
# Towards a Mission-Oriented Research and Innovation Policy in the European Union

An ESIR Memorandum: Executive Summary

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Research and Innovation

**Towards a Mission-Oriented Research and Innovation Policy in the European Union – An ESIR Memorandum: Executive Summary**

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EUROPEAN COMMISSION

# Towards a Mission-Oriented Research and Innovation Policy in the European Union

## *An ESIR Memorandum: Executive Summary*

2017 Directorate-General for Research and Innovation

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# INTRODUCTION

*The expert group on the Economic and Societal Impact of Research (ESIR)[1] is a group of independent experts set up by DG RTD of the European Commission in the fall of 2017. The members of the group are comprising Dominique Foray, Luke Georghiou, Georg Licht, Patrick Llerena, Mariana Mazzucato, Ester Martinez-Ros, Andrea Renda, Sylvia Schwaag-Serger, Luc Soete (chair), Marzenna Weresa and, external members, Richard Nelson and Jeffrey Sachs. As one of its first tasks the group was asked to reflect on the economic rationale for a new Mission-Oriented Research and Innovation Policy in line with the discussions starting on the development and design of a new Framework Programme. The ESIR Memorandum outlines both challenges and opportunities of reviving research and innovation policies with a mission-oriented lens.*

*RISE is the Research, Innovation and Science Expert high-level group[2] advising the European Commissioner for Research, Science and Innovation, Carlos Moedas. In autumn 2017, the Commissioner asked RISE to provide policy insights on mission-oriented research and innovation (R&I) policy at EU level. To ensure coherence between the work of the groups, a member of RISE, Luke Georghiou, participated in the work of ESIR on mission-oriented policy.*

## 1 Research and Innovation Policy: challenge-led and mission-oriented[3]

Over the last decade, following the financial crisis, European economic growth has suffered from a lack of private investment and increasingly uneven levels of competitiveness across member states. In this context, the European Commission (EC) has continued to put forward its ambition to create economic growth not just in quantitative terms but also in qualitative terms: achieving growth which is smart, i.e. research- and innovation-based, inclusive and above all sustainable. The ambition to achieve a particular type of economic growth is an admission that the underlying rate of technical change bringing about productivity growth has not only a **rate but also a *direction***. Not all smart growth is inclusive, nor sustainable.

Acknowledging the direction of technical change requires, however, a quite fundamental re-thinking of the role of government and public policy in the economy. In particular, it requires a new justification of government intervention that goes beyond the usual one of the state as "repair shop": the fixing of market failures as in the case of R&D investment subsidies or tax advantages to fix private under-investment in R&D. Policy in this context will now also have to be about co-creating and co-shaping markets; about new, sometimes experimental ways to assess intervention so that dynamic system wide spill-overs are better captured; and about creating new criteria through which public policies can be justified, nurtured and evaluated.

In this context, research and innovation strategies can become the key pillars of Europe's 2030 strategy: achieving transformational change by identifying and articulating challenge-led ***missions*** that can galvanise innovation while transforming production, distribution and consumption patterns across various sectors. Addressing such challenges – whether decarbonising the economy, develop sustainable agriculture or tackling modern care problems – depends crucially on investments by both private and

[1] https://ec.europa.eu/info/research-and-innovation/strategy/expert-groups/esir_en

[2] https://ec.europa.eu/research/openvision/index.cfm?pg=expert-groups-rise

[3] Parts of this note are based amongst others on publications and reports written by various ESIR members. For a recent report which has very much inspired the present document see Mariana Mazzucato, *Mission-Oriented Innovation Policy: Challenges and Opportunities*, Working Paper IIPP WP 2017-01, September 2017. For all other references see the main Memorandum text.

public actors, and much more. Providing a direction for such investments is what mission-oriented policy is about.

## 2 How missions could galvanize private R&D investment and boost innovation performance

The EU has been lagging in both innovation performance and R&D investments behind the US and Japan for decades. The soft, so-called Barcelona targets of 3% of GDP being spent on R&D within the framework of the ambitious Lisbon strategy of 2000 were never achieved. Only some Member States achieved the target, most saw the financial crisis putting severe pressure on maintaining public support for R&D as budgetary priority. Whereas leading innovation countries increased or at least maintained their level of public R&D, modest innovators and laggards appeared no longer to be able to afford their level of public R&D. Hence, the crisis and its aftermath increased the heterogeneity between member states' innovation capacity.

There are many possible reasons explaining the failure of Europe's R&D or innovation system to deliver its expected economic impact. On the one hand, the fragmented nature of European public research, defined as an area of "shared" policy responsibility between individual Members States (MS) and the European Commission (EC), is likely to represent significant "costs of non-Europe" in the area of research. On the other hand, differences in regulation or the lack of a European, as opposed to 28 different national procurement systems is likely to represent significant "costs of non-Europe" in innovation, increasing the costs of innovation and diffusion in Europe as opposed to truly single market countries such as the US, Japan or China.

From this perspective, continuing a European R&D policy, aimed at providing financial subsidies through Framework Programmes (FP) to facilitate European collaboration between public and private R&D actors or other financial "risk sharing" support instruments, will at best only represent second-best solutions to the low level of private R&D investment in Europe. By contrast, a mission-oriented innovation policy should shift the attention from R&D inputs to the full impact of the many complex systemic interactions between basic and applied research, development, innovation, diffusion and the various accompanying spillovers: "tilting" R&D and innovation investments of private firms as well as the public sector to a higher level. By providing leadership in new areas, public investments that are mission oriented can, by increasing the expectations of business of where future opportunities lie, better 'crowd-in' the missing private investment.

This new mission-oriented research and innovation framework highlights on the one hand the crucial policy distinction between subsidies and investments in the area of research and innovation and on the other hand, the particular role large, societal challenges could play in Europe co-creating new (local and global) markets. Contrary to previous FPs, the purpose of a mission-oriented policy framework should not be confined to using public money to incentivise private firms to invest in R&I in general. Rather it should also orient/direct those investments to specific missions, targets, objectives, set by policy in close interaction with both the public and private research community, as well as the increasingly important voluntary sector (e.g. foundations involved in areas like health and energy) and organisations in civil society.

## 3 Reconceptualising the role of the public sector

Mission oriented public investments are not about de-risking and levelling the playing field, but tilting the playing field in the direction of the desired goals. This includes making strategic decisions on:

- the kind of cross-cutting technological changes that will affect opportunity creation across sectors (e.g. Internet, battery storage),

- the type of finance that is needed (including the role *public investment banks* can play in providing patient long-term strategic finance to high risk and capital intensive projects, crowding in future business investment),

- the types of innovative firms (SMEs; new, young disruptive firms; spin-outs from incumbents) that will need extra support, the types of collaborations with other actors to pursue (including citizens groups, the third and private sector), and

- the types of regulations and taxes that can reward behaviour that is desired (e.g. rewarding long-term investments and reinvestment of profits rather than hoarding).

While public funding has always been important in the early, capital-intensive high-risk areas that the private sector tends to shy away from, modern day missions can provide an even more fervent ground for an ambitious catalytic role for governments in *creating and shaping markets* which provide the basis for private investment. From an economic perspective, this approach is likely to increase the multiplier effect of public R&I investment, unleashing not only more private R&I investment and market-creating innovation but also open up opportunities for new synergies with other European public financing instruments (e.g. the Structural Funds or EFSI). In setting out such a new "MOP" framework, the core guiding principle should be on how to maximise the economic impact of the next FP 9.

## 4 From challenges to missions

The 21st Century is becoming increasingly defined by the need to respond to major social, environmental and economic challenges. These include environmental threats like climate change, demographic, health and wellbeing concerns, as well as the difficulties of generating sustainable and inclusive growth. These problems are 'wicked' in the sense that they are complex, systemic, interconnected, and urgent, requiring insights from many perspectives.

Mission oriented thinking requires understanding the difference between (1) broad challenges; (2) sectors and/or technologies; and (3) concrete problems that different technologies/sectors can address to tackle a challenge. Sectors/technologies define the boundaries within which firms, and more broadly, agents operate, such as transport, health, or energy. A challenge is a broadly defined area, which a nation may identify as a priority (whether through political leadership, or the outcome of a movement in civil society).

A defining feature of many of the challenges European society is confronted with is that they are ***global*** in reach. The very existence of the UN "Sustainable Development Goals" (SDGs), which should in our terminology be rather defined as "***challenges***", is a clear manifestation of the global nature of most societal challenges. And the over one hundred 'targets' underlying the 17 SDGs can provide insights for how such challenges can become concrete targets. The targets share one thing in common: they all require international cooperation. International cooperation will be important both in finding and in implementing solutions to missions, and include both supply and demand side policies. Global cooperation opens up the possibility of science diplomacy as a key international collaboration tool.

Missions are broader than sectors but more specific than challenges. They involve tackling challenge led problems, focussing on specific problems such as reducing carbon emissions by x% over a specific year period. Their goal should be to galvanise investment and innovation across multiple sectors (climate change cannot be fought by the energy sector alone, but also transport, nutrition etc.) and actors (private, public, and third sector). As industrial strategy makes a return globally, a mission-based approach can help to ensure that industrial policy does not end up as merely a static list of sectors to support.

Missions contributing to societal challenges require transformation rather than handouts. Doing so, the particular interactions of cross-sectorial innovation and trans-disciplinary basic and applied science are essential.

Furthermore, given that the European project began as a project of peace and solidarity, mission setting could well represent a strategic way to revive the spirit of Europe in one of its most delicate phases (rising populism across Europe, democracy and the rule of law, BREXIT). In so doing, it could be driven by '***European values'*** that are today not shared so widely by the Trump administration, neither by countries, including some MS struggling with the democratic process. These values include openness as argued in the RISE book but include also European values such as equality, solidarity, public education and health care, security and social welfare. These are all values strongly embedded within the SDGs: one more reason to view the SDGs as a powerful point of departure for rethinking Europe's efforts, instruments and approaches to promote research and innovation.

Obviously not all SDGs can be addressed through R&I policy, nor can they be achieved through just EU policy. However, the EU can become the anchor point for global programming of international, European, national MS and regional/local R&I policies.

Four such ***challenges*** appear central:

- Clean energy and resource efficiency, combating climate change;
- Developing digital technologies, including AI and cyber-security for better public services;
- A healthy life at all ages (e.g. life style changes and prevention, affordable care, and controlling deadly diseases such as dementia or cancer);
- Sustainable cities, embracing circular economy and future mobility.

## 5 Defining and selecting missions

A key challenge for challenge led innovation is to both provide a direction, while also enabling and fostering bottom up experimentation and exploration. Mission-oriented policies should focus on creating system-wide transformation across many different sectors. For example, the Apollo mission to the moon required innovation across many different high-tech sectors (e.g. Aerospace) and low-tech sectors (e.g. Textiles). While the vision for the mission top down, it was the bottom-up experimentation around solving dozens of 'homework problems', involving different types of partnerships that galvanised the ensuing growth.

Missions that are not purely technological but more social, and hence complex ('wicked') in nature, require even more focus on bottom up experimentation and inter-disciplinarity. For example, missions around sustainability and green growth will require changes in life-styles, and the need to reinvigorate investment and innovation in maturing sectors like steel so that their material content is lowered. Transformational policies can lead to more 'additionality' in business investment: helping companies in different sectors to make investments that would otherwise have not been made—extremely important in countries experiencing low business investment.

Crucial to the implementation of mission-oriented approach innovation policy is the need to reinvigorate capacity building, competencies and expertise within the state (the 'developmental and networked' entrepreneurial state as argued by Mazzucato). Thus can its different organisations can effectively fulfil their roles in coordinating and providing direction to private actors when formulating and implementing policies that address societal challenges through innovation.

The move to a mission-oriented approach raises a number of questions for discussion with which we conclude these first ESIR reflections. They are analysed in more detail in sections 2 and 3 of the Memorandum.

> **1. Granularity:** What should be the scope of missions? Should they be more missions of the accelerator type speeding up progress in a particular field or transformational missions, leading to more systemic change or both or a mix? And at what level of granularity should we design individual missions?
>
> **2. Targets and objectives**: We need to define objectives that are progress concretely through R&I policies, while also requiring systemic change (e.g. on the demand side). How to make such objectives coherent with wider policy goals and create a pull-effect across both the EC and MS activities? How to create a set of targets and programmes underneath each missions to enable a portfolio approach that allows multiple pathways to be pursued, keeping the process of innovation open while also directed?
>
> **3. Identification/Selection of Missions**: How should the missions be chosen, and how can a wider group of stakeholders, member states and public be involved. How can citizens be involved so missions also have greater democratic legitimacy?
>
> **4. Design and implementation**: What should be the level of prescriptiveness in setting missions? Should there be roadmaps and work programmes? How to balance the need to set direction in a top down manner with the need to allow for bottom up input and innovation? How to move from supporting individual sectors to supporting systemic transformation? How can demand side measures (e.g. procurement, regulation) be integrated? What time frames should the missions run over? How can existing instruments be aligned with the goals of the mission?

There are many other issues of course as well, including how to balance the need to allow freedom to operate to the mission managers with the need for accountability when spending public funds? Can one design a mechanism to shut off support to projects that are not delivering on the mission objectives? How to make sure that the views of end-users as well as funders are taken into account? How to learn from mistakes, provide interactive feedback? Monitoring progress, evaluation and assessment of each mission will have to become an essential and integral part of the policy roadmap.

## 6 By way of conclusion: a first reflection to be continued…

Europe is facing economic, social, political and technological challenges. It is also facing an extraordinary set of opportunities that can harness the full potential of new technologies (e.g. artificial intelligence) for social goals. We believe a mission-oriented approach can provide a framework, as well as a methodology, for tackling such challenges in a more holistic manner than has been done with narrow sectoral, or narrow science policies. The implications of such an approach are huge, including the need to involve member states and civil society in a coherent and systemic way.

As ESIR expert group we will not propose particular missions, but guide the thinking that is required for a mission-oriented approach to lead to a different status quo. We expect many proposals for missions to be proposed over the coming months ranging from purely scientific missions to more transformative missions. When such proposals are made, we believe it will be useful to test those against the framework proposed here.

This Memorandum is in the first instance a "living document": an invitation to others to enrich the document with comments, references and examples, as the debate in Europe takes form in the coming weeks and months and gets the attention of interested parties.

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The ESIR Memorandum contains the first reflections of the group of experts, all leading economic policy analysts in the area of R&I in Europe who have published extensively over the years on the nature, purpose and implementation challenges in the design and implementation of a mission-oriented R&I policy framework.

*Studies and reports*