 92% but well above the EU average of 28%. Broadband take-up in Denmark in 2015 was flat, but there was a significant increase of subscriptions to high-speed broadband, accompanied by an increase in mobile broadband uptake, reaching 112 subscriptions per 100 people, third in the EU and still increasing by 3 percentage points. It is relevant to highlight that the roll-out of high-speed network infrastructure is based on private investment. Public funding is only reserved for areas with poor broadband coverage which display a market failure element. Currently, there only 8% of homes in Denmark have no access to broadband networks capable of providing at least 30 Mbps. To promote access to digital opportunities also outside urban areas, the Danish Government has committed to further enhance network quality in rural areas. Between 2016 and 2019 Denmark will dedicate investments of DKK 200 Million (approx. €27 Million).

There is some uncertainty as to whether current spectrum assignments - only 68% of the harmonised bands, slightly below the EU average at 69% - and planning are in line with the growing trend towards mobile broadband take-up.

2 – Human Capital

Denmark is performing well and it ranks 5th among EU countries. However, its growth rate was limited over the last year. Its population as a whole has a very high level of digital skills with 93% of internet users. However, the low share of ICT specialists in the workforce (3.9% and 14th at EU level) could pose challenges to business investment in ICT in the long term. Denmark is performing well regarding graduates holding a STEM (Science, Technology and Mathematics) degree, with 20 graduates per 1000 individuals.

With regards to educating skilled IT-professionals, the number of students enrolled in IT education increased by 2,404 from 2007 to 2015. Denmark has launched two mapping of activities, of business needs and research and education in the field of cybersecurity, and future needs for digital skills, which will provide a basis for further actions. Businesses carry a great deal of the responsibility for educating their workforce and they should have an ongoing focus and incentive to strengthen digital skills within companies. Furthermore, the Danish government launched two partnerships promoting digitisation in SMEs in specific industries. These partnerships include the Danish Business Authority, industry associations and other private stakeholders. Close public and private cooperation aims to create common ground to further boost the supply of digital skills. Denmark has not yet set up its National Coalition for Growth and Jobs[7], which would be very important to ensure that all the key stakeholders are involved. However, in December 2015, they presented a Digital Skills manifesto with contributions from the government, education and political worlds as well as research and industry[8].

The announced strategies will help establish a clear focus on public and private partnerships which will not only encourage ICT professionals but also detect future needs for digital skills. Monitoring outcomes shall be an important element of these activities.

3 – Use of internet

Danish citizens display a strong propensity to use a variety of services. They are the most advanced in the use of Internet, such as eBanking and online shopping. 82% of Danish internet users shopped online last year and nearly half of them do so cross-border.

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[7] https://ec.europa.eu/digital-single-market/en/national-local-coalitions
[8] http://eskills4jobs.ec.europa.eu/c/document_library/get_file?uuid=4ecb3dc3-c0eb-4ae4-9aa9-81393608e890&groupId=2293353

4 – Integration of Digital Technology

On the Integration of Digital Technology by businesses, Denmark is performing very well (2nd out of 28 Member States), well above EU average but behind the US. Progress from last year is limited.

The adoption of digital technologies is an important driver of labour productivity growth. Danish businesses do exploit the benefits and possibilities offered by digital technologies with 25% of SMEs selling online and 15% of their turnover coming from this type of commerce. As a matter of fact, almost half of all Danish enterprises (47%) - and 45% of SMEs - have an electronic information sharing system indicating noticeable progress with respect to last year (5 percentage points from 2014 – 42%). In Denmark, adoption rates of eBusiness technologies, like eInvoices and Cloud services are among the highest in the EU. Denmark has put in place the Industry 4.0. Initiatives overseen by MADE – Manufacturing Academy of Denmark, supporting manufacturing industry as it seeks to maintain its leadership position in innovation. This initiative foresees a budget of DKK 183.5 Million DKK (approx. €25 Million) for the period 2014-2017[9].

5 – Digital Public Services

Denmark is performing very well and it is making good progress on Digital Public Services. Internationally however it ranks behind US, South Korea and Japan.

Positive results from the previous Danish eGovernment strategy 2011-2015 have led to an even more ambitious new strategy for 2016-2020 which will require close cooperation between central government, regions and municipalities as well as public-private corporations. In this new eGovernment strategy 2016-2020,[10] central government (1), regions (5) and municipalities (98) work together to deliver results. Its terms of reference define three key milestones of the strategy: (a) a productive and efficient public sector; (b) public services must create value for citizens and businesses; (c) public digitisation must support business growth. On top of that, specific themes have been selected for inclusion in the new strategy, namely automation of public administrative procedures, better user experience for citizens and businesses, digital welfare, data sharing and management of the joint public digitisation efforts, among others.

The new eGovernment strategy 2016-2020, which still has to be published, will strengthen Denmark's worldwide leading position on Public Service Digitisation. Its previous strategy already set a high level of ambition for the digitization of the public sector and succeeded to a large extent in shifting citizens and businesses to public digital channels[11].

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[9] MADE – Manufacturing Academy of Denmark http://made.dk/welcome
[10] New eGOVERNMENT strategy 2016-2020: http://www.digst.dk/Servicemenu/English/Policy-and-Strategy/New-Digital-Strategy
[11] New eGOVERNMENT strategy 2016-2020: http://www.digst.dk/Servicemenu/English/Policy-and-Strategy/New-Digital-Strategy

Europe's Digital Progress Report (EDPR)

Highlight: Denmark's digital by default strategy

The "digital by default" strategy was at the core of Denmark's eGoverment strategy 2011-2015, aiming for 80% of all service requests to be electronic by 2015 and 100% of business communications to be electronic by the end of 2012. Indeed, citizens were gradually moved into a digital transition to "mandatory digital self-service" and communication, being at the end able to receive digitally letters, notices and messages from public authorities. These services were introduced in four "waves" up to 2015, one per year from 2012. The first wave up to December 2012 included a total of 10 services, such as "basic" online applications. The second wave (December 2013) increased in number and complexity since it included 29 services, from paternity statements to tax forms and passport application. The third wave followed with 27 new services which included applications for allowances and all kind of social benefits. Finally, the fourth wave included 25 additional services, such as health allowances, sickness benefits, and permanent residence permits. All in all, by 2015, there were 91 mandatory digital self-services, which represented 80% of all services within the four waves.

Europe's Digital Progress Report (EDPR)

A report complementing the Digital Economy and Society Index (DESI) [1] *country profile*

GERMANY

Germany ranks 9th out of the 28 EU Member States in the European Commission Digital Economy and Society Index (DESI) 2016[2]. Germany is part of the **running ahead** cluster of countries[3] because its DESI score is above the EU average and the country developed faster than the EU over the last year. In four out of the five DESI dimensions detailed below, Germany outperforms a majority of Member States. The Use of Internet dimension is where Germany made most progress. The only dimension where Germany performs below average is Digital Public Services. In 2014 Germany had adopted its *Digital Agenda 2014-2017*[4] and in March 2016 the Federal Ministry for Economics presented the *Digital Strategy 2025*[5].
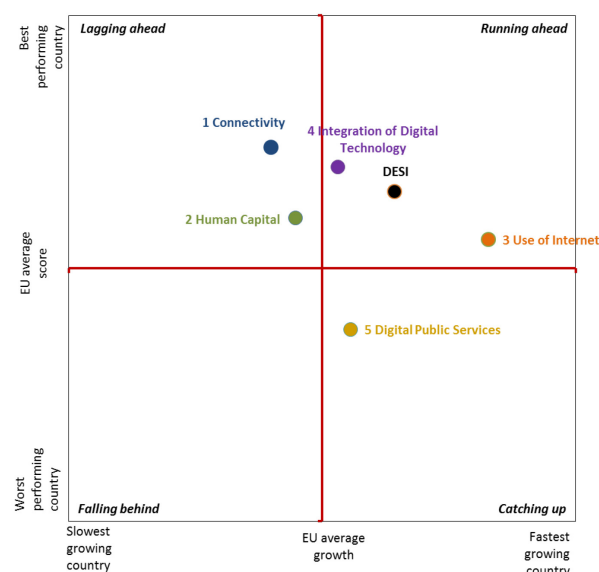
Germany's performance in the five DESI dimensions relative to other EU countries

1 – Connectivity

Germany is performing well and is making good progress as regards connectivity. Germany is fully covered by basic broadband services (including fixed, mobile and satellite networks) and has wide fixed basic broadband coverage of rural areas, slightly above the EU average (93% of households versus 90.6%). Additionally, the German Government's Digital Agenda sets out the goal to provide at least 50Mbps broadband internet connection nationwide until 2018. This will further contribute to bridge the digital divide and is supported by the 2015 federal state aid programme (*Bundesförderprogramm*) to close the remaining white spots. It is also noteworthy that Germany is the only Member State that has assigned 100% of the overall harmonised spectrum for mobile broadband.

Although fixed-line operators have in recent years upgraded their legacy copper and coaxial cable networks, current market share of fibre-based access networks (FTTH and FTTB) is well below the EU average (1.3% versus 8.7%). Consequently, ultrafast networks will increasingly need to install fibre closer to business and household premises or connecting directly to them.

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[1] The Digital Economy and Society Index (DESI) is a composite index developed by the European Commission (DG CNECT) to assess the development of EU countries towards a digital economy and society. It aggregates a set of relevant indicators structured around 5 dimensions: Connectivity, Human Capital, Use of Internet, Integration of Digital Technology and Digital Public Services. It clusters countries in four groups: Running ahead, Lagging ahead, Catching up and Falling behind. For more information about the DESI please refer to https://ec.europa.eu/digital-single-market/en/desi

[2] DESI Country Profile for Germany: https://ec.europa.eu/digital-single-market/en/scoreboard/germany

[3] Other running ahead countries are Austria, Estonia, Malta, the Netherlands and Portugal.

[4] http://www.bmwi.de/EN/Topics/Technology/digital-agenda.html

[5] https://www.bmwi.de/English/Redaktion/Pdf/ict-strategy-digital-germany-2015,property=pdf,bereich=bmwi2012,sprache=en,rwb=true.pdf

Europe's Digital Progress Report (EDPR)

If Germany wants to move towards ultrafast broadband technology, more investments in fibre upgrades will be necessary. Germany still has to transpose the Cost Reduction Directive[6] which could help to speed up broadband roll-out.

2 – Human Capital

In the Human Capital dimension, Germany is performing well and making progress. The inhabitants of Germany are regular users of the Internet, more than Europeans on average. They also possess, on average, higher skills: 66% of Germans have basic or above basic digital skills, above the European average of 55%. In 2015 3.7% of the workforce were ICT specialists (equal to the EU average of 3.7%) but there were still 40 000 open vacancies.

The potential of the digital economy for growth and jobs is hampered by a shortage of ICT professionals and reluctance or inability to properly exploit the possibilities offered by the Internet and related digital tools. An element of the *Digital Agenda 2014-2017* is the Digital knowledge society. However, no major coordinated strategy exists for the advancement of digital skills and Germany has no national coalition for digital competences. This being said, there is a wide range of activities by different entities on national[7], regional[8] and local[9] level.

A national coalition could facilitate the building of synergies between the different stakeholders for the design and implementation of strategies addressing the shortage of ICT specialists.

3 – Use of Internet

In Use of Internet services, Germany is performing well and is making good progress. In particular users in Germany tend to use Internet for online shopping more than most other Europeans, although because of the size of the national offer, cross-border transactions are less frequent compared to the European average.

4 – Integration of Digital Technology

In Integration of digital technologies by businesses, Germany is performing well and is making good progress. German companies are performing Europe-wide best on integrated electronic information sharing and are performing well regarding the use of eInvoices. However, German businesses (like German citizens) show reluctance to use social media. German enterprises increasingly take advantage of the possibilities offered by on-line commerce: nearly a quarter of SMEs sell online, and those who sell online make 9.6% of the share of their turnover from those sales. 9.2% of SME are selling online cross-border.

In the context of the *Digital Agenda 2014-2017* the Federal Ministry for Economic Affairs and Energy is implementing a number of policies[10] to respond to the challenges of digitisation, such as Big Data

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[6] Directive 2014/61/EU of the European Parliament and of the Council of 15 May 2014 on measures to reduce the cost of deploying high-speed electronic communications networks (OJ L155, 23 May 2014, p. 1)

[7] See https://www.bmbf.de/de/digitale-medien-in-der-bildung-1380.html for digital learning projects

[8] See for example the "Bayern Digital Strategie", targeting digital skills development from early childhood https://www.stmwi.bayern.de/digitalisierung-medien/bayern-digital/.
Or for Berlin http://be-digital.berlin/agenda/

[9] See for example Digitale Bildung Köln http://www.stadt-koeln.de/leben-in-koeln/bildung-und-schule/digitale-bildung/

[10] For example Integration of digital technologies: (www.digitale-technologien.de), Autonomics for Industry 4.0 (www.autonomik40.de), Smart Data - Data Innovations (www.smart-data-programm.de) Smart Service Welt (www.digitale-technologien.de/DT/Navigation/DE/Foerderprogramme/Smart_Service_Welt/smart_service_welt.html), ICT for Electric Mobility III (www.ikt-em.de) Central innovation Program for SMEs (www.zim-bmwi.de) Collective Research Program (IGF) (www.aif.de/innovationsfoerderung/industrielle-gemeinschaftsforschung.html), Digitale Technologien für die Wirtschaft

and Smart Data, smart services, mobile internet, cloud computing, social media and Industry 4.0. Looking at the structure of the German Industry, in particular "Industry 4.0" has the potential to radically redesign/ to substantially reform value chains and to significantly influence Germany's key industrial sectors.

The measures in place and the strategy announced are appropriate for encouraging and facilitating the digital transformation. For companies, such as those in the automotive industry, "Business as usual" is not an option and they will have to actively embrace the opportunities and challenges of digitisation - on all levels of society and the economy.

Highlight: Trials on the digital motorway test bed

To reflect, analyse and support the increasing automation and connection of modern vehicles, the "Digital A9 motorway test bed" has been launched, on which state of the art digital technology is installed to enable digital communication between the road and the vehicle as well as vehicle-to-vehicle. The digital motorway test bed is a technology neutral offer to industry and the research community and can be used by all stakeholders from the automotive industry, the digital technology sector and academia interested in testing their innovations. The trial is accompanied by scientific research and there will be an open transfer of knowledge.

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5 – Digital Public Services

When it comes to Digital public services, Germany's performance is below the EU average and it is only making slow progress. Germany is one of the EU countries with the lowest online interaction between public authorities and citizens. Only 19% of Germans going online use eGovernment services actively.

An act to promote e-government was adopted in July 2013[11], and an e-government strategy was adopted in August 2014 as part of the Digital Agenda 2014-2017 bill, to foster the digital transformation of the public administration. The "Digital Administration 2020" programme aims to ensure that in future public administration is generally electronically accessible for all citizens. It includes measures on electronic filing, the central DE-Mail gateway, the central eID service, an extended payment platform and public procurement.

In November 2015, the National Regulatory Control Council (Nationaler Normenkontrollrat) adopted an opinion on eGovernment in Germany[12]. It confirms that there is no coherent and nation-wide eGovernment offer in Germany. Diverse and not necessarily interoperable systems create friction losses. It was found that however effective eGovernment could deliver considerable savings.

Germany's federal structure poses specific challenges in the context of the establishment of a coherent and nationwide eGovernment offer. Furthermore, for citizens to make more use of the

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(http://www.bmwi.de/DE/Themen/Digitale-Welt/Digitale-Technologien/digitale-technologien-fuer-die-wirtschaft,did=748308.html), Connectivity: Smart Network Strategy (http://www.bmwi.de/DE/Themen/Digitale-Welt/Initiative-Intelligente-Vernetzung/strategie-der-bundesregierung.html), SME: (www.mittelstand-digital.de) and Industrie 4.0 (www.plattform-i40.de)

[11] http://www.bmi.bund.de/DE/Themen/IT-Netzpolitik/E-Government/E-Government-Gesetz/e-government-gesetz_node.html , see also http://www.bmi.bund.de/SharedDocs/Downloads/DE/Broschueren/2014/digitale-agenda-im-fokus.html

[12] https://www.normenkontrollrat.bund.de/Webs/NKR/Content/DE/Pressemitteilungen/2015_11_18_pm_it_gipfel_u_gutachten_egov.html?nn=826682

existing digital public services, the offer needs to be better known and easier to use. Also citizens' worries regarding data protection need to be taken into account.

Stronger governance at federal level, as well as between the Federation and the Länder, could contribute to Germany's eGovernment performance. Moreover, the use of already existing solutions for cross-border eGovernment, for example 'eID', 'eDelivery', 'eSignature' und 'eInvoicing', which are provided via the Connecting Europe Facility, and whose development was also co-financed by Germany, could also be used in the federal context.

Finally, linking eGovernment to current challenges, e.g. the refugee crisis, can also support uptake. Moreover a strong German commitment and engagement to implement the new eGovernment Action Plan 2016-2020 would also support eGovernment within Germany.

Europe's Digital Progress Report (EDPR)

A report complementing the Digital Economy and Society Index (DESI) [1] *country profile*

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ESTONIA

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Estonia ranks 7th out of the 28 Member States in the European Commission's Digital Economy and Society Index (DESI) 2016[2]. Overall Estonia falls into the cluster of **running ahead** countries,[3] scoring above the EU average and with rapid growth from last year. Estonia is at the forefront in supply and use of Digital Public Services and Estonians are well-skilled in the use of digital technologies and keen users of a variety of internet services. 22% of Estonians shop cross-border, a higher rate than the European average. Despite progress, the greatest challenge in terms of digitisation is the Integration of digital technology by businesses.

Estonia's performance in the five DESI dimensions relative to other EU countries
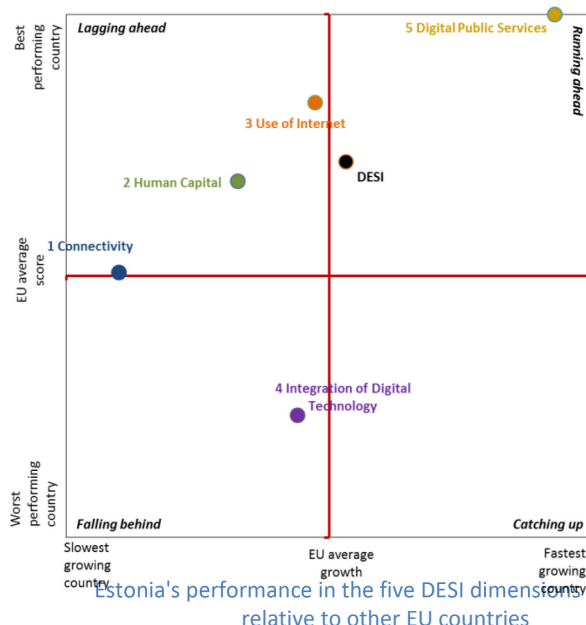
The current Estonian Digital Agenda[4] sets out the general objective to "contribute to achieving higher growth, more jobs and increased welfare by creating an environment supporting the use and development of ICT solutions". It's an ambitious strategy that sets out a vision, principles, sub-objectives and measures with targets, indicators and action lines. The implementation of the strategy in Estonia is steered by the e-Estonia Council led by the Prime Minister.

1 – Connectivity

With an overall Connectivity score of 0.59, on a par with the EU average, Estonia ranks 16th among EU countries, down from 14th a year ago. Uptake of mobile Internet (3G and 4G) is among the highest in the EU, around 86% of the population. This includes multiple subscriptions, and illustrates the high diffusion of mobile technologies to access the Internet. With an increase in take up of fixed broadband, there has also been an increase in the share of subscriptions to fast broadband (at least 30 Mbps) from 24% to 27%, thereby closing in on the EU average of 30%. The level of assigned spectrum in the ranges harmonised by the European Union, has gone down in Estonia (also due to the newly harmonised 1500MHz band) but still remains well above average (84% vs an EU average of

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[1] The Digital Economy and Society Index (DESI) is a composite index developed by the European Commission (DG CNECT) to assess the development of EU countries towards a digital economy and society. It aggregates a set of relevant indicators structured around 5 dimensions: Connectivity, Human Capital, Use of Internet, Integration of Digital Technology and Digital Public Services. It clusters countries in four groups: Running ahead, Lagging ahead, Catching up and Falling behind. For more information about the DESI please refer to https://ec.europa.eu/digital-single-market/en/desi

[2] DESI Country Profile for Estonia: https://ec.europa.eu/digital-single-market/scoreboard/estonia

[3] Other running ahead countries are Austria, Germany, Malta, the Netherlands and Portugal

[4] https://www.mkm.ee/sites/default/files/digital_agenda_2020_estonia_engf.pdf

69%). While Estonia scores well in the take up of broadband, both mobile and fixed, Estonia occupies the third to last position in terms of availability of fixed broadband in rural areas (89% of homes).

In early 2014, Estonia updated its targets and measures for broadband development as part of its new Digital Agenda 2020 for Estonia. The country aims at providing all residents with internet access of > 30 Mbps, and achieving at least 60 % household subscription rates for speeds > 100 Mbps. Funding is expected to come from private and public sources, state budget as well as EU structural funds.[5]

Estonia's challenge is to get universal coverage of fast broadband, although, the current fixed broadband network is of a high standard with a high proportion of fast connections. In this regard, it is key to secure the final and timely completion of the Estwin middle mile project, designed in 2009 with the aim of ensuring that after completion, 98 % of all households in Estonia will be located no further than 1.5 km from the nearest network fibre access point, in line with the newly planned deadline of 2020. Estonia still has to transpose the Cost Reduction Directive[6] which could help to speed up broadband roll-out.

2 – Human Capital

In the Human Capital dimension Estonia is performing well. They rank 7th but progress from previous year is limited. The share of ICT Specialists as a percentage of the workforce is above the EU average but Estonia is falling in the ranking. The number of graduates in science and technology is increasing but Estonia still falls well behind the EU average. Given that 51% of companies reported difficulties in recruiting ICT specialists, addressing this skills gap would help the country to remain competitive in the digital economy. Estonia recognises the importance of digital skills for competiveness and economic growth and prioritised digital skills for over a decade. Estonia believes that there is a lack of motivation among people, entrepreneurs and all levels of education to fully embrace a digital mind-set.

One of the four sub-objectives in the current Digital Agenda is "better ICT skills for more jobs with higher added value, increased international competitiveness and higher quality of life". It covers both skills needed for everyday life as well as skills for the workforce. There are several action lines that will be implemented through the Estonian Lifelong Learning Strategy 2020.

Part of the long term solution to address digital skills gaps lies within formal education. In order to improve the quality of teaching and learning in the ICT field in higher education, the Estonian ministry of education and research, in cooperation with the private sector, launched an IT academy programme in 2012. To expand and further build on the IT Academy programme Estonians can establish National Coalitions for Digital Jobs. These are multi-stakeholder partnerships developed in Member States to enhance digital skills at national, regional or local level.

These actions should have a positive impact on digital skills in Estonia. A national coalition for digital skills and jobs could very well act as an implementation and follow up mechanism for the Estonian Government.

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[5] atene KOM GmbH, Outline of National Broadband Plans in the EU-28
[6] Directive 2014/61/EU of the European Parliament and of the Council of 15 May 2014 on measures to reduce the cost of deploying high-speed electronic communications networks (OJ L155, 23 May 2014, p. 1)

3 – Use of Internet

Estonia ranks 5th among all the EU countries in this dimension and while the consumption of music, video and games content by Estonians is at levels comparable to the EU average, there has been a considerable increase in online shopping. High levels of Internet service usage among citizens constitutes part of a good foundation for businesses and public administration to transform their operations into effective, digital operations. Estonians are also in the forefront of Europe in online banking and the consumption of news content. In general Estonians are placed above the EU average in almost all categories, with the exception of video on demand and social media. In eCommerce, both domestic and cross-border, they are above the European average but slightly below their own levels in other dimensions.

4 – Integration of Digital Technology

In Integration of Digital Technology by businesses, Estonia ranks 22 in DESI 2016, its weakest score among the five dimensions. The progress of digital technologies and practices by businesses is below EU average, and Estonia's businesses are only starting to exploit the possibilities offered by on-line commerce.

An important source of growth and innovation is digitally based, potentially fast-growing and global companies - Internet startups. The Startup Manifesto[7] tracker monitors the national implementation of 22 actions in the Startup Manifesto to boost digital entrepreneurship and innovation. In implementing the 22 actions, Estonia ranks below the European average on three dimensions, Skills & education, Better Access to Capital and Thought Leadership, while above it on Institutional Framework, Access to talent and Data Policy and Privacy. Startup Estonia is a governmental initiative,[8] operational since 2015, to support Estonian entrepreneurs and create a startup friendly environment. Its tasks include developing the startup ecosystem, educating founders, employees and local investors as well as eliminating regulatory barriers.

The Estonian Entrepreneurship Growth Strategy 2020[9] sets out the vision that by 2020: "The Estonian innovation and entrepreneurial policy will have considerably improved the welfare of Estonian citizens and enhanced Estonia's integration in the international economy as well as the competitiveness of its enterprises". It focuses on three main challenges: increasing productivity, stimulating entrepreneurship and encouraging innovation.

These strategies are comprehensive and in some instances complemented by other sector-specific initiatives. Given that Estonia currently lags behind in this dimension, these recently adopted initiatives are needed for the Estonian society and economy.

5 – Digital Public Services

Estonia has been at the forefront of online public services for a few years and is now the best performing country in Europe in 2016 according to DESI, with significant progress since last year. The share of eGovernment users (80%) returning filled-in electronic forms is far above the EU average (32%); this is also facilitated by the possibility to complete online almost all the steps for a required

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[7] The Startup Manifesto was created by the Leaders Club, a group of founders of technology companies based in Europe, by invitation of the European Commission in 2013. It contains 22 policy actions to boost entrepreneurship and innovation to power growth in the EU.

[8] http://www.startupestonia.ee/

[9] http://kasvustrateegia.mkm.ee/index_eng.html

service. Estonia is also strongly committed to the implementation of the once-only principle, reusing previous information to lower the burden to citizens by using pre-filled forms, surpassing every other EU country.

The Estonian government has introduced a wide variety of e-services, accessed through the electronic identity (eID) of its citizens. This card enables electronic authentication, and serves as a digital signature to allow Estonians to sign contracts, vote, submit their tax declarations, purchase tickets for public transport and check their children's progress at school electronically. That user-centric approach is reflected in the popularity of e-services: 96% of tax declarations in 2015 were filed electronically. In their digital agenda for 2020, eGovernment has a prominent place, and related targets and actions feature several sub-objectives and measures. Something that looks promising for the future is the further modernisation of Estonian public administration. There is a strong focus on cross-border capability of eServices such as eIdentities and digital signatures, something that is manifested in the possibility to become an Estonian eResident.

Highlight: e-Residency in Estonia

Estonia is the first country to offer e-Residency — a digital identity available to anyone in the world interested in administering a location-independent business online. eResidents receive a smart ID card which provides digital identification and authentication, signing of documents, verification of document authenticity and document encryption. A holder of e-residence may for example register his or her business electronically and sign business documents without having to physically be in Estonia. For more, visit https://e-estonia.com/e-residents/welcome/

In the health sector Estonia has developed the Electronic Health Record - a nationwide system that integrates data from Estonia's different healthcare providers to create a common online medical record for each patient. All primary care offices, hospitals and pharmacies are also connected to the ePrescription system – a paperless system for issuing and handling medical prescriptions.

With a high level of digitisation in the public sector, the importance of security and privacy has increased. Estonia has a separate cyber security strategy that spans 2014-2017. The outcomes as measured in DESI are the result of ambitious work within the field of modernising the public administration in Estonia. There is no evidence suggesting a lowering of future ambition and Estonia will most certainly be a role model and pilot in Europe when it comes to implementing digital solutions in and for the public sector.

Europe's Digital Progress Report (EDPR)

A report complementing the Digital Economy and Society Index (DESI) [1] country profile

GREECE

Greece ranks 26th out of the 28 EU Member States in the European Commission Digital Economy and Society Index (DESI) 2016[2]. Greece is part of the **falling behind** cluster[3] of countries: its score is lower than the EU average and over the last year it grew at a slower pace than the EU. The Human Capital dimension (i.e. digital skills) is where Greece made most progress; however, levels of digital skills remain low and hamper developments in the Use of Internet by citizens, the Integration of Digital Technologies by businesses, and limit the take up of broadband. Moreover, the country is facing a severe emigration of intelligent, well-educated individuals. Greece is a moderate performer in terms of Digital Public Services with a level of active eGovernment users above the EU average.
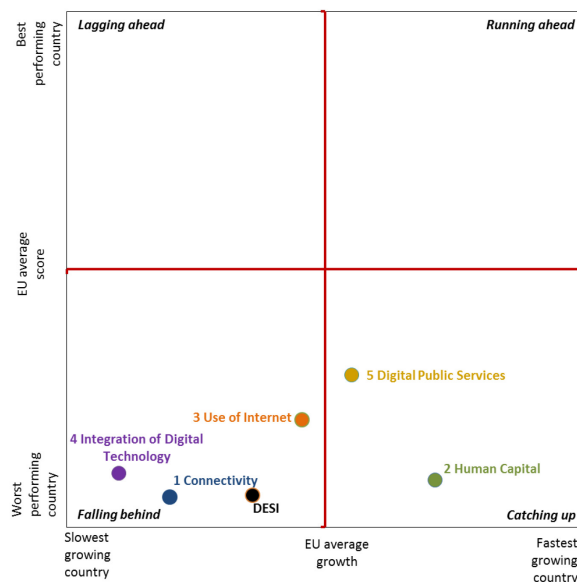
Greece's performance in the five DESI dimensions relative to other EU countries

The Prime Minister has announced the set-up of a "Digital Secretariat". This Secretariat could be fundamental for the overall coordination of the Digital Single Market in Greece and the related investments under European Structural and Investment Funds (ESIF) and the European Commission's Investment Plan for Europe ("Juncker Plan").

1 – Connectivity

Greece ranks only 26th among EU countries in terms of Connectivity and its progress is well below the EU average. While 99% of households are covered by fixed broadband, the number of fixed (in particular high speed) and mobile broadband subscriptions is well below EU average and coverage of fast networks providing at least 30 Mbps is available to only 36% of homes, far below the EU average of 71%.

Greece's broadband strategy relies on the private sector to take on the vast majority of investments in high speed networks, with public intervention focusing mostly on areas characterised by market failure (required funding is expected to range from €1.36 Billion to 4.53 Billion). The competitiveness, entrepreneurship and innovation Operation Programme (OP) and the European Agricultural Fund for Rural Development (EAFRD) provide a total of €369 Million funding for broadband[4].

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[1] The Digital Economy and Society Index (DESI) is a composite index developed by the European Commission (DG CNECT) to assess the development of EU countries towards a digital economy and society. It aggregates a set of relevant indicators structured around 5 dimensions: Connectivity, Human Capital, Use of Internet, Integration of Digital Technology and Digital Public Services. It clusters countries in four groups: Running ahead, Lagging ahead, Catching up and Falling behind. For more information about the DESI please refer to https://ec.europa.eu/digital-single-market/en/desi

[2] DESI Country Profile for Greece: https://ec.europa.eu/digital-single-market/en/scoreboard/greece

[3] Other falling behind countries are Bulgaria, Cyprus, Czech Republic, France, Hungary, Poland and Slovakia.

[4] This figure includes also funds under code 048 (ICT infrastructure). National contribution will be added to these figures.

From a regulatory capacity point of view, being without a chief executive for more than a year means that the Greek National Regulatory Authority (EETT), has not been in a position to adopt decisions. Major decisions expected in the area of ex ante market regulation and spectrum assignment have been delayed without any indication of timing, with negative effects being felt throughout the market.

The challenge for Greece is to accelerate the implementation of its strategy and to ensure that the relevant public funds are released as quickly as possible (e.g., by addressing all the pending elements of the ESIF ex-ante conditionality 2.1 on the national digital growth strategy). Moreover, the current situation of EETT creates legal uncertainty and is detrimental to the telecoms sector. Finally, Greece still has to complete its transposition of the Cost Reduction Directive[5], which will enable more efficient deployment of high-speed networks and will maximize the effect of public investment.

2 – Human Capital

In terms of human capital, Greece's performance is below the EU average, but it is making good progress. In 2015, only 63% of the Greek population was using the internet on a regular basis (versus 76% EU average) and only 44% of Greeks had at least basic levels of digital skills. Nowadays digital skills and competences are needed for nearly all jobs where digital technology complements existing tasks, and shortages can be a significant barrier to the country's economic development. The share of Science, Technology, Engineering and Math (STEM) graduates is increasing, providing potential for the take-up of new professions, but currently Greece has the lowest share of ICT specialists in the workforce (1.3%) in the EU. Greece faces a dual challenge: although an increasing number of intelligent, well-educated individuals emigrate in search for better pay or conditions ("brain drain"), the Greek ICT companies have difficulty in finding people with the right digital skills.

To address the challenge, a number of initiatives have been or are about to be introduced. In May 2014 the Greek Government (5 Ministries and 3 General Secretariats) along with the Federation of Hellenic ICT Enterprises (SEPE) launched a Greek National Coalition for the Digital Economy. The Ministry of Interior and Administrative Reconstruction is now planning to design a National Action Plan for digital skills by the end of 2016, in collaboration with several other Ministries and national stakeholders. Furthermore, the Ministry of Labour has recently launched an initiative aimed at training 3000 unemployed youngsters with the digital skills that are in high demand in the labour market. The stakeholder alliance "Women and Girls Go Digital in Greece" (WGGDG), is undertaking concrete actions to promote the participation of women in ICT professions and the digital society at large. Additionally, the "Digital School" programme, which was officially launched in 2010 but is suspended for the time being, is a large scale national initiative of the Greek Ministry of Education for the modernisation of school education. The Ministry also intends to carry out programmes offering ICT training to teachers; to introduce innovative teaching material; and educational tools in the classroom and to promote computational thinking from the first years of primary school.

Greece will benefit from developing new initiatives to address the chronic skills mismatch observed between the ICT industry's needs and the skills offered by formal education, as well as by providing leadership and cooperation between diverse stakeholders, and key resources for digital skills development. If successfully implemented, the Greek National Coalition for the Digital Economy could help building digital skills capacity with industrial relevance and could enable better collaboration, especially between government, education and industry.

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[5] Directive 2014/61/EU of the European Parliament and of the Council of 15 May 2014 on measures to reduce the cost of deploying high-speed electronic communications networks (OJ L155, 23 May 2014, p. 1)

3 – Use of Internet

A significant percentage of Greek Internet users engage in a wide range of online activities, such as reading news online, listening to music, watching films and playing games online, using the Internet to communicate via voice or video calls and participating in social networks. Nonetheless, Greeks are reluctant to engage in online transactions, like eBanking (21%) and online shopping (47%), for which participation levels are much lower than the EU average (57% and 65%, respectively), revealing a certain distrust in the online environment. Having said that, the share of users engaging in online shopping has improved significantly by 7 percentage points.

4 – Integration of Digital Technologies

The adoption of digital technologies by businesses is a catalyst for economic development and labour productivity growth. While the ICT industry performed reasonably well during the economic crisis and is focusing increasingly on international markets, Greece's overall industry performance in integrating digital technology is below par and progress is slow. The percentage of businesses using technologies such as electronic information sharing (ERP – 37%) and social media (18%) is nearly equal to the EU average; however, not many Greek businesses use RFID, eInvoices, or cloud services. Very few Small and Medium Enterprises (SMEs) in Greece sell online (6.1%) and even fewer sell online to other EU member states (3.4%), probably because of delivery costs. On the positive side, the Greek start-up ecosystem is viewed very favourably worldwide and investments in digital companies have multiplied over the last few years, from €500 000 Euros in 2009 to more than €50 Million Euros in 2015.

It is expected that a programme for "Upgrading of micro and small existing businesses to develop their capacity in new markets" will be issued under the OP Competitiveness - Entrepreneurship - Innovation of the National Strategic Reference Framework 2014-2020 (ESIF). This programme will reinforce existing micro and small enterprises operating in eight strategic priority sectors: agro-food, energy, cultural and creative industries, supply chain, environment, information and communication technologies (ICT), health - medicines and materials - construction. One of the proposed areas this programme will cover is support of small enterprises in simplifying and automating operational and production activities through modernisation of equipment and the introduction and/or increase of the use of ICT.

It is important that Greek businesses improve their level of digitisation in order to attain further efficiency and productivity gains so as to be able to benefit even more from taking advantage of the possibilities offered by online commerce. Greece would also benefit from an Industry 4.0 strategy as well as from European Fund for Strategic Investments (EFSI) dedicated funds for SMEs and larger companies.

5 – Digital Public Services

In Digital Public Services, Greece ranks 20th and its progress is just above the EU average. The percentage of Internet users that have exchanged filled forms with the public administration online is above EU average (37%). Greece's open data score is also higher than the EU average. However, Greece performs worse on the supply side of online public services[6].

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[6] 8.1/100 in the Pre-filled Forms indicator (measuring the extent to which data that is already known to the public administration is pre-filled in the forms that are presented to the user), and of 54/100 in the Online Service Completion

Greece's strategy for eGovernment (2014-2020) aims at modernising the state and public administration and to reconnect citizens with them. An Action Plan for Open Government and Open Public Administration has been adopted. The commitments undertaken in the new Action Plan are structured along the following lines: encouraging public participation; open public data; and integrity and accountability. Moreover, a number of eGovernment portals have been put in place. Notably, 'Ermis', the Governmental Portal of Public Administration, aims to inform citizens and businesses, and ensure the safe use of eGovernment services through digital certificates. The 'Citizen Service Centres' (or 'KEP' in Greek transliteration) are the administrative one-stop service centres, where citizens can have access to public service information and to over 1,000 standardised administrative procedures. There are also plenty of additional initiatives, such as in eProcurement, the electronic Prescription programme (eHealth), as well as various public Networks.

The eGovernment Strategy of Greece appears to be comprehensive and offers a path towards the design of effective online services and tools that will increase transparency and efficiency. It could also enable greater citizen trust and participation.

Highlight: ePrescription helps to modernise Greece's medical care network

The "ePrescription" project is a digital social service which aims to connect and render interoperable all national social insurance funds through a fully integrated platform that helps to manage, monitor and control the drug prescription lifecycle. This cycle begins with the prescription or laboratory test referrals, and monitors them from issuance through to payment of the final beneficiaries, and encompasses the clearance of the transactions of all national social insurance funds, medical consultations and electronic medical act referrals. The total investment in the project "ePrescription" was almost €12 Million, of which the European Regional Development Fund contributed €10 Million, for the 2007-2013 programming period.

The first pilot project was initiated in 2010 and, thus far, ePrescription is the most important eHealth application. It has a high rate of coverage and penetration throughout the country and is positively affecting the public health and public finance systems. By using ePrescription patients benefit from reduced difficulties affecting their prescription insurance coverage and enjoy a simpler process, especially when it comes to renewal of prescriptions. Furthermore, health authorities are relieved of excess paperwork and bureaucratic procedures. From the doctor's point of view the project offers a clear overview of the patient's medical history and better alignment with guidelines.

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indicator (measuring the extent to which the various steps in an interaction with the public administration – life event – can be performed completely online).

Europe's Digital Progress Report (EDPR)

A report complementing the Digital Economy and Society Index (DESI) [1] country profile

SPAIN

Spain ranks 15th out of the 28 EU Member States in the European Commission Digital Economy and Society Index (DESI) 2016[2]. Spain is part of the catching up[3] cluster of countries because, although it still performs slightly below the EU as a whole, it has developed fast over the last year and got closer to the EU average.

Spain has improved its ranking on all of the dimensions measured, with the sole exception of the Use of Internet dimension where growth is slow. Its performance is especially remarkable in digital public services, although Spain made most progress in the Human Capital dimension. However, in general, Spain is weak on the demand side, with lower levels of growth in digital skills. Spain launched "Digital Agenda para España"[4] in 2013, in line with the Digital Agenda for Europe. This national strategy aims at further digitisation of public services, increased digital literacy, boosting of the digital economy and the development of high-speed networks by setting 32 key indicators.
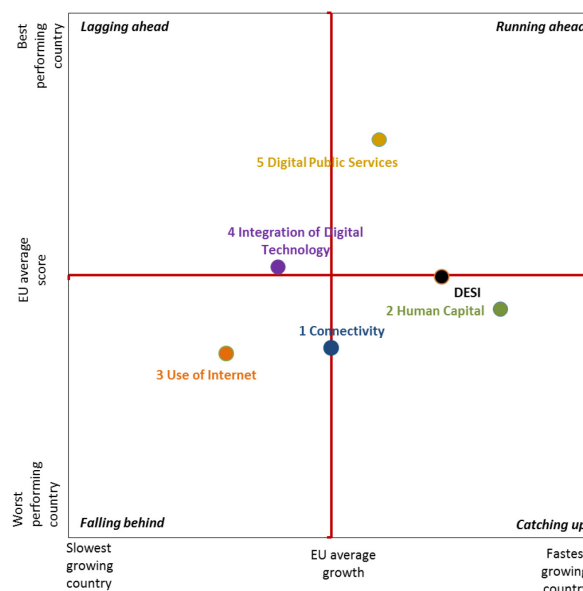
Spain's performance in the five DESI dimensions relative to other EU countries

1 – Connectivity

Spain is almost aligned with the EU average in terms of connectivity. Currently, 77% of households have access to fast broadband networks capable of providing at least 30 Mbps, although with significant differences between regions and between urban and rural areas, where further efforts are needed.

It is worth highlighting that Spain recorded the strongest growth in the EU in the deployment of fibre networks (FTTP) compared with 2014 (17.7 percentage points). The National Regulatory Authority - CNMC's predecessor, the CMT - facilitated this through its 2008 decision to mandate access to the incumbent's ducts (Telefonica); and imposed (in 2009) a symmetrical obligation upon all operators to provide access to in-house fibre cabling. The signing of several agreements on FTTH co-investment and co-deployment in 2012 and 2013 also contributed. In addition, cable operators have also upgraded their networks to DOCSIS 3.0 in recent years. As a result infrastructure-based competition in high speed broadband access is developing in dense urban areas.

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[1] The Digital Economy and Society Index (DESI) is a composite index developed by the European Commission (DG CNECT) to assess the development of EU countries towards a digital economy and society. It aggregates a set of relevant indicators structured around 5 dimensions: Connectivity, Human Capital, Use of Internet, Integration of Digital Technology and Digital Public Services. It clusters countries in four groups: Running ahead, Lagging ahead, Catching up and Falling behind. For more information about the DESI please refer to https://ec.europa.eu/digital-single-market/en/desi
[2] DESI Country Profile for Spain: https://ec.europa.eu/digital-single-market/en/scoreboard/Spain
[3] Other catching up countries are Croatia, Italy, Latvia, Romania and Slovenia.
[4] Digital Agenda for Spain: http://www.agendadigital.gob.es/digital-agenda/Documents/digital-agenda-for-spain.pdf

Mobile broadband and fixed broadband take-up ratios are the two main sources of improvement in the DESI: 69% of households subscribe to fixed broadband (but remains still 3 points below the EU average) and 29% of these subscriptions were fast broadband networks capable of providing at least 30 Mbps (still 1 percentage point below the EU average). In addition, 51% of Spanish households subscribe to a bundle offer[5].

Spain still has to fully transpose the Cost Reduction Directive[6] which could help to speed up broadband roll-out.

Highlight: Fibre regulation – innovative and complex approach

In the last review of Spain's broadband markets, the National Regulatory Authority CNMC sought to impose on Telefonica remedies differentiated on the basis of infrastructure (copper vs NGA networks); by geographic area to reflect different levels of competition; and of business and (consumer) mass-market customers. Telefonica will have to offer virtual access to its fibre network for 60-70% of the population of Spain, and bitstream access over copper and fibre with no speed cap for the business market across Spain. CNMC is deploying an innovative approach to determine the areas in which fibre regulation is needed; however the geographic differentiation proposed is highly complex. This dynamic and forward-looking approach results in a lower number of regulated geographical areas, as opposed to regulating on a local exchange-basis. In its analysis of these broadband measures, the Commission asked CNMC to closely monitor the markets and ensure that the outcome of the proposed methodology accurately reflects the actual level of competition. CNMC adopted the broadband measures on 25 February 2016.

The Digital Agenda for Spain includes one implementation plan for telecommunications and high-speed networks that is fully in line with the EU digital targets. The plan contains measures to reduce the costs of deployment; financial support to the roll-out of backhaul and access networks providing at least 30 Mbps or 100 Mbps connectivity in white areas; measures to facilitate the deployment of mobile networks and the access of operators to new spectrum bands; as well as initiatives to support demand. Spain plans to devote more than €420 Million from the European Regional Development Fund (ERDF) to broadband investments. In some regions the European Agricultural Fund for Rural Development will also support broadband deployment in rural areas. Spanish projects were among the most active participants in the European Commission and World Bank's Connected Community initiative and a Spanish project, *Guifi.net*, received the 2015 European Broadband Award for the best project in the category of innovative models for financing, business and investment.

This strategy will further encourage ultra-fast broadband investment. Setting ambitious targets and policies on the demand side to improve take up of high-speed broadband connections will contribute to achieve a leading and strengthened position for Spain in the Digital Economy.

2 – Human capital

In the Human Capital dimension, Spain is below the EU average but is growing fast. In order to fully develop its digital society, Spain needs to nudge more of its citizens to use the Internet and to acquire digital skills. Insufficient levels of digital skills also limit the economic benefits from

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[5] Special Eurobarometer 438 – Wave EB84.2. – TNS opinion and social - E-communications and Digital Single Market. By bundle, we mean a package offering a combination of electronic communication services (or a combination with other services such as TV channels) from the same provider at an overall price.

[6] Directive 2014/61/EU of the European Parliament and of the Council of 15 May 2014 on measures to reduce the cost of deploying high-speed electronic communications networks (OJ L155, 23 May 2014, p. 1)

investments in ICT by companies and public authorities. Although Spain is not faring too badly compared with other EU countries, in absolute levels the problem remains a significant one, since only 54% of individuals between 16 and 74 years old have basic digital skills. ICT specialists represent a lower share of the workforce (3.1% compared with 3.7% in the EU). Spain is performing well as regards graduates holding a STEM (Science, Technology and Mathematics) degree with 19 graduates per 1000 individuals.

The Digital Agenda for Spain[7], adopted in February 2013, was presented as a strategy to develop the digital economy and society in Spain during 2013-2015 in line with European Digital goals. This strategy was positioned as an umbrella for all the Government's actions in terms of Telecommunications and Information Society. The Agenda is coordinated by the Ministry of Industry, Energy and Tourism and The Ministry of Finance and Public Administrations and sets the ICT and eAdministration roadmap to achieve the goals of the Digital Agenda for Europe in 2015 and 2020.

The objectives, lines of action and plans established in this Digital Agenda are intended to encourage the creation of employment opportunities and economic growth through the smart adoption of digital technologies, thus contributing to the collective effort of promoting the country's economic recovery. The Agenda has 9 main areas, namely (a) Ultra-fast broadband; (b) ICT for SME & e-commerce; (c) Digital economy and digital contents; (d) Internationalization of technological industries; (e) Trust and security; (f) R+D+I; (g) Digital inclusion & digital jobs; (h) e-Administration; (i) Digital Public Services.

Having defined the overall strategic framework to address the challenges in human capital, focus on the effective implementation of the planned measures will facilitate successful outcomes. Spain has not yet set up its National Coalition for Growth and Jobs[8], which would be important to ensure that all the key stakeholders are involved. Funding opportunities to consider include Erasmus+, European Structural and Investment Funds, and the Employment and Social Innovation programme.

3 – Use of internet

Spain's progress is below EU average, and it has the weakest growth.

Spanish citizens are keen to engage in a variety of online activities, but the overall score hides important differences across services. Video calls and to some extent video-on-demand are much less used in Spain than in the EU as a whole, probably reflecting the as yet unachieved potential of subscriptions for fast broadband networks. For those applications requiring public confidence in online security, low levels of adoption are being tackled by the Digital Agenda for Spain under section (e) Trust and Security[9].

4 – Integration of Digital Technologies

Spain is performing above EU average however its progress is slow. Spain has put in place Industry 4.0 initiatives, such as *Industria Conectada 4.0., Basque Industry 4.0.* and *Tecnalia*[10]. Regarding the share of SMEs using eInvoicing, Spain's good performance (10%), is partly driven by the fact that electronic invoicing has become obligatory for all suppliers dealing with the central public administration for invoices higher than €5000, thus limiting scope for fraud, since 2015. The law on

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[7] Digital Agenda for Spain: http://www.agendadigital.gob.es/digital-agenda/Documents/digital-agenda-for-spain.pdf
[8] https://ec.europa.eu/digital-single-market/en/national-local-coalitions
[9] See Digital Agenda for Spain.
[10] See http://www.industriaconectada40.gob.es, www.spri.eus/industry40 and http://www.tecnalia.com/industry-4.0/.

administrative procedure also promotes eGovernment. Many autonomous regions have already adhered to the central entry portal (FACe) or are putting a similar system in place.

Also, the Digital Agenda for Spain proposed actions for this dimension in these key areas: (a) ICT for SME & e-commerce; (b) Digital economy and digital contents; (c) Internationalization of tech industries; (d) Trust and security; (f) R+D+I.

5 – Digital Public Services

Spain is performing well and it is making good progress on Digital Public Services. Indeed, Spain is clearly committed to open data, as reflected in its eGovernment strategy.

The Government adopted the ICT Strategic plan for 2015-2020[11] *(Plan de Transformación digital de la Administración General del Estado y sus Organismos Públicos)* which sets out the global strategic framework to make progress in the transformation that will deliver eAdministration.

This plan is needed as a continuation of the Digital Agenda in order to speed up the digital transformation of the Administration. Yearly revisions will be undertaken by the Commission on ICT Strategy. This new strategy 2015-2020 is expected to strengthen Spanish position on Public Service Digitisation by setting ambitious goals for the digitisation of the public sector. This will facilitate a "digital by default" strategy for the most used citizen's public services, boosting the number of eGovernment users.

Finally, despite the fact that a national eHealth strategy has not been adopted[12], Spain is fairly advanced in comparison with the EU, especially in terms of medical data exchange and ePrescription.

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[11] Plan de Transformación digital de la Administración General del Estado y sus Organismos Públicos:
http://administracionelectronica.gob.es/pae_Home/pae_Estrategias/Estrategia-TIC-AGE.html#.Vuklmf4UV9A
[12] European eHealth report 2016: http://portal.euro.who.int/en/indicators/ehealth-survey-2015/ehealth_survey_3-has-a-national-ehealth-policy/

Europe's Digital Progress Report (EDPR)

A report complementing the Digital Economy and Society Index (DESI) [1] country profile

FRANCE

France ranks 16th out of the 28 EU Member States in the European Commission Digital Economy and Society Index (DESI) 2016[2]. France falls into the cluster of **falling behind**[3] countries, where it performs above average. FR's score was slightly lower than the EU average and over the last year the score grew at a slower pace than the EU.

Connectivity, the Use of Internet by people and the Integration of digital technologies by companies are the dimensions, in which France performs relatively below average. However, the country fares quite well in human capital and in online public services.

France's performance in the five DESI dimensions relative to other EU countries
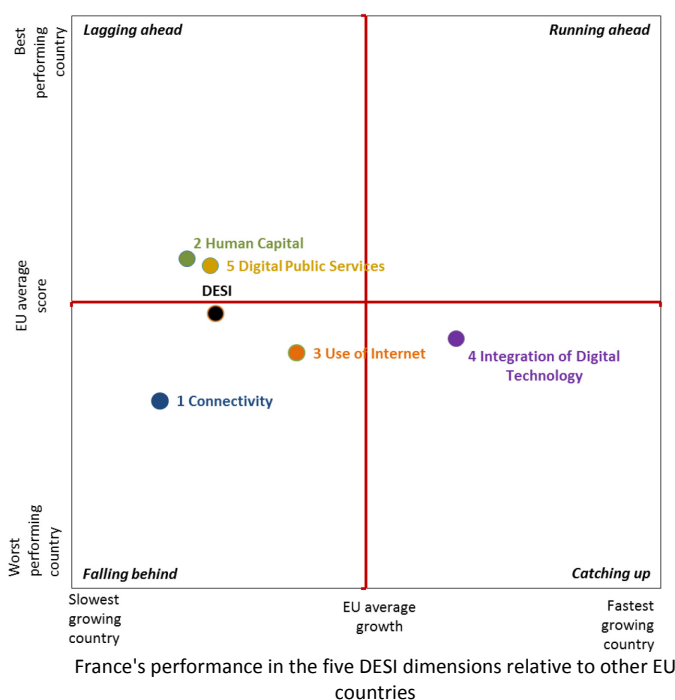
1 – Connectivity

In connectivity, France's performance is below the EU average; moreover, its progress is below the EU average. All French households are covered by fixed broadband. With respect to NGA, the coverage is still relatively limited at this stage with 45% of households covered in June 2015, against 71% in the EU, and 15 % of subscriptions are fast broadband (at least 30Mbps) in June 2015, against 30% in the EU, with the consequence that France ranks 24th out of 28 in the EU. However, this situation should be seen against the sheer size of the national territory combined with a relatively low population density in rural areas. With respect to mobile broadband, take-up is 73% of the population, a 9 percentage points increase over 2015.

In order to tackle the problem of the coverage of high speed broadband, the French government has adopted the "Plan Très Haut Débit" and set up the "Mission France Très Haut Débit" with a view to a full coverage of all homes by 2022 (mostly with fibre connections). Moreover, the regulatory approach on FTTH network roll-out outside very dense areas whereby operators are required to offer co-investment options on the fibre terminating segment may have the effect of extending the scope of infrastructure-base competition and potentially lead to higher take-up in these areas. As far as the 700 MHz band is concerned, an auction procedure for allocating frequencies was organised from 16

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[1] The Digital Economy and Society Index (DESI) is a composite index developed by the European Commission (DG CNECT) to assess the development of EU countries towards a digital economy and society. It aggregates a set of relevant indicators structured around 5 dimensions: Connectivity, Human Capital, Use of Internet, Integration of Digital Technology and Digital Public Services. It clusters countries in four groups: Running ahead, Lagging ahead, Catching up and Falling behind. For more information about the DESI please refer to https://ec.europa.eu/digital-single-market/en/desi

[2] DESI Country Profile for France: https://ec.europa.eu/digital-single-market/en/scoreboard/france

[3] Other falling-behind countries are: Bulgaria, Cyprus, the Czech Republic, Greece, France, Hungary, Poland and Slovakia.

to 17 November 2015 with blocs of 5 MHz duplex being awarded to the four incumbent mobile network operators. Frequencies will be progressively freed up from digital terrestrial TV and put at the disposal of mobile operators between April 2016 and July 2019.

The implementation of the « Plan Très Haut Débit » will help offset the lack of NGA coverage currently observed. France still has to transpose the Cost Reduction Directive[4] which could help to speed up broadband roll-out.

2 – Human Capital

In Human capital, France is performing relatively well, but its recent progress has been limited. With 81% of Internet users in the population and 57% of citizens with at least basic skills, France ranks 10th and 12th respectively out of the 28 EU MS. 42% of enterprises (versus 38% at EU28 level) which recruited/tried to recruit ICT specialists in 2015 reported hard-to-fill vacancies. France is lacking skilled ICT professionals; and indeed it is one of the countries expected to see a growing gap between supply and demand up to 2020. France ranks 2nd out of the 28 EU Member States for the proportion of graduates with a STEM (Sciences, Technology, Engineering and Mathematics) degree, with a rate of 23 per 1000 individuals (between 20 and 29 years old).

The digital agenda "The digital Republic in action" presented on 18th June 2015 includes a significant section on the development of digital skills in France. The "digital education plan" (with a billion euros over 3 years), announced by the President of the Republic on 7th May 2015, aims both to exploit the educational potential of digital content, and to develop the digital literacy of students through the use of digital tools and through familiarising them with computer programming. Moreover, a "Grande Ecole du Numérique" was launched, offering short courses. It aims especially at youngsters, high school dropouts, unemployed or people in vocational retraining.

France's policy to address its digital skills challenges is on track. However, setting up a national coalition of relevant stakeholders, bridging the industry, education and employment worlds would help to tackle the lack of digital skills and reduce unfilled ICT-related vacancies.

3 – Use of Internet

In the use of internet services, France is below the EU average, and its progress is only average. Engagement among French people shows a contrasting situation between different activities. France ranks very well in Europe for the use of online media (Video on Demand), and it scores well for online transactions (online banking and shopping). On the contrary, French people are less inclined to use social networks than their European counterparts (45% compared with an EU average of 63%), they are amongst the weakest internet users in terms of reading news (only 50% of Internet users have read online newspapers or magazines in the last 3 months); and are clearly below average in using Internet for Music/Videos/Games (only 47% of Internet users have played games or downloaded images, films or music in the last 3 months).

4 – Integration of Digital Technology

In the Integration of digital technologies by businesses, France's performance is below average, but it is making good progress. Integration of Digital Technologies by businesses is the area where France has its lowest score according to the DESI Scoreboard.

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[4] Directive 2014/61/EU of the European Parliament and of the Council of 15 May 2014 on measures to reduce the cost of deploying high-speed electronic communications networks (OJ L155, 23 May 2014, p. 1)

Europe's Digital Progress Report (EDPR)

The adoption of digital technologies is an important driver of labour productivity growth and needs to be strengthened. Therefore the French government has decided to implement several actions to facilitate the digital transformation of French companies especially SMEs. Digital loans, proposed in 2014 by Bpifrance (a.k.a. Banque publique d'investissement - Public Investment Bank) in the "Investment for the future" programme, with a value of €300m in subsidized loans, have been offered to support small and mid-sized companies involved in projects to integrate new digital tools. The "Industry of the Future" initiative, part of the "New face of Industry in France"programme, was presented by the Minister of Economy on 18th May 2015. It aims to accelerate the transformation of industry through digital technologies, and it comprises 5 pillars: developing technologies, supporting businesses, training employees, strengthening international cooperation and promoting French industry. The implementation of the nine industrial solutions put forward in the "Industry of the Future" initiative will help to overcome challenges in this area.

Tour de France Digital

The "Tour de France digital" is a contest organised by "France Digitale," a French public interest association that brings together digital entrepreneurs and investors, including venture capitalists and business angels, in order to promote the digital economy in association with public authorities). In 2016, "France Digitale" set out to identify the best startups in the digital domain and to award its annual prize to this year's digital economy champion in various cities (Montpellier, Rennes, Grenoble, Aix-en-Provence and Lille). The Top 10 startups will be selected by investors at national level and announced on 7th June 2016. They will participate in the *Grande Finale* on 30th June 2016 in Paris. 5 investors and Bpifrance (Public Bank of Investment) will award €1.5 million to the winner. http://www.francedigitale.org/evenement/tourdefrancedigitale2016/#event-Evenement

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5 – Digital Public services

In digital public services, France is performing relatively well, but its progress is below EU average. Its indicator scores place it among the top performers in the EU: 48% of internet users interact online with public authorities by sending filled-in forms (7th rank, EU average: 32%). However, some weakness can be observed in terms of prefilled forms. Moreover, France performs above average in user centricity, transparency and key enablers.

The roadmap for the Digital Economy, presented by the French government in February 2013, encompasses a single pillar covering the whole society, of which one objective aims to "Modernise public policy through the use of digital tools and resources" and another aims to "Promote the use of digital means in the health sector". The main portal for eGovernment Service-Public.fr, launched in 2000, is the principal entry point to all online public services. This portal is supplemented by Mon.Service-Public.fr , to be merged with the former by June 2016, which provides unified (e.g. with a single password) personalised and secure access to French online public services. This portal also has a personal space where each citizen can store his documents and allows him to notify changes of personal data (e.g. address) to multiple authorities at once. The "open data" policy is piloted by the ETALAB mission under the supervision of the Prime Minister, within the General secretariat for the modernisation of public action. France adopted on 28th December 2015 the "Loi relative à la gratuité et aux modalités de la réutilisation des informations du secteur public" implementing the revised PSI (Public Sector Information) 2013/37/EU directive. The "simplified public market" (MPS) was launched in April 2014. It allows companies to respond to call for tenders by simply providing their SIRET registration number. Moreover, as from 1st January 2005, all French public authorities have been obliged to accept bids submitted electronically above a certain threshold. The "France Connect" Single-Sign-On (SSO) solution, in experimentation phase since 2015, will be launched in 2016. It provides users with an eIdentification mechanism (compatible with the eIDAS European Directive) for

all online public services and possibly for private online services. In March 2013, the Minister for Social affairs and Health disclosed the French strategy for eHealth. The ministry also launched the "Personal Medical Record" (DMP) initiative, which contains all a patient's personal medical data for sharing with health professionals.

France currently has no overall "digital by default" (i.e. the digital channel becomes the channel of choice for public service provision and interaction of the public administration with the citizen) strategy; but it would greatly benefit from such an approach, given its efforts to centralise access to services and the high propensity of its citizens for online interaction with the public administration.

Europe's Digital Progress Report (EDPR)

A report complementing the Digital Economy and Society Index (DESI) [1] *country profile*

CROATIA

Croatia ranks 24th out of the 28 EU Member States in the European Commission Digital Economy and Society Index (DESI) 2016[2]. Croatia is part of the **catching up**[3] cluster of countries: although it still performs below EU average, it has progressed faster than average over the past year. Digital Public Services and the Use of Internet by citizens are the dimensions where Croatia made most progress and Croatian Internet users engage in a broad range of activities; however, Croatia's percentage of regular Internet users is below the European average. In terms of Connectivity, Croatia is significantly improving but still performs worse than all other EU Member States.

Croatia's performance in the five DESI dimensions relative to other EU countries
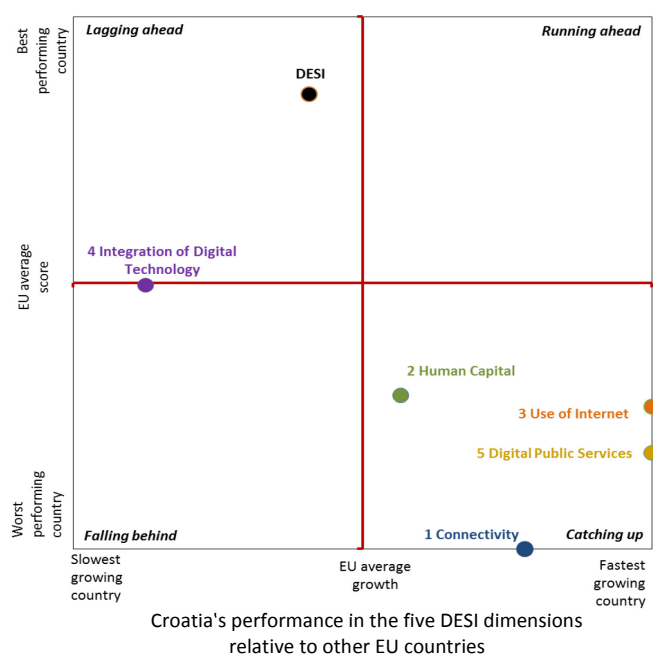
1 – Connectivity

While there is some progress in terms of performance with regard to the Connectivity index, Croatia sits at the very bottom of the EU ranking. This is mainly driven by indicators concerning high speed fixed broadband, where Croatia is far below the EU average, both in terms of availability of high-speed fixed broadband and its take-up. Despite the trend towards increased high-speed broadband subscriptions compared with last year (1.1% versus 2.8%), this figure is significantly below the EU average (30%), with Croatia being last in Europe. Different factors contribute to this outcome, ranging from those related to the limited demand for high speed internet, which can be driven both by affordability of fixed broadband, where Croatia performs poorly with standalone fixed broadband significantly more expensive than the overall EU average of 1.3% of disposable income, and internet use (lower than EU average) to those related to the supply side, such as the absence of a large scale alternative cable infrastructure which has affected the competitive dynamics and features of high speed broadband investments.

Therefore connectivity is one of the key areas for improvement. A new Strategy for Broadband Development in the Republic of Croatia for the period 2016-2020 has been prepared and is pending adoption. In this regard, measures to increase rural broadband connectivity (rural fixed broadband coverage is 81.5% of households against 90.6% EU average) as well as fast broadband coverage (currently 52% of households against 71% EU average) will be of utmost importance. Croatia still has

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[1] The Digital Economy and Society Index (DESI) is a composite index developed by the European Commission (DG CNECT) to assess the development of EU countries towards a digital economy and society. It aggregates a set of relevant indicators structured around 5 dimensions: Connectivity, Human Capital, Use of Internet, Integration of Digital Technology and Digital Public Services. It clusters countries in four groups: Running ahead, Lagging ahead, Catching up and Falling behind. For more information about the DESI please refer to https://ec.europa.eu/digital-single-market/en/desi
[2] DESI Country Profile for Croatia: https://ec.europa.eu/digital-single-market/en/scoreboard/croatia
[3]Other catching up countries are Spain, Italy, Latvia, Romania and Slovenia

to transpose the Cost Reduction Directive[4] which could help to speed up infrastructure coverage and broadband roll-out.

2 – Human Capital

In human capital, Croatia's performance is below EU average but it is making slow progress. In 2015 only 66% of the Croatian population were regular internet users (versus 76% EU average) and 51% had basic or above basic digital skills. Moreover, the share of graduates in Science, Technology and Mathematics (STEM) in is quite low, being only 1.6% of the 20-29 years old cohort. The Education and Training Monitor - Croatia 2015 stated that Croatia lags behind on the digitisation of teaching practices. Less than 10% of students in Croatia are in primary schools that are classified as digitally supportive and on average there are 26 students for every computer in Croatian schools.

A series of projects, activities and initiatives are under way to mitigate the situation. ICT plays a prominent role in the revision of the National Curriculum Framework for preschool education and general compulsory and secondary education[5]. ICT skills are an important element of the 2014-2020 Structural and Investment Funds. For example the national e-Schools project will ensure that digitally competent teachers dispose of and use adequate ICT equipment and that they develop e-content for digital education which meeting the needs of the labour market. There will also be support for the development of Sectorial Curricula for Vocational Education and Training (VET), including ICT, in order to increase qualification levels and the employability of adult labour force, and citizen's vouchers for acquiring the necessary skills and qualifications in priority fields such as tourism, agriculture, mechanical and electrical engineering, electro-technics and information technology. There will also be vouchers for acquiring (general) basic skills in ICT[6]. Digital skills also play an important role under the eGovernment (e-Croatia 2020) strategy.

The timely implementation of the proposed strategies has the potential to significantly increase digital skills level in Croatia.

3 – Use of Internet Services

Regarding the use of internet services, Croatia's performance is below the EU average; but Croatia is making good progress. Croatian internet users engage in a broad range of online activities. They read news online (89%), use the Internet to communicate via voice or video calls (42%); or through social networks (64%). While for most of these activities engagement among Internet users in Croatia is in line with and higher than overall in the EU, they appear less eager than in other countries to use Internet for business transactions. However, the share of Croatian Internet users that use online banking has increased by over 19 percentage points last year. Yet only 44% of Internet users shop online, against an EU average of 65%.

4 – Integration of Digital Technology

In the integration of digital technologies by businesses, Croatia's performance is average and Croatia did not progress over the past year. The percentage of businesses using technologies such as RFID (4.7%), e-Invoices (10%), cloud services (15%) and social media (15%) in Croatia is in line with or higher than the EU average. Croatian businesses appear to be eager to take advantage of the possibilities offered by online commerce. Nearly one fifth of SMEs in Croatia sell online –above the

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[4] Directive 2014/61/EU of the European Parliament and of the Council of 15 May 2014 on measures to reduce the cost of deploying high-speed electronic communications networks (OJ L155, 23 May 2014, p. 1)

[5] http://public.mzos.hr/Default.aspx?sec=2525

[6] http://www.strukturnifondovi.hr/UserDocsImages/Novosti/FINAL%20OP%20EHR.pdf

EU average of 16% - and 8.9% sell cross border (against 7.5% at European level). However, their turnover from these sales significantly decreased over last year.

Croatia does not have an Industry 4.0 strategy. However, since 2014 a research group[7] has been working on a scientific project, development of a Croatian model for *Innovative Smart Enterprises* (HR-ISE model). The aim is to adapt the Innovative Smart Enterprise model so its fits the specific regional way of thinking, manufacturing, organisational tradition, and the specific educational background in Croatia. In the context of the strategy for development of entrepreneurship in Croatia 2013 to 2020 and the European Structural and Investment Funds 2014-2020,[8] Croatia intends to improve the competitiveness and efficiency of enterprises through ICT by supporting initiatives aimed at digitisation of business services and products[9].

If it is implemented in a timely way, the proposed strategy has the potential to have a positive impact on the Integration of digital technologies by Croatian business.

5. Digital Public Services

In Digital public services, Croatia's performance is below par but it is making good progress. This might be partly due to the e-citizens' web portal, introduced in 2014 to tackle the very low online interaction between the public administration and citizens (21% against 32% in the EU average). An e-business module has only recently been introduced and is still being supplemented by additional features.

The e-citizens portal[10] has reached more than 250,000 citizens. The platform is a one stop shop and consists of a central web portal (gov.hr) into which all web pages of all state administration bodies will be integrated, a National Identification and Authentication System (NIAS) and a government-issued personal mailbox dedicated to communication between government and citizens. Through that platform all e-services of all governmental institutions can be reached, while the identification and authentication is performed only once if so chosen. Available e-Services to date include for example: e-registers (birth and marriage); insurance records and health insurance; medical appointments; the Croatian Pension fund; electronic employment status; the Croatian Employment Agency; tax cards; e-registers (birth and marriage); e-Voters; e-certificates of residence and vehicle ownership; applications for residence online; enrolment for study programmes; and Zagreb utilities billing. In September 2015 the E-Craft function was launched enabling for example the online establishment of a new craft. In the context of the European Structural and Investment Funds 2014-2020[11], Croatia has devised a new e-Croatia 2020 Strategy,[12] currently in the process of adoption, together with an eGovernment Action Plan (2016-2020). An important feature is the establishment of a "Shared Service Centre" (under the Ministry for Public Administration) which will coordinate and manage all ICT applications and e-services for citizens and businesses by various governmental institutions (2300 targeted public bodies to be included in the project). Other measures envisaged include the financing of the ICT infrastructure and software necessary to create and ensure operations of a cloud service managed by the Shared Service Centre. The Law on State Information

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[7] Of scientists from the Faculty of Electrical Engineering, Mechanical Engineering and Naval Architecture (FESB) and Faculty of Economics (EFST), University of Split, and Faculty of Mechanical Engineering and Computer Engineering (FSR), University of Mostar.

[8] http://www.strukturnifondovi.hr/UserDocsImages/Novosti/Programme_2014HR16M1OP001_1_2_en.pdf

[9] For example support to companies introducing and implementing e-business solutions optimising the business processes, e-services creation and provision between enterprises and implementation of ICT solutions aimed at establishing processes that extend beyond the boundaries of the enterprise such as supply chain management and customer relationship management.

[10] https://vlada.gov.hr/smart-government-e-croatia/18023

[11] http://www.strukturnifondovi.hr/UserDocsImages/Novosti/Programme_2014HR16M1OP001_1_2_en.pdf

[12] [to be completed when adopted]

Europe's Digital Progress Report (EDPR)

Infrastructure obliges all stakeholders to interconnect registers needed to develop integrated e-services via a government service bus (˝Paperless Government˝ project). Croatia plans the development of further e-applications in the following areas: e-Construction, e-Land Management, e-Justice, e-Health, e-Tourism, e-Culture and e-Inclusion.

Further implementation of the eGovernment strategy has the potential to significantly boost the eGovernment landscape in Croatia.

Highlight: Dubrovnik Smart City

In March 2016 Dubrovnik's first Smart Street at Obala Stjepana Radića opened, a pilot project developed in strategic partnership between the City of Dubrovnik and Hrvatski Telekom, IT company Cisco, and in collaboration with local partners.

The Smart Street features public lighting with a multi-functional sensory network, and a variety of access technologies, from optical links to 4G and Wi-Fi networks. These technologies allow the residents and visitors of Dubrovnik to obtain free of charge Internet access within the pilot project's footprint, at high speed and throughput (50 Mbit/s). The Smart Street project also includes a traffic management solution that will use cameras to identify traffic violations, as well as innovative parking technology. The parking management system will automatically recognize vehicles and perform contactless charging of parking fees. It will also, both via a smartphone application and via digital panels, provide real-time information on the vacancy status of parking spots, not only in Dubrovnik's Smart Street, but all over the city. An important part of connected solutions in the Smart Street is the monitoring and control of environmental parameters that will provide extremely useful data for the city's environment. All solutions are connected with the city's legacy systems, and the Cisco Digital Platform will keep all collected data open for development of new solutions.

Europe's Digital Progress Report (EDPR)

A report complementing the Digital Economy and Society Index (DESI) [1] *country profile*

IRELAND

Ireland ranks 8th out of the 28 EU Member States in the European Commission Digital Economy and Society Index (DESI) 2016[2]. Ireland is in the **lagging ahead** cluster of countries[3], performing better than the EU average but improving at a slower rate than the EU as a whole. Amongst the DESI dimensions, Ireland has made most progress over the last year with Integration of Digital Technologies. In particular, significant increases in SMEs selling online, selling online cross border, use of Cloud technologies and use of social media were recorded. Nevertheless there continues to be room for improvement especially in electronic information sharing and use of RFID. Major improvements were also made in Connectivity, with substantial increases in NGA coverage and subscriptions to fast broadband, as well as smaller ones for fixed and mobile broadband take up. However access costs remain relatively high

Ireland's performance in the five DESI dimensions
relative to other EU countries

as a percentage of income and both coverage and take up of BB remain below the respective EU averages. Use of internet also improved marginally, however Ireland's rankings on Human Capital and Digital Public Services fell. Ireland has developed a National Digital Strategy[4]. The strategy focuses on driving digital adoption in three key areas: enterprise, citizens and education.
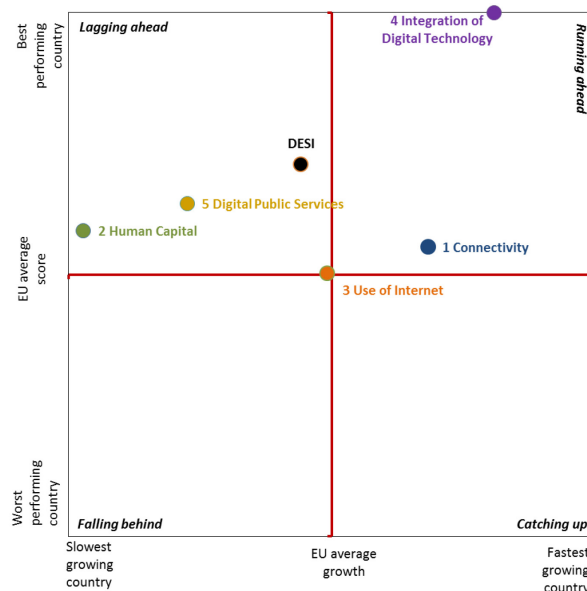
1 – Connectivity

In Connectivity, Ireland performs relatively well and has made good progress recently. In Ireland 96% of households are covered by fixed broadband, similar to the EU average of 97%. 80% of homes are covered with speeds of at least 30 Mbps. There was a significant increase in NGA coverage in Ireland, by 9 percentage points in 2015, due to deployments by the incumbent and alternative operators. Ireland has therefore surpassed the EU average of NGA coverage after having caught up in 2014. With regard to mobile broadband coverage, 95% of households were covered by 3G and 90% of households covered by 4G mobile broadband. Take–up of mobile broadband is at 87 per 100 people, above the EU average.

Ireland's National Broadband Plan was published in 2012 and outlines the government's policy on the delivery of high speed broadband services and specifies targets for delivery and roll-out. The state intervention goes under the name 'Connecting Communities' and aims to extend high speed

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[2] https://ec.europa.eu/digital-single-market/en/scoreboard/ireland

[3] Other lagging ahead countries are Belgium, Denmark, Estonia, Finland, UK, Lithuania, Luxemburg and Sweden.

[4] http://www.dcenr.gov.ie/communications/en-ie/Digital-Strategy/Pages/home.aspx

broadband to every premise in areas of Ireland with no planned high speed broadband network by 2020. The plan is principally addressed at rural areas where the quality of telecom infrastructure is not yet adequate, addressing a divide between rural and urban areas in Ireland and a particular situation of a very dispersed rural population that affects coverage in remote areas.

The delivery of the National Broadband Plan will require concerted efforts, not only at central government level, but also at regional and local levels. In order to address digital divide in the sparsely populated areas, the cooperation of local authorities is crucial when it comes to permits and planning requirements so that modern infrastructure can be made available also to those living in all the rural areas. Despite progress to date, the objectives of the National Broadband Plan need to be further supported also by local and roads authorities in terms of their approach towards digital infrastructure in terms of road openings and access to state-owned property. Ireland still has to transpose the Cost Reduction Directive[5] which could help to speed up broadband roll-out.

2 – Human Capital

In Human Capital, Ireland performs relatively well but its recent progress has been limited. Figures on internet usage are somewhat better than the EU average, but Ireland continues to exhibit some digital skills gaps. Despite relatively good levels of access and use, 56 % of the Irish population has low or no digital skills. In addition, Ireland suffers from a deficit of skilled ICT professionals. While this is an EU-wide phenomenon, Ireland is one of the countries particularly affected. In 2015, over 50% of businesses that recruited – or tried to recruit – ICT professionals reported difficulties in doing so, one of the highest rates in Europe.

The Irish government's *National Digital Strategy* focuses on driving digital adoption in three key areas: enterprise (see section 4), citizens and education. In education, the Irish government has invested in bringing 100Mbps connectivity to all secondary schools and developed "Switch On" workshops to optimize the use of technology. The new *Digital Strategy for Schools 2015-2020*[6] sets out a plan to embed ICT in teaching, learning and assessment over the next five years. At the level of higher and further education, the department of education and skills is leading a project to create a network of regional skills fora, building bridges between education and business. Ireland's *ICT Skills Action Plan 2014-2018*[7] was developed and launched in 2014. The plan aims to increase awareness of ICT in the education system, increase high-level graduate supply and to make Ireland the best location in the world for ICT Skills availability. The *BenefIT* programme has led to the training of 137,000 "non-liners" in basic digital literacy. The new *National Skills Strategy*[8] aims to ensure that Ireland's current and future workforce needs are met. See also Springboard+ (box).

The Irish government is actively addressing digital skills gaps in the economy and society. It has developed a digital skills strategy and is tackling digital skills issues all levels and types from basic digital literacy and inclusion, to digital education and learning, through to ICT professional skills in further and higher education and digital skills of adults all levels to improve employability and provide enterprises with the new digital skills they require. While already working to improve the interaction of the various stakeholders through a number of actions and initiatives, establishing a national digital skills coalition could help to facilitate the efficacy of Irish policies in this area.[9]

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[5] Directive 2014/61/EU of the European Parliament and of the Council of 15 May 2014 on measures to reduce the cost of deploying high-speed electronic communications networks (OJ L155, 23 May 2014, p. 1)
[6] https://www.education.ie/en/Publications/Policy-Reports/Digital-Strategy-for-Schools-2015-2020.pdf
[7] http://www.ictireland.ie/Sectors/ICT/ICT.nsf/vPages/Papers_and_Sector_Data~ict-skills-action-plan-2014-14-03-2014?OpenDocument
[8] http://www.education.ie/en/Publications/Policy-Reports/pub_national_skills_strategy_2025.pdf
[9] https://ec.europa.eu/digital-single-market/sites/digital-agenda/files/toolkit_for_national_and_local_coalitions_5.pdf

Europe's Digital Progress Report (EDPR)

> **Highlight: "Springboard+"**
>
> Springboard+, which incorporates the ICT skills conversion programme, provides flexible, free, part-time higher education and training courses for unemployed and previously self-employed people who require up-skilling or cross-skilling in order to return to sustainable employment. The programme targets areas where there are job opportunities, based on advice from the Expert Group on Future Skills Needs, e.g. ICT, high-end manufacturing, international financial services and skills for entrepreneurship. Enterprise engagement is a key part of the programme – over 90% of courses have a work placement component. To date, almost 11,500 people have taken an ICT course, at levels 6 to 9 on the National Framework of Qualifications. Funding of €63.8 million has been allocated. Trend analysis of all graduates 2011 – 2014 indicates that within two years of completing a Springboard course, 60% of respondents are employed or self-employed, with progression to employment steadily increasing over time. While a survey of ICT skills conversion graduates indicates that 87% of graduates are in employment within 18 months of completing their course. By the end of 2015 the Exchequer had invested some €105 million in Springboard+, enabling over 30,000 people to gain an opportunity to up-skill or reskill in skill areas where there are employment opportunities.

3 - Use of Internet Services

In Use of Internet Services, Ireland is performing on a par with the EU average and has made average progress in the last year, improving its DESI ranking. Almost four fifths of Irish citizens are now online. The most popular online activities amongst Irish internet users are VoD (Video on Demand 68%), Social Networking (66%), online shopping (63%) and online Banking (64%). The use of these services as well as other services, such as news, continues to increase.

4 – Integration of Digital Technologies

In Integration of Digital Technologies by businesses, Ireland performs very well, ranking first on this DESI dimension, and has also made good progress recently, increasing its ranking by two places over the past year. In particular, significant increases in SMEs selling online (32%, +6 percentage points), selling online cross border (16%, +5 percentage points), use of Cloud technologies (21%, +5 percentage points) and use of social media (35%, +4 percentage points) were recorded. Nevertheless there continues to be room for improvement in electronic information sharing and use of RFID.

Together with education and citizen engagement, the Irish government's *National Digital Strategy* focuses on driving digital adoption by enterprises. In particular, it aims to get 2,000 small and micro enterprises trading online. To this end, the *Trading Online Voucher Scheme* provides a small financial incentive, coupled with training and mentoring supports by the Local Enterprise Offices (LEO) to small and micro-enterprises to develop their online trading capability. The training provides insights for owners-managers on how their business can benefit from online trading, with a focus on skills development. Based on government information, by early November 2015, some 1,500 small businesses had completed, or were in the process of completing their trading online projects. 70% of businesses surveyed expected to recruit new staff as a result of increased business and changed work practices.

5 – Digital Public Services

In Digital Public Services, Ireland is performing relatively well but its growth rate is limited. While active eGovernment use at 56% is above the EU average (32%), provision of pre-filled forms in online

services is relatively low (35 out of 100), and where Ireland ranks 17th out of 28 countries. However, Ireland performs relatively well in the EU with respect to online service completion (ranked 9th) and Open Data (ranked 10th), though its ranking in both of these has fallen over last year.

As a result of previous eGovernment strategies, most public services in Ireland are now online, available through the www.gov.ie portal which gives access to more than 430 online and information and transactional services. The Irish government has started issuing Personal Public Service Numbers (PPSN), now mandatory for children at birth, available to adults too on a voluntary basis; this personal identifier can be used to access a wide range of eGovernment services. In June 2015 it launched a new version of the national Open Data portal, which aims to provide a single source of access to official data in an open format, currently comprising 840 datasets.

Ireland does not have a comprehensive digital by default strategy, as according to its eGovernment Strategy 2012-2015, it follows the principle that public services should be delivered through the most appropriate channels. In January 2015, the Irish government adopted and published a new eGovernment strategy, the Public Service ICT Strategy[10]. The strategy identifies 5 key objectives aimed at better sharing and integration of services; continued and improved digitisation of services; facilitating lawful sharing of data; improving governance of ICT; and improving the resource levels and skillsets in Public Service ICT. Aligned with the objectives of the Public Service Reform Plan 2014-2016 and building on previous eGovernment strategies, the new strategy aims to provide better outcomes for citizens, businesses and public servants by embracing the latest technological advances.

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[10] http://ictstrategy.per.gov.ie/

Europe's Digital Progress Report (EDPR)

A report complementing the Digital Economy and Society Index (DESI) [1] country profile

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ITALY

Italy ranks 25th out of the 28 EU Member States in the European Commission Digital Economy and Society Index (DESI) 2016[2]. Italy is part of the catching up[3] cluster of countries: although it still performs below EU average, it has progressed faster than average over the last year. The Human Capital dimension (ie digital skills) is where Italy made most progress; however, levels of digital skills remain low and hamper developments in the Use of Internet by citizens and in the Integration of Digital Technologies by businesses. Italy shows average performance in Digital Public Services. In terms of Connectivity, Italy ranks close to last because of insufficient supply of and demand for high-speed broadband.

In 2015, the Italian government adopted its Strategy for Digital Growth[4] and a Strategy for Ultra-broadband development[5] encompassing

Italy's performance in the five DESI dimensions relative to other EU countries

different action fields: broadband connectivity, eGovernment, eJustice, Digital Skills and ICT for healthcare, education, culture, tourism and agriculture.
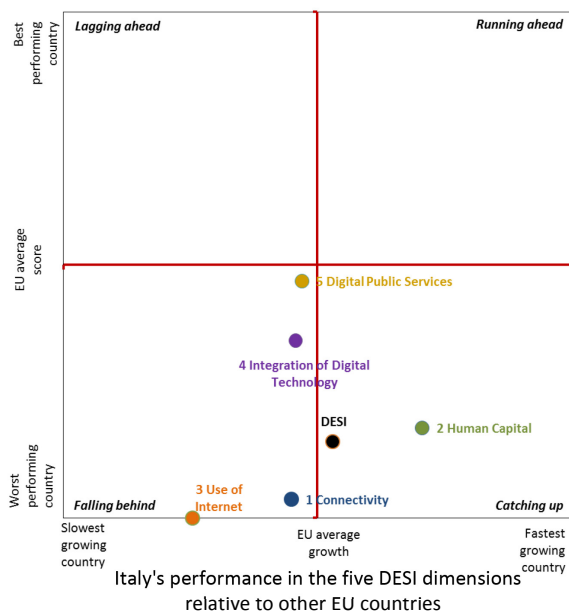
1 – Connectivity

In Connectivity, Italy's performance is well below par and its progress is EU average. While mobile broadband take-up is actually in line with the EU average (75 subscriptions per 100 people), the overall performance on Connectivity is mainly driven by indicators concerning fixed broadband: Italy ranks 27th out of 28 EU countries in NGA coverage, unchanged from the previous year, notwithstanding the progress made from 36% of the households covered in 2014 to 44% in 2015, mostly residing in urban areas. Also NGA subscriptions lag behind, with 5.4% of total broadband subscriptions, which are themselves low at 53% of households. Different factors contribute to this outcome; while some relate to the limited demand for high speed internet, also analysed in the context of the digital skills section below, and data hungry applications, such as video and TV, others relate more to the supply side. In particular, in the absence of a large scale alternative cable infrastructure, the legacy copper access network maintains a crucial role in the development of high

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[2] https://ec.europa.eu/digital-single-market/en/scoreboard/italy

[3] Other catching-up countries are Cyprus, Croatia, Latvia, Romania and Slovenia

[4] "Strategia per la Crescita Digitale". http://www.agid.gov.it/agenda-digitale/agenda-digitale-italiana/crescita-digitale-banda-ultralarga

[5] "Piano Nazionale Banda Ultralarga" http://www.sviluppoeconomico.gov.it/index.php/it/comunicazioni/banda-ultralarga/progetto-strategico-banda-ultralarga

speed networks, at the moment mainly focusing on FTTC roll-out. Finally, the importance of (digital) terrestrial broadcasting in satisfying demand for TV content has led to extensive use of spectrum with significant problems in terms of international coordination with neighbouring countries.

Italy has adopted a National Ultra-Broadband Plan (Piano Nazionale Banda Ultra-Larga - PNBUL) in 2015 aiming *inter alia* to ensure 100% coverage with 30Mbps and 85% coverage with 100Mbps by 2020. In white areas,[6] the plan provides a direct model of investment to build a passive public infrastructure managed with a wholesale-only model. Accordingly, Italy plans to use a significant proportion of different national and EU funds available at different territorial levels for broadband deployment, in particular for NGA coverage of white areas. In particular Italy has planned to use € 4.9 billion of national funds and 2 billion euro of EU regional funds to achieve the objectives of the plan. Also, Italy is the first EU Country to notify full transposition of the Cost Reduction Directive 2014/61/EU, which could further support cost-savings in network build-out and investments in synergy with smart utilities objectives (eg: smart meters). Finally, Italian authorities are trying to finalise the implementation of spectrum management measures aiming at addressing the current international interference issues as a first step to ensure coordination with neighbouring countries.

Italy's PNBUL strategy is extremely important as, in the absence of any public policy initiative, a new digital divide may emerge for significant parts of the country. The challenge will be to put in place an implementation mechanism to ensure effective and coordinated use of the several sources of public funding for broadband projects available from different levels of government. On that aspect, Italy is participating in the Broadband Competence Offices (BCOs), an initiative launched recently by Commissioners Hogan, Cretu and Oettinger which calls on MS authorities to reinforce their capacity to plan and coordinate regional and national action with the support of ESIF technical assistance funds. An effective and coordinated use of available public resources with a clear allocation of roles to each level of government - including relevant agencies and national regulatory authorities - could indeed facilitate a progression of NGA coverage to white areas, complementing the development of competitive investment dynamics that are already emerging in more densely populated areas.

2 – Human Capital

In Human Capital, Italy's performance is well below EU average but it is making good progress. In 2015 only 63% of the Italian population was a regular internet user (vs 76% EU average) and only 43% had basic or above basic digital skills. Only 2.2% of all persons employed in 2015 were ICT professionals. Also the share of graduates in STEM in is quite low, being only 1.4% of the 20-29 years age cohort.

The Italian government is realising that the lack of digital skills is a serious issue for the development of the Italian society and economy. A national "Coalizione per le Competenze Digitali" (coalition for digital competences) was set up in early 2015 as part of the Grand Coalition for Digital Jobs initiative of the European Commission. The Italian coalition's range of activities covers not only skills for ICT specialists but also digital competences for citizens, entrepreneurs, job holders and civil servants. The only other pillar of the Italian digital skills' strategy is the National Plan for Digital School which envisages investment in ICT infrastructure, teacher training and updating school curricula to include digital.

No other major initiative exists for the advancement of digital skills in the general population and especially among the categories at risk, the old, people with lower levels of education and the inactive. For the national coalition initiatives to have a relevant impact, some of its best practices (e.g. Pane e Internet of Emilia-Romagna region) could be scaled up with the involvement of more

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[6] White areas are defined as those areas for which no operator has plans to invest in NGNs

stakeholders but also with an active role for government, for instance as a source of funding. An eGovernment strategy launched recently by the Italian Government (Agenda Semplificazione 2015-2017, see below) aims at greatly improving the interaction between citizens/businesses and public administrations through the online channel. This initiative will benefit from actions aiming to strengthen users' digital skills as well as those of public administration employees. Funding opportunities to consider include Erasmus+, European Structural and Investment Funds, and the Employment and Social Innovation programme.

3. Use of internet

In Use of Internet, Italy's performance is well below par and Italy is making only average progress. More and more Italians (63%) are using Internet services, and digital content services, like music, videos and games (52%) are enjoyed by more Italian Internet surfers than the EU average. Italian internet users are reluctant to engage in transactional services like eBanking (43%) and online shopping (39%), suggesting a certain distrust of the online environment. Having said that, the share of surfers engaging in online shopping has improved significantly, by 4 percentage points in one year, in line with the progress experienced by enterprises with their online sales.

4 – Integration of Digital Technologies by Business

In Integration of Digital Technologies by Businesses, Italy's performance is below par and Italy is making average progress. Its enterprises are not making much progress in the take up of enterprise solutions, but the eCommerce sales channel is gaining importance, although starting from very low levels.

Italy has mandated the use of eInvoices for payments by public administrations: since summer 2014 for State public administrations and since March 2015 for all public administrations. The use of mandatory eInvoices for public administration transactions is expected to drive up adoption of eInvoice solutions (and possibly more general eBusiness solutions), given that a significant part of Italian businesses sell to the public administrations. Italy is about to launch an Industry 4.0 strategy; such a strategy would benefit the country to a great extent given the importance of Italian manufacturing (2nd in the EU).

5 – Digital Public Services

In Digital Public Services, Italy's performance is just below par and its progress is at EU average. On the availability side, Italy has progressed somewhat but there is room for improvement in re-using information across administrations to make life easier for citizens. However, use of eGovernment remains one of the lowest in EU28.

Italy has devised a new eGovernment strategy at the beginning of 2015, which is part of a more general Digital Agenda Strategy (Strategia per la Crescita Digitale) and the main tool for the reform of public services (Agenda Semplificazione 2015-2017). The main elements of this strategy are the digital identity (Sistema Pubblico Identità Digitale, SPID, see also box below), a system for online payments to the PA (PagoPA) and the unification of local administrations' up till now unconnected population registries (Anagrafe Nazionale Popolazione Residente, ANPR). The strategy includes many other initiatives like a digital address which the citizen can ask to be used for all communications from public administrations, pre-filled tax declarations and an eGovernment portal with all services needed by the citizen in one place (ItaliaLogin). The Italian eGovernment strategy is complex and characterised by many interdependent parts. The role of some enabling platforms (PagoPA and ANPR) is a key one for the effective usability of many eGovernment tools (like SPID, see below) and services: it is therefore important that they are fully operational by the deadline (December 2016)

without further delays. With that purpose, some additional financial support and oversight or guidance from the central government and regional authorities would significantly help local public administrations to fulfil their role in the strategy. The EU will contribute by providing European Funds (ERDF and ESF) for the national Operational Programme on "Governance and Institutional Capacity".

In October 2015 Italy, together with other 16 countries, signed up to the International Open Data Charter which includes principles, specific actions, practical advices and guidance on implementation of Open Data strategies and policies. Since June 2015 Italy has activated a new version of the national Open Data portal, which ensures uniformity of content, good quality metadata and data in open format. It currently contains data from national, regional and local administrations[7].

Italy does not have a comprehensive digital by default strategy but it has introduced some "digital by default" services like enrolment to high school and tax declarations. However, because of weak digital skills in the population, without an accompanying digital skills strategy these actions are increasing final users' recourse to professional intermediaries, thereby increasing users' costs.

On eHealth, ePrescription started in March 2016 for medicines and will be gradually extended to clinical tests and specialists' consultations. Regarding the electronic health record, on the other hand, there is no national strategy yet: only some regions have already implemented it and without consistently guaranteeing interoperability between the different systems. It would be important to have a nationally interoperable health record, improving the efficiency and the efficacy of the health system.

Highlight: SPID, the Italian way to digital identity

Italy introduced in March 2016 a digital identity system (Sistema Pubblico Identità Digitale, SPID) which will allow, when completed, access to every online public service with a unique password instead of the many that are necessary today. For the time being a first batch of 300 services (among them tax declarations, social security) has been made accessible through SPID while the remaining public administrations will follow suit by end 2017. Private service-providers (e.g. banks) could also in future use SPID for access to their services. SPID is already interoperable with other European digital identity systems since it adheres to the EU eIDAS standard. Another interesting development is the possibility to add to the profile of the user (either citizen or enterprise) additional, certified attributes like for example educational qualifications.

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[7] Currently (March 2016) it contains 10348 datasets from 76 administrations

Europe's Digital Progress Report (EDPR)

A report complementing the Digital Economy and Society Index (DESI) [1] *country profile*

CYPRUS

Cyprus ranks 23rd out of the 28 EU Member States in the European Commission Digital Economy and Society Index (DESI) 2016[2]. Cyprus is part of the **falling behind** cluster[3] of countries: its score is lower than the EU average and over the last year it grew at a slower pace than the rest of the EU. Cyprus made most progress in connectivity, driven by increased NGA coverage. However, take up of broadband remains below average. Businesses and citizens use digital technologies at European average levels. Despite progress, digital skills levels remain relatively low, and the provision of online public services progresses slowly. In February 2012, Cyprus launched a "Digital Strategy"[4], in line with the Digital Agenda for Europe. In addition to the development of future-proof network infrastructure, the strategy foresees

Cyprus' performance in the five DESI dimensions relative to other EU countries

the further digitisation of public services, increased digital literacy, the fostering of the digital economy, and the use of ICT for the environment.
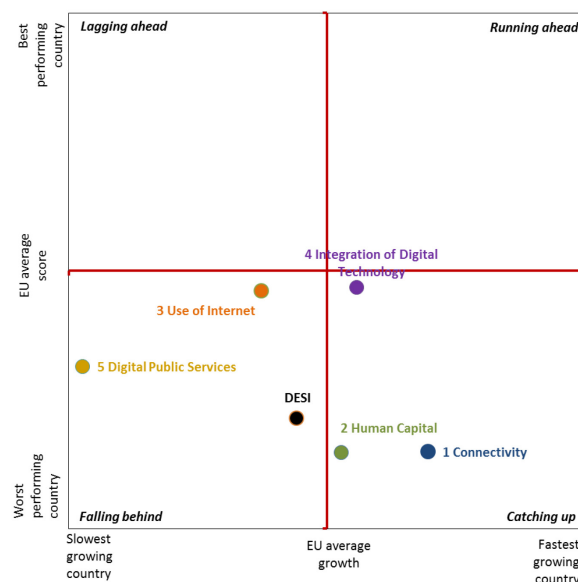
1 – Connectivity

In connectivity, Cyprus' performance is below par but progress is faster than the EU average, with a remarkable achievement on the supply side: 100% of households are covered by fixed broadband and high-speed broadband is available to 84% of them (against 71% of European households). However, on the demand side, only 69% of households subscribe to fixed broadband and only 66% of Cypriots subscribe to mobile broadband (against an EU average of 75%).

In February 2012, Cyprus launched a "Digital Strategy", in line with the Digital Agenda for Europe targets (100% coverage with 30 Mbps until 2020; 50% take-up rate for 100 Mbps). Cyprus follows a market-based approach to achieve its targets as regards network deployment. Some public financial resources are nevertheless being planned for the deployment of NGA networks. The competitiveness and sustainable development Operation Programme includes a total of €19 Million (plus €3,35 Million of national contribution) funding for ultra-high-speed broadband networks. Furthermore, in

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[1] The Digital Economy and Society Index (DESI) is a composite index developed by the European Commission (DG CNECT) to assess the development of EU countries towards a digital economy and society. It aggregates a set of relevant indicators structured around 5 dimensions: Connectivity, Human Capital, Use of Internet, Integration of Digital Technology and Digital Public Services. It clusters countries in four groups: Running ahead, Lagging ahead, Catching up and Falling behind. For more information about the DESI please refer to https://ec.europa.eu/digital-single-market/en/desi

[2] DESI Country Profile for Cyprus: https://ec.europa.eu/digital-single-market/en/scoreboard/cyprus

[3] Other falling behind countries are Bulgaria, Greece, Czech Republic, France, Hungary, Poland and Slovakia.

[4] Ψηφιακή Στρατηγική της Κύπρου http://www.mcw.gov.cy/mcw/dec/digital_cyprus/ict.nsf/index_gr/index_gr?opendocument

early 2016 Cyprus launched a competitive procedure for the assignment of three rights of use for radio frequency in the 800 and 2600 MHz bands, to deploy a 4G broadband network, with speeds of at least 30 Mbps, covering 50% until end-2018 and 75% until end-2020 of the territory which is under the effective control of the Republic of Cyprus. Cyprus still has to transpose the Cost Reduction Directive[5] which could help to speed up broadband roll-out.

Cyprus will benefit from monitoring the implementation of its Digital Strategy, adapting it and updating it to the current financial situation.

2 – Human Capital

In terms of Human Capital, Cyprus's performance is below the EU average, but progress is being made. In 2015 70% of the Cypriot population used the internet regularly (versus 76% EU average) and only 43% possessed at least basic levels of digital skills. Nowadays digital skills and competences are needed for nearly all jobs where digital technology complements existing tasks, and shortages can be an important barrier to the country's economic development. Moreover, Cyprus has a low share of Science, Technology, Engineering and Math (STEM) graduates (ranking 27th in the EU) and a lower share of ICT specialists in the workforce than the EU average. The digital skills deficit may impede the potential of the digital economy.

To address this challenge, a National Coalition for Digital Jobs was set up in the end of 2015. It brings together 40 organisations from the public, private and academic sectors. This coalition is part of the network of national coalitions affiliated to the Grand Coalition for Digital Jobs initiative of the European Commission. Furthermore, there are several organisations that offer digital skills training. Among those, the Human Resource Development Authority of Cyprus (HRDA) promotes company training programmes that improve the knowledge and skills of the employees on ICT. On the education side, according to a report of the European Schoolnet,[6] coding and programming is a compulsory subject in lower secondary and in the first year of upper secondary school (ages 13-16) as part of a specialised computing course. It is offered as an option in the last two years of upper secondary school (ages 17-18). ICT-related training is mandatory for incoming teachers. This training is offered by universities and pedagogical institutes as part of general initial teacher training, or by teacher training centres as part of in-service training. For instance, the Cyprus Pedagogical Institute is implementing various ICT training activities for school teachers and other executives at various levels. Finally, the Adult Education Centres are organising ICT classes for the general public within a lifelong learning framework.

As mentioned above, Cyprus has undertaken a few very important initiatives aimed at alleviating its digital skills shortfall. It is important to grow and strengthen these initiatives as well as provide leadership, cooperation among diversified stakeholders and key resources towards digital skills development. The National Coalition for Digital Jobs is a stepping stone in this direction because it can help to break down silos and make collaboration happen, especially in government, education and industry. If successful, it could help to build digital skills capacity with business relevance.

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[5] Directive 2014/61/EU of the European Parliament and of the Council of 15 May 2014 on measures to reduce the cost of deploying high-speed electronic communications networks (OJ L155, 23 May 2014, p. 1)
[6] Computing our future Computer programming and coding - Priorities, school curricula and initiatives across Europe, European Schoolnet, October 2014

3 – Use of Internet

Cypriot Internet users engage in a wide range of online activities, such as reading news online, listening to music, watching films and playing games online, using the Internet to communicate via voice or video calls and participating to social networks. For most of these activities, engagement among Cypriots is higher than overall in the EU. Nonetheless, Cypriots refrain most when they need to engage in online transactions, like eBanking (29%) and online shopping (32%), which have not grown over the past year and are much lower than the EU average (57% and 65%, respectively), revealing a certain distrust in the online environment.

4 – Integration of Digital Technologies

Digital technologies are profoundly changing all business functions and industries. They transform processes, business models and the customer experience. Their adoption by businesses is a catalyst for economic development and labour productivity growth. Cyprus's performance is below par in terms of Integration of Digital Technology by businesses, but its progress is faster than the EU average. The percentage of businesses using technologies such as electronic information sharing (ERP – 43%) and social media (30%) are well above the EU average (36% and 18%, respectively). However, not many Cypriot businesses use RFID, eInvoices, or cloud services. Cypriot businesses also need to take advantage of the possibilities offered by online commerce. Very few SMEs in Cyprus sell online (10%) and even less sell online to other EU member states (8.3%), probably because of transport costs, but surprising in the case of tourism.

The Digital Strategy Action Plan of Cyprus for 2015-2017 includes specific funding schemes (€4.5 Million) for helping SMEs with the deployment of ICT for their internal operations as well as in their customer service chain. The objective of the funding schemes is to increase the development of local applications for the Internet, based on cloud computing services. In addition, they aim at increasing the use of eCommerce so that Cypriot businesses increase their turnover, at home and abroad. In parallel the Ministry of Energy, Commerce, Industry and Tourism is promoting a set of new regulations concerning the current eCommerce Law that is expected to regulate and clarify existing procedures in a better manner as well as to improve citizens' trust in online markets. After all, the Cybersecurity Strategy of the Republic of Cyprus (OCECPR) already aims to establish a safe electronic environment in the Republic of Cyprus, with specific considerations and actions for the protection of critical information infrastructures.

The Cypriot government has put in place a number of promising policies aimed at enhancing the adoption of digital technologies by businesses. Cyprus will benefit from a timely implementation of the strategy, especially given the economic importance of tourism in the country. Finally, Cyprus does not have an Industry 4.0 strategy and it is important to take action to develop such a strategy.

5 – Digital Public Services

In Digital Public Services, Cyprus' performance and progress are below EU average. The development of more sophisticated online services could attract more active eGovernment users.

The eGovernment Strategy of the Republic of Cyprus covers the period 2014-2020 and applies to all ministries, departments and services of the Cypriot government focusing on technical, operational and organisational aspects of the provision of electronic services (eServices) to citizens and businesses. Initiatives affecting back-office systems or government ICT infrastructures are also foreseen by the eGovernment Strategy, provided that they assist the government to achieve its

objectives up to 2020, whilst being in line with the EU policies and directives. The objectives of the eGovernment strategy of Cyprus are to enhance public sector capacity while reducing operational costs; deliver additional eServices, which will be flexible, accessible, complete, easy and secure; and facilitate cross-border collaboration at European level. The strategy foresees major strategic interventions. Among those are the provision of advanced electronic identification and electronic signatures, an Integrated Information System that will digitise the Justice sector supporting the automation of all court processes, the creation of an Integrated Health Information System and many others. To accelerate the implementation of projects, in May 2015 the Council of Ministers decided to establish the Electronic Governance Council, which aims to approve, implement and monitor the progress of all IT/ eGovernment projects and policy development of eGovernment issues.

The eGovernment Strategy of Cyprus appears to be comprehensive and offers a path towards the design of effective online services and tools that will increase transparency and efficiency. A timely and effective implementation of the strategy and its actions could also enable greater citizen trust and participation.

Highlight: eProcurement System of the Public Procurement Directorate of the Treasury of the Republic of Cyprus

The eProcurement System[7] (ePs) is a secure and interoperable web-based application of the Republic of Cyprus (utilizing Open Source Software), which constitutes a comprehensive solution for the implementation of electronic procedures in conducting public procurement competitions. Since November 2009 ePs is fully functional and serves all Contracting Authorities in Cyprus for free, for all types of Procedures and all types of public procurement competitions. The system complies with the provisions of the European and Cypriot Law of public procurement. In September 2011, the Treasury of the Republic was awarded the Innovation Award of 2010, for the wider public sector, thanks to the development and implementation of the eProcurement System. Furthermore, ePs placed Cyprus first in the area of eProcurement amongst the Member States of the EU. Finally, it was awarded the Good Practice Label in the framework of the 4th European eGovernment Awards of 2009.

The ePS in Cyprus is decentralized and the Contracting Authorities include the Central Government (Ministries, Independent authorities), Municipalities and Local Authorities, Bodies Governed by Public Law, and the Utilities Sector.

There are around 6000 Registered Economic Operators on the Platform and 1000 foreign Economic Operators. Every year about 4000 competitions are launched. Moreover, the value of the procurement exceeds €1 Billion and the value of online purchasing by the public sector is approximately €20 Million.

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[7] Ηλεκτρονικό Σύστημα Σύναψης Συμβάσεων https://www.eprocurement.gov.cy/ceproc/home.do

Europe's Digital Progress Report (EDPR)

A report complementing the Digital Economy and Society Index (DESI) [1] country profile

LATVIA

In the 2016 Digital Economy and Society Index (DESI)[2] Latvia falls into the cluster of **catching up** countries[3], scoring below the EU average (19th among the EU Member States) and with an above average growth from previous year. High speed broadband infrastructure is a precondition for digitalisation and Latvia performs well in this respect with 91% of homes having access to high speed broadband connections.

In 2013, the Government approved Information Society Development Guidelines for 2014 -2020[4], which is the current national strategy for digitisation. The goal of the Guidelines is to provide the opportunity for anyone to use ICT, to create a knowledge-based economy and to improve the overall quality of life by contributing to national competitiveness, and increasing economic growth and job creation.

Latvia's performance in the five DESI dimensions relative to other EU countries
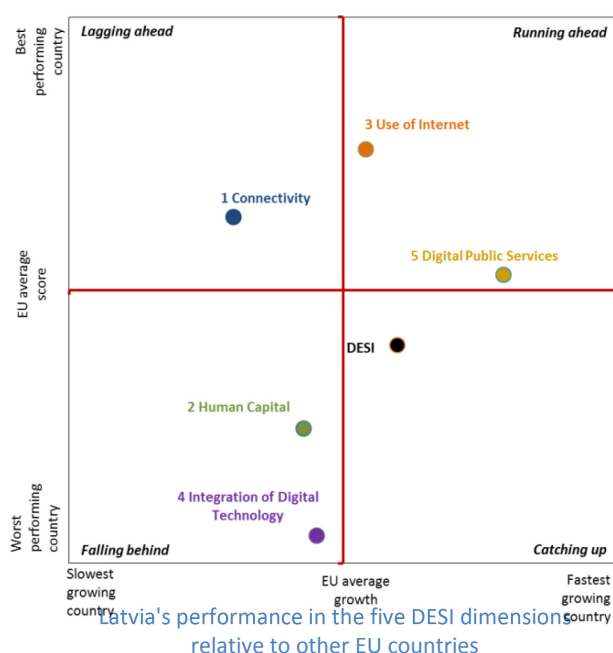
1 – Connectivity

In the overall connectivity dimension of DESI 2016, Latvia ranked 10th. The country stay at its level of fixed broadband coverage of households, still lagging behind the EU, but ensures widespread Next Generation Access (NGA). The speed of connections in Latvia is higher (91% of households have access to NGA as opposed to only 71% in the EU), while on average the EU is better served in terms of fixed broadband coverage (97% of households as compared to 93% in Latvia), However, while there has been a positive trend in fixed broadband take-up, Latvia is still somewhat below the EU average in terms of both coverage and take-up of mobile broadband. (65 subscriptions per 100 people vs the EU average of 75).

The efforts for national investments in broadband should continue according to the Latvian National Broadband Plan till 100 % coverage with 30 Mbps service is achieved and 50% household penetration with 100 Mbps service is attained by 2020. The overall goal, namely to ensure the availability of high-speed broadband network access everywhere including in scarcely populated, remote territories

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2 DESI Country Profile for Latvia: https://ec.europa.eu/digital-single-market/scoreboard/latvia

3 Other catching up countries are Spain, Croatia, Italy, Romania and Slovenia.

4 http://www.varam.gov.lv/eng/darbibas_veidi/e_gov/?doc=13317

where telecommunications providers do not see any commercial incentive, should be pursued further. The intermediate evaluation and comparison of planned and actual outcomes in the process of broadband deployment in 2015, showed that the original goals concerning both deployment of NGA access points in rural areas and the deployment of optical cable connections between main grid and access points have been respected. The implementation of the plan should continue as planned until all its goals are met.

Currently, there are no specific financial instruments dedicated to broadband deployment in Latvia. However, state and European funds do provide some financial aid for infrastructure projects.[5] Finally, Latvia still has to fully transpose the Cost Reduction Directive[6] which could help to speed up broadband roll-out.

2 – Human Capital

Latvia is below average and making limited progress in the Human Capital dimension. The number of Internet users (75%) has increased slightly from 2015, and is now closing in on the EU average. At the same time, the basic digital skills of Latvians (16-74 years), is below average. On the higher end of the digital skills spectrum Latvia has a lower share of ICT Specialists (2% vs 3.7% in the EU) and of science and technology graduates (13/1000 vs. 18/1000 in the EU) than the EU average. This can potentially hold back Latvian companies from digitally developing their business and the public sector from modernising.

In Latvia, the digital skills development strategy is included in the National Development Plan for 2014–2020, Information Society Development Guidelines 2014–2020, as well as the National Reform Programme. The current Education Development Guidelines 2014-2020 include actions addressing the use of ICT in the learning process and development of digital skills, with support from the state budget and EU financial instruments. They include goals for teachers training, educational content including optional programming courses, improved infrastructure, attracting students to STEM-education, and better co-operation. In addition to Education Development Guidelines, the Information Society Development Guidelines 2014–2020 (ISDG) envisage providing the opportunity for anyone to use ICT; to create a knowledge-based economy and to improve the overall quality of life by contributing in job creation; increasing competitiveness and economic growth. The ISDG action line "ICT education and e-skills" foresees the development of digital skills fit for the digital age.

Since 2013 Latvia has had a strong national coalition for digital skills and jobs as a part of the European Grand Coalition for digital skills and jobs. It involves several ministries from the national government as well as industry, represented by among others the Latvian Information and Communications Technology Association (LIKTA), which coordinates the coalition. Their activities span basic everyday skills to highly specialised ICT professional skills. Overall Latvia recognise the importance of digital skills in different groups and takes action to reduce skills gaps in order to make Latvia's private and public sector efficient and competitive.

> **Highlight: "ICT training for small and micro enterprises for raising competitiveness and productivity"[1]** was initiated by Ministry of Economy of Latvia with 80 % ESF financing and co-ordinated by LIKTA. The project aimed to increase long-term competitiveness of small and micro-enterprises by teaching how to effectively apply ICT in their businesses. More than 6,000 employees in 1,500 SMEs got trained. A follow-up will start in 2016.

[5] atene KOM GmbH. "Outline of National Broadband Plans in the EU-28"
[6] Directive 2014/61/EU of the European Parliament and of the Council of 15 May 2014 on measures to reduce the cost of deploying high-speed electronic communications networks (OJ L155, 23 May 2014, p. 1)

3 – Use of Internet

Latvians are frequent users of different online services, scoring above the EU average in DESI 2016 (Latvia 0.54 vs. EU 0.45) and this is the dimension where Latvia ranks highest compared with other dimensions of the evaluation. There's been an increase in usage of most services measured over the last year. Online banking is a service where Latvians stand out as very frequent users, with a big increase from the previous year. While online shopping also saw an increase it's still below the EU average. In many other activities, such as online news, social media and video calls, Latvians are also more often users than the average European.

4 – Integration of Digital Technology

In Integration of Digital Technology by businesses dimension, Latvia is close to the worst performing country in the EU. Latvian businesses are lagging behind the EU in all aspects of e-commerce and the performance of on-line commercial activities has stagnated compared to previous year. E-commerce remains underdeveloped in Latvia with only 38% of the population purchasing online goods or services (53% EU[7]) and consumer confidence in national and EU on-line sellers is below EU average[8]. Moreover, only 8% of Latvian SMEs were selling online in 2015 (16% EU[9]). The slow digitisation of the economy is also reflected in the low growth of ICT jobs. The number of ICT specialists has increased less than in the EU on average, which corresponds to the low take-up of digital technologies in all sectors of the economy.

An important source of growth and innovation is digitally based, potentially fast-growing and global companies - Internet startups. The Startup Manifesto[10] tracker tracks the national implementation of 22 actions in the Startup Manifesto to boost digital entrepreneurship and innovation. Latvia's adoption of the manifesto recommendations ranks well below the European average on all dimensions.

There have been several actions supporting improved digital entrepreneurship in Latvia; for example, in 2015 "Labs of Latvia" was launched, a Latvian Startup community platform with a database of startups, investors and communities where "techHub Riga" is a cornerstone. During the Latvian presidency of the EU, Riga hosted #InnoWeek2015, a conference for policymakers and the Startup scene, with a focus on access to finance for research, innovation and SMEs. The "Demola" project[11] was launched in 2014 to support university students in doing co-creation projects with companies, either locally or internationally, with the aim of finding digital innovative solutions for the needs of companies, institutions and organisations. The "Cross-border Cooperation for Digital Single Market" priority in Latvia's digital agenda sets out the ambition to facilitate the country's integration into Digital Single Market. It focuses on making sure that the necessary digital infrastructure provided by the public sector is adapted to European standards and solutions.

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[7] Eurostat Community Survey on ICT usage in households and by individuals, 2015
[8] Consumer Conditions Scoreboard 2015
http://ec.europa.eu/consumers/consumer_evidence/consumer_scoreboards/11_edition/index_en.htm
[9] Eurostat ICT usage by enterprises, 2015
[10] The Startup Manifesto was created by the Leaders Club, a group of founders of technology companies based in Europe, by invitation of the European Commission in 2013. It contains 22 policy actions to boost entrepreneurship and innovation to power growth in the EU.
[11] http://latvia.demola.net/about

Europe's Digital Progress Report (EDPR)

Making use of technology to improve businesses, both in terms of modernising more traditional businesses as well as facilitating digital entrepreneurship and innovation, will contribute to the development of the Lithuanian economy. For digital entrepreneurship there have been a positive development over the last few years and if sustained, and possibly expanded, Latvia could grow a sustainable Startup scene. Furthermore efforts on digital skills (described under the Human Capital dimension) for SMEs are promising and will lead to modernisation of more traditional industries as well.

5 – Digital Public Services

Overall Latvia's performance in eGovernment is just above the EU average (Latvia 0.57 vs EU 0.55), and making good progress. Latvia ranks 13th in the EU for availability of government services online. The number of citizens using eGovernment services is 36% as compared with the EU average of 32%. Availability and coverage of e-Health services remain below the EU average.

EGovernment policy is mainly set out in the Information Society Development Guidelines for 2014 - 2020 while there are several other development planning documents on various topics complementing this. Special attention is devoted to implementation of the open data principle in the public administration and most of the main priorities contain elements related to digitisation of the public sector. In 2015 Latvia has made its national eID available to partners in other EU Member States. In 2014 the initiative "Latvia's e-index" was launched as a tool for evaluating and benchmarking the digitisation of municipal and state institutions. The index shows usage of ICT solutions at various institutions and different aspects such as service delivery, inter-institutional data and document exchange, open data, modernisation of internal administrative processes, etc.

Latvia has dedicated EUR 7 million to e-Health investments. The project encompasses common e-Health portal, e-Booking visits referral, e-Health records, ePrescriptions. E-health services should have been implemented already in 2014. However, there have been several delays and extensions. The authorities plan to complete the development of the e-Health integrated information system by requiring the medical institutions and pharmacies to use the electronic sick leave and electronic prescription in 2016. Availability of e-Health services is expected to be mandatory from 2017. The State Audit Office has raised concerns on the effective implementation of the eHealth. Planned services are not yet provided with repercussions on progression of health care reforms, including those delivering fiscal savings, and the EU grant for the project is at risk.

Overall Latvia seems to have a comprehensive eGovernment strategy in its Society Development Guidelines for 2014 -2020.

Europe's Digital Progress Report (EDPR)

A report complementing the Digital Economy and Society Index (DESI)[1] country profile

LITHUANIA

Lithuania ranks 13th out of the 28 EU Member States in the European Commission's Digital Economy and Society Index (DESI) 2016[2]. Lithuania is part of the **lagging ahead[3]** cluster of countries, because its DESI score is above the EU average but overall the country has developed slower than the EU over the last year.

With the exception of Human Capital, Lithuania scores above the EU average and excels in Connectivity. Lithuania is below the EU average for Human Capital and is improving slower than the EU average as well. A sizeable part of the Lithuanian population therefore cannot or is not motivated to take full advantage of Lithuania`s excellent infrastructure, and, based on the relatively slower rate of improvement, this seems to be a difficult and complex problem to solve.
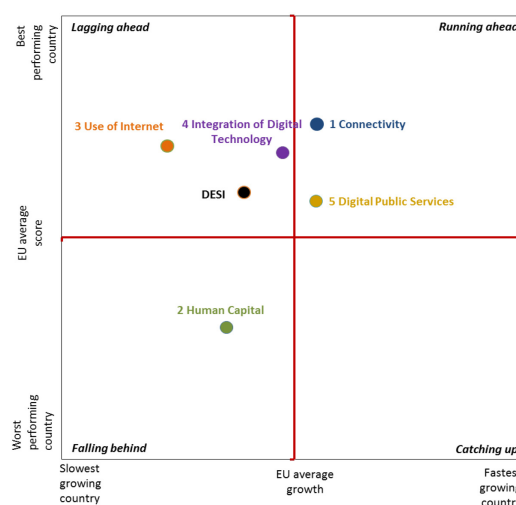
Lithuania's performance in the five DESI dimensions relative to other EU countries

Lithuania seems fully aware of the problem and its complexity as reflected in its 2014-2020 digital agenda strategy[4], and adopted specific objectives to deal with it, based on concrete targets for 2020. The digital agenda strategy is funded from both national and EU Structural Funds. As always, effective implementation measures are key for overcoming challenges in this area. Information on the implementation of the agenda each year is included in the annual performance report of the Ministry of Transport and Communications.

1 – Connectivity

Lithuania is one of the European leaders in NGA deployment, with one of the best NGA coverages in Europe, significantly above the EU average (97% versus 71%). These excellent results have been achieved through broadband infrastructure investment projects RAIN I and RAIN II, financed with European funding, and now using the third phase of the RAIN project "Development of Rural Area Information Technology Network", focused on masts and further middle mile roll-out. Telecom operators focussed on FTTP deployments rather than upgrades to VDSL, supported by a policy of duct access, resulting in FTTP coverage being the highest in the EU (95%). LTE coverage is also slightly higher than the EU average in Lithuania, while mobile broadband take up, although improving, is still below the EU average (64 subscriptions each 100 people versus 75 EU average). Lithuanian consumers also benefit from the most affordable broadband in Europe, when compared with their

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[1] The Digital Economy and Society Index (DESI) is a composite index developed by the European Commission (DG CNECT) to assess the development of EU countries towards a digital economy and society. It aggregates a set of relevant indicators structured around 5 dimensions: Connectivity, Human Capital, Use of Internet, Integration of Digital Technology and Digital Public Services. It clusters countries in four groups: Running ahead, Lagging ahead, Catching up and Falling behind. For more information about the DESI please refer to https://ec.europa.eu/digital-single-market/en/desi

[2] DESI Country Profile for Lithuania: https://ec.europa.eu/digital-single-market/scoreboard/lithuania

[3] In the DESI 2016, Lithuania is part of the lagging ahead cluster of countries: countries who score above the EU average but whose score grew slower than that of the EU as a whole (in comparison to the DESI 2015). Other lagging ahead countries are Belgium, Finland, Denmark, Ireland, Luxembourg, Sweden and the UK.

[4] Resolution No 244 of the Government of Lithuania on Approval of Information Society Development Programme for 2014-2020 `Digital Agenda for the Republic of Lithuania`.

income: an average EU consumer has to spend almost twice as much of their - on average, higher - income on broadband as a Lithuanian resident. However, take-up of broadband services (including fixed and mobile broadband) is significantly below the EU average (60% versus 72%). Lithuania still has to fully transpose the Cost Reduction Directive[5] which could help to speed up broadband roll-out.

2 – Human capital

On Human capital, Lithuania ranks 19th among EU countries; this is below the EU average. Currently, the share of regular Internet users is also below the EU average and does not show any year-on-year growth. As a result, Lithuania has fallen even further behind in this dimension, ranking only 21st. Barely half of Lithuanians have basic digital skills. Furthermore, 25% of Lithuanians has never used the Internet, significantly worse than the EU average (16%). As in other countries, this figure is higher among for example older people and among people with a low general education. When it comes to the more specific section of the labour market of ICT specialists, the share of ICT Specialists as a fraction of employed individuals is also very low (1.9% compared with the 3.7% EU average). A positive sign for the future is that Lithuania has a relatively high share of STEM graduates.

As described in the European Semester Country Report for 2016, Lithuania faces the challenge of managing the transition from a low-cost, low-tech economy to a more skills- and innovation-intensive economy. The report concludes in general that skills shortages have emerged and are expected to become more acute in the future. In addition, the education and training on offer is not always relevant to the labour market and low rate of adult learning remains a weakness. Addressing the issue of digital skills would presumably help address the more general problems as these are critical skills for the labour market of an innovation-intensive economy.

The Lithuanian Digital Agenda recognises various issues relating to Human Capital. Regarding the digital divide, it recognises that some groups are more vulnerable and less able/motivated to benefit from the Internet. This digital divide for example seems to be apparent between senior and younger citizens, people living in rural areas versus urban areas and people with low versus high incomes. The specific difficulties disabled people may face when it comes to accessing and using the internet is also recognised. Lithuania therefore set the objective to reduce the digital divide by encouraging people to gain knowledge and skills required for the successful use of the ICT. The Digital Agenda Strategy sets concrete targets to achieve by 2020, for example, to decrease the percentage of people who never used the internet to 10% and to increase the use of internet among vulnerable groups to 74%. The strategy also sets the target to increase significantly to 95% the share of Internet users with higher and medium skills to use the Internet.

Increasing the digital skills of the general population is bound to have a positive effect on general competences needed in labour markets. This is complemented by a 2015 action plan on non-formal adult education with the aim of helping adults to acquire or improve basic competences. In a digital world, digital skills should count as basic competences. In addition, the Digital Agenda strategy recognises a significant shortage of ICT professionals and sets an objective to encourage young people to apply for an ICT study programme. Finally, Lithuania has a National Coalition for Digital Jobs, which should also help to address the Human Capital problems faced by Lithuania and complement centralised government initiatives.

The Digital Agenda strategy shows that these issues are important for Lithuania and the detailed targets also suggest a commitment to deal with these issues. On 8 September 2014, a multi-fund operational programme for Lithuania, financed by the European Regional Development Fund (ERDF),

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[5] Directive 2014/61/EU of the European Parliament and of the Council of 15 May 2014 on measures to reduce the cost of deploying high-speed electronic communications networks (OJ L155, 23 May 2014, p. 1)

the Cohesion Fund (CF) and the European Social Fund (ESF), was adopted to address the country's goals within the EU 2020 strategy. One of the objectives is to enhance access to, use of and quality of ICT technologies (ICT). Since the digital agenda strategy was adopted already two years ago, the monitoring and interim evaluation of the different follow-up initiatives is important for the success of the strategy.

3. Use of internet services

Lithuanian Internet users are particularly keen on consuming online news content, and interacting via video calls. They are comparable or above the EU average in exploiting most other typical Internet services, such as banking, social networks, music, videos and games. Although Lithuanians still seem relatively reluctant to shop online as compared with other Europeans (44% of Internet users shop online as compared to the 65% EU average), there has been a significant increase among Internet users who shop online relative to last year.

4 – Integration of digital technologies by business

In Integration of Digital Technology by businesses, Lithuania progressed somewhat relative to last year and places 8th in the ranking of EU Member States. In 2015 Lithuanian enterprises were embracing the opportunities offered by various digital technologies. There seems to be a steady, though not striking increase in the number of enterprises which make use of several specific applications of digital technology in business activities. Although only 11% of SMEs sell online, this is already slightly above the EU average. For an SME in a relatively small EU Member State, e-commerce offers access to a much larger market. 10% of SMEs sell online to other EU countries, also slightly above the EU average. There is therefore scope to convince more and more SMEs of the benefit of selling online to other EU markets.

As evidenced by the Digital Agenda strategy, Lithuania is aware of the potential benefits of increased online sales and the adoption of digital technologies by businesses in general. One of the main goals of the strategy is to promote the application of ICT in the development of e-business and sets concrete targets to this effect. On the supply side this includes the goal to increase the share of companies selling online to 45% by 2020. As for SMEs the target is roughly to double the share of online sales in the overall turnover of SMEs (20% by 2020). On the demand side, the target set by the Digital Agenda strategy is that at least 70% of the population should have bought or ordered goods via the Internet. Again, monitoring and evaluation of individual follow-up measures is important for successful implementation.

5. Digital Public services

Digital Public Services is the dimension where Lithuania ranks 12th among EU countries in DESI. With the exception of Open Data, Lithuania is above the EU average for the relevant DESI indicators. The use of eGovernment services was facilitated by the introduction of eID cards in 2009.

This overall performance is consistent with the latest eGovernment Benchmark Report, which places Lithuania above the EU average for the main dimensions relating to the domestic provision and use of eGovernment services. However, Lithuania places below average in cross-border access and use. Lithuania joined a European STORK project in 2010, which aims to implement EU-wide interoperable eIDs. Interconnection activity has already been completed with 8 member states; Lithuania`s participation in this pilot project signals an interest in increasing cross-border mobility when it comes to accessing and using eGovernment services.

Europe's Digital Progress Report (EDPR)

Despite its relatively good performance so far in this dimension, Lithuania aims to develop eGovernment services further. The Digital Agenda strategy contains concrete measures and aims to further improve eGovernment within Lithuania by bringing additional services online and by encouraging even more people to use these services. On the supply side, this scheme promotes interoperability between the information systems of different state and municipal authorities and agencies and emphasises information security. The Digital Agenda strategy also recognises the potential benefit of providing accessible and usable public data both in general and in the specific area of transport and spatial data management.

Highlight: Network of Public Internet Access Points (PIAPs)

In 2008, the project 'Development of Public Internet Access Points' (PIAPs) was completed. It was financed by the EU Structural funds and the Lithuanian Government, and implemented by the Ministry of the Interior. This brought the total of such access points to 875 throughout the country, making Lithuania a European leader in this respect. The PIAPs were mostly established in regions with poor communication infrastructure. The centres operate in the most frequently visited institutions in rural areas, such as schools, libraries and, community centres, providing access to the Internet and electronic content to all societal groups. They also serve as the ICT education, consultation and knowledge centre. The network of PIAPs is integrated as a single administrative system.

Europe's Digital Progress Report (EDPR)

A report complementing the Digital Economy and Society Index (DESI) [1] country profile

LUXEMBOURG

Luxembourg ranks 10th out of the 28 EU Member States in the European Commission Digital Economy and Society Index (DESI) 2016[2]. Luxembourg's scores places it among **lagging ahead**[3] countries, who score above the EU average but whose score grew slower than that of the EU as a whole, in comparison with the DESI 2015.

Connectivity, the Use of the Internet by citizens and Human Capital are the dimensions in which Luxembourg performs relatively above average. However, the country fares quite badly in integration of digital technologies and in online public services.

Luxembourg's performance in the five DESI dimensions relative to other EU countries
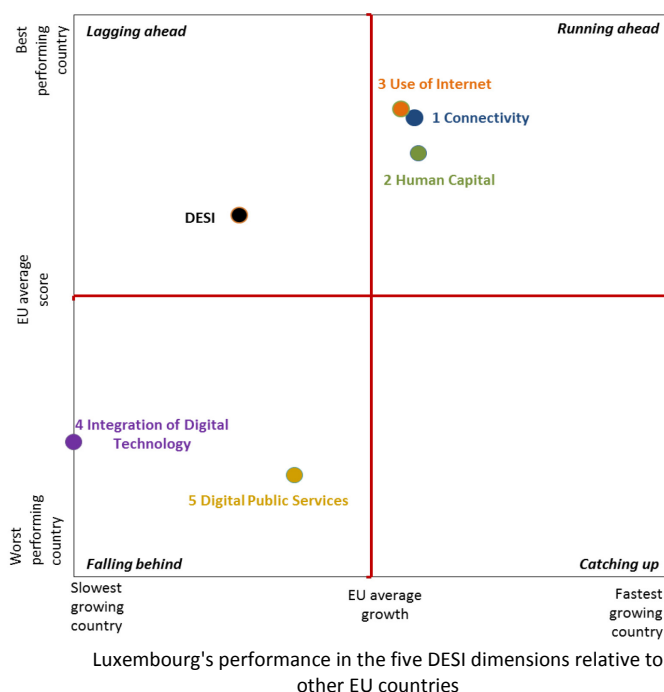
1 – Connectivity

In Connectivity, Luxembourg is performing very well; moreover, it's making good progress. Having already achieved complete broadband coverage, both fixed and mobile broadband uptakes have grown further in Luxembourg. Nevertheless, NGA coverage has remained stable at a high level. The ambition to become the first country with complete FTTH coverage should provide further drive for network development. On the other hand, the relative amount of spectrum assigned for wireless broadband has further decreased in Luxembourg (53% of harmonised spectrum being assigned), in spite of the very rapid increase in mobile broadband take-up last year (It jumped by 15 percentage points from 58 to 73 subscriptions per 100 people, although still slightly below the EU average). The harmonised spectrum has however been made available and it can be assigned to operators once they express a need.

As the country with the largest number of households subscribing to fixed broadband (94%), there still remains room for development both in mobile and high-speed fixed broadband. The Digital Lëtzebuerg initiative should be leveraged to support projects that will further boost penetration in rural areas where operators lack investment incentives, including in mobile delivery settings. In this regard, it might be appropriate to consider how spectrum planning can stimulate and support possible future increased demand for spectrum.

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[1] The Digital Economy and Society Index (DESI) is a composite index developed by the European Commission (DG CNECT) to assess the development of EU countries towards a digital economy and society. It aggregates a set of relevant indicators structured around 5 dimensions: Connectivity, Human Capital, Use of Internet, Integration of Digital Technology and Digital Public Services. It clusters countries in four groups: Running ahead, Lagging ahead, Catching up and Falling behind. For more information about the DESI please refer to https://ec.europa.eu/digital-single-market/en/desi
[2] DESI Country Profile for Luxembourg: https://ec.europa.eu/digital-single-market/en/scoreboard/luxembourg
[3] Other lagging ahead countries are Belgium, Denmark, Finland, Ireland, Lithuania, Luxembourg, Sweden and the United Kingdom

Europe's Digital Progress Report (EDPR)

In 2010, the Luxembourgish government set up the "National strategy for very high-speed networks - Very high-speed broadband for all", in which it aimed to have 1 GBps downstream and 500 Mbps upstream by 2020 for everybody. This plan surpasses the goals of the DAE. The government intends to achieve its goals by market-driven broadband roll-out based on competition among the operators. Furthermore, it should be noted that the government does not plan to spend public money on this project, but it will offer generous tax incentives. Luxembourg still has to transpose the Cost Reduction Directive[4] which could help to speed up broadband roll-out.

2 – Human Capital

In Human capital, Luxembourg is performing relatively well; moreover, it is making good progress. The country ranks 1st in Europe for Internet users (96.8% of individuals are regular internet users in 2015) and it also ranks 1st in Europe for digital skills (86.2% of individuals have basic or above basic digital skills in 2015). While the proportion of ICT specialists in total employment, at 5.1%, is relatively high, Luxembourg lacks skilled ICT professionals. In 2015, 59.1% of enterprises which recruited or tried to recruit staff for jobs requiring ICT specialist skills reported problems filling these positions, up from 58.5% in 2014. This is the second-worst figure in the EU, almost on an equal footing with the Czech Republic (59.2% in 2015). Demand for skilled ICT professionals within the economy is rising rapidly, while the supply is not keeping pace. This problem is also related to the low number of STEM (Science, Technology, Engineering and Mathematics) graduates, where Luxembourg is the worst performer out of the 28 EU Member States, with a mere 3.6 per 1000 individuals aged 20 to 29 (versus 18 per 1000 at EU28 level). This performance is mainly due to the fact that a very large majority of students are doing their studies abroad, and are therefore not being taken into account for the purpose of these statistics (which only take into account residents, i.e diplomas from the University of Luxembourg, and not from universities abroad).

The transmission of technology into new ideas and products hinges on the availability of a vast pool of aptly skilled workers. In this perspective, the Luxembourgish government presented the Digital (4) Education[5] strategy on 20th May 2015. This strategy has set two key objectives: "Digital Education" (**training young people** in **digital** media) and "Digital for Education" (learning through digital media). This strategy is structured around 5 axes: Digital citizen, Digital peer, Digital learner, Digital worker and Digital entrepreneur.

If Luxembourg has recently launched the "Digital (4) Education" strategy, however it has not yet set up its National Coalition for Growth and Jobs under the Grand Coalition for Digital Jobs. This coalition would ensure that all the key stakeholders (government, businesses and education) are involved in the implementation of strategies addressing the human capital problems faced by Luxembourg (e.g. shortage of ICT specialists).

3 – Use of Internet

In the Use of internet services, Luxembourg is performing very well, according to the EU DESI 2016 scoreboard. Moreover, it's making good progress and the use of internet continued to grow in most of the monitored categories with the exception of banking, which has stagnated.

Internet users in Luxembourg are skilled and do not hesitate to engage in a broad range of online activities. They read news online (85%), listen to music, watch films and play games online (59%), use

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[4] Directive 2014/61/EU of the European Parliament and of the Council of 15 May 2014 on measures to reduce the cost of deploying high-speed electronic communications networks (OJ L155, 23 May 2014, p. 1)
[5] http://portal.education.lu/digital4education/

the Internet to communicate via video calls (47%) or through social networks (70%), and obtain video content using their broadband connections (28% of households with a TV use Video on Demand). For most of these activities, engagement among users in Luxembourg is in line with or higher than the EU average.

4 – Integration of Digital Technology

In the Integration of digital technologies by business, Luxembourg's performance is below the EU average; moreover, its progress is below the EU average too.

Regarding the integration of eCommerce by SMEs, both the percentage of SMEs selling online and the share of eCommerce in SME's turnover are low. Moreover, the share of SMEs selling online cross border dropped dramatically last year. The "one-off" change in VAT rules (from country of origin to country of destination) for **telecoms**, **broadcasting** and **electronic** services as of 1st January 2015, as an implementation of the European legislation, may be the origin of this problem. To promote the integration of eCommerce by SMEs, the government launched the initiative « Atelier Digital »: a training programme to support SMEs in seizing the benefits of new technologies and engaging in e-commerce.

The "Digital Lëtzebuerg" initiative aims to accompany the transition to a digital economy and society. Luxembourg is stepping up its efforts to diversify its economy, most notably by supporting startups and innovative projects and by stimulating the development of its thriving FinTech sector. The programme "Fit4Start" has been launched to support innovative ICT startups in their initial phase by offering them financing and coaching adapted to the needs of early-stage enterprises. In addition, the "Digital Tech Fund" was created in April 2016 aimed at providing funding for projects in various fields[6].

5 – Digital Public Services

In Public services, Luxembourg's performance is well below the EU average; moreover, its progress is below EU average. EGovernment is the dimension in which Luxembourg ranks lowest: 22nd out of 28 in DESI 2015 and DESI 2016 (although this is only its second worst score: 0.41 in DESI 2015 and DESI 2016). Luxembourg has posted below average scores in many aspects of eGovernment. According to the eGovernment factsheet[7], Luxembourg has been a laggard in terms of user centricity (with a score of 69 for Luxembourg versus 73 for EU in 2014), of transparency (47 versus 51) and of cross-border mobility (51 versus 58). On the contrary, Luxembourg stands above average (with a score of 55 for LU versus 50 for EU in 2014) as regards key enablers (electronic Identification, electronic documents, authentic sources, electronic safe and Single-Sign-On). Concerning open data policy, Luxembourg fares poorly (according to the PSI Scoreboard, one of the components of the eGovernment dimension of the DESI composite index, Luxembourg scored 135 in 2015, taking the 27th and last-but-one rank in the EU). Although Luxembourg implemented the Public Sector Information (PSI) directive (2003/98/EC) in its original version (Law on the re-use of public sector information enacted on 4th December 2007), it adopted the national measures implementing the PSI revised directive (2013/37/EU) in April 2016.

In response to these weaknesses, , the Luxembourgish government has carryied out several actions. The most important initiative "Digital Lëtzebuerg" covers eGovernment services. The Council of Government of 24 July 2015 approved a series of principles for the implementation of an efficient

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[6] These fields include cybersecurity, FinTech, Big Data, Digital Health, digital education, new generation networks, telecoms or IoT.

[7] Source: European Commission, eGovernment factsheets, eGovernment in Luxembourg, February 2016

digital administration: "Digital by Default" i.e. any new law must take into account and integrate its electronic implementation, "once only" i.e. the obligation for each administration to reuse the information already held, transparency, improved usability, the widespread use of "guichet.lu:" a single address for all the administrative paperwork. This initiative will enable Luxembourg to improve its situation with reference to digital administration and several new features have already been developed to improve this situation, notably with regard to transparency and user-centricity. Another important measure taken is the development of an online Open Data Portal[8].

Previously, the Luxembourgish eGovernment strategy was launched by the eGovernment Master Plan (2005-2010) and by the subsequent Master Plan for the Implementation of Information Technology within the State (2010-2014). The State Information Technology Centre (CTIE) was established in 2009 as the main body responsible for the implementation of the master plan.

> **"Digital Lëtzebuerg" was announced in October 2014. This overarching initiative has been put in place to support Luxembourg's transition towards a digital society and a digital economy.**
>
> For many years, Luxembourg's digital economy has experienced outstanding growth. Successive governments focused first on the infrastructure necessary to provide the best environment for the development of ICT sector companies. However digital transformation must include all aspects of public and private life. Thus the Luxembourgish government wanted to provide a unifying framework for all the countless public and private initiatives that comprise the economy and digital society.
> **www.digital-luxembourg.public.lu**

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[8] https://data.public.lu/en/

Europe's Digital Progress Report (EDPR)

A report complementing the Digital Economy and Society Index (DESI) [1] country profile

HUNGARY

Hungary ranks 20th out of the 28 EU Member States in the European Commission Digital Economy and Society Index (DESI) 2016[2]. Hungary's score was lower than the EU average, and over the last year the overall score grew at a slightly slower pace than the EU. As such, Hungary is part of the **falling behind** cluster of countries[3].

Hungary scores relatively well in the Use of Internet, and is slightly below the average on Connectivity and Human Capital. The greatest challenges remain the Integration of Digital Technology by businesses and the area of Digital Public Services. Hungary progressed most in Connectivity, the Use of Internet and Digital Public Services.
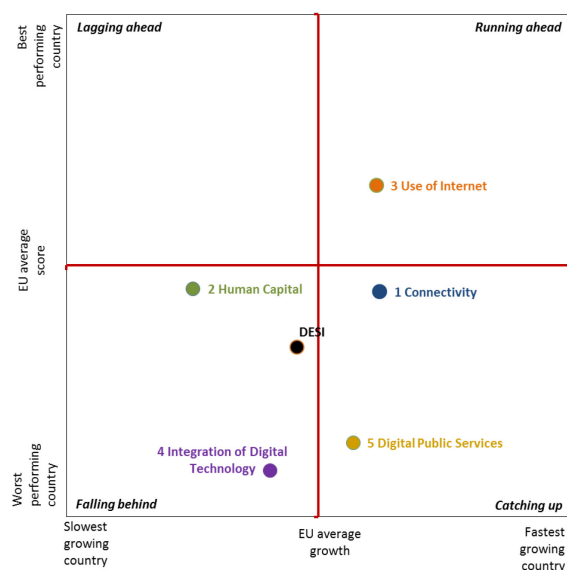
Hungary's performance in the five DESI dimensions relative to other EU countries

1 – Connectivity

Regarding Connectivity, Hungary is just below the EU average. There was good improvement compared with last year, which is caused mainly by the progress in the take-up and coverage of fast broadband technologies. Fixed broadband services are available to 95% of homes in Hungary, which leaves a gap of 5% to achieve universal coverage compared with only 3% in the EU. Nevertheless, fast broadband technologies are already widespread, covering 78% of homes as opposed to 71% in the EU. In Hungary, there is strong platform competition between xDSL and cable broadband. Cable technology is mainly responsible for the high availability of fast broadband currently, but VDSL coverage is also growing. Hungary is catching up regarding the take-up of fixed broadband access: in 2015, 69% of households had a fixed broadband subscription, up from 66% a year ago, but still below the EU average of 72%. The Hungarian mobile market showed a rather stable market structure with three mobile network operators for many years. Following the outcome of the multiband auction in 2014, the cable operator DIGI also acquired rights in the 1800 MHz range, as the fourth mobile network operator. Throughout 2014 and 2015, two new MVNOs entered the mobile market alongside the existing one, and branded resellers started to provide services as well. At the same time, Hungary has the lowest score in the EU for mobile broadband take-up. 4G coverage increased to 95% by June 2015, which may trigger growth in mobile broadband subscriptions over the coming years.

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[1] The Digital Economy and Society Index (DESI) is a composite index developed by the European Commission (DG CNECT) to assess the development of EU countries towards a digital economy and society. It aggregates a set of relevant indicators structured around 5 dimensions: Connectivity, Human Capital, Use of Internet, Integration of Digital Technology and Digital Public Services. It clusters countries in four groups: Running ahead, Lagging ahead, Catching up and Falling behind. For more information about the DESI please refer to https://ec.europa.eu/digital-single-market/en/desi
[2] https://ec.europa.eu/digital-single-market/en/scoreboard/hungary
[3] Other falling behind countries are Bulgaria, Cyprus, the Czech Republic, Greece, France, Poland and Slovakia.

Europe's Digital Progress Report (EDPR)

The development of digital infrastructure is one of the pillars of the National Infocommunication Strategy 2014-2020[4], adopted in 2014. The strategy also includes broadband related targets, which are consistent with those of the Digital Agenda. Overall, the Hungarian broadband strategy envisions primarily promoting market-based broadband roll-out by enacting adequate public policy and regulatory measures. Where deployment incentives for market players are lacking, credit or tender schemes (e.g. tax relief for developments and allocation of application funds to support investments not recoverable on a market basis) will be developed to support network upgrades. With regard to budgetary issues, the National Broadband Plan states that about 180 – 210 Billion HUF (600 - 700 Million €) investments are needed in order to assure at least 30 Mbps internet speed for all households in Hungary. The country still has to transpose the Cost Reduction Directive[5] which could help to speed up broadband roll-out.

It remains to be seen whether the financial incentives made available will be able to compensate for the effects of levies established on telecom operators, in particular the infrastructure tax introduced in 2013. It is also important to note that the current strategy focuses mainly on the 30Mbps connectivity target, although the Digital Agenda also stresses the need to deploy superfast broadband networks (at least 100Mbps) by setting the target of 50% of homes subscribing to such speed by 2020.

2 – Human Capital

On Human capital, Hungary ranks 17th among EU countries, slightly below the EU average, and its progress was limited last year. 72% of people in Hungary use the internet, compared with 76% in the EU. Hungary shows a mixed picture in digital skills: only 50% of individuals have at least basic digital skills (EU average 55%), while ICT specialists represent a relatively high share of the workforce (4.9% compared to 3.7% in the EU). Hungary is lagging far behind on graduates holding a STEM (Science, Technology and Mathematics) degree.

The development of digital competences is one of the pillars of the National Infocommunication Strategy. The strategy underlines Hungary's huge backlog regarding digital literacy with 3.5 million people not yet benefitting from digital technologies. Internet users mainly engage in only basic activities on-line. It is also acknowledged that digital competences are not sufficiently developed in public education, since the curicululum have not yet been adapted to digital, the teachers have limited knowledge and the IT tools are insufficient. Hungary has set itself the objective of reducing the number of digitally illiterate adults as well as increasing the number of regular internet users. In addition, the shortage of ICT experts (estimated at 10,000 people in 2013) should be significantly reduced by doubling the number of students studying ICTs by 2020 and improving higher education to better respond to the needs of the labour market.

Having defined the overall strategic framework to address the challenges in human capital, the focus from now is on the effective implementation of the planned measures. Hungary has not yet set up its National Coalition for Growth and Jobs[6], which may be very important to ensure that all the key stakeholders are involved. Funding opportunities to consider include Erasmus+, European Structural and Investment Funds, and the Employment and Social Innovation programme.

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[4]http://www.kormany.hu/hu/nemzeti-fejlesztesi-miniszterium/infokommunikacioert-felelos-allamtitkarsag/hirek/infokommunikacios-akciotervet-fogadott-el-a-kormany
[5] Directive 2014/61/EU of the European Parliament and of the Council of 15 May 2014 on measures to reduce the cost of deploying high-speed electronic communications networks (OJ L155, 23 May 2014, p. 1)
[6] https://ec.europa.eu/digital-single-market/en/national-local-coalitions

3 – Use of Internet

In general, Internet users in Hungary engage in a broad range of internet activities and outperform the EU average on the Use of the Internet. As for the most popular activities on-line, 86% of internet users read news, and 83% use social networks. The use of social networks is the highest in the EU. 47% of internet users listen to music, watch films or play games online, and 55% make video calls. Despite progress last year, Hungary still falls well below the average on internet banking and online shopping. On eCommerce, this is also linked to the supply side, as the percentage of SMEs selling online is also below the average.

4 – Integration of Digital Technologies

On the Integration of Digital Technology by businesses, Hungary's ranks 26th, well below the EU average, and its worst performance ranking among all five DESI 2016 dimensions, and progress was also limited last year. The percentage of businesses using technologies such as electronic information sharing (16%), cloud services (6%) or social media (11%) is among the lowest in the EU. Hungarian businesses need also to take advantage of the possibilities offered by on-line commerce. Very few SMEs in Hungary sell online (10%), and even fewer sell online to other EU Member States (4.5%). The reluctance of people to engage in transaction-based services such as electronic payments, banking and shopping online is partly responsible for the low performance.

The government in its ICT strategy sets the objectives that 90% of the micro and small enterprises should have internet access by 2016 (and 99% by 2020) and 50% of the micro and small enterprises should have internet presence (website, Facebook profile, etc.) by 2016 (80% by 2020). In addition, the value of Hungarian software and services exports should increase by 100% by 2020; 33% of SMEs should make purchases or sales online by 2020, and the rate of SMEs having integrated corporate systems should reach the then EU average by 2020. Government measures include support for the development of ICT services for export, support to the development of internal IT and electronic services of SMEs and instruments to boost the market of electronic commerce, electronic invoicing and payments as well as e-Signatures.

The timely and effective implementation of relevant schemes in the Economic Development and Innovation Operational Programme (EDIOP) could significantly contribute to overcoming the challenge in this area.

5 – Digital Public Services

On Digital Public Services, Hungary performs fourth worst in the EU, well below the average, despite the fact that the growth of the related DESI indicators was somewhat higher than the EU average last year. It is, however, remarkable that Hungary nonetheless improved in online service completion, measuring the extent to which the various steps in an interaction with the public administration can be performed completely online.

The Digital State pillar of the National Infocommunication Strategy focuses on the supply of internal IT services, the provision of digital public services for both citizens and enterprises as well as on security. The government aims at improving not only the IT background in the public administration, but also the digital competencies of people working for the public administration. By 2018, citizens and enterprises should be able to manage the full range of public administration services (including cross-border) on-line, and 60% of adult population should use e-government services by 2016.

During the implementation of the measures, it may be worth taking into account the results of the latest eGovernment Benchmark Report , which states that Hungary is well below the average in all the four dimensions, i.e. on user centricity, transparent government, cross border mobility and the key enablers (such as electronic identification).

Highlight: The new Hungarian eID card

In January 2016, Hungary launched a new electronic ID card. The new card has an integrated Near Field Communication (NFC) chip, and it meets the requirements of the European Union's eIDAS regulation. Apart from the eID function, there are two other electronic functions available: the ePASS function and the e-Signature function. The card also stores the citizens' Tax ID and National Health Insurance Number. The eID function of the card is secured with a 6 digit PIN, and the optional e-Signature function with a 7 digit PIN. During January 2016, 133,000 eID cards were issued by the Hungarian authorities, out of which 51,000 includes= the biometrics necessary for the optional ePASS functionality, and 19,000 include the digital certificate needed for the e-Signature function. The necessary card readers are officially distributed by the Hungarian Post, the cheapest available from 13.000 HUF (approx. 40 euros).

Europe's Digital Progress Report (EDPR)

A report complementing the Digital Economy and Society Index (DESI) [1] *country profile*

MALTA

In DESI 2016, Malta ranks 11th out of the 28 EU Member States. Malta's Digital Economy and Society Index (DESI) 2016[2] score is above the EU average and the country developed faster than the EU over the last year, which places it in the **running ahead** cluster of countries[3].

Malta scores relatively well in all five dimensions of DESI. Malta is particularly strong in broadband deployment and take-up. All Maltese households are covered by fixed broadband, and all networks can provide 30 Mbps or more. In addition, already more than half (58%) of broadband subscriptions provide a minimum speed of at least 30Mbps. As for the weak points, Malta is lagging behind in the assignment of radio spectrum for mobile broadband and in making government data available for re-use.
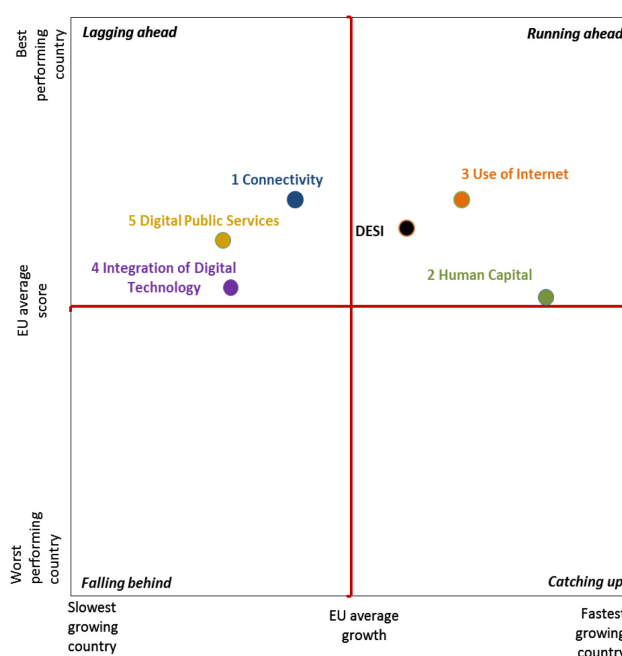
Malta's performance in the five DESI dimensions relative to other EU countries

1 – Connectivity

Connectivity is the DESI 2016 dimension where Malta performs best. It ranks 9th among EU countries and above the EU average. However, progress last year was slightly below the EU average. Malta has universal broadband coverage, and the whole population can have access to fast broadband (at least 30 Mbps). Malta has strong platform competition between xDSL and cable broadband. The take-up of fixed broadband is well above the EU average too. The majority of consumers have already migrated to fast broadband services (at least 30Mbps download). Nevertheless, Malta needs to improve its performance in mobile. 4G services are available to close on three quarters of the population, compared with 86% in the EU; and the take-up of mobile broadband is also below the EU average.

The current National Broadband Plan of Malta (called "Digital Malta 2014 – 2020"[4]) was issued in March 2014. Malta's broadband targets are in line with the Digital Agenda targets: 100 % coverage with 30 Mbps, 50% take-up rate for 100 Mbps until 2020. In terms of investments, the National Broadband Plan mentions the possibility to use public funding and public-private partnerships for the

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[2] https://ec.europa.eu/digital-single-market/en/scoreboard/malta

[3] Other running ahead countries are Austria, Germany, Portugal, the Netherlands and Estonia.

[4] https://digitalmalta.gov.mt/en/Documents/Digital%20Malta%202014%20-%202020.pdf

deployment of infrastructures. However, this only applies within areas where market failure exists. Regarding radio spectrum for mobile broadband, Malta has assigned only 37% of the overall harmonised spectrum for broadband (EU average is 69%). Although the unassigned parts of the 1800 MHz band, the 2600 MHz and the 3600-3800 MHz bands have been placed on the market some years ago, the market did not show interest in making use of these bands. Concerning the 800MHz band, the Commission granted a derogation until 31 December 2014 due to cross-border frequency coordination problems with Italy. Malta formally requested in January 2016 that the derogation regarding the 800 MHz band be extended to the end of February 2017. Malta still has to fully transpose the Cost Reduction Directive[5] which could help to speed up broadband roll-out.

Malta has already achieved the 30Mbps coverage target, but the superfast broadband take-up target (at least 100Mbps) remains a challenge. Although cable networks are already capable of delivering such speeds, the take-up of superfast broadband services is very low in Malta (1% of subscriptions compared with 11% in the EU). In addition, FTTP coverage is only 10% of homes (EU average: 21%).

2 – Human Capital

On Human Capital, Malta ranks 15th among EU countries, slightly above the EU average, and progressed faster than the EU on average last year. Although 74% of people in Malta are regular internet users, up from 70% a year ago, Malta still scores below the EU average. Moreover, 22% of people have never used the internet (EU average: 16%). Malta shows a mixed picture in digital skills: only 52% of individuals have at least basic digital skills (EU average 55%), while ICT specialists have a relatively high share in the workforce (4.6% compared with 3.7% in the EU). Regarding STEM (Science, Technology and Mathematics) graduates, Malta ranks 18th, below the EU average.

Digital Malta, the national ICT strategy for 2014-2020 builds on three themes: Digital Citizen, Digital Business and Digital Government. These themes are supported by three key enablers: regulation and legislation, infrastructure and human capital. Among the 71 actions of Digital Malta, several initiatives concentrate on increasing the percentage of internet users and improving digital skills. For example, Digital Citizenship will be part of the National Education Curriculum so that young people can learn how to use the internet safely and intelligently. Malta is to launch an education and awareness programme to improve basic ICT competences, especially among vulnerable/minority groups and the elderly. The government sees digital as a "social equaliser", and aims to ensure that all citizens have the possibility to benefit from ICTs, as a fundamental right. The strategy also emphasises the importance of local and Maltese language content. As for work-related skills, Malta will develop a Lifelong Learning Programme with digital skills at its heart to improve employability, and will update its eCompetence framework for ICT specialists.

In February 2014, the eSkills Malta Foundation[6] was launched under the Grand Coalition for Digital Jobs, which is a multi-stakeholder partnership between industry, the educational sector and the government. This partnership may play an important role in the effective implementation of Digital Malta. Funding opportunities to consider include Erasmus+, European Structural and Investment Funds, and the Employment and Social Innovation programme.

3 – Use of Internet

In terms of the use of Internet services, Malta ranks 11th among EU countries, above the EU average, and it progressed well last year. Internet users in Malta engage in a broad range of online activities.

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[5] Directive 2014/61/EU of the European Parliament and of the Council of 15 May 2014 on measures to reduce the cost of deploying high-speed electronic communications networks (OJ L155, 23 May 2014, p. 1)

[6] http://eskills.org.mt/en/Pages/Home.aspx

They read news online (81%), listen to music, watch films and play games online (56%) as well as use the Internet to communicate via voice or video calls (45%) or through social networks (78%). For all of these activities, engagement in Malta is higher than the EU average. Malta outperforms the EU also in online banking and shopping. However, regarding the use of video on demand, Malta's score of 9.5% is well below the EU average of 41%.

4 – Integration of Digital Technologies

In the Integration of Digital Technology by businesses, Malta ranks 13th among EU countries, somewhat above the EU average, however it progressed relatively slowly last year. Malta's businesses still need to better exploit the possibilities offered by Electronic Information Sharing, eInvoices and eCommerce. For example, eCommerce represents only 4.2% of the turnover of SMEs (EU average: 9.4%), and only 7.9% of enterprises use eInvoices. On the bright side, 26% of enterprises use social media and the percentage of SMEs selling online to other EU Member States is also high (12%).

ICT is seen as a key enabler of growth and innovation in Malta, a country of small size with limited resources. Within the Digital Business pillar of the Digital Malta strategy, the government defined 14 actions grouped in four categories: transforming businesses, sustaining entrepreneurship and attracting new businesses, eCommerce, and stimulating research and innovation. Actions target both the ICT sector and the use of ICTs by other sectors. A special emphasis is put on SMEs, start-ups, cloud computing and digital gaming. On eCommerce, Malta has the ambition to widen the horizon and target the global market in addition to increasing the adoption of eCommerce within the country.

Continuing collaboration between government, industry and the educational sectors remains very important also in this area to enable Maltese businesses to better embrace digital technologies.

5 – Digital Public Services

In Digital Public Services Malta ranks 11th among EU countries. Malta is well above the average in the sophistication of online public services and in online service completion. Nevertheless, the percentage of eGovernment users is low, as only 28% of internet users engage fully with the public authorities on line. In addition, Malta scores low in making government data available.

Digital government is one of the pillars of Digital Malta with twelve actions grouped in four categories. Under "citizen and business centric government", the government aims to improve the user experience, to make services available also on mobile devices and to implement a one-stop shop concept. "Efficient government" refers to actions to reduce bureaucracy and implement leaner processes through an advanced uses of IT. The third category, "open government" promotes the sharing of government information across the public administration and with the public, as well as the use of ICT to encourage people to participate more in democratic decision-making. Actions under "essential government services" cover use of ICTs to provide services such as education, healthcare, welfare, justice, tourism, utilities and transport. As a key enabler of digital public services, the government decided to renew Maltese citizens' identity cards by launching electronic IDs in 2014. The eIDs are equipped with an electronic chip with the same biographic data visible on the card and a digital image of the citizen. In addition, the chip also includes a digital certificate for authentication, which will enable the citizen to log on securely to eGovernment services and a qualified digital

certificate, which is an enabler for electronic signatures.[7] A steady increase of users over the coming years will maximise the benefits of digital public services.

Highlight: The ICT Career Exposure Experience (CEE) Week[8]

The ICT Career Exposure Experience (CEE) Week is an initiative of the eSkills Malta Foundation and the Education Psycho-Social Services Section within the Ministry for Education and Employment. The programme targets students, aged 14 - 15 years, who can spend one week at an ICT company. Students will be able to observe the daily routines of ICT professionals and increase their understanding of ICT and ICT-related careers; to begin to identify career interests in one or more ICT-related fields; to gain awareness of the academic, technical, and inter-personal skills required in the ICT and related professions; and to develop an understanding of the critical connections between school and work. The latest ICT Career Exposure Experience (CEE) Week took place between 16 November 2015 and 13 May 2016.

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[7] Source for information on eID:
https://joinup.ec.europa.eu/sites/default/files/ckeditor_files/files/eGovernment%20in%20Malta%20-%20February%202016%20-%2018_00%20-%20v3_00.pdf
[8] https://eskills.org.mt/en/careerexposure2015/Pages/The-ICT-Career-Exposure-Experience-Week--.aspx

Europe's Digital Progress Report (EDPR)

A report complementing the Digital Economy and Society Index (DESI)[1] country profile

THE NETHERLANDS

The Netherlands ranks 2nd out of the 28 EU Member States in the European Commission Digital Economy and Society Index (DESI) 2016[2]. The Netherlands' DESI 2016 score is above the EU average and has developed faster than the EU over the last year, which places it in the **running ahead** cluster[3] of countries. In nearly all five DESI dimensions detailed below, the Netherlands outperforms the other Member States. Particularly in Connectivity and Integration of Digital Technologies the Netherlands is progressing faster than the EU average. Conversely, in Human Capital and Use of Internet its progress is below EU average.
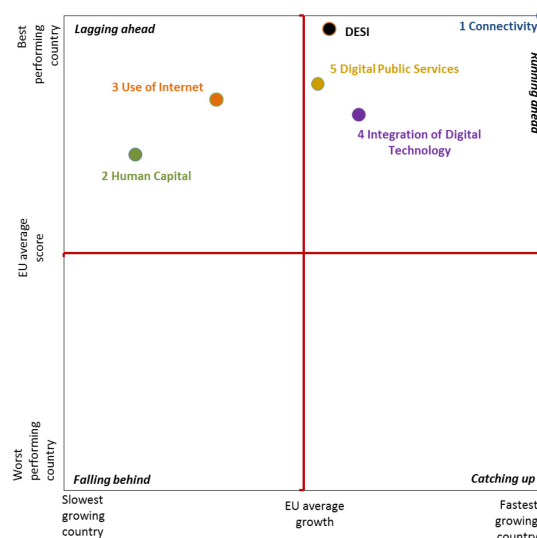
The Netherlands' performance in the five DESI dimensions relative to other EU countries

The Dutch Digital Agenda 2016-2017 is to be published in Spring this year. It will maintain the 2011-2015 action lines[4] albeit with added focus on digitisation of entrepreneurs and other (social) areas apart from the government itself. In 2015, the Netherlands also launched new initiatives to foster digitisation and digital skills in its economy and society. The main ones are Education 2032, Smart Industry, Knowledge and Innovation Agenda ICT[5], Human Capital Agenda ICT and Technology Pact 2020.

1 – Connectivity

The Netherlands is performing well and making good progress. Both with regard to broadband and fast broadband coverage, the Netherlands is in the top 3. Every Dutch household can have access to broadband Internet. Next Generation Access networks capable of providing at least 30 Mbps are available to practically all Dutch households (98% compared to 71% in the EU). Of all fixed broadband subscriptions, 62% are for fast broadband, up from 46% last year and significantly above the average for the EU (30%). The Netherlands is therefore well on track to comply with the 2020 targets set out by the Digital Agenda for Europe.

The Netherlands is also leading the way in Europe with virtually 100% LTE (4G) coverage. Over the last year, the number of mobile broadband subscriptions increased from 77 to 80 per 100 people,

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[1] The Digital Economy and Society Index (DESI) is a composite index developed by the European Commission (DG CNECT) to assess the development of EU countries towards a digital economy and society. It aggregates a set of relevant indicators structured around 5 dimensions: Connectivity, Human Capital, Use of Internet, Integration of Digital Technology and Digital Public Services. It clusters countries in four groups: Running ahead, Lagging ahead, Catching up and Falling behind. For more information about the DESI please refer to https://ec.europa.eu/digital-single-market/en/desi

[2] DESI Country Profile Netherlands: https://ec.europa.eu/digital-single-market/en/scoreboard/netherlands

[3] Other running ahead countries are: Austria, Germany, Estonia, Malta and Portugal

[4] (i) Making it easier for enterprises to work smarter, (ii) High-speed and open infrastructure, (iii) Digital security and trust, and (iv) Knowledge that works (https://ec.europa.eu/digital-single-market/news/digital-agenda-netherlands-digital-agendanl)

[5] Aimed at stimulating public- private partnerships in big data analysis in energy, smart industry, cybersecurity, life sciences & health.

which is just above the EU average. The percentage of assigned spectrum in the EU harmonised bands is also close to 100%, significantly above the EU average of 68%.

The Dutch broadband strategy is formulated in "Digital Agenda.nl – ICT for innovation and economic growth"[6] published by the Ministry of Economic Affairs in May 2011. It seeks to ensure that "By 2020, networks will match the demand from users and suppliers of services", and signals that the local government's main task is to create the right conditions, such as planning and coordinating excavation work, shortening and reducing the costs of licensing procedures and promoting the development and use of applications and services. Where market-based infrastructure roll-out fails, local and regional actors may assist in finding other funding and financing instruments.[7] The Netherlands will publish its Digital Agenda 2016-2017 in April this year. The main action lines are expected to be maintained in order to meet future challenges and improve benefits for the overall economy stemming from its excellent digital infrastructure. The Netherlands still has to transpose the Cost Reduction Directive[8] which could help to further speed up broadband roll-out.

2 – Human Capital

The Netherlands is performing well, yet its growth rate is limited. This score is not so much related to the ability of people to use the Internet (91% of people use it at least once a week), as to a low score in science and technology graduates, i.e. just over half the EU average. Although in 2014 5% of all persons employed in the Netherlands were ICT professionals, in 2015, 53% of enterprises in the Netherlands trying to recruit ICT professionals found it hard to fill their vacancies. By 2020 the lack of ICT professionals could be as high as 56,000.[9] The stagnating science and technology graduate numbers since 2006 are not helping. Not enough young people, including women, are being attracted to careers in ICT.[10] Interestingly, only 18% of enterprises provided training to their personnel to develop or upgrade their ICT skills, which is below the EU average (21.5%) and less than in the majority of peers in the running ahead cluster. In 2015 72% of people had basic digital skills and around 20% of people in the Netherlands still had low digital skills.

The Netherlands has been seeking to address its digital skills gap with a range of programmes over the past few years.[11] One major recent initiative is the primary and secondary education curriculum renewal "Education 2032". The objective is that kids starting school today, by 2032 have the basic knowledge of ICT, the ability to find and select information, the competence to use (social) media, and the skill to use ICT to solve problems (computational thinking). The ongoing design of the new curriculum is an interactive process between inter alia government, schools, teachers, and students.

Another recent major initiative is the "Human Capital Agenda ICT".[12] The objective is to reduce the gap between demand for and supply of ICT professionals and to stimulate life-long learning. The ECP, an independent platform for the information society, is the national contact point for the Netherlands under the Grand Coalition for Digital Jobs. It collaborates with business, government and other organisations on several topics related to digital economy and society.[13]

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[6] https://ec.europa.eu/digital-single-market/news/digital-agenda-netherlands-digital-agendanl
[7] https://www.rijksoverheid.nl/documenten/brochures/2011/08/26/handreiking-breedband
[8] Directive 2014/61/EU of the European Parliament and of the Council of 15 May 2014 on measures to reduce the cost of deploying high-speed electronic communications networks (OJ L155, 23 May 2014, p. 1)
[9] empirica, e-Skills in Europe, Trends and Forecasts for the European ICT Professional and Digital Leadership Labour Markets (2015-2020).
[10] Digital agenda scoreboard; Statistics NL (The Netherlands on the European Scale 2016); EU Skills Panorama (Focus on STEM skills).
[11] e.g. www.techniekpact.nl; www.digivaardigdigiveilig.nl; www.digitaalhulpplein.nl
[12] https://www.dutchdigitaldelta.nl/en/ict-professionals
[13] https://ec.europa.eu/digital-single-market/en/national-local-coalitions

Europe's Digital Progress Report (EDPR)

To fully exploit the benefits of the digital economy, a high-skilled and adaptive workforce is key, as it powers the capacity to innovate and underpins competitiveness. The potential of the digital economy for growth and jobs is easily hampered by a shortage of ICT professionals and the reluctance or inability to properly exploit the possibilities offered by the Internet and related digital tools. The announced initiatives will contribute to further stimulating the Netherlands' well-on-track digital transformation. Attracting more people, including women, into science and technology education and careers, for example by building on EU and other good practice initiatives such as the Grand Coalition for Digital Jobs, the national coalition, EU Code Week and Startup Delta will contribute to creating an sizeable pool of digitally skilled consumers, employees, entrepreneurs and ICT professionals. Funding opportunities to consider include Erasmus+, European Structural and Investment Funds, and the Employment and Social Innovation programme.

Highlight: Human Capital Agenda ICT

Recognising a qualitative and quantitative shortage of ICT professionals, particularly in areas related to cloud computing, Big Data and cybersecurity, the Dutch Human Capital Agenda ICT intends to (i) better match supply and demand, mainly by increasing inflow into ICT-education and by increasing the participation of companies in education. This includes increasing the number of Centres of Expertise with a focus on ICT; reducing shortages in ICT professors; developing a specialised labour market monitor to obtain better insights into ICT professional competence shortages. A further priority is (ii) promoting life-long learning through investments in the supply of lifelong-learning training courses and more attention to the personal career development of ICT professionals.

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3 - Use of Internet

The Netherlands is performing well although its progress is below the EU average. Consumers are keen broadband users for video on demand, listening to music, watching videos and playing games. Use of social networks is just above EU average. Online banking is very common, almost saturated for several years now. Online shopping usage, including cross-border purchases, is above the EU average, in particular among students. However, people tend to read less news online and make fewer online video calls.

4 – Integration of Digital Technology

In integration of digital technologies by businesses, the Netherlands is performing well and making good progress. Companies perform Europe-wide best in the use of social media and particularly well in electronic information sharing. Businesses also increasingly make use of eInvoices and online sales. Nonetheless, there could be scope for improvement in the use of Radio Frequency Identification technologies for person identification, supply chain and inventory tracking or after sales product identification, where the Netherlands scores below the EU average.

The Dutch digital economy and society could thrive even more if more businesses were encouraged to integrate digital technologies to enhance their efficiency and productivity, reach costumers and realise sales. Around 39% of enterprises score low in Digital Intensity. Only 7.4% of enterprises exploit Business to Consumers web sales opportunities, 17% sell online, and 15% send e-invoices. In 2015, eCommerce turnover of SMEs amounted to 8.3%, i.e. below the 9.4% EU average.

According to a Smart Industry survey (2015), a significant number of entrepreneurs are still relatively uninformed about the digital revolution and its implications for their business.[14] "Smart Industry", an initiative kick-started in 2015 under the Dutch Top Sectors policy, the action agenda of Team ICT for

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[14] www.smartindustry.nl

big data knowledge and innovation (PPP) and the ICT Agenda in the Netherlands, seeks to respond to the cross-sectoral digitisation need by capitalising on existing knowledge, accelerating Field Labs (networks of companies and knowledge institutions), and strengthening the foundation (knowledge, skills and ICT, and legal parameters). Also the Dutch Digital Agenda 2016-2017 plans to increase the focus on digitisation of entrepreneurs. The government has set up a working group on digitisation to develop longer term policy options also with regard to "smart entrepreneurs". These initiatives and strategies are likely to further encourage and facilitate the digital transformation.

5 – Digital Public Services

The Netherlands performs very well in Digital Public Services although progress is average. The increased availability of automated services has led to a decrease in eGovernment users returning filled forms. Online service completion considerably improved in the Netherlands and on the Open Data Indicator, the Netherlands scores well above the EU average.

The government has the ambition with "Digitaal 2017"[15] - which implies a digital by default approach - to ensure that all citizens and enterprises in the Netherlands will be able and are encouraged to communicate and do business with the authorities online; i.e. digital where possible, personal where necessary. Current examples of eGovernment services are "overheid.nl", an access point for persons and businesses by theme and location providing information about services, legislation, consultations, open standards for better interoperability, and access to the open data portal "data.overheid.nl". The entrepreneurial portal "ondernemersplein.nl" gives information about subsidies and permits. The eIdentity login systems eHerkenning for organisations and DigiD for citizens enables secured online access. In eProcurement, the Netherlands is one of the best performers in the EU.[16] The Dutch eHealth strategy supports the country's healthcare system. It has three key patient-centred goals for the next five years: at least 80% of the chronically sick will have access to their medical records; 75% of chronically ill and vulnerable elderly will have access to self-management and self-testing with telemonitoring; everyone with home care will have access to e-consultation or online therapeutic diagnoses.

The Netherlands is very active in modernising its public administration. The challenge for the next five years lies in the implementation of the eHealth objectives, which will require getting eHealth accepted by the people, and with the implementation of "Digitaal 2017".

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[15] http://www.digitaleoverheid.nl/digitaal-2017/inleiding
[16] http://ec.europa.eu/europe2020/pdf/csr2016/cr2016_netherlands_en.pdf

Europe's Digital Progress Report (EDPR)

A report complementing the Digital Economy and Society Index (DESI) [1] *country profile*

AUSTRIA

Austria ranks 12th out of the 28 EU Member States in the European Commission's Digital Economy and Society Index (DESI) 2016[2]. Austria is part of the **running ahead** cluster[3] of countries, because its DESI score is above the EU average and overall the country has developed faster than the EU over the last year. Austria is doing relatively well and keeps improving at a relatively faster pace on the dimensions of Human Capital, Digital Public Services and Integration of Digital Technology. On the Connectivity dimension, however, Austria places close to, though higher than, the EU average with a relatively slower pace of improvement over the past year. Austrians benefit from affordable internet and relatively wide availability of high-speed internet. Digital technologies are relatively well exploited by businesses, individuals and public institutions.
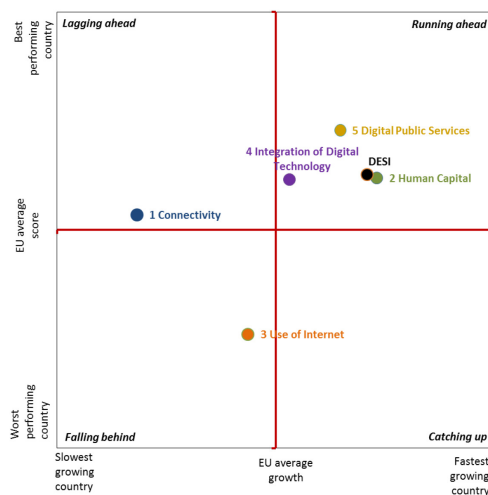
Austria's performance in the five DESI dimensions relative to other EU countries

Despite already doing well in most DESI dimensions when compared to Europe, Austria has ambitious plans to improve further. This includes an already ongoing federal scheme to increase accessibility of ultrahigh-speed broadband infrastructures by 2020. In addition, a public consultation on a comprehensive digital strategy called *'Digital Roadmap Austria'* was launched in mid-February and closed in March 2016. The discussion paper prepared by expert groups contains proposals for measures relating to the entirety of the digital economy, society and government.

1 – Connectivity

Austrians benefit from affordable internet and a relatively high availability of high-speed internet. Fixed broadband is available to 99% of households as compared with the 97% EU average; and 89% of all households in Austria now have the possibility to be connected to an NGA infrastructure allowing access to a high-speed broadband connection (versus 71% in the EU).

The key connectivity challenge is to ensure rural NGA coverage, given the country's geography. To this end, Austria is implementing an ambitious funding scheme to increase NGA coverage, using the proceeds of spectrum revenues. Austria's National Broadband Strategy 2020 supersedes DAE targets in several aspects to achieve 70 % coverage of ultrafast-broadband (100 Mbps downstream) in metropolitan areas until 2018, with 99 % coverage of ultrafast-broadband for all households in Austria until 2020. While the Austrian Broadband Plan is quite comprehensive, it could benefit from specification of investment needs. To this end it is also worth noting that although fixed-line

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[1] The Digital Economy and Society Index (DESI) is a composite index developed by the European Commission (DG CNECT) to assess the development of EU countries towards a digital economy and society. It aggregates a set of relevant indicators structured around 5 dimensions: Connectivity, Human Capital, Use of Internet, Integration of Digital Technology and Digital Public Services. It clusters countries in four groups: Running ahead, Lagging ahead, Catching up and Falling behind. For more information about the DESI please refer to https://ec.europa.eu/digital-single-market/desi

[2] DESI Country Profile for Austria: https://ec.europa.eu/digital-single-market/scoreboard/austria

[3] In the DESI 2016, Austria is part of the running ahead cluster of countries: countries who score above the EU average and whose score grew faster than that of the EU as a whole (in comparison to the DESI 2015). Other running ahead countries are Germany, Estonia, Malta, the Netherlands and Portugal.

operators have in recent years upgraded their legacy copper and coaxial cable networks, current market share of fibre-based access networks (FTTH and FTTB) is well below the EU average (7% versus 18.7%).

Despite an overall better than average supply-side situation in broadband, the uptake of fixed and mobile broadband connections is each respectively below the EU average. This notwithstanding, 81% of households in Austria have at least one type of broadband connection (fixed, mobile or both), which largely corresponds to the EU average (80%). It should also be mentioned that Austria is a country with relatively high fixed-mobile broadband substitution (16% of households only have mobile broadband at home, which is well above the EU average of 8%).The take-up of high-speed fixed broadband seems to be particularly low in Austria: only 21% of fixed broadband subscriptions are for high-speed broadband as opposed to a 30% EU average. Austria still has to fully transpose the Cost Reduction Directive[4] which could help to speed up broadband roll-out.

2 – Human capital

On Human capital, Austria has moved up considerably, from 14th place among EU countries in DESI 2015 to 8th place in DESI 2016. The digital skills of the wider population are above the EU average: 81% of Austrians use the Internet and around 64% of Austrians have at least basic digital skills, well above the EU average of 55%. This notwithstanding, as in other countries, the digital divide issue is still present in Austria when it comes to age and the level of education of the user. E-inclusion therefore remains a challenge. When it comes to the specialised ICT segment of the labour force, only 4% of Austria`s workforce is made up by ICT specialists. This basically corresponds with the European average. Austria ranks high considering the number of graduates holding a degree in science, technology, engineering and mathematics (STEM). This notwithstanding, as remarked in the 2016 European Semester Country Report, Austria does have comparatively fewer STEM graduates at Masters and PhD level than comparable industrialised countries. This could limit its ambition to further develop as a high technology economy and become an innovation leader.

Austria is, and has been for several years, aware of the importance of digital skills for the labour market and for social integration generally, and also of the challenge of eInclusion. For example, Austria has introduced a national digital education strategy *"efit21",* which focusses on the integration and use of ICT in Austrian educational institutions. Its goal is to enhance the quality of digital education, to teach digital skills to facilitate success on the labour market, and to help integration in society (eInclusion, media skills). There are also targeted programs in place. The project *"Learn forever"* for example, which is being co-financed from the European Social Fund (ESF), aims to improve the digital competences of educationally disadvantaged women. There is also a focus on women and older workers in the *'Qualification for employees'* scheme (also ESF co-funded), which includes strands to improve digital skills.

The draft *'Digital Roadmap Austria'* includes a comprehensive digital skills strategy. Several specific actions are proposed to increase the digital competencies of the population in their private and professional lives with a number of specific educational measures both for youth and adults, and in particular for women, to tackle eInclusion, to increase the use of ICT and to ensure a high level of digital skills for the labour market. Austria expects to deal with demand for ICT specialists and thereby raise its competitiveness by teaching digital skills to young people from an early age, by providing extensive eLearning programmes, by enabling youth participation in various digital programmes (such as "Sparkling Science", "Citizen Science", "Open Innovation", "Research Internship

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[4] Directive 2014/61/EU of the European Parliament and of the Council of 15 May 2014 on measures to reduce the cost of deploying high-speed electronic communications networks (OJ L155, 23 May 2014, p. 1)

for Youth" and several initiatives on media science) and by encouraging youth towards an ICT/STEM study programme.

Austria also intends to optimise the deployment of broadband and WLAN connections in schools and to develop financing models, including social tariffs, for digital equipment used in schools (tablets, notebooks).

Austria is not yet one of the 13 Member States which have National and Local Coalitions for Digital Jobs. These multi-stakeholder partnerships developed to enhance digital skills at national, regional or local level can complement centralised initiatives for digital skills.

3 – Use of internet services

Austrians score above the European average when it comes to the more practical uses of the Internet, e.g. internet banking (61%) and online shopping (68%). Austrians are also among the most active cross-border shoppers in Europe. This indicates a general trust in online services and confirms good digital skill competences. However, Austrians seem to make less use of the Internet for classical entertainment purposes (music, videos, games, TV) and make few video calls.

4 – Integration of digital technologies by business

Austria ranks 10th in DESI for the Integration of digital technologies by business. Businesses in Austria are ahead of the EU average in some specific uses of digital technology. For example, Austrian companies are the leading users of e-invoicing in Europe. The number of SMEs selling online is still lower than the EU average, notwithstanding a modest year-on-year growth of 2 percentage points. However one of the most digitised sectors in Austria is tourism, where Austrian SMEs are very active in selling to consumers in other countries and raising the average of cross-border trade relative to other European countries (10% of SMEs engaged in online cross-border sales versus the EU average of 7.5%). Austria has implemented measures to encourage the digitisation of industry. For example, since January 2014, federal authorities no longer accept paper invoices or pdf invoices. Contractors to the Federal Government have to provide their invoices in a standard electronic format. This is expected to lead to more efficient transactions with lower costs and is likely to have contributed already to Austria`s top spot in the use of electronic invoices. The recently published draft "*Digital Roadmap Austria"* also contains various specific targets and objectives to encourage businesses to take advantage of digitisation. This includes measures to encourage and facilitate e-commerce, in particular cross-border. For companies operating in a relatively small country, cross-border e-commerce of course unlocks a much bigger market and has great economic potential.   Another focus is the development of Industry 4.0. Measures include the setting up of an experimental factory in cooperation with industry and science professionals and also the setting up of endowed professorships.

5 – Digital Public services

Austria performs well when it comes to the use of digital technologies in public services ranking 6 in the EU overall. Digitalisation of public services has a huge potential as it saves cost, time and effort for users and providers alike. Austria seems to have recognised this potential and is above average for general indicators for the use of online services. It even shows significant year-on-year improvement, e.g. in Online Service Completion.

In view of these results it is not surprising that Austria was one of the first Member States to adopt comprehensive legislation on eGovernment in 2004, which was followed by various implementation measures.

Austria has an eID (the "Citizen Card Concept") for several years which allows for the authentication of a person`s identity in electronic transactions with public bodies as well as for qualified signature of the person. This is needed to make interactions with public bodies both secure and traceable. Since the end of 2009 citizens are able to choose between two different citizen card options. One is a traditional chip-based card option, the other is a mobile phone solution called "the mobile phone signature". The latter was developed with support from the European Commission in the large EU pilot project on interoperability of electronic identities called "STORK". The European Commission`s 2015 report on eGovernment in Austria identified a positive trend regarding the activation of mobile phone signatures. This trend is continuing and shows the growing acceptance of this technical particular implementation of the Austrian citizen card concept. As of May 2016 there are more than 650 000 active Mobile Phone Signatures in use and every month some 10 000 to 15 000 new Mobile Phone Signatures are activated. Since May 2015 the activation process is even easier; as of April 2016 a smartphone application can be used as an alternative for receiving the one-time-code (TAN) via SMS which further improves security, speed and convenience of use. Again, this development is a reflection of the prominent role of mobile communications in Austria`s telecommunications market.

When it comes to eHealth, the beginning of 2014 marked the launch of the electronic health record, which is a system that allows patients and all healthcare providers access to data irrespective of location and time. This system is easily accessible by both the mobile and original version of the eID citizen card.

The draft *Digital Roadmap Austria'* foresees to extend and improve existing digital public services (e.g. by enabling access from abroad and by further improving interconnection between existing services). It is also proposed to promote eProcurement by creating one single access platform for public procurement.

Highlight: Open Data

In 2014 Austria received the annual United Nations Public Service Award for the Open Government Data Portal (data.gv.at). In the category "Improving the delivery of Public Services", Austria was awarded 1st place for the nationwide Open Government Data Portal (data.gv.at) by the Federal Chancellery of the Republic of Austria. The portal is a unique platform for providing a comprehensive database of freely accessible national government data. The awarding jury pointed out that Austria was an inspiration and a model for other countries.

Europe's Digital Progress Report (EDPR)

A report complementing the Digital Economy and Society Index (DESI) [1] *country profile*

POLAND

Poland ranks 22nd out of the 28 EU Member States in the European Commission's Digital Economy and Society Index (DESI) 2016[2] (see Annex). Poland belongs to the **falling behind** cluster,[3] meaning that Poland's performance is below the EU average and improved slower than that of the EU as a whole.

Poland made moderate progress in the Use of Internet and Integration of Digital Technology dimensions. In the Connectivity dimension Poland improved its performance. Low levels of fixed broadband coverage and take-up are to a limited extent counterbalanced by high take up of mobile broadband. Poland's Digital Public Services and Human Capital dimensions contracted. Poland adopted the Digital Poland Operational Programme for 2014-2020.
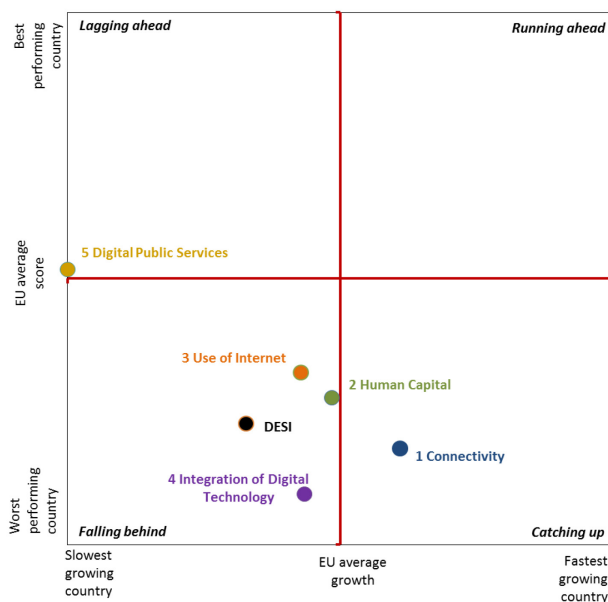
Poland's performance in the five DESI dimensions relative to other EU countries

The aim of the programme is to strengthen digital foundations for national development: common access to high-speed Internet, effective and user-friendly public e-services and a continually rising level of digital competences in society[4].

1 – Connectivity

In connectivity Poland is well below the EU average and is making moderate progress. With fixed broadband coverage of only 86% Poland ranks last in the EU. Almost 20% of rural households are still not covered by fixed broadband. Furthermore fast fixed broadband is available to only 61% of households (EU average of 71%). Although fixed broadband access costs are relatively low, Poland's take-up of fixed broadband remains weak. The latter is to a certain extent counterbalanced by high mobile broadband take-up (5th in the EU). 13.6% of households had only a mobile broadband connection in 2015. The high level of take-up of mobile broadband shows that there is demand for fast Internet and that the supply side should be improved. Furthermore many Poles use laptops and tablets to access internet away from home. Notwithstanding high mobile broadband penetration, the coverage of 4th generation LTE mobile broadband is still relatively low (76%). Therefore negative effects of the low fixed broadband coverage and take-up cannot be fully offset by the mobile take-up.

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[2] DESI Country Profile for Poland: https://ec.europa.eu/digital-single-market/en/scoreboard/poland

[3] Other falling-behind countries are Bulgaria, Cyprus, Czech Republic, Greece, France, Hungary and Slovakia

[4] https://www.polskacyfrowa.gov.pl/media/1655/POPC_eng_1632015.pdf

Europe's Digital Progress Report (EDPR)

Poland's broadband targets are in line with the targets set by the Digital Agenda for Europe (DAE). Broadband infrastructure funding comes from EU[5] and state funds as well as from private investments. In 2015 Poland completed the auction for assignment of spectrum in 800 MHz and 2600 GHz bands.[6] The final assignment of digital dividend spectrum in Poland will help accelerate the roll out of the 4th generation mobile networks (LTE), in challenging areas especially. A review of rules to ensure binding offers for spectrum assignments and regulating auction participation could reduce the risk of delays in spectrum assignments, while increasing the legal certainty of assignment procedures. In total Poland has assigned 96.1% of harmonised spectrum compared with EU targets. The country's main challenge continues to be fix broadband coverage and take-up; therefore it will be important to ensure efficient implementation of the National Broadband Plan. Effective use of available funds at regional and at central level will be of paramount importance to speed up broadband deployment in order to meet the DAE connectivity targets. Poland still has to fully transpose the Cost Reduction Directive[7] which could help to speed up broadband roll-out.

2 – Human Capital

In the Human capital dimension, Poland performs below par and is making moderate progress. Only 40% of individuals have basic digital skills.[8] The level of digital skills, however, is improving among 16 - 24 years old, of whom 80% have basic digital skills. Although Poland's STEM (science, technology, engineering, mathematics) graduate level is above EU average, the percentage of ICT specialists remains low in the workforce. Around 30% of Poles obtained ICT skills through formal education (school, college, university, etc.), but only 2% have written a computer program.

Poland has recognised the deficit of programing skills and plans to change the core school curriculum so that all students will learn programing starting in the first class of primary school. The third axis of the Operational Programme Digital Poland 2014 - 2020 is devoted to digital competencies. It provides the "Framework catalogue of digital competences" and outlines actions to support their development. It stresses the relevance of digital skills for obtaining everyday advantages and links the use of digital technologies to the needs of different social groups. Broad Alliance on Digital Skills in Poland ("Szerokie Porozumienie na rzecz Umiejętności Cyfrowych w Polsce") and Foundation of Information Society Development ("Fundacja Rozwoju Społeczeństwa Informacyjnego") promote digital education and use of new technologies in Poland. The latter initiative focuses on small towns and rural areas.

The third axis of the Operational Programme Digital Poland 2014 - 2020 should contribute to targeted digital skills development. These ongoing initiatives would profit from greater visibility and promotion.

3 – Use of Internet

In the Use of Internet section Poland is below the EU average and is only making moderate progress. Poles are still hesitant to go online. 65% of Poles are regular internet users (EU average of 76%). 27% of individuals have never used internet. This affects the overall low use of internet based services. Still few Poles read online news, use internet banking and participate in online social networks. 42% of individuals use Internet to look for information about goods and services; but less than one third of Poles order physical goods online and only 11% of individuals order services online.

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[5] EU funds are available via the Operational Programme "Digital Poland" covering the period of 2014-2020.
[6] The assignment decisions were finally issued only in January 2016, with significant delays compared with the expiry of the derogation for the assignment of the 800MHz band in December 2013, also due to poor spectrum auction design.
[7] Directive 2014/61/EU of the European Parliament and of the Council of 15 May 2014 on measures to reduce the cost of deploying high-speed electronic communications networks (OJ L155, 23 May 2014, p. 1)
[8] based on 4 digital competence domains: information, communication, content-creation and problem-solving

4 – Integration of Digital Technologies

In the Integration of digital technologies by business dimension, Poland performs below par and is making moderate progress. The digitisation of Polish businesses is lagging behind. Use of social media and Cloud services (including at least one of the following services: data hosting, accounting software, CRM software, computing power) remains at a very low level. Only one out of ten Polish enterprises is selling online[9] compared with the EU average of 17% of enterprises. Furthermore only 12% of Polish enterprises employ ICT specialists and the percentage of ICT specialists in the Polish workforce remains low at 3%, versus the EU average of 3.7%.

In January 2013, the Council of Ministers adopted the "Strategy for Innovation and Efficiency of the Economy: Dynamic Poland 2020." The strategy's main objective is to foster a competitive, innovative and efficient economy based on knowledge and cooperation. It anticipates support for the development of "Internet of Things" with emphasises on the energy sector. The INNOMOTO, INNOLOT programmes are aimed at promoting innovation in and digitisation of the automotive and aviation sectors. Nevertheless, the Digital Poland Operational Programme for 2014-2020 does not contain specific measures for the digitisation of enterprises.

It is important for Polish businesses to fine-tune their development strategies and to identify fields where they can profit from digitisation. It is expected that in the long run Polish businesses will profit from positive synergies between better connectivity and higher digital skills. The more individuals go online, the stronger the incentives become for business to expand their digital presence. Furthermore as individuals' digital habits evolve, these may translate into more innovative practices and processes within businesses. According to startup Manifesto[10] Poland offers a startup friendly ecosystem. While pronounced number of startups is technology driven, their growth may additionally accelerate the diffusion of digital technologies among other Polish enterprises.

5 – Digital Public Services

In Digital Public Services, Poland ranks at EU average and made a slower progress in comparison to the EU as a whole. It is, however, the dimension where Poland scores best. A high number of individuals are using pre-filled forms, but in general the use of eGovernment services remains low. Exchange of medical data and the share of ePrescriptions are still at low levels in Poland (11% and 4% of general practitioners; compared with EU averages of 36% and 27%). Only 7.5% of individuals[11] make an appointment with a practitioner over a website.

Polish public administration is not particularly inclined to share data and information. Although the Polish Law on Access to Information (2002) includes provisions supporting broad data re-use, there are legal procedures in specific domains that often differ and overrule the general law.[12] Poland announced it would use the Pan-European Public Procurement Online standard as a pillar for the national eInvoicing strategy in 2013; however there is still no clarity on its adoption and implementation. eGovernment is among the priorities of the "Digital Poland" Programme 2014-

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[9] (sales via computer network and representing at least 1% of total turnover)
[10] There is an increasing number of innovative startups. According to The Startup Manifesto[10] tracker Poland ranks 9 among the EU Member States in the overall adoption of the Manifesto Recommendations, providing Poland with a startup friendly ecosystem. Poland performed well in Skills & Education and in Thought Leadership dimensions. There is however still a strong need to improve access to capital including: loans to startups, access to government contracts and enhanced access to public capital.
[11] Internet users (last 3 months)
[12] Open Government Data Review of Poland. Unlocking the Value of Government Data; OECD 2015

2020[13] that aims to improve the quality and efficiency of public services through digitisation. The National Development Strategy 2020 promotes introduction of uniform rules for eGovernment in administration. Actions are envisaged to digitise public administration, to simplify administrative processes, to create structured digital knowledge resources, and to enable auditing of public information. "Strategic Directions of Actions of the Minister of Digitization in the area of computerisation of public services", published in February 2016, sets the goal of creating a "Service State", in which citizens will be able to deal with all administrative matters electronically. It envisages creation of a central information and government services portal and puts emphasis on the unified system of digital identification of citizens. Although in the field of e-Health, Poland introduced new legal and institutional measures,[14] there is still considerable room for improvement.

These ongoing initiatives are expected to increase the use of digital public services. However, Poles still harbour deep concerns about the privacy and security of their data. Addressing the latter issue and further promoting the available eGovernment and e-health services will in due course contribute to flourishing Digital Public Services.

Highlight: "Paperless, cashless Poland"
Poland's Digitalization and Development Ministries are working on the "Paperless, cashless Poland" project that covers the areas of e-Identity, e-Health, e-Courts, eTaxes, e-Invoices and cashless transactions. Its aim is to create a digital infrastructure that enables individuals to use services spreading from driving licence application to university payments

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[13]https://mac.gov.pl/files/program_operacyjny_polska_cyfrowa_05122014.pdff
[14] Poland established the National Centre for Health Information Systems and passed the Low Act on the Information System in Health Care in 2011. Electronic Platform for Collection, Analysis and Sharing of Digital Medical Records and The Platform for Sharing Services and Resources of Digital Medical Records with Online Business were created. Since 2013 Poland uses electronic system to verify patients' entitlements (E-wus)

Europe's Digital Progress Report (EDPR)

A report complementing the Digital Economy and Society Index (DESI) [1] country profile

PORTUGAL

Portugal ranks 14th out of the 28 EU Member States in the European Commission's Digital Economy and Society Index (DESI) 2016[2]. Portugal is part of the **running ahead** cluster[3] of countries because its DESI score is above the EU average and overall the country has developed faster than the EU over the last year. Portugal's progress is in great part due to noteworthy developments in human capital. However, human capital continues to be the country's weakest area. Conversely, Portugal's strongest performing dimension is digital public services, but this was the dimension that saw the frailest development over the last year.

Portugal's performance in the five *DESI* dimensions relative to other EU countries
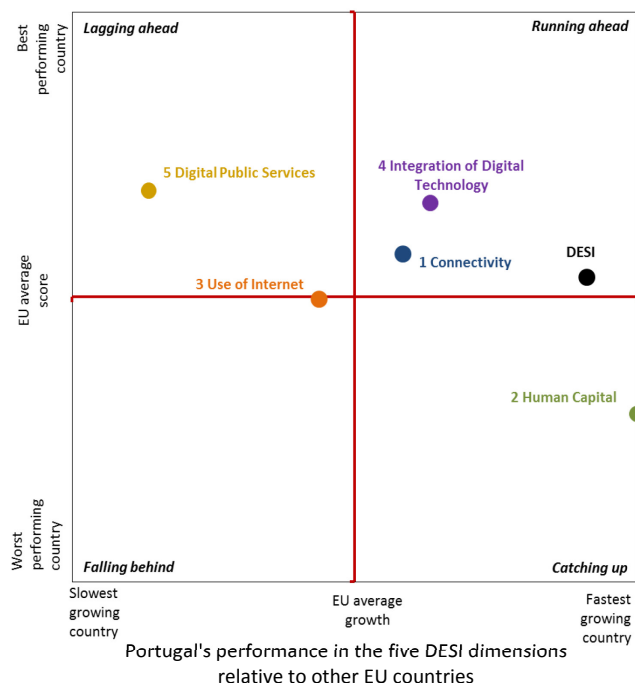
1 – Connectivity

Portugal is performing well and making good progress in Connectivity. Broadband network coverage is good: fixed broadband is available to all homes and next generation access networks (NGA) capable of providing at least 30 Mbps are available to 91% of them (well above the 71% EU average). Besides the upgrade of cable networks and the network sharing agreement complementing the individual plans of the two operators deploying fibre to the home (FTTH), an important facilitator of the fast NGA deployment is Portugal's policy on access to passive infrastructure: Portugal was one of the first countries to introduce this type of measure. However, there are still differences between regions, and in rural areas networks capable of providing at least 30 Mbps are available to less than half of the households. Over the course of last year, several fixed broadband operators announced significant investment in fibre to the premises, aiming to cover over 5 million houses (of the existing 6 million) by 2020, which shows that Portugal has a vibrant market that nurtures private investment. Hence, it is important that competition is maintained and enhanced, including through adequate regulatory tools, as Portugal seeks to bridge the remaining gaps in NGA deployment. Portugal also performs above EU-average in mobile coverage: over 94% of households enjoy 4G coverage.

Portugal's main challenge continues to be fixed and mobile broadband take-up. Although subscriptions to broadband grew significantly during previous years, only about 61% of Portuguese households subscribe to fixed broadband, and less than half of citizens subscribe to mobile

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[1] The Digital Economy and Society Index (DESI) is a composite index developed by the European Commission (DG CNECT) to assess the development of EU countries towards a digital economy and society. It aggregates a set of relevant indicators structured around 5 dimensions: Connectivity, Human Capital, Use of Internet, Integration of Digital Technology and Digital Public Services. It clusters countries in four groups: Running ahead, Lagging ahead, Catching up and Falling behind. For more information about the DESI please refer to https://ec.europa.eu/digital-single-market/desi

[2] DESI Country Profile for Portugal: https://ec.europa.eu/digital-single-market/scoreboard/portugal

[3] Running ahead countries are Austria, Germany, Estonia, Malta, the Netherlands and Portugal.

broadband. Low take-up may be in part due to affordability - the country has the fifth most expensive entry-level broadband price in the EU - but also to lack of interest or knowledge of the benefits of the internet, which is in turn a probable consequence of the country's significant digital skills gap.

In April 2015 Portugal undertook an extensive revision of the Portuguese Digital Agenda Strategy (APD – "Agenda Portugal Digital", first launched in 2012) and updated the strategy's objectives and measures. The strategy includes two targets for broadband coverage by 2020: Internet access at speeds greater or equal to 30 Mbps available to all citizens, and access at speeds greater or equal to 100 Mbps available to 50% of households. It also comprises objectives to improve access to broadband at speeds higher than 40Mbps to citizens in rural areas, to improve coverage of fast mobile broadband in 480 civil parishes currently not covered (and in 588 more parishes as of 2018), and to further release spectrum bands for mobile broadband use in line with European decisions. The broadband deployment targets initially included in the APD in 2012 were important steps to improve the country's deployment of fast broadband, leading to significant private and public investment that allowed the country to attain its current well-developed networks. However, in order to achieve the 100% fast broadband coverage target, Portugal will need significant investment in rural areas. The transposition of the Cost Reduction Directive could help to speed up broadband roll-out[4]. The target of having 50% of households with 100 Mbps broadband coverage by 2020 is of questionable usefulness, given that, by June 2015, 88% of households in Portugal already had such coverage.

2 – Human Capital

Portugal's performance is below par in Human Capital, but the country is rapidly developing this dimension. Only 65% of Portuguese citizens use the Internet on a regular basis, the 6th lowest value in the EU, and 28% of the population have never used the Internet (The EU average is 16%). Only 48% of the Portuguese population have at least basic digital skills (8th lowest in the EU), and only 2.5% of employed people are ICT specialists (6th lowest in the EU). Only in STEM graduates does Portugal perform above the EU average (in 7th place) with 2.1% of people in their twenties holding a STEM degree. Nevertheless, Portugal improved its performance relative to last year in all fields considered. The APD includes a target to reduce to 23% the percentage of people that have never used the Internet by 2020. It includes a section dedicated to digital literacy, qualifications and inclusion ("Área de intervenção 3"), as well as measures to promote ICT R&D&I, focusing on ICT specialist skills and on ICT-based innovation. In 2015, Portugal launched the Digital Inclusion and Literacy National Strategy ("Estratégia Nacional para a Inclusão e Literacia Digitais") to improve digital skills in the workforce and overall population (including citizens with low education, elderly, and with special needs) via a lifelong learning approach. The Portuguese Coalition for Digital Employability ("Coligação Portuguesa para a Empregabilidade Digital", set up under the Grand Coalition for Digital Jobs[5]) and the Digital Employability Strategy and Action Plan ("Estratégia e Plano de Ação para a Empregabilidade Digital") also started in 2015. The plan seeks to reduce the deficit of ICT professionals in the economy, improve ICT skills in the public and private sectors, and in the population at large, and increase the number of companies using digital technology. The country is also setting-up a platform with polytechnic institutes to act at regional and local levels aiming to provide re-qualification through vocational training to respond to ICT-related job opportunities.

Portugal has the greatest lag compared with the EU in human capital, but there is an important nuance: digital skills attainment in Portugal depends very much on age, income bracket and education level. 91% of Portuguese aged 16 to 24 have at least basic digital skills, as do 76% of those

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[4] Directive 2014/61/EU of the European Parliament and of the Council of 15 May 2014 on measures to reduce the cost of deploying high-speed electronic communications networks (OJ L155, 23 May 2014, p. 1)
[5] https://ec.europa.eu/digital-single-market/grand-coalition-digital-jobs

aged 25 to 34, both above the EU average (81% and 73% respectively). Portugal is 3rd in the EU in digital skills among citizens with high formal education (ISCED 5+) and 2nd among citizens with medium formal education (ISCED 3-4). Wealthier citizens (4th income quartile) also have better digital skills than their EU counterparts; so Portugal has a quintessential digital divide problem on its hands, where the most vulnerable groups are the less digitally-skilled: older, lower income and low education.

It is important to enact differentiated policies to target the digital divide, while at the same time keeping up successful efforts to educate the younger generations; hence the importance of planned digital literacy and inclusion measures that target vulnerable groups, which should be put in place and appropriately funded and followed-up. The same should happen to the various initiatives proposed to develop ICT specialist skills, which will stimulate the already high propensity of younger generations of Portuguese to acquire digital skills and to take up scientific and technological education. Such policies can be partly funded by EU structural funds, for instance using the Human Capital Operational Programme ("Programa Operacional Temático Capital Humano: PO CH" – 3.1 billion EUR for the period 2014-2020) already in place, or by means of the Youth Guarantee, which could help offer ICT vocational training to unemployed youths.

3 – Use of Internet

Portugal has average performance but its progress is below the EU average in Use of Internet. Portuguese Internet users engage in a broad range of online activities, and depending on the activity, engagement among the Portuguese is at par or higher than overall in the EU. However, Portuguese Internet users are very reluctant to perform online transactions such as online banking (41%, the 5th lowest value in the EU) or online shopping (44%, the 7th lowest value in the EU).

Citizens' reluctance to undertake transactions online may reflect lack of trust caused by perceived lack of security. The APD includes one measure seeking to improve trust and security of networks and services. Furthermore, there have been initiatives seeking to simplify online authentication and payments in order to increase trust in online services, such as MBNet for online payments and Chave Móvel Digital for simplified authentication in public or private websites.

4 – Integration of Digital Technology

Portugal is performing well and making good progress in Integration of Digital Technology. It ranks 2nd among EU countries in the use of RFID and 5th in use of ERP, but there's room for improvement, particularly in the use of social media (8th lowest in the EU). Portuguese businesses made great progress in online commerce: the share of SMEs selling online increased significantly (from 14% to 19%) as did the percentage of SMEs that sell online to other EU member states (from 5.4% to 7.9%) and the overall turnover obtained from online sales (from 11% to 13% of SMEs' total turnover).

The APD has a 2020 target to increase by 55% (baseline 2011) the number of companies using e-commerce, paired with measures to increase SMEs' participation in the digital economy. Digitisation of businesses, especially SMEs, is under the spotlight in the distribution of European structural and investment funds under the Portugal 2020 partnership agreement. The agreement includes actions to increase companies' competitiveness and promote their internationalisation, seeking to help them integrate digital technologies, develop an online presence and engage in online sales.

Incentives for digitisation and internationalisation of Portuguese companies (SMEs in particular) are starting to bear fruit as shown by the improved performance in the aforementioned eCommerce indicators. Portugal 2020 sub-programmes have available budgets in the 2014-2020 period of €4.4 Billion for the Competitiveness and Internationalisation programme and €2.1 Billion for Social

Inclusion and Employment programme (plus specific regional funds). Such funds can be put to use in further contributing to the digitisation of Portuguese businesses.

5 – Digital Public Services

Portugal is performing well in Digital Public Services but its progress is still below the EU average. Portugal has seen slightly fewer of its internet users engaging with public administration online (41% vs. 43% last year), despite the fact that it has among the most sophisticated online public services in the EU: Portugal ranks 3rd in services offered fully online and 4th in reuse of user data in online forms. Over the past year, the country's commitment to open data seems to have weakened.

Portugal has developed concerted efforts to rationalise, simplify and digitise its public administration for years, mostly under the Global Strategic Plan for Rationalisation and Cost Reduction in ICT in the Public Administration ("Plano global estratégico de racionalização e redução de custos nas TIC, na Administração Pública"). The plan seeks, among others, to improve governance mechanisms for ICT in public administration, reduce costs, modernise the administration using ICT, and develop common ICT solutions for different administration sectors. The APD includes a demand-side target to have the use of online public services by the Portuguese converge to the EU average by 2020. Furthermore, it includes a comprehensive set of measures to further improve digital public services dealing with various branches of the administration, namely employment services, justice services, eHealth and smart mobility.

Portugal is one of the leaders in this area and the country's continued investments have borne fruits. Portugal is in a positive path towards public sector modernisation and digitisation by setting itself ambitious objectives and putting forward relevant measures, which should be appropriately funded and followed-up. One of the country's main obstacles to realising the potential of its digital public services is the relatively low usage by citizens; this is partly due to the digital divide in the population. Portugal is however trying to put in place creative solutions to reach out to the disadvantaged (e.g., Citizen's Spot) so that they can also benefit from the country's comprehensive online service offer.

Highlight: Espaços Cidadão (Citizen Spots)

Citizen Spots are locations where services from different administrations are made available at a single point using an internet-connected computer. Each spot has a worker assisting citizens, to show them how to use the online public services at their disposal. In June 2015, 1000 spots were co-located in post offices, municipality halls and other similar places. One goal is to deliver assisted digital services to citizens unfamiliar with eGovernment, or lacking in digital skills, so that they can use eGovernment, and thereby contribute to their own digital inclusion. Another goal is that citizens learn from the assisted experience and become autonomous users of these services.

Europe's Digital Progress Report (EDPR)

A report complementing the Digital Economy and Society Index (DESI)[1] country profile

ROMANIA

Romania ranks 28th out of the 28 EU Member States in the European Commission Digital Economy and Society Index (DESI) 2016[2]. However Romania is part of the **catching up[3]** cluster of countries: although it has performed below EU average, it has progressed faster than average over the last year. The dimensions driving the strongest growth are human capital and digital public services. Romania has made good progress but since it is the lowest performing state in the EU, it has significant unexplored potential for growth.

The Romanian government adopted the National Strategy for Romanian Digital Agenda 2020[4] last year. The strategy sets out the following targets for 2020: at least 80% of broadband coverage (with speeds of more than 30Mbps); at least 60% of Romanians using the Internet regularly; at least 30% of Romanians trading on line and at least 35% of Romanian citizens using e-Government systems.
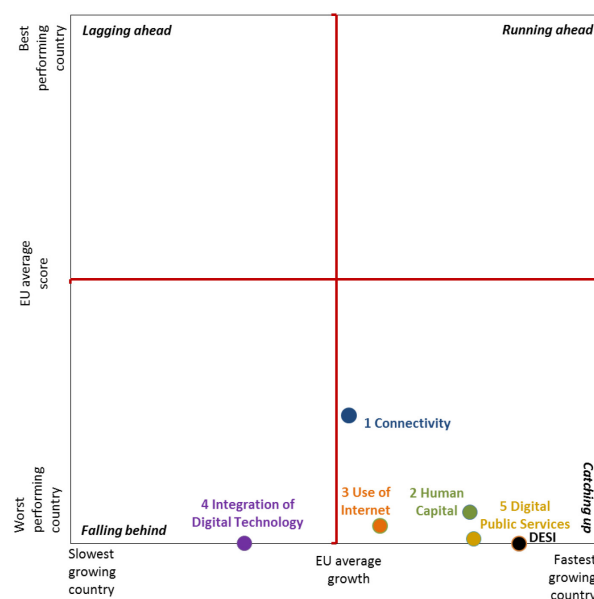
Romania's performance in the five DESI dimensions relative to other EU countries

1 – Connectivity

In Connectivity, Romania's performance is below the EU average but it's making average progress. Romania retains its ranking for fixed broadband coverage of households, still amongst the lowest (26th) in the EU. 89% of households are covered compared with the EU average of 97%. Coverage of next generation access (NGA) network (with speeds of more than 30Mbps) however is at 72% of homes covered, similar to the EU average. In terms of take-up, the number of subscriptions to fast broadband is among the highest in the EU (63% of fixed broadband subscriptions are above 30Mbps as opposed to only 30% in the EU). Moreover, in view of the high level of infrastructure competition, Romania decided to deregulate markets 3a and 3b of the 2014 Recommendation (Wholesale local access and Wholesale central access), a first in the EU. In terms of the take-up of fixed broadband subscriptions, despite progress, Romania is still among the lowest in the EU. The reasons for the low take-up might be the low levels of digital skills of the population and the broadband subscription price which, although low in absolute terms, is one of the highest in the EU relative to the income of a Romanian citizen. Another reason might be the low level of development of digital public services.

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[1] The Digital Economy and Society Index (DESI) is a composite index developed by the European Commission (DG CNECT) to assess the development of EU countries towards a digital economy and society. It aggregates a set of relevant indicators structured around 5 dimensions: Connectivity, Human Capital, Use of Internet, Integration of Digital Technology and Digital Public Services. It clusters countries in four groups: Running ahead, Lagging ahead, Catching up and Falling behind. For more information about the DESI please refer to https://ec.europa.eu/digital-single-market/en/desi

[2] DESI Country Profile for Romania: https://ec.europa.eu/digital-single-market/en/scoreboard/romania

[3] Other catching-up countries are Cyprus, Croatia, Italy, Latvia and Slovenia

[4] "Strategia Națională privind Agenda Digitală pentru România"

Europe's Digital Progress Report (EDPR)

Access to ICT services consequently remains uneven among the population with big gaps especially in rural areas. Mobile broadband take-up is also below the EU average (59 as opposed to 75 subscribers/100 people).

Efforts to boost national investments in broadband are continuing according to the "National Strategy for Romanian Digital Agenda 2020," which sets the targets for 2020: 100% households fixed broadband coverage, 80% households over 30 Mbps broadband coverage and 45% households connected with subscriptions over 100 Mbps. In view of these targets the allocation of European Structural and Investment Funds for sustaining high-speed broadband networks covers only a relatively small part of the investment needed, estimated to be between €3.1 and 5.5 Billion. The Romanian Operational Programme Competitiveness (2014-2020) earmarked €100 Million from the European Regional Development Fund (ERDF) while the Operational Programme Rural Development (2014-2020) allocated €35 Million from the European Agricultural Fund for Rural Development (EAFRD). A decision should be taken by the Romanian authorities on more efficient investment models for broadband roll-out and a list of priority investments in this area should be established.

Meanwhile, the administrative capacity to prepare and deliver ICT projects under existing EU, national or regional strategies should be reinforced as well as horizontal and vertical cooperation between relevant authorities and stakeholders. The experience of the 2007-2013 programming period shows that only €15 Million was absorbed from €69 Million ERDF funds while €10 Million from EAFRD had to be reallocated for other purposes. In addition the Romanian authorisation system imposes a very cumbersome procedure that generates long delays in the deployment of broadband infrastructure for those operators who abide by it. Romania still has to transpose the Cost Reduction Directive[5] which could help to reduce the infrastructure gap and bring more clarity in this regulatory field.

2 – Human Capital

In Human capital, Romania's performance is below the EU average but it's making good progress. Despite the existence of many skilled Romanian ICT specialists digital skills in the overall population and in the workforce are among the lowest in the EU. Half of Romanians are regular internet users (52%) compared with 76% in the EU and one third (32%) of Romanians have never used the internet at all (vs 16% in the EU). Digital skills in the population are the lowest in the EU with only 26% of Romanians possessing above basic levels of digital skills (vs 55% in the EU). Romania performs relatively well in terms of science, technology and mathematics (STEM) graduates, with 1.7% of Romanians aged 20-29 years old holding a STEM degree. While positive, this is not enough to compensate for Romania's digital skills deficit which is further increased by many ICT specialists leaving the country to work abroad.

Romania's digital strategy ("Strategia Națională privind Agenda Digitală pentru România") includes actions aimed at improving the digital skills of the population. A Romanian National Coalition for Digital Jobs was launched in the context of the Grand Coalition for Digital Jobs[6] initiative of the European Commission but with few stakeholders involved. Since 2007, there have been various projects funded by Structural Operational Programmes – mostly for human resource development (POS DRU), enabling ICT qualification improvement of persons occupied in various sectors, including administration, education, transport and agriculture. Using ICT in education and training has become a priority for teacher training programmes in Romania and a large-scale ICT infrastructure has been

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[55] Directive 2014/61/EU of the European Parliament and of the Council of 15 May 2014 on measures to reduce the cost of deploying high-speed electronic communications networks (OJ L155, 23 May 2014, p. 1)
[6] https://ec.europa.eu/digital-single-market/en/grand-coalition-digital-jobs

installed. Since 2012, ICT has been an optional subject in the national curriculum for primary education.

The involvement of more stakeholders and a more active role for government could strengthen the impact of the national coalition.

3 – Use of Internet

In the use of Internet services Romania' performance is below the EU average but it's making progress as more and more Romanians are using Internet services. The use of social networks has shown the highest increase but Romanian Internet users are reluctant to make on-line transactions, like on-line banking (10%) and online shopping (18%), suggesting distrust of the online environment. Having said that, the share of Internet users engaging in online shopping is increasing.

To tackle these challenges, the Ministry of Communications and for Information Society has initiated an EU-funded project[7] that aims in particular to develop and streamline eCommerce by analysing the current normative framework and propose improvements. The main concerns addressed through this project are: distrust in online services, the lack of a proper legal framework to manage potential legal conflicts between companies and consumers, and other concerns related to encrypted communications and payments.

4 – Integration of Digital Technology

In Integration of digital technologies by businesses Romania's performance is below the EU average and its progress is limited. Consumer and retailer confidence in domestic online transactions is low and thus the potential of online transactions (such as eCommerce) is still largely untapped.

Romania has since 2001 offered a fiscal incentive for ICT specialists. This policy has attracted many IT companies to invest in Romania and retained ICT specialists to stay in the country and start their own companies. There are hopes for a new generation of entrepreneurs. A strong culture of programming, innovation and incubation is emerging. Universities in Bucharest, Timișoara, Cluj-Napoca, Iași and Constanța provide a regular source of talented people and drive tech innovation. The Romanian start-up ecosystem now boasts numerous incubators, co-working spaces and dedicated events to help emerging entrepreneurs[8].

Strengthening the enforcement capacity of consumer protection authorities would ensure that rules are better enforced, also in the digital world, and thus increase trust in online transactions. National start-up figures are modest, but growing. However there are barriers to business growth including a lack of start-up funding, bank lending and equity investment, as well as a relatively small domestic consumer market.

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[7] http://www.comunicatii.gov.ro/proiectul-ecom/
[8] Startup Manifesto Policy Tracker, Track progress in Romania http://www.europeandigitalforum.eu/startup-manifest-policy-tracker/country/RO

5 – Digital Public Services

In Digital public services, Romania's performance is below the EU average but it's making good progress. Romania has progressed mainly on the supply side by promoting an Open Data policy; but the use of eGovernment services remains the lowest in EU28 with only 8% of users interacting with the public authorities by returning filled forms.

In Romania, digitisation of public administration has been slow and fragmented. There is room for improvement in re-using information across administrations to make life easier for citizens. A positive sign is that the Government made one of its priorities to support interoperability and provision of better digital services at national level. An important project[9] is in progress until July 2016 and will recommend a strategy to align and integrate ICT resources within the Romanian government and provide the policy and technical recommendations to adopt a Romanian Government Enterprise Architecture and Interoperability Framework. Another initiative launched this year is an on-line platform to consult with citizens and businesses on how to simplify interaction with the public administration ("Comisia de tăiat hârtii" http://maisimplu.gov.ro/). This initiative will help identify ways to simplify the administration and to devise user friendly solutions together with users. Another positive sign is that Romania has at its disposal for eGovernment projects an allocated sum of €213 Million in the 2016-2020 Programming Period.

Using various platforms and funding mechanisms, the EU contributes to the sharing of best practices between EU Member States. For instance through the Joinup platform https://joinup.ec.europa.eu/ the ISA progamme: http://ec.europa.eu/isa/ and the Connecting Europe Facility (CEF) https://ec.europa.eu/cefdigital.

Highlight: The special committee designed to cut red tape ("Comisia de tăiat hârtii")

The Romanian Government launched on 24 February 2016 an initiative aimed at identifying ways of reducing bureaucracy in the public administration through suggestions from the general public via an on-line platform (http://maisimplu.gov.ro/). The government wants an institution to ask only once for information from a citizen and to make public institutions capable of electronically transferring information between themselves. The initiative is also looking to remove cumbersome documents and procedures. The initiative has attracted thousands of suggestions for simplification.

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[9] Romania`s Enterprise Architecture and Interoperability Framework Technical Assistance (RGEAIF)

Europe's Digital Progress Report (EDPR)

A report complementing the Digital Economy and Society Index (DESI) [1]*country profile*

Slovenia ranks 18 out of the 28 EU Member States in the European Commission Digital Economy and Society Index (DESI) 2016[2]. Slovenia is part of the **catching up** countries cluster[3]: countries who score below the EU average but whose score grew faster than that of the EU as a whole compared with 2015. The Integration of Digital Technologies by the business sector is the dimension where Slovenia made most progress. However Slovenian citizens are not very active when it comes to private use of Internet and use of e-government services. Nevertheless Slovenia benefits from a digitally skilled population. Slovenia ranks low in the use of Digital Public Services and access to open data. There exists a gap between the fine potential of its human resources and the take-up

Slovenia's performance in the five DESI dimensions relative to other EU countries

of digital services. Slovenia will benefit from improved supply of e-services and content.
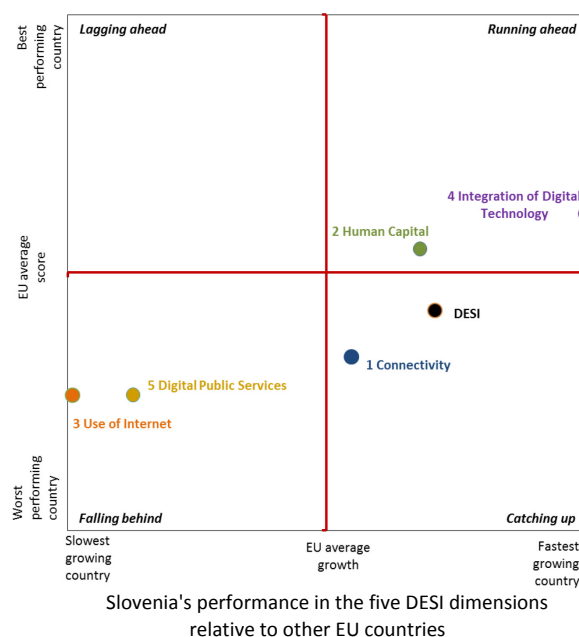
In terms of broadband connectivity Slovenia has made some progress; but further improvements are needed. In March 2016, the Slovenian government adopted Digital Slovenia 2020, comprising the Development Strategy for Information Society 2020; the Development Plan for Next Generation Networks; and the Cybersecurity Strategy. Digital Slovenia 2020 is a horizontal national strategy (Digital Strategy) building on the Europe 2020 Strategy, the Digital Agenda for Europe and the Digital Single Market Strategy. Slovenia has provided updated information on projects and measures adopted in late 2015[4].

1 – Connectivity

In terms of connectivity, Slovenia's performance is below the EU average, but it is making progress.

Fixed broadband is available only in 84% of Slovene rural areas which is significantly below the 90,6% EU average for rural broadband. Also Slovenia is well below EU average as far as the take-up of both mobile broadband (50% of subscribers against 75% EU average) and fixed fast broadband above 30

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[1] The Digital Economy and Society Index (DESI) is a composite index developed by the European Commission (DG CNECT) to assess the development of EU countries towards a digital economy and society. It aggregates a set of relevant indicators structured around 5 dimensions: Connectivity, Human Capital, Use of Internet, Integration of Digital Technology and Digital Public Services. It clusters countries in four groups: Running ahead, Lagging ahead, Catching up and Falling behind. For more information about the DESI please refer to https://ec.europa.eu/digital-single-market/en/desi

[2] DESI Country Profile for Slovenia: https://ec.europa.eu/digital-single-market/en/scoreboard/slovenia

[3] Other catching up countries are Spain, Italy, Latvia, Romania and Croatia

[4] DIGITALNA SLOVENIJA 2020 Strategija razvoja informacijske družbe do leta 2020 http://www.mizs.gov.si/si/delovna_podrocja/direktorat_za_informacijsko_druzbo/digitalna_slovenija_2020/ -

Mbps (21% against 30% EU average) are concerned. However, Slovenia is ranked at the EU average for individuals actually using a mobile phone or smart phone to access the internet via 3G (42,5% of population). Furthermore, there was a significant increase in high-speed broadband subscriptions compared with last year (21% v 10%); and Slovenia has a relatively good NGA coverage of 79% of Slovenian households which is significantly higher than the EU average of 71%. Different aspects can be seen as factors which contribute to the low take-up, ranging from those related to the limited demand for high speed internet, and high prices for fast broadband. Note that Slovenia has higher prices than EU average for speeds of 30 – 100 Mbps and it is the second most expensive for speeds above 100 Mbps. In terms of internet use, Slovenia ranks 24th among Member States (lower than EU average).

A major challenge for Slovenia is to make further improvements to ensure better broadband connectivity in rural areas. In March 2016, Slovenia adopted a new National Broadband Plan. It sets new coverage targets to be achieved by 2020, with a planned 96% of households to be connected with broadband speeds of at least 100 Mb/s and the remaining 4% of households connected with speeds of at least 30 Mb/s. As next steps for the implementation of this strategy, Slovenia will test market interest to provide access to broadband speeds of at least 100 Mb/s and should then establish a list of planned investments along with a description of the prioritisation of investments in areas affected by market failure. According to the National Broadband Plan, 355 million EUR should be invested to reach the broadband targets that the plan sets. The plan foresees public funding, mostly European, amounting to € 72,5 EUR Million, and private funding of € 292,5 Million. Slovenia still has to fully transpose the Cost Reduction Directive, which could help to to speed up broadband roll-out[5].

2 – Human Capital

Regarding human capital, Slovenia is making good progress and performing well. Slovenia still has a relatively low percentage of regular Internet users (71%, below the EU average of 76%). Slovenia has a good position regarding the share of ICT specialists in the workforce (4,8%, well above the EU average of 3,7%) and in the share of STEM (Science, Technology and Mathematics) graduates, where Slovenia is above the EU average and ranks 9th among EU Member States. Nevertheless, Slovenian companies still find it difficult to recruit ICT professionals as the young, educated and foreign language-speaking generation of Slovenian STEM graduates is very mobile. The development of digital skills and the raising of digital awareness are already well embedded in the whole education cycle,from kindergarten to university, and in the later stages of lifelong learning measures. Slovenia has announced complementary measures to the formal education cycle. Several stakeholder and public financed, bottom-up initiatives exist for lifelong learning, typically improving competences of already ICT-aware citizens, those who are employed or better educated.

The development of digital skills and digital awareness are two cornerstones of Slovenia's recently adopted Digital Strategy. Slovenia has announced in its Digital Strategy the setting-up of a Slovenian Digital coalition bringing together stakeholders in the development of the digital economy and digital jobs. Slovenia announced measures to provide vocational training to less educated and less skilled labour force segments above 45 years of age. Slovenia has earmarked € 11 Million in the period 2016

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[5] Directive 2014/61/EU of the European Parliament and of the Council of 15 May 2014 on measures to reduce the cost of deploying high-speed electronic communications networks (OJ L155, 23 May 2014, p. 1)

- 2019 for financing training programmes primarily aimed at increasing digital competences among the labour force.

In Slovenia the younger generations benefit from the development of digital skills during the existing formal education process. Lower levels of ICT awareness and digital literacy among certain population segments - the older generation, people living in rural areas, less skilled workers - limit the use of internet, including for example e-government services. Computer literacy- and e-inclusion of citizens living in rural areas, unemployed, less educated or older citizens remain a challenge for which EU co-financing could be used as a complementary resource.

3 – Use of Internet

In terms of Use of Internet, Slovenia is performing below the EU average and has not progressed since last year. Compared with the previous year, Slovenian Internet users are less keen to engage in "private" Internet activities such as reading news online and the use of Social Networks. On the contrary, there has been an uptick in "commercial" Internet activities such as: banking and shopping transactions. The Digital Strategy foresees measures to enhance the use of Slovenian in the digital environment; these will contribute to the take-up of demand for digital content. Further take-up is expected in future due to measures on the supply side that continue to be introduced successively. For example, eGovernment services with new features were introduced in autumn 2015 and more relevant eContent is now available).

4 – Integration of Digital Technology

In terms of Integration of digital technologies Slovenia is performing well and is making solid progress. This is the dimension where Slovenia performs best. In particular progress was made in eInvoicing and SMEs selling online cross-border. In terms of Electronic Information Sharing, Social media and Cloud computing Slovenia is slowly progressing. Slovenian SMEs take advantage of on-line commerce. 16% of SMEs in Slovenia sell online, mirroring the 16% EU average, and make 15% of turnover, compared with the 9,4% EU average.

Digital Slovenia 2020 comprises references to the digitisation of business and Industry 4.0. However, there exists no sector specific business-led Industry 4.0 strategy.

Most private business sectors and especially SMEs seem to be on right track towards integrating digital solutions rapidly into their production processes, business models and distribution channels. In addition to already existing "bottom-up" initiatives (OpeningUp Slovenia, Slovenian Internet Forum) new stakeholder initiatives fostering the digitisation across the industry have been announced. Slovenia has no specific policies aimed at stimulating eCommerce and has not introduced any specific and targeted fiscal breaks for investment in digital.

In Slovenia eInvoices became mandatory in all transactions with the public administration in January 2015. It is expected that the mandatory use of eInvoices in dealing with public administration and promotion of opt-in use of eInvoices - for example for household billing in the utility sector - will drive up the adoption of eInvoices in other areas.

5 – Digital Public Services

Europe's Digital Progress Report (EDPR)

In terms of Digital Public Services, Slovenia is performing below the EU average and has not progressed since last year. The number of eGovernment users went down by 5%. Slovenia is according to data available in 2015 performing well below the EU average in terms of access to Open Data, however new functionalities and ePublic services made available in the last months of 2015 are expected to contribute to the take-up of ePublic services. Only the completion of online services improved and is now above the EU average.

Slovenia is seriously lagging behind in the introduction of an efficient eProcurement system covering all stages of the procurement cycle.

Recently a new eGovernment portal (eUprava) with improved interoperability, covering among other things life events and transactional procedures with pre-filled forms on-line was launched. eUprava is designed to be user-friendly, simple to use and offers access to more than 30 public registers.

The Digital Slovenia 2020 Strategy foresees the roll out of e-government services by 2020 on all levels of government. Additionally, the Digital Strategy addresses introduction of digital solutions in the judiciary. The strategy introduces a "digital by default" principle. The Digital Strategy also includes measures enhancing open data policy. Digital Slovenia 2020 refers to the development of various key enablers for access and interoperability to eGovernment services, such as eIdentity, eAuthentication, eSignature and eDelivery.

It is expected that the recently adopted legislative changes implementing the Directive on the re-use of public sector information (Directive 2003/98/EC) as well as the already publicised completion of a national interoperability platform will improve access to and re-use of public sector data.

The improved availability and wider scope of available e-public services; the successive opening of public registers; the introduction of key-enablers for eAuthentication, and the use of digital public services are all expected to increase in Slovenia in future.

Highlight: ePrescriptions

Slovenia informed the European Commission about recent progress in e-health. Building on its tradition of introducing new solutions using a big-bang changeover, Slovenia rolled out e-Prescription and e-Referrals in October 2015. By December 2015 all general practitioners in Slovenia were using e-Prescriptions, taking the country from 0% to 100% usage in just a few weeks. The Slovenian preference for big-bang changeovers compensates for delays that accumulate during the long process of consensus-building, decision-making, planning culminating with lengthy procurement procedures. The success of the approach can serve as a good example.

Europe's Digital Progress Report (EDPR)

Europe's Digital Progress Report (EDPR)

A report complementing the Digital Economy and Society Index (DESI) [1] *country profile*

SLOVAKIA

Slovakia ranks 21st out of the 28 EU Member States in the European Commission Digital Economy and Society Index (DESI) 2016[2]. Slovakia is part of the **falling behind**[3] cluster of countries: it performs below EU average, and overall the country has developed at a slower pace than the EU. The Use of Internet dimension is where Slovakia made most progress and Slovaks have a good level of digital skills. The sophistication of digital public services is expected to improve, driven by recent initiatives in the public sector. There is some potential for improved integration of digital technology by businesses and improved connectivity.

Slovakia's performance in the five DESI dimensions relative to other EU countries
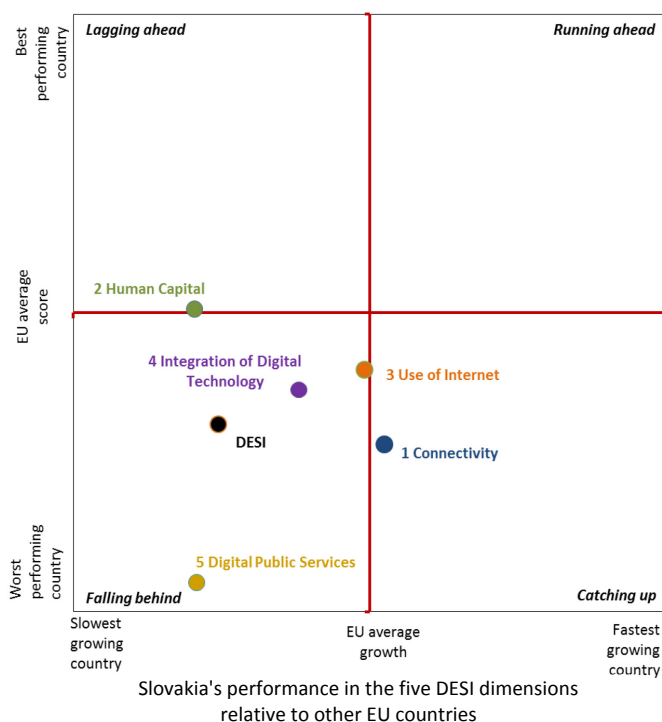
1 – Connectivity

In Connectivity, Slovakia's performance is below par but the country is making some progress. Fixed broadband networks are still not available to 14% of households in Slovakia, which contrasts strongly with the EU average of 3%. 67% of households have access to fast broadband networks providing at least 30 Mbps, lagging behind the EU average of 75% still. 4G mobile broadband is available only to 61.2% of households, which is far behind the best performers and well below the EU average of 86%. Similarly, mobile broadband take-up at 63.4% is trailing behind the EU average of 75.3%. The main challenge for Slovakia in this area is thus ensuring a better coverage of broadband networks and in particular in rural areas.

Given the significant delays and underspending of the public funds allocated to broadband deployment in the previous financial programming period, a concerted effort by all public institutions involved will be necessary to ensure successful execution of the revamped national broadband project (where €97.75 million are currently earmarked for broadband deployment) and to avoid further time delays. Completion of the assignment process for all harmonised frequency bands would

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[1] The Digital Economy and Society Index (DESI) is a composite index developed by the European Commission (DG CNECT) to assess the development of EU countries towards a digital economy and society. It aggregates a set of relevant indicators structured around 5 dimensions: Connectivity, Human Capital, Use of Internet, Integration of Digital Technology and Digital Public Services. It clusters countries in four groups: Running ahead, Lagging ahead, Catching up and Falling behind. For more information about the DESI please refer to https://ec.europa.eu/digital-single-market/en/desi

[2] DESI Country Profile for Slovakia: https://ec.europa.eu/digital-single-market/en/scoreboard/slovakia

[3] Other "Falling behind" countries are Bulgaria, Cyprus, the Czech Republic, France, Greece, Hungary and Poland.

also help foster broadband connectivity as well as quality of the services offered. Finally, Slovakia still has to fully transpose the Cost Reduction Directive[4] which could help to speed up broadband roll-out.

2 – Human Capital

In human capital, Slovakia's performance is on a par with EU average but its progress over the last year is limited.

The share of manufacturing in employment in the Slovak economy is one of the highest within the EU. However, with automation and process optimisation, the number of manufacturing jobs will be declining. It is estimated that labour substitution could put at risk up to 55% of all jobs in Slovakia.[5]

In cooperation with academia, education and training providers, the Smart Industry for Slovakia strategy intends to develop a more appropriate, anticipatory and interdisciplinary curriculum at all educational levels. It is considered crucial to bring universities closer to business and industry; and large enterprises and leading industries should take an active role in the education process. Education in fields such as eLeadership, IoT, computing science, coding, digital skills and STEM subjects should be brought to the centre of educational objectives at all levels.

3 - Use of internet

In use of Internet services, Slovakia's performance is slightly below EU average, but Slovakia is making good progress. Slovakian Internet users engage in a broad range of online activities. Uptake of online banking services is stagnating whilst online shopping and the Use of Social Networks are growing.

4 – Integration of Digital Technology

In Integration of digital technologies by businesses, Slovakia's performance is below par, but it is making progress. Slovakia's enterprises are slowly progressing in the take up of eBusiness solutions and the eCommerce sales channel is gaining importance in terms of turnover.

Since 2009, when establishing its "Manufacture SK" policies, Slovakia has been supporting innovation across its industries. This is all the more important since the industry share of GDP is very high (in 2014 amounting to 23.2% of which 19% manufacturing, mostly in traditional industries). Manufacturing's share of employment in the Slovak economy is one of the highest within the EU. The Slovakian Ministry of Economy recently established the Smart Industry for Slovakia Strategy. It focuses on recommendations on the following areas: awareness raising and collaboration, Future driven research, smart factories and manufacturing, access to finance, labour market, education and skills, future-proof regulation and smart government. The strategy proposes to establish *Slovakia's Smart Industry Platform* as the governing body of Smart Industry, an interdisciplinary expert working group consisting of key stakeholders and government authorities. By the end of 2016 the platform should establish a concrete, industry-specific Action Plan.

Given the importance of the Slovakian manufacturing sector, the timely and coordinated implementation of the Smart Industry for Slovakia Strategy is important for Slovak industries. The coordination of funding mechanisms will contribute to a successful implementation of the strategy .

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[4] Directive 2014/61/EU of the European Parliament and of the Council of 15 May 2014 on measures to reduce the cost of deploying high-speed electronic communications networks (OJ L155, 23 May 2014, p. 1)

[5] Smart Industry for Slovakia (Ministry of Economy, page 12) http://media.wix.com/ugd/300c03_cb20568414e74f7e8cbe0eda6687a055.pdf

5 – Digital Public Services

In Digital public services, Slovakia's performance is below par and is progressing only slowly. Use of eGovernment remains one of the lowest in the EU28.

Slovakia devised a national concept of eGovernment back in 2008. In 2015 this was updated (National Concept of eGovernment 2015 2020) and is now built around a vision of an innovative and open state that provides citizens and businesses with user-friendly and easy to use services, while at the same time meeting future challenges. On that basis, strategic priorities were defined such as: better customer-oriented e-services that interactively deal with life events; approaching data as a valuable national resource and a strategic asset (data driven state); data ownership; data sharing with creative communities and businesses; better usage of data in the policy-making and regulatory process; a central integration platform that will lead to a common data layer of eGovernment; cloud security across all layers of the enterprise architecture (a business, application and technology layer); and efficient IT operations in the eGovernment cloud.

Slovakia is planning to invest EU Structural and Investment Funds in the development of electronic services for citizens and businesses, covering complex life events, cross-border interoperability and increasing the availability of government data through open data. At the same time, public administrative reform will be supported through ICT, including the further extension of the government cloud (see the Operational Programme Integrated Infrastructure)[6].

At the end of 2015, under the previous Structural Funds Operational Programme for the Information Society, Slovakia implemented a new concept of eGovernment. Nowadays, citizens and entrepreneurs can use more than 800 electronic services, including registration of permanent and temporary addresses, applications for social allowances, vehicle registration and submission of tax and customs declarations. In the area of local government, the innovative cloud project "Data centre for municipalities" was introduced, providing software-as-a-service to more than 50% of all Slovak municipalities. These digital services are built around key enablers, including a central public administration portal, an electronic identity card and basic registries. To provide easy access to electronic services, the Central Public Administration Portal www.slovensko.sk has been set up.

This strategy has had some impact: by the end 2015, 28 % of all Slovaks had eID cards with secure electronic signatures; more than 600,000 electronic vehicle registrations are issued per year; and according to the Slovak authorities, more than 6.5 million tax declarations are now submitted electronically.

With www.slovensko.sk and the National Concept of eGovernment, Slovakia is making good progress in Digital Public Services.

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[6] Ministry of Finance of the Slovak Republic

An eGovernment policy in the spotlight

In November 2015, the municipality project DCOM (Municipal Data Centre) was nominated in the category Best Cloud Service for Vertical Markets during the EuroCloud Country Awards 2015 – Finding Europe's best Cloud Services. DCOM is a national project aimed at digitising public administration and the development of electronic services on a local and regional level. It is designed to facilitate the digital conversion of service provision by local authorities and raise the standard of services, while greatly reducing the administrative burden on citizens, businesses and local governments.

DCOM, which is being developed by a consortium of companies, will provide services to an estimated 1500 towns and villages. At present, over 1100 are already affiliated to the project.

DCOM provides town and villages with a tool that lets them deal with their policy agendas and offer services to citizens and companies electronically. This primarily concerns 138 key duties that local governments administer. For villages, DCOM will secure the operation of all other information systems.

As part of the project, a suite of software solutions is being created that will be provided to municipalities as "software as a service". The project also includes the supply of necessary IT equipment for municipal offices, with subsequent maintenance and also training of users. The municipalities will therefore obtain a complex package of services, new technical equipment and professional IT support, covering all their needs, which unburdens them from caring for their IT. Responsibility for operation of the systems, their updating, security and legislative compliance, will remain with the operator of the data centre that provides the services.

Europe's Digital Progress Report (EDPR)

A report complementing the Digital Economy and Society Index (DESI) [1] country profile

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FINLAND

Finland ranks 4th out of the 28 EU Member States in the European Commission Digital Economy and Society Index (DESI) 2016[2] (see Annex). Finland belongs to the cluster of countries with high scores but slow improvements called **lagging ahead**[3]. In the Digital Public Services dimension Finland is progressing faster than average despite an already high starting level. Finland is displaying very high connectivity, but very slow fixed broadband take-up compared with other countries; however, performance in mobile broadband is excellent. Finland's comparatively slow improvement in digital skills mostly reflects the very high scores already achieved and the success of other countries in catching up. The Use of

Internet and the Integration of Digital Technologies are both advancing roughly at EU average rates. All in all, Finland is a world leader in digitisation[4].
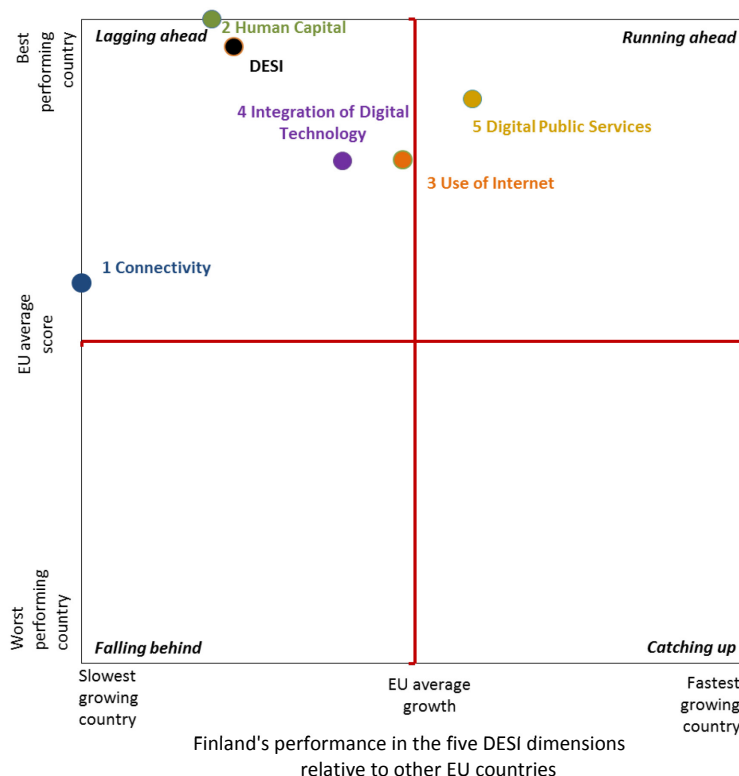
1 – Connectivity

In Connectivity, Finland's performs relatively well. Fixed broadband is available to 97% of Finnish homes, which is remarkable given the geographical characteristics of the country. Nevertheless, fixed broadband take-up decreased and is among the lowest in the EU (59%) and NGA coverage did not progress (still at 75%), although fast broadband subscriptions increased by 4 percentage points (reaching 31%), slightly above the EU average. One of the reasons for the relatively low figures in terms of fixed broadband take up is the excellent performance in mobile broadband. Finland leads the ranking in mobile broadband take-up with quite a distance (139 subscriptions per 100 people compared with 114 for Sweden and 112 for Denmark) and is not far away from twice the EU average.

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[1] The Digital Economy and Society Index (DESI) is a composite index developed by the European Commission (DG CNECT) to assess the development of EU countries towards a digital economy and society. It aggregates a set of relevant indicators structured around 5 dimensions: Connectivity, Human Capital, Use of Internet, Integration of Digital Technology and Digital Public Services. It clusters countries in four groups: Running ahead, Lagging ahead, Catching up and Falling behind. For more information about the DESI please refer to https://ec.europa.eu/digital-single-market/en/desi

[2] DESI Country Profile for Finland: https://ec.europa.eu/digital-single-market/en/scoreboard/finland

[3] Other lagging ahead countries are: Belgium, Denmark, Ireland, Lithuania, Luxemburg, Sweden and the UK.

[4] I-DESI https://ec.europa.eu/digital-single-market/news-redirect/31457

Europe's Digital Progress Report (EDPR)

Finland has nevertheless taken action to address the gap in broadband coverage: a range of local projects have been implemented to expand coverage, with the necessary middle-mile backhaul segments, in order to ensure that every household is located within 2km from a fibre access point, in line with the Finnish broadband strategy; moreover, the state aid plan for scarcely populated areas has been prolonged until 2019 following clearance by the European Commission. Finally, an existing broadband Universal Service Obligation has been upgraded in 2015 to ensure at least 2Mbps capacity. The take up of broadband could also benefit from finalisation of the Ministry's recent plans for measures to create an innovative business environment for digital service platforms and ecosystems and to increase the private sector's business possibilities in many sectors by promoting availability of fast broadband connections. Finland still has to fully transpose the Cost Reduction Directive,[5] which could help to speed up broadband roll-out.

2 - Human Capital

Finland has performed very well in previous years, which helps to explain its below average progress over the last year. While Finland's score is already way above the EU average in terms of regular Internet users (91% versus 76%), basic digital skills (75% versus 55%) and STEM (Science, Technology, Engineering and Mathematics) graduates (22 versus 18 per thousand), it is the share of ICT specialists which really distinguishes Finland from all other EU Member States. With 6.7% this share is close to twice the EU average. It is unrealistic to expect this share, which is partly due to the importance which Nokia played in the Finnish economy in the past, to grow rapidly further.

Although basic ICT skills are fairly widespread in Finland, there are still people without them. Thus, reaching out to these people and ensuring ICT skills for everyone remains a priority for Finland. A new curriculum reform will take place in 2016. ICT competence is one of the seven broad-based competences defined in the new core curriculum that will enter into force in 2016. The use of ICT is systematically embedded throughout the 9 years of general basic education, in different subjects, for integrative/thematic studies, and other forms of school work.

Finland appears to be very well placed to face the rapid technological change which makes occupation-specific knowledge and skills quickly obsolete. It is proactively deploying a policy to combine foundation skills like literacy, numeracy and digital skills with generic skills like the ability to cooperate and structure one's time.

3 - Use of Internet

Using the Internet to get news and manage bank accounts is nearly universal in Finland, indicating a high level of trust in the online environment. Three quarters of Finns also use it to shop and to get music, videos or games, as one would expect in a digitally very advanced country like Finland. However, when it comes to video on demand or video calls, Finland is at low in the EU ranking.

4 - Integration of Digital Technology

In Integration of digital technologies by businesses, Finland performs relatively well, with average progress. Internationally it is behind only to the US. While Finnish enterprises are enthusiastic users of cloud computing and fairly strong in the use of RFID and social media, they are surprisingly

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[5] Directive 2014/61/EU of the European Parliament and of the Council of 15 May 2014 on measures to reduce the cost of deploying high-speed electronic communications networks (OJ L155, 23 May 2014, p. 1)

reluctant to sell online, even less motivated to sell cross-border, which is counterintuitive for a small country.

Following the decline of Nokia, the government took new measures to diversify the economy, notably though the promotion of innovation and investment in digitisation, biotechnology and clean technologies. One instrument is through research and development and measures aimed at helping new companies; for example, a package of €1.6 billion to fund key projects in 2016-18 will contribute to encourage innovation. Much of the focus has recently been on investing in clean technology products and better use of ICT in manufacturing processes. Other objectives of the current government term are to promote the Internet of Things and to identify promising areas of the platform economy from the Finnish perspective.

In recent years, Finland has increasingly responded to the challenge of encouraging the creation of new companies. Start-up rates have been very low, both before and during the downturn. The share of young companies among small businesses is among the lowest in the EU and the OECD. Furthermore, young firms' growth has been fairly slow on average. This is of particular concern for the ICT services industry, where much of the growth typically comes from newer companies. One way of helping SMEs would be by encouraging them to internationalise further.

5 – Digital Public Services

In Digital public services, Finland performs very well and is still progressing faster than the EU average. On the availability side, Finland now stands at around 90% for re-using information (amount of data that is pre-filled in public services' online forms) and for allowing online service completion, while close to two-thirds of Internet users actually filled in forms online. Digital Public Services are thus one of the strong points of Finland's digital landscape. This reflects partly the high priority which has been given to eGovernment by successive governments. According to the eGovernment Benchmarking report 2015, Finland is also amongst the leading EU countries in the transparency of public organisations[6].

Indeed, digitisation is high on the agenda of the government appointed in May 2015. In the Programme of the Government[7], the goal for the next ten years is that Finland will make a productivity leap in public services and the private sector by grasping the opportunities offered by digitisation, dismantling unnecessary regulation and cutting red tape. According to the Programme, public services are to be primarily digital. As a part of the implementation of the programme, the Prime Minister and the Minister of Local Government and Public Reforms issued an open letter requesting proposals on how to contribute to digitisation. By early August 2015 over 260 proposals from public administration, businesses, NGOs and citizens were submitted as a response to the letter. Some of the proposals will receive funding. Moreover, the Public Sector ICT Department has launched a process for renewing legislation to meet the demands required[8].

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[6] Capgemini et al. for the European Commission, *Future-proofing eGovernment for the Digital Single Market*, eGovernment Benchmarking report, 2015 [available at: https://ec.europa.eu/digital-single-market/news/eu-egovernment-report-2015-shows-online-public-services-europe-are-smart-could-be-smarter]

[7] Available at: http://valtioneuvosto.fi/en/sipila/government-programme
[8] European Commission, National Interoperability Framework Observatory, eGovernment Factsheets 2015 (published in 2016), Finland [https://joinup.ec.europa.eu/community/nifo/og_page/egovernment-factsheets]

With the help of new operating practices, public services will thus become user-oriented and primarily digital. In order to achieve this, a one-stop-shop service model will be developed and the information management legislation reformed. Finally, to make e-government services more widely available, the government is also building a National Digital Services Infrastructure, which will facilitate the introduction of a national common digital identification solution[9].

The policy focus placed by the government on digital public services combined with the widespread availability of network access and the high level of skills in the population make Finland an ideal case for proving the benefits of digitisation for public services. Finland's experiences will be of great interest to the other Member States.

Highlight: ePrescriptions without borders[10]

ePrescriptions now make up over 90% of all prescription services in public and private health care in Finland as well as in Sweden. Joining the Finnish ePrescription Centre is mandatory and, from 2017, ePrescriptions will be the only option available for dispensing medication. A pilot project in the Tornio valley established a functioning cross-border ePrescription service between Finland and Sweden. The pilot project implemented cross-border ePrescription services in four pharmacies in Sweden and three in Finland. The challenges encountered in the project were primarily legal and organisational in nature, though these were overcome by implementing specific amendments to the existing ePrescription laws in both countries

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[9] European Commission, Staff Working Document SWD(2015) 45, Country Report Finland 2015.
[10] FROM INNOVATION TO IMPLEMENTATION, eHealth in the WHO European Region (World Health Organization) http://www.euro.who.int/__data/assets/pdf_file/0012/302331/From-Innovation-to-Implementation-eHealth-Report-EU.pdf?ua=1

Europe's Digital Progress Report (EDPR)

A report complementing the Digital Economy and Society Index (DESI) [1] *country profile*

SWEDEN

Sweden ranks third in the EU regarding digitisation, according to the Digital Economy and Society Index (DESI 2016)[2]. It recorded a high performance on all of the dimensions and falls into the cluster of **lagging ahead** countries[3]. Scoring well above the EU average but with below average growth from the previous year. Sweden faces the challenge of continually improving its already high levels of digitisation in most areas. The dimension where Sweden ranks highest is Use of Internet, while Digital Public Services is the one with the biggest relative weakness. All in all, Sweden is one of the world leaders in digitisation[4].
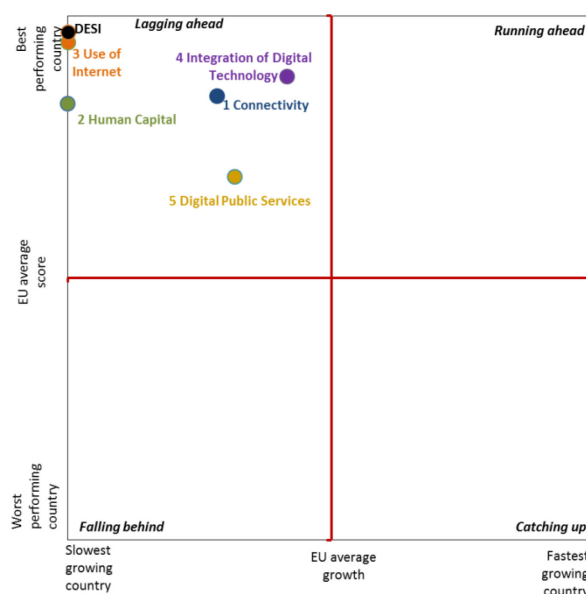
Swedens's performance in the five DESI dimensions

relative to other EU countries

1 – Connectivity

Sweden scores well above EU average on connectivity but saw little progress from the previous year. At international level, however, Sweden's performance is below South Korea and Japan. With fixed broadband available to 99% of homes, there is a strong foundation for the digitisation of society. 4th generation networks and related mobile broadband services are equally available to 99% of homes, thanks to timely spectrum awards and licence terms that favoured market investments and development of LTE networks also in rural areas. Operators have therefore been able to fulfil the increasing demand for wireless services, reflected also by very high mobile broadband take-up and considerable mobile data consumption among swedes.

In rural areas, fixed broadband covered 93.6% of homes, above the EU average of 90.6%, a good result given the geographical configuration of the country. Sweden scores only 18th among MS as regards Next Generation Access coverage, with 76% of homes having broadband capable of providing at least 30 Mbps download (compared with 71% in the EU), lower than its performance in other dimensions. However, newly published data in Sweden indicates a recent increase in NGA coverage. On the other hand there is very good availability and take up of high speed broadband connections above 100 Mbps, due to continual deployment of fibre driven by consumer demand.

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[1] The Digital Economy and Society Index (DESI) is a composite index developed by the European Commission (DG CNECT) to assess the development of EU countries towards a digital economy and society. It aggregates a set of relevant indicators structured around 5 dimensions: Connectivity, Human Capital, Use of Internet, Integration of Digital Technology and Digital Public Services. It clusters countries in four groups: Running ahead, Lagging ahead, Catching up and Falling behind. For more information about the DESI please refer to https://ec.europa.eu/digital-single-market/en/desi

[2] DESI Country Profile for Sweden: https://ec.europa.eu/digital-single-market/scoreboard/sweden

[3] Other lagging ahead countries are Belgium, Denmark, Finland, Ireland, Lithuania, Luxemburg and the United Kingdom.

[4] I-DESI: https://ec.europa.eu/digital-single-market/news-redirect/31457

Fibre investments are now focusing on rural areas and single dwelling units were an increasing part of last mile investments, also financed by consumers. Subscriptions with speeds of 1Gbs are available on the market, approaching the Gigabit connectivity consumer services that characterise the Japanese and Korean markets.

The current broadband strategy[5] was adopted in 2009 with the overarching goal that Sweden should have world-class broadband. The long term objective is to achieve 90 % coverage of households and businesses with 100 Mbps until 2020. Sweden's Government emphasizes the role of private capital and the market in making investments in the network infrastructure and mainly confine its own role to provision of a conducive regulatory and market environment. State aid for deployment of broadband infrastructure with very high speed is available in remote areas where market players are unwilling to invest. The aid is distributed through the two EU-funds: The Rural Development Programme and in the northern part of Sweden also through the European Regional Development Fund.

Swedish municipalities play a crucial role in the development of very high speed broadband infrastructures, by defining local digital strategies, deploying networks and owning fibre-based infrastructure, also with the aim of offering welfare services to citizens, i.e. municipal information, services in education, health and social care over broadband networks. Fibre deployment is also fostered by the policies of municipal housing companies, since they invest in fibre to the apartments, while tenants' associations agreed increased rents for fibred properties with property owners, reflecting the added value of a fibre connection for the end user. Sweden still has to transpose the Cost Reduction Directive[6], which could help to to speed up broadband roll-out.

2 – Human Capital

In DESI 2016, Sweden ranks second on the Human Capital dimension, but has made no progress over the last year. Overall, 89% of Swedish people use the internet and 72% of the population have the basic digital skills that allow them to partake in the possibilities offered by the internet and to benefit from the opportunities offered by a digital society and economy. Furthermore, Sweden also has the second highest number of ICT specialists in its workforce, in European terms. However, demand for ICT professionals outstrips supply. Sweden ranks only 19th when it comes to producing graduates in science and technology and companies report difficulties in recruiting ICT-specialists. At the same time the number of applicants to engineering courses has increased in recent years, which should have a positive future impact on the skills gap.

There is currently no national coalition for digital skills and jobs, or strategy for developing digital skills in Sweden. The Committee for Digitisation, a public inquiry body, has in its last report proposed that the Government should initiate a national cooperation council for the advancement of higher education programmes for digital jobs. In 2015 the Government assigned The Swedish National Agency for Education (NAE) to come up with digital skills development courses for teachers, principals and education providers, propose national ICT strategies for the Swedish compulsory, upper secondary and adult school system, suggest necessary changes in curricula for digital and entrepreneurial skills – including coding – and suggest changes to strengthen innovation and collaboration with the labour market as a part of the education.

In an advanced and highly digitised economy, one of the challenges will most likely be to close the different digital skills gaps. This is already a reality in Sweden, as mentioned demand outstrips supply

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[5] http://www.regeringen.se/rapporter/2009/11/n20098317itp/ (Swedish)
[6] Directive 2014/61/EU of the European Parliament and of the Council of 15 May 2014 on measures to reduce the cost of deploying high-speed electronic communications networks (OJ L155, 23 May 2014, p. 1)

for ICT professionals; the last non-digital part of the population is resistant to become digital; and all jobs are increasingly conducted with some digital elements. If this is left unattended it could hold back further development in the digitisation of the Swedish economy and society.

The initiative for ICT strategies for the school system is a positive step and should help close the digital skills gap in the long run. Given that this work is focused on the formal education system, its outcome will affect those in education at the time and after these actions are taken. There should be further actions targeting those already in the workforce and out of the education system. These actions might or might not be government-initiated, but the potential impact on society if these challenges are left unattended will become an issue for the government. Sweden would benefit from having a multi stakeholder partnership like a national coalition for digital skills and jobs as well as one or several strategies tackling the digital skills gaps both in the short and long term. The latest digital agenda from 2011 did include some aspects of digital skills but most of the actions are outdated now.

> **Highlight: The home PC reform – computers for everyone!** In 1998 a tax reform was implemented so that the cost of a computer provided by an employer to its employees, could be deducted from wages so not subject to income tax, but treated as an employment benefit. In effect, this reduced the cost of a computer by about 30-50% for citizens. The trade unions also had an offer their members the possibility to rent a computer at a favourable price. These initiatives stressed the importance of raising the level of digital skills among all citizens, and aimed at making Sweden one of the leading digital nations in the world. There is no doubt these had a positive effect, although the exact level of impact is difficult to measure and has been somewhat debated. The initiative terminated after about 10 years when Sweden had reached high levels of home access to computers.

3 – Use of Internet

In the Use of Internet Sweden performs second best among the EU countries. A digital economy is partly fuelled by its citizen's activity and consumption online. The Swedish population is actively engaging in a multitude of online services. They read news online (83%), listen to music, watch films and play games online (57%), use the Internet to communicate via video calls (43%) or through social networks (69%), and obtain video content using their broadband connections (49% of households subscribe to Video on Demand). 78% of internet users shop online, but they have a preference for shopping at home, since only 35% of them do so cross border.

4 – Integration of Digital Technology

In DESI 2016, Sweden ranks 3rd among EU countries for business digitisation and eCommerce activities, well above average. Despite slipping down a place from the previous year, its score has improved somewhat, but progress is below EU average. Internationally it ranks behind the US but ahead of South Korea and Japan.

An important source of growth and innovation is digitally based, potentially fast-growing and global companies - Internet startups. The Startup Manifesto[7] tracker monitors the national implementation of 22 actions in the Startup Manifesto to boost digital entrepreneurship and innovation. In adoption of the manifesto recommendations, Sweden ranks below the European average on the dimensions

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[7] The Startup Manifesto was created by the Leaders Club, a group of founders of European technology companies, by invitation of the European Commission in 2013. It contains 22 policy actions to boost entrepreneurship and innovation.

Institutional Framework, Access to talent, Better Access to Capital and Thought Leadership, while above average on Skills & Education and Data Policy and Privacy. Still, Sweden is one of the more successful countries in the world for producing Internet Startups and recently appointed a Startup Director to establish a faster dialogue and feedback between business and politics.

Over the last decade Sweden's approach to digitisation of industry have been somewhat like its approach in broadband – the government's role has mainly been focused on providing good market conditions through only necessary regulation. Recently there have been a few more proactive initiatives launched by the Government to stimulate the digitisation of businesses and entrepreneurship. One of them, the recently announced Smart Industry Strategy,[8] sets out four focus areas to strengthen the ability to cope with the rapid conversion that Swedish industry is now in the midst of.

5 – Digital Public Services

This is where Sweden ranks lowest of all in its DESI 2016 dimensions, still stuck at 7th place in the EU. Modern public services offered online in an efficient manner are a vehicle for reducing spending on public administration as well as for driving efficiency gains in the market. Its indicator score illustrates that Sweden is performing well above the EU average with regard to the implementation of services as well as with the uptake.

In 2015 the Swedish Government announced a four-year scheme to advance digital in government. This was later complemented with a "Digital First" principle, meaning that all agencies should primarily use digital channels to citizens and companies for their service delivery. A national Council for Digital Government was established where the public agencies are represented in order to strengthen the collaboration and enhance agencies implementation. Some public agencies are appointed responsible for coordination of digitisation within special life events and focus areas. The Swedish eIdentifications (eID) are mainly issued by banks in Sweden. More than 7 million Swedish citizens possess an eID which can be used for accessing a variety of public and private services. For 2015 the number of transactions was estimated to be 2 billions.

Swedish citizens have strong access and rights to public information. According to the Swedish Government, this limits the political incentives for open data. Although, there is a government objective that open data should be more readily available and there is currently work undertaken to formulate an open data policy. For eHealth the Government recently presented a new vision in cooperation with the Swedish Association of Local Authorities and Regions. The vision states that Sweden should be the best country in the world for utilising the possibilities of digitisation to achieve good and equal health by 2025.

Overall Sweden is doing well in many of the diverse aspects of eGovernment. On the other hand, compared with other high performing countries, Sweden isn't reaching its full potential in this area. Given the country's leading position in the digital economy and society, a further improvement of eGovernment services could act as a driver for raising technology adoption among companies and citizens.

Europe's Digital Progress Report (EDPR)

A report complementing the Digital Economy and Society Index (DESI) [1] country profile

UNITED KINGDOM

The United Kingdom ranks 6th out of the 28 EU Member States in the European Commission Digital Economy and Society Index (DESI) 2016[2], unchanged from last year. The United Kingdom is in the **lagging ahead** cluster[3] of countries; performing better than the EU average but improving at a slower rate than the EU as a whole. Turning to the individual DESI dimensions, the UK has made most progress over the past year in Use of the Internet. In particular, increases in reading online news, use of video calls and social networking were recorded. Small improvements were also been made in Connectivity, Integration of Digital Technologies and Digital Public Services. The score on the Human Capital dimension fell marginally.[4] However, a significant improvement in the number of STEM (science, technology and mathematics) graduates was recorded. The UK is currently developing a national digital strategy.
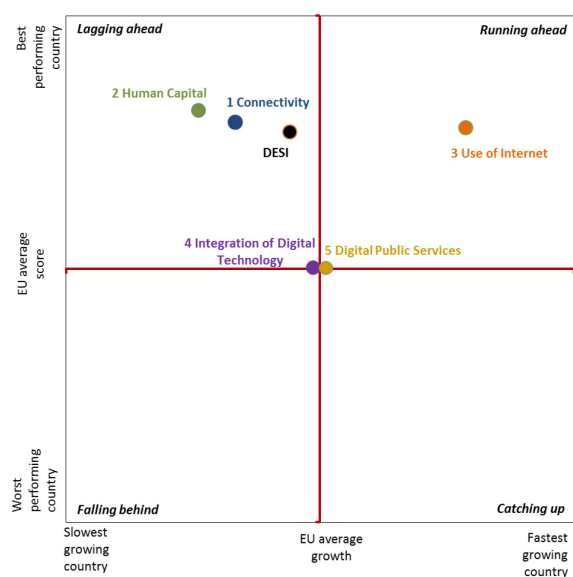
The United Kingdom's performance in the five DESI dimensions relative to other EU countries

1 – Connectivity

In Connectivity, the United Kingdom performs relatively well but recent progress has been rather limited. The United Kingdom performs relatively well in terms of fixed broadband coverage and take-up, having 100% household coverage of fixed broadband and 85% household take-up. In terms of fixed basic broadband, and specifically coverage of rural areas, the United Kingdom performs rather well, as it ranks above the EU average (99.7% versus 90.6%). NGA coverage in the United Kingdom, at 91% of households, is significantly above the EU average (71%). Also take-up of mobile broadband, at 87 per 100 people, is significantly above the EU average of 75 per 100.

The UK is implementing a national broadband strategy to extend broadband to the hardest-to-reach areas in the 'final third' of England, Wales, Scotland and Northern Ireland. Although the programme's definition of 'superfast broadband' is lower than the relevant DAE target (i.e. at least 24 Mbit/s instead of 30 Mbit/s), the UK Government intends to reach its target earlier (i.e. by 2017 instead of 2020). As regards spectrum, the UK has assigned 73% of the overall harmonised spectrum for Broadband and is above the EU average of 69%.

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[1] The Digital Economy and Society Index (DESI) is a composite index developed by the European Commission (DG CNECT) to assess the development of EU countries towards a digital economy and society. It aggregates a set of relevant indicators structured around 5 dimensions: Connectivity, Human Capital, Use of Internet, Integration of Digital Technology and Digital Public Services. It clusters countries in four groups: Running ahead, Lagging ahead, Catching up and Falling behind. For more information about the DESI please refer to https://ec.europa.eu/digital-single-market/en/desi

[2] DESI country profile for the United Kingdom: https://ec.europa.eu/digital-single-market/en/scoreboard/united-kingdom

[3] Other lagging ahead countries are Belgium, Denmark, Estonia, Finland, Ireland, Lithuania, Luxemburg and Sweden.

[4] Due to the inclusion of the variable on basic digital skills that is missing for last year's index due to comparability issues resulting from a change in the some of the questions used in the indicator.

Europe's Digital Progress Report (EDPR)

Even though the UK performs very well in terms of fixed basic broadband coverage of rural areas, and BDUK programme actions already address the gap in the availability of superfast broadband between urban and rural areas, there is still an opportunity for additional effort in order to bridge the gap. Moreover, there is a need for concrete measures and a roadmap to achieve the UK's ultrafast broadband goal, i.e. that at least 100Mbps should become available to nearly all UK premises[5]. Ofcom's recently announced strategic shift to encourage the roll-out of new ultrafast networks wherever possible, as an alternative to the incumbent BT's network, and requiring BT to improve access to its duct and pole infrastructure, is an important step. The United Kingdom still has to fully transpose the Cost Reduction Directive[6] which could help to speed up broadband roll-out.

2 – Human capital

In Human Capital, the United Kingdom performs very well but its recent progress has been rather limited. A large proportion of the UK population uses the internet regularly (90% - at least once a week); most people do so daily; and only 6% of the population has never used the internet. These figures are well above the averages for the European Union (76% and 16%, respectively). Nevertheless, the UK faces digital skills shortages, particularly at the high end. In terms of basic digital skills, the UK performs above average in the European Union. Indeed the percentage of the population with at least basic digital skills was 67% in 2015, compared with an EU average of 55%. However a third of the population is in effect digitally illiterate. The UK also suffers from a large and growing shortage of skilled ICT professionals. While employment of ICT professionals in the UK has grown significantly in recent years, supply is not keeping pace with demand. Graduate numbers have fallen dramatically over the last decade, more than in other countries, and, despite some recent improvement, have now fallen to 63% of the number recorded for 2003. This effect is exacerbated by an increasing number of retirements and exits. There is also a strong gender divide with very few women studying and choosing ICT careers. While many countries in the European Union face similar challenges, the UK is particularly affected. At around 1.5 million, the UK employs the largest number of ICT professionals in the European Union, accounting for around 5% of UK employment, and demand continues to grow.

The United Kingdom has developed a digital skills strategy[7] in collaboration with industry which it published in October 2014. The strategy addresses three main lines of action: creating new talent, expanding the talent pool, and developing the skills to succeed in new markets. The strategy is being implemented by industry in collaboration with government and other relevant stakeholders. In education, a new computing curriculum was developed with industry and introduced into the school curriculum in September 2014. The curriculum takes a three pronged approach covering learning about how computers function, programming/coding and digital literacy; some universities have rolled out new courses designed to bridge the gap between IT and business. The United Kingdom has an active digital skills coalition in "The TECH partnership"[8] (see box) which functions as the UK's national coalition in the Grand Coalition for Digital Jobs. Basic digital skills are being addressed

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[5] The relevant DAE target is that 50% of the EU to subscribe to broadband above 100 Mbps by 2020.

[6] Directive 2014/61/EU of the European Parliament and of the Council of 15 May 2014 on measures to reduce the cost of deploying high-speed electronic communications networks (OJ L155, 23 May 2014, p. 1)

[7] https://www.thetechpartnership.com/globalassets/pdfs/research-2014/informationeconomydigitalskillsstrategy_oct14.pdf

[8] https://www.thetechpartnership.com/

through the "Go On UK" initiative.[9] These two bodies (the Tech Partnership and Go On UK) are responsible for tracking and reporting on the progress of the digital skills strategy. The UK is reforming the apprenticeship system and has created new degree apprenticeships, including for digital. The UK has set up the Ada National College for Digital Skills, the Institute for Coding and the Digital Business Academy. They are also reviewing accreditation and funding of digital skills and have developed courses on cyber security and IT conversion courses.

The UK is well aware of the digital skills challenges it faces and is making a concerted effort to address them. The UK has developed a comprehensive digital skills strategy. Actions to implement curricula change in schools and introduce new courses in further and higher education are major steps to increase the supply and quality of digital skills, of all levels, in the economy and society. Key to the success of these initiatives will be providing the necessary training and support to teachers to improve their digital skills; breaking down barriers to more female participation in technology related streams of education and careers; and ensuring life-long learning opportunities for learning and up-grading digital skills of all types. In this context, a review of accreditation for digital skills acquired through non-formal and informal means is also welcome.

Highlight: "The TECH partnership"

The United Kingdom has an active digital skills coalition in "The TECH partnership"[10] which is licensed by the UK government as the Sector Skills Council for Business and Technology and which functions as the UK's national coalition in the Grand Coalition for Digital Jobs. It is a coalition of employers (including also a stakeholders' network and a set of Ambassadors, including a significant cohort of MPs), working to "Inspire young people about technology, accelerate the flow of talented people from all backgrounds into technology careers and help companies develop the technology skills they need for the future**."** Together with "Go On UK", the UK initiative on digital inclusion and basic digital skills, the TECH partnership is responsible for tracking and reporting on progress on the UK's digital skills strategy. It is also responsible for the development of the highly successful ITMB course designed to bridge the gap between IT and business and which has spread and been emulated across a number of universities and higher education establishments in the UK.

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3 - Use of Internet

In Use of Internet Services, the United Kingdom is performing relatively well and has also made good progress in the last year. As mentioned above, most UK citizens are now online. By far the most popular online activity in the UK is shopping. 87% of UK internet users buy online. As such, the UK ranks first in terms of online shopping amongst Internet users. This position is unchanged over the last year. Social networking (71%), reading online news (71%) and online banking (63%) are also activities undertaken by the majority of internet users. Use of VoD (Video on Demand) is also relatively widespread. Use of music, video and games online is below the EU average and the UK ranks 26th in the EU for this indicator.

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[9] https://www.go-on.co.uk/
[10] https://www.thetechpartnership.com/

Europe's Digital Progress Report (EDPR)

4 – Integration of digital technologies

In Integration of digital technologies by businesses, the United Kingdom shows only average performance even if its progress is on a par with the EU average. Businesses in the United Kingdom are not fully taking advantage of the possibilities of digital technologies for business. The percentages of businesses using technologies such as electronic information sharing (ERP – 17%) and RFID (1.6%), are very low; so the UK ranks third to last and second to last in the EU for these two indicators. However, take-up of Social Media, at 34% of enterprises, is advanced. Domestic eCommerce by SMEs is also somewhat more widespread in the UK than in other EU countries. However, turnover from eCommerce is somewhat below the EU average, while the percentage of SMEs that sell online cross border is somewhat higher.

The UK's Digital Economy Strategy 2015-2018[11], published in 2015 sets out UK strategy to help businesses innovate through digital technologies. The strategy has five objectives: encouraging digital innovators; focus on the user; equipping the digital innovator; growing infrastructure; platforms and ecosystems; and ensuring sustainability. It will commit a total of £120 million over a four year period for the implementation of the strategy, including £15 million a year to support innovative business projects and a further £15 million to support the Data Catapult centre, the Open Data Institute and Tech City UK, each of which is involved in delivering the objectives of the strategy.

5 - Digital Public Services

In Public services, the United Kingdom shows only average performance and its progress is also on a par with the EU average. While active eGovernment use is somewhat above the EU average, online service completion and in particular the sophistication of the services on offer could be improved: availability of pre-filled forms is very low (17 out of 100), and the UK ranks 26th out of 28 countries. However, the UK is "best in class" within the EU for use of Open Data.

The Government Digital Strategy[12], published in December 2013, sets out how the UK government's plans to redesign its digital services to make them so straightforward and convenient that people prefer to use them. In other words, the strategy sets out how the government will become digital by default. On the 1 June 2015 the UK government defined an updated Digital by Default Service Standard[13] listing 18 criteria that digital public services must meet in order to appear in the UK eGovernment portal (GOV.UK). Those quality criteria will ensure a smooth transition towards use of the digital channel as the main channel for citizen-government interaction. Since April 2016, GOV.UK Verify is the default way for accessing eGovernment services. It requires a single set of log-in credentials provided by certified private service providers through a federated system. This system offers a level of security sufficient for allowing people to interact with public authorities entirely online for a range of public services. The UK government is one of the founders of the Open Government Partnership (OGP). In its second National Action Plan (published in October 2013)[14] it continues to build on the open data commitments made in the first National Action Plan and addresses several other cross-cutting, open government issues.

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[11] https://www.gov.uk/government/publications/digital-economy-strategy-2015-2018
[12] https://www.gov.uk/government/publications/government-digital-strategy/government-digital-strategy
[13] https://www.gov.uk/service-manual/digital-by-default
[14] http://www.opengovpartnership.org/sites/default/files/20131031_ogp_uknationalactionplan.pdf