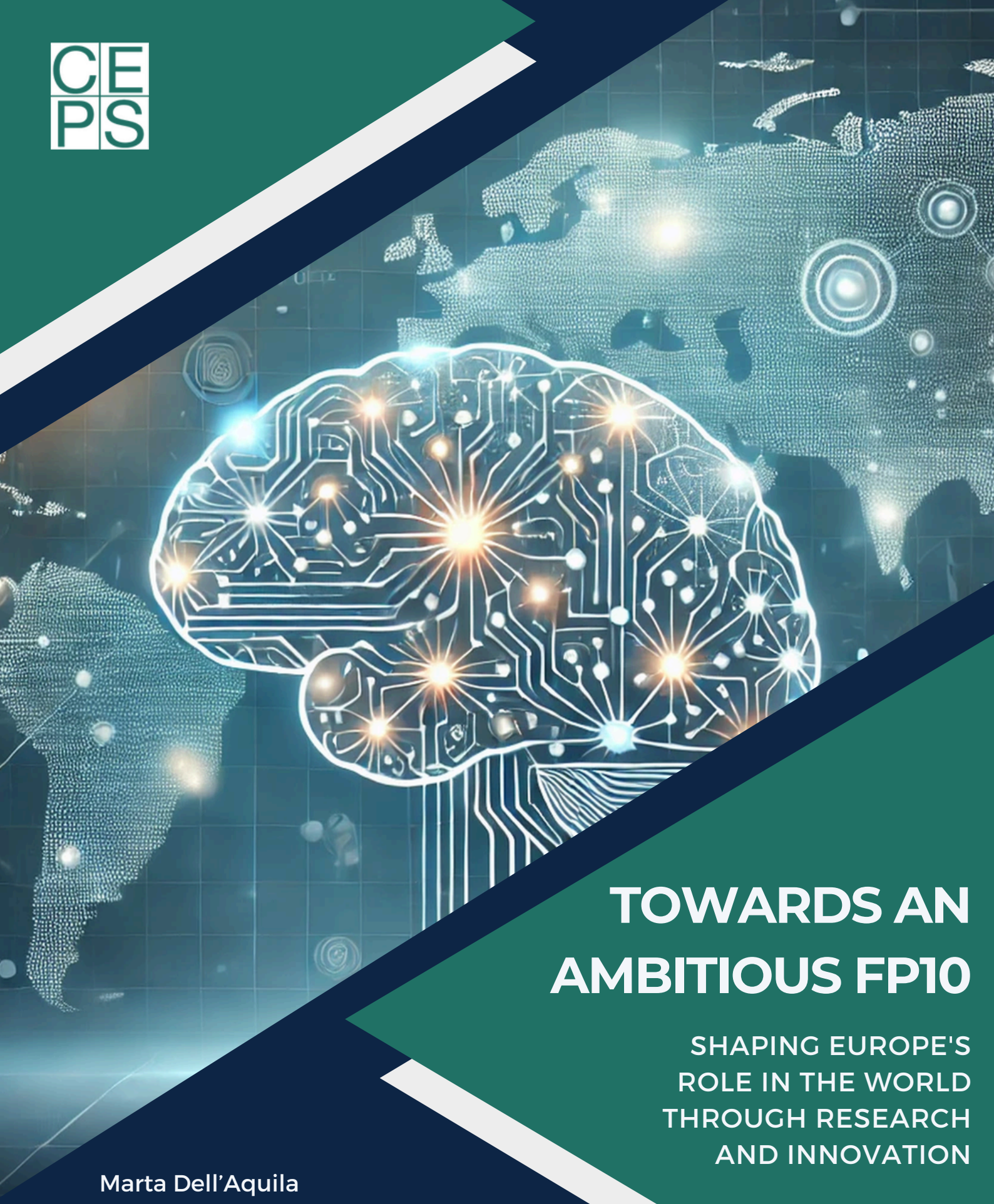

TOWARDS AN AMBITIOUS FP10

SHAPING EUROPE'S ROLE IN THE WORLD THROUGH RESEARCH AND INNOVATION

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Forewords

The 10th Framework Programme for research and innovation (FP10) represents a pivotal moment for Europe—one that could shape its future for decades to come. Defining the contours of a programme set to launch in 2028 is no small task; it is as daunting as it is essential. In our efforts to rise to this challenge, we have drawn upon evidence, foresight, and collective reflection. This endeavour was supported by two exceptional institutions, numerous passionate and engaged stakeholders, a dedicated team of Center for European Policy Studies (CEPS) researchers, and the invaluable guidance of fifteen world-class experts.

This wealth of collaboration and expertise has instilled in us a profound sense of responsibility. We knew that our proposal's ambition and quality had to reflect the gravity of the task at hand. As we delved deeper into the potential of FP10, we became increasingly convinced of its transformative power. A well-conceived and expertly implemented programme could be the difference between a Europe struggling to navigate an increasingly hostile global landscape and a Europe that thrives—one that partners with the world to push the boundaries of knowledge and tackle the many unanswered questions that lie ahead.

Andrea Renda, Director of Research at CEPS and Lead Author of the Report

In an increasingly complex period of geopolitical and economic change, the time to design FP10 comes at a pivotal moment. As a global charitable foundation, based in the UK and Germany, funding science all around the world, Wellcome's vision is of a healthier future for everyone. We aim to achieve that by supporting discovery research and bringing solutions to the urgent health challenges of mental health, infectious diseases, and climate & health. But let us be clear: those are global challenges that require international collaboration in science, research, and innovation to solve them.

The EU Framework Programmes have a strong track record in bringing together scientists around the world. Here, the CEPS offers deep reflections and valuable recommendations for shaping FP10 into a programme capable of driving research and innovation for the EU, which in turn will drive global progress. We know research thrives when we work together across borders and across sectors. We have a unique opportunity - let us make the most of it by bringing partners together to support EU and its member states in creating a framework that is bold, equitable, and truly collaborative in its ambition.

John-Arne Røttingen, Chief Executive Officer of the Wellcome Trust

FP10 is being developed at a time of profound socioeconomic, environmental and geopolitical change across Europe and beyond. Science and innovation are essential to humanity's ability to respond to global challenges in health, climate, emerging technology and security.

Imperial's world changing research and innovation harnesses our expertise in science, technology, engineering, medicine and business (STEMB). We are a community of problem solvers from over 140 countries, collaborating with partners in over 190 countries. For decades the EU's R&D Framework Programmes have been of unparalleled scale, enabled multilateral collaboration and provided access to critical knowledge, infrastructure and networks for scientific discovery and technological innovation.

Policymakers and science communities across Europe will need to come together to develop a new FP10 programme that can continue to support collaboration for impactful science. We hope that this report contributes to a new programme that will harness European strength in science to drive economic, social and environmental progress across the continent and beyond.

Hugh Brady, President of Imperial College London

Executive summary

In a world increasingly prone to uncertainty and crisis, Europe has a major responsibility to lead the way in tackling global challenges, using science and technology for the benefit of humanity. The President of the European Commission, Ursula von der Leyen, confirmed this ambition by stating the EU's aim to put research and innovation, science, and technology at the heart of the European economy, and observing that Europe will be needed more than ever, particularly when it comes to multilateralism and partnerships.

A key instrument for Europe to pursue these goals is the Framework Programme for Research and Innovation (R&I), the largest R&I funding programme in the world. Following the 9th Framework Programme ('Horizon Europe'), the next edition, the 10th Framework Programme (FP10) will run from 2028 to 2034. It represents a critical opportunity for Europe to restore and relaunch its leading role in pursuing scientific breakthroughs and groundbreaking innovation for all.

Against this background, this report presents a vision and possible pathways towards an ambitious FP10. It has been drafted by a team of CEPS researchers and benefited from the support of the Wellcome Trust and Imperial College London. We have relied on an in-depth analysis of stakeholder views, as well as guidance from an Advisory Group of 15 outstanding experts with wide-ranging, world-class expertise on research and innovation. We have also drawn on the findings of important contributions such as the recent reports authored by Enrico Letta and Mario Draghi, as well as the 'Heitor group', all of which call for reforming EU R&I policy and at least a doubling of the budget for FP10 compared with Horizon Europe.

The resulting vision for FP10 will require several reforms.

First, **FP10 will have to juggle a multiplicity of objectives**, such as boosting European competitiveness, achieving the EU's sustainability goals to help the world remain within planetary boundaries, and strengthening Europe's economic security and resilience. In addition are promoting the 'fifth freedom' by ensuring that every European region can thrive and supporting the advancement of science to address global challenges facing humanity and the planet. Different parts of FP10 may prioritise some goals over others, but overall FP10 must be balanced and oriented towards a North Star, i.e. the EU Treaty commitment to promoting well-being and sustainable development for Europe and the wider world.

Second, **FP10 will have to be more agile and future-proof than Horizon Europe**. This is essential for at least two reasons. By 2028, artificial intelligence (AI) and new frontiers of collective intelligence are expected to revolutionise the way research is carried out and translated into market-ready innovation. Failure to reflect this in FP10 would be a fatal design mistake. AI can also help in many ways in the implementation of FP10, in speeding up project selection, monitoring and evaluation, and in setting up innovative platforms to match start-ups with potential funders and mentors. This is why the newly announced AI research council should make an important contribution to the setup and operation of FP10.

Third, **the current pillar structure of Horizon Europe needs to evolve for FP10**, as it conflates two domains (industrial competitiveness and societal challenges) that increasingly require different governance, instruments, and mixes of goals. **We propose designing FP10 like a human brain**: with a core motor or cerebellum, i.e. a stronger excellent-research area accessible from all over the world and centrally coordinated at the EU level. **One hemisphere would be devoted to industrial competitiveness**, where an ad hoc council governed by public and private stakeholders (including industry) work towards systemic industrial transformation for sustainable competitiveness. **Another hemisphere would concentrate on multistakeholder partnerships for global public goods.** These would be open beyond European borders and would involve philanthropies, international donors and researchers from low- and middle-income countries in the governance of a dedicated council.

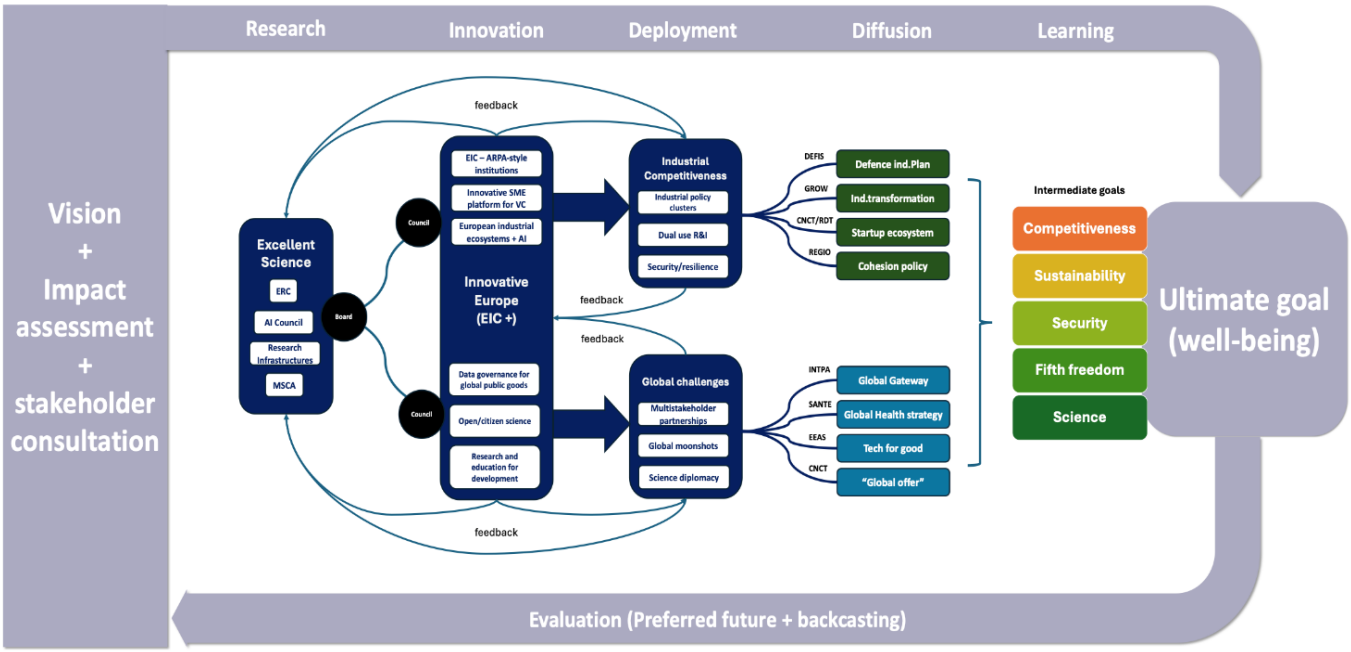
Fourth, with this new structure, the **FP10 hemispheres should feature different rules**, e.g. on intellectual property and the funding of dual-use R&I, which would be more possible in the competitiveness hemisphere. They should also feature **a different blend of instruments**, with innovative procurement, ARPA-style institutions and a platform for

startups playing a prominent role in the competitiveness pathway. Multistakeholder, mission-oriented innovation and partnerships should become the vital lymph of the global public goods one. We also recommend **different forms of governance**, with industrial competitiveness attracting European countries (including non-EU ones) and the private sector, whereas global public goods should have broader and more inclusive participation.

Finally, the two hemispheres of FP10 would enable **stronger and more coherent links with other EU and national policies** – a weak spot of the current Horizon Europe. The industrial competitiveness one would naturally be linked to industrial policy, defence, cohesion and regional policy, and trade. The global public goods one would be more easily coordinated with international partnerships, the global health strategy, and more generally the EU's priorities in external action.

The resulting structure and governance of FP10, shown in the figure below, **carefully balances the need to adjust direction when needed and to provide direction and stable funding for researchers and innovators**. It would cater to Europe's thirst for **sustainable competitiveness**, but also relaunch Europe as a leader of a global community seeking **answers to the challenges of our time and the years ahead**. It would give Europe a chance to thrive in a future of inevitable uncertainty, regain its gravitas in defending the role of science for a more prosperous future, and gather the global community of researchers and innovators around a pivotal set of actions, **promoting science as an engine for peace and prosperity**.

Figure 1. A comprehensive framework for an agile, effective, balanced and coherent approach to R&I in Europe



Introduction

Set to start in 2028 as part of the next EU budget cycle (2028-2034), the EU's 10th Framework Programme for Research and Innovation (FP10) is already at the centre of a very lively debate. Several recent contributions, including Enrico Letta's report on the single market for the Council of the EU, Mario Draghi's report on the future of European competitiveness commissioned by Ursula von der Leyen, and the 'Heitor report' on the evaluation of the current framework programme (Horizon Europe) have proposed a **significant increase in the EU's budget for research and innovation (R&I)**.

In preparing for her new mandate as President of the European Commission, von der Leyen explicitly stated in her guidelines her intention to put R&I, and science and technology, at the centre of the EU's economy. This implies a significant increase in research spending 'to focus more on strategic priorities, on groundbreaking fundamental research and disruptive innovation, and on scientific excellence'.

While Letta, Draghi, the Heitor group and numerous academic organisations agree on the need to at least double the budget, there also seems to be **convergence among diverse stakeholders on the need to significantly revamp the EU's framework programme.** Its overall ambition, structure and governance need to be redefined. This includes its relationship with other EU-level policy instruments (e.g. industrial policy, trade policy and international partnerships) and its link with policies and programmes that connect the EU level with Member States and regions (structural and cohesion funds, NextGenerationEU, etc.). The European Commission is reportedly working on merging several EU-level instruments into one large, consolidated fund for European competitiveness, and all multilevel instruments into single national plans. Yet it is not clear whether, when or how this will happen, or what conditionalities will apply to give direction to R&I programmes and projects.

Against this background, FP10 will need to **cater to a wide variety of outstanding policy imperatives**, which are increasingly taking on the contours of existential challenges for the whole EU project. The debate at the EU level has become inward-looking, with 'competitiveness' more and more seen as the North Star of future EU economic policy. New stances have emerged on economic security and technological sovereignty, triggered by recent shocks such as the COVID-19 pandemic and Russia's full-scale invasion of Ukraine. **This new compass seems to be orienting EU policies towards shorter-term, impact-oriented and inward-looking initiatives**, often inspired by approaches adopted in the US and China. These include a greater reliance on venture capital and the replacement or upgrading of the current European Innovation Council (EIC) with more dynamic institutions, modelled on the US advanced research project agencies (ARPAs).

However, the renewed emphasis on competitiveness, deeply nested in the Draghi report, has been criticised by some as not capturing the complexity of the challenges the EU faces, either internally or globally. Some critics have argued that doubling the public R&I budget would not address Europe's real shortcoming, i.e. the relative lack of private investment in R&D. **Commentators have pointed out that the emphasis on competitiveness could undermine Europe's decarbonisation ambitions**, which already appeared to be significantly diluted towards the end of the first von der Leyen Commission. Among others, the Expert group on the economic and societal impact of research and innovation (ESIR) advising the European Commission has called for a definition of competitiveness that takes into account the bio-physical limits of the Earth system, the 'planetary boundaries'. Future EU policies will also have to take into account the social, political and territorial boundaries that have often been ignored when crafting EU policy, generating discontent in many parts of the EU.

Amid this kaleidoscope of goals, **the EU cannot lose sight of its ambition to lead the world in the pursuit of global public goods**. The recent Pact for the Future conveys a strong sense of urgency about the need to recover the lost ground on Agenda 2030, and places huge expectations and responsibilities on science, technology and innovation to boost global progress towards the Sustainable Development Goals. FP10 is expected to be one of the EU's key contributions to this endeavour, towards 2030 and beyond.

Yet in order to effectively play this role, it should be endowed with governance, instruments and *modus operandi* that **reflect the evolution of science and innovation, enable global multistakeholder partnerships, and provide accessible**

and meaningful solutions for researchers and partners outside the EU. As von der Leyen stated in a speech in 2019 at the start of her first mandate as President, 'countries from East to West, from South to North, need Europe to be a true partner. We can be the shapers of a better global order'. It is now time to finally deliver on that promise.

While combining these ambitions and expectations seems challenging, the real test for FP10 will come from the evolution of technology itself. **Preparing for a science and innovation programme that will run from 2028 to 2034 involves two daunting tasks.** On the one hand is **anticipating how technology will evolve in the coming years**, so that money for research and innovation can be put to the best use by identifying meaningful, worthy programmes and projects that contribute to European and global objectives. On the other hand is **sensing how technological developments in artificial intelligence (AI) and other general-purpose technologies will gradually reshape the 'scientific enterprise' itself**, or the way in which scientific questions are approached, or solutions studied and tested. A recent example of the ongoing revolution in science is provided by the decision of the Royal Swedish Academy of Sciences to award the Nobel Prize in Chemistry to an accomplished computer scientist, who, although not a domain expert, used deep learning techniques to solve a scientific problem that human scientists had been grappling with for decades.

All in all, the making of FP10 appears at once as a highly important endeavour, a major challenge, and a make-or-break prospect for the EU, capable of enhancing Europe's role as a champion of global public goods or marking the EU's decline from a global power to an influential, if not self-referential, middle power. By responding appropriately to the economic, societal and environmental challenges of today and tomorrow, FP10 could also help Europe and the world to re-establish the role of science in an era increasingly fraught with disinformation and 'post-truth' narratives, and by a short-termism that is hard to reconcile with the need for robust scientific solutions.

This report, which CEPS has drafted with the support of the Wellcome Trust and Imperial College London, maps the current positions on FP10 of stakeholders from academia, government, business, and the scientific community. It makes recommendations developed with the support and guidance of an Advisory Group of 15 outstanding experts[1]. By combining stakeholder mapping with expert advice, we have been able to take stock with a more forward-looking approach, capturing ambitious ideas and translating them into feasible options for the future FP10.

> *The cornerstone and unique value-added of the European framework programs for research and technological development has been pre-competitive collaborative research. The success of FP10 will be measured by its ability to transcend national and sectoral borders to bring together current and future scientific, industry and technology leaders in endeavours that will boost science AND strengthen economic, social and environmental sustainability.*
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> 
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> **Sylvia Schwaag Serger,**
> President of the Royal Swedish Academy of Engineering Sciences (IVA), Professor at Lund University

To map stakeholder positions, we have analysed 32 position papers from academics and research institutions (72 %), public authorities (19 %) and business and industry associations (9 %). The majority of the papers were collected from European Research Area portal and the European University Association. Additionally, we have identified 56 op-eds and commentaries archived in the Science Business repository. These articles reflect the perspectives of academic or research institutions (55 %), EU public authorities or elected members (30 %), industry and business associations (13 %) and non-EU public authorities (2 %). We then gathered our Advisory Group members and a wide representation of over 90 stakeholders in a workshop organised at CEPS on 6 November 2024. The methodology and main findings from this scoping exercise and analysis can be found in the Report Annexes (separate file). This report sets out the lessons we have learned in the process.

The remainder of this report is structured as follows. Section 1 breaks down the policy problem into four main aspects. Section 2 looks at the design of FP10, including its goals. It discusses how to reconcile its European and global vocations, and its excellence and mission orientations. It also considers how to ensure an optimal bridge between research, education and innovation. Section 3 provides a more in-depth analysis of options related to the structure

[1] Jean-Pierre Bourguignon, Gunilla Carlsson, Peter Dröll, Evelyn Gitau, Daria Gołębiowska-Tataj, Desta Lakew, Benedicte Løseth, Eva Maydell, Anders Nordström, Andrea Renda, Sylvia Schwaag Serger, Luc Soete, Stefaan Verhulst, Jimmy Volmink, Amanda Wolthuizen.

and mix of instruments of FP10, its budget and governance. It assesses options for radically simplifying its procedures without compromising the quality of project selection, monitoring or evaluation, and addresses the debate around economic security and dual use. Section 4 concludes by outlining a roadmap towards a successful FP10. The report also contains three annexes with more detailed reports on stakeholder positions.

1 What is at stake

Independently of the goal it sets for the coming decade, Europe needs to boost its excellence and impact in research and innovation to be able to thrive in a constantly changing geopolitical landscape, and under the pressure of a rapid technological evolution. As world powers such as the US and China, as well as India, Korea and Japan, boost their investment in R&I and strive for enhanced coherence with other policies (inter alia, public spending, physical and digital infrastructure, trade and procurement), Europe must leverage its unique blend of knowledge, talent, institutions and infrastructure to achieve progress and prosperity for all.

Within Europe, the EU is by far the most integrated and powerful bloc, able to commit to substantial public investment through programmes such as Horizon Europe (FP9). As such, the EU has a special responsibility to ensure that Europe does not disappear from the map of global R&I, with many countries that have much to contribute to Europe's R&I landscape, potentially strengthening our continent's resilience, excellence and prosperity. **Joining forces with scientific powerhouses like the UK, Switzerland, Norway and prospectively Ukraine, is therefore of utmost importance if Europe is to continue playing its role in the world.**

This is even truer as the technology landscape is quickly changing, and Europe seems to be too fragmented in its approach to R&I to follow the pace of innovation observed in countries like the US, where general-purpose technologies such as generative AI are now being predominantly designed, developed, deployed and used[2]. As new technologies like quantum computing and synthetic biology increasingly mature in the coming years, Europe needs to dramatically shift gear if it does not want to become a colony of more advanced countries, dependent on technological solutions, infrastructure and data built and operated elsewhere, and designed based on values other than European ones. The recent appointment of a Commission Executive Vice President with a mandate on technological sovereignty responds exactly to this need. Yet sovereignty cannot and should not be achieved at the expense of non-European countries, especially low- and middle-income countries (LMICs), or at the expense of the collective pursuit of global public goods.

What is at stake is thus much more than simply Europe's 'competitiveness', expressed as Europe's market share in specific economic sectors, or its ability to access new markets in the coming years. **It is rather the continuity of the European project** built on the promise of prosperity and sustainable development, the pursuit of global public goods, the preservation of natural and social capital, the protection of democracy, human rights and the rule of law. There is also widespread agreement among scientists, policymakers, policy analysts and diverse stakeholders that **a more excellent Europe can have significant benefits not only for Europe but also far beyond**.

Below, we break down this problem into four dimensions: the need for FP10 to lead Europe through the 'triple transition' and face the disruptions likely to occur in the coming years; the need to embrace technological change and make it drive more dynamic and impactful R&I policy; the need to ensure that Europe remains a global champion of public goods; and the need to leave no one behind, be it within or outside the EU.

1.1 Navigating the social, green and digital transition in the polyrisk age

There is widespread consensus among scholars and scientists that we live in a 'polyrisk' or even 'permacrisis' age[3]. Governments and businesses invest in foresight to navigate the great unpredictability generated by global megatrends with enhanced situational awareness. The constant evolution of the geopolitical, technological,

[2] See Aiworld.eu.

[3] See, inter alia, ESIR group, 'Transformation in the poly-crisis age: From permacrisis to positive peace', EurActiv (2022).

environmental and socio-demographic landscape forces policymakers to abandon previous practices such as forecasting based on the simple projection of the present into the future.

Deep uncertainty and the deep interconnectedness of economic, social and environmental phenomena also lead policymakers to **abandon mono-dimensional approaches to policy**. From purely competitiveness-oriented policies to the Green Deal, attempts to reduce the complexity of policymaking by aiming at one target are often falling short of expectations: the 'Tinbergen principle' – one goal for one policy – does not hold here. Policymakers must address the trade-offs that each policy presents by imposing conditionalities and giving direction to innovators through supply- and demand-side policy measures.

For FP10, the challenge will be similar. The EU's enhanced focus on competitiveness should not come at the detriment of its role as a champion of global public goods or as a global benchmark in terms of quality of life and democracy. Our exchange with stakeholders and experts, and our own research, confirm that the EU should not try to emulate other countries by simply trying to outcompete them on their own turf; on the contrary, Europe should chart its own path. This is also confirmed by the recent reports authored by Enrico Letta, Mario Draghi and the Heitor group.

The name of the game, for Europe, is thus to find a way to boost Europe's competitiveness while preserving and further nurturing its social model and vocation of global public goods and long-term sustainability, in a world in constant evolution and with an ever-shifting technology frontier. This entails, among other things:

- **adopting a systemic approach to R&I** which considers our planet as a complex, adaptive system. This implies, inter alia, defining competitiveness in a way that is compatible with decarbonisation and socioeconomic sustainability. R&I policy must thus aim at maximising the societal value gained by using the Earth's limited natural resources while minimising environmental and social costs (including the non-equitable distribution of the benefits);
- **boosting R&I to seek those solutions that will enable a sustainable social and industrial transformation over the coming years**. In many sectors, including energy-intensive industries, R&I is needed to ensure that sectors can sufficiently decarbonise in a way that is at the same time human-centric and resilient ('Industry 5.0' approach);
- **devoting ample efforts and resources to effectively address not only European, but also global existential challenges** such as those identified in the recent 'Pact for the Future' promoted by the United Nations. It heavily relies on science and technology to find a solution to the widening distance between the status quo and the 2030 objectives nested in the Sustainable Development Goals;
- writing rules and designing programmes with foresight and anticipatory governance, in full awareness that reality can change quickly and in unexpected ways;
- navigating between grey rhinos, foreseeable but often ignored risks, and black swans, the unpredictable but highly impactful risks, governments should at once 'learn to prepare', and 'prepare to learn' when unpredictable events occur;
- **joining forces** with like-minded countries, international donors and the private sector, especially in the joint pursuit of global public goods, and **ensuring that the benefits of EU R&I policy become widely available to the whole of the EU and to the rest of the world, especially LMICs**. This involves a commitment to openness, in terms of both building bridges with non-EU researchers from all over the world and sharing the results of EU-funded research with those most in need of solutions.

Against this backdrop, it is clear that moving forward will require a North Star and new strategies. In crafting the future FP10, **the EU should thus address the many trade-offs posed by today's polyrisk age, but keep its principles and ultimate goals stable and non-negotiable.** It should also build FP10 as an adaptive programme, which masters and embraces technological evolution and its ability to shift the possibility frontier over time, while maintaining that science and technology is a means, not an end of public policy or its impacts.

Box 1. The EU Cities Mission: an example of a systemic approach to challenge-driven R&I

The Cities Mission aims at delivering 100 climate-neutral and smart cities by 2030, and making them act as experimentation and innovation hubs to enable all European cities to follow suit by 2050. It features clear targets and all the ingredients of an industrial plan for economic transformation in an era of global warming and polycrisis. In order to deliver on its goals, it faces uphill battles on several fronts.

First, **cities lack access to relevant resources** (metals and materials), **which forces them to experiment** with new solutions, including demand-side approaches. This has positive spillovers for Europe as a whole in its approach to decarbonisation, as it can lead to reinventing how and what we consume.

Second, the mission brings the entire industry value chain in dialogue with cities to align supply and demand. Yet, **the challenge of addressing skills gaps remains**, also in government. To deliver on complex and ambitious missions, policymakers should be trained, inter alia, in system thinking, as well as policy design and implementation.

Third, existing funding schemes are not in line with the growing magnitude of the problem, with the planet's warming expected to reach 2.4°C by 2040. The experience of the Cities Mission supports the view that **EU R&I policies and spending should be made more compatible with other, substantial sources of institutional and corporate finance.**

Fourth, narratives surrounding sustainability often frame green policies as potentially worsening living standards. **Europe's creative industries** are a major untapped resource, which **could play a key role in shifting public imagination**. They should be at the centre of innovation, showing that sustainable living can lead to prosperity, balance, and justice.

Finally, **the EU's multilevel governance system, while complex, offers many opportunities** which the EU can use to encourage actions for change. This would require combining place-based transformation and centrally coordinated R&I to achieve a significant shift in governance design and foster a more agile, locally tailored yet holistic approach to research and innovation in the EU.

1.2 Anticipating and embracing change: designing the new scientific enterprise and leveraging technological transformation

At present, 1 January 2028 is far into the future and the world could be a different one. Much can change within this timespan: only 3 years ago, in early 2021, the world was grappling with the COVID-19 pandemic. It had not seen ChatGPT or the return of war on Europe's soil, let alone the rise of the far right around the world or the first Nobel Prize in Chemistry awarded to a computer scientist with limited knowledge of the field. **So, do we really know how science and innovation will be carried out in 2028 or through to 2034?** The answer is no, but our conversation with experts provides an indication of how technological change will enable the scientific enterprise to reimagine and redesign itself.

From closed to open and collaborative research

Today, most R&I projects under FP9 feature a rather stove-piped, closed governance, which leaves limited space for openness and collaboration. This is often coupled with rigid governance, which translates into a reluctance to push the boundaries of science and innovation by testing high-risk, high-reward solutions or deploying new methods altogether. It also translates into a limited ability to grasp the best ways to address outstanding economic, societal and environmental challenges.

> *FP10 represents a vital opportunity to align Europe's research and innovation ecosystem with the global challenges of our time, fostering collaboration and groundbreaking solutions that benefit society, the environment and industry alike.*

Gunilla Carlsson,
Deputy Executive Director of UNAIDS, and Former Minister for International Development Cooperation of Sweden

Ten years from now, the scientific enterprise will be profoundly different and intertwined with AI and the practices of computation, openness and collective intelligence. The combination of these trends will reshape how research needs to be funded and conducted, leading to a more dynamic, inclusive, and impact-driven approach to tackling the world's most pressing public problems. Research will need to become more responsive, collaborative, and globally focused (not just Europe-centric), helping to address problems related to climate, health, inequality, and beyond.

Embracing AI-enabled research and innovation

The breathtaking evolution of AI is a good example, though by far not the only one (think about advances in quantum computing and synthetic biology among others). **New frontiers in AI will lead to new inroads in automated discovery and hypothesis generation**. By handling increasingly vast swaths of data, AI will be able to find patterns, suggest and test hypotheses, and even design experiments. Researchers will partner with AI models to enhance problem-solving capacity, especially in areas like drug discovery and climate modelling, and for societal challenges like inequality or pandemics. Many social sciences will also become more computational in their methodologies and approaches.

AI will also increasingly act as a collaborator in scientific teams, and an essential research 'colleague', accelerating innovation cycles by optimising processes like peer review, literature synthesis, and experimental replication. Research skills will still be crucial, but AI is expected to handle much of the complex data analysis and many of the repetitive tasks. It may also retain and preserve the knowledge base of research teams, by relying on locally stored knowledge and retrieval-augmented generation.

In this context, it is likely that **open science will become a non-negotiable part of the research landscape**. AI-driven science can indeed only exist if datasets are made accessible to generate insights. This in turn calls for Europe to keep mandating data access and open-access publishing in its FP10, a feature that will become inevitably more difficult in dual-use settings. But that will level the playing field for researchers globally, particularly in under-resourced settings.

Advances in data, AI, and collective intelligence are poised to transform the research enterprise, unlocking unprecedented opportunities for discovery and innovation. By aligning research funding with a vision of a more effective, open, and collaborative ecosystem, there is a window of opportunity to steer these changes to amplify the impact, foster inclusivity, and redefine the boundaries of scientific progress for the benefit of society.

Stefaan Verhulst,
Co-Founder of The GovLab and The DataTank, and Research Professor, New York University

The coming years may also see the consolidation of an already existing tendency towards **collaborative research models**. Platforms like ResearchCommons or Data Collaboratives can facilitate collective efforts, by pooling data and intellectual resources to focus on pressing global concerns. AI tools will curate and analyse these resources in real-time, improving the overall quality and impact of the research.

People will be an even more important element in this new mix. **Younger researchers** should be trained so that they pursue interdisciplinarity and combine the ability to formulate meaningful research questions with data and AI literacy. **Citizen science** too will likely move from a niche activity to a mainstream method for scientific inquiry, thanks to advances in collective intelligence, AI, digital tools, and open platforms. The general public, regardless of location or formal scientific training, can contribute to research in meaningful ways (and give more legitimacy to the whole scientific enterprise), enabling new features such as data collection at scale, crowdsourced insights, participatory policymaking, decentralised research networks, open research platforms, tokenised incentives and reputation systems, and peer-driven research review.

AI will also affect the 'back office' of R&I funding in several ways. These include **AI-augmented funding decisions**, in which AI helps funders identify high-impact research projects by analysing proposals, matching them to past success rates, and predicting potential societal impacts; **real-time impact monitoring**, with AI systems continuously monitoring ongoing projects, assessing impact in real-time and reallocating funds based on evolving challenges and needs; and a **greater focus on public interest problems**, thanks to AI's ability to help articulate outstanding matters through sophisticated modelling, hence improving predictions of future issues like resource depletion, displacement of large populations, and biodiversity loss.

Besides changes in technology, as well as new technological means to improve the funding, monitoring and evaluation of research, **AI has a widely recognised potential to dramatically improve the way we tackle grand challenges**. These include climate change and environmental sustainability, public health and pandemics, societal inequality and digital governance and democracy. All calls and larger-scale initiatives that will be launched under FP10 should thus include a strong AI component, in order to ensure they can harness the potential of this fast-evolving technology to provide answers to carefully designed research questions.

This leads to three further considerations. First, AI must be approached as foundational – a general-purpose technology that will permeate most scientific domains. This implies that **in its quest for scientific excellence, competitiveness and tech sovereignty, FP10 will have to devote significant attention to AI advancement and deployment**. The setup of an 'AI research council', included in Ursula von der Leyen's programme and echoing a recent report of the Scientific Advice Mechanism of the European Commission, as well as the emphasis on 'verticals' included in the Draghi report, are useful proposals that would need to be appropriately translated into a consistent, coherent effort to boost Europe's scientific excellence in AI, as well as the uptake of AI solutions in science. **But it is of utmost importance that the future AI research council looks at all R&I domains, rather than focusing only on a few use cases in science, as AI can have a pervasive impact on the whole scientific enterprise.**

Second, the growing role of AI and collective intelligence in research will inevitably pose new dilemmas in terms of ethics and governance, particularly concerning biases in algorithms, accuracy and trustworthiness, and governance models for data use. **The scientific community will need to ensure that research driven by AI and collective intelligence remains transparent and accountable**. Discussions about the 'social licence' for AI and data will play a crucial role in shaping future policies on how research is conducted and funded.

How we approach FP10 is an opportunity to trigger an innovation renaissance. Horizon has been an incredible vehicle for ground-breaking ideas and European excellence, but now it's time to shape FP10 in a way that also enables EU tech champions & globally in-demand companies to emerge.

Eva Maydell,
Member of the European Parliament (ITRE, D-US)

Third, **AI can accelerate the globalisation of science, enabling LMICs to better participate in global research efforts.** International partnerships, supported by AI tools for cross-language and cross-disciplinary collaboration, will address shared public problems. Funding models should prioritise global equity and avoid the use of neocolonial approaches to research partnerships, ensuring that LMIC voices are heard and values are also created at the local level. This is not a given: **the role of the EU in developing trustworthy AI solutions for science, and promoting access to these solutions outside the EU will be crucial to ensuring that the divide between more advanced countries and LMICs does not widen over the next decade**.

Taking technology seriously

In summary, the role of technology poses important challenges and opportunities for the upcoming FP10, which need urgent attention. Policymakers should ensure that:

- the launch of FP10 is preceded and inspired by a vision of how to integrate new technologies into the scientific enterprise. Consideration is needed of how to ensure that key preconditions are in place when FP10 is launched, such as distributed governance, access to computational capacity and AI models, data sharing and collaboration;
- **FP10 is designed based on suitable foresight and horizon scanning**. What shocks and technological evolutions lie ahead, and how can the EU play a leading role in AI governance and global collaboration?
- **EU values and principles, rooted in EU Treaties, are embedded as conditionalities in funding R&I** on all general-purpose technologies (AI, quantum, synthetic biology, etc.), leading to a human- and planet-centric approach to R&I;
- sufficient attention is paid to the involvement of next-generation researchers, from European and non-European countries, in making careers more attractive;
- **changes in the scientific enterprise are appropriately reflected**, including a departure from linear R&D models to nurture innovation, towards a highly data- and AI-driven scientific process;
- **space is given to more participatory, open science and innovation processes and projects**, in particular by leveraging AI and collective intelligence as the way forward towards a human-centric approach to R&I;
- **openness and public funding** continue to be cornerstones of FP10 in an age of increasingly privatised R&I and science. This includes mainstreaming data sharing and availability across all FP10 areas.

1.3 Placing Europe at the forefront of global challenges: multistakeholder partnerships

While part of FP10 will be devoted to European excellence and policy objectives, **the orientation of the framework programme towards addressing global challenges should be confirmed and strengthened**. This is essential also in view of the likely evolution of global governance in the coming years, with uncertainty looming over the global community's ability to take bold action to achieve the Sustainable Development Goals and proceed along the path charted by the Pact for the Future.

Importantly, FP10 will have to place collaboration between multiple stakeholders at the forefront of its *modus operandi*, especially on global challenges. This is far from trivial, since past framework programmes have often struggled to enable impactful multistakeholder collaboration, with some notable exceptions (e.g. EDCTP3, the European and Developing Countries Clinical Trials Partnership Joint Undertaking). Horizon 2020 and Horizon Europe have marked an attempt to advance on this front by fostering innovative governance forms, including the missions and the Knowledge and Innovation Communities (KICs). However, as observed by many, multistakeholder partnerships have not always delivered the expected results, and should be reconsidered in view of FP10, by streamlining the existing variety of governance forms.

In FP10, the EU should double down on its efforts to address global concerns by launching large-scale, mission-oriented collaborative projects. The reasons are simple. First, the magnitude and planetary nature of challenges such as climate change, loss of biodiversity, global migration, rising inequality, infectious diseases, weakening of democracy, human rights and the rule of law, and cyber risks are such that no government can go it alone. An absence of strong leadership and sufficient involvement beyond Europe would lead to moral hazard and collective action problems, thereby frustrating the ambitions of initiatives to address the concerns.

Second, the **transnational nature of many global problems** and the magnitude of the financial effort needed call for a strong involvement of global public institutions, private foundations, private business, civil society and local partners where appropriate. This also implies that the **financial and administrative rules of FP10 will have to be flexible enough, at least in the global challenges domain, to enable the blending of different sources of finance**, under the agile management and governance of one convening party. These complex initiatives, sometimes referred to as 'orchestration schemes', should see the EU play a role of orchestrator, at least in a limited number of key priorities, on which the EU is seen as a strong actor and a credible leader.

> *Strengthening the competitiveness of the European Union will not be possible without strong global collaboration and partnerships with other regions. The challenges of today and tomorrow requires research strategies and investments beyond our own borders.*
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> 
>
> **Anders Nordström,**
> Senior Advisor at Stockholm School of Economics and Karolinska Institute, Former Acting Director-General of the WHO

Third, global challenges must be addressed globally, and this requires **FP10 to reach out to large global powers such as the US, China and India, but also to Global Majority countries**, where impacts are most often disproportionately felt (for example on climate, migration, poverty and inequality, but also the digital and AI divide). In this respect, it will be essential to **strengthen the link between the current framework programme and international partnership policies such as the Global Gateway**. The latter features an ad hoc education and research pillar, which should become a solid bridge between FP10 and Europe's international research and education partnerships.

1.4 Leaving no one behind: why FP10 should address within-Europe regional disparities and the global impacts of its R&I actions

R&I does not take place in the same way, or to the same extent, everywhere. The more complex science becomes, the more that researchers augment their intelligence with technologies requiring expensive compute infrastructure, data and top talent, the less easy it is for many researchers to keep up the pace. Indeed, economies of scale and scope in research, innovation and funding intermediation are leading to **R&I activities being concentrated in a limited number of 'excellence hubs'.**

A good example is, again, AI. Our recent research has shown how most of the research taking place in Europe is concentrated in a number of metropolitan areas, including London, Paris, Munich and Eindhoven. As will be discussed in more detail below, the economics of complex R&I supports this development, even if new forms of collective intelligence and AI could increasingly draw on more decentralised, bottom-up governance forms that could democratise the scientific enterprise in many circumstances (see 1.2). At the same time, this has important consequences for Europe, as well as for non-European countries going forward.

A first important consequence is that to make the most of the FP10 budget, **EU institutions should map the existing research specialisations across the EU's** regions (and that of associated countries). This will enable a better understanding of the 'possibility frontier' of each sub-region of participating countries and possibly chart the relatedness of such specialisations to **identify patterns and pathways of cooperation**. In the case of AI, we recently found that the level of cooperation between excellence hubs in Europe is far from satisfactory, and this in turn significantly deprives Europe of the necessary scale in R&I.

Another important consequence is that when prioritising investment projects, EU decision-makers should develop a sufficient degree of situational awareness as to what could credibly be achieved in each part of the EU's regions, and by when. Such mapping should include (i) technologies where data show a clear European potential for excellence; (ii) general-purpose technologies, on which Europe needs to become excellent for reasons of competitiveness and technological sovereignty; and (iii) other technological specialisations, for which Europe should reduce its dependency on other countries that are currently dominant sources of supply.

Involving all European regions in R&I is important, but should not lead to standardised approaches. On the contrary, the specificities and preferences of regions should be factored into the assessment of what regions should be expected to develop over time. This, in turn, implies that FP10 will have to be increasingly coordinated with multilevel governance instruments such a cohesion funds, NextGenerationEU and the overall Semester. As seems to be the current orientation of the second von der Leyen Commission, coherence and even the blending of different funding instruments within single national plans should occur only after carefully mapping the relative specialisation of each part of a region, and matching specialisations with innovation and industrial transformation pathways. This could help realise what Enrico Letta, in his report on the single market, referred to as the 'right to stay' in the form of economic opportunities in each European region.

> *We are facing existential global challenges of a magnitude we have not seen before. The cost of global public goods such as environment and public health are being felt across the world, and in LMICs in particular. The Framework Programme (FP10) is a critical body of work which suggests that an urgent and intentional shift is needed from a myopic to a long view of financing of research beyond the global north. It is with great hope that this Framework Programme unlocks what has been a largely euro-centric focus to explicitly embed within its foundation a commitment to equity, public benefit, strategic partnerships, research excellence, a diverse ecosystem which values collaboration and a construct which benefits all. To quote Darwin: 'It is not the strongest of the species that survives, nor the most intelligent that survives. It is the one that is the most adaptable to change'.*
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> 
>
> **Desta Lakew,**
> Group Director of Partnerships and External Affairs, Amref Health Africa

The impact of this more coherent approach would become much stronger if FP10 funding could be made more compatible with national R&I funds. As approximately 90 % of public R&I funding is still in the hands of Member States, it becomes immediately clear that **Europe cannot make the most of its outstanding research potential if it does not sufficiently coordinate existing sources of funding at different levels of government, and leverage them to provide directionality to innovators**, while channelling private R&I funding towards high value-added ventures. It is already difficult to stand up to the strong competitive pressure of leading world powers; doing it without coordination and direction is a recipe for failure that Europe cannot afford to reiterate in the coming decade.

Lastly, **the principle of leaving no one behind can and should include non-European countries and researchers**. The EU cannot be seen as a champion of global public goods and the multilateral order if its policies end up creating negative externalities for non-European countries, particularly LMICs. This also extends to the involvement of non-EU researchers in the future FP10.

2 Designing FP10 with balance and ambition

How should the EU design FP10? Stakeholders have expressed diverse views over the past weeks and months. Individual groups and associations, however, tend to position themselves by focusing on their vested interests, which often leads them to advocate the preservation or expansion of specific instruments and sources of funding in FP10, compared with the current Horizon Europe. As in the parable of the blind man and the elephant, the views expressed are thus often partial, and focused on one side of the problem.

Our exchange with domain experts and visionary thinkers suggests that the shift from Horizon Europe to FP10 should be disruptive, more than purely incremental or path-dependent. **Rather than more of the same, Europe needs a catalytic shift on R&I**, and can achieve it only if it clarifies its ultimate and intermediate goals; balances its act between European ambitions and global orientations; joins forces with all European countries and their national R&I funds to boost innovation and industrial transformation; and partners with other institutions, philanthropies and the private sector to multiply the impact of its actions.

2.1 What is the purpose of FP10? Goals, objectives, foresight and backcasting

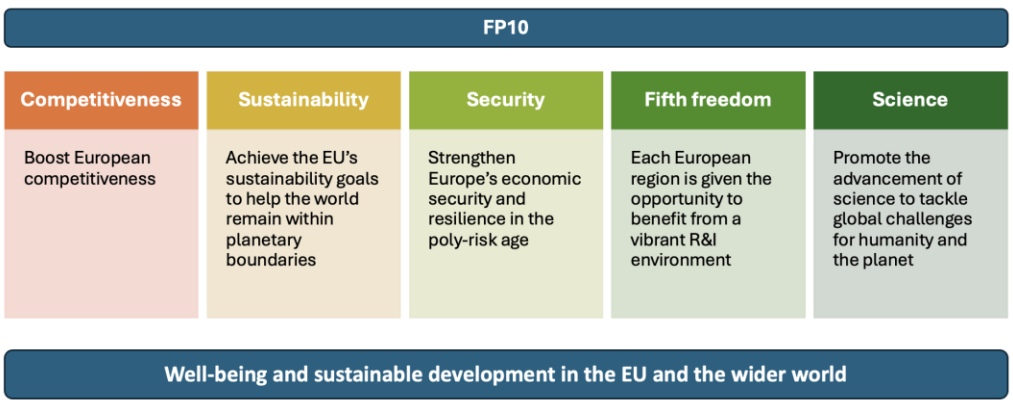
The age of the polycrisis calls for new, bold approaches to problem solving. This will require paradigm shifts in the way the EU funds the R&I that creates breakthroughs to address current and future multidimensional problems. The framework programmes as currently configured are not fit for this purpose and only address incremental scientific advancement, not systems change.

Based on the current debate and political priorities, FP10 should address five different intermediate goals:

- Boost European competitiveness.
- Achieve the EU's sustainability goals to help the world remain within planetary boundaries.
- Strengthen Europe's economic security and resilience in the polyrisk age.
- Promote the 'fifth freedom' aimed at enhancing research, innovation and education in the single market. This would involve ensuring that each European region has the opportunity to benefit from a vibrant R&I environment, based on its own specialisation and potential.
- Promote the advancement of science to address global challenges for humanity and the planet.

These are intermediate goals, meaning that they should not be pursued as such, but inasmuch as they are functional to the EU's ultimate goal as set out by **Article 3 of the Treaty on European Union: to promote, inter alia, well-being and sustainable development both within its borders and 'in its relations with the wider world'.** Note that, while intermediate goals tend to change over time (see what happened over the past 5 years, with the pendulum shifting from decarbonisation to resilience, and eventually to industrial competitiveness), the EU's ultimate goal is constitutionally set, and should not be questioned. **Intermediate goals, as shown in Figure 2. below, could be sharpened if the European Commission adopts a participatory approach to their definition**. As discussed in Section 4, stakeholder consultations organised in the context of the impact assessment of FP10 should include questions on what such goals should be.

Figure 2. Intermediate and ultimate goals of FP10



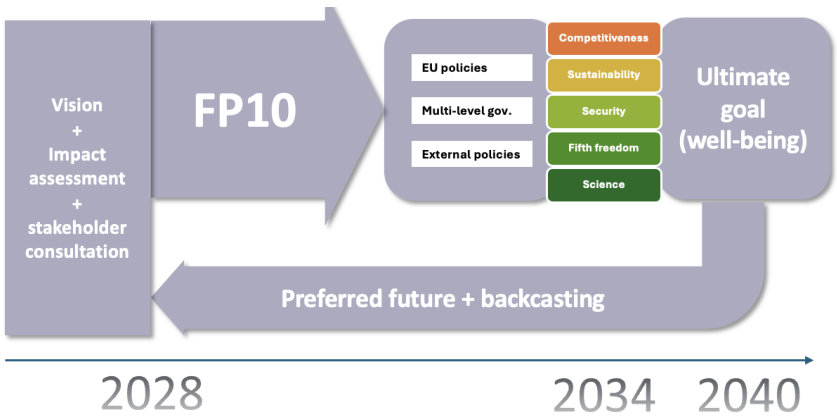
Against this background, FP10 should become a major driving force for impactful solutions that, through the intermediate goals, help Europe achieve its overall objectives. **This does not mean that all pillars of FP10 should pursue exactly the same goals**. **Rather, they may be designed to pursue a slightly different mix of intermediate goals**. For example, one pillar could focus on Europe's sustainable competitiveness, another on R&I for global challenges, and another on widening and international collaboration.

A backcasting approach to FP10

Given its projection into the future, **the design of FP10 should involve a significant degree of foresight and backcasting**. This implies that the European Commission develops scenarios for the R&I landscape during 2028-2034, sets targets related to well-being and sustainable development within and outside the EU by the end of FP10's 7-year period, and formulates today's strategy in a way that maximises the chances that the targets and the goals will be met.

Figure 3. illustrates the backcasting approach to the policy cycle. Based on the EU's ultimate goals as described above, policymakers should specify their 'preferred future' and apply a strategic foresight approach towards putting in place the best vision, policy and investment measures that can make that future most achievable in the mid to long term. **This implies that the actions, main instruments, governance and objectives of FP10 are discussed and set out in a participatory way and embedded in the design of the framework programme**, alongside provisions aimed at enhancing the adaptive and flexible nature of the programme. FP10 should be seen as contributing, alongside other EU policies, multilevel governance measures and external actions (including international multistakeholder partnerships) to the achievement of those intermediate goals that are thought to most effectively advance the EU's journey towards its treaty-based goals. As already explained, intermediate goals may be reconsidered along the way, if unforeseen events require such a change of direction.

Figure 3. Foresight, backcasting and FP10 implementation: a simplified scheme



Agility and experimentation

Europe risks being left behind unless it can support a research environment that allows maximum flexibility for experimentation for the rapid deployment of funding to push science in new directions, and with it, future economic growth led by innovation. This will necessitate a significant restructuring of the upcoming FP10 to position the EU to lead globally and capitalise on the industries of the future, ensure its security, and enhance the well-being of its society.

> *For Europe's future 'to remain the same', everything must change. Now more than ever, we must prioritise innovation and entrepreneurship, and harness network intelligence to foster a networking culture that drives competitiveness of the most dynamic ecosystems in the Single Market.*
>
> 
>
> **Daria Gołębiowska-Tataj,**
> Founder & CEO of Tataj Innovation Ltd, and Honorary Professor, Alliance Manchester Business School

Many stakeholders advocate **more agility in the programme's structure and decision-making processes** for quicker responses to emerging priorities and challenges, while also maintaining stability

for long-term research priorities. Some have suggested that **fast decision times on funding new ideas and larger grants are needed**. In the current Horizon Europe, it takes months to process decisions, often for very modest sums. In order to motivate the best and the brightest to achieve breakthrough innovations that move the needle, **a radical shift from 'trust first/evaluate later' to more applicant-friendly solutions with shorter wait times is needed**.

As explained below (see Section 3), goal-orientation and agile governance require significant restructuring and enhanced openness compared with what currently happens in Horizon Europe. This entails, inter alia:

- the creation of **agile, challenge-driven institutions** that can follow a quick, portfolio-based approach to project selection on the way to goal attainment;
- the deployment of AI technologies to improve decision-making and monitor project impacts while reducing administrative burdens;
- the **consolidation of the European Research Area** under the leadership of EU institutions (see Box 2);
- the establishment of stronger links between EU-funded R&I and other EU policy instruments, national R&I funds within and outside the EU, and private resources.

Box 2. Unleashing Europe's excellence in science through a new governance of basic research

According to many experts and stakeholders, one of the key strengths Europe can rely upon is to be found in its basic research capabilities. At the same time, public investment in basic research is affected by fragmentation, with Member States deploying their funds in a way that is not coordinated or integrated with EU-level funding.

Our research led us to a lively discussion on the need to centralise responsibility for funding fundamental research at the EU level by **integrating some national research funding into the ERC**. Pooling funds could also channel more funds to bigger and international projects. Member States would then focus on funding projects with higher technology readiness levels or more targeted research outputs.

While potentially challenging and politically sensitive in the current context, some experts advocated a **treaty change to shift more research competences to the EU level**, in order to enhance the efficiency and coordination of European research efforts. This would imply reverting to the original division between research and innovation in earlier framework programmes, which was abandoned in Horizon 2020, and strengthening the role of the framework programme as the funding arm of the European Research Area, with a clear focus on supporting scientific and technological excellence.

This proposal echoes the Heitor group report recommendation 8.c, which could be extended by proposing that the **national plans and investment in public R&D**, given their long-term impact nature, **are not included in the Semester assessments of the fiscal deficits of Member States, effectively becoming exempted from the Maastricht fiscal deficit criterion of 3 %**. This would imply, if Member States envisage in their annual budgets a reduction of public R&D, that such reductions are not considered part of fulfilling their fiscal deficit objectives.

This proposal would also allow associated countries such as the UK, Switzerland and Norway to fully participate in the excellence research part of EU funding. By separating the public R&D part within FP10 as being the central issue in achieving excellence, associated countries would be able to participate more fully in the European attempt at taking the lead in international/global RD&I collaboration and governance.

2.2 Global and European: how can FP10 thrive in the post-2024 world?

While there is a tendency to approach R&I funding as eminently 'from Europe, to Europe', **FP10 cannot simply be designed to distribute funds to European researchers, or to cater to Europe's strategic needs**. It is pivotal to balance the European strategic dimension with Europe's ambition to lead on key global challenges and promote sustainable development around the world. As explained in the previous section, it is the Treaty on European Union that requires FP10 to keep this North Star in view. Yet while international cooperation is framed as an integral part of the framework programmes, guided by the EU's 'Global Approach to Research and Innovation', over the past years the EU has shown a rather cautious, selective approach that limits cooperation to like-minded countries and selected domains.

Europe's role in the world becomes even more important not only in view of the 2030 Agenda, but also of the post-2024 world. Recent years have seen radical shifts in global geopolitics, leaving the multilateral order facing one of its deepest existential crises in decades. Conflicts at Europe's borders and the prospect of changing political priorities in

major global powers, including the US, are likely to make **global collaboration for sustainable development and well-being more challenging**. The very timid (if not dismissive) reactions to the adoption of the Pact for the Future in September 2024 reveal a deeper, structural distrust in the ability of the global community to deliver on its commitments.

This situation is a wake-up call for Europe to step up and fill the role it is supposed to play in leading the world towards prosperity and well-being for all. This means that in FP10, **Europe's legitimate ambitions to strengthen its industrial and technological base, as well as security, sovereignty and resilience, will have to be coupled with substantial reform of its approach to international R&I collaboration**.

Seeking coherence and integration within Europe

For pursuing EU competitiveness, resilience and security, FP10 should become part of a significant reorganisation effort aimed at unifying fragmented EU initiatives, and chart meaningful transformation and collaboration pathways for all European regions. This is the opportunity that the recently proposed 'competitiveness fund' offers to European researchers and businesses. However, as noted above, competitiveness should be seen as an intermediate goal, to be achieved in a way that is not detrimental to the ultimate ambition of promoting well-being and sustainable development.

The proposed competitiveness fund should thus leverage FP10 to boost the socioeconomically and environmentally sustainable transformation of EU industrial ecosystems, in a way that leverages R&I to translate Industry 5.0 principles and values into practical solutions. Through activities at different technology readiness levels (TRLs), FP10 should interact with large-scale industrial policy projects (e.g. HYBRIT), joint undertakings, important projects of common European interest (IPCEIs) and the industrial defence plan. It should also tie in with multilevel governance instruments and policies (the Semester, NextGenerationEU and cohesion funds) to promote a stronger and more cohesive Europe within its borders.

In this respect, **some stakeholders worry that a competitiveness focus might affect the situation of non-EU countries in FP10**. The model of the competitiveness fund merging different EU funding programmes into one measure would threaten the position of associated countries under the framework programme. More specifically, it would impose higher costs on them and possibly exclude non-EU partners in critical fields like AI, quantum and other technologies with potential for dual-use applications.

While the case for strong collaboration with partners aligned in terms of values has been made above, it may be unwise for the EU to weaken ties with global scientific powers that compete with its core areas and/or do not fully share its values. China, now the second-largest R&I spender and top producer of scientific papers, is a key partner for other major R&I nations. And despite competitiveness concerns, collaboration with the US remains crucial due to the quality and expertise available in the world's leading country on R&I.

Leading collaborative R&I to tackle grand challenges: a revamped, genuine international partnership approach

On the EU's vocation to pursue global sustainable development, there are concerns that current R&I policy has not fully leveraged its potential. **Horizon Europe (with notable exceptions) insufficiently facilitates multistakeholder partnerships** – the most effective way to pursue coordination and collaboration under the leadership of one or more 'orchestrators'.

Experts and stakeholders are in favour of a stronger emphasis on **launching international partnerships to address global challenges in the future FP10**. This has important consequences for the design of the framework programme: while Horizon Europe has conflated global challenges and industrial competitiveness in a single pillar, several arguments point towards a separation of these areas, due to the different mixes of (intermediate) goals and of instruments, and the degree of openness required by the respective actions.

The successful implementation of this approach requires significant changes in the *modus operandi* of EU institutions in the context of R&I policy.

First, **understanding the dynamics and governance of international partnerships** is a must for any institution that wishes to positively contribute to large-scale projects and initiatives for sustainable development. In what was academically labelled as 'orchestration schemes', public and private stakeholders contribute to the search for solutions or the operationalisation of actions that would otherwise fall prey to significant collective action problems. Examples include the Global Fund, Gavi and the Global Environmental Facility, among many others.

Second, **EU financial and administrative rules should make it easier for international partners** to blend their funds with EU ones, and jointly seek maximum impact. Currently, partnering with the EU in a grand challenge scheme appears problematic and burdensome, if at all possible. Reflection is needed for projects that require significant scientific breakthroughs as well as those that are meant to deploy solutions at higher TRLs.

Third, the governance of FP10 initiatives geared towards societal challenges will have to include non-European partners, international donors and young researchers from Europe and beyond, to ensure the intergenerational, global nature of the priorities being set. This would also help the EU to boost its talent-focused programmes, accelerate visa procedures for third-country researchers participating in Marie Sklodowska-Curie Actions (MSCAs) and hence attract talent from the rest of the world.

Fourth, and relatedly, in deploying solutions **the EU seems to be falling short of a fully-fledged 'Research for Development' strategy**. This is due to the suboptimal coordination between the Directorate-General for Research and Innovation (DG RTD) and that for International Partnerships (DG INTPA) in promoting 'research for international development'. DG RTD focuses primarily on excellence, with less emphasis on development, while DG INTPA is considered to underutilise the research and education pillar under the Global Gateway.

Fifth, Europe's participation in multistakeholder partnerships for sustainable development could also mitigate some of the concerns around limited local social and economic impacts. This, in turn, necessitates that EU actions keep such impacts in mind and become **more genuinely oriented towards creating value at the local level, rather than merely pursuing European interests**. Importantly, this should not be seen as a call for purely other-regarding strategies: by consolidating and nurturing its image and role as a promoter of solutions to global challenges, the EU would not only live up to its constitutional commitments, but also strengthen its 'actorness' in the global governance of sustainable development.

Sixth, the **EU needs to adopt more bidirectional and equitable scientific relationships with LMICs**. In this respect, the EU is often seen as excessively self-interested, especially in its partnerships with LMICs. Projects and programmes under the international partnerships pillar should become accessible to non-European researchers and partners, in a meaningful (non-box-ticking) way. Current evidence on Horizon Europe shows more encouraging results whenever priorities are co-decided in an ad hoc council and through a bespoke process (e.g. the EU-AU Innovation Agenda). In the future, co-decision should be mainstreamed in EU international collaboration. It is important that LMICs attain intellectual property protection of research outcomes funded by FP10. These public goods should be made available to the people who need them most, irrespective of their economic status. This is where **strengthening the access clause is important.**

Finally, **Europe certainly possesses the scientific excellence to lead on some global challenges, but cannot lead on all of them**. Understanding which priorities to focus on, where to lead and where to contribute is an exercise too often left to spontaneous order, with a consequent lack of directionality and strategy. The EU should develop a framework to identify and integrate priority areas into its R&D strategy, leveraging foresight and inclusive stakeholder engagement. Foresight can help explore future grand challenges, assess their potential impacts and map the EU's R&D capacity in each area. Additionally, this prioritisation process should be conducted regularly to ensure responsiveness to emerging concerns and scientific advancements.

Greater openness through more nuanced and dynamic international partnerships

FP10 should foster greater openness to collaboration with international R&D partners compared with Horizon Europe. To balance competitiveness, strategic autonomy, security and global interests, **FP10 must adhere to the principle of being 'as open as possible, as closed as necessary'.** Applying this principle in the same way to all FP10

instruments, however, is likely to lead to a '**lowest common denominator effect'**, with projects that could have been completely open to international collaboration being constrained by rules designed for initiatives focused on industrial competitiveness, which are accordingly more strategic and closed to global competitors. This is one of the main reasons why, in Section 4 below, we propose that some areas of FP10, such as the European Research Council (ERC), MSCAs and partnerships for global challenges, are made subject to different, more open governance arrangements.

Greater openness can already be achieved today, through strengthened collaboration with associated countries. A particular focus can be put on the UK, Switzerland, Canada, New Zealand and South Korea. **The list of** third countries associated with **the programme could be expanded**. It is also critical to assess the impact of the potential budget increase of FP10 and/or the competitiveness fund on the financial obligations of associated countries.

Europe wants to take global leadership in the R&D ecosystem and would like to demonstrate this by addressing global challenges that go beyond European challenges. This can only be achieved if 1) European countries work collectively to avoid duplication and inefficiencies (this can be done by harmonizing national level priorities), 2) collectively develop partnerships in LMIC countries to harmonize engagements, 3) have a higher appetite for risk to increase diversity in terms of recipients and partnerships to include those who may be new to them (this will help increase the pool of researchers and grow the innovation ecosystem).

Evelyn Gitau,
Chief Scientific Officer at Science for Africa Foundation

With partners from high-income countries, **greater reciprocity can ensure sustained R&I funding**. FP10 could enhance international partnerships and co-funding mechanisms with international sister associations globally. One measure to ensure reciprocity would be **allowing the participation of EU companies in partner countries' R&I programmes**.

With countries not fully aligned with EU values, some suggest **FP10 should maintain scientific diplomacy as part of the EU's foreign and security policies**. Instead of severing R&I ties with these partners, the EU could implement risk mitigation measures to protect its interests where needed. Others advocate a less cautious approach: EU researchers should cooperate with scientists in these countries to avoid isolation and marginalisation. **FP10 could also adopt dynamic relations.** With the same partner, it is possible for the EU to have different levels of R&I relations in different sectors, as either R&I partners or competitors. For example, dual-use research could imply limiting or excluding third-country participation.

2.3 Excellence-driven vs mission-oriented: a false dichotomy?

Horizon Europe notably features a dedicated pillar on excellence-driven research which strives to produce groundbreaking discoveries, challenge existing knowledge, and contribute meaningfully to scientific fields, with no constraints in terms of area or domain[4]. The ERC has been highly praised for its achievements in this domain. **Positive spillovers from this research funding are often very significant**: think about string theory in physics, or studies on dark matter. Advancements in scientific knowledge have increasingly transformed into entirely new ecosystems and scientific methods (e.g. the World Wide Web and CRISPR-Cas9) and concrete solutions in times of need (mRNA vaccines).

Against this background, the quest for competitiveness and solutions to global challenges calls for **R&I that aims at specific outcomes**, and as such is mission- or challenge-oriented. From fighting cancer to solving the problem of protecting privacy online, achieving trustworthy AI and sustainable decarbonising of the steel value chain, the EU and the global community await solutions to specific outstanding scientific, industrial and societal problems. Even in fundamental research, the creation of ad hoc institutions such as CERN or the European Molecular Biology Lab (EMBL) have helped channel R&I funding towards a more coherent set of solutions, with enormous spillovers for society as a whole.

[4] The terms 'blue sky' and 'curiosity-driven' research are also used in this context, more specifically to denote limitless approaches to discovery, where researchers are driven by the desire to expand knowledge, often without clear expectations of immediate outcomes.

Thinking fast and slow: combining excellence-driven and mission-driven research into multi-tier governance for FP10

Existing missions in Horizon Europe have been positively assessed by the European Commission and many stakeholders, but it has also been highlighted that their potential has not been explored enough and remains untapped, and public awareness of their activities is also very limited. **This calls for better embedding missions into the future operation of FP10, as enablers of multistakeholder impact-driven collaboration, and improving their coordination with other instruments,** such as existing public-private partnerships, to avoid excessive fragmentation.

The **institutionalisation of large-scale mission-oriented research** is, in this respect, a growing trend which can further leverage the huge promise of new, pervasive technological advancements in AI and, in the future, quantum computing. As an example, CERN scientists recently adapted AI algorithms used in the Large Hadron Collider to analyse, envisage and classify brain pathologies starting from MRI scans. This shows that policymakers or other stakeholders presuming **a dichotomy between blue sky and mission-oriented R&I are often mistaken**.

In FP10, balancing excellence-driven research with moonshots and other challenge-driven, often higher TRL funding, will be essential. The tension between these two seemingly conflicting approaches is certainly a reflection of the fact that the EU has a rather limited research budget[7]. The question is about added value and subsidiarity, i.e. how to make the best possible use of the limited research budget available at the EU level. The Heitor group report notes that over 70 % of proposals evaluated as excellent and worthy of funding cannot be funded under Horizon Europe due to lack of budget. And while approximately 20 % of these proposals were awarded a 'Seal of Excellence' to allow Member States to fund them using national or structural funds, such funding has very seldomly occurred.

Stakeholders and experts are divided. Many experts have echoed the need for more mission-driven approaches. The Draghi report puts forward ARPA-style institutions and emphasises 'startups' and 'technology sovereignty' in the new European Commission portfolios[5]. The report argues that funding in radically new technologies with low TRLs in the EU has been woefully inadequate. Yet the Heitor report recommends less prescriptive calls and conveys a strong focus on excellence and on strengthening the ERC.

Focusing on general-purpose technologies boosts science, competitiveness and sovereignty

There is alignment on the need for the EU to **launch large-scale initiatives on general-purpose technologies**, to irradiate the whole European scientific effort with new knowledge and a productivity boost. This is certainly the case for AI, where Europe needs more cohesiveness and a concerted public-private effort to bring talent, infrastructure and new discoveries to the cause of trustworthy AI solutions. Ursula von der Leyen has seemingly taken on board the proposal 'to set up a European AI Research Council where we can pool all of our resources, similar to the approach taken with CERN'. However, this proposal has not yet been fully presented as a mission or a moonshot. To fit such a description, it should entail clear objectives, scientific breakthroughs, a portfolio approach, agile governance and significant multistakeholder collaboration.

Once these initiatives have been launched, they should be gradually integrated and coordinated with existing missions, partnerships and public research institutions. For example, the future 'AI research council', often referred to as the 'CERN for AI', could lead to spillover effects not only for CERN and the EMBL, but also for the EU Missions on Cancer, on Cities, on Soil Health and Food, Oceans, and Climate.

In this respect, **a mission-oriented approach is not incompatible with embracing excellence-driven research**. This is even truer as fast technological evolution is reducing the gap between theoretical solutions and concrete innovations. A well-designed mission-oriented call for projects should allow for excellent research even if its TRL is low. Modern R&I imposes a multi-tier structure, in which high-risk, high-reward solutions are sought through fast-paced experimentation, with a common direction towards solving a scientific or societal challenge. FP10 should be able to reproduce the ability of the human brain to 'think fast and slow' by combining agile experimentation and project selection with medium- and long-term mission orientation.

[5] ARPA agencies focus on funding high-risk, high-return research, aimed at bringing forward groundbreaking and unconventional ideas.

A bold move could be to go beyond the institutional boundary of the framework programmes and identify large-scale, long-term, high-risk and high-potential research endeavours that allow the participation of a wide range of researchers and developers from both private and public institutions, from Europe and beyond. Its timespan could exceed the EU's 7-year financial cycle, and its funding structure involve contributions from philanthropies and companies.

2.4 Bridging science, education and innovation

In a constantly changing world with shifting boundaries for R&I collaboration and fast-paced innovation, nurturing talent is essential, including attracting researchers from all over the world. **Europe currently does pretty much the opposite.** It trains an outstanding number of leading researchers (more than the US), but often cannot offer them a suitable home and loses them to other countries. Plus, it fails to attract enough talent from abroad.

This not only reverberates on EU competitiveness, but also on the type of research that eventually translates into innovation around the world, including in Europe. The EU is characterised by a degree of diversity, which constitutes significant value through its richness of perspectives. Even so, more richness and innovation can be brought to our region if our perspectives blend with those of talented researchers from other parts of the world. This involves **attracting, nurturing, and retaining talents and scientists who are currently drawn to other regions, due to better mobility schemes and career prospects.**

Bringing education into the R&I equation and cherishing interdisciplinarity

Europe crucially needs sufficient skills to master the fast-changing scientific enterprise, as well as to achieve sustainable pathways for industrial transformation. **Yet currently, education is significantly isolated from the R&I space; Europe cannot afford such separation anymore.**

Stakeholders generally agree on the importance of strengthening the connection between these areas, which currently remain too fragmented, as evidenced by their division among different Commissioners. A unified approach could enhance the EU's education and innovation ecosystem and increase EU competitiveness. It would also easily reflect on the external action of the EU, which merges research and education into one pillar of the Global Gateway.

The development of new tools to link these areas is controversial, as such tools come with the risk of exacerbating fragmentation and silos. Existing instruments and initiatives, like Erasmus, MSCAs and the EU university alliances, have proven effective in respectively promoting internal mobility, attracting global talent, and positioning universities as central hubs for connecting these areas. Stakeholders in our workshop agreed with the proposal of the Heitor report that support of Erasmus and MSCA programmes should be expanded, to strengthen the bridge between research and education.

Still, the landscape of R&I is changing so fast that the skills needed in 2028-2034 should be carefully analysed, anticipated, and acted upon. While the debate on skills has centred around STEM and coding over the past decade, the advent of generative AI and the changes in the scientific enterprise have significantly turned the tide towards different types of skills. The scholarly literature is increasingly focused on more foundational critical and analytical thinking capabilities, as well as skills that enable flexibility and adaptability to changing circumstances. Future R&I projects that nurture both scientific excellence and address global challenges will need several types of skills and research methods, including most notably:

(i) **interdisciplinary and foundational skills**, i.e. the ability to cross-fertilise different research domains to seek innovative solutions to known problems. Background education and knowledge can help future researchers adapt and re-skill over time. The concept of transdisciplinarity is largely absent from the Heitor report, yet stakeholders recognise it as being essential to identifying 'societal challenges' and to reshaping the EU's research culture;

(ii) **complementary skills to AI and machine learning, to be coupled with domain knowledge** in different verticals (health, manufacturing, energy, infrastructure engineering, etc.) to ensure that humans can make the most of their cooperation with machines, rather than being enslaved to them or face a de-skilling path;

(iii) **data governance and stewardship skills**, including the ability to identify the 'right questions' for which data are needed, and the many skills needed to handle data properly[6].

Funding of education remains a significant challenge, particularly for the collaboration needed between EU public funding and the private sector. Private sector investment is limited, largely due to a perceived lack of return on investment. Stakeholders also highlighted the **weak and unstable career prospects within academia**. This is partly due to a disconnect between the education and innovation ecosystems. One solution could be for industries to become more involved in the process and provide stronger support for PhD students.

If significant investment is put into specific sectors, for example to promote the deeper integration of AI into verticals, education has to become part of broader cooperation between the R&I community, the education community, and the private sector. This could lead to enhanced dialogue between industrial players and education institutions, for profound reform of Europe's approach to education.

The same applies for the existing and prospective large-scale initiatives on general-purpose technologies, from CERN to the future AI initiative. **Without human skills, these institutions will struggle to maintain a human-centric approach to science and technology**, and this will have repercussions on both the embedding of EU values into future innovation and the employment opportunities that industrial and societal transformations will offer to human workers.

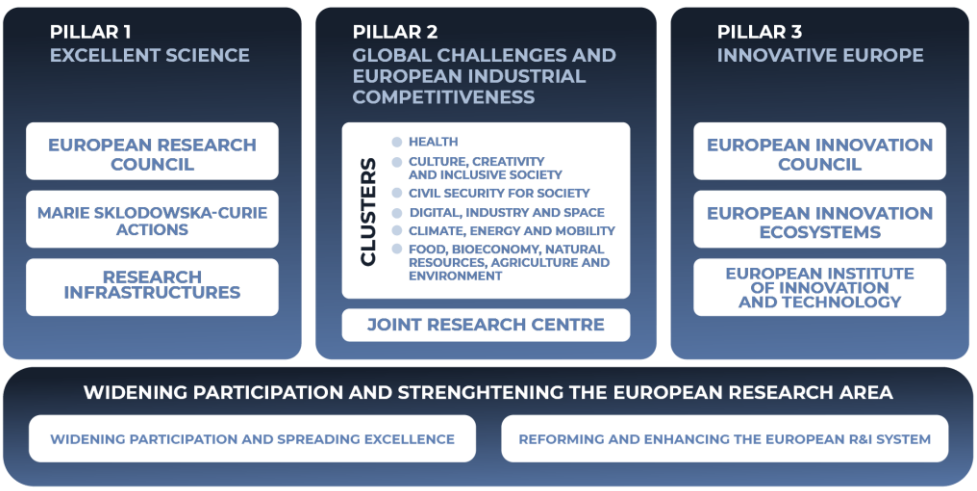
3 From Horizon Europe to FP10: coherence, simplification, agility and balance

What concrete changes will be needed to equip FP10 with the resources, governance and mix of instruments that we have outlined in the previous sections? As already mentioned, a significant break with Horizon Europe will be needed. Below, we lay the foundation for our vision for FP10 by identifying the main changes needed compared with Horizon Europe.

3.1 Beyond the pillar structure of Horizon Europe

Horizon Europe is currently structured around three main pillars (excellent science, global challenges and European industrial competitiveness, and innovative Europe) coupled with a section on 'widening participation and strengthening the European Research Area'. As explained in this section, FP10 may depart from this rather siloed structure to reflect the evolution of R&I, as well as the need to create better synergies between existing programmes and activities.

Figure 4. The pillar structure of Horizon Europe



[6] Ensuring data quality, data definition and compliance with privacy standards; ensuring data completeness, accuracy and integrity; managing metadata and processes; ensuring data security; and carrying out sufficient monitoring.

Start. Stop. Continue. The future of individual Horizon Europe pillars

In research and interaction with stakeholders, **pillars 1 and 2 are deemed more effective than pillar 3**.

Instruments under the current pillar 1 (e.g. the ERC, MSCAs and Research Infrastructures) are considered impactful and effective, and therefore should continue and be enhanced under FP10, with a budget increase for the ERC and MSCAs[7]. This set of activities should be open to international researchers, beyond EU Member States and associated countries, and oriented towards excellence. They should be accompanied by large-scale initiatives on general-purpose technologies such as AI, for which (as already mentioned) a research council is being established.

Apart from calls to increase its budget share[8], several proposals have been tabled on how to restructure pillar 2. There is emerging consensus among stakeholders (including in the Heitor group report) on the continuation of the missions, despite concerns over their excessively narrow scope, their complexity and administrative burden, TRLs that are too high, and related difficulties in monitoring and demonstrating their impacts.

For instruments currently under pillar 3, our research and interaction with stakeholders suggests the need for substantial changes, in particular:

- There is broad agreement on the need to **discontinue or deeply rethink the** European Institute of Innovation & Technology **(EIT) and the KICs**. While the KICs have shown their potential to create networks of research partners, criticism centres around unsustainable budget, unclear approach to membership, frequently changing rules and limited impact[9].
- **While the EIC effectively allows for blended finance, what is missing to scale up innovation is large company involvement** and demand-side procurement mechanisms. The Draghi report has suggested turning the EIC into an ARPA-style agency and the Heitor report has proposed introducing disruptive innovation programmes[10]. In the future, the EIC could be made more functional to the objective of systemic industrial transformation, along the tenets of Industry 5.0. It could also focus more on deepening the AI uptake in industrial ecosystems, as supported, inter alia, in the Draghi report.

Most importantly, experts and stakeholders advocate the strengthening of **synergies between activities currently under the three pillars**. For example, FP10 could introduce research actions (currently pillar 2) alongside the ERC Synergy Grants (currently pillar 1) and EIC Pathfinder Open (pillar 3). Unlike research and innovation actions that support R&D for new technologies at TRL 3-6 or innovation actions focused on prototyping, demonstrating and validating new products or services, research actions could cover destination-level, small, collaborative calls from the bottom up, while still adhering to the thematic areas of pillar 2. The introduction of research actions could strike a better balance of TRLs under pillar 2[11].

Beyond the pillar structure?

Simply reforming the current pillar structure is unlikely to make FP10 an ambitious, ground-breaking, impactful programme fit for the next decade, for several reasons.

First, **stakeholders endorse an enhanced focus on risk-taking and portfolio approaches**. Businesses report that they often find the current Horizon projects too prescriptive. In line with the Draghi and Heitor reports, stakeholders highlight the opportunity for more agile and demand-side mechanisms to procure solutions (such as an ARPA-style

[7] The Draghi Report for instance recommended 'doubling the support for fundamental research through the ERC'. A budget increase would also enable an expansion of ERC Synergy Grants, targeting bottom-up and collaborative research. The ERC itself advocates an increase of its budget from EUR 2 billion annually to EUR 5 billion, equalling about 5 % of the funding for Europe's national research agencies.

[8] For example, Business Europe suggests increasing the current 56 % to 60 % under FP10.

[9] MEP Maria da Graça Carvalho also called for a critical rethink of the EIT and consideration of merging it with the EIC.

[10] In particular, there are calls to bolster EIC Pathfinder and EIC Transition through public funding, and EIC Accelerator through private funding. SPRIND in Germany is considered an effective mechanism based on EU legal grounds, which is procurement oriented and allows for blended funding for moonshot projects.

[11] See the University Alliance Stockholm Trio.

agency) to enhance collaborative bottom-up R&I, support high-risk projects and allow for quick corrections and termination of initiatives that are underperforming. ARPA-H projects, for example, enable professional programme managers to spot additionalities of funding while taking on more of a portfolio approach, still complemented by more societally-driven mechanisms.

Second, experts and stakeholders recommend adopting an **'ecosystems approach' with more involvement of national R&I funding,** including through structural funds. These conditions would allow for enhanced participation of large companies and strengthen university alliances. EU funds, national funds and regional structural funds are currently programmed out of sync with each other timewise and mandate-wise. Incentives should therefore be set to encourage more coordinated implementation at different levels of government.

Third, while strengthening synergies across programmes and funds with different rationales for intervention remains a challenge, **some coherence is deemed critical – notably for associate countries that are not necessarily participants in all programmes**. Enhancing synergies across projects could be ensured by a layer of support infrastructure with dedicated portfolio managers. Finally, stakeholders emphasise the importance of demand-driven R&I and getting innovation procurement right – specifically in green and digital technologies to support startups and scale-ups, as suggested in both the Letta and Heitor reports.

Fourth, **stakeholders call for large collaborative research approaches to solve societal challenges with strong partnerships and a degree of global co-creation**. To this end, Widening Actions under Horizon Europe could be coupled with 'deepening' ones, within the single market, in coordination with cohesion policy. The Widening activities have shown potential to reduce the R&I gaps in the EU through developing a pocket of scientific excellence in the Widening countries[12].

Fifth, there is growing realisation of the **need to separate activities oriented towards EU industrial competitiveness, and programmes and projects aimed at addressing (global) societal challenges**. This would make more space for industry participation in competitiveness-oriented activities, which might then also entail a link to dual-use technologies. It would also enable broader and more inclusive participation in projects and partnerships aimed at global challenges. For example, the Heitor group report recommends the creation of two separate councils: an industrial competitiveness and technology council to enhance FP10's attractiveness and relevance to industry, and a societal challenges council[13].

> *A main key for Europe is to plan and act large and forward-looking, aspiring to chase new insights and knowledge to understand both known and unknown needs ahead. To succeed, the next framework program needs to boost European creativity and curiosity-driven research and innovation, with a funding structure that includes and attract[s] international partners and is truly agile between different segments.*
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> 
>
> **Benedicte Løseth,**
> Executive Director, Research System and Internationalisation, Research Council of Norway

Finally, if FP10 is to be agile and experimental, and mirror the expected changes in the scientific enterprise in the coming years, **the current pillar structure does not seem to be the most appropriate or effective**. The Heitor group proposes, instead of the current three pillars, the creation of four overlapping 'spheres' of action. The report stresses the structural interdependencies and interrelation between competitive excellence, industrial competitiveness, societal transformations, and RD&I ecosystems.

[12] Public authorities suggest that Widening projects could be mapped onto a dedicated widening programme with an increased budget and widening measures, with funding allocated based on regional rather than national parameters. See for instance position papers of Latvian and Flemish administrations.

[13] The idea received mixed reactions among stakeholders. Some worried about the lack of synergies and the increased scope and size of consortia, whereas others advocate increased involvement of philanthropy, civil society as well as large companies in ever more ambitious initiatives.

A new structure for FP10

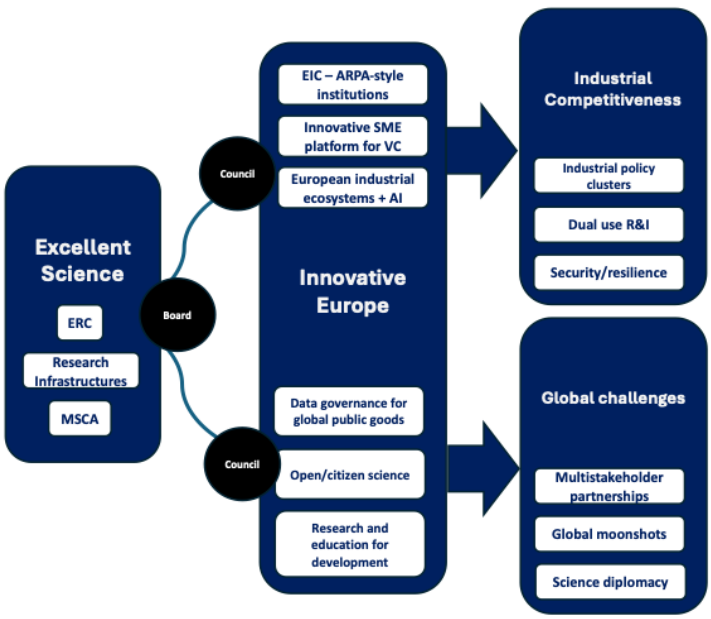
Figure 5. below sketches out a new approach to the structure of FP10, which preserves a number of areas of intervention, structured along a continuum that goes from fundamental research to applied research, deployment and diffusion of innovation. It entails several assumptions.

Consistent with the findings of our research, we have imagined **a much tighter governance between funding for excellence-driven research and activities aimed at diffusing innovation for industrial competitiveness and addressing global challenges**. This is due to several considerations, including the need to leverage the translation of excellent research into applied solutions and ultimately scaled-up innovation, as well as the short time that elapses in new technologies (e.g. GenAI) from research activities to market implementation.

We also imagine that **instruments currently under the 'innovative Europe' heading for contributing to industrial competitiveness and global challenges** are not a separate set of activities but an integrated toolkit that can be mobilised by portfolio managers for the purposes of achieving specific goals (again, related to industrial competitiveness or global challenges). For example, entities in charge of industrial transformation should be able to rely on the EIC and ARPA-style institutions (e.g. on health or energy) to procure R&I solutions that can be embedded into emerging value chains and industrial processes. In the domain of global challenges, the EU could rely on demand-side innovation tools to accelerate the identification of solutions to outstanding problems. This experimental, agile way of leveraging existing tools would rely on innovative governance approaches to place the EU at the forefront of the quest for new solutions to existential problems faced by our planet, society and the economy.

We further imagine that **the work plan and priority setting would be subject to redefinition thanks to the joint work of three bodies: the ERC Board, a council for industrial competitiveness, and a council for global challenges**. We imagine the governance of the two councils and the *modus operandi* in these two dimensions of FP10 to be very different. A council for industrial competitiveness would blend industry, academic experts and representatives of participating countries (EU and associated countries). It would remain open to the possible funding of dual-use technologies, with a link to key domains of EU action such as the defence industrial plan, industrial policy, trade policy and cohesion policy, among others. A council for global challenges would feature broader and more inclusive governance, possibly including LMICs, younger researchers, international donors and philanthropies.

Figure 5. A new structure for FP10



In the 'innovative Europe' area, Figure 5. features a **non-exhaustive set of governance tools and approaches that could significantly boost the effectiveness and agility of FP10**. For industrial competitiveness, these include **ARPA-**

style institutions and the setup of a new platform to match startups with venture capitalists and mentors. In addition are demand-side mechanisms to procure solutions to be embedded in the systemic transformation of industrial ecosystems, such as those needed to deepen the uptake of AI in different industrial value chains. On global challenges, the key enablers mentioned are the use of open data governance and stewardship, open science (including citizen science) and the deepening of the research and education for development approach, linking the EU with LMICs.

3.2 The budget and governance of FP10: bigger, bolder, simpler?

Horizon Europe has a budget of EUR 90 billion, yet the Draghi report calls for EUR 200 billion for FP10, and the Heitor group suggests a budget of EUR 220 billion, for the 7 years between 2028 and 2034.

While welcoming an increase in the overall budget, in this report we do not take an *a priori* stance on the amount of resources to be deployed, for several reasons. The discussion on budget cannot be disconnected from the one on scope, content, governance or expected impact of the funded projects and initiatives. Content and budget should be determined simultaneously, through an evidence- and foresight-based exercise.

Moreover, even if the budget doubled, the EU R&I framework programme would still be a relatively tiny fraction of total public R&I funding in Europe. Coordinating and possibly cumulating EU with national R&I funding would be far more powerful for the future of R&I than any multiplier of current Horizon Europe funding. The question is, what main narrative could draw resources from EU Member States and associated countries?

It is time particularly when dealing with Europe's long-term future to free its investments in research and development from Member States' short-term fiscal considerations. So, make public research investment the primary responsibility of the EU, integrating Member States' and associated countries' funding of their national research councils into an ERC+.

Luc Soete,
Professor Emeritus, Maastricht University and Brussels School of Governance, VUB

Finally, as earlier explained, the leverage effect of EU R&I funding could be even more important than the actual amount of public EU budget earmarked. As many commentators have pointed out, the key challenge for the EU is to find a way to increase private R&I investment. The availability of a vibrant ecosystem for contributing public and private resources to industrial competitiveness would likely incentivise investors and private businesses to contribute funds. Similarly, blending EU and Member State funding with resources deployed by private and public international donors could multiply the impact of solutions to global challenges, in terms of both the quantity of earmarked funds and the blending of EU competences with the often very sophisticated knowledge and expertise of other funders.

Box 3. FP10 under a single competitiveness fund: some hopes, many concerns

Stakeholders and experts have mixed feelings with respect to the possible reorganisation of EU-level spending into a single EU competitiveness fund, encompassing FP10.

On the negative side, pooling budgets together may risk removing resources from FP10, especially if new emergencies and shocks hit the EU in the coming years, triggering a reshuffling of priorities. Moreover, pooling all R&I funding into a broad competitiveness fund may dilute the relevance of objectives other than competitiveness (e.g. decarbonisation). It may also reduce the attractiveness of FP10 to non-EU countries, which have research objectives and plans that do not necessarily converge with the EU's own competitiveness priorities.

On the positive side, the pooling of funds could prove effective if it leads to enhanced coherence, as well as sharing best governance practices among those in charge of the administration of the funding process. Yet the process could become worse if all applications go through the same review process, with the same criteria. Such a drastic change should be well thought through and not lead to additional administrative burdens.

Importantly, there is widespread agreement that the current pillar 1 would benefit from being more independent, and should not be pooled into the EU competitiveness fund.

All in all, these concerns would be mitigated if a pillar on EU competitiveness were singled out and incorporated into the fund under which international cooperation could be considered case by case, with the rest of FP10 remaining open to international collaboration. This would be in line with the proposed reorganisation shown in Figure 5. above.

3.3 Radical simplification – tackling red tape and boosting accessibility in FP10

Framework programmes have been criticised for being overly bureaucratic and administratively complicated, with weak synergies and coordination with other funding schemes at both the national and EU levels, despite the progress – the 'radical simplification' – already made between FP7 and FP8. Among outstanding problems are the lengthy period between the launch of a call and its award, the transaction costs created by large consortia, and the fragmentation of rules across different schemes, at the EU level and between EU and Member State funding schemes.

> *Horizon Europe is, on many accounts, a huge success. But what got us here, won't get us there: to the next stage of European integration. We need to try the impossible in order to realise what is possible. What if we integrated national limitations to fund, to review quality, to cooperate, to test, to share, to valorise and to scale into EU Research and Innovation United? The two European Councils, for Research and for Innovation, have proven that we can do it but are limited to their scope and budget. Now we need scale – through a new 'High Authority', a new Council, which makes national research and innovation European and, allocates regional funds to deploy new knowledge in the EU at big scale, for the prosperity of all.*
>
> 
>
> **Peter Dröll,**
> Former Director for Prosperity, DG for Research and Innovation, European Commission

Importantly, the definition of 'impact' and what it entails, for both researchers and funders, is found to be problematic. The **prospective impact of high-TRL projects is often insufficiently emphasised** during the application process, and hardly assessed in the monitoring and evaluation phase. Furthermore, focusing mainly on the need to deliver results can affect the approach to, and the outcome of, R&I projects. This issue is also reflected in the **debate between more prescriptive versus more open-ended calls**. The former seem to incentivise the participation of smaller organisations, whereas more open calls offer greater freedom to engage in exploratory research.

Concrete solutions to streamline administrative processes, like excessive reporting, include the following:

- **New technologies and digital tools can reduce administrative burdens**, for example in filling out documents, answering questions in grant agreements and clarifying application rules. In the age of generative AI, re-engineering the application process to enable the use of chatbots to accompany applicants, better collect information on proposed projects and facilitate matchmaking to form consortia could prove useful and time-saving.
- **Reliance on external intermediaries to handle application complexity** – following the Canadian experience[14] – has proven fruitful and, as a result, attracted more entrepreneurs.

Use of the right instrument for the right purpose. For specific needs, like supporting SMEs or startups, faster and more tailored funding instruments are needed rather than applying the same approach to all types of projects. In the proposed reorganisation of FP10 illustrated in Figure 5. above, it would be easier to tailor rules to different needs, for example, the protection of industrial property in industrial competitiveness projects and open data governance in multistakeholder partnerships for global challenges.

3.4 Economic security: should FP10 fund dual-use research?

With increasing emphasis placed on the need to develop synergies between civilian and defence research, there is discussion on the extent to which dual-use R&D should and can be embraced. A recent European Commission White Paper set out different approaches to handling dual-use technologies in FP10. The issue raises concern across the research community, especially as technological change increasingly blurs the distinction between civil and military applications. Strategic security interests may limit the openness of FP10 to global partners.

[14] In Canada, federal funding agencies such as the Natural Sciences and Engineering Research Council, the Social Sciences and Humanities Research Council and the Canadian Institutes of Health Research all use external reviewers and advisory committees for proposal evaluation. These include peer review panels and ad hoc reviewers, as well as university research offices that perform an initial quality check, ensuring proposals meet eligibility and guideline requirements. In some cases, also international experts and independent organisations are involved in the process.

Given the existential threats Europe is facing due to changing geopolitical dynamics, it is clear that Europe can no longer rely on outside actors for defence and must develop its own capabilities. Supporting dual-use technology development through the R&I budget has been repeatedly put forth as a solution to the EU's competitiveness problems and slow growth. While there are good arguments to support it, there are a number of issues and counterarguments that need to be addressed in tandem.

According to stakeholders and experts, **a direct comparison between the EU and the US or China on dual use and defence is problematic**. Differences include the size and integration of the US industrial base; the magnitude of the US budget for defence spending (3.5 % of GDP vs 1.5 % in the EU); political and cultural factors (particularly the US emphasis on 'hard power'); and the US innovation ecosystem, which supports the development and commercialisation of technologies beyond defence. US technology and financial markets have been developing together for over 80+ years, while the EU single market and monetary union have only been in place for 30 and 25 years, respectively. Comparisons with China are even more flawed due to its state-led growth and innovation policies, extremely large population, and very different stances on human rights and governance.

That said, dual-use R&I funding was explicitly contemplated by the Commission in its White Paper earlier this year. The debate extends to whether it is truly necessary to allow dual-use in FP10, considering that military research is funded by a separate mechanism, the European Defence Fund. Concerns raised over permitting funding for dual-use R&I are also triggered by fears of a possible shrinking of funds for basic, curiosity-driven research for civilian applications; increased competition for funding that would disadvantage smaller organisations; and ethical concerns regarding possible unintended consequences of dual-use technologies. Such internal tensions would be potentially exacerbated by the conflation of sources of funding into a single European competitiveness fund (see Box 3).

Proponents of dual-use are advocating a **US-inspired agency for advanced research projects on defence**, which adopts a sandbox approach to commercialising miliary technology for civilian purposes. Other proposals suggest separating the goal of industrial competitiveness from other goals such as decarbonisation and societal challenges and related funding frameworks into different categories. Still another proposal suggests implementing funding for competitiveness through the European Semester process, rather than fully integrating it into framework programmes.

According to a public consultation launched by the European Commission, the research and academic community are overwhelmingly in favour of maintaining the status quo, which would bar dual-use R&I funding in future framework programmes. Associated countries, e.g. Switzerland, have been very clear in demanding that FP10 remains purely civilian, not least due to fears of exclusion from certain projects and a rise in administrative burdens. Some commentators have similarly expressed concern that opening FP10 to dual-use would make collaboration with foreign partners more difficult, and might undermine trust in science[15]. Such a position was also recently echoed by South Korea. More generally, the prospective association of Canada, Japan, Korea and New Zealand in FP10 would create even more geopolitical tension in the coming years over joining forces on dual-use R&I.

By contrast, private sector companies and business associations are mostly in favour of allowing dual-use in FP10 and future framework programmes. Given the evolving geopolitical landscape and the EU's vulnerabilities in defence and competitiveness, some research organisations have expressed their willingness to entertain the idea of permitting dual-use, seen as enhancing the EU's long-term competence in critical sectors such as AI, biotech, sensors and cybernetics[16].

Is separating dual-use R&I at all possible?

A universally accepted definition of dual use does not exist[17]. Yet EU institutions have regularly tackled the issue of funding technologies with the potential for dual-use application, with sometimes diverging positions between legislative bodies (for example, in 2018 during negotiations on the final text of Horizon Europe). Recently, the action

[15] See the Leibniz Association.

[16] See the Norwegian School of Science and Technology.

[17] Hähnel, M. (2024), 'Conceptualizing dual use: A multidimensional approach', *Research Ethics*, forthcoming.

plan on synergies between civil, defence and space industries acknowledged that it is in many instances difficult to draw a clear line between civil and defence R&D.

At low TRLs, the potential for dual-use applications often implies research on general-purpose technologies. For example, general-purpose AI systems defined by the AI Act can by definition be applied to a wide variety of use cases, often including military ones. The same could be said about research on quantum technologies, synthetic biology, and much more.

At higher TRLs, the purpose of R&I investment and funding becomes clearer and it gets easier to distinguish between dual use and non-dual-use R&I. What seems to emerge from the ongoing discussion is that **at higher TRLs, for example in our proposed industrial competitiveness pillar** (as separate from the global and societal challenges one, and possibly merged into the competitiveness fund), **dual-use technologies could be funded under challenge-driven approaches aimed at boosting Europe's strategic autonomy and economic security**. Here, EU R&I funding would seek synergies with the European Defence Fund where appropriate. The rest of FP10 would remain completely isolated from projects with significant military potential.

Concrete suggestions on dual-use R&I funding

Our research has broadly confirmed that separating actions related to industrial competitiveness from initiatives on global challenges can help solve the dual-use puzzle. Besides providing for and even strengthening the funding of excellent science on general-purpose technologies, in the industrial competitiveness domain dual-use funding could be allowed under specific conditions, whereas the same possibility would not be available for global challenges.

Stakeholders and experts have started to identify actions to create the conditions for possibly funding dual-use R&I in the future FP10:

- **Develop agile, flexible frameworks for assessing and managing dual-use research**. Frameworks must be able to quickly identify and address potential misuse or harmful applications of research, rather than relying on rigid, binary exclusions. A case-by-case approach may be more appropriate than a one-size-fits-all policy.
- **Ensure transparency, accountability, and ethical oversight**. Transparency, peer review, and appropriate oversight mechanisms are important to address the potential risks of dual-use research, including considerations around data ownership, publication restrictions, and other frameworks to mitigate harm while enabling beneficial research.
- **Balance openness and security in research collaborations**. Overly restrictive approaches could inadvertently drive R&I outside the EU's sphere of influence.
- **Promote equity, trust, and reciprocity in global research partnerships**. Imbalances must be addressed in data sharing, power dynamics, and mutual benefit between the Global North and Global South.
- **Align security interests with research funding priorities**. Security interests must be incorporated into the objectives and funding mechanisms of the framework programmes, including navigating the potential trade-offs between civilian and defence-oriented research, and the implications for international partnerships.

3.5 An FP10 with two hemispheres

Based on the above, we imagine an FP10 designed in a different, more agile, dynamic and less linear way compared with Horizon Europe. In FP10, agility and impact could be achieved by leveraging excellence in basic research and coupling it with demand-driven project selection for fast adoption and scale-up. This implies, inter alia, the re-engineering of application and evaluation processes to enable faster and simpler applications and results; the specification of fast-tracked impact indicators that would enable, whenever appropriate, terminating projects that do not show promise within a given timeframe; and the identification and selection of portfolio managers (internal or external to the EU) for the expert appraisal of mission-oriented projects.

This approach could produce two types of pathways:

- In **competitiveness-oriented pathways**, the supply of ideas and approaches would merge excellent science with innovations identified in corporate R&D to generate solutions for industrial uptake, in each of the earmarked industrial ecosystems.

- In **pathways addressing global challenges**, solutions emerging from ERC-funded projects and others outside the EU could then be implemented through research actions. They could be integrated into large-scale multistakeholder partnerships shaped by public engagement and the crowdsourcing of priorities, through a more participatory and co-created process.

Each pathway would be given specific governance, structures and funding criteria, reflecting the different needs and ambition of the two tracks. This is described in Table 1. below.

Table 1. Two proposed hemispheres of FP10

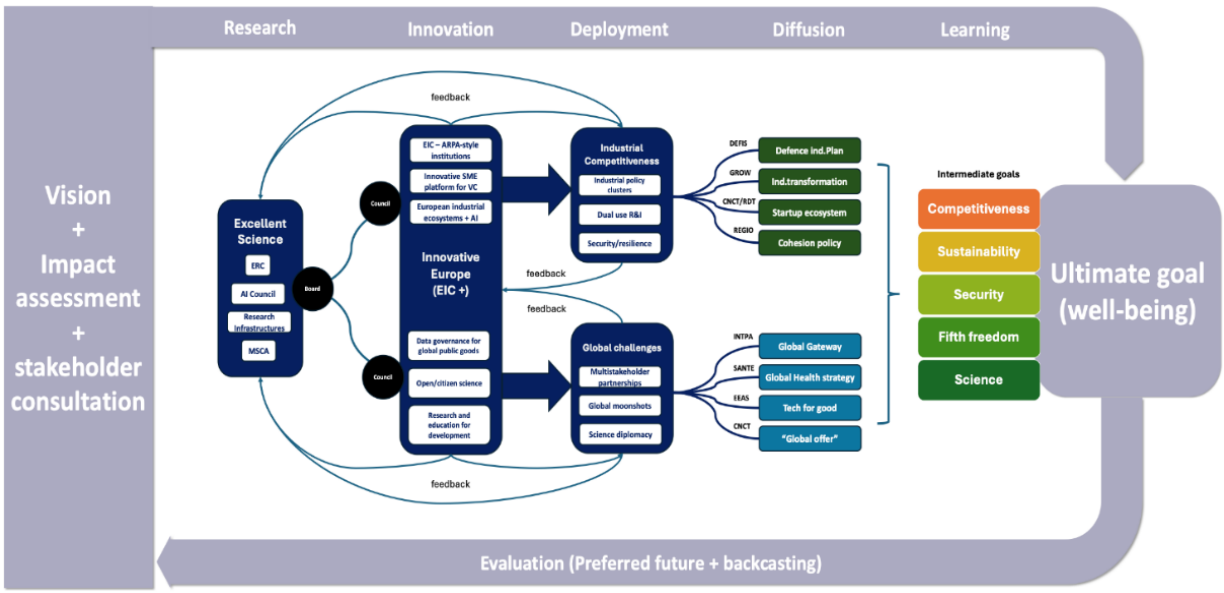
	Competitiveness	Global challenges
Instruments	Large-scale industrial projects, ARPA-style portfolio management, innovative procurement	Multistakeholder partnerships, challenge-driven moonshots, data collaboratives, citizen science
Governance	European Commission, Member States, and associated countries, European industrial players, trade unions	EU, Member States, third countries (including LMICs), younger researchers, civil society, international donors, philanthropies
Criteria for success	Competitiveness, decarbonisation, technological sovereignty and economic security	Challenge-related progress indicators, measurable targets
Linked policies/ programmes	Industrial policy/clean industrial plan; InvestEU, NextGenEU, cohesion policy; IPCEIs, defence industrial plan	Global Gateway, Global Health Strategy, Tech Diplomacy, Global Offer, data for good (e.g. Copernicus)
Dual use	Yes	No

Source: Authors

For each of the two pathways, ideally (but not necessarily) starting from basic research developments, a new approach to the policy cycle could be introduced, which would enable a determination of where research results could be used for a subsequent stage of the *continuum* linking **research to innovation, deployment, diffusion, learning and evaluation (RIDDLE)**. Solving the RIDDLE would help research agencies and the proposed council to assess whether the emerging results of existing projects and partnerships should be continued, transferred, integrated into next steps, or terminated.

The results of all our proposals are shown in Figure 6 below. As depicted, we imagine a set of foundational measures, including the availability of a suitable R&I infrastructure with open data and compute; an ongoing set of consultation processes in the two main areas (competitiveness and global challenges); the R&D cycle (here relabelled and refocused as RIDDLE to emphasise agility, continuous learning and reuse of results); and possible interfaces between FP10 and other EU and non-EU policies.

Figure 6. A comprehensive framework for an agile, effective, balanced and coherent approach to R&I in Europe



4 Preparing for launch: a roadmap to a successful FP10

As noted earlier, FP10 will officially start on 1 January 2028, but most of the policy debate around it is already well underway, and will become even more pronounced during 2025, as the European Commission is expected to present its proposal for the next multiannual financial framework (2028-2034).

The next 3 years are therefore crucial. If FP10 is to be the ambitious programme we have outlined in this report, several steps should be taken by EU institutions and other stakeholders so that work towards the final structure, governance and priorities of FP10 does not face resistance or insurmountable obstacles – at a time when many countries are seeing the rise of populism and growing scepticism towards the world of science.

Below, we discuss some of the key milestones that should be reached before the launch of the programme, to ensure its successful implementation. We first focus on the foundations, then look at the key values and principles to be embedded in the programme ahead of its start. Finally, we discuss how to shape a narrative that would make science and innovation the very foundation of a new era for the EU.

4.1 Preparing for launch: shaping the R&I infrastructure and providing foresight

Strengthening the European R&I infrastructure is critical if FP10 is to become an engine of excellent, impactful science and innovation in the coming years. The steps described below should be undertaken in cooperation with the research community, in a co-creation process that can build ownership among researchers and boost uptake of common resources once implemented.

First, **it is essential to improve the data and infrastructure** by emphasising open data and the reuse of data for research purposes as a basis for excellent science and innovation. Researchers and entrepreneurs should find, in an open and interoperable cloud environment, both the data they need to develop new solutions and the compute resources needed to engage in data-driven R&I. The creation of a **data space for R&I**, alongside the other data spaces that the EU has been developing over the past 5 years, could become a key aspect of the new EU approach to science. It would also enable the EU to adopt a full Government-as-a-Platform approach to innovation, similar to successful experiences like Estonia's X-Road. This would ensure the availability of a digital public infrastructure as a launchpad for entrepreneurs willing to deploy value-added solutions by using publicly accessible data, while avoiding violations of privacy rights. Such an achievement requires policy measures, such as:

- attention to data use for R&I purposes in the upcoming review of GDPR; the activation and effective implementation of business-to-government and government-to-government data access and provision as put forward in the EU Data Act;
- the creation of trusted data platforms for specific research domains, facilitating access to data;
- investment in data stewardship skills and competences throughout the European Commission and ad hoc research executive agencies.

Second, **compute infrastructure is crucial for advanced science and innovation**, independently of the domain of application (for example, advanced research in social sciences and humanities tends to be data-driven and multidisciplinary, and requires access to data and compute). The recent measures adopted by the European Commission in 2024 to promote access to Europe's world-class high-performance computing infrastructure and establish the first AI factories across Europe go in the right direction[18]. What will be important in the coming months is connecting the availability of compute infrastructure with the implementation of a fully-fledged data governance layer for research, as described above, and with research and consultation on emerging use cases, for which compute infrastructure could be optimised.

[18] The seven AI factories involve fifteen Member States and two EuroHPC participating states: Portugal, Romania and Türkiye have joined Spain; Austria and Slovenia have joined Italy; and Czechia, Denmark, Estonia, Norway and Poland have joined Finland. With an investment of around EUR 1.5 billion from the EU and Member States, these sites will deploy new AI-optimised supercomputers and upgrade existing systems, significantly enhancing Europe's AI capabilities.

Third, the setup of the **new AI research council could become a cornerstone of the EU's new approach to R&I**, if properly implemented. This implies that the 'CERN for AI' to be established will work on several fronts: (i) encompassing scientific breakthroughs on trustworthy AI and related technology layers; (ii) enabling the use of data and trustworthy AI solutions for science and innovation, robotics and public services; (iii) developing open source AI solutions for reuse in FP10 projects; and (iv) deploying AI solutions to facilitate access to funding in FP10 and related programmes[19]. In order for these results to be achieved, the governance of the council, its scope and remit will have to be carefully designed in the first half of 2025.

Fourth, the European Commission should launch a **comprehensive foresight and horizon scanning exercise** to develop scenarios for future R&I, as well as Europe's ability to thrive in terms of competitiveness and 'actorness' when it comes to tackling outstanding global challenges. This should be aimed at developing pathways towards preferred futures, as well as contingency plans in case shocks occur along the way. In the polycrisis age, as explained in Section 1 above, the EU cannot afford to place its bets on a single 'Plan A'; rather, it needs to embed agility and adaptiveness at the design stage of FP10. The foresight activities should be coupled with technological **horizon scanning** aimed at improving Europe's situational awareness. The latter could be built out of existing initiatives, such as the proposed work on technology monitoring and assessment for anticipatory European policies by DG R&I.

Fifth, urgent action should be taken on **making Europe a more attractive place for researchers and entrepreneurs**. This implies several possible actions, which should be given priority during 2025:

- Create **ad hoc academic paths** for talented researchers to base their projects in Europe, while maintaining a global network of collaboration. This could take the form of dedicated 'academic chairs', as suggested in the Draghi report, ensuring that such positions provide sufficient stability and security for researchers willing to progress their career in Europe, and streamlined and accelerated visa procedures for third-country researchers participating in MSCAs.
- Launch a **matchmaking platform for SMEs and startups** willing to participate in specific verticals, offering solutions to problems identified under the competitiveness hemisphere of the future FP10 and receiving enough mentorship to best deploy these activities.
- Develop the **28th regime for innovative SMEs**, helping them to establish their activities across countries within the '**European Innovation Area**', access and reuse data and compute, and obtain guidance and mentorship throughout their journeys in research and innovation.

4.2 Getting FP10 right: an evidence-based, foresight-based, inclusive process

The FP10 proposal will be accompanied by a series of studies that will compose the *ex post* evaluation of Horizon Europe (the interim evaluation was the subject of the Heitor report). These studies will have to be coordinated and then distilled into one or more reports that will merge into the *ex ante* impact assessment of FP10, following the 'evaluate first' rule. In this respect, the impact assessment will have to:

- **Clarify the general, specific and operational objectives of FP10**. This should be done by establishing a hierarchy between intermediate goals (European competitiveness, sustainability, economic security and resilience, the fifth freedom and promoting the advancement of science) and the ultimate goal, as specified in Section 2.1 above.
- **Carefully define the problem and the 'baseline'**. There is a plethora of contributions, starting with the 2024 SRIP report, the Letta, Draghi and the Heitor group reports, which line up well-known evidence on Europe's relative lack of competitiveness in research and (even more so in) innovation. Yet the policy problem to be addressed by the FP10 proposal needs to look at existing flaws in Horizon Europe as well as the whole R&I ecosystem, since solutions may be found outside the current remit of FP9 (e.g. in cohesion funds or the defence fund). That said, a key part of the preparation of the FP10 proposal should be devoted to assessing

[19] The EU cannot wait for 2028 before it pilots some of the key innovations to be introduced in FP10. A sandbox exercise could be carried out to start experimenting with simpler rules, to be scaled up after 2028. This may entail the use of AI-enabled solutions, as well as reliance on professional intermediaries in the selection of projects.

how the EU's relative situation would likely evolve in the future if no further action were taken (a 'baseline' or 'do nothing' scenario, which should look at both continuing with FP19 as is and discontinuing the framework programme). Ideally, as described in the previous section, such activity should consider **alternative futures, and a time horizon of two decades (2045)**. It should lead to conclusions on general and specific objectives, and related instruments and indicators.

- **Embed anticipatory governance in the identification of the problem and possible solutions.** This can be achieved by merging forecasting and foresight, thus using both quantitative and qualitative methods. Questions such as 'what type of scientific enterprise should Europe promote?' can guide the identification of policy options and their associated monitoring and governance implications.
- **Assess Europe's potential to thrive in R&I through a mapping of the available technological and scientific specialisations**, region by region, and the relatedness of such specialisations. This approach, rooted in economic complexity, is already used by DG R&I, but should be strengthened to better understand the 'frontier' the EU should try to reach, as well as to single out unreasonable expectations. This analysis can also be helpful to chart possible 'widening' and 'deepening' initiatives, and to define the EU's potential to lead multistakeholder partnerships and missions on specific global challenges.
- **Identify alternative policy options in terms of governance, structure, budget and instruments**. For each pillar, discontinuation, continuation, minor and major change options should be assessed and compared, against the background of the alternative futures identified. The EU must not get FP10 wrong, as explained in the introduction to this report; and this is even truer if it plans to double its budget, and/or combine it with several other existing EU instruments, as well as national R&I funding.
- **Closely examine options for dual-use funding**. It is essential that the preparatory work on FP10 leads to clear rules of engagement with non-EU countries when it will come to dual-use technologies. Several stakeholders back the idea of establishing an advisory function/platform to provide information and knowledge for Member States and institutions about research security when dealing with dual use, and in particular on collaborating with 'complex' R&I partners[5].
- **Use multi-criteria analysis to compare the possible effectiveness of individual options, or bundles of options**, with respect to the specific objectives outlined above in Section 2.2. Using multi-criteria analysis is essential to identify existing trade-offs and address them under uncertainty.
- **Assess co-benefits (or 'ancillary benefits').** R&I funding stands out for its positive spillover effects, eloquently highlighted by cases such as the US Apollo Program, but also by CERN. An ambitious FP10 could create positive spillovers for dozens of industries as well as for other existing instruments, inter alia by making national R&I funding, EU cohesion funds, and global multistakeholder platforms more impactful and effective.
- **Stress-test existing options,** using different definitions of competitiveness, different future scenarios[20], and different funding availability (e.g. the doubling of the budget and the availability of funds proposed by the Draghi report).
- **Carry out or commission ad hoc studies** to analyse, inter alia, specific opportunities for the mainstreaming of diversity, equity and inclusion (DEI), for the attraction of talent, and for data governance, openness, and stewardship.
- **Carefully outline a monitoring and evaluation strategy** that enables learning and course correction if macro and micro trends suggest the need to reorient priorities, and if the performance of specific institutions or programmes proves significantly suboptimal.

Inclusive governance, participatory debate

All the actions outlined in this report should be carried out in a transparent way – sharing data and findings with stakeholders, and **involving the wider R&I community in evidence- and foresight-based decision-making** on how to approach the design and implementation of FP10. Specific consultation, expert- and public-led dialogues should be

[20] A good example is the TRIGGER scenarios for global governance in 2050.

carried out on specific topics, such as boosting citizen science, using AI in the scientific enterprise and in the management of FP10, and involving talented researchers from other parts of the world.

All in all, this is essential to inspire ownership of FP10 in the community, without simply paying lip service to vested interests. Indeed, it takes an enlightened set of EU leaders to ensure that FP10 does not end up trying to solve the problems of the past, and instead addresses the challenges of the next decade.

More specifically, the European Commission should co-create with academia, industry, relevant civil society organisations and the startup ecosystem the pathways that are meant to lead Europe towards greater competitiveness in the coming years. It is crucial to understand what is really needed and how to generate the R&I that will constitute the vital lymph of future actions to be adopted under the industrial competitiveness heading of FP10. This consultation process should involve, as proposed in Section 3 above, setting up a council for industrial competitiveness, able to discuss what instruments should be used to translate excellent research into innovation that tackles problems and presents opportunities in Europe's industrial transformation.

Likewise, the EU should promote constructive dialogue with associated and partner countries, international organisations, donors and philanthropies to identify **existing and future large-scale collaborative initiatives where the EU can lead or contribute**. The EU is a successful partner and orchestrator in some current initiatives, including EDCTP3 and (to some extent) PRIMA, the Partnership for Research and Innovation in the Mediterranean Area. Yet, in many circumstances international donors and partner countries, let alone large corporations, have difficulties in teaming up with the EU to address global challenges. In this respect, possible governance changes should be explored for the EU to make the most of its global ambitions under FP10.

This debate will be functional to the establishment of a council on global challenges, with broad and inclusive participation. One idea is to set up an **inter-DG working unit on international R&D collaboration**, involving and integrating separate teams in DG RTD working on international collaboration and in DG INTPA working on research and education. Another idea is to **document best practices and pitfalls in international partnerships** to identify common patterns and methodologies that can drive or block success.

> *For FP10, it is of the highest importance to win a very major increase of its budget and to preserve the governance of its bottom-up part under the control of the scientific communities.*
>
> 
>
> **Jean-Pierre Bourguignon,** Former President of the European Research Council

More generally, **the research community should be substantially involved** in shaping the *modus operandi* of FP10 as well as the pragmatic actions that should be undertaken to improve the European R&I area, making it attractive and impactful. Involving key actors in this rather large space also calls for accountability: once the challenges identified by stakeholders are acknowledged and acted upon in FP10, these stakeholders would also be accountable for achieving results only partially attained in past framework programmes.

4.3 Nesting diversity, equity and inclusion in the DNA of EU R&I

DEI values are not only central to the EU project, they are also **very important for a more vibrant R&I community**. The literature on the impact of DEI on productivity and innovation is increasingly rich and empirically solid.

Our research supports the view that **DEI should become a cross-cutting feature of FP10, embedded in its very design**. At the moment, DEI considerations surface in the funding of individual Horizon Europe programmes, yet often in the form of a box-ticking exercise or an afterthought. Stakeholders take different positions on DEI and gender considerations – in terms of both gender equality and gender mainstreaming. On the one hand, instruments like gender equality plans are welcomed as valuable tools for raising awareness and promoting equality. On the other hand, they are seen as a potential source of added burden, complicating both the application and evaluation processes. Stakeholders emphasise the importance of designing these instruments in alignment with the 'need for simplification'.

In R&I, the DEI dimension has often been closely linked to gender equality and gender mainstreaming, both of which are distinct concepts. However, DEI extends beyond these concepts, encompassing procedural and content-related aspects.

Procedural and substantive aspects of DEI

The bridge between the procedural and substantive aspects of DEI lies in transdisciplinarity, an approach that transcends traditional research boundaries, methods, and silos to foster inclusive research. FP10 should prioritise extending this approach, as it naturally leads to a broader and deeper understanding of DEI dimensions. From a substantive perspective, this includes **promoting an element of 'belonging'**, particularly in how research topics are addressed and by whom. For instance, disability studies should actively involve researchers with lived experiences from the relevant populations to ensure authentic representation and avoid top-down research approaches. Similarly, targeted aspects of DEI, such as addressing gender-based violence or harassment (within workplaces and as a research topic), should be supported and monitored by dedicated task forces. For example, a **task force on gender-based violence** could serve this purpose, as recently highlighted in the EC Communication as part of its actions under the European Research Area Policy Agenda.

In this context, FP10 should also emphasise the diversification of task forces, bringing together experts from various sectors. Additionally, developing clear guidelines and implementing specific impact assessments on DEI-related topics would provide essential tools for evaluating progress and outcomes.

Promoting intersectional research

An intersectional perspective can significantly enhance the understanding and implementation of the DEI dimension. This approach goes beyond gender considerations, addressing the various factors that hinder access to, and retention in, academia and research for certain populations and individuals. Moreover, the absence of (dis)aggregated data remains a significant barrier to effectively applying this perspective and FP10 should address this by fostering the collection, analysis, and dissemination of (dis)aggregated data as a foundational step to inform and advance intersectional DEI strategies.

A meaningful DEI dimension in FP10

FP10 should therefore move beyond treating DEI as merely a condition to fulfil or a value to promote in alignment with EU principles. Instead, it must be implemented meaningfully through concrete policy tools and actions. This includes fostering diversification not only in terms of topics and disciplines but also within specific projects. Prioritising these efforts will ensure that DEI becomes an integral and impactful element of research and innovation strategies.

4.4 Communicating FP10 and the value of R&I for the future of the EU

A key challenge in the coming months will be defending and relaunching the role of science and innovation in a world increasingly dominated by misinformation and harmful echo chambers. Achieving the FP10 Europe needs is going to be difficult, if EU institutions, Member States and associated countries, the academic community and industrial actors do not devote strong efforts to **communicating the value of funding R&I for the future of Europe and the world**. Many good things already happen under the radar, with ordinary people and even researchers and business ignoring the value that research brings to society as a whole. In this case, trust in science becomes even more important as post-truth narratives spread around the world, fuelling a general deterioration of democracy and potentially also weakening the EU project.

It is an EU constitutional commitment and priority to promote science and technological development within and outside the EU. Against this background it is critical to communicate transparently and effectively that **money invested in R&I not only benefits companies but also the public within European countries and beyond**. Failing to do so risks leaving space for fake news and conspiracy theories. Succeeding in explaining what science and innovation can do for Europeans and the world also requires renewing and re-establishing the 'social licence' behind research and trust in science.

4.5 Synopsis of problems and proposed solutions

Throughout this report, we have highlighted and analysed several challenges that the EU faces on its quest to developing an ambitious, world-class R&I policy. To help the reader gain a bird's eye view of our recommended actions, the table below summarises the main identified problems and proposed solutions.

Table 2. A vision for FP10: identified problems with proposed solutions

Problem	Proposed solution
Lack of clarity on the objectives of FP10	A hierarchy of intermediate and final goals, differentiated across FP10 areas (excellent research, industrial competitiveness and, global challenges)
Fragmentation of the EU R&I landscape	Consolidation of competences for basic research at the EU level; tailoring of governance and rules for different pathways
Limited coherence within FP9 and with other EU policies	Direct links to specific policy domains for the two separate pathways (e.g. industrial policy, cohesion policy, structural funds and FP10; Global Gateway, Global Health Strategy and FP10, etc.)
Insufficient boost to EU competitiveness	A specific pathway devoted to industrial competitiveness, subject to an Industry 5.0 approach and the involvement of stakeholders (including industry) in priority-setting
Lack of impact of EU R&I on global challenges	A specific pathway devoted to multistakeholder collaboration, with more comprehensive and inclusive participation and ad hoc rules to facilitate partnering with other institutions
Rigidity and lack of agile governance	More agile institutions, reduced burden on initial applicants, a shift towards more impact-based evaluation, and the use of new AI-driven tools and third-party expertise to evaluate, select, monitor, terminate or follow-up on projects and programmes
Need to adapt to a fast-changing scientific enterprise	An AI research council to drive the awareness of how AI is changing science; a data space for R&I; more open, globalised and collaborative research thanks to AI solutions; space for AI + collective intelligence projects (citizen science, open-source intelligence, etc.)
Blending excellence-driven and mission-oriented R&I	A doubling down of the ERC, but leaving space for mission-oriented institutions to channel the results of blue sky research (CERN, EMBL, AI research council, etc.)
Excessive administrative burdens	Shift towards lighter application processes; use of AI and third-party expertise (including professional portfolio managers); speedier demand-driven solutions in innovation procurement in the industrial competitiveness pathway; a platform for startups
Absence of an education component in FP9	Introduction of education in FP10 in the form of ad hoc, attractive career schemes for talented researchers; linking FP10 with Global Gateway's Research, Education and Innovation pillar
Lack of involvement of the private sector in key areas	Direct involvement in the pathway on industrial competitiveness, with more adapted rules on intellectual property and on dual use; involvement of the private sector in the respective council
Lack of involvement of researchers from LMICs	Involvement of researchers from LMICs in the proposed council on international multistakeholder collaboration for global challenges
Unclear terms of participation for associated countries	Clarification of different rules applicable to different pathways and the proposed consolidation of competences for basic research at the EU level should reduce uncertainty for associated countries, in particular for those that are opposed to dual-use R&I funding
Underdeveloped 'Research for Development' area	Direct link between FP10 and the Global Gateway with a view to bridging the current chasm on Research for Development
Lack of full mainstreaming of DEI	Promotion of intersectional research and more thorough embedding of DEI requirements in project evaluation
Uncertainty regarding dual-use R&I funding	Recognition that dual-use R&I is common and should not be resisted at low technology readiness levels (e.g. basic research on general-purpose technologies); then, there should be separate rules for separate pathways, with dual-use R&I funding only possible for funds oriented towards European industrial competitiveness (linked to the defence industrial plan)
Uncertainty on intellectual property rules	Participation of industry in a separate industrial competitiveness plan, which could allow for the tailoring of intellectual property rules, making involvement less risky
Lack of trust in science	An active communication campaign raising awareness of the importance of science and innovation; policies ensuring that the benefits of innovation, even when production is concentrated in excellence hubs, accrues to all of the EU

Source: Authors

4.6 Open questions and avenues for future research

This report focuses on the direction and overall ambition of FP10, without delving deeply into the wide array of specific problems and prospects that will eventually form the DNA and *modus operandi* of FP10. Several outstanding matters need further consideration. These include, inter alia:

- a definition of competitiveness that will eventually back the design and implementation of FP10;
- the composition, legitimacy and accountability of the future institutions that will run FP10 on a daily basis (the ERC Board, the two proposed councils, etc.);
- the extent to which technological sovereignty should be pursued, even if at the expense of global collaboration and access to world-class R&I infrastructure if offered by non-EU players;
- new attractive pathways for academics and entrepreneurs willing to establish themselves in Europe;
- full integration of partners such as the UK, Norway and Switzerland and philanthropic institutions in the governance of FP10;
- avoidance of redundancies, inconsistencies and sub-additivity in instruments such as the KICs, missions and partnerships, to foster a more common and integrated governance;
- simplified access to funding and the evaluation of projects by deploying data- and AI-driven solutions along the way, learning from experience in other countries and international donors;
- whether and how to launch a large-scale initiative on AI and make it functional for a revamping of the scientific enterprise, seen from a European lens;
- ways to measure success, and the conditions under which course correction – by reallocating resources whenever circumstances so require – in what would need to become much more agile governance of FP10 projects and instruments.

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