1. The innovation imperative

Innovation is essential to drive Europe's future competitiveness and to ensure the health and well-being of its citizens. Innovation shapes markets, transforms economies, stimulates step changes in the quality of public services and is indispensable to achieve the objectives of the twin green and digital transition.

Europe has a proud history in innovation and is well positioned to ride the current wave of deep tech innovation. It has excellent Universities and is a powerhouse in knowledge production, a foundation stone for innovation. With 7% of the world population, the EU is responsible for one quarter of all top-quality publications in the world [REF *NB define*] and for 25% of all the publications and patents that can contribute towards the green transition [REF].

Bold policy choices on for example, climate change mitigation and environmental protection, reinforced by synergies between EU initiatives have created the conditions to turn these knowledge outputs into innovation and growth here in Europe. It has become increasingly competitive, leading global country rankings of economic fitness and in high value inventions linked to key sectors such as renewables and energy efficiency [REF]. Half the Original Equipment Manufacturers (OEMs) in the wind energy sector for example, are headquartered in the EU and a quarter of all manufacturing facilities are located in Europe [REF]. A key feature here has also been the close cooperation between the public and private sector, reinforced recently through the European industrial strategy and associated initiatives such as the European Chips Act, which will look to both grow Europe's market share and reduce external dependencies for semiconductors, the building block of all electronic products.

Innovation has nonetheless become an increasingly international activity with the levels of cross-border flows of business R&D beginning to mirror longstanding trends in scientific cooperation. [REF]. Horizon Europe alongside other EU programmes and policies have consistently supported such cooperation, and opportunities to leverage complementary capabilities and develop innovative solutions in partnership to address global challenges will continue.

The new sectors and markets created by these innovations will deliver social and economic benefits for citizens, as new business and job creation opportunities abound. The deployment of renewable energy technologies could create jobs along the value chain across the EU: the bioenergy sector for example may account for up to 700.000 direct and indirect jobs, while the deployment of Electric Vehicles could create up to 200.000 jobs by 2030 in Europe [REF]. The need for local action to address challenges such as climate change will also translate into local jobs and impact: according to the International Energy Agency [REF] about half of the solar workforce will be local [REF].

The adoption of new technologies also appears to have accelerated during the pandemic including in sectors that traditionally lagged behind [REF], and importantly, Europe now has a healthy landscape of start-ups. The EU's early-stage innovation ecosystem is on an equal footing with the US. EU start-ups accounted for 33% of all capital invested globally in rounds of up to $5m compared to 35% for the US. Europe's share of early-stage funding has grown while that of the US has decreased. Further, the number of 'unicorns' (a start-up company with a value of over $1 billion) almost doubled in 2021, and the need and opportunity to scale-up deep tech companies, which will disrupt and define the markets of the future, has led to the establishment of the European Innovation Council (EIC).

However, strategic competition and geopolitical tensions that have come to the fore underline the need to mitigate damaging dependencies on suppliers and platforms elsewhere for critical technologies. In keeping with recent REPowerEU communication, Europe must also be weaned from its dependence on Russian fossil fuels well before 2030 by accelerating the development and deployment of energy from hydrogen and renewable sources.

Companies, prompted by the pandemic or Russia's aggression against Ukraine to build supply chain resilience, are likely to seek out a more diversified supplier base that may in time lead to moving supply chains nearby [REF] with considerations for a more circular and resource efficient economy also leading to new business models including in for example, the agri-food sector.

This creates opportunities to develop and strengthen pan European ecosystems in areas that can help the EU achieve open strategic autonomy that both incentivises the development and uptake of transformative new technologies across all regions of the EU, and facilitates informed international cooperation that is essential to address global challenges and to access global markets.

Ambitions for a more resilient, greener and digital EU, with the objective of becoming the world's first climate-neutral continent, also require a systemic approach to innovation. Investment in, and support for knowledge valorisation, the uptake of technologies, the adoption of reforms where needed and the development of associated skills must be complemented by framework conditions that incentivise private investment in innovation. Individuals, organisations and territories cannot tackle these issues in isolation and the broad mix of partners and policies calls for new roles and approaches.

Finally, the importance of transformative innovation, now apparent across all sectors, make high growth potential SMEs including start-ups, a key force in driving innovation, bringing new ideas, creating markets and jobs. To take full advantage of the opportunities here, support for the development of such technologies in the EU must be complemented by efforts to enable their uptake. The clear correlation between diverse teams, innovation and growth [REF], mean efforts must also be made to harness the talents and diverse perspectives of individuals from all backgrounds.

In light of these wider global trends, this communication examines the EU's innovation performance and focuses on longstanding issues on which we must act now with renewed vigour. Particular attention is thus paid to shortcomings in access to finance for innovative SMEs, the risk-averse and fragmented regulatory framework, insufficiently connected innovation ecosystems, talent shortages and the persistent innovation divide across Member States and regions.

The communication, building on the objectives and priorities of the New European Research Area[1] (ERA), also proposes a set of measures that can work in concert and leverage the strengths of the EU's Single Market, strong manufacturing base, stable institutions and democratic societies to deliver on the opportunities offered by the twin transition and the need for greater future strategic autonomy. These actions grouped under five flagship areas, will complement and build on past and ongoing initiatives, to improve the EU's innovation performance.

2. European perspectives and opportunities

2.1 The scale-up gap

Europe is amongst the fastest growing regions in private capital investment [REF], and the start-up gap is nearly closed: the EU has as many start-ups as the US.

The deep-tech innovations that are emerging from a growing cohort of innovative European start-ups have the potential to drive innovation in sectors such as energy, digital, agriculture, healthcare, food,

[1] https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52020DC0628&from=EN

construction, manufacturing and mobility. This can in turn transform our business landscape and associated markets.

Efforts to incentivise and ensure the provision of private investment to support such innovations also continue apace. InvestEU will for example mobilise more than €370 billion in long-term public and private investment in support of a sustainable recovery from the coronavirus pandemic and building a greener, more digital and more resilient European economy, including through innovative projects.

However, Europe has a significantly lower number of tech scale-ups than the United States and China, and scale-up financing lags behind that for start-ups. While venture capital funds raised in the EU have increased since 2013 and are currently above pre-crisis levels (rising from EUR 2.3 billion in 2013 to EUR 10.2 billion in 2020), over seven times as much was raised in the United States, reaching about EUR 70 billion in 2020. When focusing in on deep tech, the United States and China also dominate the international scene accounting for around 81% of global private investments in deep-tech companies between 2015 and 2018 [REF].

Unlocking Private Investment

Traditional bank products, such as loans, credit lines and bank overdrafts continue to be the main source of external finance for European enterprises. Alternative market based external resources such as equity play a relatively minor role in the EU with the tax system reinforcing the status quo as interest payments on debt financing are tax deductible, while the costs related to equity financing are not.

The short-term character of traditional financing and comparative disadvantage of equity is a significant constraint to innovation investments. Deep tech innovation requires large amounts of patient capital: the companies concerned generally lack revenue streams and secured cash flow; are IP rich but have no tangible collateral; and will take time to deploy their results in terms of both marketable products and financial returns.

The Commission will therefore look to increase the availability of equity and make it more attractive for companies by reducing the cost of new equity across the EU through a **debt-equity bias reduction allowance (DEBRA) on corporate income tax**.

This action will provide an allowance on equity cost combined with a limitation of interest deductibility. All non-financial corporations would be eligible for an allowance on new equity and SMEs will receive a higher notional interest rate compared to larger firms.

Intellectual Property as Collateral

Deep tech innovation is centred on new science and technology, with the underpinning Intellectual Property (IP) a critical asset held by start-ups and SMEs. When protected, valued and transferable, IP can help attract investment. However, there is currently limited scope for technology driven start-ups to value, and use IP as collateral for debt financing.

Under InvestEU, the Commission will look to facilitate access to financing for innovative start-ups, scale-ups and SMEs by building expertise and capacity to **help financial institutions apportion value to, and enhance the transferability of IP** (intangible assets). This will allow SMEs to use IP as collateral, lowering capital costs. The Commission will also examine how advances in data science can help inform IP valuations

Improving Deal Flow

The pipeline of deep tech companies in the EU has grown in recent years. However, the EU underperforms when compared to its main international competitors in terms of number deep-tech start-ups. Hello Tomorrow and BCG [REF] identified almost 8 700 deep-tech firms operating in fields as diverse as biotechnology and quantum computing with the US accounting for almost 50% of start-ups in the sample and the EU lagging behind with just 14% across all its Member States.

By establishing the European Innovation Council (EIC), the most promising start-ups in Europe can now gain support for, and scale-up their breakthrough innovations. Through a unique combination of public grant and patient investment, designed with a view to crowd-in private investment, the EIC covers pre-seed, seed and early stage financing for deep tech companies.

During the course of Horizon Europe, leveraging a budget of €10 billion, the EIC will boost support for breakthrough technologies and innovation across Europe, and is structured to crowd in between €30 and 50 billion from other private investors. This will radically transform tech investments and company growth across Europe. Further, a new **'EIC ScaleUp 100'** action will identify a cohort of a hundred deep tech start-ups with the potential to scale up as global leaders or potential unicorns from the portfolio of the EIC as well as other EU programmes. By mid-2023 these companies will start receiving enhanced support to develop their strategy and leadership team, protect Intellectual Property [IP], connect to strategic investors and partners, expand internationally and obtain links to national scale up support. Besides direct support to companies, the initiative will also share best practice amongst Member States and across Europe-wide networks.

Later Stage Venture Capital Financing

The EU lacks large ticket sizes from large VC funds when compared to those in the US and China, as well as some sovereign wealth funds. When looking at the distribution of VC investors across different investor types, pension funds and insurance companies account for only 12.7% of the total VC funds raised in the EU in 2020. Government agencies on the other hand accounted for the largest share (almost 35%), which in turn reinforces the fragmented European VC market, with many investors focusing on early stage, narrow regional markets, which result in fewer and smaller late-stage investment rounds in Europe. To date, a majority of the larger investment rounds have also been driven by overseas investors (non-EU based VC funds are present in 75% of the scale-up finance deals in the EU) resulting in a large percentage of recipient firms leaving the EU: 45% of EU-companies between 2003 and 2015.

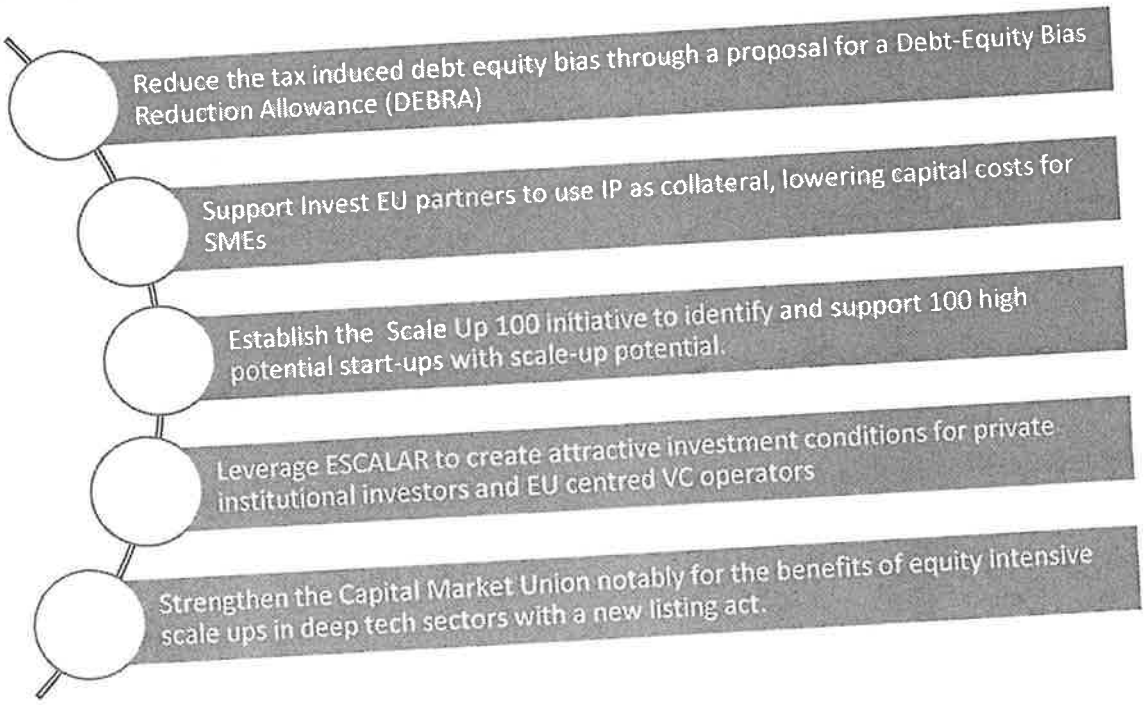
Mobilising a fraction of the ca. €10 trillion of "assets under management" (AUM) of EU-based long-term institutional / private investors including pension funds and insurance companies, into scale-up venture capital funds will significantly alter the playing field. To this end, following a successful and well-received pilot, the **European Scale-Up Action for Risk Capital (ESCALAR) mechanism will be expanded under InvestEU**. The expansion will attract more and new private funds, institutional investors in particular, by turning equity into quasi-equity with a reduced risk profile. This has the potential to double a given VC fund's investment capacity without distorting the character of the European VC landscape by attracting additional private investment based on a non pari-passu approach. The approach also increases the fund-raising capacity of ESCALAR-participating VC funds for normal equity investments, as fund scale increases the potential cost-benefit in favour of investors.

Listing

Going public through an Initial Public Offering (IPOs) is a logical final step on the growth path of SMEs and allows scale-ups to access risk capital to an amount of capital 5.5 times superior to that raised by those that remain private [REF].

EU IPOs however play a minor role in scale-up financing when compared to the US. In 2020, only 5% of the total divestment amount took place through IPOs in the EU, against the 30% reported in the US. An underdeveloped IPO market limits growth opportunities, reduces investor appetite and reduces the competitive pricing of new companies. It draws companies towards overseas listing, especially where complemented by an attractive supply of corporate investors capable of integrating start-ups into their portfolio [REF]. Taken together, this will push European deep tech companies towards relocation or result in their being out-paced by better financed rivals, threatening both the EU's ability to deliver against its policy ambitions, fully realise the economic benefits of these breakthroughs in Europe and achieve strategic autonomy in key sectors.

In recognition of these issues, and in line with the objectives of the Commission's 2020 Capital Markets Union (CMU) Action Plan, the **Commission will propose a Listing Act in Q3 of 2022.** An initiative simplifying and easing both initial and on-going listing requirements for companies in order to reduce costs and increase legal certainty for issuers. This action should facilitate cross border capital flows, choice for the companies for a first listing and reduce the investor home bias. The Listing Act will encompass the review of substantial pieces of financial regulation.



2.2 Framework Conditions

Framework conditions including regulations can drive or thwart the development and uptake of innovative new products and processes.

The EU has taken steps to remedy the current fragmentation of the internal market and adopt regulations that finely balance the need to protect with that to innovate as evidenced by the

Commission's 'Better Regulation' guidelines and associated toolbox. Experimentation clauses paving the way for a more dynamic evolution of regulations exist in the digital (REF: Artificial Intelligence) and financial (REF: Digital Finance) spheres. The European Blockchain Services Infrastructure (EBSI) is one such example providing a general-purpose pan-European platform for cross-border public services, which opens up an opportunity to test innovative solutions for use cases that benefit from the trust blockchain establishes in the immutability and transparency of data. The transport and energy sectors have also benefited from such approaches in some Member States.

Enabling Experimentation

The pace of technological change and the nature of breakthrough innovations calls for regulatory frameworks that facilitate experimentation by innovators and enable learning and adaptation by regulators. There is also considerable scope to learn from distinct approaches taken forward across EU Member States to clarify options at the disposal of innovators and regulators, to facilitate such experimentation.

The Commission will therefore **issue a Staff Working Document by the end of 2022** with an overview of the main existing experimentation clauses and regulatory sandboxes in EU law. An accompanying **Guidance Document,** to be issued in the first half of 2023, will clarify relevant differences and use cases with a view to supporting policy-makers and innovators in their choice of instrument. Moreover, as part of the Artificial Intelligence Act, a common framework for AI regulatory sandboxes across Europe has also been put forward to ensure that the regulatory framework is innovation-friendly, future-proofed and resilient to disruption.

Facilitating Testing

Technology infrastructures are key enablers accelerating the progress of new ideas and technologies to the market. They are essential to help convert breakthrough ideas into commercial propositions that can attract investment and enter the market. These infrastructures have their own lifecycle and can often be large-scale facilities critical to a multitude of users. The need for, and use of such infrastructures continues to grow and their availability must keep pace with the unique requirements of a range of breakthrough technologies.

The Commission will therefore establish a new **Open Innovation Test Bed in Hydrogen** to provide access to physical facilities, capabilities and services, including compliance with the legal and regulatory constraints, to support the development of a vibrant Hydrogen economy in the EU. A policy report will also be published with a further analysis of Open Innovation Test Beds (OITBs) and their potential applicability in the areas of nanotechnology and advanced materials in industrial environments.

[Placeholder for a potential Living Lab in energy communities].

The revised RDI Framework [scheduled for adoption in the first quarter of 2022] also includes **a new rule on aid for the construction and upgrade of testing and experimentation facilities**. As part of a wider set of measures, this will ensure that the General Block Exemption Regulation (GBER) and associated Guidelines can deliver to the policy ambitions of the European Green Deal and its Industrial and Digital Strategies.

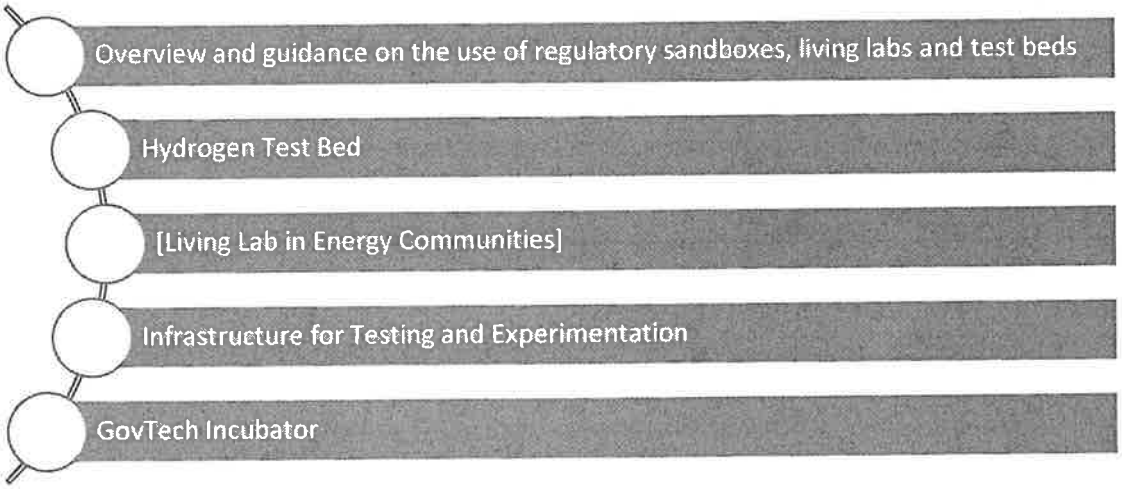
Innovation in the Public Sector

The recent evaluation of the European Interoperability Framework found that establishing structured cooperation around the interoperability of digital public services could have a material impact on innovation in the public sector.

[The Commission will therefore pilot a **Regulatory Advice Mechanism** (an expert group that provides upstream policy advice on new technologies and business models) **on the use of Artificial Intelligence in the public sector**, by Q4 2022. Advice from the group will facilitate experimentation of AI-enabled solutions in controlled environments.]

The Commission has also recently launched a tender to facilitate and operate a pan-European regulatory sandbox for Distributed Ledger Technologies (DLT), blockchain in particular. This will provide comprehensive legal advice pertaining to the operation of the core services of the European Blockchain Services Infrastructure (EBSI) and specific use cases.

The Commission will also support the **creation of the GovTech Incubator**: a multi-country cooperation framework focused on experimentation for the creation of innovative digital public services through the Digital Europe Programme.



2.3 Innovation ecosystems

Europe's innovation performance has improved over the period 2014-2021, and place-based innovation can turn Europe's diversity into an asset and lead to thriving ecosystems.

Smart Specialisation Strategies have played a key role in strengthening local and regional innovation ecosystems to stimulate economic growth. This has been complemented by initiatives such as INTERREG that stimulate interregional cooperation: over the last six years, 37 interregional partnerships were created across the EU, and 180 territories from 33 EU and non-EU countries have worked together in specific smart specialisation areas [REF *and more definition – are these technologies/ markets, perhaps a case study for inclusion?*].

There is also now more coherence with greater synergies between EU policies and funding mechanisms supporting business innovation at all levels and the recently established Recovery and Resilience Facility (RRF) will underpin such developments. EUR 672.5 billion (in 2018 prices) will be provided in the form of loans and grants to address country-specific challenges identified in the European Semester and to promote the green and digital transition that will contribute to system-wide resilience. It is estimated that more than EUR 44 billion of this amount will support research and innovation. This comes on top of the billions of euros Member States can use to support research and innovation from the EUR 392 billion budget of the EU's cohesion policy in 2021-2027, and the EUR 13.5 billion dedicated to the European

Innovation Council, the European Institute of Innovation and Technology and the European Innovation Ecosystems under Horizon Europe's "Innovative Europe" Pillar in 2021-2027.

New models of collaboration are also being encouraged. The Hubs for Circularity (H4C) initiative, for example seeks to accelerate the industrial green transition by involving all stakeholders including industry, local authorities and civil society to anchor solutions in the local ecosystem and develop new value chains for the engineering of net-zero (waste) circular economy.

By increasing the inclusion and interconnection of less represented regions and actors into a more strongly integrated European ecosystem, Europe can capitalise on the experience, needs, vision and perceptions of a diverse range of people, companies and places. In so doing, it can also take forward a uniquely inclusive European model that is sustainable, guards against substantial labour market and wage gaps, and associated threats to social cohesion.

Nonetheless, regional disparities in R&I performance remain a concern. Europe's highest performing regions are up to nine times more innovative than the lowest performing ones. This gap in innovation performance mirrored by downturns in economic growth, connectivity and income, alongside rising inequality [REF], weaken the performance of the EU ecosystem for innovation as a whole. In this context, the uptake of innovative technologies also needs strengthening: around two-thirds of EU manufacturing companies have not recently used any advanced technologies [REF].

Low R&D investment and innovative capacities also link to the quality of local institutions, fragmented support structures and sub-critical networks. Inter-regional linkages are also critical to enable diversification that build on regional capabilities [REF] and prevent 'lock-in' by absorbing new knowledge, addressing local needs and enabling businesses and entrepreneurs to go beyond local or national markets to successfully respond to global competition.

Further, there is unexploited potential in local and regional innovation ecosystems, often centred on a higher education or training institutions. These institutions can contribute to industrial sectors and global value chains, but currently lack incentives, experience and the resources to engage more actively.

Partnerships for Regional Innovation

Building on the experience of smart specialisation strategies, the EU will **pilot Partnerships for Regional Innovation** to explore routes to enhance coordination and the directionality of R&I investment and policies at the national and regional level in support of EU policy priorities. A key focus will be the five Horizon Europe mission areas, alongside technology and value chains in areas such as AI, blockchain, quantum, batteries, biotech, cleantech, hydrogen, renewables, mRNA and oncology.

These new partnerships will provide strategic frameworks for innovation-driven territorial transformation, linking placed-based opportunities and challenges to EU priorities. The pilot action launched in May 2022 by the Commission and the Committee of the Regions will develop and test new tools and governance mechanisms inspired by best practice across Europe and the globe, and will enable participating regions and Member States to:

- Mobilise policies, funding instruments (EU, national and regional) and stakeholder efforts towards a coherent direction, tailored to the specificities of each region, to amplify local impact and contribution in relation to the twin transition and resilient recovery;
- Develop and test tools and methods for assessing the functioning of regional innovation ecosystems, based on a mapping and gap analysis of existing governance mechanisms, innovation-support services and collaborative structures; and

- Identify the need and operational plans for new or reinforced collaborative structures to support deep-tech innovation, and field-test remedial actions for reinforcing access to relevant services and facilities.

Supporting Local Implementation

Local innovation actors need to have easy access to innovation-support services for a range of essential services ranging from those that help test and validate new technologies to advisory structures facilitating access to finance, skills and markets.

There are numerous such structures at EU, transnational, and local levels that have been put in place over the years. Research and technology infrastructures for example, act as excellence hubs that attract the best researchers, engineers, technicians and students. They have the capacity to engage in, and further develop, regional and local innovation ecosystems and to become one-stop-shop for societal and economic activities.

In some regions, smart specialisation and aligned regional development funds to investments in research infrastructures have intensified and accelerated these synergies, fostering place-based innovation. This has led to the creation of regional knowledge and innovation hubs based on co-location of research infrastructures, universities, research and technology organisations, and industry (e.g. Grenoble, Hamburg or Brno).

However, in the absence of such centralised entry points, the myriad of support structures that may exist can create a complex and fragmented landscape, which hinder the ability of innovators to fully exploit the support and opportunities that may be on offer.

The Commission will therefore test the concept of ERA Hubs with the subset of EU regions participating in the Pilot Action on Partnerships for Regional Innovation. These hubs will complement and reinforce the delivery of innovation-support services to local actors, as well as their interconnection across regions. This will enable existing pockets of excellence to develop and consolidate into **local 'deep tech valleys'** in priority areas for the EU. It is envisaged that in time, 50-100 such local deep tech valleys could be created across the EU, which will focus activity, funding and ensure the provision of essential support for services including:

- Capabilities for testing and validation
- Access to finance
- Business acceleration services including with regard to internationalization
- Market intelligence, and
- Education and skills development

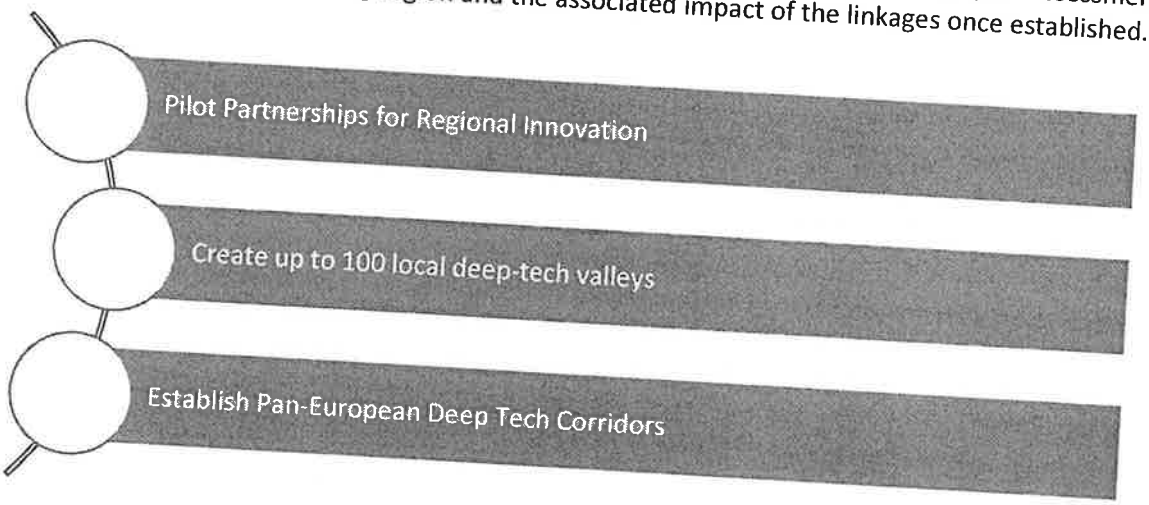
Ensuring European Added Value

Creating European value chains in support of achieving open strategic autonomy in key domains requires inter-regional networks to be established that can foster essential cooperation and build innovation capacity across EU regions.

The Commission will therefore design, test and support the **establishment of deep tech corridors** bringing together and linking the local 'deep tech valleys' to others with a complementary focus and capability in order to build EU technological and industrial value-chains in these priority domains.

This action will build on existing efforts aimed at reinforcing and connecting regional innovation ecosystems through amongst others, the Interregional Innovation Investments of Cohesion Policy (I3 instrument), Horizon Europe (European Innovation Ecosystems) and the European Institute for Innovation and Technology's (EIT) Regional Innovation Scheme.

It will be informed by the identification of strategic deep-tech areas for Europe, an assessment of the potential of each contributing region and the associated impact of the linkages once established.



2.4 *Innovation Policy*

Impactful policies, including public sector demand, drives innovation.

[NB *More background/ scene setting text to come*]

Enhancing Public Procurement

Public procurement makes a significant contribution to global GDP: EU public authorities spend around 14% of GDP (around €2 trillion per year) in procuring products and services. Leveraging the role of the public sector as a lead customer can shape markets that support the twin transition, deliver improved services and importantly, provide innovative start-ups with a vital first customer.

According to the OECD (REF) however, while 81% of OECD countries have developed strategies or policies to support innovative goods and services through public procurement, less than half of these countries are measuring the impact of their support.

Further, data that can inform improved approaches are either missing or inconsistent, impeding informed decision-making. The Commission will therefore publish a **report on the take up of the Innovation Partnership** procedure within the procurement directive of 2014, intended to enable a combination of support for research, innovation and procurement. The Commission will also publish a report on the uptake and impacts of pre-commercial procurements in the EU and a study, on the strategic use of public procurement for innovation in the digital economy.

Effective policy design and implementation also requires insights gained from the provision of innovation support to be shared and adapted to accommodate needs and capabilities as appropriate at EU, national and regional levels.

The European Commission's Technical Support Instrument, Horizon Policy Support Facility and Technical Assistance for regional policy, supports Member States and regions in designing and implementing better innovation policies. The newly established the EIC Forum also provides a new platform to share insights and explore scope to test new approaches at scale.

The Commission will therefore propose **support for the professionalisation of public procurement personnel** to facilitate innovation procurement, through the Technical Support instrument and its flagship actions. This will strengthen capacity in Member States and regions in the design, identification and implementation of impactful policies that can help leverage the significant untapped potential of public procurement to drive innovation by building associated capacity.

Improving policy-making on R&I at an EU level

Policy experimentation allows new approaches to be tested and their impact to be understood. To encourage and support more such experimentation, the Commission will launch a tender to explore approaches to better embed policy experimentation into research and innovation policymaking and, explore the use of such approaches in the context of the EU Missions.

The Commission will also publish a study to evaluate and identify lessons from Horizon 2020 that should be incorporated under Horizon Europe, with a particular focus on innovation support programmes, such as Access to Risk Finance, Innovation in SMEs, the EIC Pilot, EIT KICs and Eurostars-2 and building on prior evaluations. The study will feed into the *ex post* evaluation of Horizon 2020, due by the end of 2023, and the mid-term review of Horizon Europe.

Data Informed Policy

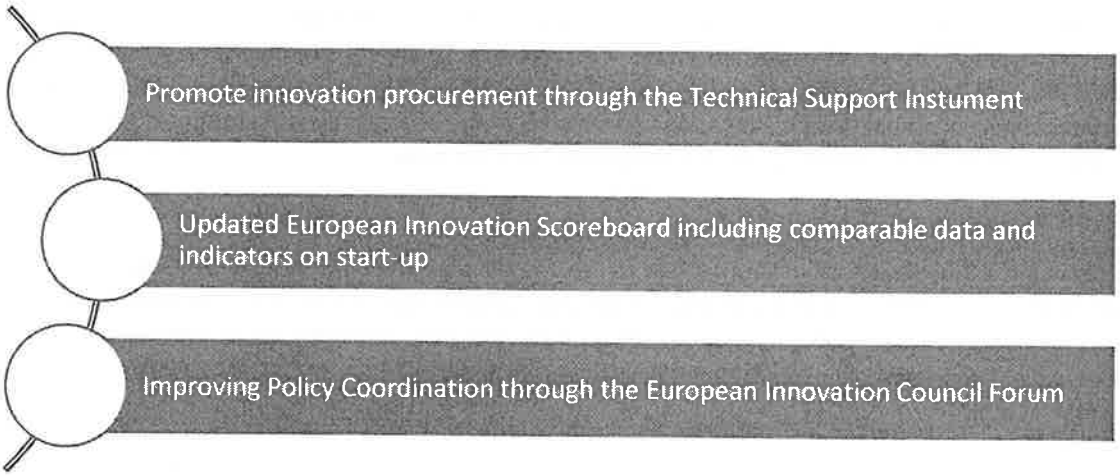
Common definitions that lead to comparable data and insights can inform better policy making by delivering comparable statistics on emerging themes such as scale-ups and deep-tech, and lead to the development of a common data taxonomy.

The Commission will prepare an exploratory report during the first quarter of 2023 on **definitions related to start-ups and deep techs** and consider incorporating this into an updated European Innovation Scoreboard. A study will also be published in the first quarter of 2024 to **establish a set of indicators on start-ups** in particular, that can track, analyse and model innovation ecosystem policies at regional, national and European level.

Improved Coordination

The coordination of activity at all levels across the EU towards achieving priority goals remains a significant challenge at present. This [expanded problem statement to come]...

The Commission will therefore **strengthen the role of the European Innovation Council Forum** as the coordination platform for national innovation policy initiatives, in synergy with the Pact for Research and Innovation in Europe, supporting the implementation of national European Research Area policies.



2.5 Fostering, attracting and retaining talents

Innovation requires the successful nurture, retention and attraction of talent.

Conditions that ensure a flow-through of highly skilled and talented individuals is key to achieving wider policy priorities including the twin transition and a competitive edge. This requires a combined effort at EU level and policy synergies and associated instruments to address common challenges. To date, the Bologna and Lisbon processes have played a key role in improving European competitiveness in higher education, boosting both mobility within Europe and incentivising global talent to move to Europe [REF].

Despite this, the EU appears to be losing the global race for talent with other OECD countries, such as the USA, Canada, and Australia attracting more at early career stages including PhD level. Skilled researchers and potential academics have moved to the US, with low capacity to retain young researchers, unfavourable framework conditions, a lack of private funding cited amongst the reasons. Research salaries in Europe are also lower when compared to the US and Japan [REF] and the lack of fair recruitment processes, particularly in southern European countries [REF] add to concerns.

In parallel, Europe's working age population is shrinking and the changing labor market with the shift to a more digital and green economy alongside the need for a more highly skilled workforce [REF], point to the likelihood of a growing skills mismatches and future shortages. These shortages will be accentuated by high concentrations of talents. The HEInnovate Country Reports show that the most innovative and entrepreneurial HEIs are concentrated in the main cities with a resultant disparity between the needs of the economy and the availability of talent. Regions with the potential to develop technologies critical to the green transition such as renewables are often distant from those with transitioning industries such as coal mining [REF]. University-industry collaboration, a crucial channel for the production and diffusion of new knowledge, also point to mixed uptake in support of inter-sectoral mobility despite increased recognition of its value [REF].

Further, Entrepreneurship training is not equally accessible and the EU's innovation ecosystem does not reflect the rich diversity of its population: women, including founders and investors remain under represented with 85% of start-up funding going to all-male founding teams with no material change to this trend in recent years [REF].

Efforts are now being made across a number of Member States to deliver more open and transparent merit-based recruitment, improve the employment status, working conditions and mobility of researchers. Incentives are also now in place for industry to recruit early career researchers.

Several Member States have now launched 'start-up visas' and in 2021, twenty-four Member States signed the Declaration on the EU Start-up Nations Standard, which promotes policies that will favour start-ups, and facilitate access to talent, including international talent.

At EU level, proposals under ERA, EEA, the Skills Agenda and the European Strategy for Universities have also sought to better retain and attract talent. However, much more needs to be done to meet the talent needs of the EU and to drive innovation in key sectors.

A European framework attract and retain talent

Retaining and attracting talent will require a coherent and coordinated approach across the EU. Weaknesses in recruitment and working conditions, social protection, training and career progression must be addressed, while enabling geographical and inter-sectoral mobility, inclusiveness and the promotion of entrepreneurial skills.

The Commission will therefore put forward a proposal for a **Council Recommendation establishing a European framework to attract and retain research, innovation and entrepreneurial talents**.

The framework will foster the recognition of the research profession, often at the heart of breakthrough innovation, as well as interoperability and comparability of careers across sectors and Member States. It will bring together efforts from Member States, the Commission and stakeholders including academia and business to facilitate the necessary flow of talents, a culture of innovation and an entrepreneurial mind set.

Developing a deep tech talent pool

To retain and grow deep tech companies in the EU, it will be essential to have an adequate flow of talented individuals that are knowledgeable in, and trained as required to work with state-of-the-art technologies.

To this end, the European Institute of Innovation and Technology (EIT) will take forward an initiative to train at least **1 million deep tech talents** over the next three years. The EIT will update and scale up its talent and skills development programmes based on the needs of deep tech fields ranging from biotechnology to cleantech. The curricula will be developed with the input of scale up companies and wider industry representatives and elements will be continuously updated to accommodate changing labour market needs in respective technology areas. The scheme will pay particular consideration to, and include incentives to ensure a high percentage of female representation and participation in the initiative.

Public and private organisations including for example members of the Unicorn group, businesses and education providers will also be invited to join the initiative and to pledge their support to develop and roll out associated training.

Promoting an entrepreneurial and innovation culture

There is a wealth of activity at European and national levels providing opportunities for talented young individuals to experience and potentially follow an entrepreneurial career path. However, much of this remains sub-critical in scale, geographical reach and impact.

The EIC and the EIT will therefore launch an **innovation intern scheme** that will create opportunities for over 600 researchers and innovators to gain work experience in successful EIC and EIT supported companies. Each internship will be informed by the researcher's and associated company's needs.

The programme will be open to participants of EU programmes supporting postdoctoral researchers, PhD candidates and Master's students[2].

A **Women Entrepreneurship and Leadership scheme** will also be established to support early-stage women-led tech start-ups including through an enhanced 'WomenTech EU' call and by reinforcing collaboration between the EIC and EIT to support female entrepreneurs, by opening the EIC's Women Leadership Programme to women-led deep-tech start-ups from the EIT. Opportunities to establish a network to connect female beneficiaries from a range of initiatives will also be explored. Efforts will also continue to equip girls and women with entrepreneurship and digital competencies through targeted actions like ESTEAM Fests, and to support the creation and development of social start-ups led by women by making the best use of actions included in the European Social Economy Action Plan.

Connecting to European Ecosystems

Increasing the mobility of tech talents towards and within Europe will be instrumental for Europe to fulfil Europe's future labour market needs.

The policy package on "Skills and Talent" adopted by the Commission in April 2022 will facilitate this by establishing an EU Talent Pool for international recruitment and support matchmaking between EU-based employers looking for qualified third country nationals wishing to work and move legally to the EU coupled with Talent Partnership with those countries. The revised Students and Researchers VISA and the EU Blue Card Directive within the package can through their swift transposition offer a legal pathway for attracting high-skilled third country labour to the EU and facilitate mobility within the EU.

The above measures can be further reinforced with an EU Talent Pool and Talent Partnerships targeting talents within the EU, by exchanging best practice and cooperation amongst Member States and key stakeholders. In addition, facilitating a marketplace matching job seekers to potential employers could be achieved by boosting capacities of the ERA Talent Platform in synergy with EURES and Europass to use data and technology to connect talents more directly to relevant opportunities and by giving recruiters what they need to make the best matches and convince their candidates.

More can also be done to accelerate the development of the legislative framework to attract entrepreneurs from third countries to Europe and to assess the scope for further EU level action targeting the attraction of entrepreneurs and start-up founders from third countries.

Fostering entrepreneurial education and life-long learning

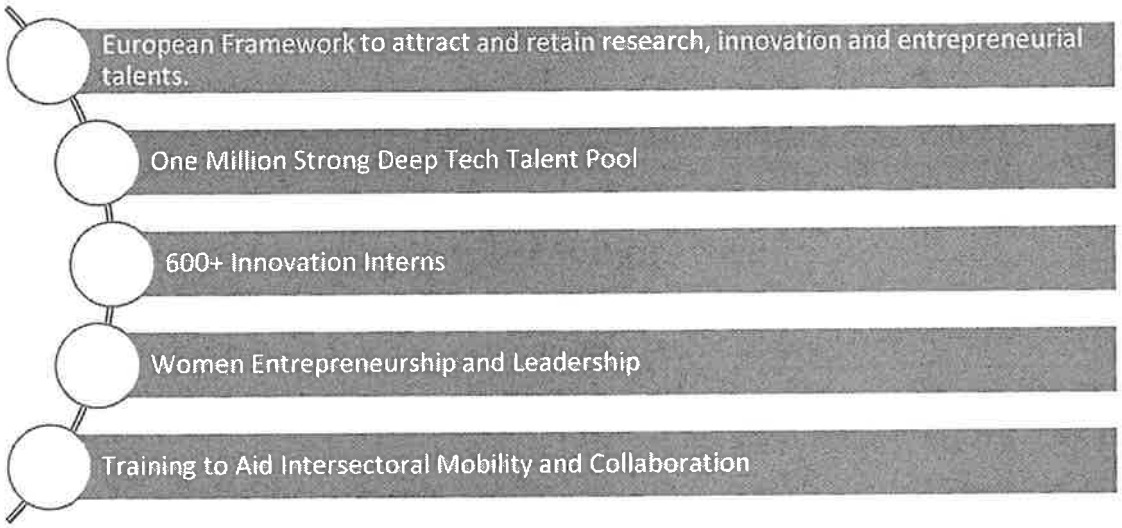
In order to increase the European innovation potential, inter-sectoral mobility and market uptake of new technologies, there is a need to increase the flow of individuals from universities and research performing organisations to industry.

Steps have been taken under the ERA policy agenda to improve collaboration through the development of Guiding Principles for knowledge valorisation and the Codes of Practice for smart use of IP and standardisation for researchers. However, stakeholder discussions to date also point to an urgent need

[2] Marie-Sklowdowska Curie Actions (MSCA), EIC Pathfinder, European Research Council RC and EIT Label degree education programmes, EIT Alumni and EIT Jumpstarter

to mature the knowledge of open science, data management, and IPR in research performing organizations and amongst technology transfer offices to facilitate collaboration with business and SMEs including start-ups, at local, European and global levels. This requirement has become ever more urgent given the growing needs for high quality remote testing, validation and up-scaling services delivered by research and technology infrastructures across Europe.

The Commission will therefore provide **targeted training** for researchers, technology transfer officers and research and technology infrastructure operators and technicians in universities and research performing organisations.



3. Conclusion

Indicative timeline – next milestones

By 6 May COB

- DGs comments and feedback on the draft text.

Until 10 May

- Call for Evidence published on the better regulation portal – for stakeholders to comment.

21 May – 7 June TBC

- Written ISC of 10 working days

5 July

- College meeting and possible adoption date

Indicative timeline

by end of March

- DGs comments and initial feedback

April

- Call for Evidence published on the better regulation portal – stakeholder have four weeks to comment.

End of April

- II ISSG meeting to present the stakeholder feedback and draft text of the Communication

by mid-May

- DGs comments and feedback on the draft text.

Mid-May till end of May

- ISC

5 July 2022
College meeting and possible adoption date

European Commission