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

A new ERA for Research and Innovation

{SWD(2020) 214 final}

1. THE EUROPEAN RESEARCH AREA IN A NEW CONTEXT

The European Research Area (ERA) was launched in 2000, in the context of the Lisbon strategy, to address the fragmentation of the EU's research and innovation system, which at the time consisted of the juxtaposition of the national R&I systems and an EU level funding programme.

It aims at building a common scientific and technological area for the EU. Creating a single market for research and innovation fostering free movement of researchers, scientific knowledge and innovation, and encouraging a more competitive European industry. This involves restructuring the European research landscape towards more cross-border cooperation, continent-wide competition, building of critical mass and coordination, and the improvement of national research policies and systems.

Since 2009, achieving the ERA has also become an explicit Treaty objective, as expressed in Article 179 TFEU.

The ERA: 20 years on

Over the past 20 years, the European Research Area has seen major achievements.

The work of the European Strategy Forum on Research Infrastructures (ESFRI) resulted in the development of plans for 55 European Research Infrastructures, of which 37 have already been implemented, across all fields of science, mobilising close to EUR 20 billion in investments¹.

Jointly addressing common challenges through coordination and pooling of resources has resulted in more than EUR 7 billion of national investments in joint research programmes since 2004, with current annual joint spending of EUR 800 million.

Significant progress has been made in removing the geographical barriers to researchers' mobility and the fragmentation of research careers in Europe, driven by the European Charter for Researchers and a Code of Conduct for the Recruitment of Researchers already adopted by 1242 organisations.² In addition, the EURAXESS³ initiative supports researcher mobility and career development by delivering information and support services to professional researchers.

The ERA has enhanced access to open, free of charge, re-usable scientific information through the Open Science initiative⁴ and the recently launched European Open Science Cloud (EOSC) creating a cloud area for research data in Europe allowing for better science through open and collaborative knowledge sharing.

At the same time, the progress towards the ERA objectives has been slowing down and further improvement could be achieved⁵ in key areas:

- The EU R&D investment is at 2.19% of GDP (2018), still far from its 3% target. Public R&D investment has stagnated since 2010. EU business R&D investment (1.45% of GDP) remains significantly lower than that of our main competitors⁶. In South Korea it

¹ See <http://roadmap2018.esfri.eu/>

² <https://euraxess.ec.europa.eu/euraxess/charter-code-researchers>

³ Researchers in Motion is a unique pan-European initiative backed by the EU, member states and associated countries. <https://euraxess.ec.europa.eu/>

⁴ <https://ec.europa.eu/research/openscience/index.cfm?pg=openaccess>

⁵ ERA Progress Report 2018 and https://ec.europa.eu/info/research-and-innovation/strategy/support-policy-making/support-national-research-and-innovation-policy-making/srip-report_en

⁶ See Staff Working Document, section 2.1.1.1.

stands at 3.64 %, in Japan at 2.59 %, in the United States at 2.05 % and in China at 1.69 %.

- While participation of the less performing Member States in the Framework Programme is now on the rise⁷, indicators regarding science quality or innovation activity show significant discrepancies within the Union.
- Europe is also lagging behind in translating R&I results into the economy. Although Europe is a world leader in some high tech sectors such as green technology, with the growing importance and diffusion of ICT⁸, efforts need to be channelled towards strengthening industrial innovation⁹, technology transfer and fostering the uptake of R&I solutions and the diffusion of innovation through knowledge transfer and public-private cooperation¹⁰.
- The EU is a leader in science quality, including in international scientific collaboration. However, in relative terms the EU scores below the US on number of high impact publications and has not seen progress since 2012, while China is rising.
- Despite the continuous policy attention to gender equality in R&I, progress has been slow and remains insufficient. While equality has nearly been reached in PhD graduates, only 24% of top positions in the higher education sector are occupied by women.

The slowing of progress raises concerns when ambitious national funding and reforms, supporting a strong collective governance structure, are needed for Europe to engage in stronger action in the economic recovery.

New challenges for R&I policy

Europe is currently facing deep societal, ecological and economic challenges, aggravated by the coronavirus crisis. Delivering on Europe's recovery is a pressing priority, while the green and digital transitions (*twin transition*) are more important than ever¹¹.

The EU has set itself ambitious goals and put in place instruments to achieve competitive sustainability. It committed to climate neutrality¹² by 2050, and the Commission has proposed an ambitious target of at least 55% reduction in greenhouse emissions by 2030 compared to 1990. Accelerating research and innovation and improving the collaboration between private and public R&I in the Member States towards early market deployment of clean technology solutions is vital for reaching these targets and provides an economic opportunity for the EU. It is also important to develop strategic supply chains of industrial capabilities in clean technologies¹³. Similarly, the COVID-19 pandemic has brought to the forefront the vulnerabilities of our relationship with nature and emphasised the need for healthier and more sustainable lifestyles. R&I can be instrumental in accelerating a positive change, for example in the area of more sustainable farming practices or plant-based diets.

⁷ It has increased from 4.4% under FP7 to recently 5.6% under Horizon 2020

⁸ "An Analysis of the International Positioning of the EU Using Revealed Comparative Advantages and the Control of Key Technologies", European Commission

⁹ See e.g. OECD STI Scoreboard 2017, <http://dx.doi.org/10.1787/888933616940>: Out of the 20 emerging ICT technologies identified in the report, none is led by EU27. See also EU Industrial Scoreboard 2019

¹⁰ The share of innovative firms cooperating with knowledge institutes is only 15% (2016). The share of public research financed by the private sector is only 7.2% (2017) and has been slowly declining since 2007

¹¹ [IPCC Special Report](#) on the impacts of global warming of 1.5°C (2018)

¹² COM(2019) 640, European Council conclusions of 12 December 2019 and [Paris Agreement](#) (2016).

¹³ Including photovoltaic, batteries, renewable hydrogen, wind and ocean energy, grid and electronic components

As highlighted in the EU wide assessment of National Energy and Climate Plans¹⁴, Member States need to identify policies and measures to improve preparedness and enhance resilience in respect of clean technologies for the next decade.

The next ten years are Europe's Digital Decade. The COVID-19 pandemic has shown the importance of state-of-art digital technologies, based on European values, for the resilience of the economy and the society. Digital transformation is also a key enabler of the Green Deal. The Industrial Strategy, the European Skills Agenda for Sustainable Competitiveness, Social Fairness and Resilience, the Digital Education Action Plan and the new European Education Area, are strategies that will guide the development and roll-out of digital technologies as well as the take up of digital skills in the EU. Europe must also focus on enhancing its model of open strategic autonomy, economic security and potential for job creation.

The COVID-19 pandemic has demonstrated the importance of R&I cooperation to rapidly deliver solutions to the most demanding needs. The ERAvsCorona action plan¹⁵ and the International Pledging Conference¹⁶ are examples of rapid joint responses to such crises.

Although the EU is still a global leader in research and innovation, its performance has stagnated since 2012, and major players, from Asia in particular, are gradually growing and occupying a more prominent position on the global R&I and technological landscape. While R&I is the engine of long-term productivity growth¹⁷, Europe continues to lag behind in turning the outcomes of its excellent research into disruptive innovation and fails to fully mobilise research and technological capacities in less developed regions. In this new context of growing global competition and volatile geopolitical interests, what is at stake is not only Europe's prosperity and economic competitiveness, but also its ability to autonomously source and provide crucial raw materials, technologies and services that are safe and secure for industry and people.

Europe's shared values of democracy, solidarity and equality are assets to build on. To match these generational challenges, a new level of ambition that links better R&I with the economy, as well as with education and training is necessary to put EU's scientific knowledge to work.

Because it is anchored in the principle of excellence¹⁸ and because of its ability to bring the national and the European level of R&I policies together, the ERA has a key role to play in addressing these challenges. Drawing on the lessons from the COVID-19 crisis, the ERA needs to be strengthened and Member States need to be incentivised to reinforce R&I at national and regional levels and to deepen cooperation at the European level.

To foster global leadership, the ERA also needs to better incentivise its high-quality researchers and innovators to work together and become a pole of attraction for the world's best talents.

The EU will need to play its part: facilitate quick and easy access to funding for cooperation and sharing of data, develop attractive career frameworks for researchers, equip them with the

¹⁴ COM(2020)564.

¹⁵ https://ec.europa.eu/info/research-and-innovation/strategy/era_en#eravscorona-action-plan

¹⁶ https://global-response.europa.eu/index_en

¹⁷ Two thirds of economic growth in Europe from 2010 to 2016 can be traced back to R&I defined in a broad sense (SRIP 2020,p. 101)

¹⁸ In this context, excellence means the commitment to supporting the best possible research teams and projects, irrespective of any considerations.

skills they need in a fast changing global world and support state of the art research infrastructures.

In parallel, a new ERA will need to boost Europe's recovery and to support its green and digital transitions by supporting innovation based competitiveness and fostering technological sovereignty in key strategic areas (e.g. Artificial Intelligence and data, microelectronics, quantum computing, 5G, batteries, renewable energy, hydrogen, zero-emission and smart mobility, etc.) in line with the model of open strategic autonomy.

The EU's long-term budget for 2021-2027, the large-scale recovery plan "Next Generation EU" will lay the foundations of a modern and more sustainable Europe, while promoting an inclusive recovery and social fairness. The Recovery and Resilience Facility, Cohesion policy, as well as the Technical Support Instrument, will contribute to more coordination encouraging Member States to invest in new technologies and in a number of flagship areas¹⁹.

This Communication reaffirms the commitment to the ERA and proposes a new approach in order to accelerate Europe's green and digital transformation, strengthen Europe's resilience and preparedness to face future crises, and to support Europe's competitive edge in the global race for knowledge.

2. THE VISION: A STRONGER EUROPEAN RESEARCH AREA FOR THE FUTURE

Member States are keen to engage in EU level initiatives when provided with easy to use and accessible tools and incentives to act jointly or in a coordinated manner. This includes, in particular, the benchmarking of progress, guidelines and exchange of good practices, joint programming of national programmes and EU funding.

Member States have strongly reiterated the need for a renewed ERA agenda²⁰. To this end, the Commission organised a series of discussions with national authorities and stakeholders through a dedicated ERA "capitals tour" inviting feedback and input on the future of the ERA.

In order to increase the excellence and efficiency of the European R&I system, all the traditional 'single market' elements of the ERA (building of critical mass, mobility, open science, etc.) continue to be highly relevant, but implementation needs to progress in a more ambitious manner. The first element of a new concept for the ERA will therefore consist of deepening existing priorities and initiatives, where possible through new and stronger approaches.

At the same time, the challenges and opportunities ahead require a broader vision for the ERA. The green and digital transitions and the recovery call for cooperation between the Commission and the Member States, which goes beyond the traditional single market philosophy. They require the setting of new priorities to better orienting funding, launching ambitious joint initiatives and developing common approaches between policies.

In order to ensure that a new ERA is fit for the challenges ahead, the Commission proposes a new vision based on the following strategic objectives, which can only be achieved in partnership with Member States. The fourth objective consist of deepening the ERA in existing priorities, whereas the other three objectives will broaden the ERA towards new priorities:

¹⁹ <https://www.consilium.europa.eu/media/45109/210720-euco-final-conclusions-en.pdf>

²⁰ ERAC 1201/20 of 23 January 2020; Informal Research Ministerial meeting of Competitiveness (Research) of July 2020

- i. **Prioritising investments and reforms:** to accelerate the green and digital transformation and to increase competitiveness as well as the speed and depth of the recovery. This requires better analysis and evidence and includes simplifying and facilitating the interplay between national and European R&I systems. The principle of excellence, meaning that the best researchers with the best ideas obtain funding, remain the cornerstone for all investments under the ERA.
- ii. **Improving access to excellence:** towards more excellence and stronger R&I systems across the whole of the EU where best practice is disseminated faster across Europe. Member States willing to increase the performance of their R&I system towards excellence should be encouraged and supported, building on dedicated Horizon Europe measures and complementarities with smart specialisation strategies under Cohesion Policy.
- iii. **Translating R&I results into the economy:** R&I policies should aim at boosting the resilience and competitiveness of our economies and societies. This means ensuring Europe's competitive leadership in the global race for technology while improving the environment for business R&I investment, deployment of new technologies and enhancing the take up and visibility of research results in the economy and society as a whole.
- iv. **Deepening the ERA:** to further progress on the free circulation of knowledge in an upgraded, efficient and effective R&I system, in particular by moving from an approach of coordination towards deeper integration between national policies. The ERA will continue to promote adequate framework conditions and inclusiveness, help develop the skills that researchers need for excellent science, and connect all actors across Europe, including in education, training and the labour market.

To accomplish the objectives the Commission proposes a set of actions to be implemented in collaboration with Member States and stakeholders according to an *ERA Roadmap* (see appendix).

In response to the *Opinion of the European Research and Innovation Area Committee* (ERAC) of December 2019²¹ the Commission proposes that Member States reinforce their commitment to shared policies and principles, drawing on the 20 years of the ERA, by adopting a *Pact for Research and Innovation in Europe*.

With the Pact, the governance process should be made more effective and impactful with regular political dialogue with Member States addressing priorities, implementation strategies and progress monitoring towards the realisation of the set objectives.

2.1 Prioritising investments and reforms

Facilitating EU and national investments and reforms towards the EU's priorities

The recovery from the COVID-19 pandemic and the need to move towards a more competitive and sustainable economy requires a better alignment of R&I investments and reforms at national and EU level to accelerate the green and digital transformation of Europe's society and economy. This will help to deliver on EU priority areas such as the clean energy transition, decarbonisation and modernisation of industry, smart and sustainable mobility and the circular economy.

²¹ ERAC Opinion, Council document 14989/18 of 30 November 2018, page 6. See Staff Working Document, p. 93, for the mandate of the European Research Area and Innovation Committee.

Financial support for constructing the ERA through the EU Framework Programmes has evolved over time²². The Horizon Europe programme envisages stepping up these efforts through robust and balanced R&I investments. It supports researchers, industry, and citizens to throughout the whole R&I cycle. . The first pillar of the programme supports researchers to carry out fundamental research. The second pillar focuses on collaboration between EU, industry and sometimes Member States to deliver research and innovation that has impact on the ground in key policy areas from health, accessibility, digital, industrial competitiveness, to climate, energy, mobility, natural resources and food systems. Essential for this are joint strategic agendas with Member States and industry through a streamlined set of “R&I Partnerships”. Horizon Europe proposes also new forms of collaboration, such as the future “R&I Missions²³”, which would involve citizens in wide projects, such as plastic in oceans or fighting cancer. Finally, the third pillar focuses on breakthrough and market-creating innovation. The European Innovation Council (EIC) and the Knowledge and Innovation Communities (KICs) run by the European Institute of Innovation and Technology (EIT) will support game-changing innovations by EU start-ups and SMEs, including providing regional focus. The Horizon Europe Programme aims to be ambitious when it comes to green and digital transitions. The Commission proposed that Horizon Europe includes a 35% funding target for climate change, and that there is a substantial increase in investment in core digital technologies. Member States should consider replicating this ambition for green and digital investment in their national programmes.

However, Horizon Europe and other relevant programmes under the EU budget alone, such as Cohesion Policy or Next Generation EU, would not be enough to fund the R&I needed for the green and digital transitions. In order to bring about a real positive change, this must be complemented by investments from Member States. These efforts combined should crowd in significant private investment to ensure ownership and quality of results.

The 3% R&D investment target has, since 2002, provided, at times, a stimulating effect to increase investments in the EU and Member States, however not enough to meet this target. Business expenditure lags behind the EU’s main competitors and public investment stagnated since 2012 and even went down in some countries. This impacts on the capacity of the EU to keep up the pace with the speed of innovation at global level. With a current value of 0.81% GDP, EU public effort to support R&D is still too low. The pandemic has accelerated the twin transition. Therefore, the level of investment must increase to keep up with the new pace. Member States should commit to raising their public R&D efforts from 0.81% to 1.25% of GDP. This increase is commensurate with reaching the 3% goal and keeping a high level of ambition to deliver on the recovery and the twin transition. Only a small share of revenues are currently spent by the private sector on R&I in the sectors where low-carbon technologies are needed to be applied on a large scale²⁴. The private sector should be encouraged to increase its R&D investment. Furthermore, current annual spending on joint R&D programmes between Member States constitutes about 1% of total public R&D funding in Europe. A target of 5% can help Member States focus and align national public R&D efforts, also with Horizon Europe Missions and Partnerships. Similarly, national reforms will be needed to strengthen national and regional R&I systems, taking into account the 2019 and 2020 country specific

²²Horizon 2020 introduced 7 Societal Challenges and Focus Areas cutting across societal challenges (i.e. circular economy or digitalisation). Other elements such as policy experimentation are also being tested.

²³ Missions are a novelty under Horizon Europe aiming to tackle complex challenges through an inclusive and deliberative approach.

²⁴ JRC SETIS <https://setis.ec.europa.eu/publications/setis-research-innovation-data>

recommendations of the European Semester²⁵ and the assessments of National Energy and Climate Plans.

The Recovery and Resilience Facility should also contribute to such effort as it encourages Member States to undertake reforms and investments in new technologies and in a number of European flagships initiatives, such as powering up future proof clean technologies or scaling up European industrial data cloud capacities and developing the most powerful, cutting edge, and sustainable processors²⁶. Possible investments include would foster cross border cooperative projects or important projects of common European interest²⁷. The coordination of R&I investment and reform efforts should occur:

- First, by setting funding targets, in particular for supporting the twin transition and the recovery priorities, which can have a mobilising effect over national R&I budgets and leverage private R&I investment.
- Second, by joint programming with priority areas for action and ambitious budgets to facilitate the critical mass needed in key areas supporting the twin transition. A strong focus on deployment of new technologies and solutions throughout the economy and public administration will be essential to increasing the impact of R&I expenditure. Cohesion Policy, the Connecting Europe Facility, the Common Agricultural Policy, Digital Europe and the Recovery and Resilience Facility will play an essential role in delivering transition on the ground.
- Third, through engaging in Horizon Europe Missions and Partnerships to support the alignment of national strategies and industrial and business investments towards common EU objectives. In addition, R&I partnerships between the EU, its Member States and industrial stakeholders, such as the Joint Undertakings on Hydrogen or on Microelectronics, have become a well-established tool of the Framework Programmes²⁸ to pool resources towards common objectives.

To deliver on the twin transition, the Commission is ready to support Member States in the prioritisation of national funding between countries and with the EU. The *ERA Forum for Transition* is a Commission-driven forum for discussion with Member States of the four priorities of the new European Research Area. This would help focus the new European Research Area process by working with the Member States to prepare the research and innovation angle of the national recovery plans, to maximise the benefit from cohesion funds, to implement the industrial strategy through work on industrial ecosystems and to discuss regulatory and non regulatory initiatives to create a favourable framework for research and innovation in the EU. It will complement the Horizon Europe Strategic Programming process and offer a platform for the development of ambitious joint policy and funding actions in strategic areas and their alignment with other policies. The forum would also address issues linked to implementation of R&I policies at national and regional levels, by bringing together the Commission and Member State bodies responsible for R&I funding – including

²⁵ In 2019 all Member States of the EU received a country specific recommendation that called for R&I investments

²⁶ https://ec.europa.eu/commission/presscorner/detail/en/IP_20_1658

²⁷ Cf Commission staff working document, Commission guidance to Member States, Recovery and resilience plans, COM (2020) 205; 17.09.2020.

²⁸ https://ec.europa.eu/info/horizon-europe-next-research-and-innovation-framework-programme/european-partnerships-horizon-europe_en

authorities managing cohesion policy – to ensure synergies across all relevant funding sources.

The Commission:

1. Proposes that Member States re-affirm the 3% EU GDP R&D investment target and update it to reflect new EU priorities, including a new 1.25% EU GDP public effort target to be achieved by Member States by 2030 in an EU coordinated manner, to leverage and incentivise private investments.
2. Support Member States in the coordination and prioritisation of national R&I funding and reforms, between countries and with the EU, through dialogue and a dedicated ERA Forum for Transition. This will focus Member States common efforts, to voluntarily commit 5% of national public R&D funding to joint programmes and European partnerships by 2030²⁹.

2.2 Improving access to excellence

Advancing Europe together

Member States' R&I investment remains uneven with important differences, from 0.5% to 3.3% of the GDP and concentrated in EU northern and western parts. These differences in investment translate into gaps in scientific excellence and innovation output. For example, proxy indicators for science quality (top cited scientific publications) show also a persistent divide³⁰.

The less R&I performing Member States³¹ have managed to progress but most of these countries still perform well below the EU average³². Nearly all Eastern European Member States have managed to increase their R&I expenditure, while a number of southern countries appear to be falling behind³³. Most Member States are engaged in improving their national R&I systems to strengthen their science base, including by stimulating public-private, cross-sectorial interactions and building an innovative private sector.

The EU already supports Member States that aim to strengthen their research and innovation capacity through different measures. The *Horizon Policy Support Facility*³⁴ and the future *Technical Support Instrument*³⁵ provide these Member States with expert advice and a variety of good practices to develop and implement reforms, as well as tailor made support on the ground.

The high concentration of R&I activities in Europe and agglomeration effects imply that there are regions with more incentives for R&I investments. Increasing concentration of economic and innovative activities in capitals and metropolitan areas, on the one hand, and decline in industrial or peripheral areas on the other lead to negative developments in regions with low capacity to exploit innovation.

²⁹ The current average annual investment in the period 2015-2018 was around EUR 800 mio (ERA-LEARN data) or just below 1% of total public funding for R&I in the EU

³⁰ SRIP report https://ec.europa.eu/info/publications/science-research-and-innovation-performance-eu-2020_en (pp. 368 and 369).

³¹ https://ec.europa.eu/growth/industry/policy/innovation/scoreboards_en

³² See also https://www.eib.org/attachments/efs/innovation_investment_in_cesee_en.pdf

³³ Science, Research and Innovation Performance of the EU 2020, DG R&I

³⁴ <https://rio.jrc.ec.europa.eu/policy-support-facility>

³⁵ <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM:2020:0409:FIN>

Horizon Europe will support the less performing Member States, through the ‘*Widening participation and strengthening ERA*’ package, to valorise and connect existing ecosystems. It will support collaborations with more experienced counterparts in order to enhance access to excellence. The Widening programme will continue to operate in synergy with the Cohesion Policy. A smart and coherent use of Cohesion policy support should complement EU and national R&I programmes in upgrading knowledge infrastructures, building capacity and inducing structural transformations, on the basis of well-designed smart specialisation strategies. Other EU instruments, as well as investments through the *Recovery and Resilience Facility* should also support reforms in the research and innovation domain.

The Commission will stimulate policy reform through regular dialogue and stronger interaction with Member States. Strategic and coordinated support will also be offered to regions and cities building on successful initiatives such as the *Knowledge Exchange Platform*³⁶ (together with the Committee of the Regions) and the Science meets Regions initiative. These will be upgraded to a strategic level ensuring an effective dialogue for setting priorities and promoting synergies between R&I instruments and education and training with adequate mobilisation of cohesion policy funds.

The Commission:

3. Proposes that Member States lagging behind the EU average R&D investment over GDP direct their investment efforts to increase their total investment in R&D by 50% in the next 5 years. The Commission will support Member States to reform their R&I policies, also by targeting technical assistance to this end. It will facilitate the coordination and complementarity of national and EU programmes, and contribute to the deployment of the recovery package.

Nourishing talent for excellence

Attracting and retaining talented researchers remains key for knowledge diffusion across the EU. In general, countries with a higher R&I performance have a greater inflow of researchers. It becomes imperative to ensure that all researchers in the EU, regardless of their geographical location, can produce and have access to excellent results.

The *ERA4You* initiative will be launched to deepen the European Research Area by strengthening the mobility opportunities for researchers to access excellence and expand their experience through dedicated mobility schemes between industry and academia. It will include, targeted mobility measures to support researchers in Member States with low R&I performance to learn and develop excellence, in order to broaden the talent capacity.

The initiative will monitor indicators of access to excellence of researchers and institutions to improve the understanding of obstacles and support relevant policy measures. It will also foster a structured collaboration between academia and businesses, and across disciplines and borders, taking into account the internal market. Enabling framework conditions for this initiative will be complemented in a wider context by measures proposed under the action on European Framework for Research Careers (see section 2.4 below).

³⁶ <https://cor.europa.eu/en/our-work/Documents/SEDEC/KEP-action-plan-2019-en.pdf>

The Commission proposes to:

4. Institute a dedicated work stream in the ERA Forum for Transition (i) to promote and monitor access to excellence of researchers and institutions from Widening Countries, with Cohesion Policy support, (ii) to support Member States to better integrate researchers in smart specialisation strategies in cooperation with industry, and (iii) help them design measures to support researchers in Widening Countries to improve their skills for excellence in the labour market. This should support low R&I performing countries to increase the excellence of their R&I systems. Member States lagging behind the EU average on highly cited publications should reduce the gap to the EU average by at least one third in the next 5 years.

2.3 Translating R&I results into the economy

Competitiveness of European industry

The EU is lagging behind its main global competitors in business R&D intensity³⁷, in particular in high-tech sectors, and in scaling-up innovative SMEs³⁸ with negative effects on productivity and competitiveness. This is happening at times when entire sectors will undergo the twin transition and when industrial leadership will rely more than before on pushing further the frontiers of science, mastering deep technologies, and combining digital, physical and biological innovations. Unlocking investment in innovation in business, services as well as in the public sector is critical to reversing this trend, as well as to reinforce Europe's industrial and technological sovereignty.

The EU needs to make full use of its excellent research and innovation results to support the green and digital transition of EU economy.

Europe needs a framework that is conducive to long-term ambitious investments from the EU budget, Member States and the private sector. Investments in research and innovation are often risky and require long-term commitments. This may be even more challenging to ensure during crisis times. Horizon Europe partnerships between the EU and the private sector, as well as the Member States, provide the necessary framework to ensure that risk taking is catered for there where there is a market failure, and that private investment is leveraged. In addition, the European Innovation Council, complemented by EU financial instruments, will enhance access to debt and equity finance for high growth, R&I driven SMEs, start-ups, and small midcaps taking into account the EU taxonomy on sustainable finance³⁹. It will support more entrepreneurship across Member States, identify next generation technologies and accelerate their commercial application, thereby strengthening European industrial and technological presence in strategic parts of key value chains, and fostering technological choice and open strategic autonomy. The European Institute of Innovation and Technology also has an important role to play. Where they exist, industrial alliances⁴⁰ should be inclusive to contribute to defining research agendas and to increasing the industrial impact of R&D results. Member States can cooperate in case of market failure in Important Projects of

³⁷ In 2018, 1.45% GDP in EU, 2.59 % in Japan, 2.05% in United States and 1.69 % in China. SRIP 2020

³⁸ For each (SRIP 2020) - SRIP 2020, https://ec.europa.eu/info/research-and-innovation/strategy/support-policy-making/support-national-research-and-innovation-policy-making/srip-report_en

³⁹ https://ec.europa.eu/info/publications/sustainable-finance-teg-taxonomy_en

⁴⁰ Following the recent Battery Alliance, the Industrial Strategy announces the launch of a Clean Hydrogen Alliance, followed by alliances on low-carbon industries and on industrial data and cloud, and raw materials.

Common European Interest (IPCEI)⁴¹, to bring R&D results towards industrial deployment for the benefit of business and public sector.

To support the implementation of the new Industrial Strategy and speed up the transfer of research results into the real economy, the Commission will guide the development of common technology roadmaps with industry to include R&I investment agendas from basic research to deployment. These roadmaps will allow an efficient use of the full set of support mechanisms to crowd in private investments in key cross-border projects. These roadmaps will be part of the Strategic Innovation Agendas agreed with Member States and industry, under the Horizon Europe R&I Partnerships. Pro-innovation regulatory frameworks are also important to foster the development of competitive technologies in key strategic value chains while securing a stronger European position.

The European Universities and research and technology organisations (RTO) and EU Technology Infrastructures, as producers of high quality knowledge underpinning industrial innovation, will be key partners in developing these roadmaps.

The Commission will, in cooperation with Member States and stakeholders:

5. Support the implementation of the New Industrial Strategy by jointly developing common industrial technology roadmaps by the end of 2022 to align and link key partnerships under Horizon Europe with industrial ecosystems, so as to ensure that efforts team up and that research results are known and rolled out faster in the economy.

Strengthening innovation ecosystems for knowledge circulation and valorisation

Knowledge circulation and creation of value from knowledge are important parts of the ERA. R&I Hubs and Centres of excellence, spread across EU Member States and regions. They facilitate the involvement of a diversity of stakeholders in multi-disciplinary and cross-sectorial collaborations. They provide a valuable and still largely missing service to innovative start-ups and SMEs, which face particular market failures or obstacles.

Over the years, different types of supportive structures were created, ranging from Centres of Excellence to advisory services or specialised innovation hubs. There could be great benefit from fostering a stronger interconnection between them across the EU.

Based on a mapping of existing entities, and the analysis of potential gaps, an *ERAHubs* initiative could be developed, building on existing capacities, such as the Digital Innovation Hubs and clusters, and linking to the Enterprise Europe Network and StartUpEurope, to provide an interconnected knowledge space. This will facilitate collaboration and exchange of best practices, with the incentive to maximise the value of knowledge production, circulation and use.

In 2008, the Commission issued a *recommendation* on the management of intellectual property and knowledge transfer and a *code of practice* for universities and other public research organisations. In the current dynamic context, in order to achieve stronger impact, the Commission in consultation with Member States and stakeholders will update these guidance documents to support a common valorisation strategy for research and innovation based on existing good practices, including with respect to public procurement. As announced in the March 2020 Industrial Strategy for Europe⁴², further actions to improve the

⁴¹ The ECSEL partnership, behind the launch of the first IPCEI on Microelectronics has shown the way.

⁴² COM/2020/102 final

management of intellectual property by the research community will be provided in the upcoming Intellectual Property Action Plan.

EU business should have access to effective and affordable intellectual property protection throughout the continent so that innovation can be valorised and rewarded. In this context, the forthcoming launch of the Unitary patent will be an important milestone. Putting an end to fragmentation and complexity, the Unitary patent will provide a one-stop shop for businesses, reducing costs for up to six times compared to the existing, Member State per Member State-based system (1). It will also improve transparency and facilitate licensing process. It will also provide for a centralised litigation system, thanks to the new Unified Patent Court.

The Commission will:

6. Develop and test a networking framework in support of Europe's R&I ecosystems, building on existing capacities, in order to strengthen excellence and maximise the value of knowledge creation, circulation and use by 2022.
7. Update and develop guiding principles for knowledge valorisation and a code of practice for the smart use of intellectual property, by the end of 2022, including facilitating the implementation of the unitary patent, to ensure access to effective and affordable intellectual property protection.

2.4 Deepening the ERA

A European Framework for Research Careers⁴³

Career development conditions to attract and retain the best researchers in Europe are necessary in the global race for talent. Precarious employment, notably for new entrants, has not improved adequately over the past years increasing the risk that most talented researchers opt for working outside Europe.

The imbalances between the number of PhD graduates and the number of tenure track positions in the public science systems are an obstacle for retaining talent. Training and career development of researchers insufficiently focusses on entrepreneurship or opportunities outside academia. The increased dependency on short-lived, project-based, research funding, has also contributed to this.

As part of the existing European Research Area instruments, the *charter and the code for researchers* together with actions underpinning mobility, including the *Marie Skłodowska Curie* actions, played a role in supporting researchers' careers, but given the evolution of the labour market and the economy, there is a need for a more comprehensive approach – a tool box built on tackling the recognition of researchers skills, enhanced mobility and exchanges between academia and industry, targeted training opportunities and a one-stop-shop portal that researchers can access for a number of support services.

The skills mismatches constitute a worrying trend for industry and businesses with negative impact on innovation and productivity both in highly innovative industry and services sectors. Incentivising researchers to pursue a career outside academia through enhanced inter-sectoral circulation schemes involving industry can help improve researchers' employability and boost the permeability of talents across Europe's economy and society.

An enhanced *European competence framework for research careers* will support comparable and interoperable research careers identifying a set of core skills and modernising rewarding

⁴³ See section 2.4.3.2 of the Staff Working Document.

systems. Defining with Member States a *European competence framework* and a taxonomy of researchers' skills will allow monitoring the trends in the research labour market careers, skills and talent⁴⁴. This can be supported by deepened skills intelligence, a flagship action presented in the Communication on a European Skills Agenda for sustainable competitiveness, social fairness and resilience.

The *ERA4You* initiative will introduce measures to reinforce inter-sectoral mobility, strengthen academic-business cooperation and the involvement of the private sector in training and skills development of researchers. This will underpin permeability of R&I talents to the entire society and economy, thus boosting growth and jobs. It will encourage researchers towards entrepreneurship and business creation. The ERA4You will have a dedicated pillar for Widening Countries to support researchers from these countries to develop and access excellence.

The EURAXESS services, network and portals will be broadened into an *ERA Talent Platform*, an online one-stop-shop, with improved structure and governance, exploiting links to Europass, the EU platform for people to manage their learning and careers and the EURES network of European public employment services⁴⁵.

In implementing this toolbox, the Commission will pursue synergies with mobility and career development initiatives of the European Education Area, and the European Pillar of Social Rights. In this context, the pan-European pension fund for researchers (RESAVER), is an important support to researchers cross-border and cross-sectoral mobility.

The Commission will:

8. Deliver, by the end of 2024, in partnership with Member States and research organisations, a toolbox of support for researchers careers with the following components: (i) a Researchers Competence Framework, (ii) a mobility scheme to support exchange between industry and academia, (iii) targeted training under Horizon Europe and (iv) a one-stop shop portal. The toolbox will lead to the creation of a pipeline for talent.

Open Science

Open science makes the R&I systems more efficient and creative and reinforces excellence and society's trust in science. This is because opening and sharing research results and data, making them reusable and reproducible, and having access to research infrastructures provides the basis for peer scrutiny and quality, as well as efficiency in taking research reflections, analysis and innovation further.

First, the Commission has already taken steps towards Open Science. The *European Open Science Cloud* (EOSC) is being built to become a common, federated, European framework for openly sharing research data and accessing services. In the medium term, EOSC will grow into a trusted research and innovation data space and service platform in Europe that is fully articulated with sectoral data spaces such as the common European health data space, and open up and connect with the wider public and private sectors.

Furthermore, the European Strategy for Data recognised the good experience with the European Open Science Cloud and set out the way to develop it further, ultimately opening it up beyond research communities⁴⁶, and the European COVID-19 Data Platform⁴⁷ demonstrated the importance of such open approaches and infrastructure.

⁴⁴ COM(2020)274 final of 1.7.2020

⁴⁵ <https://euraxess.ec.europa.eu>; <https://europa.eu/europass/en>; <https://ec.europa.eu/eures/public/en/homepage>.

⁴⁶ COM(2020)66 of 19.2.2020

Second, policies for open access to scientific publications have also progressed rapidly over the last decade, with different business models in place. Ensuring the right for researchers or their institutions to share publicly funded peer-reviewed research findings without restrictions is essential for knowledge to circulate freely. Immediate open access to publicly funded publications has the advantage of sharing research results as early as possible, contributing to research efficiency and scientific excellence without compromising systematic peer review. Under Horizon Europe, the Commission proposes to launch an Open Research Europe publishing platform, by ensuring that all publicly funded research is integrated into a single seamless European data space.

Third, the current research assessment system is largely based on the impact factors associated with specific journals, where the publication takes place, rather than on the individual content and added-value of the publication itself.

More should be done to incentive to share results and collaborate, and to encourage trans-disciplinary research. Improving the system requires the collaboration and agreement with Member States, research funders, research performing organisations, scientific publishers and other actors to coordinate and synchronise reforms at institutional, regional, national and international level.

The Commission will:

9. Launch, via the Horizon Europe Programme, a platform of peer-reviewed open access publishing; analyse authors' rights to enable sharing of publicly funded peer-reviewed articles without restriction; ensure a European Open Science Cloud that is offering findable, accessible, interoperable and reusable research data and services (Web of FAIR); and incentivise open science practices by improving the research assessment system.

Research and technology infrastructures (including e-Infrastructures)

Large-scale research infrastructures are a backbone of the ERA and key to make Europe attractive for the best researchers across the world, contributing to knowledge sharing and innovation. Research infrastructures can foster regional development by concentrating skills and innovation talent around strategic scientific assets. E-infrastructures, in particular connectivity and collaboration services, will play a fundamental role in exploiting the full potential of research infrastructures. Ultra-fast connectivity will become a building block for the use of digital twin-like models of reality, with near real-time decision-making tools, rooted on scientific evidence.

The European Commission has been working in close partnership with the Member States and the scientific communities within the European Strategy Forum on Research Infrastructures (ESFRI) to develop new pan-European infrastructures and the effective networking of existing ones. This is one of the successes of the current European Research Area, leading to cutting-edge structures across Europe and the world, such as the European Spallation Source⁴⁸, the European Plate Observing System⁴⁹ or the European Social Survey⁵⁰.

However, research infrastructures have greater added value when used both for research and technological applications. This unleashes the innovation potential to deliver on EU's broader

⁴⁷ <https://www.covid19dataportal.org/>

⁴⁸ <https://europeanspallationsource.se/>

⁴⁹ <https://www.epos-ip.org/>

⁵⁰ <http://www.europeansocialsurvey.org/>

policy priorities. This will support industries and SMEs, with balanced scientific resources and access for researchers across the EU.

The recently published ESFRI White Paper⁵¹ sets out a new vision in this direction.

Infrastructures can also make a significant contribution to innovation. In that context, the strategic development of European technology infrastructures has been identified as a key issue⁵². Industry, and notably SMEs, require access to the right technology infrastructures to quickly develop and test their innovations and successfully enter the market. This involves establishing a governance structure for Technology Infrastructures, which will bring together and complete currently existing mappings of available facilities, performing a gap analysis and prioritisation at EU level and elaborating recommendations for common access conditions and engagement models.

The Commission will, together with the Member States:

10. Support ESFRI to work towards a world-class research infrastructures ecosystem focusing on the broader range of the EU's policy priorities and improve its governance to address the broadened focus of its activity by the end of 2021, and establish a new governance structure for Technology Infrastructures.

Strengthening the public science system through synergies with the European Education Area

The public science system is an indispensable part of the overall R&I organisation and a cornerstone of excellence for Europe's prosperity. It consists of universities and other publicly funded research and technology organisations, which base their action on academic freedom fully embedded in the scientific culture and processes.

Freedom of discussion is essential for peer-review and for publishing verifiable results, which is a prerequisite for scientific excellence. Without academic freedom, science cannot progress and the ERA cannot function.

The most vibrant and innovative ecosystems in the world have strong interactions with top quality universities. While Europe has many strong universities, their potential is not fully exploited. The new ERA will strengthen the R&I dimension of universities through a comprehensive transformation agenda to be developed together with stakeholders and Member States and in synergy with the European Education Area (including their education, research, innovation and service to society missions).

It will empower Universities in Europe to develop common R&I strategies, creating critical mass to deliver on Europe's challenges, facilitating the sharing of capacity such as digital and knowledge infrastructures and resources through collaborative settings. The aim is also to improve the attractiveness of researchers' careers, facilitate co-operation with surrounding R&I ecosystem actors and to play a key role in engaging citizens in science.

The *European Universities initiative*, piloted under the Erasmus programme and supported in its R&I dimension by Horizon 2020, will help the transformation process offering a longer-term framework for transnational cooperation between universities, allowing for stronger borderless cooperation and circulation of knowledge and talents.

Large-scale concerted action in support of the institutional transformation efforts of universities will be based on a roadmap of EU, national and regional actions for better use of

⁵¹ <https://www.esfri.eu/esfri-white-paper>

⁵² SWD(2019) 158

synergies between Union programmes including Horizon Europe, Erasmus, ESF+ and ERDF and private R&I investments, notably through the support of the InvestEU programme.

The Commission will, together with the Member States through the EEA and ERAC steering bodies:

11. Develop a roadmap of actions for creating synergies between higher education and research, notably building on the dual role of universities.

Gender equality to strengthen the European R&I potential

Despite evidence that balanced teams perform better, gender inequalities persist in Europe's R&I systems. Coordinated action with education policies and research funders will promote a gender-inclusive culture.

The *She Figures 2018*⁵³ report presents overall improvement, but the pace remains too slow. Gender balance in PhD graduates (48% women) has nearly been reached. Yet, women remain significantly under-represented: only 33.4% of researchers in the EU are women, the share of women in Grade A positions in the Higher Education Sector (full professor and equivalent) reached just 24% for the EU in 2016 and the proportion of women heading higher education institutions in Europe was only 22% in 2017.

The number of women among patent holders, also remain extremely low and only 1.79% of scientific publications of the EU integrate a gender analysis. Ambitious targets need to be set at EU level to enact sustainable change in R&I institutions and foster a pipeline of female talent.

In concert with the Skills Agenda, the Communication on the European Education Area and the new Digital Education Action Plan, the ERA will strengthen the focus on participation of women in Science, Technology, Engineering and Mathematics (STEM) fields and foster entrepreneurship. There is also a need to address diversity by opening policy to intersections with other social categories, such as ethnicity, disability (including accessibility and inclusion) and sexual orientation, as well as gender-based discrimination and violence in R&I organisations⁵⁴.

The Commission will:

12. Propose as of 2021, in line with the Horizon Europe programme objectives, the development of inclusive gender equality plans with Member States and stakeholders in order to promote EU gender equality in R&I.

3. CITIZENS' ENGAGEMENT

The engagement of citizens, local communities and civil society will be at the core of the new ERA to achieve greater societal impact and increased trust in science.

Building on the key role of science during the COVID-19 pandemic, Member States, research organisations and industry should involve citizens in technology choices. To achieve this, leaders of R&I institutions, funders and policy makers need to agree on principles,

⁵³ https://ec.europa.eu/info/publications/she-figures-2018_en

⁵⁴ Henning, M.A., Zhou, C., Adams, P., Moir, F., Hobson, J., Hallett, C. & Webster, C.S. 2017. Workplace harassment among staff in higher education: a systematic review. *Asia Pacific Education Review*, 18: 521–539

recommendations and good practices for incentivising and rewarding citizen participation to promote trust and facilitate the uptake of science, technology and innovation.

The ERA will enhance the communication to the wider public, and young generations in particular, on science addressing the twin transition and promote participatory actions concerning the transformation of our economy and society. It is also important to include representative organisations of groups at higher risk of exclusion such as persons with disabilities and older persons in order to address critical issues related to their exclusion in the research.

Underpinning simplification and coherence, there is scope for integrating the “Capitals of Innovation” award and other relevant EU activities, such as the European Contest of Young Scientists (EUCYS) or the Science in the City Festival into a broader policy initiative, which would open up science and innovation to Europeans in their own cities, regions and countries.

Citizens’ engagement will build on already existing initiatives and events, such as the European Researchers’ Night, which has become the largest research communication and promotion event in Europe, and could be an appropriate platform to engage actively with citizens.

The EU can make use of Horizon Europe Missions to pursue citizen’s involvement. Networks such as the European Youth Portal, the Eurodesk Network, the European Youth Forum, student and alumni associations, the Safer Internet Centres and the EU BIK portal, eTwinning, the School Education Gateway, and EPAL (Adult learning) platforms, are effective multipliers to engage with society.

The Commission will:

13. Organise with Member States and stakeholders Europe-wide participatory citizen science campaigns to raise awareness and networking, crowdsourcing platforms and pan-European hackathons, in particular in the context of Horizon Europe Missions. The Commission will develop with Member States best practices to open up science and innovation to citizens and youth.

4. GOVERNANCE OF THE NEW ERA

The new ERA requires action at national and EU levels, supported by a process to set and update the policy priorities, monitor and assess progress and ensure strategic advice towards common objectives.

Action at EU level will be guided by the proposed list of actions according to a timeline (the ERA Roadmap presented in the appendix) that will be updated by the Commission as implementation proceeds. Action at national level will be guided by a set of key values and principles, building on the experience of the past 20 years in areas such as open access, gender equality or career conditions for researchers and others.

A first step will consist of a European *Pact for Research and Innovation* to be proposed by first half of 2021, aiming at deepening the implementation of the new ERA’s objectives, setting out commonly agreed values and principles and indicating the areas where Member States will jointly develop priority actions. It will take the form of a single non-binding initiative.

Through its coordination work, the *ERA Forum for Transition* may also contribute to the identification of investments and reforms to help Member States prepare their national Recovery and Resilience plans for the implementation of the *Recovery and Resilience Facility*.

A transparent monitoring system will be essential through the publication of a yearly *ERA Scoreboard* which will address the progress at EU and national level, revise priorities and actions in the ERA Roadmap and provide evidence and analysis for the European Semester.

The ERAC will continue to provide strategic advice on priority setting, monitoring and assessment, to deliver on the new ERA vision. ERAC should ensure the follow-up at national level and continue to carry out its oversight role of day-to-day implementation through working groups. Lessons learned from the Horizon Europe co-creation strategic planning process should be taken into account.

The Commission will assist the running of the groups equipping them with the necessary resources and contributing to agenda setting and co-chairing. Countries associated to the Framework Programme will be invited to participate as observers, provided this is foreseen in the respective association agreements.

The Commission will:

14. Building on the lessons learned from the Horizon Europe Strategic Planning process, develop with Member States an approach to set and implement strategic priorities that deliver on the ERA agenda through the European Forum of Transition and by means of a Pact for R&I in Europe.

5. THE GEOPOLITICAL DIMENSION OF ERA

International cooperation through ERA will take into account the EU external relations priorities⁵⁵ contributing to the Sustainable Development Goals and and to the implementation of the Next Generation EU by supporting a Stronger Europe in the World. Cooperation will be based on multilateralism, reciprocity and purposeful openness, combined with strategically targeted actions with partners on the Green Deal, health and the digital transition. In line with the model of open strategic autonomy, it will protect and promote EU vital interests and sovereignty in strategic technology areas and critical infrastructures based on common values and supporting a global level playing field.

Association to the EU Framework Programmes is the strongest form of international cooperation in the field of R&I. The Associated Countries are an integral part of the ERA and are already contributing to its goals. Creating partnerships globally, in order to enhance knowledge sharing and skills as well as research and innovation capacities, without accelerating brain drain, will be key, particularly for the benefit of young people. The European Neighbourhood deserves specific attention. Some of the Western Balkan countries are already part of the ERA, while for others, integration in ERA will help them transition towards a performant R&I system, paving the way to their accession to the EU. For the Horizon Europe programme the Commission has proposed to broaden the possibility for association towards countries sharing common values, also beyond the EU's geographical proximity.

6. CONCLUSION

Europe has responded to the tremendous challenges it faces by setting itself ambitious goals. The Commission, Member States and R&I stakeholders have an important role to play at this crucial moment to ensure a recovery that responds to people's needs. Building European resilience based on a greener, digitally empowered, competitive and more sustainable Union,

⁵⁵ Such as the new Comprehensive Strategy with Africa.

requires joint efforts and global leadership in science and innovation, as well as engaging and empowering citizens.

A new, deeper and broader European Research Area will work with Member States to achieve the four key strategic objectives: prioritising investments in R&I, improving access to excellence, translating R&I results into the economy and deepening policies that promote the free circulation of knowledge.

Furthermore, the European Research Area and the European Education Area will work together to achieve a new level of ambition in which education, research and innovation are steered in the same direction to underpin knowledge as a foundation for democratic, resilient and inclusive societies. This is essential if Europe is to remain globally competitive and innovative while, at the same time, true to its common values in creating a more equitable and sustainable world.

Europe looks ahead and paves the way to the next generation by offering an excellent knowledge-based society with top institutions and talent while promoting inclusiveness and democratic values.

APPENDIX - ERA Roadmap

| | Key actions | Date |
|-----|---|--------------------|
| 1. | Re-affirm the 3% GDP EU R&I investment target and propose a new EU 1.25% GDP public effort target to be achieved by Member States by 2030 | Starting in 2021 |
| 2. | Launch of ERA Forum for Transition, to support Member States in the coordination and prioritisation of national R&I funding, and reforms | Starting in 2021 |
| 3. | Support Member States who are below the EU average R&D investment over GDP to increase their total investment in R&D by 50% in the next 5 years | Starting in 2021 |
| 4. | Set up a dedicated work stream in the ERA Forum for Transition for access to excellence and support less performing R&I Member States in increasing their number of highly cited publications by one-third over 5 years | Starting in 2021 |
| 5. | Develop common industrial technology roadmaps | By the end of 2022 |
| 6. | Develop and test a networking framework in support of Europe's R&I ecosystems, building on existing capacities, in order to strengthen excellence and maximise the value of knowledge creation, circulation and use | By 2022 |
| 7. | Update and develop guiding principles for knowledge valorisation and a code of practice for the smart use of intellectual property | By the end of 2022 |
| 8. | New toolbox in support of researchers career development | By the end of 2024 |
| 9. | Launch, via the Horizon Europe Programme, a platform of peer-reviewed open access publishing; analyse authors' rights to enable sharing of publicly funded peer-reviewed articles without restriction; Ensure a European Open Science Cloud that is offering findable, accessible, interoperable and reusable research data and services (Web of FAIR); and incentivise open science practices by improving the research assessment system. | Beginning in 2021 |
| 10. | Implement the EFSRI White Paper and establish an updated governance structure for research and technological infrastructures | By the end of 2021 |

| | | |
|-----|--|------------------|
| 11. | Develop a roadmap of actions for creating synergies between higher education and research, notably building on the dual role of universities | 2021 |
| 12. | Develop inclusive gender equality plans with Member States and stakeholders in order to promote EU gender equality in R&I | Starting in 2021 |
| 13. | Organise with Member States and stakeholders Europe-wide participatory citizen science campaigns to raise awareness and networking | Starting in 2021 |
| 14 | Develop with Member States an approach to set and implement strategic priorities that deliver on the ERA agenda through the ERA Forum for Transition and by means of a Pact for R&I in Europe. | 2021 |