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Evolution and/or disruption?

Designing the next Framework Programme for Research and Innovation

STUDY

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Designing the next Framework Programme for Research and Innovation

This study explores the design of future Framework Programmes for Research and Innovation (R&I) in the European Union. Employing a foresight methodology – comprising a literature review, case studies, scenarios and foresight workshops with stakeholders – the study examines prevailing discourses on Framework Programme structures, identifies key R&I trends, and analyses the challenges posed by current developments. It presents a set of hypothetical programme structures alongside policy recommendations to optimise the Framework Programme for fostering effective R&I across the EU.

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Executive summary

The Framework Programme as a strategic R&I tool in the EU

The European Union's Framework Programme (FP) for Research and Innovation (R&I) has long served as a cornerstone for scientific and technological progress across Europe. As the world transitions into an era of unprecedented challenges – ranging from climate change and digital transformation to geopolitical instability and economic shifts – the next Framework Programme (FP10) must be designed to remain strategically relevant, adaptable, and impactful. The debate between evolution and disruption is central to shaping the future of the FP. Should the programme evolve incrementally, refining existing structures and policies to ensure continuity? Or could it embrace disruption, rethinking the way research is funded, evaluated, and implemented to respond more effectively to emerging global and European needs?

Study objectives and scope

The study undertakes a forward-looking analysis, based on alternative scenarios for Europe and its R&I landscape and exploring the structural adaptations that may be required to ensure the programme remains responsive, effective, and aligned with the EU's strategic priorities. The study then presents a set of hypothetical programme structures that meet the different scenario settings.

We develop policy options that can be implemented in FP10. Not all specific activities are mutually exclusive, while some activities may be mutually reinforcing.

Past evolution and disruption in FP development

The Framework Programme, first introduced in 1984, has evolved continuously, reflecting the growing importance of research and innovation in European knowledge societies, as well as an increasing level of European cooperation. The changes from FP1 to FP9 concern the objectives of the FP, shifts in the thematic focus and target groups, governance models for instruments, and funds, all of which are reflected in the changing structure of the FPs. Outlining the developments of the past FPs provides reflections on the nature and conditions for changes for the next Framework Programme. Overall, the development of the FP over the last 40 years can be characterised as largely evolutionary with a continuous gradual extension. The budget of the FPs has been steadily increasing, reflecting the enlargement of their thematic scope and their gradual extension to include additional target groups.

Radical changes, such as the alignment of FP6 with the ERA policies, the establishment of the ERC in FP7, and the alignment of Horizon 2020 with dedicated policy goals and the SDGs, often reflected wider R&I policy objectives. Many of the disruptive changes or instruments were first piloted before being included permanently. The structure of the FP is not the decisive element that determines intensity of change. Rather, especially for the more recent programmes, the structure is a (graphical) representation of how their instruments relate to the wider objectives of the FP, explaining how the programme is expected to impact European society. The extent to which changes in the design of successive FPs have been disruptive has depended on how their roles in the wider European policy context have been perceived. Therefore, the changes needed in FP10 depend on current and potential socio-political realities.

Current appetite for evolution and/or disruption

The second chapter of this report summarises the main challenges of funding the world's biggest programme for research and innovation as expressed in stakeholders' position papers, key trends in national R&I programmes and their implications for FP10, and visions, needs and suggestions from recent high-level policy reports.

The challenges in designing FP10 are, on the one hand, how to take account of the new policy context and past experience from running its predecessors. A first challenge is the administrative complexity and bureaucratic burden of Horizon Europe (FP9), which creates barriers to participation, particularly for SMEs, local authorities, and research entities that are oriented towards social sciences and humanities disciplines. The high costs of applications, fragmented funding instruments, and inefficiencies in programme management hinder accessibility and reduce the programme's transformative potential. Stakeholders also highlight disconnects between funding priorities and strategic needs, particularly regarding sustainability, resilience, and geopolitical shifts. The focus on higher technology readiness levels (TRLs) has led to gaps in early-stage research, while the oversubscription of the ERC and MSCA limits opportunities for fundamental science. Meanwhile, inequalities in funding success rates persist across Member States, requiring improvements to the widening of participation and better international cooperation strategies.

Another concern is programme rigidity and thematic fragmentation. The lack of flexibility prevents the FP from adapting quickly to emerging global challenges, while fragmentation across funding mechanisms reduces synergies and efficiency. Addressing systemic transformations, such as the green and digital transitions, requires greater integration across disciplines, sectors, and governance levels. To strengthen FP10, the programme must become more agile, strategically aligned, and inclusive. Reducing complexity, improving accessibility, and ensuring greater coherence between research, innovation, and policy priorities will be crucial for maintaining Europe's scientific leadership and global competitiveness.

An analysis of five national R&I programmes across Europe reveals a clear shift towards high-risk, high-reward funding models, long-term strategic investments, and more decentralised governance. These programmes reflect a growing recognition that traditional research funding mechanisms must evolve to support breakthrough innovation, foster commercialisation, and tackle urgent societal challenges. Together, they signal a move towards more flexible, bold, and mission-driven research and innovation ecosystems.

Recent high-level policy reports undertaken on behalf of the European Commission converge on the need for a more ambitious, strategically focused, and better-resourced FP10. While addressing different priorities – from competitiveness and industrial policy to security and market integration – they collectively call for increased investment, streamlined governance, stronger alignment with EU and national strategies, and more agile, risk-tolerant instruments. Proposals include boosting funding for excellence-driven programmes (ERC, EIC, MSCA), integrating dual-use research, and expanding FP10's scope to support the free flow of knowledge, data, and talent – framing FP10 as a central tool for Europe's long-term resilience and innovation leadership.

Potential future evolution and/or disruption of the FP

Looking ahead, the study identifies key trends that will affect Europe's R&I landscape, including technological advances, geopolitical shifts, and climate and sustainability. These will significantly influence the objectives and structure of future FPs, particularly as geopolitical tensions and economic pressures drive a stronger focus on strategic autonomy and common EU priorities. To explore how these dynamics may unfold, the study presents three future scenarios based on a critical uncertainty: economic growth. The scenarios provide a structured analysis of how societal, economic, and environmental trends provide a context to shape the FP's goals and structural aspects.

The study outlines a set of 10 policy options which can be implemented to improve the FP, with a focus on enhancing the current functioning and impact of the programme. Examples of policy options include 'Enhancing strategic autonomy in R&I' and 'Simplifying access and participation'. The options include descriptions of their rationale, objectives, what to implement and expected impacts.

In discussions with R&I stakeholders, no disruption to the FP was envisaged, nor did they question the introduction of dual-use research, thus acknowledging societal and political needs. However,

these discussions took place before Donald Trump was re-elected US president. The ensuing disruption of US politics and policies are increasing the pace of the changes needed in Europe, with repercussions for FP10.

Stakeholders expressed their desire for evolution of the FP. This would bring some changes, mainly addressing the weaknesses of the current programme, but also responding to recent economic and political pressures. Evolution is the convenient path, as it does not require much adaptation from those who know the intricacies of the programme. However, it is not clear whether evolution is realistic or, possibly more importantly, whether it will be sufficient to prepare the R&I community and build its resilience for the challenges that arise.

We have tried to use a longer time horizon to anticipate potential challenges. To prepare for those challenges, the next FP may introduce incremental procedural changes and improvements. Taken together, these may help to address current shortcomings. However, if we envisage more radical scenarios shaping the socio-economic and political landscape, the FP – as an instrument for common R&I policy – may require more than cosmetic adjustments. If economic growth remains constrained and if the post-World War II world order continues to change, the R&I community cannot and will not ignore this.

While our current R&I structures are characterised by routine, the various political threats, climate change, demographic change, forced migration, etc. are factors which do not impact the single researcher as such in his or her research activities. Researchers may therefore prefer to remain in their established routines. However, to address broader challenges such as climate change and strategic autonomy, policymakers need to have the political will and courage to introduce change – against a lot of resistance from national- and EU-level pressure groups.

Limited public budgets and key challenges are factors that could stimulate the design of a slim, agile, and targeted European programme that focuses on EU added value, and which reminds the Member States of their own responsibilities. If disruption provides a (new) range of opportunities and increases the resilience of the R&I system to overcome future crises, it is better to introduce the changes in the near term.

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1. Introduction

1.1. Purpose of the study

The European Framework Programmes (FPs) for Research and Innovation are pivotal in addressing the goals of the European Union. These programmes provide essential funding to drive forward the EU's research and innovation agenda, aligning with the broader policy objectives of sustainability and climate neutrality. The developments since FP7 indicate that 'evolution instead of revolution' has been the guiding design principle for the past two decades. As the world undergoes significant changes, including technological advancements like AI, geopolitical shifts, and the green and digital transitions, questions arise about the future design of the upcoming Framework Programme (FP10) to best address these challenges. The current discussion concerning FP10 and perceived challenges revolve around whether to incrementally refine its existing structure, or to fundamentally transform the framework programme structure.

Advocates for a major overhaul argue for comprehensive changes to address new global challenges, a declining competitiveness, and the need to align with Europe's strategic goals. On the other hand, proponents of gradual improvement suggest building upon the current system, emphasising continuity and simplification to enhance effectiveness without causing significant disruption.[1] Over time, the FPs have developed into increasingly complex structures; in essence, the term "Framework Programme" serves as an umbrella for a broad range of sub-programmes, actions, and instruments. Midterm- and ex-post evaluations of individual sub-programmes/instruments typically receive positive responses which leads to an ever-increasing number of specific actions and instruments. Yet, this increasing complexity makes it challenging for potential beneficiaries to navigate calls and areas of interest and many are questioning the sustainability of this overly complex structure.

The goal of this study is to develop and assess high-level designs for the EU's next FP (Hypothetical Programme Structures, HPS), considering the identified geo-political, societal, and economic challenges as well as expected impacts of major technological developments. For each HPS, we assess policy options that detail ideas for the management of the FP, prioritization and thematical focus, instrument design, improved coordination within the FP, as well as governance mechanisms. Assessment is meant in a non-traditional sense – in fact, the assessment is based on insights of a stakeholder dialogue, which is organised throughout the study. Based on collected input and the conversations with stakeholders, we carve out the pros and cons of both the evolutionary and disruptive approaches in selected scenarios and their impact on the EU's R&I landscape up to 2040.

The report is aimed at politicians and policy makers to help them reflecting in priority setting and policy development to ensure a relevant R&I programme in the EU in the future.

1.2. Key concepts of the study

Evolution and/or disruption

The EU Framework Programme for Research and Innovation has experienced in the past both evolutionary and disruptive changes, not only along the budget, thematical focus, instruments, target groups, alignment with other EU policies, objectives of the FP, but also governance and structure. As evolutionary change, we understand in the framework of this study the gradual, incremental adjustments—such as continuously increasing budgets, a gradual shift in thematic focus, or the adaption of instruments—that refine and improve the programme while largely maintaining

[1] ScienceBusiness. (2024). 'Exclusive: Here's what member states have in mind for FP10'. Retrieved from https://sciencebusiness.net/news/fp10/exclusive-heres-what-member-states-have-mind-fp10.

the character as in the previous Framework programme. In contrast, disruptive change represents abrupt, more radical shifts that challenge and redefine the core principles of the framework, potentially leading to significant overhauls, with for instance novel funding distributions, profound changes in priorities, or fundamental restructurings. These two modes of change, while both aiming to enhance the programme's effectiveness and relevance, differ primarily in the intensity, number, and speed of changes, with evolutionary change being more continuous and incremental, and disruptive change more sudden and transformative.

Hypothetical programme structures

A hypothetical programme structure for the FP refers to a conceptual blueprint that outlines how the programme could be organised to support R&I in the future. It is a speculative, yet plausible design based on current trends, policy priorities, and emerging global challenges. In the context of this study, we understand the HPS as a narrative description as comprising two main elements:

- The **overarching objectives** of the programme – defining its fundamental purpose and strategic intent.
- The **main components** of the programme – outlining the broad pillars or themes that guide research investments.

Therefore, each HPS 'tells a different story' about the objectives and means of intervening in the EU R&I landscape. While funding mechanisms, thematic priorities, specific research domains, and implementation processes are critical aspects of any FP, they were not within the focus of this study. While they nevertheless surfaced in the discussion about FP10, the main aim was on exploring different structural configurations of future Framework Programmes in response to shifting global and European R&I landscapes.

Policy options

The study also formulates several policy options as suggestions for designing the next Framework Programme. They encompass a range of concrete actions that can be implemented across multiple dimensions: the management of the FP, instrument design, improved coordination within the FP, governance mechanisms, and prioritization and thematical focus. Together, these options form key building blocks for various hypothetical programme structures, offering tailored strategies which either blend continuity with strategic renewal, or more radical suggestions for change. In Chapter 4.4., we illustrate which policy options may be viable for which of the HPS.

1.3. Study approach

1.3.1. Document analysis

For this study, we conducted document research to understand the evolution and disruption of the Framework Programme in both historical and contemporary contexts. We revisited past developments to define what evolutionary and disruptive changes meant at different points in the programme's history and complemented this analysis by consulting current FP10 position papers and high-level policy reports that offer insight into today's policy landscape. In addition, we conducted case studies of funding programmes implemented by national funding agencies, which provided practical examples of relatively new R&I programmes. This comprehensive approach situates the study within a rich historical and policy framework, and it also underpins the development of the hypothetical programme structures and policy options we propose.

1.3.2. Foresight workshops with R&I stakeholders

A series of three foresight workshops with more than 30 stakeholders representing EU R&I stakeholders (university networks, RTOs, private sector companies, NCPs, policymakers, civil society representatives etc.) were a central cornerstone for this study. The workshops were conducted online during November 2024 and January 2025, therefore at a time when many of the immediately subsequent geopolitical changes, that point towards a need for more radical changes, were not tangible yet. The workshops had an iterative character which allowed to consider the stakeholder needs, trends and barriers but also ensure that the development of HPS and Policy Options could be validated. In preparation of the workshops, the study team prepared discussion material, based on the desk research, and developed scenarios.

Each scenario includes different external conditions, from technological to economic factors. Envisaging the potential impact of these conditions on research and innovation and on the FP allows us to identify key drivers that should be reflected in the HPS. Based on scenario insights, the HPS is structured to align with these potential future trajectories. For instance, a scenario emphasising rapid scientific advancement may lead to a more mission-oriented FP, while a scenario of economic stagnation might prioritise efficiency and sustainability of core EU infrastructure. Once the HPS is designed in response to scenarios, policy options are developed to support its implementation. Policy choices may include suggestions for the management of the FP, Prioritization and thematical focus, instrument design, improved coordination within the FP, or governance mechanisms to ensure that the FP remains effective under different conditions.

Figure 1 – Overview of key components of the foresight process

Source: Technopolis Group.

1.4. Reading guide

This report is structured along six chapters. **Chapter 2** looks back to the development of Framework Programmes, highlighting dimensions of change and reflecting the nature of evolution and disruption in the past changes. **Chapter 3** examines the current appetite for both evolution and disruption by providing an overview of key challenges identified by stakeholders and past evaluations for FP9, draws on trends from national R&I programmes, and presents visions, needs, and recommendations for FP10 as outlined in high-level policy reports. **Chapter 4** present three future scenarios and outlines the hypothetical implications they might bring to the FP structure. It also introduces policy options to achieve new FP structures. **Chapter 5** draws the results of the desk research and stakeholder workshops together to answer the study question "Evolution and/or disruption – which way to follow to design the next Framework Programme for R&I? **Chapter 6** provides the references consulted during the study.

In the **Appendix** we share a detailed description of the Methodology, the summaries of the foresight workshops, and more details for the case-studies and the analysis of funding for the FP.

2. Past evolution and disruption in FP development

Since its inception in the 1980s, the Framework Programme has continuously evolved, reflecting not only the growing importance of research and innovation in European knowledge societies, but also an increasing level of European cooperation. Looking at past developments of the FP one can characterise different dimensions of change, i.e. continuous expansion of objectives, shifts in the thematic focus and target groups, novel governance models for specific instruments, a steady increase of funding – all of which are reflected in the changing structure of the FPs. Whether changes from one FP to another can be described as evolutionary or disruptive, in line with the objective of this study, depends on the number and intensity of changes along them. In the following, we describe the major changes along these dimensions over the last 40 years and reflect on what we can learn about potential future changes.

Prior to the establishment of the Framework Programme, there was limited coordination of the EU-funded research and innovation activities. Therefore, a key objective of the creation of the FP was the long-term coordination of European research funding and thus a more efficient and strategic use and management of funding.[2] The first Framework Programme (FP1) was established in 1984 expressing a clear focus on the promotion of industrial and agricultural competitiveness, with projects that should improve the European management of energy resources, raw materials, as well as a general improvement of European living and working conditions. [3] Programmes such as ESPRIT, RACE, and BRITE focused on pre-competitive research in industrial sectors such as energy, information and communication technologies, and materials science.[4] Besides, the first FP also contained a thematical focus on science and technology for development and a transversal action supporting mobility initiatives for researchers. As the first FP, FP1 put forward clear coordination mechanisms and provided a coherent structure for the selection and management of research programmes. In 1987 the *Single European Act*[5] was introduced, making 'research' a dedicated European competence and thereby giving the FP a firmer legal basis. The two subsequent Framework Programmes (**FP2** in 1987 and **FP3** in 1990) largely reassembled their predecessors, with minor adaptations of specifying selection criteria for the projects. The main target group in these early FPs were large industrial companies and researchers. SMEs, whose participation was explicitly encouraged already in FP2, however struggled to participate.

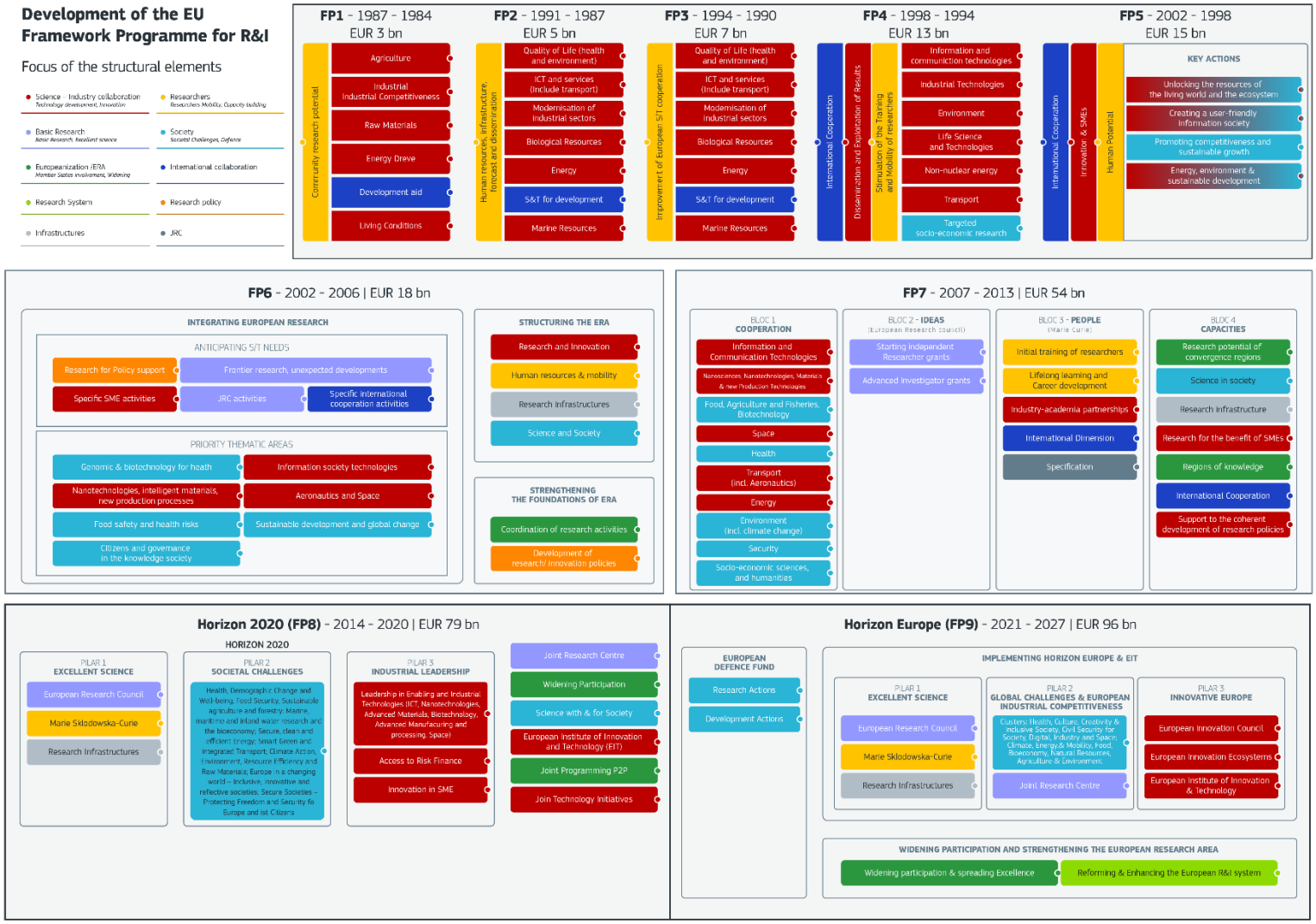
[2] Reillon V, 'EU framework programmes for research and innovation Evolution and key data from FP1 to Horizon 2020 in view of FP9', EPRS, September 2017, https://www.europarl.europa.eu/thinktank/en/document/EPRS_IDA(2017)608697

[3] Andrée D, 'Priority-setting in the European research framework programme', Vinnova, June 2009, https//www.vinnova.se/contentassets/7731e8676b274f408d932161a6e8e381/va-09-17.pdf

[4] Guzzetti L, 'A brief history of European Union research policy', European Commission, October 1995, https://netaffair.org/documents/1995-a-brief-history-of-european-research.pdf

[5] European Communities, 'Single European Act', July 1987; *https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=legissum:xy0027*

Figure 2 – Development of the EU Framework Programme for R&I



Source: Technopolis Group.

With the entry into force of the *Treaty of Maastricht*[6] in 1993, the scope of the Framework Programme was extended beyond the mere strengthening of competitiveness to including all research activities in support of the objectives pursued by the Union.[7] The FP implemented after the Treaty of Maastricht, **FP4** (1994), reflected these extended competences in two significant changes: On the one hand the thematic focus was broadened to socio-economic research, including social sciences as an explicit target group. On the other hand, the transversal elements of the FP, focusing on international cooperation, dissemination and exploitation of results, and stimulating the training and mobility of researchers, became more pronounced. Also, in terms of budget FP4 represents a major leap forward, with almost twice as much funding as the previous FP. However, despite these changes the overarching structure and the thematical focus areas of industrial areas of ICT, energy, mobility and biotechnology, remained largely the same as during the first three FPs. For the subsequent FP, **FP5** (1998), there were limited changes. But what became more pronounced during FP5 was the clear objective of the FP to showcase the impact of research on societal problems. This was tangible not only in the framing of the key actions, but also through the explicit involvement of end users as beneficiaries.

In the year 2000 the Council adopted the *Lisbon Strategy*[8], with the aim of promoting the European Research Area (ERA) and thus counteracting the fragmentation of the European research landscape. **FP6**'s main objective was supporting the implementation of ERA.[9] It introduced considerable structural changes, as well as a multiplication, and diversification of instruments. These were structured along the priorities to Integrate European Research, Structure the ERA and Strengthen the Foundations of the ERA. New instruments promoting the coherence of European scientific cooperation were, for instance, the large-scale initiatives such as "Integrated Projects" or the "Networks of Excellence". In FP6, the thematic focus of the FP was further extended, in line with previous developments, towards including a more explicit focus for the societal relevance of research to improve the lives of citizens as well as supporting policy making. This also involved an explicit awareness of research ethics as a cross-cutting dimension. Whereas fundamental research for concrete applications had been funded also during earlier FPs, FP6 was the first time basic research was funded in its own right. Another major novelty of FP6 was the implementation of public-public partnerships, that allowed a coordination of national research programmes (e.g. ERANETs, Article 169 Partnerships). Their introduction represents a noteworthy shift in governance and decision-making, away from a previously centralised, towards one that promotes the complementarity of European and national funding. Overall, the reassessment and redesign of the content of EU research activities was intended to have a structuring effect on the European research landscape. In essence, this also meant that the FP became a financial instrument for the implementation of a coordinated EU research policy. Yet, despite all these changes, the FP did not see a significant increased funding level, being funded merely 8.67% more than FP5. During FP6 it was also decided that 15% of the budget should be spent on supporting SMEs, as this target group still struggled with the participation in the FP.

The seventh Framework Programme (**FP7**), introduced in 2007, also came with considerable changes. The duration of the FP was increased to 7 years, aligning the negotiations of the FP with the overall EU budget negotiations. The annual funding available for FP7 increased by 77% compared to FP6, reflecting not only the commitment to R&I but also the accession of 12 New Member States.

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[6] European Communities, 'Treaty on European Union', OJ C 191, July 1992

[7] Reillon, V; 'EU framework programmes for research and innovation. Evolution and key data from FP1 to Horizon 2020 in view of FP9', EPRS, September 2017, https://www.europarl.europa.eu/RegData/etudes/IDAN/2017/608697/EPRS_IDA(2017)608697_EN.pdf

[8] Lisbon European Council, 'Presidency Conclusions', March 2000, https://www.europarl.europa.eu/summits/lis1_en.htm

[9] Reillon, V, ' The European Research Area', EPRS, March 2016, https://www.europarl.europa.eu/RegData/etudes/IDAN/2016/579097/EPRS_IDA%282016%29579097_EN.pdf

The main objective of FP7 was presented as supporting the knowledge triangle of education, research, and innovation to steer European competitiveness. This objective emphasised facing the effects of the 2008 financial crisis, which posed questions about the flexibility of the FP and its contribution to European resilience. [10] Besides that focus on competitiveness, FP7 also recognised the need to address pressing societal issues and "Grand Challenges", such as climate change, renewable energy, and public health. This shift laid the foundation for transitioning from mainly technological/industrial priorities to a problem-driven research agenda. These new objectives are also visible structurally in FP7 being organised around four blocs: cooperation, ideals, people, and capacities. During FP7, the co-funding instruments, pioneered in FP6, were extended towards new forms of public-public partnerships (e.g. Joint Programming Initiatives) but also towards public-private partnerships (e.g. JTIs, ETPs). This meant not only leveraging contributions from the private sector, but also a further extension of governance to coordination with private stakeholders. The use of co-funding instruments was increased, to promote the Barcelona Goal of investing 3% of EU GDP in research and innovation.[11] During FP7 a number of new, radical instruments, such as the European Research Council (ERC) and the European Institute of Innovation and Technology (EIT) were piloted. Executive agencies were launched to implement EU programmes, so the Commission could focus primarily on policy design, in an increasingly complex framework balancing multiple objectives, national interests, and a broad spectrum of topics and beneficiaries.

Horizon2020 (**FP8**) was set up in line with the *Europe 2020*[12] strategy promoting smart, sustainable and inclusive growth for Europe. One of its seven flagship initiatives was the "innovation union"[13], seeking a more strategic approach to innovation. Horizon 2020's design focused on contributing to European innovation as a core objective. This was made tangible by presenting the FP efforts as three pillars from fundamental research to bringing innovative solutions for the market.[14] The objective of funding innovation was, however, not only imagined as supporting competitiveness, but also to tackle societal challenges[15] through innovation and contribute to meeting the United Nations' Sustainable Development Goals. Horizon2020 also aimed to widen FP anticipation among new Member States and to include target groups spanning the entire innovation process from basic research, innovative firms, to societal actors. Dedicated new programme lines (e.g. "science with and for society") promoted the public participation of citizens, co-creation processes, and ethical research. Further, risk finance for SMEs or the "Flagship Initiatives for the Future and Emerging Technologies" (FETs), were introduced. More radical changes, that were pioneered during FP7, such as for instance the ERC funding basic, bottom-up research through an independent council, were stabilised during Horizon 2020. Taken together with the widespread forms of public-public and public-private partnerships this contributed to a multiplication of governance mechanisms for different instruments.

The following Framework Programme, **Horizon Europe** (**FP9** - 2021) was conceptualised as a continuation of Horizon 2020, with an even stronger emphasis on promoting innovation and addressing the global challenges. Horizon Europe is also organised along three pillars from Excellent

[10] Andrée D, Priority-setting in the European research framework programme, Vinnova, June 2009.
[11] Commission of the European Communities, 'Investing in research: an action plan for Europe', COM(2003) 226, June 2003.
[12] European Commission, 'Europe 2020 - A strategy for smart, sustainable and inclusive growth', COM(2010) 2020, March 2020.
[13] European Commission , 'Europe 2020 Flagship Initiative Innovation Union', COM(2010) 546, October 2010
[14] European Commission, ' The transformative nature of the European Framework Programme for Research and Innovation Analysis of its evolution between 2002 & 2023', October 2023, https://op.europa.eu/en/publication-detail/-/publication/a0421c7f-68c4-11ee-9220-01aa75ed71a1
[15] Health, demographic change and wellbeing; Food security, sustainable agriculture and forestry, marine and maritime and inland water research, and the Bioeconomy; Secure, clean and efficient energy; Smart, green and integrated transport; Climate action, environment, resource efficiency and raw materials; Europe in a changing world - inclusive, innovative and reflective societies; Secure societies - protecting freedom and security of Europe and its citizens

Science, Global Challenges and European Industrial Competitiveness, and Innovative Europe. Additionally, two additional structural elements were added, for the European Defence Fund as well as for Widening Participation and Strengthening the European Research Area. A relevant instrumental novelty was the launch of the EU Missions to address societal challenges (climate change, healing cancer, restoring oceans and water, developing climate neutral and smart cities, a soil deal for Europe) by pooling efforts from all relevant public and private actors, including national authorities and policy makers, researchers, practitioners, and citizens. Each mission covers a portfolio of actions, from policy measures, legislative initiatives, as well as research projects to create long-lasting impact. The European Innovation Council (EIC) was integrated within the Innovative Europe pillar. During Horizon Europe, the different types of co-funding instruments, were streamlined and simplified to three types of partnerships – co-programmed, co-funded, and institutionalised – which should be targeted towards strategically chosen initiatives. With a total budget of 95,5 billion Euro Horizon Europe is the biggest programme for Research and Innovation in the world.

The description of the developments of the FP over the past 40 years, does not aim to be exhaustive, but rather illustrative of major changes regarding the overall pursuit of the present study to discuss whether the future development of the FP should follow an evolutionary or a disruptive path.

Overall, the development of the FP over the last 40 years can be characterised as largely evolutionary with a continuous, but mostly gradual, extension. The budget of the FP has been steadily increasing, reflecting the enlargement of thematic scope and types of extension of target groups. Changes that can be characterised as disruptive are limited and were either first pioneered and evaluated before taken up permanently or connected to broader EU policy developments. As disruptive changes, we can name for instance: The alignment of the FP with ERA policies in FP6, resulting in a proliferation of new instruments and coordination between the EU and the MS; the establishment of the ERC as a separate agency in FP7 targeting basic research and moving away from the demands of cross-border collaboration projects; the explicit alignment of Horizon 2020 with policy goals outlined in the Europe2020 agenda and a contribution to meeting the United Nations' Sustainable Development Goals.

A central take-away from analysing the developments of the past FPs is also that the structure of the FP is not the decisive element that describes how much change is happening from one FP to another. In the past structures changed and instruments or topics stayed the largely the same (e.g., from F5 to FP6) or structures stayed the same and the objectives, target groups and topics change (e.g., F3 to F4). The major shifts in content of the FP were determined rather by shifts in R&I policy goals, while the structure of the FP described how these are implemented in specific instruments and how these instruments relate to one another and to the objectives of the FP. As such structures are also providing a narrative about how the FP is expected to insinuate change. This is particularly tangible for Horizon2020 and Horizon Europe, which illustrate the path from basic research to innovative applications.

Finally, we see that the conditions for the FP changes in an evolutionary or disruptive manner depended on the changing role and perception of the FP within a wider European societal and policy context. After the changes of the Single European Act FP4 could address not only issues of competitiveness and extended its scope and actions, FP6 was an instrument of implementing ERA developing numerous new instruments to do so, FP7 supported the recovery after the financial crisis, H2020 was a flagship initiative of the Europe 2020 strategy to steer innovative solutions. Thinking about changes of FP10 therefore requires taking the ongoing and potential future socio-political realities seriously.

Table 1 – Overview of budgets of past FPs

Framework Programme	Total Budget (In Billion EUR)	Budget per Year (in Billion EUR)	Increase from Previous FP (%) (total)
FP1 (1984-1987)	3.8	0,95	-
FP2 (1987-1991)	5.4	1,35	42,11%
FP3 (1990-1994)	6.6	1,65	22,22%
FP4 (1994-1998)	13.2	3,3	*100%*
FP5 (1998-2002)	15.0	3,75	13,64%
FP6 (2002-2006)	16.3	4,08	8,67%
FP7 (2007-2013)	50.5	7,22	209,82%
Horizon 2020 (2014-2020)	77	11	62,48%
Horizon Europe (2021-2027)	95.5	13,64	23,38%

Source: FP1[16], FP2[17], FP3[18], FP4[19], FP5[20], FP6[21], FP7, Horizon 2020[22], Horizon Europe[23].

[16] Council resolution of 25 July 1983 on framework programmes for Community research, development and demonstration activities and a first framework programme 1984 to 1987

[17] Council Decision of 28 September 1987 concerning the framework programme for Community activities in the field of research and technological development (1987 to 1991)

[18] Council Decision of 23 April 1990 concerning the framework Programme of Community activities in the field of research and technological development (1990 to 1994)

[19] Decision No 1110/94/EC of the European Parliament and of the Council of 26 April 1994 concerning the fourth framework programme of the European Community activities in the field of research and technological development and demonstration

[20] Decision No 182/1999/EC of the European Parliament and of the Council of 22 December 1998 concerning the fifth framework programme of the European Community for research, technological development and demonstration activities (1998 to 2002)

[21] Decision No 1513/2002/EC of the European Parliament and of the Council of 27 June 2002 concerning the sixth framework programme of the European Community for research, technological development and demonstration activities, contributing to the creation of the European Research Area and to innovation (2002 to 2006)

[22] Regulation (EU) No 1291/2013 of the European Parliament and of the Council of 11 December 2013 establishing Horizon 2020 - the Framework Programme for Research and Innovation (2014-2020) and repealing Decision No 1982/2006/EC Text with EEA relevance

[23] Regulation (EU) 2021/695 of the European Parliament and of the Council of 28 April 2021 establishing Horizon Europe – the Framework Programme for Research and Innovation, laying down its rules for participation and dissemination, and repealing Regulations (EU) No 1290/2013 and (EU) No 1291/2013

3. Current appetite for evolution and/or disruption

This study is situated within a period of intense debate regarding the future of the Framework Programme. To assess the appetite for incremental vs. radical change, this chapter draws insights from three complementary sources. First, we examine stakeholder perspectives through a review of position papers and evaluations of past Framework Programmes, identifying where beneficiaries see the greatest challenges and how they envision improvements. While there is broad agreement on the need for simplification and greater accessibility, opinions diverge on the extent to which funding structures, governance models, and research priorities should be reformed.

Second, we expand the analysis beyond the EU level by examining national R&I programmes that have embraced new models of research funding and governance. The emergence of experimental R&I agencies, such as SPRIND in Germany and ARIA in the UK, reflects an increasing global trend towards more flexible, risk-tolerant, and challenge-driven funding approaches.

Finally, we turn to recent high-level policy reports, including those by Draghi, Letta, and Heitor, to assess how political and economic leaders envision the future role of R&I in Europe. These reports situate the FP within broader discussions on economic competitiveness, strategic autonomy, and Europe's ability to lead in key technological domains.

3.1. Challenges of funding the world's biggest programme for research and innovation

As the European Framework Programme for R&I evolves, its effectiveness is increasingly scrutinised by policymakers, researchers, industry stakeholders, and civil society actors. While successive iterations of the FP have made incremental improvements, persistent challenges remain, affecting accessibility, efficiency, and impact. FP10 must address these challenges in a rapidly changing geopolitical and economic landscape, where technological leadership, global competition, and societal resilience are key concerns.

This section outlines the key challenges facing Horizon Europe. These are put together through an analysis of the stakeholder position papers[24], evaluations of the programme[25] and engagement with the R&I stakeholder through three foresight workshops. Identified challenges highlight areas where the FP must evolve to remain effective—whether through enhanced strategic alignment, improved governance, simplification, or new funding mechanisms.

The fundamental question remains: would addressing these issues require evolutionary refinement or disruptive transformation of the FP structure? In some cases, incremental improvements may be sufficient, ensuring that existing mechanisms function more efficiently without major structural change. In others, a more radical shift may be necessary, requiring a fundamental rethinking of how the FP is designed and implemented.

[24] The position papers considered focus only on the stakeholder statements towards FP10 and do not cover stakeholder positions towards the high-level report of Draghi, Letta and Heitor.

[25] European Parliamentary Research Service (EPRS). (2023). *Upcoming interim evaluation of Horizon Europe*; European Parliamentary Research Service (2024). *The Horizon Europe Programme: A strategic assessment of selected items*; European Commission. (2024). *Horizon Europe and the digital and industrial transition: Interim evaluation support study*; European Commission. (2024). *Horizon Europe and the green transition: Interim evaluation support study*; European Commission. (2024). *Evaluation support study on Horizon Europe's contribution to a resilient Europe*; European Commission. (2024). *Evaluation study on excellent science in the European framework programmes for research and innovation*; European Commission. (2024). *Evaluation study of the European framework programmes for research and innovation for an innovative Europe*.

Table 2 summarises the key challenges identified in the studies, evaluations and stakeholder position papers with regard to the scope, governance, management and instruments of the FP. Each of the challenges is described is more detail below.

Table 2 – Horizon Europe: Perceived challenges

Type of Challenges	Key perceived challenges of Horizon Europe
Scope	**Strategic alignment:** There is concern that funding may not match the level of ambition required to achieve desired impacts. Challenges in ensuring strategic alignment with sustainability goals. Tensions in resource allocation due to emerging political priorities.
Governance	**Complexity and simplification:** Horizon Europe is seen as complex, with a need for rationalisation and simplification of funding instruments to lower entry barriers, especially for SMEs.
	Design flexibility: Rigidity in programme design and need to balance targeted and emergent priorities.
Management	**Barriers to participation:** SMEs, SSH disciplines, local authorities, and civil society face barriers such as administrative complexity, fragmented information, and insufficient tailored support. These issues limit inclusivity, cross-disciplinary impact, and stakeholder engagement, reducing Horizon Europe's transformative potential.
	Widening and international cooperation: Lack of awareness of modifications under Common Model Grant Agreement (CMGA) or strategic plan. Lack of visibility and perceived complexity, impacting realisation of benefits. Need to increase the visibility of science and its long-term impact.
	Complexity and incoherence in thematic portfolio management: Fragmentation across funding mechanisms creates inefficiencies and missed synergies. Lack of centralised coordination limits thematic alignment and impact.
Instruments	**TRLs and funding gaps:** Emphasis on higher TRLs sidelining early-stage research, especially in Pillar 2. Whereas ERC and MSCA are heavily oversubscribed, with low success rates for applicants.

Source: Technopolis, based on analysis of stakeholder position papers.

3.1.1. Strategic alignment

Horizon Europe has faced criticism for its inconsistent alignment with societal and sustainability goals, a challenge which was also noted across several studies. While there are strong efforts to address immediate research and innovation needs, broader structural and systemic changes necessary for societal transformation often receive limited attention. For instance, the lack of integration of socio-cultural change and behavioural adaptation into key initiatives is cited as a critical gap. This disconnection hampers the programme's ability to effectively support the European Green Deal and other societal objectives through transformative actions. There is also criticism of the limited focus on structural transformations, such as developing new regulations, standards, and governance paradigms needed for systemic shifts toward sustainability. Without better strategic alignment, emerging political priorities may dilute the focus on critical sustainability objectives. [26] [27]

[26] European Commission. (2024). *Evaluation support study on Horizon Europe's contribution to a resilient Europe*.

[27] European Commission. (2024). *Horizon Europe and the green transition: Interim evaluation support study*.

Furthermore, Key Impact Pathways (KIPs), designed to measure the programme's impacts, insufficiently reflect long-term sustainability and societal goals.

The misalignment between Horizon Europe's research priorities and broader societal transformation goals raises the question of whether incremental adjustments will be sufficient or if a more fundamental restructuring is needed. While refining KIPs and strengthening thematic integration could enhance gradual alignment, the lack of structural mechanisms to drive long-term systemic change required for transitions such as the Green Deal, digital transformation, and resilience-building suggests that an evolutionary approach alone may fall short.

Rather than simply funding research projects with the hope that they will contribute to sustainability and societal goals, FP10 could be designed to drive systemic transformation from the outset. This would require a disruptive approach, embedding strategic alignment as a core principle to fully integrate research into policy implementation, rather than keeping it separate.

A more strategic investment framework would ensure research funding aligns with long-term societal missions, policy priorities, and governance reforms. This could involve challenge-driven missions with built-in policy coordination, funding conditionality linked to EU objectives, and stronger collaboration between research and regulatory bodies. A targeted investment model would direct funding toward research that drives structural transitions, such as clean energy, digital governance, and sustainable mobility. Achieving this vision would require a more centralised governance structure, actively coordinating with EU sectoral policies and ensuring coherence across Directorate-Generals (DGs).

3.1.2. Complexity and simplification

The FP is an umbrella of a complex array of funding options, various managing agencies and councils, sub-programmes, and instruments. The multitude of options, often with its own set of rules and criteria for participation and funding mechanisms, complicate the application process. For many researchers, particularly those from smaller institutions, SMEs, and new entrants, the FP's administrative landscape can feel overwhelming, opaque, and resource intensive.

One of the most frequently cited concerns is the time-consuming and costly nature of proposal preparation. On average, applicants invest 36 to 45 person-days per proposal, with no guarantee of success given the low funding rates. This results in significant sunk costs, particularly for smaller organisations that lack the resources to submit multiple applications. [29, 30] For many, the sheer administrative burden acts as a de facto barrier to participation, exacerbating disparities between well-established research institutions with dedicated grant-writing teams and those without such capacities. This challenge was strongly echoed in the workshop with stakeholders, where participants emphasised that the sheer administrative burden and inefficiencies in reporting tools and funding mechanisms discourage participation.

Beyond the application process, challenges persist in the grant management phase. Stakeholders, including Flanders, Malta, Slovenia, and Türkiye, have highlighted bureaucratic inefficiencies in online reporting tools, delays in finalising Grant Agreements, and fragmented thematic priorities. These inefficiencies reduce the cost-effectiveness of research funding, as a significant portion of

[28] European Parliamentary Research Service (2024). The Horizon Europe Programme: A strategic assessment of selected items

[29] European Commission. (2024). 'Evaluation studies on excellent science and innovation in the European framework programmes: Covering Horizon Europe and the digital and industrial transition'.

[30] European Parliamentary Research Service. (2024). 'The Horizon Europe Programme: A strategic assessment of selected items'.

project budgets (6-10%, and up to 20% in some cases) is consumed by administrative requirements rather than research activities.[31]

With each new iteration the FP has introduced additional instruments, reporting obligations, and policy-driven priorities, leading to further fragmentation and administrative strain. The FP's continuous expansion has, paradoxically, created greater inefficiencies rather than making funding more accessible. Workshop participants identified simplification, agility, and flexibility as "must-have" features for FP10, suggesting that without meaningful reform, the Programme risks becoming increasingly inaccessible and inefficient.

While the administrative complexity of the FP is a serious issue, it does not necessitate a complete overhaul of its governance and funding structure. The FP remains a globally recognised, high-impact research programme, and the challenges it faces stem not from its core mission and design but in the bureaucratic inefficiencies that have grown over time.

From an evolutionary perspective, gradual refinements—such as reducing transaction costs, harmonising administrative procedures, and leveraging AI-based tools for matchmaking and project management—could help address some inefficiencies. Workshop participants called for greater trust in beneficiaries and a reduction in burdensome reporting requirements, suggesting that FP10 should rethink its approach to application and grant management rather than continuously layering new instruments onto an already intricate framework. A fast-track system for high-potential projects or a modular funding approach could ensure that promising ideas move swiftly through the pipeline without excessive red tape.

A disruptive restructuring could introduce even greater instability, making funding even harder to access in the short term. A gradual, evidence-based approach to simplification ensures that changes are made without unintended consequences for beneficiaries. Solutions should focus on removing inefficiencies rather than reinventing the framework entirely.

3.1.3. Design flexibility

Horizon Europe has faced criticism for its rigid programme design, which, while ensuring alignment with EU strategic goals, limits responsiveness to emerging priorities. Its predefined objectives provide stability but constrain flexibility, making it slow to adapt to disruptive technologies, global crises, or unforeseen research needs. The COVID-19 pandemic and the rise of AI highlight the need for a more adaptive R&I framework.

An evolutionary approach could introduce gradual refinements to improve programme adaptability, such as iterative design mechanisms, allowing the programme to integrate emergent priorities without undermining its long-term strategic focus. However, if Horizon Europe is to become truly responsive to a rapidly evolving world, it could move towards a more modular and dynamic funding model, where striking a balance between targeted priorities and the flexibility to address new opportunities may enable Horizon Europe to remain relevant and impactful in a rapidly changing world. Incorporating iterative design principles and fostering greater stakeholder engagement in programme adjustments could help achieve this balance.

3.1.4. Barriers to participation

Several barriers hinder the full participation of key R&I stakeholders in Horizon Europe, including SMEs, local authorities, or civil society organisations. Furthermore, societal aspects – typically addressed by social sciences and humanities (SSH) players, remain undervalued. These obstacles,

[31] European Commission. (2024). 'Evaluation support study on Horizon Europe's contribution to a resilient Europe'. Additionally, 'Horizon Europe and the digital and industrial transition: Interim evaluation support study'

highlighted across multiple evaluation reports, restrict inclusivity, and reduce the programme's transformative potential:

- **SMEs** face significant challenges: Apart of the above-mentioned administrative complexity, they perceive favouritism towards larger corporations and face insufficient tailored support. SMEs often struggle to secure coordinator roles due to resource limitations and a lack of familiarity with the programme's intricate processes. Moreover, fragmented information dissemination hinders SMEs' ability to identify and access relevant opportunities.
- **Local authorities and civil society organisations** face challenges in understanding and accessing Horizon Europe's instruments, such as Missions. Their limited engagement arises from insufficient tailored communication and limited resources. Yet, if the FP wants to contribute to systemic changes, these stakeholders are essential. The lack of their involvement in decision-making processes and practical implementation strategies is mirrored by the programme's limited ability to mobilise broad societal participation and fostering multi-stakeholder alignment.
- Despite their critical role in addressing societal challenges, the potential of players that bring in **SSH disciplines** remains underutilised. Evaluations highlight that SSH is often insufficiently integrated into broader projects, which limits its impact on cross-disciplinary innovation. The lack of explicit emphasis on SSH in funding calls and thematic priorities results in missed opportunities to incorporate diverse perspectives, values, and approaches crucial for addressing complex societal transformations.

Several evaluations note the lack of clear and accessible communication about funding opportunities. Information about the programme's funding instruments is fragmented and differently disseminated. This creates confusion among stakeholders and is particularly difficult to handle for new entrants and smaller organisations. At the national level, underutilisation of National Contact Points (NCPs) could also affect the communication gap. NCPs, which are intended to provide tailored guidance and support to applicants, often fail to reach their full potential due to inconsistent outreach and engagement strategies. These communication challenges limit the visibility and potential wider reach to untapped actors, reducing its potential impact. To address these issues, streamlining information dissemination, enhancing the role of NCPs, and creating centralised, user-friendly platforms for funding information will be critical for improving access and participation across the programme. [32] [33]

Given that these challenges have been longstanding and well-documented, the question arises: is an evolutionary approach sufficient, or is a more radical restructuring required to ensure true inclusivity?

From an evolutionary perspective, gradual refinements—such as better coordination of NCPs, streamlined funding calls, and enhanced outreach strategies—could improve accessibility without altering the programme's fundamental structure. This approach would align with past trends of incrementally broadening participation while preserving the existing governance model. Whereas a more disruptive shift could involve dedicated quotas for underrepresented actors, integrating SSH as a mandatory component in all major calls, and restructuring SME funding streams to ensure fairer access to coordination roles.

[32] European Commission. (2024). *Evaluation support study on Horizon Europe's contribution to a resilient Europe; Evaluation study of the European framework programmes for research and innovation for an innovative Europe*

[33] European Parliamentary Research Service (2024). The Horizon Europe Programme: A strategic assessment of selected items

Workshop participants also called for stronger public-private partnerships and regional embedding of missions. Such changes would challenge the excellence-driven paradigm that has historically shaped FP funding, pushing towards a more mission-oriented and socially responsive framework. Ultimately, while some evolutionary improvements can enhance accessibility, achieving a better inclusion of stakeholder may require a disruptive realignment of priorities, funding allocations, and governance structures.

3.1.5. Widening and international cooperation

Persistent inequalities in research and innovation funding across MS continue to challenge the inclusivity and effectiveness of the FP. Despite the presence of widening measures, success rates remain skewed towards well-established institutions in a handful of countries, reinforcing a two-speed European R&I ecosystem. It is obvious that these discrepancies cannot be addressed only with the help of EU funding, but they require more effort at national level. What is often felt is that the disparities in success rates and institutional capacity among MS remain a significant barrier to equitable participation. There are several dividing lines which are prompted by conflicting objectives such as focussing on research excellence and competition on the one hand, while at the same time envisaging cohesion and improving lagging research systems. Workshop participants reaffirmed the need for tailored support mechanisms that address the diverse capacity-building needs of underperforming regions but have also pointed out that this would be better addressed with complementing research and cohesion – thus regional – policies. Current widening instruments, such as Teaming, ERA Fellowships, and ERA Chairs, were recognised as valuable but insufficient by actors from widening countries, with their impact constrained by poor synergies with national and regional funding. Without stronger incentives for high-performing institutions to engage in widening schemes and clearer mechanisms to encourage national co-investment, widening risks becoming a substitute for, rather than a complement to structural reform efforts in R&I in lagging regions.

To address these shortcomings, workshop participants advocated for embedding widening efforts into a broader, more structured development pathway, ensuring that regions with lower research capacity are not merely supported temporarily but actively guided toward self-sufficiency. They proposed a "ladder to excellence" approach which would provide a phased transition framework, ensuring that underperforming regions receive targeted research infrastructure investments, talent development schemes, and expanded international collaboration opportunities to integrate fully into the European R&I ecosystem. This would be complemented by a "pull effect" on national R&I funding, whereby EU-level support incentivises Member States to co-invest in their own research capacity-building, ensuring sustainable, long-term improvements. Additionally, ERA Fellowships should be fully integrated into the MSCA network, a low-cost yet high-impact measure to boost the visibility and participation of researchers from widening regions, thereby improving institutional engagement.

At the same time, international cooperation remains a complex balancing act. Europe's strategic autonomy in key technology areas such as AI, semiconductors, and quantum computing must be weighed against the benefits of global collaboration. Concerns have been raised about the extent to which this openness aligns with Europe's long-term strategic interests. Several studies identify the tension between maintaining open partnerships and safeguarding Europe's technological sovereignty, particularly in critical areas such as artificial intelligence, quantum technologies, and advanced computing. Stakeholders argue that while international cooperation enriches the programme by bringing diverse expertise and resources, it also raises concerns about intellectual property rights, dependency on third countries, and the transfer of critical technologies. These challenges are especially pronounced when engaging with partners from non-associated countries. The studies suggest that Horizon Europe must carefully manage this balance, ensuring that openness does not compromise strategic priorities or the EU's ability to lead in key innovation areas. Developing clearer guidelines for collaboration and strengthening safeguards for strategic assets

will help Horizon Europe achieve a more secure and mutually beneficial approach to international partnerships. [34] [35] In addition, workshop participants suggested a tiered engagement model, distinguishing between open partnerships, strategic alliances, and restricted collaboration for critical technologies. Greater alignment between FP10 and EU industrial policies was also highlighted as crucial to ensuring that international partnerships support, rather than undermine, European competitiveness.

Enhancing the equitable distribution of funding through targeted support for underrepresented regions and developing stronger frameworks for international cooperation is seen as critical for maximising Horizon Europe's impact and ensuring that its benefits are distributed more broadly across Europe and beyond. [36] [37]The Western Balkans position paper highlights the lack of integration and capacity building in less-developed regions, echoing the challenge that highlights inequities in funding distribution and barriers for underperforming regions.[38]

Workshop participants highlighted the need for a more selective approach to international partnerships, particularly in security-sensitive domains. While open science and transnational collaboration remain fundamental to European leadership in R&I, geopolitical tensions necessitate stronger safeguards for intellectual property, knowledge transfer, and strategic assets. Suggested solutions included a tiered engagement model that distinguishes between open partnerships, strategic alliances, and restricted collaboration for critical technologies. Greater alignment between FP10 and EU industrial policies was also deemed necessary to ensure that international partnerships support, rather than undermine, European competitiveness and innovation leadership.

An evolutionary approach would involve incremental improvements to existing widening measures, including stronger synergies with national R&I strategies, better incentives for institutional development, and reinforced engagement between high-performing and underperforming regions. Additionally, international cooperation frameworks could be fine-tuned with clearer IP protection guidelines, reinforced security protocols, and structured partnership models based on strategic interests. However, these adjustments alone may not be sufficient to fully bridge the structural disparities or safeguard Europe's long-term technological sovereignty.

A disruptive approach would require a fundamental restructuring of the funding allocation model, moving beyond a "one-size-fits-all" competitive system toward a model that actively redistributes resources based on institutional development needs. Additionally, international cooperation mechanisms would need to be redefined, potentially introducing a tiered engagement model that distinguishes between strategic partnerships, open collaborations, and restricted technology domains.

3.1.6. Complexity and incoherence in thematic portfolio management

Horizon Europe has been criticised for its complexity and lack of coherence in thematic portfolio management, which hinders the programme's ability to create synergies and align its various funding mechanisms effectively. The fragmentation across themes and funding instruments creates

[34] European Commission. (2024). *Evaluation support study on Horizon Europe's contribution to a resilient Europe; Horizon Europe and the green transition: Interim evaluation support study.*

[35] European Commission. (2024). *Evaluation study of the European framework programmes for research and innovation for an innovative Europe*

[36] European Commission. (2024). *Evaluation support study on Horizon Europe's contribution to a resilient Europe; Horizon Europe and the green transition: Interim evaluation support study*

[37] European Parliamentary Research Service (2024). The Horizon Europe Programme: A strategic assessment of selected items

[38] Dall, E. (2024). 'POLICY ANSWERS Policy Brief. The Western Balkans on the Road to FP10'. Horizon Europe project funded by the European Commission, Grant No. 101058873, September 2024.

inefficiencies, with overlapping objectives and missed opportunities for collaboration between projects under different pillars. This disjoint approach makes it challenging to identify key results and maximise the collective impact of funded initiatives. The lack of a centralised portfolio management system also limits the programme's ability to address cross-cutting challenges, such as sustainability and societal transformation, which require coordinated efforts across multiple domains. Stakeholders have noted that more effective thematic integration could reduce redundancies, streamline operations, and foster stronger synergies.

Addressing this issue by implementing better portfolio management strategies and fostering thematic alignment across Horizon Europe's pillars will be critical for enhancing the coherence and overall impact of the programme. [39] The integration and strategic support deficiencies, as noted by organisations such as EU-LIFE and the ERIC Forum, highlight the need for better integration of research into innovation processes, particularly through mechanisms like the EIC, and for stronger strategic support for European Research Infrastructure Consortia (ERICs), broadening the studies' critique of thematic fragmentation. Additionally, a more disruptive change would be replacing rigid pillar structures with a more challenge-driven, mission-oriented funding model which would enhance coherence, synergy, and long-term impact.

3.1.7. TRLs and funding gaps

The FP's increased focus on higher Technology Readiness Levels (TRLs), particularly within Pillar 2 on Global Challenges and Industrial Competitiveness, has drawn criticism for sidelining early-stage research, which is considered important for long-term innovation potentials.

The FP's focus on higher TRLs, which aligns with immediate market demands, has incrementally grown in the past decade. While this is not a problem per se, many argue that it has inadvertently marginalised early-stage research and foundational science—areas critical for breakthrough innovations and long-term competitiveness channelled through oversubscribed instruments such as the ERC and MSCA. Without adequate support in promising early-stage research, Europe's ability to sustain disruptive innovation pipelines and new knowledge frontiers will be limited.

In addition, stakeholders also highlight the lack of support for non-technological innovation. While technology-driven advancements receive substantial investment, social, behavioural, and governance innovations—which are essential for sustainability, social resilience, and inclusive growth—remain underfunded and underutilised. Addressing challenges like climate adaptation or digital governance requires more than just technological breakthroughs. Compounding these funding gaps, key strategic technology sectors such as Artificial Intelligence, robotics, quantum technologies, and advanced computing also face resource shortages, leading to low success rates and disincentivising participation in these high-priority domains. [40] [41]

At the other end of the innovation chain, scaling European research into market-ready solutions remains a major bottleneck. While Pillar 3, through mechanisms such as the EIC, is designed to support market deployment, it falls short in meeting the needs of scaling European companies. Stakeholders have raised concerns that existing support mechanisms focus heavily on early-stage funding but provide insufficient tailored assistance for late-stage commercialization. The lack of end-to-end funding continuity, targeted mentoring, access to global markets, and regulatory alignment creates barriers for European innovators seeking to scale their technologies globally. The

[39] European Commission. (2024). *Evaluation support study on Horizon Europe's contribution to a resilient Europe; Horizon Europe and the green transition: Interim evaluation support study.*

[40] European Commission. (2024). *Evaluation study on excellent science in the European framework programmes for research and innovation*; *Evaluation study of the European framework programmes for research and innovation for an innovative Europe*

[41] European Commission. (2024). *Horizon Europe and the digital and industrial transition: Interim evaluation support study.*

issue is particularly acute in fast-moving sectors such as AI, renewable energy, and deep tech, where European firms face intense international competition.

Stakeholders, including Germany, Slovenia, LERU, CE7, The Guild, ISE, EUA, and CNRS, have repeatedly called for a recalibration of funding priorities to strengthen basic research, support non-technological innovation, and bridge the gap between research and commercialization. Additionally, organisations such as AENEAS, EPoSS, and INSIDE have highlighted a funding disparity for large enterprises, which, despite conducting half of the EU's R&D, received only 7.5% of Horizon Europe's funding between 2021 and 2023. [42] This suggests that FP instruments may not be attractive enough for large companies, limiting their engagement in European R&I efforts. Unless these gaps are systematically addressed, Europe risks losing competitiveness in key strategic sectors, failing to capitalise on its research outputs, and falling behind global innovation leaders.

Ultimately, neglecting early-stage research weakens the pipeline of future breakthrough technologies, while the lack of adequate support for scaling European innovations limits their commercial impact. Under FP 10, an evolutionary approach would involve gradual improvements of funding mechanisms, such as modest increases in low TRL funding streams, enhanced coordination with ERC and EIC, and refined support for scaling mechanisms under Pillar 3. While such adjustments would help rebalance the research-to-market continuum, they may not be sufficient to correct the structural deficiencies that have persisted across successive FPs. A disruptive shift would require redefining the FP's funding logic, moving beyond a linear research-to-market model toward a more integrated, challenge-driven funding approach where funding flows dynamically between early-stage research and later-stage commercialisation based on strategic EU priorities. This could include dedicated instruments to strengthen basic research within Pillar 2, embedding non-technological innovation as a cross-cutting criterion, and introducing funding conditionalities to ensure that high TRL projects remain rooted in European research ecosystems.

3.1.8. Conclusions

Many of the administrative and operational inefficiencies, such as complex funding instruments, high transaction costs, and barriers to participation, can be improved through streamlining processes, enhancing synergies, and reducing bureaucratic hurdles. Workshop discussions repeatedly emphasised non-prescriptive calls, fast-track systems, and simplified reporting requirements as necessary adjustments rather than radical reforms. Similarly, international collaboration must be redefined through a tiered engagement model, balancing openness with the need to protect Europe's technological sovereignty. In these areas, an evolutionary approach would be most effective, allowing for continuity while enhancing efficiency and accessibility.

However, certain structural weaknesses demand a disruptive shift where incremental changes have failed to deliver results. Integrating R&I policy with other EU priorities can only occur through enhanced strategic alignment. The current pillar structure, which often limits synergies across research areas, requires a transition toward a challenge-driven model that fosters cross-sectoral collaboration. Additionally, the current funding balance between early-stage and applied research needs reconfiguration. Over-prioritising high-TRL projects at the expense of blue-sky research risks stifling innovation. A more dynamic funding model is needed, allowing resources to flow flexibly between TRLs based on strategic priorities.

Expanding participation across Member States cannot be solved through incremental incentives alone. It would require a shift in resource distribution, moving toward a strengthened capacity-building model that strengthens weaker research ecosystems. These changes require a fundamental rethinking of FP's funding logic and governance structures to create a more inclusive and impact-

[42] European Commission. (2024). *Evaluation study of the European framework programmes for research and innovation for an innovative Europe*

driven programme. Such a shift would however move the goal from 'research excellence' to 'cohesion' – which is likely to face a serious debate of research and innovation actors which prefer a model based on competition.

Finally, design flexibility must be embedded into FP10 to ensure adaptability to emerging crises and breakthrough technologies. This requires rolling funding calls and real-time resource allocation mechanisms, allowing the FP to remain responsive, resilient, and forward-looking.

3.2. Key trends in national R&I programmes: Implications for FP10

Across different national contexts, research and innovation strategies are evolving to prioritise agility, risk-taking, strategic investment, and stronger alignment between research outputs and societal needs. Programmes such as Expedition Zukunft (Germany), SPRIND (Germany), Mission-Driven Topsectors and Innovation Policy – MTIP (Netherlands), ARIA (UK), and France 2030 illustrate a shift towards more dynamic, outcome-driven funding models, greater autonomy in governance, and a more integrated approach to bridging research, industry, and public policy. Looking at their Scope Relevance, Innovative Features, Instruments, and Beneficiaries, is useful to help think about potential priorities and instruments that could be incorporated in FP10.

In Table 3, the elements are compared across the five selected national programmes.

Table 3 – Synthesis of insights from case studies

	Expedition Zukunft	SPRIND	Mission-Driven Topsector and Innovation Policy	ARIA	France 2030
Scope	Breakthrough innovations with potential to create new markets or revolutionise existing ones, specifically addressing complex societal and environmental challenges.	Disruptive innovations across various sectors, particular focus on technologies and societal solutions	Leveraging the Netherlands' strengths in specific economic sectors to tackle societal challenges	High-risk, high-reward research that pushes the boundaries of science and technology, often exploring interdisciplinary areas that are not typically funded by traditional research bodies.	Innovations in green energy, digital technology, and healthcare, promoting a sustainable and competitive economic landscape.
Relevance	Counters "fund and forget" with continuous support; guides assist beyond funding period, ensuring long-term project success and integration.	Addresses early-stage funding gaps with novel modalities; simplifies bureaucracy, enhances project validation and support, speeding	Aligns with EU objectives, addressing societal challenges; employs public-private partnerships, diversifying funding to stimulate	Fills critical R&I gaps by funding high-risk research; enhances funding decision speed and agility, promotes economic competitiveness and private	Targets global challenges, industrial sovereignty, and technological leadership; focuses on economic recovery and job creation

	Expedition Zukunft	SPRIND	Mission-Driven Topsector and Innovation Policy	ARIA	France 2030
		innovation to market.	innovation collaboration.	sector engagement.	post-COVID-19.
Innovative feature	Implements a stage-gate model to support projects from inception to scale. Provides ongoing guidance from Expedition Guides during and after the project. Maintains thematic openness in calls and engages diverse, non-traditional stakeholder groups.	Operates without fixed calls, focusing on identifying and supporting potential breakthrough innovations with tailored solutions.	Emphasises market creation and valorisation, turning research into practical applications. Utilises programs like Start-up in Residence and SBIR to encourage market adoption. Focuses on regional innovation hubs and key technologies (AI, photonics, quantum tech) to drive missions.	Possesses high strategic autonomy, free from ministerial direction on funding choices. Employs a Programme Director-led, bottom-up approach to foster innovation. Uses a variety of funding instruments that create a dynamic, responsive ecosystem.	Combines top-down strategic priorities with bottom-up flexibility for innovation. Focuses on ecological transition and technological breakthroughs, with significant funding for decarbonization and emerging players. Uses a hybrid funding approach to foster public-private partnerships and drive national priorities.
Instruments	Grants for preparatory work, innovation, industrial research, and interdisciplinary challenges, and support services	Flexible funding including grants and equity investments for high-risk projects.	Collaborative funding across public, private, and academic sectors for technological and social innovations.	Grants, potential equity stakes, and other innovative financial mechanisms	Grants, loans, and incentives for private sector involvement
Beneficiaries	Entities (e.g. startups, NGOs) engaged in pioneering projects that can significantly change markets, technologies, or societal functions.	Academic and private sector innovators who are working on disruptive technologies.	Wide array of stakeholders, including businesses, academic institutions, and public research organizations.	Innovators and researchers from the academic and industrial sectors who engage in high-risk, high-reward projects.	Wide array of private stakeholders, from emerging startups to established industrial sectors.

	Expedition Zukunft	SPRIND	Mission-Driven Topsector and Innovation Policy	ARIA	France 2030
Budget	€18,3 million	€1 billion	€5.8 billion	€800 million	€956 million

Source: Technopolis Group.

3.2.1. A shift towards high-risk, high-reward innovation

At their core, these national programmes prioritise high-risk, high-reward research that has the potential to reshape markets, drive technological sovereignty, and tackle urgent societal challenges. Unlike traditional research funding models that tend to favour incremental advancements, these programmes embrace uncertainty and bold experimentation. Initiatives like ARIA and SPRIND focus on radical innovation by deliberately investing in emerging, interdisciplinary, and disruptive technologies that might struggle to secure funding through traditional means. Similarly, France 2030 seeks to balance technological breakthroughs with ecological transition, ensuring that cutting-edge advancements contribute directly to strategic policy goals. Expedition Zukunft and the Dutch Mission-Driven Policy further reinforce this approach by aligning their innovation ecosystems with broader economic and societal needs, ensuring that research outputs remain relevant beyond academic circles.

Another key trend is market integration and commercialisation. MTIP strongly focuses on ensuring research leads to marketable applications, using mechanisms like Start-up in Residence and SBIR programs to push innovations toward real-world deployment. France 2030 follows a similar approach, integrating top-down strategic goals with bottom-up flexibility, ensuring that both national priorities and disruptive innovation can thrive.

Public-private partnerships (PPPs) play a central role in France 2030 and MTIP, where industry and government collaborate to address societal challenges. These programmes recognise that successful innovation ecosystems require strong connections between public investment, research institutions, and private sector expertise. This contrasts with ARIA and SPRIND, which focus more on radical autonomy and risk-taking, fostering disruptive innovation through highly flexible funding.

In order for FP 10 to adopt an ambitious risk profile, the programme could combine mission-oriented funding, designed to ensure impact and societal benefit, with open, high-risk innovation funding, and create dedicated paths that support radical innovation while ensuring continuity from early-stage research to market deployment. Additionally, FP10 could introduce challenge-based and flexible funding mechanisms that allow riskier projects to progress based on milestones, mitigating failure while enabling breakthrough discoveries.

3.2.2. Long-term strategic investment

The FP's project-based funding model does not provide sustained support beyond the initial grant period. In contrast, programmes such as Expedition Zukunft and SPRIND have introduced mechanisms to guide and support projects throughout their lifecycle, ensuring that promising innovations do not stagnate due to funding discontinuities. France 2030, with its hybrid funding approach, combines grants, loans, and private-sector incentives to create an ecosystem where R&I investments yield tangible economic and societal returns. Similarly, the Dutch Mission-Driven Topsector Policy embeds long-term partnerships between industry, academia, and government, ensuring that research is continuously adapted to evolving economic and technological landscapes.

In order to transition from short-term project funding to a more sustained, strategic investment approach, the FP could adopt a stage-gate funding model, where projects receive incremental

support based on milestones, or establishing long-term mission-driven clusters that align funding with industrial and societal objectives over extended periods.

3.2.3. Decentralised, agile, and independent governance

A defining feature of these national programmes is their flexibility and independence in decision-making. ARIA, for example, operates with full autonomy from ministerial directives, allowing it to make funding decisions rapidly and strategically rather than being constrained by bureaucratic cycles. Similarly, SPRIND actively identifies and nurtures promising innovations without relying on traditional calls for proposals, enabling a proactive rather than reactive approach to funding allocation. These governance innovations reflect a growing recognition that bureaucratic delays and rigid administrative structures can hinder innovation. The lesson for FP10 is that an overly centralised, prescriptive governance model may limit its ability to rapidly adapt to emerging opportunities and disruptive technological breakthroughs.

A more decentralised governance structure, where certain funding decisions are delegated to expert-driven bodies, would allow a more dynamic allocation of resources based on emerging trends and could significantly enhance FP10's responsiveness and adaptability. However, such a shift would require careful design to avoid replicating the limitations seen in some existing institutionalised partnerships, which are often perceived as closed to newcomers and overly influenced by specific stakeholder groups. Any expert-driven bodies involved would need to operate with a high degree of independence from political or lobbying pressures, while also maintaining clear lines of accountability. While proposals such as those in the Heitor report (see next section) suggest this direction, further reflection is needed on how such structures could be effectively implemented in practice. Complementing this, a portfolio-based funding approach—balancing high-risk, high-reward projects with more stable investments—could allow FP10 to support transformative research while safeguarding financial sustainability.

3.2.4. Diversifying funding instruments: Beyond traditional grants

The national programmes show a diverse mix of funding instruments, which go beyond conventional grants to include equity investments, milestone-based funding, and public-private financing models. SPRIND and ARIA, for instance, blend financial support with strategic investment approaches, ensuring that projects receive not just funding, but also the necessary infrastructure, mentorship, and regulatory guidance to succeed. France 2030 incorporates private-sector incentives and co-financing mechanisms, ensuring that research funding is leveraged effectively to drive industrial innovation. The Dutch Mission-Driven Innovation Policy, meanwhile, uses targeted financial incentives to stimulate collaboration between SMEs, universities, and large corporations, ensuring that innovation is not limited to well-established institutions.

To expand financial toolkit, FP10 could further integrate venture-style funding mechanisms, outcome-based grants, and flexible capital injections that adapt to the specific needs of different types of innovation projects.

3.2.5. Strengthening inclusivity and regional innovation

Finally, these national programmes provide important lessons on how FP10 can broaden access to research funding and ensure that innovation is not concentrated in a few selected institutions or regions. Expedition Zukunft, for example, has taken a deliberately thematically open approach, ensuring that non-traditional innovators, including startups, NGOs, and regional research hubs, can access funding. Operating without fixed calls, SPRIN-D allows for tailored funding decisions that meet the needs of breakthrough innovators, particularly in the private sector. ARIA in the UK has similarly introduced a high-autonomy, low-bureaucracy funding model, attracting risk-taking innovators and startups.

Meanwhile, while widening instruments in the FP have often been perceived as parallel mechanisms rather than integrated components of the main programme, national strategies take a different approach. They place a strong emphasis on regional innovation hubs, fostering stronger collaboration between academia, industry, and local governments. The Netherlands' Mission-Driven Innovation Policy leverages its top sectors as regional anchors, enabling local innovation ecosystems to drive mission-oriented research. Similarly, France 2030 has prioritised investments in regionally anchored research clusters, linking national R&D funding with industrial competitiveness goals.

These lessons align with the FP's challenge of widening participation and reducing disparities in access. FP10 could integrate these best practices by developing dedicated instruments for less represented actors, including:

- **Fast-track grants for SMEs**, modelled after SPRIND's flexible funding approach, ensuring that innovative small businesses can access R&I financing with fewer bureaucratic hurdles.
- **Local innovation accelerators**, inspired by France's regional R&D strategies, to help civil society organisations and municipal authorities play a more active role in innovation ecosystems.
- **Challenge-based funding calls**, based on the Netherlands' Mission-Driven Policy, allowing regional stakeholders to propose solutions to locally relevant societal challenges, with the potential for scaling across Europe.

These national R&I programme initiatives demonstrate a trend toward integrating long-term strategic vision with flexibility, risk tolerance, and multi-stakeholder engagement. A regional angle would certainly benefit from building of synergetic effects with cohesion funding.

For FP10 to remain competitive and impactful, it must not simply refine existing instruments but adapt to the rapidly changing innovation landscape by:

- **Embracing high-risk, high-reward research** by introducing challenge-based, flexible funding mechanisms.
- **Shifting from project-based funding to long-term strategic investment models**, ensuring milestone-based continuity from early research to commercialisation.
- **Increasing governance agility** by decentralising decision-making and reducing bureaucratic bottlenecks.
- **Diversify funding instruments** to include equity investments, public-private co-financing, and results-based funding models.
- **Enhancing inclusivity and regional innovation capacity**, ensuring equitable distribution of research funding and opportunity.

3.2.6. Conclusions

The analysis of five national R&I programmes across Europe highlights a clear shift towards high-risk, high-reward funding, strategic long-term investment, mission oriented transformative policies and more decentralised governance models. These trends reflect an evolving recognition that traditional research funding mechanisms must adapt to drive breakthrough innovation, enhance commercialisation, and address urgent societal challenges. Trends include:

- Embracing high-risk, high-reward research through more flexible, challenge-based funding mechanisms that support disruptive innovation.

- Shifting from short-term project-based grants to long-term strategic investment, ensuring research continuity from early-stage development to market deployment.
- Increasing governance agility by reducing administrative bottlenecks and decentralising decision-making, allowing for more responsive and adaptive funding allocation.
- Diversifying funding instruments beyond conventional grants to include equity investments, milestone-based funding, and public-private co-financing models.
- Strengthening inclusivity and regional innovation ecosystems by ensuring that funding opportunities extend beyond elite institutions to include SMEs, startups, local governments, and underrepresented regions.

While FP10 operates on a pan-European scale, these national initiatives illustrate an attempt towards greater flexibility, risk-taking, and mission-driven collaboration. The challenge for FP10 will be finding the right balance between ambition and feasibility, ensuring that new funding mechanisms align with Europe's institutional framework while fostering a more dynamic and globally competitive R&I ecosystem.

3.3. Visions, needs, and suggestions from high-level policy reports

This section examines the key themes emerging from the recent high-level reports commission by the European Commission, namely those of Enrico Letta[43], Mario Draghi[44], Manuel Heitor[45], and Sauli Niinistö[46], and the impact they might have on FP10. Each report approaches the issue from a different angle—economic competitiveness, market integration, industrial policy, and security preparedness—yet they collectively underline the need for a stronger, more coordinated, and better-resourced European R&I strategy.

The table below provides an overview of challenges identified in this report linked to the scope, governance, management and instruments of the FP together with a list of proposed recommendations. We then analyse each one of these aspects in detail below.

Table 4 – Identified challenges and recommendations in high-level policy reports

Aspect	Challenges Identified	Recommendations
Scope	• Persistent innovation gap: Difficulty translating scientific research into commercial products and market leadership (Draghi, Letta, Heitor). • Fragmentation and inefficiencies across Member States and sectors, duplication and weakened strategic autonomy (Draghi, Letta, Heitor).	• Significantly increase R&I budget (€200 billion) and fulfil 3% GDP target (Draghi, Letta, Heitor). • Narrow FP10 scope to fewer priority areas, increasing ERC, EIC, and MSCA funding (Draghi, Heitor). • Establish "fifth freedom" for research, innovation, knowledge, data, competences, and education (Letta). • Embed R&I centrally within Single Market policies (Letta).

[43] Letta, E. (2024). 'Much more than a market.'
[44] Draghi, M. (2024). 'The future of European competitiveness.'
[45] EC (2014). 'Align, Act, Accelerate. Research, technology and innovation to boost European competitiveness.' Expert group report chaired by M. Heitor, 'Heitor report'.
[46] Niinistö, S. (2024). 'Safer together. Strengthening Europe's civilian and military preparedness and readiness.'

Aspect	Challenges Identified	Recommendations
	• Insufficient R&I investment, below EU's 3% GDP target (Draghi, Letta, Heitor). • Outdated Single Market framework inadequate for digitalisation and knowledge economy (Letta) • Insufficient preparedness and weak integration of civil-military dual-use R&I (Niinistö). • Risk-averse financial environment hindering innovation scale-up (Draghi, Heitor).	• Strengthen dual-use instruments (Defending Europe Facility, Securing Europe Facility) (Niinistö).
Governance	• Complex governance structures causing regulatory fragmentation and administrative burdens hindering cross-border collaboration (Draghi, Letta, Heitor). • Absence of coordinated EU-wide strategic alignment between EU and Member States (Draghi, Letta, Heitor). • Lack of comprehensive civil-military governance model and vulnerabilities to foreign interference and technology leakage (Niinistö).	• Establish EU-wide strategic R&I action plans (Draghi) and dedicated councils (Industrial Competitiveness and Technology Council, Societal Challenges Council) (Heitor). • Standardise IP rules, ethics regulations, data-sharing, and simplify bureaucracy (Letta, Draghi, Heitor). • Adopt Finnish Comprehensive Security model for integrated civil-military preparedness (Niinistö). • Implement EU-level recommendations enhancing research security and preventing technology leakage (Niinistö).
Management	• Excessively bureaucratic and complex funding processes, hindering SME and innovator participation (Draghi, Letta, Heitor). • Weak management of technology transfer pathways, impeding scale-up and deployment (Draghi, Heitor) • Limited agility and insufficient capability-driven management to quickly respond to new challenges (Heitor, Niinistö). • Weak structural links across the research-innovation-deployment continuum, especially in security-related fields (Niinistö).	• Simplify administrative and legal procedures ("trust first, evaluate later" approach) (Draghi, Heitor). • Expand mobility programmes (MSCA, Erasmus for All, European Universities Initiative) to facilitate cross-border talent mobility (Letta). • Establish agile funding processes and capability-driven management approaches (Heitor, Niinistö). • Create experimental units for disruptive innovation funding ("ARPA-style" mechanisms) (Heitor). • Introduce innovation procurement programmes driving demand-led solutions (Heitor).
Instruments	• Insufficient instruments for high-risk, disruptive innovation, limiting potential for breakthrough innovation (Draghi, Heitor). • Existing instruments (e.g., EIT, European Innovation Ecosystems)	• Create a new instrument modelled on US Advanced Research Project Agencies by reforming the EIC Pathfinder (Draghi, Heitor). • Expand funding for ERC, EIC, MSCA; establish ERC-I (ERC for Institutions)

Aspect	Challenges Identified	Recommendations
	becoming inefficient or redundant (Heitor). • Limited synergy between civilian and military dual-use R&I instruments (Niinistö). • Insufficient structural support and incentives for scaling innovative companies within the EU, causing "valley of death" (Draghi).	and an "EU Chair" for top academics (Draghi, Heitor). • Implement blueprint for fair and transparent royalty-sharing between researchers and institutions; roll out the Unitary Patent across EU Member States; introduce an "Innovative European Company" status (Draghi). • Create the European Knowledge Commons digital platform pooling publicly funded research and educational resources (Letta). • Strengthen civilian-military R&I coordination through dedicated dual-use programmes (Defending Europe Facility, Securing Europe Facility) (Niinistö). • Reform or phase out ineffective instruments (e.g., EIT, European Innovation Ecosystems) (Heitor).

Compilation: Technopolis Group.

3.3.1. Scope: Scale, focus, dual-use and risk

Europe stands at a critical juncture as four major policy reports—authored by Mario Draghi, Enrico Letta, Manuel Heitor, and Sauli Niinistö—highlight pressing challenges that could profoundly reshape the strategic scope of the next Framework Programme for Research and Innovation (FP10). Each report, while distinct in perspective, collectively underscores key constraints and proposes ambitious reforms with far-reaching implications.

The Draghi, Letta, and Heitor reports collectively spotlight Europe's persistent innovation gap—a paradoxical challenge in which Europe excels in producing world-leading scientific research but consistently struggles to convert these discoveries into commercial successes and market leadership. Despite considerable intellectual capital, Europe continues to trail behind global competitors, particularly the United States and China, in leveraging research excellence to produce market-disrupting innovations. To decisively address this gap, these reports advocate a significant increase in FP10's funding—proposing a bold expansion to around €200 billion, thus aligning Europe closer to its longstanding (yet unmet) ambition of dedicating 3% of GDP to research and innovation. Such a significant financial increase could substantially alter FP10's scope, enabling greater investment in ambitious, high-risk innovations, thereby increasing the programme's strategic influence on Europe's technological leadership.

However, increasing the FP's budget alone may not fully address the structural fragmentation identified across these reports. Draghi, Letta, and Heitor explicitly note that Europe's R&I landscape remains fragmented and inefficient, characterised by duplicated efforts, resource underutilisation, and uneven priorities across sectors and Member States. Such fragmentation reduces Europe's capacity to leverage its collective potential and undermines its strategic autonomy. Draghi and Heitor therefore recommend a narrowed FP10 scope, strategically focusing on fewer, carefully selected priority areas—particularly boosting funding for excellence-driven institutions and initiatives such as the European Research Council (ERC), European Innovation Council (EIC), and Marie Skłodowska-Curie Actions (MSCA). Heitor advocates for targeted investment in innovation

ecosystems, ensuring that research institutions, industries, and start-ups collaborate in regional innovation clusters that can drive local and global technological leadership.

While the proposal to narrow the scope of the FP could substantially enhance strategic alignment, concentrating resources on specific areas of existing or emerging European competitive strength and improve impact, it also introduces concerns. Europe may inadvertently reduce its capacity to remain flexible and responsive to unforeseen scientific breakthroughs, emerging societal issues, or rapidly changing technological landscapes. This loss of flexibility could limit Europe's adaptability and innovation resilience, causing missed opportunities in areas not initially prioritised. Furthermore, overly targeted directionality in funding calls might unintentionally exclude emerging, interdisciplinary fields, risking the exclusion of innovative ideas and future growth sectors simply because they do not align neatly with predefined strategic objectives. Moreover, narrowing priorities inherently involves complex political negotiations, as Member States, sectors, and research institutions advocate for their respective interests. Achieving consensus on a limited set of priority areas might prove politically challenging, potentially creating friction or delays that offset any efficiency gains.

In addition, Enrico Letta's report introduces a transformative dimension—the establishment of a new "fifth freedom" of free movement for research, innovation, knowledge, data, competences, and education. Such a proposal could imply a broadening of FP10's scope, suggesting that it would no longer primarily serve as a traditional funding mechanism, but rather evolve into a comprehensive policy tool promoting regulatory alignment, enhanced mobility, and improved cross-border collaboration. If implemented, the FP could become integral to advancing Europe's broader economic and societal integration. However, expanding into these policy areas might stretch the FP's original remit, potentially requiring significant institutional restructuring, new administrative mechanisms, and rebalancing of resources.

Moreover, Niinistö further expands the debate by highlighting the necessity of dual-use research—where scientific discoveries serve both civilian and defence applications—in strengthening Europe's technological sovereignty. This view is supported by Draghi who urges to maximise technological spillover between civil and defence innovation cycles. The EC's 2024 white paper on dual use[47], proposes an option to remove the civilian-only clause in parts of FP to allow dual-use projects. Opinions on dual-use research in FP10 range from cautious support to staunch opposition, with common concerns about budget trade-offs, openness, and ethics. The emerging policy considerations include possibly ring-fencing parts of FP10 for dual-use, coordinating with the European Defence Fund, restricting sensitive projects to EU-only participation, and instituting ethics review processes. Inclusion of dual-use research must be handled transparently and thoughtfully.

Finally, Draghi and Heitor identify Europe's risk-averse financial environment as a key barrier hindering the scaling-up of innovative companies and technologies. To increase risk taking, the FP10 would need to implement financial and structural reforms aimed at reducing investment risks and enhancing commercialisation support. This in turn means shifting the focus on higher TRL projects.

In summary, the reports signal significant potential changes in FP10's scope, advocating increased budgetary ambition, strategic concentration of resources, enhanced integration into the Single Market framework through a "fifth freedom," and expanded support for dual-use capabilities and enhanced risk taking. Critically, these proposed changes, while promising strategic benefits, would substantially broaden the FP's original remit and require careful consideration of institutional capacities, resource allocation, policy coherence, and ethical implications. The precise nature and

[47] ec_rtd_white-paper-dual-use-potential.pdf

extent of these changes will ultimately depend on policy deliberations and political consensus within the European Parliament and broader EU institutions.

3.3.2. Governance: National coordination, industry alignment

The governance reforms proposed by Draghi and Heitor have the potential to substantially reshape the strategic and operational framework of FP10, addressing entrenched structural inefficiencies while simultaneously introducing significant new challenges.

Mario Draghi's critique clearly highlights one core governance failure: the EU's longstanding inability to meet its 3% GDP target for research and innovation investment. Draghi attributes the EU's lags behind global innovation leaders, such as the USA and China, directly to this shortcoming. The resulting underfunding is tangible—for instance, Horizon Europe's failure to fund approximately 71% of high-quality research proposals due to budget constraints. Draghi's recommended solution is ambitious, advocating the creation of a comprehensive European Research and Innovation Action Plan. This action plan aims at stronger strategic coordination and clearer alignment between national and EU-level research investments, ultimately transforming Europe's fragmented research landscape into an interconnected, coherent research area. However, while the plan's potential benefits in reducing duplication and improving resource allocation are clear, implementing such a far-reaching plan requires substantial political will among Member States. Many national governments may hesitate to cede control over research agendas or funding priorities, raising fundamental questions about sovereignty, accountability, and the acceptable extent of EU-level decision-making.

Heitor's governance proposals further expand on this concept of strategic coordination by recommending two dedicated councils: the European Technology and Industrial Competitiveness Council (ETIC2) and the European Societal Challenges Council (ESC2). ETIC2 would closely integrate industry experts and policymakers, explicitly aiming to increase the industrial relevance and rapid applicability of research outputs. ESC2, on the other hand, would address complex societal challenges, encouraging interdisciplinary approaches and engaging diverse stakeholders, including civil society and philanthropic organisations. These councils represent a promising strategy to enhance strategic alignment and responsiveness within FP governance. Nonetheless, introducing additional governance bodies raises the risk of inadvertently increasing bureaucratic complexity, creating decision-making overlaps, or causing conflicts of interest between industry priorities and broader societal goals. Policymakers must thus carefully manage these risks, ensuring clarity of roles, robust transparency mechanisms, and safeguards for stakeholder balance in decision-making.

In summary, the governance structure of the FP may need to carefully balance enhanced coordination among Member States and closer alignment with industry priorities. Successfully addressing these aspects could significantly improve the EU's strategic coherence, maximise resource allocation efficiency, and enable more agile responses to emerging challenges. However, the implementation of these governance reforms must carefully navigate Member States' sensitivities regarding sovereignty and autonomy and mitigate the risk of increased bureaucratic complexity.

3.3.3. Management: Simplifying access and enhancing risk taking

A shared critique across Draghi, Letta, and Heitor emphasises the excessive bureaucratic burden of FP administration. Complex application processes, lengthy decision timelines, and high transaction costs disproportionately affect SMEs, newcomers, and innovative entities seeking access to funding. These administrative burdens reduce participation, stifle innovation, and ultimately limit the impact of Europe's R&I investments. Specifically, Draghi highlights the complexity of proposal procedures as a significant barrier, Heitor stresses the resulting slow pace in translating research into innovation,

and Letta underscores the detrimental impact of administrative barriers on cross-border researcher mobility.

To address these management challenges, and to make the FP more accessible, Draghi and Heitor explicitly advocate for radical simplification of administrative procedures. They propose adopting streamlined application processes, significantly reducing time-to-grant periods, and lowering transaction costs. Heitor goes further, suggesting a management approach characterised by a "trust first, evaluate later" principle. While broadly beneficial in making FP funding more accessible—particularly for SMEs and new entrants—these simplifications must carefully balance ease of access with rigorous evaluation standards and accountability to prevent misuse or reduced research quality.

Additionally, the reports highlight the importance of bridging the gap between research and market impact. The Heitor Report emphasises the need for more robust technology transfer mechanisms, ensuring that innovations move swiftly from research labs to commercial application. This includes enhanced public-private partnerships, increased venture capital support, and targeted funding mechanisms that help scale up emerging technologies. The Draghi Report echoes these concerns, advocating for reformed intellectual property policies and the introduction of a blueprint for fair and transparent royalty-sharing models between researchers and institutions. Additionally, it proposes the establishment of an ERC for Institutions (ERC-I) to provide long-term funding to top research centres, ensuring that they can compete with leading global institutions for talent and resources. The Draghi Report adds a layer of flexibility. It envisions decentralised regional hubs that manage calls and funding decisions locally, reducing delays and tailoring support to specific contexts. For example, a hub in southern Europe might focus on climate resilience, drawing on regional expertise while aligning with overarching EU goals. Such a model is foreseen to accelerate decision-making but also empower communities to drive solutions to their own challenges.

Furthermore, Heitor's proposal for an Experimental Unit within the EIC to pilot an ARPA-inspired funding model, aligning with a similar recommendation by Draghi. This approach would give programme managers significant autonomy, ample funding, and the flexibility to pursue goal-oriented projects, supported by strict milestones and rapid evaluation to discontinue unsuccessful projects promptly. However, Heitor acknowledges the practical constraints within the European context, including labour laws limiting recruitment of highly autonomous, highly compensated managers, and stresses the necessity of an already robust innovation ecosystem. Thus, while advocating for experimentation, the report suggests adapting only selected elements of the ARPA model that align realistically with the EU's institutional and innovation landscape.

In summary, simplifying administrative procedures and reducing bureaucratic complexity is crucial to improving FP management, as highlighted by Draghi, Letta, and Heitor. Streamlined processes and shorter funding timelines could significantly increase participation from SMEs and innovators. Additionally, better technology transfer mechanisms, fairer IP frameworks, regional funding hubs, and experimental ARPA-inspired initiatives could accelerate market uptake of innovations. However, these reforms must be balanced against rigorous accountability standards and adapted carefully to address practical constraints within the EU's institutional framework, such as for example constraints in managing high-risk investments.

3.3.4. Instruments: Rethinking Europe's R&I toolbox

If the FP is to position Europe as a global leader in research and innovation, the instruments it deploys must be fit for purpose, agile, and strategically aligned with its ambitions. Yet, as Draghi, Heitor, Letta, and Niinistö have emphasised, the current suite of instruments suffers from inefficiencies that limit their effectiveness. While some mechanisms have driven scientific excellence, others have become outdated, redundant, or too risk-averse to support truly breakthrough innovation. As FP10 takes shape, the challenge is to refine and redesign its

instruments to ensure they serve not only frontier research and technological leadership but also Europe's broader strategic interests, from industrial competitiveness to societal resilience.

DG RTD's expert group with its 'Heitor report' paints a picture for FP10, organised into four clear and interconnected "spheres of action", which closely resemble the current FP pillar structure. These include:

- **Competitive excellence**, defined as optimal harnessing from a large pool of applications submitted to open calls, to competitively select the most excellent proposals for funding by using appropriate criteria (i.e., ERC, MSCA, EIC).
- **Industrial competitiveness**, defined as the ability to provide state-of-the-art products, services and technology-based solutions which contribute positively to overall sustainability (economic, environmental and social) for which there is a market demand or that create new markets.
- **Societal challenges,** defined as complex and interrelated issues that significantly impact the well-being and development of societies. They consider issues that significantly impact fundamental human rights and affect individuals' personal or social lives, underlying well-being of communities, countries and the European Union. These challenges are typically multi-level and multi-dimensional, often coexisting and requiring innovative solutions, transdisciplinary approaches and coordinated efforts from various actors including government, industry, research, and civil society to be effectively addressed. There is usually disagreement about their nature, causes or solutions.
- **A strong R&I ecosystem**, defined as a supportive, productive and interconnected interplay between institutions both public and private, infrastructure, researchers, innovators, entrepreneurs, companies and their surrounding communities to foster the creation of breakthrough discoveries and innovations and their rapid translation and scaling to global markets and applications.

This structure complements existing entities like the European Research Council (ERC) and the European Innovation Council (EIC), which retain their autonomy and receive enhanced funding to continue fostering research excellence.

Yet, simply reorganising the programme is not enough—some instruments must be expanded, others reformed, and a few phased out altogether. The calls to increase funding for the ERC, EIC, and MSCA, show the future strengthening of these instruments and increased ability to attracting scientific talent. Heitor suggests that spending should be focused on areas where EU programmes have unique added value, such as multi-country collaborations and expensive research and technology infrastructures. It recommends streamlining FP10 by discontinuing or reforming underperforming programmes:

- European Institute of Technology (EIT): The report recommends significantly reducing FP funding for the EIT, integrating effective elements such as entrepreneurial training into competitive funding mechanisms like the MSCA, while phasing out ineffective Knowledge and Innovation Communities (KICs).
- European Innovation Ecosystems (EIE): This programme is considered redundant and should be dissolved, with successful initiatives absorbed into broader EU R&I frameworks.
- Mission-Oriented Policies: The non-research components of Missions, such as policy implementation, should be managed outside FP10 at higher political levels, with FP10 focusing on their research and innovation elements.
- Widening Instruments: Consolidate and focus on effective initiatives like Teaming and MSCA while discontinuing fragmented or less impactful schemes.

While the EU has long invested in Research Infrastructures (RIs)—such as large-scale scientific facilities—there is a growing recognition that Europe lacks the necessary infrastructure to scale research into market-ready solutions. To bridge this gap, Heitor proposes:

- **A European Strategy for TIs**, modelled on ESFRI (European Strategy Forum on Research Infrastructures), ensuring that investments align with Europe's strategic priorities, such as AI, quantum computing, advanced manufacturing, and green technologies.
- **Dedicated Funding and Co-Investment**, where FP10 resources are complemented by Member State contributions, industry co-investment, and structural funds, reducing fragmentation and maximising financial sustainability.
- **Integration of RIs and TIs**, creating seamless pathways from discovery to commercialisation by ensuring that data generated by RIs can be processed and validated in TIs, accelerating innovation timelines.

To further strengthen the European R&I ecosystem, the reports propose the creation of an ERC for Institutions (ERC-I), providing long-term, stable funding to Europe's top research centres, enabling them to compete with global leaders such as MIT and Stanford. Additionally, the introduction of an "EU Chair" position would offer prestigious, direct EU employment for top researchers, helping to retain world-class talent and mitigate brain drain to the US and China.

To bolster FP10's ability to lead in disruptive, high-impact technologies, Draghi and Heitor emphasise the limitations of the EIC Pathfinder, which, despite its mandate to support frontier innovation, remains constrained by risk-averse funding structures that deter truly bold projects. Their solution? A new ARPA-inspired instrument, designed to provide greater flexibility, autonomy, and risk tolerance in funding breakthrough innovations. This would entail:

- Give programme managers autonomy, allowing them to allocate funds flexibly, make quick decisions, and redirect resources based on project performance.
- Embrace a goal-driven, mission-oriented approach, with strict milestones and evaluation criteria, ensuring rapid progress while terminating underperforming initiatives.
- Encourage risk-taking, prioritising high-impact, high-uncertainty projects that traditional funding schemes might overlook.

3.3.5. Conclusions

Several core themes emerge across the reports. First, there is a broad consensus on the need to increase the scale and ambition of FP10, both in terms of budget and strategic focus. Calls to meet the 3% GDP R&I investment target and significantly boost funding for excellence-driven instruments such as the ERC, EIC, and MSCA reflect a shared belief that Europe must overcome its persistent innovation gap to maintain global competitiveness.

Second, the reports underline the importance of improving governance and management. Proposals range from establishing strategic EU-wide R&I action plans and thematic councils to simplifying administrative procedures and reducing time-to-grant. However, these reforms must navigate complex political dynamics, including national sovereignty concerns and the risk of added bureaucratic layers.

Third, the reports call for a rethinking of the instruments that underpin FP delivery. There is widespread support for phasing out underperforming or duplicative initiatives while introducing new mechanisms—such as ARPA-style programmes, enhanced technology infrastructures, and long-term institutional funding—that can better support disruptive innovation and scale-up.

Fourth, the scope of FP10 is expected to broaden to align more closely with Europe's strategic objectives, including security, dual-use research, and greater integration into the Single Market. The

proposed "fifth freedom"—free movement of research, knowledge, data, and talent—illustrates a growing desire to embed R&I more deeply into the EU's broader policy architecture.

Taken together, these recommendations point to a Framework Programme that is not only larger and better resourced but also more focused, strategically coordinated, and operationally agile. At the same time, the ambition to reform FP10 raises critical questions about implementation, including how to balance directionality with flexibility, how to ensure accountability in new governance structures, and how to avoid unintended exclusion of emerging or interdisciplinary research areas.

As Europe stands at the crossroads of global competition and unprecedented challenges, FP10 has the potential to become a beacon of excellence and resilience. They offer both a critique of current limitations and a roadmap for transformative change. The challenge now lies in translating these visions into a coherent, actionable, and politically feasible programme architecture. The next chapters explore how such a transformation could take shape by examining hypothetical programme structures for FP10 under different future scenarios.

4. Potential future evolution and/or disruption in FP development

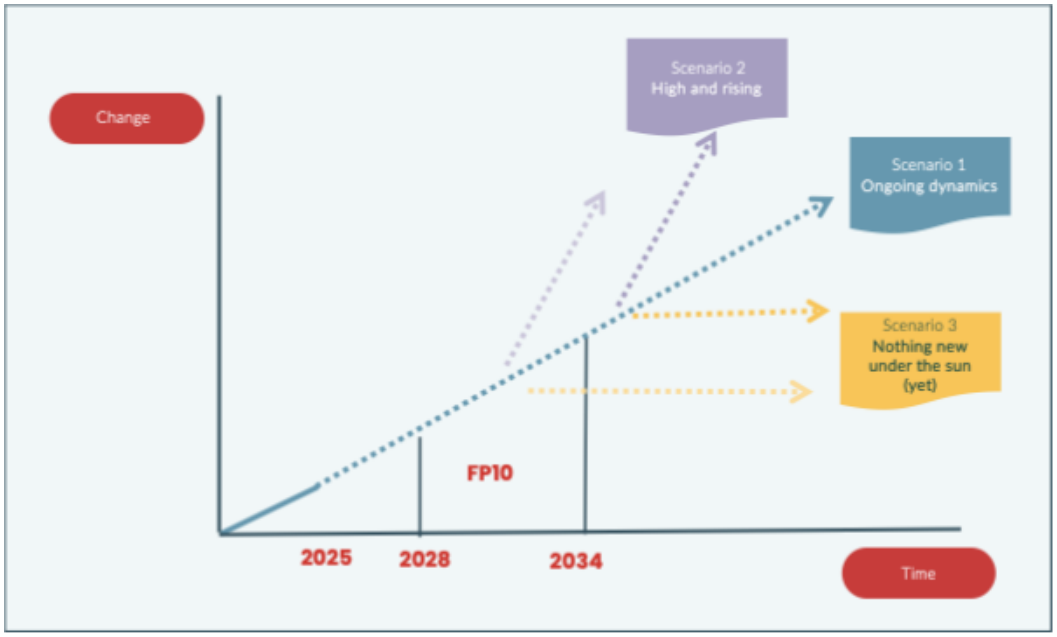
Since the main question of the project centred on the potential future developments of the next Framework Programme and its high-level design, scenarios were developed and various aspects such as drivers and challenges discussed in a series of stakeholder workshops. The future is uncertain, yet preparing for it is essential. Imagine standing at a crossroads, where multiple paths stretch out before, each leading to different possible futures. Some paths are well-trodden, shaped by past trends and policies, while others venture into unfamiliar terrain, presenting both challenges and opportunities. When designing the future FP that remains relevant, effective and forward looking, we must anticipate the implications of possible futures.

Scenarios are means to imagine alternative futures and develop ideas, strategies, or policies to help societies, stakeholders, organisations etc. to innovate and design means to enable the said societies, stakeholders etc. to deal with the potential futures. In such scenarios, the time horizon matters. Obviously, we can imagine a closer future – say within the next five years – more vividly since we tend to extrapolate from the past and current situation. When thinking about longer horizons, say ten to 15 years or even longer, many events may happen which can dramatically alter the future in one direction or another. Initially, we have placed the horizon of expected events to the mid 2030s and seen FP10 as a means to prepare for challenges to come.

The study team had developed scenarios as a basis for informed discussions in the workshops. They are detailed in Chapter 4**.** Figure 3 provides an overview of three scenarios. The middle, green line signals where we are today and when FP10 will be implemented (2028-2034). The two disruptive scenarios where initially set after 2035, but the two lighter coloured lines indicate that they can also happen much earlier. The 'Ongoing dynamics' (Scenario 1) was envisaged as a continuation of ongoing developments. This does not preclude major changes within the structure of the programme but all in all, it would provide more of what is known (today) rather than what is not known.

Each workshop was attended by 35-40 stakeholders which were then divided into parallel break-out groups, deliberating on specific questions. Summaries of the workshops and their insights are provided in the Annex.) Yet, the project work and discussions were caught by surprise of the political new realities: The development of the scenarios and much of the background research took place in September and October 2024. The disruptive scenarios developed then looked radical and rather still far away. The workshops with stakeholders took place from second half of November 2024 to second half of January 2025, the last one on the inauguration day of President Trump in the USA. During the past weeks, a range of political decisions by him created a politically and socio-economically unpredictable new reality to which European policymakers are working to find responses to. Thus, what seemed to be a disruptive scenario in January 2025, took a preliminary shape within a couple of weeks. This propelled also some potential future policy options into the immediate focus as we will see further below.

Figure 3 – Timelines of scenarios



Source: Technopolis Group.

4.1. Scenario development and use

When designing a future Framework Programme for research and innovation that remains relevant, effective and potentially even forward looking, we must anticipate the implications of possible futures. One way to achieve this is through scenario planning—a tool that allows us to explore multiple possible futures. Scenarios do not offer predictions; rather, they present structured narratives that illustrate how external forces—such as technological advances, economic shifts, and policy decisions —might shape the research and innovation landscape and thus the design of the FP. One of the most effective approaches in scenario planning is the development of contextual scenarios. These scenarios provide frameworks for understanding the broader environment in which a future FP will operate. Rather than focusing solely on policy choices, contextual scenarios examine external conditions, emerging trends, and structural dynamics that influence European research and innovation. They serve as plausible representations of alternative future contexts, helping policymakers anticipate how research funding, collaboration models, and strategic priorities may need to evolve.

They are distinctive from policy scenarios which focus on specific policy choices and their projected consequences, offering structured alternatives from which decision-makers can select a preferred approach. Policy scenarios typically inform short-term political decisions, whereas contextual scenarios provide a strategic framework for long-term planning.

In this study, three contextual scenarios were developed to explore how external factors could shape the design and implementation of FP10**.** Each scenario represents a distinct trajectory for European research and innovation:

- **(1) Ongoing Dynamics** – A scenario reflecting a more evolutionary development of the current system, where changes build upon existing structures and policies. In this scenario,

Europe still seeks global cooperation but does so largely out of enlightened self-interest. Terms such as 'technology sovereignty' and 'open strategic autonomy' are leading.

- **(2) High and Rising** – A future in which Europe experiences a period of rapid scientific advancement, strong investment in research, and an expanding role in global innovation leadership.
- **(3) Nothing New Under the Sun (Yet)** – A future in which innovation stagnates, economic pressures constrain research funding, and progress slows due to external or internal challenges. If innovation stagnates and funding becomes constrained, FP structures may need to prioritise efficiency, resilience, and sustainability of previous investments. Europe remains important, but global cooperation is not seen as the answer to all problems, and the lack of financial resources also has a direct impact on the extent and intensity of global contacts.

Understanding possible futures is only the first step—what matters is how these scenarios influence the structural and strategic design of the FP. The following sections provide the narratives of the three scenarios and their respective matching hypothetical programme structures.

We have chosen the 'degree of economic growth' in Europe as the most decisive driver. The degree of economic growth provides the room for socio-economic policies and has a major influence on the available public budgets. Low (high) growth typically follows with low (high) incomes and subsequently low (high) budgets for R&I activities. The degree of economic growth also impacts on how companies and knowledge institutions relate to knowledge development, technology, and innovation. With low or even negative economic growth, they will not necessarily prioritise these topics. Instead, they will mainly be concerned with their short-term financial survival. With higher economic growth, public and private spending on R&I is more realistic. Private sector firms may need to invest further in R&I to respond to shareholder requirements, but managers may also have more room to think and act more longer term.

The rise of artificial intelligence as a 'general purpose technology' - its continued rapid development is expected to have major effects such as how we will conduct scientific research, develop technology, and carry out innovation processes. However, it may also happen that the current expectations are not matched; that AI might not entirely fulfil its potential.

The quality of technology is also related to the economic growth: with more room for investment and a longer-term focus, the ethical and societal aspects of technology will be considered better. In addition, economic growth has a major impact on how people relate to each other, to the direction of geo-political developments, and to internal national political relations. The degree of economic growth also affects the extent to which the various societal transitions (such as energy, food, climate) receive sufficient funding.

Social polarisation can also be directly linked to economic growth as well as the trust that citizens have in their government.

Ageing can be seen as an autonomous demographic trend that is not easily influenced by the degree of economic growth but is very likely to influence growth.

In this scenario, we pay attention to the current conflict between Russia and Ukraine. We assume two variants of this current conflict:

- In the first variant, there is a 'frozen conflict', a long-term stalemate in which neither side is winning or losing. This is not to say that the military conflict will not have an impact on European society and on scientific research, technology and innovation. This 'development' will certainly contribute to the reconstruction of the European military industry, the budgets

that countries spend on defence, limiting international cooperation, limited mobility (people and goods), and it can also be expected that part of the European research budget will focus on this, such as more attention to 'dual use'.

- In a second variant, we assume that the conflict has been 'resolved' (we will leave the exact form of this unanswered) because (a form of) peace has been concluded. The Russian threat will continue to exist, and mutual distrust describes the relationship between Europe and Russia best. This situation will also have an impact on the European budgets for research and innovation. Although the bulk of defence spending may be less than in the first variant, it will be significantly higher than it is at present.

Understanding possible futures is only the first step—what matters is how these scenarios influence the structural and strategic design of the FP. The following sections provide the narratives of the three scenarios and their respective matching hypothetical programme structures.

We have equally developed a number of policy options which are detailed in section 4.5.

4.2. Europe in an 'Ongoing dynamics' scenario

Figure 4 – Illustration of the 'Ongoing dynamics' scenario

Source: Technopolis Group – ChatGPT.

4.2.1. The 'Ongoing dynamics' scenario

For this scenario, we expect that the current dynamics of a volatile, uncertain, and ambiguous world will prevail and that the following, already observable, developments and trends will be extended in the short to medium-long term future:

- **Increasing populism (politics):** more parties coming into power that focus on short term issues and with less interest for evidence-based policy.
- **Declining globalisation** ('blocs', regionalisation): increasing nationalistic thinking

- **Geo-political unrest:** more military conflicts (globally) leading to more spending on defence
- **Economic growth:** on a stable but low level
- **Polarisation:** increasing economic and social inequality as well as political differences
- **Technological growth continues:** more AI, digitalisation, robotisation, biotechnologies, sustainable energy technologies, blockchain, 3D-printing, new materials, nanotechnology etc.
- **Information integrity crisis:** digital divide, rise of disinformation, AI-fakes, election interferences
- **Governments are being watched very critically**: low trust in institutions such as democracy but also in science, (traditional) media, and justice.
- **Individualisation (societal fragmentation):** people increasingly identify as individuals rather than as part of a collective group
- **Aging of society:** more use of health services and increasing labour shortages (in almost every industry and sector, including science, research, and technology)
- **Climate change continues**: More focus on adaptation and mitigation instead of prevention
- National R&I policies remain predictable and rather constant

In the 'Ongoing dynamics'-scenario, low economic growth has proven to be a constant factor. In fact, economic growth is only just above zero percent in some parts of the EU. There are constantly discussions and arguments about how to distribute the scarce public money. Policy makers are trying to increase the 'economic cake', but in terms of economic growth they seem to be in a stalemate. To limit inflation, the central banks use their tools including interest rates. Interest rates rose somewhat with the effect that investments got more costly for companies. This has negative impact on employment and thus on the level of the GDP of many countries. The economy of the European Union has started to resemble that of Japan, although there is a lower savings rate and Europe is not (yet) suffering from population decline and a very large share of an aged population.

As a result, many European countries are turning inward, approaching international cooperation with significant scepticism. This applies to both the large geo-political 'blocs' (Europe, USA, China, etc) as well as for individual European countries. They strive for 'strategic autonomy' or even 'strategic sovereignty', which in practice means that they make use of protectionist measures. People are wary of becoming overly dependent on foreign nations. While complete autarky remains unrealistic, EU countries are striving to prioritise their own economies and to strengthen and diversify their technological foundations. Culturally, the tide has shifted, with a growing emphasis on cherishing and protecting one's own heritage. Many argue that foreign influences lead to a sense of alienation among citizens, both from their country and themselves. Prioritising national interests and putting one's own country first is no longer taboo. As more countries adopt this stance, it creates a self-reinforcing cycle.

People increasingly rely on existing technologies and are hesitant to adopt innovations, as the risk of failure is deemed too high in this extremely fragile economy. People are increasingly critical of technology, questioning whether it truly meets their needs and desires. The technological hype of the 2020s—with its ethical breaches and privacy violations—has not been forgotten. This scepticism also extends to trust in the government and other institutions, which are still seen as contributors to economic and social problems rather than their solutions. Interestingly, the lower standard of living has had a positive impact on climate change, as reduced production leads to lower consumption of raw materials and decreased overall consumption.

The design of a new European framework programme for research and innovation will need to be responsive to the following European-wide challenges that are part of this scenario:

- **Declining confidence in government, science, technology, and innovation**. Existing technologies are considered sufficient, and people do not want new technology and knowledge that does not match the slow pace of this society.
- The **lower economic growth** almost automatically implies that there is less budget available for additional investments in technology and knowledge.
- Increasing cultural differences and the growing **focus on national interests** have made establishing international partnerships among EU countries increasingly challenging.

4.2.2. Hypothetical programme structure I – Challenge-driven developments: Towards stability, strategy, and resilience

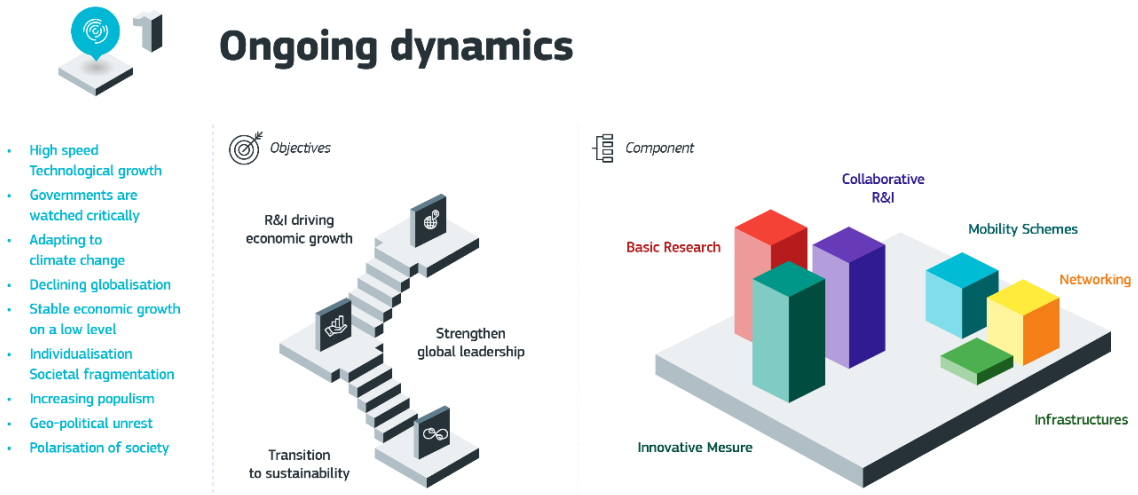
Under this scenario (which includes many current pressures that may aggravate in the coming years), the next FP emerges at a critical juncture in European and global affairs. It is not designed in a vacuum; rather, it takes shape amidst profound geopolitical shifts, economic uncertainty, and technological advancements that redefine the nature of innovation itself. The imperative is clear: FP10 must continue the EU's commitment to scientific excellence, innovation, and industrial competitiveness while ensuring that research and innovation contribute to the long-term resilience of European societies. As the world becomes more fragmented, less predictable, and increasingly shaped by crises, FP10 cannot afford to be static. Its structure must reflect the observed developments. It can be a programme that maintains continuity where stability is needed but introduces flexibility where adaptation is required.

Yet, stakeholders in the workshops typically ignored the difficult messages of the scenario. Potentially overall less budget available, a shift to defence – were not really seen as threatening the well- established and well-known structures. Their discourse clearly preferred an evolutionary development of the FP. An adapted version of the Horizon Europe pillar structure was deemed the preferred option. It is little surprising as stakeholders draw suggestions and requirements about a new FP 10 on past and current experiences and many of them echoed the positions of their members, which is closer to a 'no experiments' position. Especially in the first workshop session, the discussions concerned questions on programme management, access and foci (Do we still need widening? What can be improved?), while economic and global challenges to which the FP 10 could or should serve as a means – remained unaddressed. Many position papers and stakeholders acknowledged the war in Ukraine and potential threats in terms of defence. Also, the overall need to contribute to more resilience was equally acknowledged, but would this require a change? The remedies opted for remained by and large the same: more budget, simplified processes, stakeholders directly or indirectly in the driving seat. It cannot be excluded that this appetite for evolution would be less, had the last workshop not been on the inauguration day of President Trump, but a few weeks later.

The necessary more coherent European defence policy and investments in defence may require a clearer focus on EU added value. According to workshop discussions, EU added value will be maximised by investing in areas where collective action delivers benefits that national programmes cannot achieve alone. A primary area of focus should be European digital sovereignty, ensuring that Europe retains control over its critical digital infrastructure, artificial intelligence governance, and data protection frameworks. Funding should be directed towards European AI development, quantum computing, and secure digital ecosystems to reduce dependency on external tech giants. Given the erosion of trust in science and technology, the FP must also address societal fragmentation by supporting technology-driven solutions that foster social cohesion. This could include digital inclusion initiatives, public engagement in research decision-making, and governance

models that reinforce transparency and trust in science. Demographic and workforce challenges might take a central role in the FP.

Figure 5 – Hypothetical programme structure under 'Ongoing dynamics' scenario



Source: Technopolis Group.

The following summarises the potential structure:

Scope

FP10 continues the EU's commitment to research and innovation as a driver of economic growth, sustainability, and technological leadership. However, the programme must evolve to address new challenges, including shifting geopolitical dynamics, the tension between openness and strategic autonomy, and the need for greater funding flexibility. Rather than a radical overhaul, FP10 refines the existing framework, maintaining the three-pillar structure while enhancing coherence, accessibility, and adaptability.

FP10 recalibrates the balance between high-TRL innovation and early-stage research, ensuring foundational science is not sidelined. Climate change remains a priority, with an increased focus on adaptation. Research into crisis resilience, cybersecurity, economic stability, and public health will be expanded. Industrial competitiveness will be strengthened by bridging the gap between research discoveries and market applications, accelerating innovation uptake.

Governance

A more dynamic governance model is essential, incorporating shorter funding cycles and regular reassessments to remain responsive to emerging challenges. Excellent Science remains central, with the European Research Council (ERC) and Marie Skłodowska-Curie Actions (MSCA) supporting frontier research. However, FP10 enhances inclusivity by lowering administrative barriers for early-career researchers and interdisciplinary collaborations. Applied research and innovation deployment will be prioritised, focusing on higher Technology Readiness Levels (TRLs) to drive tangible societal and economic benefits while ensuring continued support for foundational research that fosters long-term breakthroughs.

As globalisation declines, FP10 must balance strategic autonomy with international collaboration. Knowledge security and technological sovereignty will be reinforced without retreating into insularity. Public-private partnerships will be leveraged to sustain funding, enhancing cooperation

between industry, academia, and government. In fields such as artificial intelligence, quantum computing, and advanced materials, maintaining control over critical technologies will be essential for global competitiveness.

Management

Structural adaptations will simplify FP10's complexity, making funding more accessible to SMEs and new entrants. Widening participation across Europe remains a priority to ensure equitable opportunities. With growing economic and social disparities, FP10 must ensure research benefits all citizens. Addressing workforce transitions, digital health solutions, and automation for ageing populations will be key focus areas.

The transition to this new FP structure requires clear and decisive actions from policymakers. National governments must be more integrated into FP planning, ensuring research funding aligns with both national and European priorities. Regulatory frameworks should reinforce EU-wide technological governance, preventing monopolistic control over critical digital infrastructure while maintaining ethical innovation standards. Public engagement in defining research priorities must also be strengthened, ensuring European citizens play a role in shaping the future of research investments.

Instruments

The structure of Global Challenges and Industrial Competitiveness may evolve, integrating a cross-cutting approach that connects Excellent Science with market-driven solutions. The mission-oriented approach introduced in Horizon Europe will be refined, offering greater flexibility in addressing emerging crises and technological shifts. A new crisis-responsive research mechanism will ensure funding is agile and adaptable to unforeseen developments. Bottom-up funding remains crucial, allowing researchers and entrepreneurs to drive innovation.

Innovative Europe, the third pillar, will evolve to address Europe's lag in scaling breakthrough ideas into global success stories. The European Innovation Council (EIC) and European Institute of Innovation and Technology (EIT) will be consolidated for efficiency. A Simplified Scaling Mechanism will bridge the gap between research grants and market adoption, providing a clearer pathway for European start-ups and deep-tech firms. Greater industrial co-financing will be encouraged, particularly in high-risk, high-reward research areas.

EU-level added value will be maximised by investing in areas where collective action outperforms national efforts. European digital sovereignty, AI governance, and data protection will be prioritised to reduce dependence on external tech giants. FP10 will also address societal fragmentation by supporting technology-driven solutions that foster social cohesion, such as digital inclusion and transparent research governance.

In an increasingly fragmented and economically strained environment, FP10 must move beyond traditional long-term research investments, adopting a more adaptive, challenge-oriented model. Key areas such as digital sovereignty, industrial resilience, societal trust, and workforce transitions will guide funding decisions, ensuring FP10 remains a unifying and impactful mechanism for European research and innovation.

4.3. Innovative European economies thrive in a 'High and rising' scenario

Figure 6 – Illustration of the 'High and rising' scenario

Source: Technopolis Group – ChatGPT.

4.3.1. The 'High and rising' scenario

After a period of modest but stable economic growth in the early 2020s, growth has surged significantly. Businesses, consumers, and governments are driving each other forward through increased investments and spending. Technological development and innovation have a positive influence on economic growth, which generates further resources for technology and innovation. Naturally, the spectre of high inflation looms, and in this "hype-driven" economy, fears of a potential bubble burst are not unfounded. Nonetheless, the momentum remains strong in this scenario. Companies are intensely focused on gaining "first-mover advantages", while consumers base their purchasing decisions largely on perceptions which businesses are the most innovative in offering goods and services. Government economic policies are now heavily centred on innovation. Countries recognise the value of international cooperation, viewing the European Union as an excellent platform for engaging on a global scale. This cooperation is primarily driven by economic and commercial interests, with geopolitical stability serving as a crucial prerequisite. However, mutual distrust lingers beneath these collaborative efforts, as they are often guided by pragmatic self-interest rather than a genuine commitment to fostering global peace. Technology is hailed as the ultimate "Messiah," omnipresent and regarded as the solution to virtually all problems, not just technological ones. However, it is worth noting that decisions about which technologies to develop and convert into innovations are primarily driven by commercial interests rather than the pursuit of societal goals. Experimentation takes centre stage in this environment, with extensive pre-testing often overlooked, as speed and rapid implementation are the highest priorities in this society.

Social dynamics are as intense as the economy, with individualisation reaching new heights. People increasingly prioritise defining their unique identities and qualities, making self-distinction a central goal. Many feel less connected to specific locations, including their birthplace or hometown. However, this fast-paced, individualised society is not for everyone. On the contrary, a growing

number of people struggle to keep up, and with diminishing economic and social safety nets, downward mobility is not only prevalent but also alarmingly steep. This creates a significant dilemma for governments. On one hand, they aim to foster and sustain economic dynamism, but on the other hand, they still bear a social responsibility to support those unable or unwilling to participate in the relentless "rat race." Adding to this challenge is the mismatch between the speed of government policymaking and the rapid decision-making of large international corporations. Climate change has largely been reframed as a technical challenge, though this does not mean it is on the verge of resolution. Public confidence in behavioural changes, such as frugal living, has significantly waned. Instead, technological advancements and innovations are primarily focused on enabling society to adapt to the changed climate in effective and efficient ways. While efforts are being made to use scarce raw materials more sparingly and to develop sustainable alternatives, the ever-growing levels of consumption often negate much, if not all, of these gains.

Under such a scenario, the design of a new FP must address the evolving requirements and conditions shaped by the developments outlined above. These changes will create a fundamentally different ecosystem for science, technology, and innovation. Specifically, the new framework must respond effectively to the following European-wide challenges:

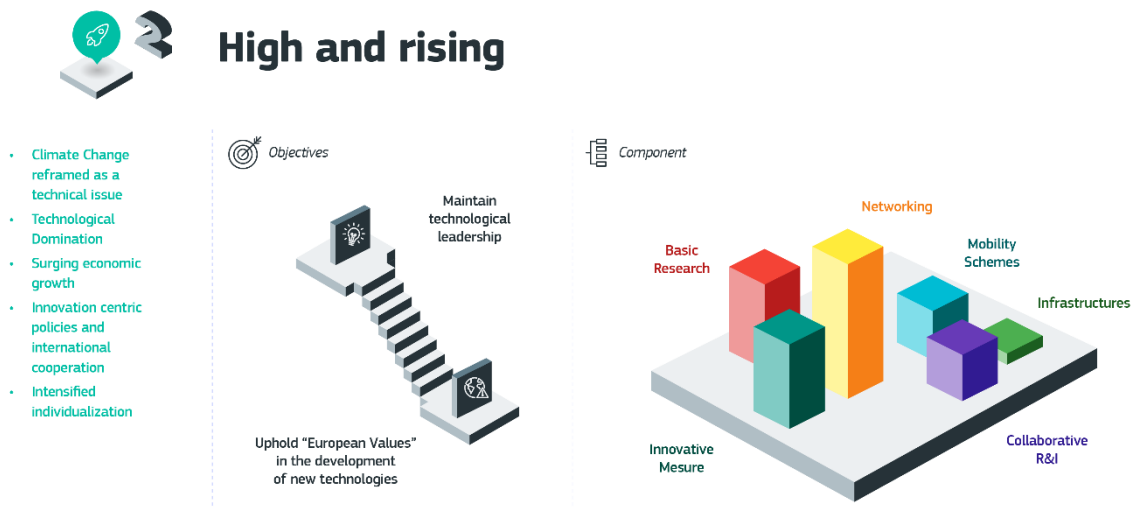
- In this highly dynamic and technological society, the question remains**:** What added value does EU R&I funding still have? Perhaps to counterbalance a one-sided technological omnipresence?
- The growing global nature of the innovation economy must somehow align with European R&I policy.
- The unequal distribution of the benefits of technology and innovation must be addressed by European R&I policy.
- Despite the continuation of climate change, EU R&I policy must make a final attempt to turn the tide.

4.3.2. Hypothetical programme structure II – Disruptive transformation for maintaining the European way

Economic prosperity and technological leadership are powerful forces shaping the trajectory of Europe's innovation landscape. In a society where market-driven progress accelerates scientific and industrial breakthroughs, the challenge for the European Framework Programme is to ensure that this rapid pace of advancement is complemented by strategic oversight, inclusivity, and long-term sustainability.

In such a scenario, the structure of FP10 must reflect these priorities by fostering technological leadership, strengthening innovation ecosystems, addressing societal challenges, ensuring ethical governance, and maintaining Europe's global research attractiveness. Rather than simply adapting the existing pillar structure, more radical changes were deemed necessary to adequately position the FP in this scenario. The structure of the FP needs to reflect the high level of directionality towards specific objectives and allow for agile responses to the highly changed world in this scenario. There are two high-level objectives of this Hypothetical Programme Structure.

Figure 7 – Hypothetical programme structure under the 'High and rising' scenario



Source: Technopolis Group.

Scope

The first objective of the FP must be its commitment to technological leadership and strategic technologies. To maintain Europe's competitive edge in global markets, investment in deep-tech, quantum computing, artificial intelligence, and other strategic domains must be prioritised. Without a strong focus on these fields, Europe risks ceding leadership to other global powers, undermining its technological sovereignty and economic resilience. The FP should act as a vehicle to ensure that Europe not only keeps pace with global competition but remains at the forefront of scientific and technological innovation.

A strong focus on the innovation ecosystem and market deployment is essential. In this high-growth environment, scalable solutions and accelerated innovation cycles demand targeted support for startups, SMEs, and corporate R&D divisions. Ensuring Europe's innovation ecosystem remains robust and adaptable is critical to maintaining technological and economic competitiveness.

The second key objective is to uphold European values in the development of new technologies, build trust, and engage with societal concerns. The responsible use of technology and innovation must be aligned more strongly with wider EU policies and allow for dedicated societal feedback loops. Investments should prioritise ageing-related research, healthcare innovation, and resilient digital infrastructure to address labour shortages and declining economic productivity. The FP must ensure that advancements in health, climate adaptation, food security, and ageing benefit all citizens rather than exacerbating inequalities.

Governance

The FP must serve as Europe's guiding framework in an evolving digital and technological landscape. Ethical AI, data privacy, and sustainability-by-design principles must be embedded in all FP-funded projects. Regulatory alignment with European values will build public trust and reinforce Europe's reputation as a leader in responsible innovation. Ensuring that technological development adheres to ethical principles requires a structured approach to governance, including mechanisms for oversight and adaptation to emerging challenges.

Collaboration will continue but become more selective, prioritising partnerships that contribute to European self-sufficiency and strategic autonomy in key technology areas. By reinforcing

regulations and ensuring the alignment of technological progress with European values, the FP can strengthen societal trust and drive responsible technological adoption.

Management

Europe's scientific excellence is only as strong as its ability to attract and retain world-class talent. In an increasingly competitive global research environment, the FP must enhance researcher mobility programmes, improve research infrastructure, and offer competitive funding incentives to ensure Europe remains a preferred destination for top-tier talent. Failure to sustain Europe's attractiveness as a research hub risks diminishing its global standing in research and innovation.

The FP must integrate a robust framework to prevent ethical breaches and ensure responsible innovation. The programme should support European efforts to challenge the dominance of global tech giants by fostering regional technology ecosystems that remain accountable to democratic values and ethical standards. Investments must be distributed equitably to ensure technological progress does not contribute to social fragmentation.

Instruments

Traditional funding mechanisms should be supplemented by regulatory sandboxes, allowing companies to test emerging technologies in controlled environments before widespread deployment. Funding directionality will shift towards applied research and innovation implementation, emphasising TRL 5-8 to ensure that projects generate tangible societal benefits. Basic research will receive less funding, with an expectation that national programmes will play a greater role in sustaining fundamental science.

Public-private partnerships that facilitate cross-sector collaboration and knowledge transfer are essential. These partnerships will ensure that innovation remains dynamic and adaptable, aligning with Europe's strategic objectives. The FP must also integrate mechanisms to support European technological sovereignty, enabling Europe to maintain control over critical emerging technologies while reducing dependence on external actors.

By fostering research in medical innovation, assistive technologies, and social resilience, the FP can ensure that economic prosperity does not come at the cost of social inequality. Aligning investments with key societal needs will enhance Europe's ability to navigate demographic shifts, workforce transitions, and the rapid evolution of digital infrastructure.

4.4. European economies and societies struggle in a 'Nothing new under the sun (yet)' scenario

Figure 8 – Illustration of the 'Nothing new under the sun (yet)' scenario

Source: Technopolis Group – ChatGPT.

4.4.1. The 'Nothing new under the sun (yet)' scenario

The stability of European societies is under pressure from various angles. Economic growth is limited, and the meagre prospects are not conducive to investment. Worldwide, we see that international cooperation in several areas (food, trade, climate, politics) is no longer the most popular and most obvious form of cooperation. Countries withdraw into their own territories or seek refuge within larger power blocs. Technological growth is continuing, but there is a fear that this growth will be hijacked by globally operating companies that do not care much about political and social views and forces and thus acquire their own dynamics. Also, citizens have less and less confidence in the national government and international governance structures. As a result, populist politics is becoming increasingly widespread. This also creates more polarisation. Citizens are becoming less and less accountable to one another, which leads to the increasing magnification of political, cultural, and religious differences. As a result, the growing polarisation seems unstoppable, placing significantly greater pressure on society. The European Parliament's elections in 2029 will be of high interest and critical. Political leadership, regardless of the course of the trends outlined, will have a major impact on the course of the EU and of European society. The interpretation of the developments outlined and the willingness to find solutions will play a crucial role in this.

In the meantime, other problematic developments continue. The ageing population is starting to take serious forms, the scarcity of labour in almost every sector is also a clear indication of this. Individualisation is also becoming more and more prevalent, which is increasingly becoming a threat to social cohesion. Due to growing self-centredness, the concept of solidarity has become increasingly challenging. Citizens increasingly develop into very critical consumers of government services. Economic inequality is also increasing; however, unemployment remains low in many European countries, keeping income levels relatively stable. Nonetheless, mirroring trends the U.S., there is a growing risk of the rise of the 'working poor'. The increased global political tensions are manifested in several military conflicts, which also leads to more refugee flows. Not much good news can be expected from the environmental level either. Climate change and decreasing biodiversity are the most pressing examples of this. However, a lot of work is being done on various transitions (such as food, agriculture) of which the energy transition offers the most hope. Also, with regard to the development of a circular economy and even circular society, more and more and bigger steps

are being taken. Technology and innovation continue to be regarded as important levers for solving urgent challenges across various social domains. But the valorisation of scientific knowledge within extensive and intensive knowledge ecosystems is no longer a 'nice-to-have' but has become an obligation because budgets are limited, and science and technology receive a lot of social and political scepticism (as a direct result of the increased populism). It will remain challenging (to say the least) to balance the demand for scientific knowledge, technology, and innovation, - necessary for addressing societal challenges – with the increasing enormous pressure on financial budgets and the need for economic stability.

The design of a new European framework programme for research and innovation will consider the requirements and conditions arising from the developments outlined in the above scenario. These developments will lead to a different ecosystem for science, technology and innovation. In particular, the new framework programme FP10 will need to be responsive to the following European-wide challenges:

- Declining confidence in science and technology, both in terms of the type of knowledge system, the direction of science and technology, and confidence in its ability to solve problems
- The growing power of globally operating tech-giants who care little about national borders, democratic principles, or confining to ethical standards
- The expected lower economic growth will shift the focus for many companies (and governments) to short-term profits. This will push investments in, and the importance of, long-term activities such as applied technological development and the implementation of innovation to the background
- An aging population, which will also affect the knowledge sector in the foreseeable future, resulting in fewer researchers being available to address important societal challenges from scientific and technological perspectives

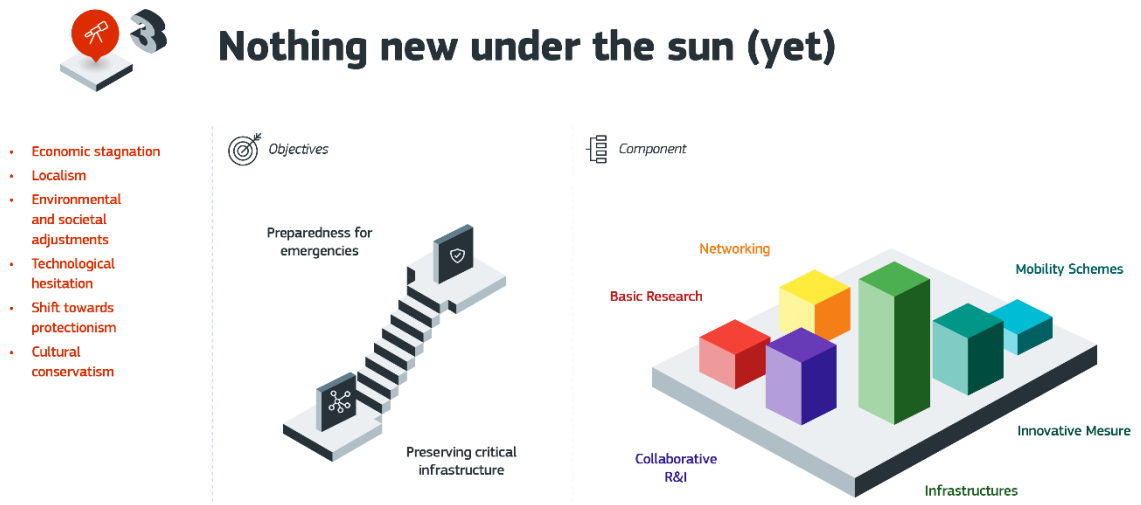
4.4.2. Hypothetical programme structure III – Disruptive changes towards a minimalistic FP

Under this scenario, economic stagnation and reduced financial resources have forced policymakers to focus on economic self-sufficiency and resilience. While the inclination toward protectionism is strong, the necessity of addressing shared challenges—such as environmental sustainability, health security, and technological dependencies—remains. In this constrained environment, collaboration is not a goal but a pragmatic tool to sustain critical infrastructures and capabilities that would be too costly to develop and maintain individually. The FP could therefore be redefined as an instrument of selective but essential collaboration, focusing on strategic areas where European-level coordination remains indispensable.

The structure of the next FP would need to be highly focused, ensuring that limited resources are directed toward sustaining core capabilities rather than pursuing expansive new initiatives. Governance would shift toward a model that prioritises adaptability and efficiency, possibly through a more centralised decision-making process that allows for annual priority revisions based on geopolitical and economic shifts. The European Council could play a greater role in setting these priorities, ensuring alignment with broader strategic objectives rather than purely scientific ambitions. The thematic focus of the FP would revolve around maintaining critical research capacities while ensuring preparedness for emergencies. The programme would prioritise areas such as health resilience, strategic digital infrastructure, and environmental sustainability—domains where collective European action remains necessary despite political fragmentation. Infrastructure maintenance would be a core pillar, ensuring that existing research facilities and technological assets

are not lost due to lack of funding. This approach recognises that in a stagnating economy, the most cost-effective strategy is often to preserve rather than create a new one.

Figure 9 – Hypothetical programme structure under the 'Nothing new under the sun (yet)' scenario



Source: Technopolis Group.

In summary, the HPS under this scenario would comprise of the following.

Scope

Funding directionality would shift toward challenge-driven R&I, with an emphasis on mid-level Technology Readiness Levels (TRL 4–7). In this environment, the FP would serve less as a vehicle for radical innovation and more as a mechanism to optimise and adapt existing technologies for practical use. Basic research would see lower levels of support at the European level, with the expectation that national governments would take greater responsibility for funding foundational science to compete with other member states. Instead, FP funding would target applied research with immediate societal and economic benefits, ensuring that innovation remains functional and accessible even within constrained budgets.

Governance

The FP's approach to research collaboration would reflect a broader societal retreat from globalisation. Mobility and softer collaborative measures would likely be deprioritised, with a stronger focus on national-level funding responsibilities. However, limited collaboration frameworks could be maintained, particularly in areas where mutual dependencies among member states are unavoidable. The FP must balance strategic autonomy with cooperative structures that support Europe's technological resilience.

Management

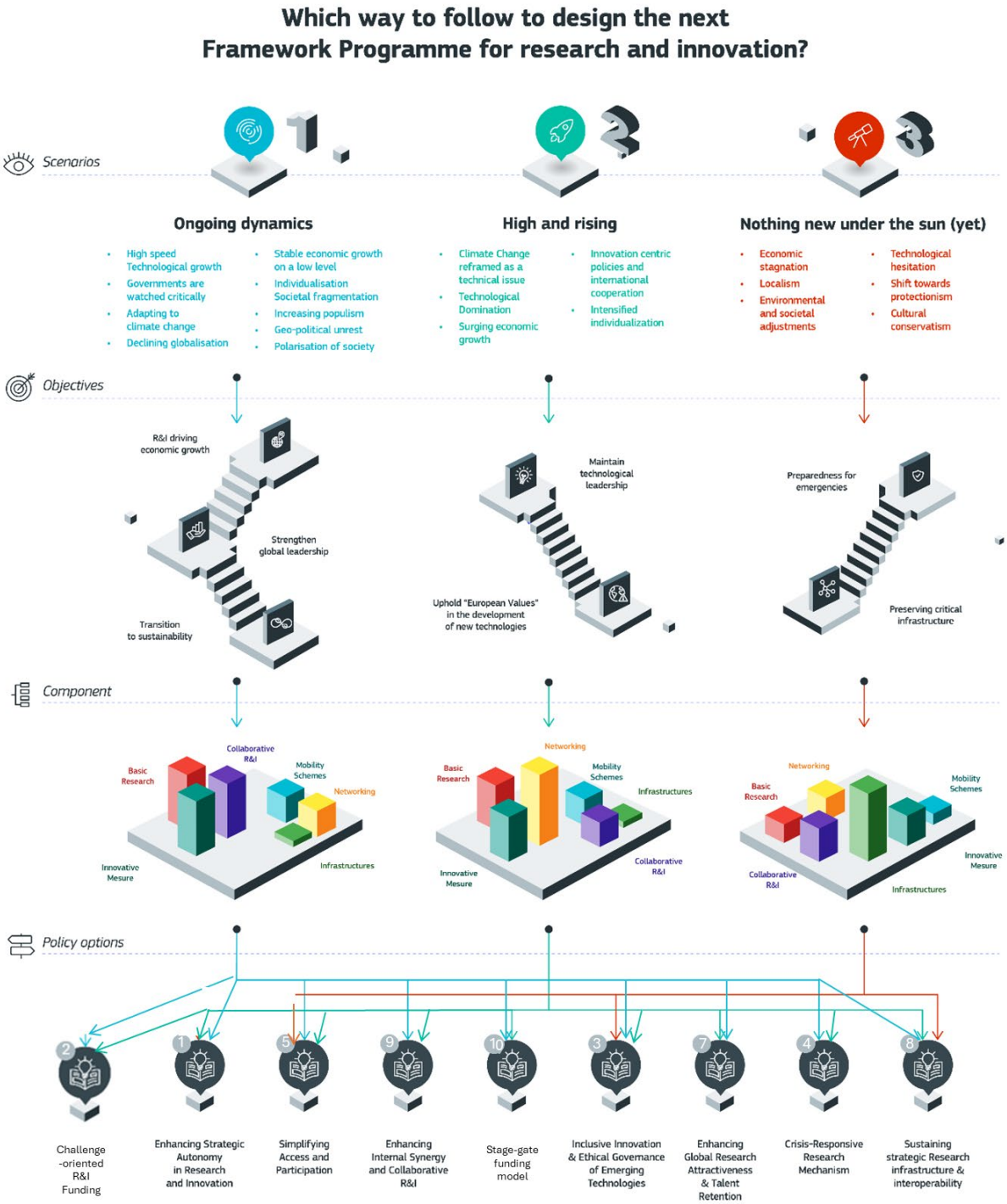
Public and private sector collaboration will play a key role in sustaining applied research within FP10. Ensuring that FP funding aligns with national research strategies will be essential to maintaining coherence across European innovation ecosystems. Strategic decisions on funding allocation should consider Europe's ability to remain competitive while responding to financial constraints and geopolitical realities.

Instruments

Collaboration in specific domains such as data interoperability and shared digital infrastructure would remain a key priority. Even in a protectionist environment, digital connectivity cannot be entirely abandoned. Maintaining frameworks for digital integration will ensure that European technological advancements continue to function within a broader cross-border infrastructure. The FP should facilitate targeted investments in digital cooperation, ensuring that Europe's digital ecosystem remains adaptable while safeguarding strategic interests.

The following Figure 10 provides a summary of the three HPS which were developed, providing the visual of potential different priorities in terms of components.

Figure 10 – Overview of scenarios, hypothetical programme structures and policy options



Source: Technopolis Group.

4.5. Policy options for FP10

Based on the broad discussions, available policy reports and examples of different programme structures at national level, a range of policy options were developed. These options address different aspects - from management to instruments and governance mechanisms. The options respond to challenges – some of them may be more easily considered for a specific HPS, others could work under one or more of the structures. Given mainly the programme management challenges that were raised, the options tend to be practical and very often pragmatic. Obviously, the descriptions below only grasp key aspects and details would need to be discussed further.

The options include a rationale – why they are included – objectives and policy interventions, In particular the latter offer a number of individual avenues that may benefit from further exploration. The options also include expected impacts and – the study teams subjective views under which HPS they make most sense.

Table 5 – Overview of policy options

Which challenge to address?	Option
Management of the FP	Simplifying access and participation
Prioritisation and thematical focus	Enhancing strategic autonomy in R&I Challenge-oriented R&I Funding Inclusive innovation and ethical governance of emerging technologies
Instrument design	FP Detox – Streamlining for a strategic focus Enhancing research attractiveness and talent retention Sustaining strategic research infrastructure and interoperability
Improved coordination within the FP	Enhancing internal synergies and collaborative R&I A stage-gate model
Governance mechanisms	Launch of a crisis-responsive research mechanism

4.5.1. Prioritisation and thematic focus

Table 6 – Policy option 1: Enhancing strategic autonomy in R&I

Policy option 1: "Enhancing Strategic Autonomy in R&I"						
Rationale	• In an era of increasing geopolitical fragmentation and declining globalisation, Europe must ensure that its research and innovation ecosystem remains resilient and competitive. • Reducing reliance on non-EU technological supply chains and strengthening EU-based research collaborations will protect critical knowledge assets. • Given the growing focus on national interests, FP10 must enhance European sovereignty in strategic R&I sectors, particularly in artificial intelligence, quantum computing, biotechnology, and energy innovation.					
Objective	• Safeguard Europe's leadership in key technology areas by prioritising research investments that strengthen strategic autonomy. • Reduce dependency on third-country partnerships while maintaining selective, high-value international collaborations. • Ensure that critical knowledge and innovations remain within the EU.					
Policy intervention(s)	• Prioritise funding for research and innovation in high-impact, high-risk sectors where Europe must remain competitive. • Introduce regulatory measures to secure intellectual property rights for EU-funded research in critical fields. • Focus on funding emerging technologies that enhance strategic independence. • Strengthen EU-wide partnerships between research institutions and industries to accelerate the commercialisation of strategic technologies. • Introduce selective international collaboration frameworks that align with European security and economic interests. • Safeguard bottom up and fundamental research to allow for innovation beyond the main trending topics.					
Expected impact(s)	• Strengthened European technological leadership in strategic sectors. • Reduced vulnerability to external supply chain disruptions in key innovation fields. • Enhanced coordination between EU industry, research institutions, and policymakers in securing critical technology development. • Improved resilience of the European R&I ecosystem against geopolitical instability.					
Works under which HPS	1	✓	2	✔	3	

Table 7 – Policy option 2: Challenge-oriented R&I funding

Policy option 2: "Challenge-Oriented R&I Funding"						
Rationale	• Given limited financial resources, funding must be focused on strategic, high-impact challenges such as health, security, energy sustainability, and supply chain resilience. • Despite growing protectionism, certain technological and scientific challenges require collective European efforts to ensure long-term stability and strategic autonomy.					
Objective	• Align FP funding with pressing European challenges and maximise impact. • Maintain key research partnerships to prevent fragmentation and loss of essential knowledge-sharing network and require openness to new players. • Obtain faster, relevant R&I outputs and outcomes					
Policy intervention(s)	• Consider elected expert boards to formulate challenge-oriented calls. • Launch non-prescriptive, competitive two-stage "challenge based calls" with short (6-12 months) project length and accelerated application process for second-phase development of solutions. • Consider societal factors (such as Societal Readiness Levels (SRL)) as a selection criteria. • Ensure selected solutions are scalable and widely applicable. • Implement a framework for bilateral and multinational research agreements.					
Expected impact(s)	• Faster solutions to critical technological challenges. • Increased resilience in strategic areas. • Enhanced coordination in addressing cross-border/international challenges. • Sustained European leadership in essential scientific fields. • Use of a broader set of agile and innovative players, providing opportunities to prove or reject ideas faster and increase efficiencies.					
Works under which HPS	1	✔	2	✔	3	

Table 8 – Policy option 3: Inclusive innovation and ethical governance of emerging technologies

Policy option 3: "Inclusive Innovation & Ethical Governance of Emerging Technologies"						
Rationale	• Ensuring that rapid technological advancement does not deepen societal inequalities or allow monopolistic control by tech giants. • Strengthening AI governance, digital rights, and fair competition will be critical for public trust and market fairness • Europe must lead in setting global regulatory standards to prevent tech giants from shaping innovation in ways that undermine public trust and democratic governance. • Need to strike a balance between enabling innovation and enforcing accountability.					
Objective	• Embed strong regulatory safeguards within the FP to ensure ethics, data protection, and responsible innovation practices. • As a cross-cutting component, support projects that provide equitable digital access and societal impact.					
Policy intervention(s)	To prevent innovation from deepening societal divides, FP10 would have to: • Ensure that cutting-edge technologies serve broader societal goals, such as healthcare, digital inclusion, and sustainable industries. • Establish strong ethical safeguards against privacy breaches, biased AI systems, and monopolistic control over digital infrastructure. • Be proactive in the development of regulatory frameworks of emerging technologies.					
Expected impact(s)	• Increased trust in advanced technology and science. • Development of solutions with a relevance for wider application.					
Works under which HPS	1	✓	2	✓	3	✓

4.5.2. Governance mechanisms

Table 9 – Policy option 4: Launch a crisis-responsive research mechanism in FP10

Policy option 4: "Crisis-Responsive Research Mechanism" (CRRM) pilot	
Rationale	• The pilot Crisis-Responsive Research Mechanism (CRRM) will provide critical evidence on how crisis-adaptive research funding can be operationalised. With economic, environmental, and geopolitical crises likely to increase in frequency, FP10 would fully integrate crisis-responsive funding structures to ensure that European R&I remains proactive, agile, and strategically impactful. • Unlike previous static programming cycles, FP10 could feature a permanently embedded CRRM, ensuring that research investments align with real-time global and European priorities while maintaining Europe's scientific and technological leadership. This pilot for rapidly mobilising R&I resources in response to emerging challenges will generate critical data, insights, and operational frameworks, laying a basis for the needed agility and alignment with evolving needs.
Objective	• Establish a permanent, ring-fenced CRRM budget within FP10, ensuring continuous availability of funds for crisis-driven R&I investments. Develop a system to identify emerging risks and trigger early-stage research funding for potential crisis areas before they escalate. • Institutionalise a Crisis R&I Coordination Unit, streamlining interactions between researchers, emergency response bodies, and EU institutions to accelerate research-to-policy translation.
Policy intervention(s)	• Launch a pilot CRRM fund, allocating a percentage of research funding to crisis-responsive R&I projects or organisations that address emerging societal and technological risks. • Establish a dedicated Crisis R&I Task Force to oversee crisis-response funding decisions and rapid fund allocation. • Implement a rolling emergency call system, allowing researchers and innovators to submit proposals in response to ongoing crises • Create a cross-European rapid deployment network of specialised institutes that can mobilise expertise in crisis situations. • Establish partnerships with EU agencies responsible for crisis management, integrating R&I investments with emergency response strategies. • Generate evidence on the impact of flexible funding structures in supporting real-time problem-solving for urgent global challenges. Assess the pilot based on effectiveness, efficiency, and societal impact.
Expected impact(s)	• Increased responsiveness of FP research to real-time global or regional crises, ensuring that research funding directly contributes to crisis mitigation and preparedness.

Policy option 4: "Crisis-Responsive Research Mechanism" (CRRM) pilot						
	• Generation of valuable insights on governance, decision-making, and impacts, shaping the refinement of FP10's crisis-responsive research funding. • Strengthened coordination between EU R&I actors and emergency response agencies, ensuring that scientific advancements are rapidly translated into operational solutions. • Enhanced agility in EU research programming, setting the foundation for a fully adaptive FP10 funding model. • Increased public trust in EU research investments as citizens see direct, immediate benefits from R&I in times of crisis.					
Works under which HPS	1	✔	2	✔	3	

4.5.3. Management of the FP

For the management of the FP, the main challenge is to simplify access and provide opportunities for wide participation. We see an immediate need and opportunities to develop improvements. It comprises of a range of individual aspects

Table 10 – Policy option 5: Simplifying access and participation

Policy option 5: Simplifying Access and Participation"	
Rationale	• Horizon Europe has faced persistent challenges related to administrative complexity, low success rates, and high participation barriers for SMEs, early-career researchers, and institutions from Widening Countries. • The complexity of application and reporting processes discourages new entrants and disproportionately benefits established players. • Streamlining access to funding and reducing the bureaucratic burden will ensure broader and more equitable participation in FP10.
Objective	• Lower the administrative burden and improve access to FP10 funding for a wider range of participants, including SMEs, interdisciplinary consortia, and underrepresented institutions. • Reduce inefficiencies in funding instruments and application processes to enhance overall effectiveness. • Increase transparency and accessibility of funding opportunities across all EU Member States.
Policy intervention(s)	• Establish a single-entry digital platform with AI-driven guidance for applicants to reduce complexity in selecting appropriate funding instruments. • Apply the two-step selection process to limit resources and costs on applicants as well as on selection/evaluation side and to enable shorter time to grant. • Decrease the envisaged size of projects, providing more opportunities for a wider range of (smaller) organisations to apply.

	• Provide transparent, clear funding rules, e.g. across FP10's pillars or by type of beneficiary. • Reduce the range of expected impacts in topic descriptions and concentrate on outputs and outcomes at project level. • Expand the role of National Contact Points (NCPs) to provide more tailored support for newcomers and underrepresented groups.					
Expected impact(s)	• Increased participation of SMEs, researchers from smaller organisations and less represented countries. • Improved efficiency in the application and funding allocation process. • Higher success rates, reducing resources for unsuccessful full proposals. Stronger alignment between funding instruments and applicants' strengths, leading to relevant research outcomes. • At instrument/pillar level, this may also lead to greater long-term impact.					
Works under which HPS	1	✔	2	✔	3	✔

4.5.4. Instrument design

Table 11 – Policy option 6: FP Detox – Streamlining the Framework Programme for strategic focus

Policy option 6: "FP Detox – Streamlining the Framework Programme for Strategic Focus"	
Rationale	• The FP has always gotten larger in scale and scope. Rarely, instruments or sub-programmes were discontinued, resulting in an ever larger and little connected FP structure. Given limited financial resources and increasing fragmentation across Europe, consolidating research programmes would enhance efficiency, reduce redundancy, and ensure that funding is directed toward the most pressing societal and technological challenges. • The increasing complexity of EU research funding has led to inefficiencies, fragmentation, and a lack of strategic coherence. The proliferation of funding instruments under past FPs has resulted in overlapping priorities, excessive bureaucracy, and an inability to rapidly redirect resources to emerging societal and technological challenges. • To ensure that FP10 remains adaptive, focused, and impactful, a fundamental restructuring is required—a "detox" of redundant and low-impact funding schemes to streamline the programme and concentrate investments where EU-level added value is highest. This approach prioritises research investments that directly support Europe's long-term strategic resilience while eliminating underperforming funding streams that fail to deliver measurable benefits.
Objective	• The goal is to create a more focused, high-impact research and innovation framework that maximises EU-wide added value while remaining responsive to shifting economic and geopolitical conditions. • Reduce the complexity of FP10 by cutting redundant funding programmes and shifting towards a challenge-driven, adaptable funding structure that aligns with EU strategic priorities. Ensure that EU R&I investments are concentrated in areas where collective European action delivers added value beyond national programmes. Improve administrative efficiency, reduce duplication, and increase funding flexibility to enable more dynamic responses to socio-economic and technological shifts.
Policy intervention(s)	• Conduct a comprehensive review of all FP10 funding instruments to identify those that are duplicative, low-impact, or misaligned with Europe's strategic needs. • Eliminate funding programmes that fail to demonstrate clear EU-level added value, particularly those that overlap with national research schemes or private-sector initiatives. Transition from fixed, long-term funding commitments to challenge-driven thematic windows, reassessed regularly based on evolving economic and societal demands.

Policy option 6: "FP Detox – Streamlining the Framework Programme for Strategic Focus"						
	• Reallocate funding toward fewer but more impactful research priorities, with a core focus on European digital sovereignty (AI, quantum computing, secure digital ecosystems), industrial resilience, societal trust in science, and labour market adaptation. • Shift implementation structures toward a greater role for national and regional agencies within an EU governance framework, reducing unnecessary layers of administration. • Strengthen public-private research partnerships to leverage private-sector investment in strategic innovation areas, reducing reliance on public funding alone. Increase transparency and accountability in research funding allocation, ensuring that EU citizens have a role in shaping the direction of FP investments.					
Expected impact(s)	• A more agile, responsive, and strategically aligned FP10, ensuring that research investments remain impact-driven and future-proofed. • Reduced fragmentation and administrative inefficiencies, leading to faster funding cycles and lower participation barriers for researchers and innovators. • Enhanced European technological sovereignty, ensuring that critical digital and industrial assets remain under EU control. • Strengthened societal trust in science and innovation, reinforcing the role of EU-funded research in addressing public concerns about digital ethics, AI governance, and social cohesion. • Improved adaptability of the European workforce through better integration of labour market transitions into FP funding priorities. • More efficient use of public resources by eliminating underperforming funding programmes and leveraging private-sector co-funding in key areas.					
Works under which HPS	1	✓	2		3	

Table 12 – Policy option 7: Enhancing research attractiveness and talent retention

Policy option 7: "Enhancing Research Attractiveness & Talent Retention"						
Rationale	• Europe faces increasing competition for top-tier researchers and innovators, with many opting for destinations offering higher salaries, streamlined funding access, and faster research deployment. • The FP can act as a strategic enabler to secure talent, enhance career pathways, and promote Europe as a global R&I leader.					
Objective	• Strengthen Europe's ability to attract and retain top-tier researchers and entrepreneurs by providing financial incentives and limiting administrative hurdles. • Enhance Europe's position as a global R&I leader by securing a strong talent pipeline for emerging and high-impact fields.					
Policy intervention(s)	• Establish EU-wide researcher mobility programmes with clear career pathways. Implement for example a "European Researcher Status" allowing seamless transitions across institutions and member states. • Strengthen reintegration incentives for European researchers abroad. • Implement fast-track funding schemes for early-career researchers and high-potential innovation projects. • Introduce rolling funding calls with simplified proposal requirements. • Enhance interdisciplinary funding to encourage cross-sector expertise. • Strengthen industry-academia collaboration & career diversity. • Expand dual-track career pathways that integrate academic research with industry experience. • Expand FP-backed industrial fellowships fostering knowledge transfer and applied R&I development. • Support joint public-private innovation labs that provide career opportunities beyond academia.					
Expected impact(s)	• A globally attractive, competitive, and efficient European research landscape, fostering high-impact knowledge production. Improved researcher mobility, reduced brain drain, and an innovation ecosystem capable of attracting and retaining top-tier global talent. Stronger academia-industry synergies ensuring career flexibility and economic impact.					
Works under which HPS	1	✔	2	✔	3	

Table 13 – Policy option 8: Sustaining strategic research infrastructure and interoperability

Policy option 8 "Sustaining strategic research infrastructure & interoperability"						
Rationale	• Maintaining existing research infrastructures is more cost-effective than rebuilding them after decline. Essential research facilities must be preserved to avoid long-term scientific and technological regression. Digital transition remains essential even under economic stagnation. Efficient data sharing and interoperability can enable cost-effective cross-border R&I collaboration.					
Objective	• Ensure the continuation of core research capacities, prevent the loss of technological assets, and maintain Europe's long-term competitiveness. Enable cost-effective, scalable collaboration through digital platforms.					
Policy intervention(s)	• Provide targeted funding for maintaining and modernising existing research infrastructures. Develop a framework for shared access to critical research facilities across EU states. Invest in common digital research infrastructures. Ensure regulatory frameworks support secure and seamless data sharing. • Continue funding in the most relevant infrastructures. • Large scale updates. • Lock in co-funding mechanisms. • Encourage collaboration with like-minded countries to use the facilities and create income. • Phased out infrastructures.					
Expected impact(s)	• Long-term preservation of European research competitiveness. Mitigation of fragmentation in the EU R&I landscape. Increased efficiency in European research collaborations. Enhanced ability to conduct cross-border research despite economic constraints.					
Works under which HPS	1	✓	2	✓	3	✓

4.5.5. Improved coordination within the FP

Table 14 – Policy Option 9: Enhancing internal synergy and collaborative R&I

Policy option 9: "Enhancing internal synergy and collaborative R&I"						
Rationale	• Multidisciplinary R&I solutions need the collaborative work across different type of R&I actors and embracing a variety of TRL levels. • To broaden and intensify the execution of collaborative R&I and networking, fostering mechanisms and incentives are needed. • This can expand beyond thematic project-based portfolio management, for example, based on somewhat wider strategic research agendas.					
Objective	• To work towards systemic solutions at a larger scale than current project-based R&I activities. • To allow a variety of research performers to work together in a flexible manner and at the scale that is needed in relation to the R&I challenge at hand.					
Policy intervention(s)	Introduce overarching collaborative R&I instruments: • With a flexible and bottom-up approach allowing collaborative partners to define the appropriate composition of the consortia. • Accepting competing consortia working on similar challenges to allow for a variety of R&I solutions. • Combining both (societal and competitiveness) challenge driven calls with open calls. • Foster the development of EU wide strategic research agendas on priority themes that help define collaborative research endeavours.					
Expected impact(s)	• A stronger alignment of research efforts within the European R&I ecosystem, more efficient R&I spending and more effective outputs. Enhanced communication between R&I actors leading to solutions.					
Works under which HPS	1	✓	2	✓	3	

Table 15 – Policy option 10: Stage-gate funding model

Policy option 10 "Stage gate funding model"						
Rationale	• To maintain Europe's technological leadership, stable investment in deep-tech, AI, quantum computing, and strategic industrial technologies is needed. Without long-term support, Europe risks ceding innovation leadership to global competitors. • The emphasis on collaborative projects mainly for higher TRL levels has sidelined early-stage research. Limiting the pipeline of groundbreaking scientific discoveries reduces the opportunities for interdisciplinary collaboration, which are essential for addressing complex societal and technological challenges.					
Objective	• A stage-gate funding model that enables seamless transitions from fundamental research to market deployment ensures that the most promising innovations receive continued support. Thus, the objective is to strengthen support for collaborative basic research projects by ensuring a balanced funding approach that fosters long-term scientific advancement, interdisciplinary synergies, and innovation capacity across Europe. This can be done through an increased attention to the needs as well as funding for collaborative research.					
Policy intervention(s)	Maintaining technological leadership requires: • Closer alignment between research funding and industrial competitiveness, ensuring that Europe's strategic sectors translate innovations into global market advantages. • Establishing an integrated funding framework with mandatory checkpoints across EU, national, and regional R&I programmes to prevent duplication and ensure coherence – for example with interoperable project databases. • Create the role of a "portfolio manager" that follows the projects throughout their funding pathways, representing the commission as an investor that takes ownership and support for its investments in research and innovation. • Develop a performance-based progression scheme that supports the assessment of key transition points prior to advancing projects.					
Expected impact(s)	• The *stage-gate* model will create a more efficient, outcome-driven R&I ecosystem, reducing fragmentation and funding misallocation. Europe will strengthen its global competitiveness by ensuring that breakthrough innovations move swiftly from research to real-world impact. • This also invites the financial incentives from public actors, with dedicated procurement policies, and regulatory support to accelerate commercialisation. • It facilitates industry co-investment and public-private partnerships to bridge late-stage funding gaps.					
Works under which HPS	1	✔	2	✔	3	

5. Evolution and/or disruption? Designing the next FP for R&I

From a system's perspective, it is unlikely that established, institutionalised processes ('the rules of the game') will be changed from within the system. Therefore, it can be understood that the stakeholders which are benefitting from the current layout are advocating for a status quo – with adaptation to improve weaknesses, but not to include radical changes which will bring the equilibrium within the system into a state of dynamics, with limited steering power of the stakeholders. Our workshop discussions have identified several areas, where future synergies between national and EU priorities and funding could be envisaged. Yet, the size of the FP, the reluctance of Member States and national funders "to give up autonomy" are factors that are current barriers. Creating opportunities to test and experiment, but also to abandon or change new ways would pave the way for a more agile structure. In order to use the FP as a means to respond timelier to external pressures and trends, policy makers need to provide the vision – what role and function a research and innovation programmes at the EU level should have, and scrutinise what mushrooming 'instruments' can be left in the hands of Member States or discontinued. If the next programme will be inspired by the vision of competitiveness, one may envisage less or no earmarked funding that is dedicated to widening countries. In fact, there have been voices in our workshops asking for abandoning a widening funding line and encouraging more national level investments in R&D to boost the lagging countries' R&I systems. But one may also envisage their mainstreaming into the programme.

The general rules for participation are complex, detailed, and try to provide a common framework for almost all programme parts and stakeholders. Creating entry points for the different types of beneficiaries and tailoring the administrative requirements, reducing the complexity through less options in terms of 'instruments', a genuine portfolio approach with the adequate professional management structures and processes, time reduction of the selection process – these are key requests shared by all kind of stakeholders and potential beneficiaries. It is now the time to step up and introduce necessary changes in structures and processes alike.

An important aspect that will aggravate the often low success rates is simplification. The simpler it gets to submit a proposal, the lower the entry costs and transaction costs. This may lead to even higher application figures and lower funding rates in particular in the mono-beneficiary instruments. Over-subscription of such an instrument cannot simply be answered with a budget increase at the expense of more complex R&I consortia. This will also put the existing evaluation and selection processes under pressure and increase related programme evaluation and management costs. To remain attractive, fair, and relevant, simplification may not be the main solution.

The current and expected socio-economic and environmental pressures, as analysed in the recent Draghi report (2024) can be seen as a wakeup-call that requires re-orientation of established, inert research and innovation structures. In system dynamics thinking, it requires an external shock to induce changes within the system. The recent Covid pandemic can be seen as such an external shock – it required new ways to communicate and collaborate, and accelerated digitalisation in research and innovation processes with immediate changes of established processes, opportunities to experiment, and impacts. Previously, the consensus-oriented policy style would have required years to obtain consensus, allocate resources, and implement digital solutions. This is an example of how an external shock has affected the stability of the R&I system but also made it stronger. History shows that technological or economic distortions (external shocks to remain in the picture) such as new technological paradigms (e.g., robotics, AI) or a war are not only factors that render established organisations, knowledge, and processes obsolete – the big fear of established R&I stakeholders. The process of 'creative destruction' and following discontinuities were identified by Schumpeter (1912) as the prime phenomenon of economic development. Yet, our current R&I structures are

characterised by routine; the role of the entrepreneur as stimulus for driving change is limited. The political threats, climate change, ageing of the European countries, global forced migration – these are factors which do not impact the single researcher as such in his or her research activities. Therefore, it needs the political will and courage to introduce change –against a lot of national-level and EU-level pressure groups.

It seems to be a crucial moment to introduce changes which may not please everyone – but limited public budgets and a handful of key challenges are factors that could stimulate the design of a slim, agile, targeted European programme that focusses on EU added value, and which reminds the Member States of their own responsibilities.

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Appendix A – Methodology

At the core of this study, was a series of three foresight workshops involving 30+ relevant stakeholders representing a variety of backgrounds (university networks, RTOs, private sector companies, NCPs, policy-makers, civil society representatives etc.). The workshop participants were selected based on their knowledge of the FP. Workshops were held online and participants were distributed in break out room. Each workshop lasted 3 hours and included a mix of different organisations and group assignments.

The iterative character of the workshop allowed to take int account the stakeholder needs, trends and barriers but also that the scenarios and HPS are validated. The workshops explored anticipated trends and developments related to FP10, discussed potential hypothetical programme structures and tested these against the contextual scenarios.

At the end of the workshop, participants received a summary report. The workshops were conducted in accordance with the Chatham House Rule, which ensures that the report and outcomes cannot be traced back to individual participants. This approach fosters a secure environment that allows participants to express themselves openly and share their knowledge and personal insights freely. Table below provides an overview of consulted stakeholders.

Table 16 – List of stakeholders consulted

Organisation	Stakeholder Category
Governmental organisation	ERAC Member (GPC)
	ERAC Member (MS Estonia)
	ERAC Member (MS France)
	ERAC Member (Slovenia)
	ERAC Member (MS Germany)
Industry	European Business Network (EBN)
	Digital Europe
	EIC (Accelerator)
	Orgalim
	COCIR
	Hello Tomorrow
	EuropaBio
	Disruptive Technologies Innovation Fund for Enterprise Ireland
Network association	ERA Learn
	EUREKA
	ECSITE
Research Association	ISE (Initiative for Science in Europe)
	Helmholtz Association
	EU-LIFE
	ScienceEurope
	COST
RTO	AIT (Austrian Institute of Technology)
	EARTO (European Association of Research and Technology Organisations)
	CEA (Commissariat à l'énergie atomique et aux énergies alternatives)
	Fraunhofer Institute for Systems and Innovation Research
University Association	The Guild
	LERU (League of European Research Universities)

Organisation	Stakeholder Category
	CESAER (Conference of European Schools for Advanced Engineering Education and Research)
	YERUN (Young European Research Universities Network)
	Young Academy of Europe
	European University Association

Methodological takeaways

Using foresight methods to develop potential high-level structures for FP10 – as initially envisaged in the study terms is slightly challenges. FP10 is not a moving target in the far future but in contrary, it is in the initial planning phase within the policy cycle. At this initial phase it is typical to have position papers, to have expert groups which scrutinise and synthesise the various evaluation studies, and other independent reports. As examples of the latter 2024 saw the Letta and Draghi reports. Their visibility and public discourse shape the new Commissions political priorities, which are then triggering down to the various policy areas.

This is thus a current debate which numerous R&I actors follow and reflect. As indicated above, in terms of system dynamics, the current actors within a functioning system are unlikely to envisage stark changes in their established routines. With this mindset, the stakeholders and potential beneficiaries were unwilling to envisage drastic change. Overall, it was challenging to trigger out-of-the-box thinking, i.e., voicing options or opportunities beyond their immediate positions. In particular in our first foresight workshop, the resistance to envisage alternative structures was high.

We initially tried to mitigate this foreseeable risk with reaching out to actors less close to the Framework Programme. However, the interest of more distant organisations is also more limited and therefore we were rather unsuccessful to obtain a lot of buy-in and interest from non-core R&I players. This leads to a bias in the results we are aware of. Somewhat mitigating this bias is however the broad choice of stakeholders with their own, particular needs and views.

Thinking in scenarios can be both challenging and inspiring. Once individuals accept to envisage a scenario and its details for a given timeframe, they immediately tend to challenge unwanted scenarios and envisage steps how not to get to such a future. This is an *inside-out* perspective which we typically see in day-to-day decision making but which comes to its limits when we envisage longer timeframes. The added value of scenario analysis is its *outside-in* perspective. By accepting that a more distant future may look very different from what we want or may find reasonable to expect, the outside-in perspective allows to critically assess if current structures and short-term plans are likely to help navigating in the more distant future's scenarios. Only when our workshop participants had accepted that it is not about what to do to make the future will not as be depicted, radical programme structures were envisaged.

Literature and document review

Prior to each workshop the study team provided participants with written input and context generated from the desk research. For this study we reviewed an analysed a broad spectrum of documents, which was used to provide context for the analysis. The study team reviewed reports, assessments, and studies concerning previous Framework programmes. This allows to map the evolution and changes of the Programmes' overarching logics and structures. It invited to assess on the nature of changes in the FP and its relation to overarching EU policy goals. Furthermore, a number of recent key EU policy reports consulted to map the key messages, needs and challenges for the developments in the EU R&I landscape. Finally, a major point of attention was the review of input published by various stakeholders. As such a large number of position papers were consulted, which voiced the views and interests, expectations and needs.

Horizon scanning is a widely used method for exploring possible futures. The emphasis of this method is to provide as broad a scope as possible for new developments that may have an impact on the subject of the foresight study. So, it is about not focusing directly on the subject but first mapping out the broad context of the subject. This can include trends (i.e., changes over time) as well as 'separate' events, as well as reasonably certain trends and uncertain variants of them. The following two definitions summarise horizon scanning nicely: *"Horizon Scanning is the systematic outlook to detect early signs of potentially important developments. These can be weak (or early) signals, trends, wild cards or other developments, persistent problems, risks and threats, including matters at the margins of current thinking that challenge past assumptions. {...} Horizon Scanning can be completely explorative and open or be a limited search for information in a specific field based on the objectives of the respective projects or tasks. It seeks to determine what is constant, what may change, and what is constantly changing in the time horizon under analysis. A set of criteria is used in the searching and/or filtering process. The time horizon can be short-, medium- or long-term."*[48] The results of horizon scanning projects are often used to draw up foresight studies, such as future scenarios, as we do in this study.

Case studies

In addition, the study team developed 5 case studies of R&I programmes for partial comparison to FP features. The aim is to illustrate best practice cases that responded to identified challenges and trends (e.g. administrative simplification, high efficiency of R&I funding, integration of dual use technology...) with specific structural measures. The selected cases include:

- Expedition Zukunft (Austria)
- SPRIND (Germany)
- Mission-Driven Top Sector policy (The Netherlands)
- ARIA (United Kingdom)
- France 2030 (France)

Appendix D of this report presents a summary of these cases.

Scenarios

For building the scenarios we scanned several reports on future developments and scenarios that were produced by various international organisations, governmental and commercial. From this we extracted the following future 11 developments:

- D1: Increasing populism (politics): more radical right-wing parties coming into power.
- D2: Declining globalisation ('blocs', regionalisation): increasing nationalistic thinking
- D3: Geo-political unrest: more military conflicts (globally) leading to more spending on defence
- D4: Economic growth: on a stable but low level
- D5: Polarisation: increasing economic and social inequality as well as political differences
- D6: Technological growth continues (high speed): more AI, digitalisation, robotisation, biotechnologies, sustainable energy-technologies, blockchain, 3d-printing, new materials, nanotechnology etc.

[48] Fraunhofer/TNO/VTT (2015). 'Models of Horizon Scanning: How to integrate Horizon Scanning into European Research and Innovation Policies.'

- D7: Information integrity crisis: digital divide, rise of disinformation, AI-fakes, election interferences
- D8: Governments are being watched very critically: low trust in institutions such as democracy but also in science, (traditional) media, and justice.
- D9: Individualisation (societal fragmentation): people increasingly identify as individuals rather than as part of a collective group
- D10: Aging of society: more use of health services and increasing labour shortages (in almost every industry and sector, including science, research, and technology)
- D11: Climate change continues (more focus on adaptation and mitigation instead of prevention)

Although these trends are relevant in the shorter term (2025-2034) and will probably remain so in the more distant future, we cannot assume that these trends will continue to move in the same direction. The recent development in the U.S.A, prove our point in this respect (see also (4.1). In the long run (2034-2040), it is likely that the future will change even more. The possibility remains, of course, that business-as-usual continues. This is not obvious because of all the assumed dynamics, and thus renders it, paradoxically, an uncertain future and thus an interesting and relevant scenario to consider if one wants to think about what a new FP-framework could look like.

However, one scenario is no scenario, thus the project team decided envisaging two other scenarios which are longer term and therefore more likely possible, disruptive scenarios. For those, we consider the basic developments of the 'Ongoing dynamics'-scenario and then subsequently depart from it in different possible directions.

For this the project team had to decide which of the above 'drivers' will be the most decisive and we decide for the 'degree of economic growth' (D4). The reason is that the existing economic space, as determined by the degree of economic growth, has a major influence on the budgets that national and international governments have for disposal in general, and for R&I activities in particular (D6). The degree of economic growth also impacts on how companies and knowledge institutions relate to knowledge development, technology and innovation. With low or even negative economic growth, they will not necessarily prioritise these topics. Instead, they will mainly be concerned with their short-term financial survival. With higher economic growth, spending on R&I is more realistic and – in case of publicly traded corporations -, it can be argued vis a vis their shareholders. Furthermore, managers have more room to think and act in the longer term. The quality of technology (D7) is also related to the economic growth: with more room for investment and a longer-term focus, the ethical and social aspects of technology will be better taken into account. In addition, economic growth has a major impact on how people relate to each other (D9), to the direction of geo-political developments (D2; D3) and to internal national political relations (D1). The degree of economic growth also affects the extent to which the various societal transitions (such as energy, food, climate) (D11) receive sufficient funding. Social polarisation (D5) can also be directly linked to economic growth as well as the trust that citizens have in their government (D8). Ageing (D10) can be seen as an autonomous demographic trend that is not easily influenced by the degree of economic growth but is very likely to influence growth.

Of course, the relationships between the 11 trends are somewhat more complex than indicated above. After all, everything is interconnected. But in order to arrive at a clear number and thus a practical set of scenarios, we chose the degree of economic growth because it touches on most trends (except for ageing). The degree and direction of technological growth seemed to be a good candidate too, but we consider it an outcome of the EU's policy on the FP framework to be set up. Otherwise, we would not be able to consider the scenarios as possible future contexts within which and for which an appropriate future FP framework should be developed.

Policy options

Based on information gathered from previous activities, including the literature review and stakeholder consultations, we initially created a comprehensive list of policy options. From this list, we developed 10 policy options further. The policy options were discussed during interviews with selected experts following the submission of the draft final report. The aim was to prioritise and select the most relevant and feasible options.

The policy options were developed based on an analytical framework that considers the timeframe for implementation (short-term or medium to long term), associated contextual scenarios, the rationale behind the proposed options, their objectives, examples of potential interventions, and expected impacts.

Appendix B – Summaries of foresight workshops

Summary of the first workshop

The first workshop on shaping the next Framework Programme brought together stakeholders from diverse sectors, including academia, industry, and public institutions, to collaboratively explore the relevance of the Framework Programme.

Participants discussed the relevance of the FP three key perspectives: User, R&I, and Global. From the user perspective, participants emphasised that the FP is indispensable for fostering collaboration, inclusivity, and trust among European stakeholders. The FP's relevance for the research and innovation community lies in its ability to facilitate ecosystems and address complex problems. Stakeholders agreed that the FP is critical for Europe to remain competitive and relevant on the global stage. A more specific analysis can be found below.

Instruments to shape FP10

As a next step the workshop participants embarked on a world café session focused on identifying and refining instruments to shape the next Framework Programme in addressing societal challenges, ensuring Europe's global relevance, and strengthening its research system and industry. Participants provided insights and proposed cross-cutting instruments to enhance the effectiveness, inclusivity, and strategic impact of FP10.

Participants highlighted the need for FP10 to effectively tackle global and societal challenges by embedding sustainability principles across all technologies and approaches. Mechanisms to assess both positive and negative impacts of sustainability were considered important. The framework should also build adaptability to respond to emergencies like pandemics, migration, and wars, while long-term evaluation frameworks should account for impacts that extend well beyond 2040. True EU-level missions were emphasised as a means to align supply and demand sides effectively, incorporating user involvement to ensure inclusivity. Additionally, fostering citizen engagement was seen as critical to combating misinformation and ensuring that technologies align with societal values, thereby enhancing trust and adoption.

In maintaining Europe's global relevance, participants highlighted the importance of strategic investments in critical technologies, particularly through FP10's Pillar 2, to sustain competitiveness. Europe's attractiveness as a global partner should be reinforced by adopting open science principles and selectively sharing knowledge in strategic areas. Leveraging artificial intelligence in research processes was also identified as a key tool to enhance efficiency, analysis, and innovation. A strong focus on European added value was deemed necessary to ensure transnational synergies and outcomes that go beyond what national-level programmes can achieve.

To strengthen the European research system and industry, participants advocated for enhanced collaboration among stakeholders, including public-private partnerships, to ensure alignment between research outputs and industry needs. Accessibility across all Member States was highlighted, with targeted support for widening countries to improve research capacity. A dedicated EU programme for coordinating technology infrastructure investments was proposed to foster innovation and competitiveness. Continuing and expanding successful instruments such as ERC, MSCA, and EIC was recommended, along with ensuring balanced brain circulation and targeted support for less successful regions.

Cross-cutting instruments were seen as important to enhancing the overall coherence and impact of FP10. Participants emphasised the importance of focusing on fewer, well-defined priorities with high strategic and societal impact. The inclusion of both large common projects for widespread influence and smaller ones to encourage efficiency, risk-taking, and participation by newcomers was also proposed. Strengthening mechanisms for knowledge valorisation was deemed essential to

ensure research outputs translate into societal and economic benefits. A risk-taking culture was encouraged to foster breakthrough innovation, and integrating formal and informal education at all levels into the R&I ecosystem was viewed as necessary to build a strong pipeline of talent and innovation capacity. Finally, ensuring that instruments are streamlined and well-integrated to avoid inefficiencies and overlaps was considered crucial.

Participants where then asked to prioritise the proposed instruments for the next Framework Programme (FP10) into three categories: "must-haves," "should-haves," and "could-haves." The aim was to identify essential elements, important refinements, and optional enhancements that collectively address FP10's objectives of tackling societal challenges, maintaining Europe's global relevance, and strengthening the European research system and industry.

Must-Have Instruments

The instruments categorised as "must-haves" are critical for the success of FP10 and form the foundation of the programme. These include retaining widening measures as a strategic priority, ensuring equal access to the programme, and reducing transaction costs to improve accessibility and efficiency. Simplification, agility, and flexibility were highlighted as essential to streamline processes and adapt to emerging challenges. Participants emphasised the need to retain successful instruments like the ERC and MSCA while fostering bottom-up collaborative research aligned with strategic priorities. Developing critical technologies, delivering EU-level added value, and ensuring coordination across programmes to avoid duplication were also considered indispensable.

Should-Have Instruments

The "should-have" instruments represent important refinements and strategic improvements for FP10. Participants stressed the need to discontinue ineffective instruments by starting with clear objectives and aligning instruments with measurable criteria such as ROI and societal needs. Simplification remained a recurring theme, with a focus on refining processes to make the programme more user-friendly.

Could-Have Instruments

The "could-have" instruments reflect innovative ideas that could enhance FP10 if implemented, though they are not immediately critical. Participants highlighted the importance of embedding missions regionally and locally, as place-based solutions driven by local knowledge institutions can foster more effective mission-oriented ecosystems. Cross-policy missions were proposed to integrate R&I with broader policy goals, though participants noted that current implementation is inefficient and requires refinement. These instruments offer opportunities for experimentation and long-term improvement, but they are not essential to the programme's core success.

Critical Processes for shaping FP10

Through the world café, participants explored four key areas of processes critical for shaping FP10: (1) processes within and around the Framework Programme (FP), including selection and project/programme management; (2) multi-actor strategic and decision-making processes; (3) processes enabling cross-programme, cross-instrument, and cross-funding synergies; and (4) broader ideas that did not fit elsewhere, categorised as "parked ideas."

Processes Within and Around FP

Participants emphasised the importance of streamlining processes within FP10, particularly in selection and programme management. They proposed mechanisms such as non-prescriptive calls and fast-track systems to reduce bureaucracy and foster more flexible approaches to project funding and evaluation. Greater adaptability in project size and duration was also highlighted, as was the need to build trust and reduce administrative burdens on beneficiaries. Tools like AI-based matchmaking and improved transitions between TRL levels were considered crucial for enhancing

efficiency. Inclusivity was a recurring theme, with widening measures like hop-on schemes recommended to ensure equitable participation across Member States.

Multi-Actor Strategic and Decision-Making Processes

Governance and decision-making processes emerged as critical areas for reform. Participants called for a review of multi-level governance structures to address overlaps and clarify responsibilities. They emphasised the importance of expert-driven governance, suggesting the reintroduction of expert groups to guide research priorities. Stronger alignment between EU and national agendas was considered essential, with strategic foresight identified as a key tool for setting priorities. Stakeholder engagement was another priority, with recommendations to strengthen academia's role, improve representation for early-career researchers, and incorporate citizen input in defining research priorities.

Processes Enabling Cross-Programme, Cross-Instrument, and Cross-Funding Synergies

To enable greater synergy across programmes and instruments, participants advocated for mechanisms that allow seamless transitions between funding sources and instruments, such as moving from ERC to EIC without requiring redundant evaluation. They emphasized the need for financial and administrative harmonisation across instruments and greater flexibility in budgeting to address emerging priorities. Strengthening links between FP10 and EU industrial policies was also seen as necessary to address strategic autonomy and competitiveness concerns.

Parked Ideas

Broader systemic issues were discussed under parked ideas, including the need to reinforce transnational research and complete the European Research Area. Participants stressed the importance of positioning FP10 as a global hub for research, advocating for significantly increased budgets for basic research instruments like ERC and MSCA. Simplification efforts were urged to directly benefit researchers, and questions were raised about the rationale for EU-level SME funding, which participants felt should focus on specific needs such as deep-tech scaling.

Analysis of the High-Level Structures Session for FP10

Another session of the World Café focused on envisioning high-level structures for FP10, encouraging participants to propose bold and transformative ideas for the next Framework Programme. A voting process was conducted to prioritise the most impactful proposals, with ideas receiving more than three votes highlighted as key stakeholder priorities. Proposed high-level structures include:

Participants stressed the importance of supporting the full spectrum of TRLs to ensure that foundational research progresses to market-ready innovations.

The active involvement of industry executives and experts in designing calls, developing work programmes, and evaluating project applications was one of the most voted ideas. This input underscores the importance of aligning FP10 with real-world industrial needs, ensuring that research and innovation efforts deliver tangible, market-oriented results.

Participants prioritised a targeted focus on critical technologies, such as advanced AI, cybersecurity, semiconductors, and biotech. This emphasis highlights the need for FP10 to address Europe's strategic autonomy and competitiveness in key sectors. The high number of votes for this idea reflects broad agreement on the importance of maintaining technological leadership in areas vital to Europe's future.

Transnational projects at lower TRLs received significant support, with participants advocating for open calls that enable foundational research and cross-border collaboration.

FP10's role in supporting European Research Area (ERA) policy reforms at the national level was another highly voted idea. Participants highlighted the need for structural alignment between EU-wide goals and national reforms to create a cohesive and inclusive R&I ecosystem.

Selecting priorities for FP10's new "Pillar II" was seen as a task requiring a balance between political decision-making and expert input. While strategic priorities should be set at the political level, their implementation must be guided by the expertise needed to achieve measurable impact.

Clear and streamlined rules of participation were widely supported, with participants advocating for simplified processes to enhance accessibility and reduce administrative burdens. This priority reflects the ongoing need to make FP10 more user-friendly for researchers and stakeholders.

Participants emphasised the value of public-private partnerships as a mechanism for fostering collaboration between industry and other R&I ecosystem stakeholders. These partnerships are crucial for translating research into innovative solutions and addressing market needs effectively.

Providing clear guidance on combining FP10 with other funding programmes, such as the Digital Europe Programme and national initiatives, was seen as essential. This would ensure that stakeholders can navigate funding opportunities efficiently and maximise the impact of combined resources.

Participants highlighted the need for FP10 to focus on the deployment of research outcomes. Ensuring that R&D efforts lead to commercialised products and societal benefits was a highly supported idea, reflecting a shared understanding of the importance of aligning supply (R&D) with demand (market and societal needs).

In the word cafe fashion, some participants where then tasked to select the envisioned structural elements for FP10 and to assess their importance and feasibility of implementation. The discussions covered transformative ideas aimed at enhancing the programme's coherence, governance, inclusivity, and impact. These elements were classified by their relative difficulty and importance, offering a roadmap for prioritising actions in the next Framework Programme.

High Difficulty, High Importance

Key structural elements in this category reflected transformative yet challenging changes essential for FP10's success. Supporting ERA policy reforms by tying funding to national investment in R&D emerged as a critical need, requiring alignment between national and EU-level priorities. Participants also highlighted the elimination of duplicate financial audits to streamline administrative processes, ensuring efficiency and reducing redundancies. Better integration of FP10 instruments was emphasised to enhance coherence and effectiveness across the programme. Shifting to expert-driven governance, particularly within Pillar 2, was seen as essential for aligning decision-making with field expertise. Finally, linking investments with measurable returns was viewed as an important but complex structural change, balancing financial inputs with societal and economic impacts.

Medium Difficulty, High Importance

Ideas in this category offered significant potential benefits while presenting moderate implementation challenges. Participants emphasised the need for real co-development of research priorities between Member States and the European Commission, fostering alignment and inclusivity. A fully bottom-up approach across FP10 calls was also proposed to increase responsiveness to stakeholder needs. Transitioning away from a rigid implementation model toward a more flexible, innovation-driven approach was seen as critical for empowering stakeholders and addressing emerging challenges dynamically.

Low Difficulty, High Importance

Some proposals were identified as high-priority but relatively easy to implement. Participants recommended a shift in policy focus from prescribing pathways to defining broad goals. This would allow for diverse, innovative approaches to addressing challenges, with promising projects receiving additional support phases. Another proposal called for prioritising disruptive innovation, investing fully in research and solutions with the potential to transform society and the economy.

High Difficulty, Medium Importance

Structural changes in this category were considered less critical but still meaningful. Simplifying FP10 processes remains a significant challenge, but doing so is vital to reducing administrative burdens and improving accessibility. Participants also called for moving beyond the dichotomy of basic versus applied research, promoting their integration to maximise impact. Expanding transnational collaboration at low TRLs was another priority.

Medium Difficulty, Low Importance

Proposals with lower importance but manageable difficulty included minor adjustments to ERC processes though no further explanation was provided.

The session revealed strong alignment among participants on the need for bold structural changes in FP10. High-priority elements such as ERA policy reforms, expert-driven governance, and better integration of instruments reflect a shared desire for coherence, inclusivity, and strategic impact. Simplification and flexibility emerged as recurring themes across categories, emphasising their broad relevance to FP10's success. A focus on aligning research investments with societal and economic needs further accentuated the programme's dual mission of advancing innovation and addressing critical challenges.

SWOT Analysis

In this last breakout, participants were asked to explore what is needed, lacking, or available to address selected needs through the use of a SWOT (Strengths, Weaknesses, Opportunities, Threats) analysis. The focus areas included synergies, relevance and widening.

SWOT on Synergies

The SWOT analysis conducted in this session focused on identifying strengths, weaknesses, opportunities, and threats related to fostering synergies in FP10. Participants emphasised that several existing elements of the programme already contribute **positively to synergies**, such as the ability to fund projects through ERDF transfers to Horizon Europe, the connection between EIC and ERC, and the role of public-private partnerships (PPPs) in enabling diverse stakeholder collaboration. Instruments like the Seal of Excellence were highlighted as strengths for recognising high-quality proposals, though their full potential is yet to be realised.

Weaknesses in the current system were also apparent when it comes to synergies. Challenges included fragmented rules, administrative burdens such as double reporting, and inconsistent audit methods. There is limited alignment between structural funds and Horizon Europe, and internal synergies between components like EIC, EIT, and Pillar 2 are often weak. The perception of Seal of Excellence projects as "second rate" also diminishes the instrument's effectiveness.

Opportunities to improve synergies were identified, including the need for clearer boundaries between FP10 and other EU programmes to ensure complementary actions. Mechanisms could be developed to ensure Seal of Excellence projects receive funding through alternative instruments. New pathways for transitioning from one EU programme to another and instruments allowing Pillar II consortia to exploit joint results were proposed. Participants also highlighted the potential of a

competitiveness fund to pool resources for strategic priorities like technological sovereignty and societal challenges, as well as the creation of an EU crisis budget to address emergent issues rapidly.

However, several **threats** to achieving effective synergies were noted. Internal competition among Commission services and unclear guidelines for combining EU and national funding present significant obstacles. Overemphasis on specific sectors and the introduction of dual-use technologies risk narrowing the programme's focus. Practical challenges, such as mismatched timelines, beneficiary types, and application procedures, further complicate synergy efforts.

Addressing administrative complexity, improving alignment between structural funds and Horizon Europe, and providing clear and consistent guidelines for funding mechanisms will be crucial.

SWOT on Relevance

Participants highlighted the collaborative nature of the FP as one of its key strengths. Pillar II was noted as the only truly collaborative component, breaking silos and facilitating the flow of knowledge between basic and applied research, as well as between public and private sectors. Mechanisms for fostering collaboration, such as public-private partnerships (PPPs) and cross-border consortia, were seen as effective in building trust and generating diverse perspectives. The programme's focus on excellence and disruptive innovation, supported by instruments like the ERC, MSCA, and EIC, has bolstered its reputation and prestige, attracted top-tier consortia and enabling groundbreaking research.

The programme's ability to address challenges such as climate change and its support for deep-tech innovation, particularly by established companies renewing their technological capabilities, were also identified as strengths. Additionally, the FP has successfully promoted collaboration between public research and industry, offering a variety of perspectives by leveraging Europe's diverse cultures and partners.

Despite its strengths, FP10 faces several systemic **weaknesses**. A recurring challenge is the programme's limited resources, leading to significant over-subscription to calls and increasing pressure to expand its budget. This issue is exacerbated by "over-tagging" funding to strategic priorities such as green and digital technologies, which dilutes resources and focus. The programme's evaluation processes were criticised for not contributing meaningfully to improving project quality, while over-management by EC personnel was seen as inefficient.

Fragmentation within national R&I systems and between EU, national, and local funding instruments further hinders FP10's coordination. Good intentions around joint programming remain under-resourced and lack the necessary scale. Moreover, the FP struggles with agility, limiting its ability to rapidly respond to changes and unforeseen challenges. There is also a lack of quick funding mechanisms to disseminate results and findings in certain fields, and instability in the R&I budget within the Multiannual Financial Framework undermines long-term planning. Finally, feedback loops between implementing agencies and policymaking services require significant improvement to enhance programme support.

Participants identified significant **opportunities** to enhance FP's relevance. Strengthening European RTOs and launching a major new EU programme on technology infrastructures were seen as key steps to advancing competitiveness and sustainable development. There was broad support for integrating programmes to maximise impact and for maintaining the continuum from research to innovation, especially in the critical stage of technological research.

The FP has the potential to increase cross-border collaboration in RD&I with strong industrial participation and common investments in AI-driven research. Regional and local ecosystems could be better connected to foster innovation, while an increased focus on demonstrating research impact would reduce risk and uncertainty, stimulating private investment in Europe. Participants

also noted the opportunity to capitalise on Europe's strong research infrastructures, university alliances, and European data spaces, while showcasing responsible approaches to disruptive technologies like AI. Europe's global competitiveness could be bolstered through initiatives that promote collective efforts, particularly in areas where individual Member States lack the scale to act alone.

Participants acknowledged that several **threats** could undermine FP's relevance. The irresponsible use of AI and dual-use technologies present ethical and regulatory challenges. National interests, such as Member States focusing on "juste retour", could detract from EU-wide goals. The potential for unforeseen crises, such as another global pandemic, raises questions about Europe's preparedness.

Globally, R&D competitors like China pose a significant threat, particularly if Europe falls behind in areas like AI-driven research. There are concerns that the FP could lose its relevance by overpromising results, particularly in initiatives like the Missions, where ambitious objectives and unrealistic KPIs could erode trust. Declining trust in science, fuelled by disinformation and democratic backsliding in some regions, further jeopardises FP's credibility. Finally, a lack of focus, with too many priorities and insufficient emphasis on EU-added value, risks diluting the programme's impact.

SWOT Widening

Participants emphasised that FP's widening instruments have proven their value in addressing gaps in research capacity and promoting prioritisation of R&I at national and regional levels. Successful instruments such as Teaming, ERA Fellowships, and ERA Chairs were identified as effective mechanisms that foster co-creation, co-design, and long-term capacity building. These initiatives strengthen national R&I systems by enhancing their connectivity to high-performing institutions. The widening policy's focus on reducing disparities in research efficiency and effectiveness was acknowledged as a critical objective, with evidence of some positive impact at the national level.

Despite its strengths, significant challenges remain. Poor synergies with national and regional funding limit the effectiveness of widening measures, and the complexity of current instruments hinders accessibility. The portfolio of widening policies does not sufficiently account for the diverse needs within widening regions, as some countries no longer require capacity building but still struggle with participation in the broader framework. Participants questioned whether widening aligns with the EU's overarching commitment to excellence, as some instruments are perceived as remedial rather than aspirational. Moreover, widening is often seen as a substitute for national investments, limiting its potential to drive structural reforms. There is also scepticism about the incentives for high-performing institutions to join widening schemes, as their participation is not clearly beneficial.

The session identified significant opportunities to enhance widening's role in the next FP. Reframing widening as a transitional pathway to excellence a phased "ladder to excellence" approach", could ensure that each region progresses according to its specific needs. Participants noted the untapped potential of widening regions, which could be realised by fostering research infrastructures and equipment to close gaps in capacity. Integrating ERA Fellowships into the MSCA network was seen as a straightforward improvement to boost visibility and participation. For Europe to maintain global leadership in research, a strategy that supports development across all regions was deemed essential. Enhancing funding synergies and creating a pull effect on national programmes could amplify the impact of widening efforts. Participants also highlighted the importance of leveraging widening countries' sensitivity to strategic autonomy to strengthen their role in the EU's broader innovation ecosystem.

Conclusions: Workshop 1

Workshop 1 employed an interactive and inclusive approach to engage participants in shaping the vision and structure of the FP.

The discussions revealed several proposed structures for FP10, reflecting both incremental improvements and transformative changes:

- Pillar Structure Continuation with Refinements
- Participants largely supported maintaining the existing pillar structure but suggested refinements to enhance alignment and coherence. For example:
- Pillar I: Continued focus on research excellence, with increased funding for ERC and MSCA.
- Pillar II: Greater integration between its thematic clusters and mechanisms for linking Pillar II consortia to instruments like EIC.
- Pillar III: Strengthened focus on disruptive innovation and better synergies with industrial policies.
- Phased Widening Framework ("Ladder to Excellence")

A novel proposal emerged to view widening as a journey, with phased support tailored to the specific needs of regions. This approach would help transition widening regions toward greater participation in excellence-driven frameworks.

Competitiveness Fund

Participants broadly supported the concept of a Competitiveness Fund as an opportunity to pool resources for addressing key strategic priorities. This fund would aim to boost competitiveness and technological sovereignty by aligning R&D efforts with industrial policy and structural or regional development initiatives. Additionally, it could tackle societal challenges through genuine EU Missions that integrate sectoral policies and implementation instruments, fostering inclusive approaches. The fund also proposed an EU Crisis Budget, designed to provide flexible funding for rapid responses to emergent global challenges, such as pandemics or geopolitical crises.

Simplification and Harmonisation

Simplified rules of participation and harmonised reporting across instruments and programmes were emphasised. This includes mechanisms like fast-track transitions between funding instruments (e.g., ERC to EIC) and clearer guidelines for combining EU and national funding.

Cross-Programme Synergies

Proposals included aligning Horizon Europe with structural funds and national programmes, streamlining their rules, and fostering greater integration across EU policies. This would amplify the impact of Horizon Europe and ensure better coordination at multiple levels.

Focus on Disruptive Innovation and Strategic Technologies

FP10 should emphasise critical technologies like AI, semiconductors, and biotech to maintain Europe's global competitiveness. Greater attention to demonstration projects and commercialisation pathways was also proposed.

Increased Flexibility in Governance

Participants called for a more agile governance structure, including expert-driven decision-making, dedicated programme managers for thematic areas, and enhanced foresight mechanisms to adapt to emerging challenges.

Inclusiveness

The importance of inclusivity, particularly for widening regions, was reinforced as essential for achieving long-term impact.

Summary of the second workshop

Framing the challenges under a business-as-usual scenario

In workshop 1, a number of challenges were identified. A synthesis of the key terms served the discussions in the first breakouts of workshop 2. The following section provides the topic and short descriptions as provided during the workshop, followed by summaries of the discussions.

1. ***Decision-making processes*** *- Governance and decision-making in research require reform, with a focus on multi-level structures, expert-driven guidance, and strategic foresight. Stronger alignment between EU and national agendas, increased stakeholder engagement, and the involvement of industry executives are essential. The integration of expert groups and a portfolio approach in governance, particularly in Pillar 2, is critical for aligning research with real-world needs.*

The dimension on decision-making processes was addressed from different levels:

- The level between EU and Member States – the dialogue between the two exists but the timing is not always perfect. MS should be involved earlier. It was also noted that high-level policy decisions are not a guarantee. In a number of cases, R&I annual budgets were cut and shifted to other EU priorities.
- There was agreement that the decision about priorities should be made by policymakers. The next level of decision-making, design of work programmes or the decision about bottom-up non-thematic calls should be left mainly to the researchers and experts. Overall, the idea about scientific boards or councils was met with pro and cons. Councils could replace the programme committees in Pillar 2, but one may first need to decide on a higher-level decision, namely, if we may envisage two programmes: one for industry and one for research. This could influence decisions on funding modes as well as on decision-making since the two could be designed differently. At this level, decision-making processes are particularly critical within and for Pillar 2.
- At instrument level, the Missions were indicated as a poor example of decision-making between EC and MS.
- While expert-lead decision making was supported, there were nonetheless questions on expertise and excellence. Often it is forgotten that the knowledge is not always synonym with a career step or title.
- Decision-making at project level. At project level, a range of administrative requirements seem to hamper flexibility. This concerns inclusion of exploratory elements in research

2. ***Simplification*** *- There is a need for simplification, agility, and flexibility in streamlining processes and adapting to challenges. There is a need for clear, simplified rules of participation to enhance accessibility and reduce administrative burdens, making FP10 more user-friendly. Providing guidance on combining FP10 with other funding programmes and eliminating duplicate financial audits are essential for efficiency and maximising resource impact.*

    - Simplification is constantly on the agenda and the EC is experimenting such as with two-stage selection procedures or now under Horizon Europe, with lump-sums. The latter was not welcomed since lump-sums "do not help". The required accountability with too many deliverables, milestones and other requirements that may deviate the focus of attention suggest a lack of flexibility at project-level: partners cannot shift budgets between partners or work packages. A suggestion was made to monitor and assess more carefully so-called 'pilots'. So far, if a pilot is not totally failing, it appears as a 'normal' instrument in the next

phase (a work programme, or FP) and adds to the range of instruments, including specific processes.

- The discussions also shifted to the observation that the very prescriptive calls "in EU speech" require that dedicated consulting firms write the proposals since they know very well which terms need to be used and which boxes ticked. This is an exercise where participants from widening countries feel disadvantaged. Another argument that touches efficiency aspects concerns the time spent on proposal writing – this is either paid through national R&I budgets or through time spent within won EU grants. A substantial share of research funding is thus not used for research but for proposal writing.

- An idea to mitigate the current complex procedures could be to base decisions and the allocation of budgets on trust. This may require changes in accounting requirements and courage of policymakers.

3. ***Directionality*** *- it is important to support the full spectrum of TRLs to ensure foundational research progresses to market-ready innovations and societal benefits. FP10 should focus on deploying research outcomes, aligning R&D with market needs, and integrating basic and applied research. Priorities include expanding transnational collaboration at low TRLs, focusing on strategic and societal impact, and encouraging both large and small projects. Emphasis was placed on critical technologies like AI, cybersecurity, semiconductors, and biotech to maintain Europe's competitiveness. The selection of FP10 priorities requires a balance between political decisions and expert input, fostering co-development between Member States and the European Commission. A flexible, bottom-up approach was proposed to empower stakeholders and address emerging challenges, with a shift from prescribing pathways to defining broad goals.*

Directionality is a term that was addressed again at different levels or contexts:

- Prescriptive call texts provide for directionality. They are rather simple and straightforward, but they are also examples for risk-averse and lack of freedom to address a challenge from another disciplinary perspective than described. Thus, too much directionality hampers the creativity and innovativeness typically linked to bottom-up ideas. A suggestion to mitigate such a lack was a permanent open call at 'Destination level' (topic level), that addresses challenges and topics but leaves it up to the researchers how to address the topic. This 'challenge-based' calls are a key approach of the German SRPRIND agency.

- Overall, it was felt that there is too much directionality at instrument level. Every instrument aims to achieve a broad range of similar or the same objectives which are passed on to the projects. But it is often not realistic at project level, that all kinds of objectives and impacts can be achieved. Here, a portfolio approach could help. Very critically reviewed were the so-called impact pathways. To many it is well understood that a project with 3-4 years does not have a tremendous impact in this period, but that the 'steps' – the research during the project – may contribute to impacts that may manifest only in the longer-run. Research is not a linear process – but to share a vision of what should be achieved or to what a given project contributes to, would provide directionality.

- Directionality was also linked to follow-up funding through 'the next pillar'. This reflects the thinking that a research project can follow a funding trajectory and ends with the creation of a start-up and is also known under the term 'synergy'.

- Finally, who should decide on directionality was addressed. To many 'researchers should be in the driving seat'. This is often the case since they are included in advisory or strategic groups. In case of frontier research, it should be researchers and innovators to decide.

Several also pointed out that the overarching direction should be provided by the policymakers.

4. ***Synergies*** *– There is the need for mechanisms to enable seamless transitions between funding sources, financial and administrative harmonisation, and budgeting flexibility to address emerging priorities. It is important to link FP10 with EU industrial policies to enhance strategic autonomy and competitiveness and providing clear guidance on combining FP10 with other funding programmes to maximise resource impact.*

   - Synergies is a term which seems to be overly used in any conceivable situation. There are various ways to distinguish synergies such as horizontal, vertical, multilevel, but also temporal synergies or synergies between actors. Since there are exogenous factors, the quest for synergies should be limited to factors that can be solved within a FP. At instrument level, it would be useful to envisage mechanisms for synergies instead of thinking about the instrument in isolation.

   - To participants, the focus on synergies between FP10 instruments is relevant but it was noted that in this respect, the inclusion of industrial policy into the FP has opened a range of challenges, which are compromising research. Perhaps it may be better to move some parts out of the remit of the FP altogether.

   - The quest for synergies with policy as it was stressed under H2020, and Horizon Europe was seen as problematic. Perhaps there are too many synergies with policies thought, while some of the attempts can be contradictory. It may be smarter to think about synergies for what purpose and effect instead of requiring all kind of synergies.

   - Overall, the structure of the FP should tell a story. The policy narrative is important. It is obvious that there is pressure on public budgets and that efficiency of the programme is key. In this respect, one can think about if the currently re-surfacing term of 'competitiveness' could or should be an aim and if it serves as a narrative.

   - At the actors' level, one can think about synergies between funders for industrial beneficiaries as well as 'journeys of beneficiaries' which enter at one point, move on to the next phase/funding opportunity.

5. ***Tackling challenges*** *– FP10 needs to address global and societal challenges by integrating sustainability principles across technologies. There is a need for mechanisms to assess sustainability impacts and adaptability to respond to emergencies like pandemics, migration, and wars. Long-term evaluation frameworks should consider impacts beyond 2040. EU-level missions should align supply and demand, with user involvement to ensure inclusivity. Citisen engagement is crucial to combat misinformation and ensure technologies align with societal values, enhancing trust and adoption. Linking investments with measurable returns is necessary but change is complex; financial inputs need to be balanced with societal and economic impacts.*

   - To thematic challenges at global level, the FP can contribute – to more local challenges, the FP is not agile, but one can question whether this is always needed given that there is national funding that can respond to these needs.

   - What is key is to have a common understanding of challenges – do we speak about all kind of challenges or only R&I related ones? What should be the role of the FP on these challenges? A much clearer direction is needed.

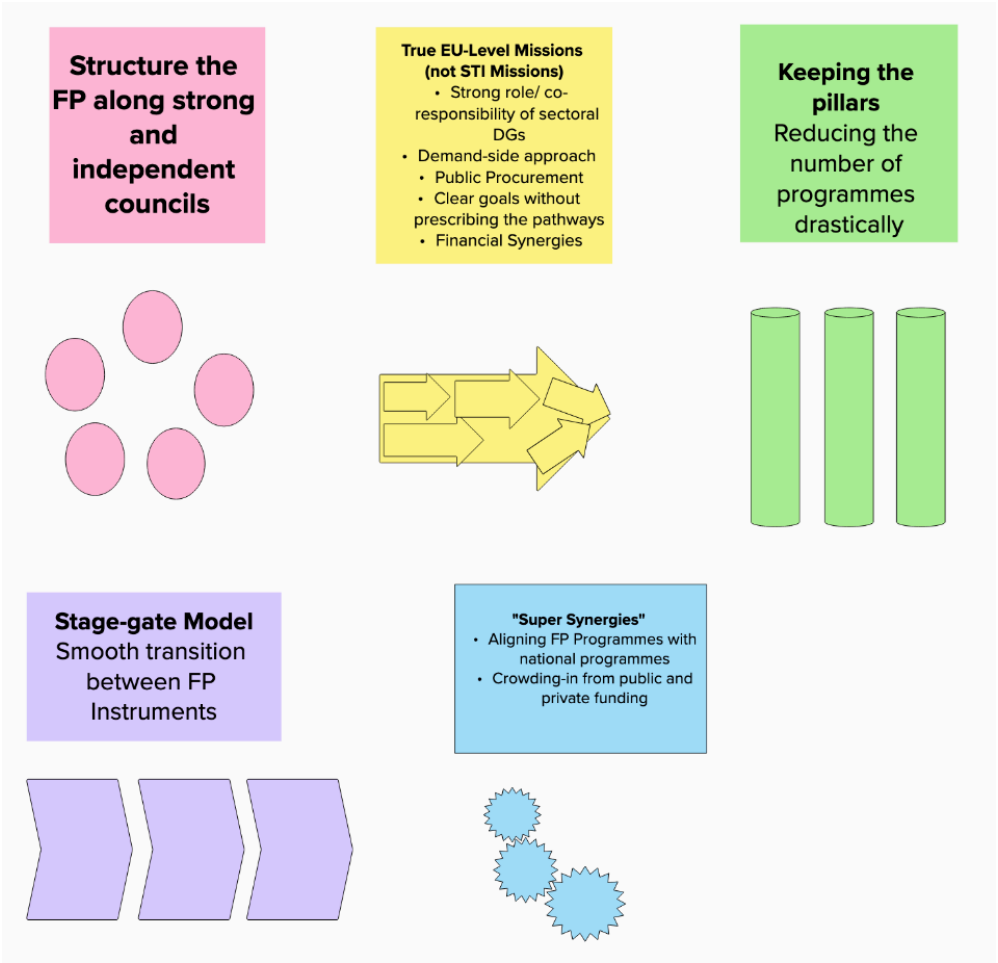
   - At policy instrument level, we have ERA that addresses a range of R&I challenges, aiming to align/pool resources. This functions pretty well. We can see that for broader challenges – as tackled through the missions – that the governance of the missions is more of a failure.

While they address very broad challenges which go beyond research, they could not reach out beyond research. The FP budget should only pay for the research and innovation of missions.

- The question of what the European added value is should guide any decision on what should be included and addressed in an FP.

Brainstorming on structures

Some ideas on potential structures were already identified in the first workshop. These were further discussed in workshop 2. We presented the following five sketches which inspired a range of remarks, summarised below.



Source: Technopolis Group.

Continuity vs Restructuring

The group debated whether the Framework programme requires restructuring or whether continuity itself might simplify and enhance effectiveness.

There was a consensus that the existing three-pillar structure has a logical foundation and should not be discarded. The idea was to preserve what works well and avoid starting from scratch. The value of the three-pillar structure provides a logic:

- Pillar 1: Focus on scientific excellence.
- Pillar 2: Serving as a bridge between science and innovation.

- Pillar 3: Innovation-driven goals.

However, concerns were raised about suboptimal linkages between Pillar 2 and Pillar 3 (RCIC), prompting a need for practical solutions.

Disruptive Framework Programme vs Disruptive Innovations

A distinction was made between a disruptive framework programme and focusing solely on disruptive innovations and technologies. The group observed that current examples predominantly highlight disruptive innovation technologies, which represent only part of the broader picture.

Integration of Stage-Gate Approach

The "stage gate" model (referred to as the purple model) should be integrated with the three-pillar structure and shifted to align with the three-pillar framework.

Clearer bridges and transitional stages between the pillars should be developed,

- ensuring continuity and scalability as follow-up options for projects.
- Improved portfolio management systems to enable efficient oversight.

Programmes and structures should be designed to facilitate these stages.

Suggestions for practical implementation included fixed evaluation panels for Pillar 2, mirroring the ERC's structure, and advisory groups with broad stakeholder representation.

Improved Linkages between Pillars

- Proposed improvements to foster better transitions across the pillars included:
- Embedding low Technology Readiness Level (TRL) research actions in Pillar 2.
- Smaller, more agile funding schemes to support smoother transitions.
- Avoiding later-stage bottlenecks and ensuring efficient ecosystem building.
- A focus on creating strong, connected research communities across Europe was emphasised.

Simplification and Efficiency

Concerns were raised about over-programming within Horizon Europe, leading to inefficiencies.

A reassessment of the programme's objectives and instruments was proposed to:

- Identify key elements that work effectively.
- Simplify and streamline the structure and processes.

Expert Involvement in Priority Setting

Experts, including end users (e.g., patients in health research), should participate in discussions on research themes.

- Their role should focus on priority agenda setting rather than decision-making.
- This ensures balanced input while maintaining strategic oversight.

Strategic Councils

Strong, independent counsels were proposed to sit atop the three pillars, providing high-level strategic direction without interfering in daily operations or programming.

Industry and Research Collaboration

Bottom-Up Involvement:

- Encouraging bottom-up approaches from industry and research stakeholders to foster innovative ideas.

Improved Linkages Between Pillars:

- A stronger connection between Pillar 2 (research) and Pillar 3 (innovation) is needed, allowing bottom-up projects to transition seamlessly as they mature.
- Emphasis on a value chain approach to integrate research and industry efforts effectively.

Debate on Separate Industry and Research Clusters

Proposal to Split Industry and Research:

- Discussions considered creating separate clusters for industry and research within the framework programme.

Concerns were raised:

- Competitiveness should apply to both industry and basic research, not be siloed.
- Clarity is required on how these clusters would function and their implications for the framework programme structure.

Comparisons were drawn to earlier proposed Innovation Councils, raising questions about the role of Member States.

Synergies with Member States

Existing synergies and channels with Member States were acknowledged.

There was caution against over-politicising the framework programme by increasing Member State involvement, recommending that current mechanisms remain as they are.

Member State Involvement

Early Engagement:

- Member States are often engaged too late in the process, leading to missed opportunities for strategic input.
- Advocated for early-stage involvement in strategic programming to better reflect Member State priorities.

Rational Process for Policy Involvement:

Concerns about potential horse trading in policy influence were discussed, with differing views:

- Some argued it could lead to undesirable outcomes.
- Others suggested that structured "good" horse trading can be beneficial if managed effectively.

Mainstreaming Widening

- Widening should not be treated as a standalone element within the framework programme.
- Instead, it should be mainstreamed vertically, integrated across all parts of the programme to promote inclusivity and reduce disparities.

Limited Enthusiasm for the Missions Model

- The mission's model (referred to as the yellow model) did not resonate with participants and was generally not well-received.

Commission and Member State Dialogue

- Strengthening Communication:
  - Early, structured dialogue between the Commission and Member States is essential for effective programming.
  - This would enhance collaboration and minimise issues arising from late-stage policy interventions.

Incorporation of New Elements

- Ideas from previous workshops, including sprinkling in elements represented by colours (e.g., pink and blue), were considered:
  - Pink elements likely refer to innovative or creative aspects that enhance the model.
  - Blue dots symbolise synergies, which were acknowledged but deemed sufficient in their current form.

Open Questions and Unresolved Points

- The group did not reach a conclusion on:
  - The structure or feasibility of separate industry and research clusters.
  - The best mechanisms for avoiding unproductive horse trading in policy influence.

Summary of the third workshop

Below provides a summary of what has been discussed in workshop 3

In a protective, stagnant economic scenario, the Framework Programme would need to be highly strategic, focusing on maintaining essential collaborations and infrastructure that provide the backbone for EU's security, health, and technological needs. It would pivot towards a model where the primary goals are to safeguard against emergencies, ensure the sustainability of critical investments, and maintain necessary operational capabilities across the EU. This focused approach would mitigate some of the risks associated with economic isolation and technological scepticism, ensuring that the EU remains prepared, responsive, and interconnected in essential areas.

Why FP10 is needed in the 'ongoing dynamics' scenario?

Emergency Preparedness and Response: The FP should focus on preparing for and responding to emergencies, such as health crises (like new vaccines) and food security, which are critical even in a protectionist and stagnant economic environment.

Maintaining Essential Collaboration: Despite a reduced scale and scope of the programme, maintaining collaboration in essential areas where Europe has dependencies, like technology (e.g., chips) or digital interoperability, is necessary to sustain capabilities that are too costly to discontinue and are essential for the region's stability and security.

Why FP10 is not needed in this scenario?

Resource Constraints: In an economic scenario characterised by stagnation, investing in a broad FP might be seen as a lower priority, with resources possibly being directed towards immediate national concerns rather than collaborative projects.

National Prioritisation of Resources: With limited investment capabilities, countries might prioritise national over collaborative European initiatives, focusing on maintaining or developing essential infrastructures independently.

What would be the objective/rationale on a high level?

Maintaining Essential Collaboration and Infrastructure: The FP aims to sustain critical collaborations and infrastructure necessary to address and respond to crises requiring an EU-level response. This includes digital technologies such as databases and cloud services, which are increasingly becoming backbone elements for security, economic activities, and societal functions.

Ensuring Preparedness and Response to Emergencies: Important objective is capable of responding effectively to emergencies, especially health crises and food security challenges. This aligns with the need for resilience in face of global uncertainties.

Infrastructure Sustainability: To continue supporting and leveraging existing infrastructures and investments that are strategically important for Europe's long-term capabilities and are costly to replace. This includes maintaining research facilities, digital networks, and other large-scale investments that support Europe's scientific and technological infrastructure.

Minimising Economic Fragmentation: By focusing on collaborative efforts through the FP, the aim would be to minimise the risk of economic fragmentation within Europe, promoting a more unified approach to tackling common challenges, thereby strengthening the internal market and economic cohesion among member states.

What components would/should be prioritised under this scenario?

Emergency Preparedness and Response: Focus on readiness to handle emergencies that impact health, security, and food security at the EU level.

Inter-EU Dependencies: Maintain essential collaborations in areas where there is a mutual dependence among EU countries, notably in digital technologies that support interoperability and collective data management systems.

Cost-effective Maintenance of Existing Investments: Prioritise sustaining existing large-scale investments and infrastructures that are integral to the EU's operational capacity and would be costly to discontinue.

"How" can the components of the FP be designed to ensure resilience and adaptability under radical scenarios?

Agile and Responsive Governance: Implement a governance structure that is politically led, more agile, and less bureaucratic. This would involve an annual revision of work programmes to swiftly adapt to changing political and economic conditions.

Streamlined and Simplified Program Design: Focus on simplifying the FP structure to reduce administrative burdens and ensure that only the most crucial elements are retained. This helps in making the programme more agile and reactive to emergencies.

Strengthening Network Partnerships: Build and maintain sustainable network partnerships that are equipped to withstand budget reductions and other economic pressures, enhancing long-term resilience.

Clear communication of impact: Communicate the impact and added value of the FP to both policymakers and the public to ensure continued support and understanding of the programme's benefits in a challenging economic environment.

What is required to achieve a resilient FP?

Preparation for Restrictive Conditions: Anticipate future more prescriptive conditions by preparing the FP with the necessary flexibility and strategic foresight to adapt to more restrictive governmental and economic landscapes.

Infrastructure and Strategic Prioritisation: Conduct thorough reviews to determine which infrastructures are critical to fund, focusing on prioritising those that provide significant value under constrained economic conditions.

Long-term Competence Building: Reinforce the research community by bolstering curiosity-driven research and competence development, preparing researchers and institutions for drastic future changes.

Effective Use of Resources: Enhance the effectiveness of the programme by focusing on synergies and complementarities between different programmes, avoiding unnecessary duplications and maximising the impact of allocated resources.

Why FP10 is needed in 'there is nothing new under the sun' scenario?

Collaboration and Networking: Despite the individualistic and fragmented nature of innovation in this scenario, there is a significant need for structured collaboration and networking.

Counteracting Individualistic Trends: The FP could help address the overly individualistic trends in society and technology. By promoting more collective and socially-oriented research agendas, it could ensure that advancements in technology and economy also enhance societal well-being.

Why FP10 is not needed in this scenario?

Economic Redundancy: Some argue that because the economy is thriving, the impact of the FP might be minimal, suggesting that the rapid economic growth reduces the relative significance of structured research and innovation funding.

Shift in Priorities: There's a viewpoint that suggests other issues may be more urgent than research and innovation, questioning the added value of the EU in this context. It posits that Europe might need to focus on different challenges rather than joint research and innovation efforts.

What would be the objective/rationale on a high level?

The primary rationale would be to ensure that the technological and economic advancements are holistic and inclusive, promoting societal welfare alongside economic growth. The FP aims to bridge the gap between individual success and collective well-being, emphasising the importance of social sciences, well-being research, and infrastructure to make Europe an attractive place for research and innovation. This includes maintaining strong infrastructure and mobility to support collaborative efforts across Europe, ensuring that innovation remains strategically important and well-supported even in a thriving economic environment.

What components would/should be prioritised under this scenario?

Technological leadership and strategic technologies: Emphasis on maintaining technological leadership by investing in strategic technologies crucial for future advancements.

Innovation ecosystem: Importance of supporting the innovation ecosystem, particularly to foster developments in deep tech sectors.

Societal challenges: Addressing societal challenges such as health, climate, and food, with a focus on ensuring that these areas benefit society broadly and not just from a commercial perspective.

Inclusion and aging: Tackling the challenges associated with an aging population and ensuring that technological advancements are inclusive and accessible to all segments of society, especially those less able to follow rapid technological changes.

Ethics and regulation: Highlighting the need for ethical frameworks and regulations to reconcile societal values with technological advancements, ensuring that technology development is aligned with social resilience and ethical standards.

Collaboration and fragmentation: The need to address fragmentation and to pool resources effectively within the EU to build critical mass in research and innovation, underlining the importance of collaboration across different sectors.

Global attractiveness and research environment: Ensuring that Europe remains globally competitive and attractive to top researchers by supporting excellent research infrastructures and creating conducive environments for scientific work.

"How" can the components of the FP be designed to ensure resilience and adaptability under radical scenarios?

Flexibility in Program Design: FP should not be fixed on annual program but rather adopt a more flexible, rolling structure. This approach allows for adjustments/ responsiveness to changing conditions and needs, enhancing the program's resilience.

Bottom-up Collaboration in basic research: Emphasising the need for more collaborative approaches not only in applied research but also in basic research. Foster bottom-up teams as well as top-down thematic teams. This is crucial for pooling knowledge and resources, which is particularly important in a scenario where individualistic tendencies dominate.

Linkages Between Academia and Industry: Strengthening the connections between academia and industry to support innovation and practical applications of research. This is seen as essential in a scenario where individual paths might otherwise lead to fragmented development efforts.

What is required to achieve a resilient FP?

Funding and Resource Allocation: A significant increase in funding for research organisations and researchers is deemed crucial to sustain and transition into future framework programmes. This includes not only increased budgets at the EU level but also at member state levels.

Global attraction of researchers: To ensure the FP remains competitive and attractive on a global scale, strategies such as researcher return schemes are suggested. These schemes are aimed at attracting researchers from outside Europe and retaining domestic talent, enhancing the overall research capacity and innovation potential of the FP.

Reconsideration of Research Categories: Make distinctions between basic and collaborative research is proposed, suggesting that these categories may need renaming or rethinking to better reflect the interconnected nature of modern research and innovation.

Appendix C – Funding developments by FP and priorities

Table 17 – Funding developments by FP and priorities

Give FP7	Content	bn €	Share	H2020	Content	bn €	Share	Horizon Europe	Content	bn €	Share
Ideas	Focused on frontier research through the European Research Council (ERC).	7.5	15.0%	**Excellence Science**	Incorporated the ERC, MSCA, and Research Infrastructures.	24.4	31.9%	**Excellence Science**	Continues to support ERC, MSCA, and Research Infrastructures	25.0	26.2%
People	Promote researcher mobility through the Marie Sklodowska-Curie Actions (MSCA).	4.7	9.4%								
Capacities	Supported the development of research infrastructures, SME support, and regional research clusters.	4.1	8.2%								
Cooperation	Supported collaborative research across thematic areas incl. health, energy, and climate.	32.4	64.8%	**Societal Challenges**	Restructured from FP7's Cooperation pillar.	29.7	38.9%	**Global Challenges and Industrial Competitive-ness**	The most prominent pillar incorporating societal challenges as well as industrial leadership – which were previously split in H2020.	53.5	56.1%
				Industrial Leadership	Introduced as a pillar aimed at strengthening Europe's industrial base and supporting innovation and access to finance for SMEs.	17.0	22.3%				
								Innovative Europe	Introduced as a pillar to supporting breakthrough innovations, especially through the new European Innovation Council (EIC).	13.5	14.1%
				Spreading Excellence and Widening Partici-pation	Introduced to reduce R&I gap between EU regions by supporting less developed regions to participate in European R&I activities	1.8	2.4%	**Widening Participation and Strengthening ERA**	Contribute to building research and innovation capacity for countries lagging behind.	3.4	3.6%

Give FP7	Content	bn €	Share	H2020	Content	bn €	Share	Horizon Europe	Content	bn €	Share
				Science with and for Society	Promoted responsible R&I by involving citizens, civil society, and end-users in R&I activities. It also aimed to increase science literacy and gender equality in R&I.	0.5	0.6%				

Appendix D – Inspiration from national R&I programmes

Expedition Zukunft

Expedition Zukunft goals, achievements and outcomes are summarised below

	Summary
Scope	The Expedition Zukunft Initiative is a programme by the Austrian Research Promotion Agency (FFG) that strives to fund radical and disruptive innovations that have the potential to disrupt markets, solve complex societal/environmental/economic problems, or contribute to major technological leaps. The resulting products, services, and processes from the funded projects should noticeable "improve all of our lives" and show a lasting positive effect in social, ecological, or economic terms. The programme is organised along five funding streams targeting different phases and hence also stakeholder of innovation processes.
Achievements	9 calls, 366 application 62 funded projects in total
Relevancy	Challenging the "fund and forget" mentality of research and innovation funding this programme focuses on an active agency approach. Each project is assigned an "expedition guide" that accompanies the team during the project period and beyond. The support covers project specific services and trainings as well as support to navigate the funding landscape. In addition, a series of network meetings are organised to exchange experiences with other funding recipients.
	Background and context
What is the starting year of the programme?	June 2023
What problem, challenge, or strategic goal was thought to be addressed with the programme?	The lack of radical, disruptive innovation in conservative funding structures that tend to be risk-averse.
Which stakeholders were involved in the planning (e.g. governments, private sector, civil society, academia)?	In 2023 the Austrian National Foundation for Research, Technology and Development – FZÖ requested in their calls to funding agencies propositions for funding programmes that support radical and disruptive innovation. As part of this call the FFG proposed the initiative Expedition Zukunft. Other major Austrian funding agencies (FWF, aws, ÖAW) were also granted programmes in that domain. Four of the funding streams (#START, #INNOVATION, #SPINOFF, #SKALIERUNG) are thematically open. To sharpen the focus of the Challenges (Public Sector, Water and Soil) the FFG engaged stakeholders from the respective area for the formulation of the challenges.
What were the initial objectives and intended impacts? (e.g. fundamental research, innovation, disruption, higher TRL)	The intended impact of Expedition Zukunft is the support of radical, disruptive, groundbreaking innovations across the innovation pipeline. Five different funding streams address different phases and stakeholders.

Who manages the programme? (e.g. Organisation, ministry)	Expedition Zukunft is managed by the Austrian Research Promotion Agency (FFG).
Is it a regional or national programme?	Expedition Zukunft is a national programme
Type of instruments used (grants, loans, support etc.)	Research grants Support: All projects receive an Expedition Guide, who is part of the Expedition Zukunft Team at FFG. Some of the services are mandatory and there is a range of services to choose from to
What is the funding directionality (e.g. bottom up, top down, collaborative)	Thematically open calls (Expedition Zukunft START, INNOVATION, SPINOFF) Targeted Challenges (Public Sector, Water and Soil)
Website	https://www.ffg.at/expedition-zukunft

	Programme design
Governance structure (e.g. programme management and decision-making process)	As the funding dedicated for the Expedition Zukunft Initiative came from direct call from Austrian National Foundation for Research, Technology and Development, the FFG Programme Team is comparably free to design, develop, and implement the programme.
Resources – what is the average annual budget? If you can provide latest available data. In case there is a budget over a longer period, include it too.	In total EUR 18,3 million in funding is available. EUR 12,3 million of which are dedicated to project grants EUR 6 million are dedicated to support services
What is the innovative feature of the programme? Describe who they are funding, through which funding instrument and the directionality of the instrument (top-down, bottom up, collaborative etc).	Stage-gate model supporting projects from early-stage ideas to scaling them up. Continuous from Expedition Guides during and after the project Openness: Thematically open calls; Addressing also "non-classical" stakeholder groups for research and innovation funding
	Implementation
What is the overall structure of the programme?	The structure is conceptualised as a stage-gate model, where different funding streams are available for different phases of the development of an idea. Currently six different funding streams have been launched. Starting from mid-2025 a stream will focus on Scale-up).
Instruments - Which instrument(s) does it entail? Who can benefit from the programme?	**#START**[49] funds exploratory projects at an early stage in which innovations are prepared that should lay the basis for major changes in markets, technologies or society. Therefore, it supports projects as preparatory actions for RTI projects: Novel use cases for an existing technology, root cause analysis, development and testing of a technical

[49] **FFG (2024).** 'Expedition Zukunft START 2024/3 - Business Edition'. Retrieved from https://www.ffg.at/ausschreibung/expedition-zukunft-start-2024-3.

How is the selection process organised?	concept, strategy and implementation planning of major change processes • Target groups: SMEs and all economically active organisations (Start-ups, companies in the process of being funded, partnerships or corporations with or without motive, natural persons, associations, ...) and Research and knowledge dissemination facilities (Universities, Universities for applied sciences, non-university research institutions, knowledge transfer associations) • Grants of max. EUR 80k for 12 months • Evaluation criteria: Quality of the project, the suitability of the project participants, the benefits and exploitation, and the call focus. **#INNOVATION**[50] supports innovation processes for in early phase developments projects addressing complex societal challenges, initiate large-scale, supra-regional changes and explore new business models. • Target groups: SMEs and all economically active organisations (Start-ups, companies in the process of being funded, partnerships or corporations with or without motive, natural persons, associations, ...) • Grants of max. EUR 150k; maximum funding quota 50 percent of the eligible costs • Evaluation Criteria: Impact and innovation, Methodological approach, Feasibility, Call for proposal. **#SPINOFF**[51] supports researchers funding potentially disruptive spin-off companies from their research. The funded projects are granted the support of the Expedition Guide and the support services. • Target Group: Researchers planning a spin-off • Max 500k for up to 18 months. **#Challenge Public Sector**[52] • The Public Sector Challenge was launched together with the Agency for Promoting Innovative Public Procurement (IÖB). It was structured along a three-phase process: a) inviting public clients to submit; challenges that require groundbreaking innovations b) search for problem solvers are then invited to propose solutions; c) R&D Partnerships to develop and implement the solutions. • Evaluation Criteria: The jury chooses the challenges consisted of FFG, IÖB and disruptive experts that selected the most relevant challenges in regular intervals.

[50] **FFG (2023).** 'Expedition Zukunft INNOVATION 2023/1'. Retrieved from https://www.ffg.at/ausschreibung/expedition-zukunft-innovation-2023-1.

[51] FFG (2024). 'Expedition Zukunft Spin-off 2024'. Retrieved from: https://www.ffg.at/ausschreibung/expedition-zukunft-spinoff-2024-1

[52] **FFG (2023).** 'Expedition Zukunft Public Sector Challenge'. Retrieved from: https://www.ffg.at/ausschreibung/neue-auflage-EZ-challenge-publicsector; **IÖB (2024).** 'Expedition Zukunft Call for Challenges'. Retrieved from: https://www.ioeb.at/expedition-zukunft-aufruf-nach-herausforderungen-oeffentlicher-auftraggeberhttps://www.ioeb.at/expedition-zukunft-aufruf-nach-herausforderungen-oeffentlicher-auftraggeber

	#Challenge Water and Soil[53] • Over the last years, precipitation patters in Austria have changed radically, where long periods of droughts are often followed by violent storms that bring large amounts of water in a very short time, causing floodings. The Challenge Water and Soil looks for projects that develop radical and disruptive solutions to for planting, soil health, disaster prevention, water storage, water drainage, soil erosion, unsealing, etc. The development of this challenge was supported by a co-creation workshop with stakeholders. • The projects can propose feasibility studies, analysis of problems and causes, development of initial solution concepts, development of proposed solutions for implementation risks, such as legal framework conditions, application hurdles, user acceptance, sustainability aspects, strategy and implementation planning for major change processes. • Target groups: SMEs, large companies, universities and research institutions, non-economic institutions as well as associations and individuals or companies in the process of being founded. Farmers are explicitly invited to join consortia. **#SKALIERUNG** • In 2025 a separate funding stream will focus on the scaling up of ideas developed in the EZ projects. The concrete procedures are currently still in development.
	Achievements and lessons learned
Quantitative or qualitative outcomes	9 calls, 366 application 62 funded projects in total
Long-term influence – is there any structural or institutional change due to the programme?	The programme is considered a pilot programme for the FFG to experiment with novel funding formats. While it is too early to assess the structural impact and institutional change, it is considered an innovative, potentially disruptive moment for the Austrian innovation systems.
Challenges faced during implementation	Guides possible only because it was able to Existing structural embedding

[53] **FFG (2023).** 'Expedition Zukunft Water and Soil Challenge'. Retrieved from: https://www.ffg.at/ausschreibung/EZ-Challenge-WasserUndBoden

SPRIND – German Federal Agency for Disruptive Innovations

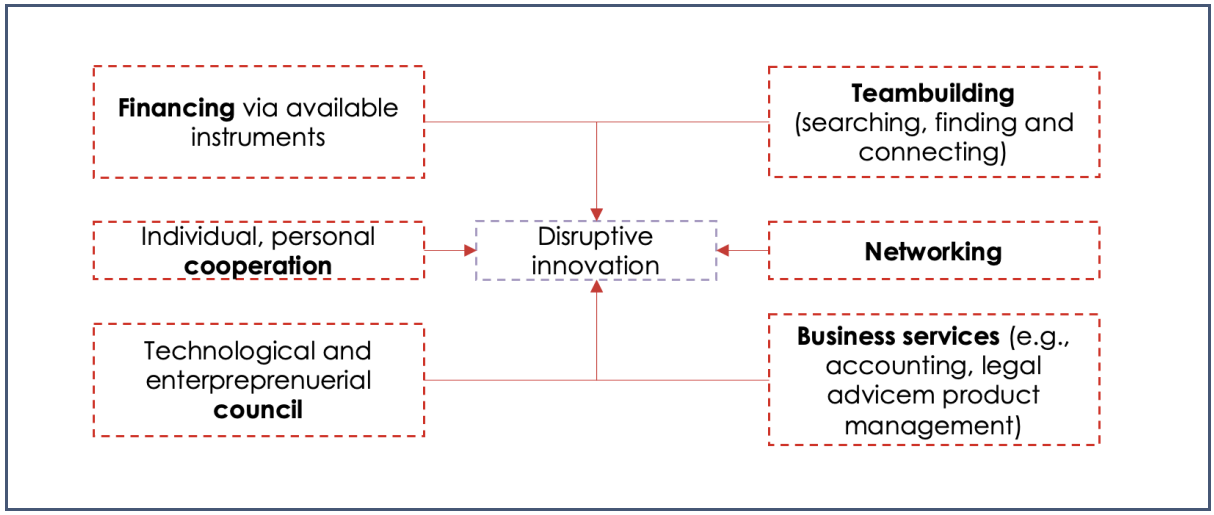
	Summary
Scope	The SPRIND is a federal agency in Germany with the goal to promote disruptive technologies. It supports projects for the early phases of innovations which are often too risky to obtain financing from capital markets, due to the lack of market maturity. With various support instruments SPRIND aims to bridge the "valley of death" between basic research and market maturity.
Achievements	Since its introduction in SPRING Freedom Act, the Agency operates on a high level of flexibility.
Relevancy	Classical funding approaches are deemed insufficient to support the risky early phases of innovations. To accelerate the translation from research to market SPRIND experimented with a variety of novel funding modalities (e.g. radical simplification of bureaucracy, validation of projects, continuous support)
	Background and context
What is the starting year of the programme?	2019
What problem, challenge, or strategic goal was thought to be addressed with the programme?	More risk tolerant and ambitious approach to STI policy support; Scouting for ideas with the potential to produce disruptive innovation; Funding research and development projects from basic-research stage to the point of being ready for application (Covering TRL from 1-5); Acting as a transfer hub, or central contact point and catalyst for ideas, project, market analysis and the funding of new start-ups. SPRIND sees itself as an incubator for breakthrough innovations in Germany and Europe. Identifying, validating, financing and supporting projects and plans that have the potential for producing breakthrough innovations. Pari-Pasu investments – Investing in projects that the private market would not fund at the low maturity levels, gaining momentum for the needs of transition to commercial exploitation. – SPRIND withdraws as soon as the projects can be transferred to private financing.
Which stakeholders were involved in the planning (e.g. governments, private sector, civil society, academia)?	The SPRIND cooperates with the private sector, academic research institutions, civil society groups and policymakers. The government and local states play a special supportive role as potential customers and regulators or wielding significant influence over the overall environment in which the innovations are to be developed.[54] The SPRIND has a supervisory board consisting of shareholders representing the Federal Republic of Germany (Federal Ministry of Education and Research, Federal Ministry for Economic Affairs and Climate Protection), German Bundestag, German Federal Ministry of Finance) as well as representatives from research and the economy.
What were the initial objectives and intended impacts?	Breakthrough innovations ("A breakthrough innovation is an innovation that changes our lives for the better in the long term. It can create a completely new

[54] Bertelsmann Stiftung (2021) Addressing societal challenges through disruptive technologies.

(e.g. fundamental research, innovation, disruption, higher TRL)	market, fundamentally change an existing market to create a completely new ecosystem, or solve a massive technological, social or environmental problem."[55]) Support new marketable products, technologies, business models and/or services that sustainably improve the lives of as many people as possible. – Social and economic added value.
Who manages the programme? (e.g. Organisation, ministry)	SPRIND is a Federal Agency independently managing the
Is it a regional or national programme?	Operating on a national level
Type of instruments used (grants, loans, support etc.)	**Investments:** Equity Investments, convertible loans, other mezzanine financing) – SPRIND can invest in the respective companies as an investment, withdrawing if sufficient financing is available from other sources; Pari-passu investments with private lead investors. **Grants for R&D projects** supplemented by the recipient's own contribution (Start-up financing for businesses max. EUR 1 million R&D projects up to max EUR 35 million) **Project GMBH:** setting up subsidiaries and finance them as required (between EUR 4 and 15 million/year). These projects are owned by SPRIND and may collaborate with private R&D start-ups. The start-ups receive the right to acquire the property of the project GmbH after the end of the cooperation. **Challenges:** The SPRIND tenders specific innovation challenges. These are financed as pre-commercial procurement for R&D services with a EUR 500k and 3 million. **Funken:** The Funke is an innovation competition with a shorter duration. It is also financed as a pre-commercial procurement for R&D services with max EUR 100k.
What is the funding directionality (e.g. bottom up, top down, collaborative)	Thematically open to topics as long as they are based on humanistic European values, and they are non-military. SPRIND Combines three funding mechanisms: bottom-up, top-down calls (Challenges, Funken) and direct solicitation/recommendation
Website	https://www.sprind.org/

[55] SPRIND (n.d.), retrieved from: https://www.sprind.org/en/faq

Figure 11 – Programme structure of SPRIND



Source: Technopolis, based on information available (https://www.sprind.org/en/impulses/projects).

	Programme design
Governance structure (e.g. programme management and decision-making process)	In 2023 the German Bundestag passed a law ("SPRIND Freedom Act"56) granting the SPRIND considerable flexibility, reducing time-consuming process of coordination with ministries and acting independently. This also includes additional financial leeway such as the establishment of subsidiaries, acquisition of shareholdings as well as being able to use funding instruments private law funding instruments.
Resources – what is the average budget?	A total budget of EUR 1 billion is available for the first ten years. For the initial phase (2019-2022) EUR 151 million were budged.
What is the innovative feature of the programme? (e.g. who they are funding, through which funding instrument and the directionality of the instrument)	SPRIND is not a traditional funding agency with dedicated funding calls but aims to identify and support potential breakthrough innovations. This requires individual answers and solutions to problems experienced in relation to the projects it supports.
	Implementation
What is the overall structure of the programme?	See above
Which instrument(s) does it entail?	See above

[56] **BMBF (2023).** 'SPRIND-Freiheitsgesetz - Bundesgesetzblatt'. Retrieved from: https://www.bmbf.de/SharedDocs/Downloads/de/2023/sprind-freiheitsgesetz-bundesgesetzblatt.pdf?__blob=publicationFile&v=1

Who can benefit from the programme?	Any type of institution is eligible to apply (e.g., SMEs, Large companies, research centres, individual researchers, or university). Projects can be submitted by individual applicants as well as by project consortia.
How is the selection process organised?	All projects undergo the same process of a holistic assessment through internal and external consultations and evaluations of the technological basis and entrepreneurial potential assessing a) potential for change in the product and service market; b= macroeconomic, ecological, and social benefits; c) opportunity and risk profile of the project; d) positioning between research & economy; e) resources of the submitters and their teams; f) types of innovation; g) social development goals. For the bottom-up processes a continuous online application is possible, which is carried out in three steps: Topic Submission, validation assignments, Establishing of project subsidiaries The top-down processes (Challenges, Funken) are organised in consecutive phases, with increasing funding for each of them. At the end of each stage, there is another selection round with a decreasing number of participating teams. [57]
	Achievements and lessons learned
Quantitative or qualitative outcomes	22 Projects Funded[58] Challenges (Carbon-To-Value; Broad Spectrum Antivirals, New Computing Concepts, Long-Duration Energy Storage, Composite Learning, Circular Bio-Manufacturing) Funken[59] (Tissue Engineering, Fully Autonomous flight, EUDI Wallet prototypes, Deepfake detection and prevention)
Long-term influence – is there any structural or institutional change due to the programme?	The SPRIND Freedom Act was a response to the challenges and limits experienced in the first years of the SPRIND's implementation. A high degree of flexibility and unbureaucratically responding to project needs was deemed necessary to support radical innovations as good as possible.
Challenges faced during implementation	An OECD report indicated in 2022 that the SPRIN-D agency faces several bottlenecks related to its organisational model and administrative burden[60]. As such they criticised amongst others: State aid rules, Public procurement law, Regulatory compliance: for example, the agency can only possess wholly owned subsidiaries, to which the agency or the ministries can then extend loans, with the obligation to sell the subsidiary after a maximum of five years, Split of responsibilities between the BMBF and BMWK: raises the problem of coordination and inter-ministerial co-operation. To increase the flexibility in public procurement, optimisation on the governance structure and increased financial resources the SPRIND Freedom Act was issued in 2023.[61]

[57] **SPRIND (2024).** 'Challenges und Funken'. Retrieved from: https://www.sprind.org/impulse/challenges/artikel/ueberblick

[58] **SPRIND (2024).** 'Projects'. Retrieved from: https://www.sprind.org/en/impulses/projects

[59] English translation „Spark "

[60] OECD (2022), OECD Reviews of Innovation Policy: Germany 2022: Building Agility for Successful Transitions, OECD Reviews of Innovation Policy, OECD Publishing, Paris, https://doi.org/10.1787/50b32331-en.

Mission-Driven Top Sector and Innovation Policy

	Summary
Scope	The Mission-Driven Top Sector and Innovation Policy (MTIP) is a Dutch programme developed by the *Topsectors* of The Netherlands ('Topsectoren Nederland'). The topsectors are platforms for cooperation between government organisations, knowledge organisations and companies that have been set up in nine economic areas where the Netherlands has an internationally important position. The MTIP is developed in 2019 and include the missions (1) Energy Transition, (2) circular Economy, (3) Agriculture, Water and Food, (4) Health & Healthcare and (5) Security. The main objective of the MTIP is accelerating the transition to a sustainable, healthy, safe and climate-neutral society, while also strengthening the competitiveness of The Netherlands. The policy is based on the need to tackle societal challenges through innovation and cooperation between government, business and science.
Achievements	The MTIB focuses on addressing societal challenges such as climate change energy transition, health, and sustainable food production. These challenges align closely with the missions and objectives of Horizon Europe. MTIB employs a blend of public, private, and regional funding. This multi-source financing approach aligns well with the EU's interest in diversifying funding sources to achieve strategic autonomy and reduce reliance on single funding streams. The synergies created in MTIB between grants, loans, and equity funding could provide insights for the EU to replicate. Studying how MTIB operationalises and organises mission-driven innovation can offer valuable insights into how to design, govern, and implement such a mission-oriented strategy at the EU level. MTIB emphasises co-creation and co-financing with public, private, and knowledge sector actors. This model mirrors the EU's ambitions for greater collaboration with industry, knowledge institutions, and civil society. The experience of MTIB in structuring and facilitating PPPs can inform the design of future EU partnerships.
Relevancy	The Mission-Driven Top Sector and Innovation Policy (MTIP) is a Dutch programme developed by the *Topsectors* of The Netherlands ('Topsectoren Nederland'). The topsectors are platforms for cooperation between government organisations, knowledge organisations and companies that have been set up in nine economic areas where the Netherlands has an internationally important position. The MTIP is developed in 2019 and include the missions (1) Energy Transition, (2) circular Economy, (3) Agriculture, Water and Food, (4) Health & Healthcare and (5) Security. The main objective of the MTIP is accelerating the transition to a sustainable, healthy, safe and climate-neutral society, while also strengthening the competitiveness of The Netherlands. The policy is based on the need to tackle societal challenges through innovation and cooperation between government, business and science.
	Background and context

What is the starting year of the programme?	2019
What problem, challenge, or strategic goal was thought to be addressed with the programme?	The MTIP is developed in 2019 and include the missions (1) Energy Transition, (2) circular Economy, (3) Agriculture, Water and Food, (4) Health & Healthcare and (5) Security.
Where there any contextual factors relevant?	N.P.
Which stakeholders were involved in the planning (e.g. governments, private sector, civil society, academia)?	A wide range of public and private stakeholders are involved. Ministries are involved in the R&I system in the Netherlands. The Netherlands has no strong hierarchy between ministries, but a very strong tradition in coordination across policy domains. Some ministries are responsible for general R&I policy, and others have a thematic focus that is in scope of this assignment. In the Netherlands, many R&I subsidies and instruments are implemented by the Netherlands Enterprise Agency (RVO). Another important agency is RWS (Rijkswaterstaat, the agency of the I&W, actually focussing on infrastructure). Also, regional development agencies and provinces are involved, from the governmental side. The Top sectors bring together the R&I stakeholders (including industry, science and government) per focus sector and play an important role in each industry in developing the strategy and actions (Knowledge Innovation Agendas and Multi-annual Innovation Programmes) for the short- to long-term. As for scientific research, the Dutch Research Council (NWO) is the most important science funding body in The Netherlands. Other stakeholders involved in conducting scientific research and research into its deployment are the Toegepast Onderzoek Organisaties (TO2) (Applied Research Institutes)[62] and all universities in the Netherlands, especially the Universities (including the federation of the four Dutch universities of technology).
What were the initial objectives and intended impacts? (e.g. fundamental research, innovation, disruption, higher TRL)	The Mission-Driven Top Sectors and Innovation Policy (MTIP) was designed to address significant societal challenges while enhancing the Netherlands' economic competitiveness. Its primary objectives and intended impacts include[63]: • **Stimulating Fundamental Research and Innovation**: MTIP aims to foster collaboration among government, industry, and research institutions to drive fundamental research and innovation. This collaborative approach is intended to generate groundbreaking solutions for complex societal issues. • **Encouraging Disruptive Innovations**: By focusing on mission-driven challenges, MTIP seeks to promote disruptive innovations that can lead to significant societal and economic transformations. This involves supporting high-risk, high-reward projects that have the potential to create new markets and industries.

[62] Deltares, Marin, NLR, TNO and Wageningen Research.

[63] Keijzer, M. C. G. (2019, April 26). *Mission-Driven Top Sector and Innovation Policy* [Policy Letter]. Ministry of Economic Affairs and Climate Policy, The Hague, Netherlands.

	• **Advancing Technologies to Higher Technology Readiness Levels (TRLs)**: MTIP emphasises the development and scaling of technologies from conceptual stages to higher TRLs, facilitating their transition from research labs to market-ready solutions. This progression ensures that innovations effectively address societal challenges and contribute to economic growth.
Who manages the programme? (e.g. Organisation, ministry)	The Mission-Driven Top Sector and Innovation Policy (MTIP) is managed by a collaborative effort involving the Ministry of Economic Affairs and Climate Policy, along with other relevant ministries, businesses, knowledge institutions, civil society organisations, and regional authorities. The Ministry of Economic Affairs and Climate Policy plays a key role in facilitating and coordinating the overall process. As said above, many R&I subsidies and instruments within the MTIP are implemented and managed by the Netherlands Enterprise Agency (RVO). Additionally, the organisational model relies on cross-sectoral collaboration involving the top sectors, which include public-private partnerships. This approach ensures the involvement of diverse stakeholders from both public and private sectors, including companies, research institutions, and government bodies.[64]
Is it a regional or national programme?	It is a national programme
Type of instruments used (grants, loans, support etc.)	The KIC 2024-2027 in the Netherlands employs a variety of funding instruments to stimulate mission-driven innovation, including[65]: • **Public and Private Funding Collaboration (loans and grants)**: It focuses on leveraging both governmental and private funds to support mission-driven innovation projects, fostering public-private partnerships. • **Co-financing of Innovation Projects (loans and grants)**: Involves regional development agencies and provinces in co-financing initiatives, tapping into regional funds and European financial mechanisms to strengthen local innovation ecosystems. • **Investment in Startups and Scale-ups (equity)**: Direct investments into startups and scale-ups through provincial and governmental funds, aimed at boosting the development and scaling of innovative companies, particularly in strategic sectors like energy and sustainability. • **Focused Investment in Technology and Sustainability (equity)**: Targets specific technologies and sustainability projects, directing funds towards the advancement of sustainable practices and technological innovations critical to national missions. • **Demand-Side and Procurement-Based Instruments (public procurement and co-financing)**: Stimulates the early market adoption of innovative products and services by leveraging public sector purchasing power. This approach allows public authorities to act as first buyers and co-developers of innovations, accelerating the commercialisation of mission-driven solutions and creating demand in emerging markets. • **Capacity Building and Skills Development (grants and subsidies)**: Provides financial support for education, training, and reskilling programs

[64] Keijzer, M. C. G. (2019, April 26). *Mission-Driven Top Sector and Innovation Policy* [Policy Letter]. Ministry of Economic Affairs and Climate Policy, The Hague, Netherlands.

[65] Ministry of Economic Affairs and Climate Policy. (2024). *Knowledge and Innovation Covenant 2024-2027*

	aimed at building a skilled workforce aligned with mission-critical sectors. This funding targets initiatives that address skills shortages in areas such as digital transformation, energy transition, and health innovation, ensuring that the labor market is prepared for future technological and societal needs. • **Knowledge Development and Research Support (grants and subsidies)**: Supports fundamental and applied research through direct funding of R&D initiatives. It funds projects under the Knowledge and Innovation Agendas (KIAs), with an emphasis on collaborative research involving universities, research institutions, and industry partners. This funding ensures the development of breakthrough technologies and accelerates the transfer of knowledge into commercial and societal applications.
What is the funding directionality (e.g. bottom up, top down, collaborative)	The funding directionality of the Knowledge and Innovation Covenant (KIC) 2024-2027 can be characterised as a collaborative funding model. Appendix A. This funding strategy promotes a balanced approach where bottom-up input from knowledge institutions and industry is aligned with top-down directives from governmental authorities[66]: • **Public-Private Collaboration**: The KIC is built on a foundation of collaboration between public authorities, private companies, and knowledge institutions. It relies on collective decision-making to determine funding allocation and prioritisation of innovation activities. • **Decentralised and Co-Financed Approach**: Each partner (public, private, and knowledge institutions) provides its own contributions based on their responsibilities, authority, and capacity. This includes private investments from companies, public investments from ministries, and contributions from research institutions like universities and TO2 institutes. • **Commitment from Multiple Stakeholders**: Contributions are made by the Dutch government, provincial authorities, regional development corporations (ROMs), and Invest-NL. The contributions are indicative and not formal financial obligations, which allows for flexibility and adaptability in funding during the program's duration. • **Multi-Year Financial Planning**: Funding commitments are structured on a four-year basis, with annual updates and reviews. This approach provides continuity while allowing for adjustments based on developments and performance reviews. • **Focus on Key Themes and Missions**: The funding prioritises areas that align with the broader missions and key enabling technologies outlined in the Knowledge and Innovation Agendas (KIAs). It ensures a targeted approach, directing resources to areas where they will have the most societal and economic impact. • **Shared Responsibility and Joint Programming**: The coordination of funding is done through joint programming, where all partners align their contributions to achieve maximum synergy in mission-driven innovation. This approach enhances alignment and coherence in the allocation of resources across multiple stakeholders.
Website	Missies voor de toekomst | Topsectoren

[66] Ministry of Economic Affairs and Climate Policy. (2024). *Knowledge and Innovation Covenant 2024-2027*

	Programme design
Governance structure (e.g. programme management and decision-making process)	The topsectors are platforms for cooperation between government organisations, knowledge organisations and companies that have been set up in nine economic areas where the Netherlands has an internationally important position. The *topsector* approach was launched in 2011. All top sectors are led by a 'Figurehead' ('Boegbeeld') with an industry background and his/her top team that includes a scientist, a representative from government and an SME-entrepreneur. The top team is appointed by the minister of Economic Affairs. In the top sectors, representatives of business, science and government work together to support innovation and share knowledge. The missions of the MTIP, as formulated above, are decided upon by the Topsectors together with public and private partners. The MTIP policy is based on collaboration between industry, science and government and is sealed with the Knowledge and Innovation Covenant (KIC). The KIC reflects the commitment and resources that public and private partners pool for research and innovation on the missions and runs for four years. The societal missions are translated into Knowledge and Innovation Agendas (KIAs). The KICs provide the strategic and financial framework for the development and execution of the KIA's. The topics and priorities within each KIAs are the result of collaboration between different public and private organisations.
Resources – what is the average budget?	In the KIC, the partners establish overarching agreements for cooperation within the framework of the KIAs and describe their intended financial contributions to these KIAs. The annual budget agreed to in the current KIC (2024-20247) is approximately €5,8 billion, of which approximately1.4 billion euros is private and 4.3 billion euros public.[67,68] There is no central budget division mechanism: the funding is reallocated within existing programmes and budgets. The covenants contain the anticipated financial contributions that the partners expect to deploy in the coming years for innovation driven by the public-private partnership across the eight KIAs.
What is the innovative feature of the programme? (e.g. who they are funding, through which funding instrument and the directionality of the instrument)	The MTIP puts a strong emphasis on market creation and valorisation. It not only supports research but also ensures that research results are converted into practical applications and marketable products. Mechanisms like the "Start-up in Residence" program, Small Business Innovation Research (SBIR), and Innovation Partnership schemes encourage market adoption of innovations. The policy emphasises regional innovation hubs and cooperation with international initiatives like Horizon Europe. It recognises that innovation ecosystems often thrive on local partnerships while remaining connected to global value chains. The MTIP promotes the development and use of key enabling technologies like artificial intelligence, photonics, and quantum technologies. These technologies are seen as essential tools to achieve the missions.

[68] In 2022 the total budget applied for the KIC was M€4.93, of which was M€2.01 private and M€2.92 public, KIC tabel 2020-2023 | Publicatie | Topsectoren

	Implementation
What is the overall structure of the programme?	In total the MTIP has five missions, and 25 submissions formulated. Beloware the five missions: Energy transition: • The Netherlands climate-neutral by 2050. • Circular Economy: The Netherlands fully circular by 2050. • Agriculture, Water & Food: A vital rural area and resilient nature in a climate-resilient Netherlands. Water and soil are directive, the agriculture and food system are sustainable and healthy, and the delta is safe. • Health & Healthcare: People in the Netherlands to live 5 years longer in good health, and a 30 percent reduction in health disparities between socio-economic groups by 2040. • Security: The Netherlands is safe and resilient against external threats and undermining crime, both in the physical and digital domains.[69] The KIC reflects the commitment and resources that public and private partners pool for research and innovation on the missions and runs for four years. The societal missions are translated into Knowledge and Innovation Agendas (KIAs). There are 8 KIAs: five thematic missions which are the same as the missions formulated in the MTIP and three cross-cutting KIAs, being Key Technologies, KIA Digitalisation and KIA Societal Earning Capacity. Each KIA is subsequently broken down into separate "Meerjaren Missiegedreven Innovatie Programma" multi-annual mission-driven innovation programmes (MMIPs), which set out specific actions to achieve the objectives of the missions. The duration of Multiannual Mission-driven Innovation Programs (MMIPs) in the Netherlands varies depending on the scope, complexity, and objectives of each program. All funding, finance and collaboration address at least one of the MMIPs. However, there are instruments that are cross-cutting and can address MMIPs from different KIAs, for example generic the tax credit for R&D wage costs and expenditures ('WBSO').
Which instrument(s) does it entail?	All instruments used within the Knowledge and Innovation Agendas (KIAs) under the Mission-Driven Top Sector and Innovation Policy (MTIP) include a wide range of mechanisms to support research, development, and innovation. The number of instruments is rather high, but below are some examples of instruments: • **Small Business Innovation Research (SBIR):** Grant-based funding instrument aimed at supporting small and medium enterprises (SMEs) to develop solutions for societal challenges. • **WBSO (Research and Development Tax Credit):** Tax credit for R&D wage costs and expenditures. • **Thematic Technology Transfer (TTT) Scheme:** Supports the commercialisation of scientific knowledge and early-stage start-ups emerging from academic research. The types of instruments are described in an earlier question.

[69] Ministry of Economic Affairs and Climate Policy. (2023). *Revised missions of the mission-driven innovation policy*. Retrieved from Government of the Netherlands website.

Who can benefit from the programme?	A wide range of organisations can benefit from the instruments: • Companies (Large Enterprises, SMEs, and Startups) **Startups and scale-ups** benefit from support programs like the Start-up in Residence, Small Business Innovation Research (SBIR) grants, and the Thematic Technology Transfer (TTT) scheme. **SMEs** benefit from programs like the MIT Scheme (Mkb-innovatiestimulering Regio en Topsectoren) and regional development funds that provide financial support for feasibility studies, R&D, and knowledge transfer projects **Large companies** can participate in Public-Private Partnership (PPP) projects and Knowledge and Innovation Contracts (KIC), where they co-invest in large, mission-driven R&D projects aimed at societal impact • Knowledge Institutions (Universities, Applied Research Institutes, and TO2 Institutes) **Universities and Academic Research Institutions** benefit from funding provided by the Dutch Research Council (NWO) for mission-aligned research projects and programs under the Knowledge and Innovation Agendas (KIAs) **Applied Research Institutes and TO2 Institutes** are eligible for direct funding from the government to conduct applied R&D, valorisation, and technology transfer activities that align with the societal missions
How is the selection process organised?	Many instruments, such as the Small Business Innovation Research (SBIR) and the Thematic Technology Transfer (TTT) scheme, start with public calls for proposals. These calls specify eligibility criteria, project requirements, and the specific mission themes targeted for funding Organisations (including SMEs, start-ups, universities, and consortia) submit detailed project proposals outlining the scope, objectives, timeline, and expected impact of their projects. Proposals are submitted through centralised platforms run by the responsible managing authorities. The primary criterion for selecting projects is their relevance to the missions outlined in the Knowledge and Innovation Agendas (KIAs). Proposals are evaluated based on their potential to create cross-sectoral impact, contribute to societal challenges, and promote sustainability and inclusivity. Proposals must demonstrate the potential to introduce new or significantly improved products, services, or processes that align with mission goals. Proposals are first checked for eligibility and completeness. Proposals that fail to meet the basic eligibility criteria are rejected
	Achievements and lessons learned
Long-term influence – is there any structural or institutional change due to the programme?	**Establishment of Mission-Driven Agendas**: The Dutch government has formulated 25 missions across four societal themes—Energy Transition & Sustainability, Health & Care, Security, and Agriculture, Water & Food—to direct innovation efforts towards specific societal challenges. This approach fosters collaboration among industry, knowledge institutions, and government entities, aligning research and development with national priorities. Before the MTIP, the policy focused on sectors; with this new approach they identify opportunities for cross-sectoral collaboration.[70]

[70] Ministry of Economic Affairs and Climate Policy. (2023). *Revised missions of the mission-driven innovation policy*. Retrieved from Government of the Netherlands website.

	The policy **promotes stronger public-private partnerships**, facilitating joint efforts in research and innovation. This collaboration is essential for developing and implementing solutions to complex societal issues, ensuring that innovations are both practical and scalable. **Research funding mechanisms have been realigned** to support mission-driven initiatives, ensuring that financial resources are directed towards projects with significant societal impact. This alignment enhances the effectiveness of investments in research and innovation.
Lessons learned	Before 2019, the Top Sectors Policy faced frequent criticism regarding its perceived siloed approach and its strong focus on corporate interests. In response to this criticism, and under political pressure, the policy was reoriented to place greater emphasis on societal challenges. This shift led to the introduction of the Mission-Driven Top Sectors and Innovation Policy (MTIP), which aligns innovation efforts with broader societal missions and objectives. The ecosystem established around the Top Sectors Policy has proven to be highly valuable. It provides public authorities with greater insight into the innovations available in the market, the ambitions of businesses, and the challenges they face in achieving these ambitions. This enhanced understanding enables the government to offer more targeted support, such as removing regulatory barriers or creating tailored education and training programs to meet the sector's needs. This ecosystem thus fosters a more dynamic and responsive environment for innovation and societal impact.[71] [72]

[71] Janssen, M. (2024, May 27). *De spanning tussen missies en topsectoren*. iBestuur. Retrieved from https://ibestuur.nl/artikel/de-spanning-tussen-missies-en-topsectoren/

[72] Janssen, M. (2023). *Adviesnota monitoring en evaluatie missiegedreven innovatiebeleid*. Mission-Oriented Innovation Policy Observatory (MIPO), Copernicus Institute of Sustainable Development, Utrecht University.

Advanced Research and Invention Agency (ARIA)

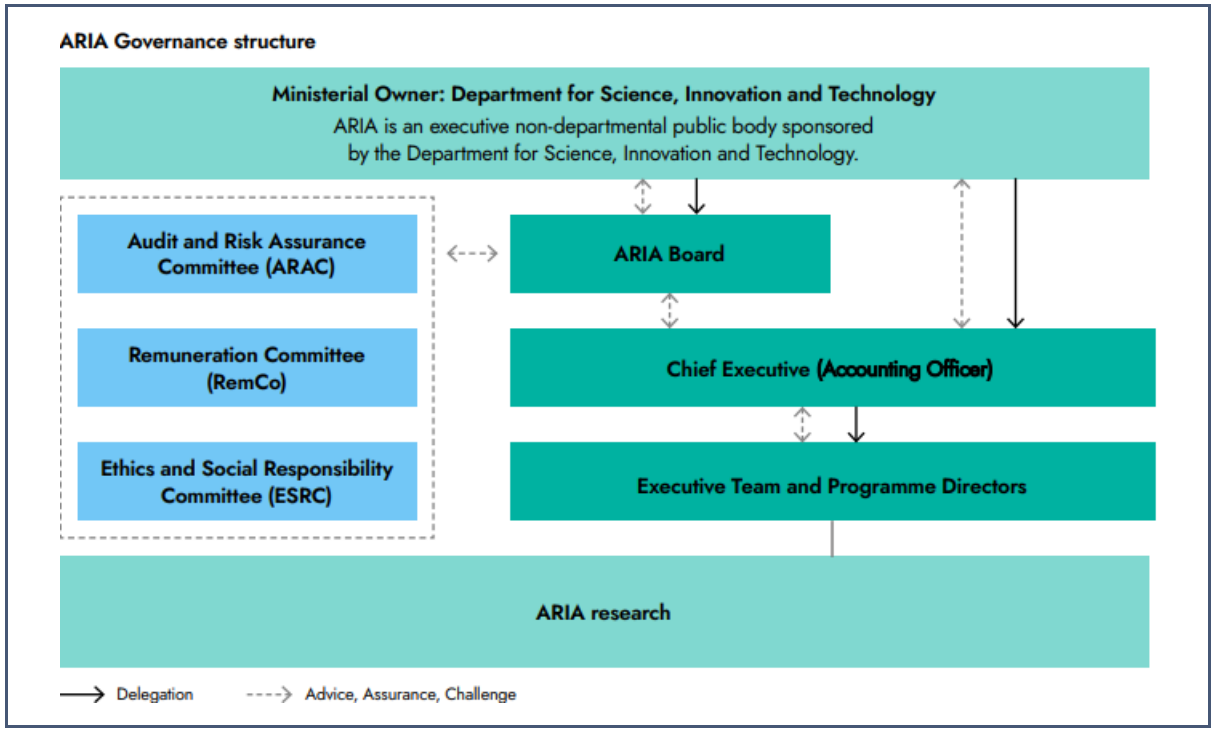
	Summary
Scope	ARIA is a UK funding programme that was formally established in 2023. The scope of the programme is to fund high-risk, high-reward research and innovation, fostering transformative breakthroughs in science and technology. It aims to address long-term, complex challenges and create disruptive innovations with minimal bureaucracy and maximum flexibility.
Achievements	As of December 2024, the Advanced Research and Invention Agency (ARIA) has initiated several key programs aimed at fostering high-risk, high-reward research and innovation, such as: • Scaling Compute: focusing on the development of significantly cheaper AI hardware. • Safeguarded AI: This program is dedicated to ensuring safe and ethical development of AI-systems and promoting responsible AI advancements. • Exploring Climate Cooling: This program investigates approaches designed to delay or avert climate tipping points, contributing to global efforts in combating climate change.
Relevancy	The establishment of ARIA is relevant because it addresses the following gaps in the UK R&I ecosystems: • Funding gaps for high-risk, high-reward research. • Lack of speed and agility in funding decisions. • Economic competitiveness and sovereignty. • Stimulate private sector participation.
	Background and context
What is the starting year of the programme?	The legislative framework for ARIA was set by the Advanced Research and Invention Agency Act 2022, which received Royal Assent on 24 February 2022. The agency became operational as an independent funding body after its official establishment on January 26th, 2023. Being established as a permanent agency, it does not have a predetermined end-date.
What problem, challenge, or strategic goal was thought to be addressed with the programme?	Being part of the Spending Review 2020 commitment to invest £14.6 billion in research and development in 2021-22 to increase economy-wide investment in R&D to 2.4% of GDP by 2027, ARIA was designed to stimulate transformative scientific and technological innovation, by creating a funding body dedicated to high-risk, high-reward research, with the agility and independence to overcome the limitations of traditional funding models. As such it aims to: • Be a flagship in addressing unnecessary research bureaucracy, minimising hurdles across a typical project lifecycle to create an agile and efficient funding body, through: **Operational Autonomy:** ARIA operates independently, granting its leadership the freedom to set research priorities and funding decisions without external interference. This autonomy allows for rapid decision-making and adaptability. **Flexible Funding Mechanisms:** The agency employs diverse funding approaches, such as seed grants and prises, to support pioneering

	research. This flexibility enables ARIA to tailor funding to the specific needs of each project, reducing administrative delays. **Streamlined Administrative Processes:** ARIA is exempt from certain standard government procedures, including the Public Contracts Regulations, allowing it to procure services and equipment more efficiently. This exemption reduces administrative burdens and accelerates project initiation. **Higher Tolerance for Risk**: The agency is structured to embrace high-risk research, acknowledging that failure is often a component of groundbreaking innovation. This acceptance reduces the bureaucratic constraints typically associated with risk management. • Foster long-term economic growth, support the UK's position as a global force in science and innovation, and create wider benefits for society;
Which stakeholders were involved in the planning (e.g. governments, private sector, civil society, academia)?	Several types of stakeholders were involved in the development and implementation of ARIA. First, being under the sponsorship of the UK Department for Science, Innovation and Technology (SIT), the Government played a central role in developing ARIA's framework. While ARIA maintains autonomy in its decision-making, it remains accountable to SIT for alignment with broader UK scientific and technological objectives. Second, UK research and Innovation (UKRI), the Royal Society and universities and research institutions also played a role in shaping ARIA to complement other research mechanisms and ensuring that it addresses gaps (i.e. risk adverse funding traditions, highly bureaucratic processes, lack of interdisciplinary collaboration and the absence of a stable and dynamic UK innovation system) in the research ecosystem. Finally, private sector stakeholders such as High-Tech industries & startups and Venture Capitalists as well as international experts such as DARPA (U.S.) were consulted to identify potential funding models and prioritise research areas.
What were the initial objectives and intended impacts? (e.g. fundamental research, innovation, disruption, higher TRL)	By not focussing on a precise industry or technology, ARIA aims to operate across the entire R&D life cycle, from pure science to applied science on all TRL levels (1-9). One of the most important design principles is the high-risk, high-reward focus, meaning that ARIA will exclusively focus on projects with potential to produce transformative technological change, or a paradigm-shift in an area of science. While these projects typically have a higher risk of failing, successful projects will have a profound and positive impact on society.
Who manages the programme? (e.g. Organisation, ministry)	ARIA falls under the Department for Science, Innovation and Technology (SIT). Given the bodies operational freedom and lack of bureaucratic processes, ARIA has maximum autonomy over its funding portfolio, procedures and institutional culture.[73]
Is it a regional or national programme?	ARIA is a programme of national scope.
Type of instruments used (grants, loans, support etc.)	Given ARIAs strategic autonomy, it is not subject to ministerial direction of its funding choices. Instead, ARIA operates through Programme Directors (PD). In total, ARIA includes 8 founding PDs that each focus on a specific scientific and technological domain. The PDs are allocated up to £50M to design a multi-year

[73] **UK Government (2024).** 'Advanced Research and Invention Agency (ARIA) Policy Statement'. Retrieved from: https://www.gov.uk/government/publications/advanced-research-and-invention-agency-aria-statement-of-policy-intent/advanced-research-and-invention-agency-aria-policy-statement#programme-manager-led-funding

	programme (exact duration per programme varies) around a specific scientific or technical challenge by compiling and funding a portfolio of projects. Potential PDs can send applications to ARIA in which they present their challenge idea. Thereafter applicants are asked to send full applications and potentially engage in virtual interviews. After the full applications and virtual interviews, the best applicants (based on their challenge ideas, alignment with the ARIA objectives and eligibility criteria, will be invited to an in-person finalist day along with the existing cohort of PDs, executive team, board members and special guests. After the finalist day, the team will make an offer for the best application to become a PD. Possible funding opportunities range from providing smaller seed grants for new research to taking equity stakes in startup ventures, attracting private co-financing and academic and entrepreneurial fellowships.
What is the funding directionality (e.g. bottom up, top down, collaborative)	While the funding direction is predominantly bottom-up there are also more top-down and collaborative aspects. Funding can be seen as bottom-up because the PDs have several flexible instruments available to empower individual researchers and innovators to actively pursue high-risk ideas, such as: • seed funding. • taking equity stakes in startup ventures. • attracting private co-financing. • academic and entrepreneurial fellowships. However, given that ARIA is designed to complement other funding vehicles such as UKRI, it also intends to align with national priorities resulting in a more top-down funding approach. Finally, ARIA also supports research partnerships and cross-sectoral collaborations (e.g. between academia and industry) meaning that there are also aspects of collaborative funding to be identified.
Website	https://www.aria.org.uk/

Figure 12 – Programme structure of ARIA



Source: Annual Report + Accounts (ARIA, 2024).

	Programme design
Governance structure (e.g. programme management and decision-making process)	ARIA is designed as a funding body, with a flat structure. The agency consists of an executive (Chief Executive Officer, Chief Financial Officer) and non-executive staff (chair appointed by the Secretary of State, Government Chief Scientific Adviser and other members as the Secretary of State may appoint). Despite ARIAs autonomy, several oversight mechanisms are in place, being: • ARIA will have to produce accounts to be consolidated within BEIS, and it will need to monitor and report transparently on the use of funding. • ARIA requires to provide a statement of accounts and an annual report on the exercise of its functions, which is to be laid before the UK Parliament. • ARIA is annually audited by the National Audit Office, ensuring a possibility for public scrutiny, and that staff are only exercising their freedoms in the public interest, and in pursuit of ARIA's aims.
Resources – what is the average budget?	Initially £800m were allocated to ARIA since its formal establishment in 2023 until 2025/2026.[74]
What is the innovative feature of the programme? (e.g. who they are funding, through	ARIA sets itself apart from traditional funding programmes by its high-level strategic autonomy, meaning that it is not subject to ministerial direction in terms of funding choices. Instead, it adopts a Programme Director led funding design in which a programme is designed around a specific scientific or technical challenge by compiling and funding a portfolio of projects around it.

[74] ARIA (2024). annual report and accounts, 2023 to 2024. Available atL https://www.gov.uk/government/publications/arias-annual-report-and-accounts-2023-to-2024

which funding instrument and the directionality of the instrument)	Where traditional funding programmes (predominantly) adopt a top-down approach to align R&D with strategic priorities, ARIA has adopted a funding approach that is to a large extent bottom-up, because it seeks to empower individuals and organisations to pursue new ideas. Under ARIA a variety of individual researchers, organisations and private sector entities are funded through various funding instruments, such as seed grants, taking equity stakes, attracting private (co)funding and fellowships. ARIA's funding instruments are designed to be synergistic, creating a dynamic and responsive innovation ecosystem: • Pipeline Development: Opportunity Seeds can serve as a proving ground for novel concepts. Successful projects may evolve into larger initiatives, potentially being integrated into existing Programmes or forming the basis for new ones. This approach ensures a continuous flow of innovative ideas into ARIA's strategic agenda. • Resource Allocation: By offering both Programmes and Opportunity Seeds, ARIA can allocate resources effectively across projects of varying scales and maturities. This flexibility allows for the nurturing of early-stage ideas while maintaining focus on broader, long-term objectives. • Collaborative Ecosystem: The coexistence of Programmes and Opportunity Seeds fosters a collaborative environment where insights from exploratory research can inform and enhance larger initiatives. Conversely, Programmes can identify specific areas where targeted Opportunity Seeds might address emerging challenges or opportunities. The aim is to have a profound and positive impact on society by exclusively focusing on projects with potential to produce transformative technological change, or a paradigm-shift in an area of science.[75]
	Implementation
What is the overall structure of the programme?	The programme is structured around several PDs. These are tasked with defining an opportunity space (an area that is likely to yield breakthroughs). While PDs are entrusted with the pivotal role of defining these areas, they actively engage with the broader research and industry communities to refine their focus. Within this opportunity space, the PD then selects and funds a portfolio of R&D projects.[76]
Which instrument(s) does it entail?	PDs have several funding instruments available, such as seed funding, taking equity stakes in startup ventures, attracting private co-financing and academic and entrepreneurial fellowships.[77]
Who can benefit from the programme?	In the first place, individual researchers and innovators, as well as academic or private organisations that have high-risk innovative ideas can benefit from the programme by receiving direct funding. In the long term, specific sectors or

[76] **ARIA (2024).** 'Become an ARIA Programme Director'. Retrieved from: https://www.aria.org.uk/become-an-aria-programme-director/

[77] **UK Government (2024).** 'Advanced Research and Invention Agency (ARIA) Policy Statement'. Retrieved from: https://www.gov.uk/government/publications/advanced-research-and-invention-agency-aria-statement-of-policy-intent/advanced-research-and-invention-agency-aria-policy-statement#programme-manager-led-funding

	society as a whole can benefit from the successful implementation of funded R&D projects under the ARIA programme.[78]
How is the selection process organised?	ARIA defaults to open competitions and solicitations, and bases awards on a transparent selection procedure. The application process consists of 2 stages, being a concept paper and a full proposal afterwards. The concept paper is reviewed by the PD and other reviewers within ARIA in 4 steps, being: • Initial screening. • Compliance review of selection criteria. • Full review. • Recommendation. In case of a successful recommendation, the full proposal will be reviewed through the same process. The only difference is that between step 3 (full review) and step 4 (recommendation), there is an additional "merit review meeting" in which the PD and reviewers can decide to request further clarifications from the applicant before taking a final decision.[79]
	Achievements and lessons learned
Quantitative or qualitative outcomes	As of December 2024, ARIA has not yet undergone comprehensive public evaluations due to its recent establishment in January 2023. However, ARIA has recently published its annual report and accounts in which it provides insights into financial performance: • Total Expenditure: ARIA reported a total comprehensive net expenditure of £5.2 million for the period. This figure encompasses all operational costs incurred during the agency's setup and early activities. • Staff Costs: Personnel expenses amounted to £1.8 million, reflecting the recruitment and remuneration of ARIA's initial team, including executive leadership and support staff. • Other Operating Costs: Expenditures on goods and services, including consultancy fees, office setup, and administrative expenses, totaled £3.4 million. Capital Expenditure: Investments in tangible and intangible assets, such as office equipment and IT infrastructure, were £0.5 million
Long-term influence – is there any structural or institutional change due to the programme?	The programme was formally established in early 2023, meaning that no evaluations have been published yet, and long-term influence cannot be assessed.
Challenges faced during implementation	No public evaluations yet

[78] ARIA (2024). 'How we fund'. Retrieved from: https://www.aria.org.uk/how-we-fund/

[79] ARIA (2024). ARIA project review and selection process. Available at: https://www.aria.org.uk/wp-content/uploads/2024/03/ARIA-project-review-and-selection-process.pdf

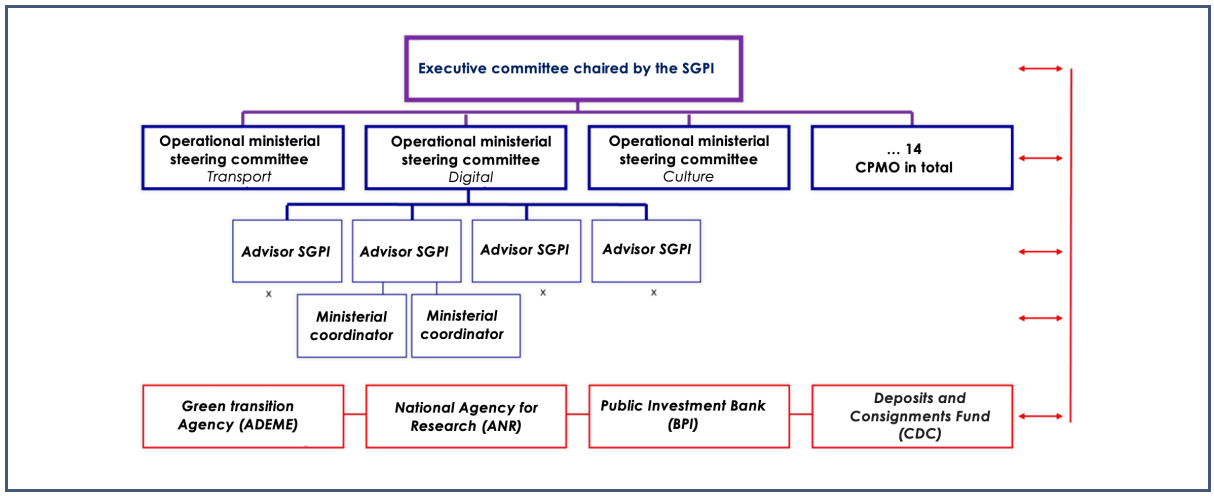
France 2030

	Summary
Scope	France 2030 is a French national funding programme launched in October 2021 with a 54 billion EUR budget. The aim is to develop industrial competitiveness and future technologies, with half of the funding going to emerging players and half to decarbonisation actions.
Achievements	• 21 Billion EUR have been committed for funding; • 40.000 direct jobs are created or maintained. • 34.000 new qualifying training courses for future careers have opened in 2022 and 2023. • A total of 8.5 million of tonnes of CO2 is saved per year based on projects undertaken under France 2030 to date.
Relevancy	With France 2030, the French Government aims to: • Address Global Challenges. • Bring about industrial sovereignty. • Aspires technological leadership and innovation globally. • Pursue economic recovery and job creation (after a covid-19 induced slowdown).
	Background and context
What is the starting year of the programme?	France 2030 was launched in October 2021 and designed to be implemented over a five-year period, concluding in 2026.
What problem, challenge, or strategic goal was thought to be addressed with the programme?	In 2010, the French National Agency for Scientific Research (ANR) created The Investments for the Future Program (PIA), with the aim to stimulate employment, boost productivity and increase the competitiveness of French businesses. The last PIA (PIA 4) was concluded in 2022. Since its launch in 2021, France 2030 has been pursuing and surpassing the ambitions of the previous PIA 1, 2, 3 and 4. The France 2030 Plan capitalises on the achievements of the Future Investment Programmes. The plan aims to develop industrial competitiveness and future technologies, with half of the funding going to emerging players and half to decarbonisation actions. It pursues 10 objectives to better understand, live better and produce better, by 2030, being: • By 2030, develop small, innovative nuclear reactors in France with better waste management • Make France the leader for green hydrogen & develop cutting-edge renewable energy technologies • Decarbonise our industry and input production • Produce 2 million zero-emission vehicles in France by 2030 and develop sustainable, sovereign and resilient mobility • Produce the first low-carbon aircraft in France by 2030 • Innovate for healthy, sustainable and traceable food

	• Produce at least 20 biopharmaceuticals in France, particularly against cancers and chronic diseases, and develop and produce innovative medical devices • Place France once again at the forefront of cultural and creative content production • Play our natural role in future space adventures • Explore the Seabed
Where there any contextual factors relevant?	France 2030 was built on 4 main observations: • An estimated need for €50-80 billion additional investments for the environmental transition • The need to reduce dependence on critical supplies • An economic competition reinforced by the covid crisis • The evaluation of the previous PIAs found out that there was a funding "valley of death" for scaling-up and the need to support industrialisation
Which stakeholders were involved in the planning (e.g. governments, private sector, civil society, academia)?	Different Governmental bodies were involved in the launch of the France 2030 plan, such as the French General Secretariat for Investment (SGPI) multiple national Ministries and the French National Research Agency (ANR). Besides the Government, academic and industrial stakeholders were also consulted to make sure that the programmes ambitions and strategic objectives align with the industrial and societal needs.
What were the initial objectives and intended impacts? (e.g. fundamental research, innovation, disruption, higher TRL)	France 2030 has 2 clear ambitions: the decarbonisation of the economy, and the emergence of key players. "Emerging key players" refers to high-potential companies, including startups and SMEs that tackle major societal challenges are drive innovation in sectors like energy, healthcare, digital technology, and ecological transition, in line with the strategic objectives of France 2030. In order to achieve these ambitions, France 2030 supports the entire lifecycle of innovation, from funding fundamental research (TRL 1-4) under the Priority Research Programmes and Equipment (PEPR), to funding implementation projects of key players that align with the plans' strategic objectives. those at the forefront of innovation to position France as an innovation leader. France 2030's expected economic impacts are: • An increase in GDP of between €40bn and €76bn by 2030 • An improvement in France's trade balance of between €14bn and €20bn • Job creation of between 288,000 and 600,000 jobs
Who manages the programme? (e.g. Organisation, ministry)	The ANR is the national operator of France 2030. The programme is being led by the French General Secretariat for Investment (SGPI), led by Bruno Bonnell, in charge of France 2030, on behalf of the Prime Minister, and in partnership with the relevant government ministries (Ministries of Economy, Higher Education, Ecological Transition, Agriculture and Health).
Is it a regional or national programme?	France 2030 is a national programme with a national scope.
Type of instruments used (grants, loans, support etc.)	France 2030 supports actors mainly though subventions (i.e financial assistance or non-repayable grants provided by the government to support specific projects that align with the strategic objectives of France 2030), reimbursable grants and specific funding schemes (i.e. equity investments).

	This support is granted mainly for specific calls for projects and expressions of interest.
What is the funding directionality (e.g. bottom up, top down, collaborative)	The funding directionality of France 2030 Is a hybrid approach, combining top-down and bottom-up elements. The programme can be considered to be predominantly top-down because it embraces a mission-driven approach with funding directed towards predefined national priorities (e.g. decarbonisation) and previously mentioned 10 objectives. Besides the predefined goals however, researchers and businesses are actively encouraged to propose innovative ideas and projects that align with the France 2030 objectives, which can be explained as a more bottom-up approach to innovation.
Website	https://anr.fr/en/france-2030/france-2030/

Figure 13 – Programme structure of France 2030



Source: Evaluation in-itinere France 2030, July 2023.

	Programme design
Governance structure (e.g. programme management and decision-making process)	France 2030 is being led an executive committee, chaired by the French General Secretariat for Investment (SGPI), who oversees the deployment and implementation of the plan, ensuring that the plans objectives are met. The executive committee works closely together with interministerial administrative management via so-called CPMOs (Operational Ministerial Steering Committee). These committees are responsible for overseeing and coordinating the execution of projects within their respective ministerial domains, ensuring alignment with the strategic objectives of France 2030. More specifically, CPMOs ensure that projects are effectively managed, resources are appropriately allocated, and that the initiatives contribute to the plan's objectives. The SGPI coordinates with various operators, such as: • French Agency for Ecological Transition (ADEME) • French National Research Agency (ANR)

	• French investment bank (BPI)) • Caisse des Depots et consignation (CDC) These operators are responsible for organising the selection, agreement, financing, monitoring, audits, evaluation, and impact assessment of projects within their respective fields. The decision-making process for France 2030 is a multi-level, collaborative approach: • Strategic oversight from the government and ministries. • Implementation and evaluation by specialised agencies (ANR) • Stakeholder input to align with industry and societal needs. • Monitoring to ensure accountability and adjust priorities as needed. Proposals are being evaluated on: • Alignment with strategic objectives. • Potential for innovation and impact. • Feasibility and technical merit.
Resources – what is the average budget?	The total budget for the France 2030 plan is 54 Billion EUR for 2021 – 2026. 50 percent of the funds will support the decarbonisation of the economy, and 50 percent will be directed towards emerging key players (companies, including startups and SMEs that tackle major societal challenges and drive innovation in sectors like energy, healthcare, digital technology, and ecological transition, in line with the strategic objectives of France 2030) and innovative projects. "Innovative projects" relate to projects that introduce disruptive technologies and new business models that challenge traditional industry standards in the fields of energy, healthcare, digital technology, and ecological transition, in line with the strategic objectives of France 2030. As of June 2024, approximately 21 billion EUR has been committed, supporting around 4,000 projects and creating or maintaining 40,000 direct jobs.
What is the innovative feature of the programme? (e.g. who they are funding, through which funding instrument and the directionality of the instrument)	The innovative feature of France 2030 lies in its mission-driven approach, combining top-down strategic priorities with flexibility for bottom-up innovation. It emphasises ecological transition, technological breakthroughs, and industrial competitiveness, with 50 percent of funds allocated to decarbonisation and emerging players. The program funds startups, SMEs, large corporations, research institutions, and training organisations through competitive calls for proposals managed by operators like Bpifrance, ANR, and ADEME. The funding directionality is hybrid: top-down for achieving national priorities, bottom-up for enabling disruptive innovation, and collaborative to foster public-private partnerships.
	Implementation
What is the overall structure of the programme?	The programme is structured around two main ambitions, being: the decarbonisation of the economy, and the emergence of key players, those at the forefront of innovation to position France as an innovation leader. In order to pursue these ambitions, the programme set out 10 strategic objectives that are discussed in the previous section (section 1.2). Proposals for funding under this programme need to align with at least one of those objectives.

Which instrument(s) does it entail?	France 2030 supports actors mainly though subventions, reimbursable grants and funding schemes, such as equity investments. This support is granted mainly through calls for projects and expressions of interest. Furthermore, France 2030 also includes various programmes, such as: • Priority Research Programmes and Equipment (PEPR) dedicated to financing the most fundamental research (TRL 1 to 4). • Skills and Professions of the Future: focuses on developing new educational courses and training programs tailored to emerging industries, thereby supporting the broader objectives of France 2030. • Decarbonisation of Industry: supports projects that promote energy efficiency, the adoption of renewable energy sources, and the development of sustainable industrial processes, aligning with France 2030s objectives. • Support for Emerging Players: Companies, including startups and SMEs that tackle major societal challenges and drive innovation in sectors like energy, healthcare, digital technology, and ecological transition, in line with the strategic objectives of France 2030) and innovative projects. The aim of these programmes is to build or consolidate French leadership in scientific fields that are linked or likely to be linked to technological, economic, societal, health or environmental change, and that are considered to be priorities at national or European level
Who can benefit from the programme?	France 2030 targets all actors and infrastructures of the innovation lifecycle, from higher education and research actors to entrepreneurs and industrials: SMEs, large businesses, universities, research organisations, local authorities, associations, mid-size businesses, etc. However, a special focus is put on private actors, since 50 percent of France 2030's funding shall target so-called "emerging actors", defined as companies that are less than 12 years old or that are making a radical strategic shift, to encourage disruptive innovation and the renewal of the productive fabric.
How is the selection process organised?	Under France 2030, calls for proposals and expressions of interests are launched in which researchers and businesses are encouraged to submit tenders for funding. These proposals are then being evaluated on: • Alignment with strategic objectives. • Potential for innovation and impact. • Feasibility and technical merit.
	Achievements and lessons learned
Quantitative or qualitative outcomes	As of October 2024, France 2030 has generated the following outcomes: • 21 Billion EUR have been committed for funding • 40.000 direct jobs are created or maintained. • 34.000 new qualifying training courses for future careers have opened in 2022 and 2023. • A total of 8.5 millions of tonnes of CO2 is saved per year based on projects undertaken under France 2030 to date. The ANR, as the operator of France 2030 for higher education and research-related actions, has launched approximately 80 calls for proposals since 2010, leading to the submission of around 3,000 project proposals. This demonstrates

	active engagement with the research community under the France 2030 framework. France 2030 builds on the former PIAs 1, 2, 3, and 4 and therefore capitalises and reap the rewards of the various PIAs while "greening" its objectives and processes. France 2030 invests more in incremental rather than rupture innovation and target industrialisation much more than PIAs did 46 % of the resources allocated by France 2030 have a potentially favourable impact on the decarbonisation of the economy Among the various decarbonisation levers, replacing the current energy mix with non-fossil fuels is the largest in terms of amounts committed.
Long-term influence – is there any structural or institutional change due to the programme?	No long-term influence to be seen yet, as the programme was only launched 3 years ago.
Lessons learned	As of December 2024, public evaluations of the France 2030 investment plan are limited. However, specific assessments, such as those conducted for the "Innovative Reactors" initiative, do offer some insights into the program's structure, impact, and success: • Support for Diverse Innovations: The program's structure effectively fosters a broad spectrum of technological innovations, encouraging a rich "idea box" of solutions. • Attraction of New Talent: The dynamic nature of the program participants contributes to revitalising sectors like nuclear energy by drawing in new expertise;

This study explores the design of future Framework Programmes for Research and Innovation (R&I) in the European Union. Employing a foresight methodology – comprising a literature review, case studies, scenarios and foresight workshops with stakeholders – the study examines prevailing discourses on Framework Programme structures, identifies key R&I trends, and analyses the challenges posed by current developments. It presents a set of hypothetical programme structures alongside policy recommendations to optimise the Framework Programme for fostering effective R&I across the EU.

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