European Commission

GOVERNING MISSIONS

# Governing Missions in the European Union

by *Mariana MAZZUCATO*

**Independent Expert Report**

*Research and Innovation*

**GOVERNING MISSIONS**
**Governing Missions in the European Union**

European Commission
Directorate-General for Research and Innovation
Directorate A – Policy & Programming Centre
Unit A4 – Missions & Partnerships

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EUROPEAN COMMISSION

**GOVERNING MISSIONS**

# Governing Missions in the European Union

*by* ***Mariana MAZZUCATO***

2019 Directorate-General for Research and Innovation

# PREFACE

*by Professor*
**Mariana MAZZUCATO**

The European Union has the opportunity to use mission-oriented research and innovation (R&I) to drive investment-led growth across the region, bring European citizens closer to policy-making and invest in those areas that matter to people's lives: from cleaner air to healthier, longer lives.

2019 is the 50th anniversary of the first moon landing, which has captured the public imagination with the famous images of man's first steps on the moon. We tend to forget that this feat required many different sectors to collaborate and innovate together, and government instruments to fuel bottom-up experimentation on a vast scale. Their pooled resources and talents – and the capturing of the public imagination — led to innovations that far outlived the mission itself. Process matters!

This report asks what changes mission-oriented R&I requires in how we 'do capitalism' in both the public and private spheres so that our tools and instruments are as ambitious as the missions themselves. Fundamentally, missions require putting innovation and outcomes at the centre of how we think about economic growth. This

requires new thinking in (1) the tools of government — from procurement to prize schemes — to drive goal oriented experimentation; (2) the ways that public financing can crowd-in and galvanize other forms of investment; and (3) ways to harness social movements and citizen participation in a creative, open and empowering process of challenge-led innovation. The report looks at all three of these dimensions — public sector capabilities; financing mechanisms; and citizen engagement.

The net result must be stimulating innovation, crowding-in investment across different actors and catalysing new economy-wide cross-sectoral development, while mobilizing citizen participation and creativity across Europe. Indeed, citizen movements have always been central to achieving social change — including labour movements which brought us one of the greatest social innovations of our time: the weekend! Today there is a growing green movement — including the youngest school children — bringing the climate emergency right to the top of public priorities. We must harness this drive for change across different parts of our population to allow R&I across Europe to tackle the greatest challenges of our time. And if we allow it to change how we 'do' on the ground, it will become the key source of our future competitiveness. The opportunity is too great to miss. I hope the report helps us take the implementation process behind missions as seriously as achieving the missions themselves.

# INTRODUCTION

Innovation is a key driver of long-term growth. It can fuel productivity growth, and transformation of production, distribution and consumption across entire economies. But where does innovation come from and what is it for?

Innovation has historically been an outcome of ambition in both the public and private sector, and increasingly is involving third sector institutions. It has also benefitted from social movements putting pressure on systems to change. Some of the greatest innovations of our time have come from the need to solve problems. The internet was initially designed to solve the problem of satellites communicating; GPS to determine the location of military equipment. Europe has the opportunity to set its sight on a challenge and use that as a way to drive our R&I agenda and to involve as many actors as possible across the economy. But rather than focusing on purely technological problems, we can focus innovation efforts to solve societal challenges that involve technological change, institutional and behavioural change and regulatory change.

The European Commission has played an important policy innovator role for decades and has been challenge-oriented around the goals of smart, inclusive and sustainable growth. The report "Mission-Oriented Research & Innovation in the European Union"[1] (from now on Missions Report), published in 2018, identified mission-oriented policy as the key instrument to reframe Europe's approach to tackling grand societal challenges — to make them more practical and systemic so that R&I investments can help attain specific, targeted and concrete goals. Five criteria were identified for selecting missions. They should:

- Be bold, inspirational, with wide societal relevance;
- Have a clear direction: targeted, measurable, and time-bound;
- Be ambitious but realistic research and innovation actions;
- Be cross-disciplinary, cross-sectoral, and cross-actor innovation;
- Drive multiple, bottom-up solutions.

[1] Mazzucato, M. (2018), Missions: Mission-Oriented Research & Innovation in the European Union. European Commission. Available online at https://ec.europa.eu/info/sites/info/files/mazzucato_report_2018.pdf

This report, **Governing Missions**, looks at the 'how': how to implement and govern a mission-oriented process so that it unleashes the full creativity and ambition potential of R&I policy-making; and how it crowds-in investments from across Europe in the process. The focus is on 3 key questions:

- How to **engage citizens** in co-designing, co-creating, co-implementing and co-assessing missions?

- What are the **public sector capabilities** and instruments needed to foster a dynamic innovation eco-system, including the ability of civil servants to welcome experimentation and help governments work outside silos?

- How can mission-oriented **finance and funding** leverage and crowd-in other forms of finance, galvanising innovation across actors (public, private and third sector), different manufacturing and service sectors, and across national and trans-national levels?

# CITIZEN ENGAGEMENT

Mission-oriented innovation cannot be top-down. It must inspire and harness the full creativity of citizens to tackle problems as urgent as climate change, rising inequality or the challenge to establish more caring societies. In order to inspire society at large, missions need to have widespread legitimacy and acceptance. This means, among other things, that mission setting must find its way to the centre of the political priority-making process and involve citizens in a serious way.

In this context, it is critical to develop a sound and transparent process to select missions, frame them, and to assess missions along the way so that they have the right checks and balances. This requires a strong level of public trust.

Ensuring public trust must start with acknowledgeing that research and innovation are not separate to society, only populated by academics and policy experts. Such approaches have in the past generated opposition as well as disinterest, and with little impact as a result. On the contrary, particularly for innovation activities aimed at citizens, the form by which they are taken up by society (i.e. users, citizens, consumers and others) is key[2]. Balancing top-down and bottom-up perspectives, can make innovation processes richer, better informed, and more likely to be adopted.

Furthermore, missions require a shift from a market-fixing framework to a market-shaping framework, redefining the meaning of public value[3]. Public value represents not just what citizens demand today, but what they may need or desire in the future. This tension between opening mission-oriented frameworks to citizens whilst avoiding capture by passing trends will be a challenging aspect of governing this framework. How missions can be opened up to a wide group of stakeholders, from individuals, and civil society organisations, to citizen movements or political parties, is critical to forming missions and to ensuring their longevity. Lessons learned from previous public consultations should be taken into account.

As identified in the Missions Report, there are three key stages where citizen engagement becomes crucial for missions:

- How to involve citizens in the **definition** and selection of concrete missions that matter to society;
- How citizens participate in the **implementation** of missions;
- How citizens will be involved in the **assessment** (evaluation, review and monitoring process) of missions.

[2] Leadbeater, C. (2018), 'Movements with missions make markets', UCL Institute for Innovation and Public Purpose Working Paper Series (IIPP WP 2018-07). Available online at https://www.ucl.ac.uk/bartlett/public-purpose/publications/2018/aug/movements-missions-make-markets

[3] Mazzucato, M. (2018), 'Mission Oriented Innovation Policy: Challenges and Opportunities', Industrial and Corporate Change, 27 (5): 803–815. Available online at https://doi.org/10.1093/icc/dty034

### 1. CO-CREATION

Missions offer an opportunity to involve citizens in solving grand societal challenges, to communicate about them and to create wide civic excitement about research and innovation. In order to achieve this and to ensure that missions reflect societal expectations, it is essential to allow as many citizens as possible to engage in the mission-definition process at an early stage.

Meaningfully engaging and involving people in co-design has become a core principle of public sector innovation, just as it is in innovative private sector practice. Co-design gives societal ownership of the missions' goals and objectives, ensuring that the missions have longevity beyond the period in post of individual ministers or governments. There are many positive examples of this occurring in the past, notably in the ideas generation and consultation that led to the framing of the UN Sustainable Development Goals[4] (see box 1). The European Commission is putting the principle of co-design in practice through the establishment of Mission Boards, which will include end-user represenatives and will be tasked to directly consult citizens on the formulation of concrete mission proposals.

Likewise, policy-makers need to be open to the frank debates and contestation that such interaction with citizens may entail. For instance, political concern about sustainable growth embodied in the Energiewende mission in Germany, which is aimed at carbon reduction across the whole economy, has been informed by the decades-long civic green movement[5]. Similarly, the feminist movement played a very important role in ensuring the development of birth control pills, and without the anti-Aids movement (e.g. ActUp) we may not have had the same development of HIV drugs. Furthermore, citizen engagement activities must recognise the diverse European population when planning EU-wide innovation activities by making efforts to garner the views of underrepresented groups, be that by age, class, race or other characteristics.

[4] Available online at https://www.un.org/sustainabledevelopment/sustainable-development-goals/
[5] European Commission (2018), 'Mission-oriented R&I policies: Case Study Report Energiewende (DE)'. Available online at http://europa.eu/!md89DM

## 1. THE DISCUSSION OF THE POST-2015 SUSTAINABLE DEVELOPMENT AGENDA

Many voices have informed this debate, and there have been valuable inputs from a wide range of stakeholders. People around the world aired their views through unprecedented consultation and outreach efforts of organised civil society groups, as well as through the global conversation led by the United Nations Development Group on "A Million Voices: The World We Want", "Delivering the Post-2015 Agenda: Opportunities at the National and Local Levels", and the "MY World" survey.

This openness towards citizens cannot be left to the goodwill of politicians, but needs to be institutionalised and embedded over the long term. The use of novel online citizen consultation tools potentially allows the collection of large, broad citizen-based input and responses, at low cost and in a flexible manner. Various governments in Europe and beyond are keen to engage in policy experiments, relying on large scale citizen input next to expert knowledge. Furthermore, in addition to online consultations, policy makers should also rely on the solid bulk of evidence coming from publicly funded research and innovation projects (see box 2) on co-creation and citizen engagement.

*Recommendation 1:* **Formal consultations as well as direct interaction with citizen movements, civic society, workers, and under-represented groups are required to ensure meaningful citizen engagement in the development of concrete mission proposals.**

A significant challenge presented by the active involvement of any type of stakeholder group, including citizens or civil society organisations, is avoiding the capture of missions by vested interests, and recognising the differences between long term civic needs, and passing trends and phases. For this reason, citizens and/or their associations should work closely alongside policymakers, researchers, and businesses/industry. This will enable multiple perspectives to be focused on the issues at hand, avoid mission capture by any one group, and ensure a wider systemic change.

*Recommendation 2:* **Public consultations that feed into the definition of mission proposals need to be designed in such a way to avoid capture by vested interests.**

[6] Available online at https://www.ecsite.eu/activities-and-services/projects/voices
[7] Available online at http://www.cimulact.eu/

## 2. FACE-TO-FACE PUBLIC CONSULTATIONS CONDUCTED BY VOICES[6] AND CIMULACT[7]

The EU funded projects VOICES and CIMULACT had as a main objective to engage citizens and stakeholders in the co-creation of European research agendas based on real, validated and shared visions, needs and demands. These projects developed and experimented methods for citizen participation on long-term foresight, as well as built capacities in already existing methods.

The experiments explored a variety of methods in order to test and inspire the research community with a broad range of options for citizen and multi-actor engagement in research and innovation priority setting. Furthermore, the diversity of methods also allowed targeting different societal groups, enriching the feedback and validation of the research programme scenarios from a wide range of societal perspectives.

## 3. FP7 INSTRUMENTS FOR CO-IMPLEMENTATION

The EU Seventh Framework Programme for R&I (FP7) had a specific instrument called 'Research for the Benefit of Specific Groups - Civil Society Organisations', foresaw 'Mobilisation and Mutual Learning (MML) Action Plans' and created clusters of projects on 'Transition Initiatives for Sustainable, Low-Carbon Societies' and on 'Citizens' Observatories'. These clusters of EU funded projects developed novel technologies and applications, trying to exploit the capabilities offered by portable devices (smartphones, tablets) and the collective intelligence available through social media streams (such as Facebook or Twitter), to enable an effective participation by citizens in environmental stewardship. These actions were still at their experimental stage within the FP7 and could be used as a good basis for reflection on how to push co-creation further when it comes to governing the missions.

### 2. CO-IMPLEMENTATION

While it is highly unlikely that citizens can and should be involved in every research and innovation process, significant space should be given for citizen science and user-led innovation processes in each and every mission. Citizen scientists and social innovators are a rising phenomenon, tackling scientific and innovation challenges that cut across disciplines. In some cases, they provide research data and solutions that could not feasibly be created by the closed science and innovation system (see box 3).

The format within which co-implementation takes place in missions depends on the context of the mission. For instance, there could be dedicated bottom-up citizen science and innovation initiatives in some mission areas. These could take the form of accelerators, providing support to small-scale initiatives through suitable grants, and stimulated by prizes and other types of rewards and incentives. In other missions it is possible that co-implementation takes place within projects gathering established science and innovation actors, thereby bringing citizen scientists and innovators much more closely into contact with the traditional research and innovation system – building mutual knowledge and understanding in the process.

*Recommendation 3:* **Citizen scientists and innovators can have clear added value and complement the implementation of missions. Their participation should be actively encouraged.**

### 3. CO-ASSESSMENT

The final stage of involvement is engaging citizens and civil society organisations in the monitoring and assessment of the progress of missions, and ultimately their results. Monitoring

should be as open and accessible as possible for people to be engaged. Indeed, this is one reason why missions should be as clearly stated as possible, so broad sections of the population can be engaged in and excited by a mission and be involved in tracking progress.

Citizen engagement should not be limited to traditional community-participation activities, such as people self-organising to clean plastics from beaches, for example. As enabling technologies develop and become more universally present in society, the participation of individuals can be more widespread through monitoring everything from butterfly populations, incidents of violence, or air quality. Using wide-spread technological devices, such as smart phones, for such monitoring activities can create mass mobilisation and civil engagement, providing further pressure for action at the political level.

Co-assessment should also take the form of well-placed citizen or civil society organisations' representation in evaluating proposals, reviewing the progress of projects, evaluating the progress of portfolios of projects, and participating in advisory structures. This ensures that the mission's outcomes are aligned with the needs, values and expectations of society. This, again, should take place alongside established researchers, businesses/ industry and policy experts with the assurance that all stakeholders uphold impartiality in their proceedings.

Furthermore, to ensure citizen's trust in the tracking of progress, public organisations that implement a mission-oriented research and innovation policy should commit to being transparent and applying an open data policy, by subscribing to the FAIR principle (Findable; Accessible; Interoperable; Reusable).

*Recommendation 4:* **Missions should enable the use of citizens' experiences and observations to monitor progress towards mission objectives.**

## 4. CITIZEN-ORIENTED COMMUNICATION & DISSEMINATION

Missions will be selected and driven forward at the political level, but their relevance and importance have to be communicated effectively to the citizen. Without this, co-design, co-creation and co-implementation for missions may fail in the same way previous technocratic efforts have. Missions by their very definition must be inspirational and engage citizens in science and innovation – and how these can deliver solutions for the challenges they face in their daily lives. This aspect can be leveraged in communication to communities around the importance and relevance of innovation policy.

Through effective communication citizens can become active participants in missions. In addition to providing innovative techniques for civil society to contribute to these missions directly, we must also reflect on the ways that new technologies make wide-scale engagement and consultation with citizens possible in a manner not previously available to policy-makers. Through live engagement via social media, the internet, and smartphones, policymakers can develop new ways for citizens to both

consult and feedback on policies. This may hold the key to scaling the successes of small-scale public consultation to wider national and EU-wide needs. Moreover, a proper dissemination and communication strategy for missions should include educational/science-society literacy in order to foster a tangible mind shift.

*Recommendation 5:* **Citizen-oriented communication & dissemination activities should be ensured throughout the entire life cycle of missions, in order for citizens around Europe to understand the value of R&I actions and the tangible impact on their lives.**

# PUBLIC SECTOR CAPABILITIES

Missions require public actors to think outside of "market failure" frameworks, and more towards co-creating and co-shaping of markets.

Missions require a new vocabulary. Rather than levelling the playing field they require tilting it. This does not mean tilting it towards one company, one sector or one technology, but tilting it towards a direction. This requires ambitious investments that crowd-in and mobilise private investment as well as the creation of synergies across the different domains of government activity: from regulatory changes, to procurement policy, to reforms in education and labour markets. This mission setting, guiding and crowding-in process requires rethinking ways in which public organisations design, implement and evaluate (innovation) policies.

Fundamentally, mission-oriented approaches require the ambition to transform landscapes rather than just fixing problems in existing ones. To do so, public sector organisations face a number of inherent barriers. Without addressing these in a systematic matter, the potential for mission success is limited.

## 1. BREAKING SILOS AND COORDINATING FOR MISSIONS

The key to success of missions, next to legitimacy and trust in the mission-setting process, are the capabilities within public bodies to devise bold and ambitious governance structures that enable cross-sectoral and cross-institutional coordination.

Missions aimed at creating and shaping markets are by definition cross-sectoral and should span across multiple public organisations (ministries, departments, national and local level governance). For example, any mission around clean growth will need to work across the departments of energy, transport, and health. They require coordination between various policy fields, synergies and breaking 'silos'. But it is exactly the lack of such coordination capabilities that has become perhaps the most difficult issue in modern day innovation policy-making. The reasons for this can be found in what is called the 'complexity paradox' of modern public policy: the more complex policy issues are, the more compartmentalised policy-making becomes, increasingly fragmented into different government departments and initiatives. On top of that, complex organisational structures, with rigid formal processes, can limit the flow of information, reduce openness and constrain creativity[8].

Breaking silos means taking innovation-led growth outside of the narrow field of research and innovation and putting it at the centre of economic growth

[8] Kattel, R. and Mazzucato, M. (2018), Mission-oriented innovation policy and dynamic capabilities in the public sector. UCL Institute for Innovation and Public Purpose, Working Paper Series (IIPP WP 2018-05). Available online at https://www.ucl.ac.uk/bartlett/public-purpose/wp2018-05

strategies. Optimal impact would be achieved by setting up a mission strategy and coordination under the direct responsibility of the highest offices of the executive power. It creates a more horizontal relationship between those directing economic growth in the finance ministry, and those in the departments that reflect the content of that growth (sustainable growth, inclusive growth, etc). In particular, public investments are often evaluated by ministries of finance in terms of cost-benefit and net present value. These static measures tend to inadequately capture the market creation potential of ambitious public policies, and in particular the dynamic spill-overs between different sectors.

*Recommendation 6:* ***The implementation of missions will benefit from breaking down silos by coordinating actions between departments, with a clear division of responsibilities and ownership. To achieve maximum impact it is key that this is coordinated by the highest offices of the executive power.***

## 2. LEADERSHIP AND AGILE WORKING MODALITIES

Breaking up silos is often successfully achieved by implementation structures that enjoy a high degree of political support, and which have operational autonomy in order to make sure that political cycles would not derail missions. Management of a mission-oriented system of innovation will require specific types of leadership, which encourage risk-taking and adaptive explorative capacity, and that can attract top talent to lead such strategies.

In some instances, this might mean hiring visionary people with a business, scientific or other background in an advisory capacity for a limited time period, to assist the governance structure in the definition and design of the missions. This approach is used in the Horizon Europe research and innovation framework programme through the establishment of mission boards for each of the European R&I missions.

When looking at how missions should be implemented, there are lessons to be learned from organisations that have tackled ambitious mission-oriented projects and have implemented structures which are flexible, adaptable and able to foster bottom-up solutions. This can be fostered through portfolio management so that a specific mission will be targeted, but broad enough to include multiple solutions which require different types of projects to be supported: picking the willing, not pre-determining winners. Putting all eggs in one basket should be avoided.

Organisational flexibility is particularly important in allowing a mission-oriented organisation to respond quickly to different conditions and to the development of novel technologies. This flexibility can be enabled by a governance structure which can grant the organisation independence from more bureaucratic branches of government, and giving implementing agencies reporting responsibilities to public servants. Such agencies are most effective if they are allowed autonomy in pay and remuneration structures, to allow them to recruit for a limited term

# 4. MANAGEMENT OF A MISSION-ORIENTED SYSTEM OF INNOVATION: EXAMPLES AND BEST PRACTICES

Flexible and adaptive portfolio management can benefit from lessons provided by other innovation and funding agencies across the world, such as Yozma in Israel, Sitra in Finland, the Government Digital Service in the UK, or organisations like DARPA or ARPA-E in the USA (Azoulay et. al., 2018[9]). The defining characteristics of the DARPA model are:

1. Organisational flexibility
   a. Independence from branches of government
   b. Flat internal structure
   c. Hiring outside standard government recruitment processes
   d. Fixed term employment of directors and project managers
   e. Flexible contracting mechanisms
2. Bottom-up program design
3. Discretion in project choice
4. Active project management.

top talent with the unique range of capabilities needed to manage complex networked missions.

By leveraging this flexibility through a high-level governance structure, implementing agencies can empower their staff to pursue a bottom-up approach to innovation and embrace the risk inherent in this innovation framework. Such a bottom-up structure means that agencies must connect sectors that may not otherwise be connected, and can then harness this network to pursue the mission projects that emerge.

Finally, implementing agencies should be able to appoint staff in charge of consolidating project results in line with a portfolio approach. With the guidance provided by a high-level mission governance structure, such agencies should place particular emphasis on the need for discretion in project selection and project management. This entails empowering the governance of missions to verify how to allocate funds and resources within a project in order to secure the given objectives, and to make decisions on milestones and technical goals throughout the project's lifetime. Mission projects by definition require the

[9] Azoulay, P., Fuchs, E., Goldstein, A.P. and Kearney, M. (2019), 'Funding Breakthrough Research: Promises and Challenges of the "ARPA Model"', Innovation Policy and the Economy, 19: 69-96.

creation of new knowledge or experience, and therefore pose challenges for conventional project management and evaluation frameworks.

*Recommendation 7:* **The mission governance should be empowered with a high-level structure including leaders from academia, business and citizen groups. These will exert leadership through advice on funding allocation, project selection and evaluation, and experimentation with new work modalities.**

*Recommendation 8:* **Agile procedures for staff exchange between the different policy departments, agencies and implementing bodies involved in missions should be established, promoting experimentation and risk-taking.**

### 3. ORGANISATIONAL RISK-TAKING

The portfolio approach behind mission-oriented R&I (exemplified by the Darpa model in box 4) requires the public sector (or: an *entrepreneurial state*[10]) to welcome uncertainty, accept risks and learn from trial and error. This is a different outlook than focussing only on de-risking, and paying fees to agencies for outsourcing government functions. While some outsourcing is to be expected, the fact it has been done so often to push the blame to others if things go wrong, means that the trial and error process of decision making is not explicitly accounted for. Ultimately this leads to a reduction of government capacity and capabilities in exploration and experimentation — capabilities that are so critical to innovation.

*Recommendation 9:* **A portfolio approach means that the public sector needs to revisit their approach to risk-taking. It should focus less on outsourcing government functions and more on learning from trial and error.**

[10] Mazzucato, M. (2013). The Entrepreneurial State. Anthem Press

## 5. VISION ZERO

In 1997 Sweden introduced the Vision Zero policy that aimed to reduce the number of road-accident fatalities to zero by 2020. Reducing the danger required physical changes on the roads and new policies to enforce traffic laws.

There are now more roundabouts, fewer intersections, and vehicles cannot turn where people cross streets. More pedestrian bridges have been built, bicycles are separated from oncoming traffic and strict policing has reduced the number of drink-driving offences.

Since the scheme began, road deaths have almost halved: 270 people died in road accidents in Sweden in 2016. Twenty years earlier the figure was 541.

### 4. PUBLIC PROCUREMENT FOR SCALING UP

Public procurement is an instrument that could help missions to create new markets.[11] The Internet, GPS technology, the semi-conductor industry and passenger jets are perhaps the most prominent examples that resulted from government innovation-oriented procurement bringing along major economic and social impacts. However, in many countries procurement ends up getting used to simply award the lowest cost bidder and often has to deal with contradicting policy goals such as cost savings, value-for-money, transparency, and siloed sectoral policy objectives such as environment, health or employment. But this does not help to stimulate innovation or high quality goods.

Therefore, public organisations should consciously develop capabilities for public procurement for innovation. A mission-oriented policy framework offers them a way to 'structure' conflicting policy goals by specifying the end result (e.g. accident free roads - see Box 5) based on criteria and characteristics, not the solution (e.g. driverless cars), and allow for plenty of space for experimentation. This helps to coordinate procurement processes across value chains and agencies. Effective public procurement for innovation and missions can create a "pick the willing" dynamic rather than picking winners. The European Commission has already taken steps to promote public procurement as a tool to stimulate innovation, by publishing guidelines on how to best do this[12].

Public organisations can support innovations through procurement in several ways, which should all be

[11] Edler, J. and Georghiou, L. (2007), 'Public procurement and innovation — Resurrecting the demand side,' Research Policy, 36:7, 949-963. Available online at https://doi.org/10.1016/j.respol.2007.03.003.
[12] http://ec.europa.eu/growth/content/commission-advises-public-buyers-how-capitalise-innovation_en
[13] RSA (2017), 'From design thinking to systems change'

## 6. THE SMALL BUSINESS RESEARCH INITIATIVE (SBRI) AND SYSTEMS THINKING

The SBRI is a government funding stream that stimulates entrepreneurs to put forward innovative solutions for societal issues. SBIR falls under the category of pre-commercial procurement (PCP) and is largely used across Europe.

A research project[13] that looked at ways to optimise the potential of the SBRI as a catalyst for social innovation, found that SBRI is effective when a problem is clearly identified and requires technical expertise and imagination to fix. However, its longer term impact relies on there being a market for the eventual product: either within government and public services or in the consumer sphere. The role of the government and public services is to intelligently assess and act to improve the market opportunities for an SBRI innovation.

## 7. THE ADAPTIVE APPROACH OF THE GREEN DEAL IN THE NETHERLANDS

The Green Deal approach in the Netherlands is an accessible way for companies, other stakeholder organisations, local and regional government and interest groups to work with Central Government on green growth and social issues. The aim is to remove regulatory barriers to help sustainable initiatives get off the ground and to accelerate this process where possible. The Green Deal approach forms part of the green growth policy and is a joint initiative by the Dutch Ministries of Economic Affairs, Infrastructure and the Environment and the Interior and Kingdom Relations.

The Green Deal approach is one element in a standard range of policy instruments. It is used to supplement existing instruments, such as legislation and regulation, market and financial incentives, and measures to stimulate innovation. The Green Deal approach is particularly suitable when innovations are actually put into practice, a phase during which projects often encounter barriers. Green Deals bring Central Government closer to companies, stakeholder organisations and interest groups. They give government a more readily identifiable presence and the other players a clear point of contact.

considered as part of a mission-oriented policy framework. Public organisations can create new markets for products and systems that go beyond the state-of-the-art or they can create a demand "pull" by expressing its needs to industry in functional or performance terms. Similarly, they can encourage innovation by providing a "lead market" for new technologies/ solutions[14], or provide a testing ground for innovative products (see box 6).

*Recommendation 10:* **Public procurement of innovative solutions should be promoted through demand-side stimulus and investment, to drive bottom-up innovation. This requires new dynamic metrics that go beyond short-term cost-effectiveness, and "picking winners" in procurement decisions.**

### 5. REGULATORY FRAMEWORKS

Mission-oriented policies are about addressing grand societal challenges through research and innovation activities. But it would not be realistic to expect that societal challenges would be solved by research and innovation activities alone. The solutions that are being developed need to be reflected in the policies that are linked to the challenges. We can develop alternatives

[14] Available online at https://www.emeraldinsight.com/doi/abs/10.1108/JOPP-10-03-2010-B003

to plastics, but if there is no policy in place to drive these alternatives to the market, to stimulate consumers to use them or to enforce the collection and re-use of plastics, the problem of plastics in our oceans and seas will not be effectively addressed. In short, a mission-oriented policy needs a broad policy approach, bringing together all relevant policies, including research and innovation.

Strong, progressive regulations, including State Aid rules and industry standards, can drive innovation and positive behaviours towards achieving mission objectives. Regulations or standards that are not clear or even contradictory, or that lock a sector into a single technology or innovation path can become barriers to innovation and cross-sectoral problem solving. In the development of legislation, it should be considered how innovation can contribute to achieve societal objectives. The design of legislation should ensure that there is room for experimentation of new solutions, to be flexible enough to adapt to fast technological developments, allow for the provision of patient strategic finance in transformational high risk areas, and be outcome oriented (see box 7).

*Recommendation 11:* **Regulation should be used to spur innovation (rather than create barriers) that will contribute to realising public value objectives.**

## 6. FIT-FOR-PURPOSE EVALUATION FRAMEWORKS AND CAPABILITIES

Missions cannot be evaluated based on a simple cost-benefit analysis (CBA). Indeed, if evaluated via CBA the Apollo Moon landings would likely never have seen the light of day. The justification for the Moonshot mission was political – to win the space race. But most of the social and economic benefits of the Moonshot mission were the many technological spin-offs and spill-overs that resulted from the mission's activities. In short, the performance of mission-oriented investments should not be merely assessed in budget-constrained, static, allocative efficiency measures, but in terms of creation of public value, dynamic efficiency and their 'additionality': the extent to which they have been successful at catalysing activity that otherwise would not have happened (see table 1). This approach helps capture the potential for policy to create spill over effects across many sectors of the economy, alter the level of investment and broader trajectory of economic growth. For example, the Concorde plane is not flying today, so according to private sector criteria it is a failure. However, the cross-sectoral investments and innovations it led to should be part of any evaluation that looks at the societal value achieved.

In order to coordinate such varied activities and policies, public policy appraisal and evaluation need to be based on a wider understanding of the value public policies can create. Avoiding government failures is clearly not a good way to coordinate a wider set of policy actions. Therefore, mission-oriented policy needs clear feedback mechanisms. Evaluation has to be adaptive to the specific characteristics of the mission, such as a portfolio of projects, take into account

the contribution of non-governmental actors and capture the positive side-effects of missions (the innovations that develop through the mission agenda, but are deployed outside of the direct mission remit). Dynamic spill-overs are themselves an intermediate objective in missions. Furthermore, evaluation tools and methods should guard public sector against lock-in and tunnel vision in situations where, for example, unexpected technological development makes specific missions irrelevant.

*Recommendation 12:* **Governments should embrace new evaluation frameworks, tools and techniques that go beyond static cost-benefit analysis, but capture spill-over effects that can be directly attributed to mission implementation.**

**TABLE 1. MARKET-SHAPING/MISSION-ORIENTED INNOVATION**

| | MARKET-FIXING | MARKET-SHAPING/MISSION-ORIENTED |
|---|---|---|
| **JUSTIFICATION FOR THE ROLE OF GOVERNMENT** | Market or coordination failures:<br>• Public goods<br>• Negative externalities<br>• Imperfect competition/information | All markets and institutions are co-created by public, private and third sectors. Role of government is to ensure markets support public purpose |
| **BUSINESS CASE APPRAISAL** | Ex-ante CBA – allocative efficiency assuming static general relationships, prices etc. | Dynamic efficiency focused on systemic change to achieve mission (including spill-over effects) |
| **UNDERLYING ASSUMPTIONS** | Possible to estimate reliable future value using discounting/monetisation of externalities/risk assessment; system is characterised by equilibrium behaviour | Future is uncertain because of potential for novelty and non-marginal change; system is characterised by complex behaviour |
| **EVALUATION** | Focus on whether specific policy solves market failure and whether government failure avoided (Pareto-efficient) | Ongoing and reflexive evaluation of whether the system is moving in direction of mission via achievement of intermediate milestones. Focus on portfolio of policies and interventions, and their interaction |
| **APPROACH TO RISK** | Highly risk averse; optimism bias assumed | Failure is accepted and encouraged as a learning device |

*Source: Kattel, R., Mazzucato, M., Ryan-Collins, J., Sharpe, S. (2018), 'The economics of change: Policy appraisal for missions, market shaping and public', IIPP Working Paper, no. 2018-06. Available online at https://www.ucl.ac.uk/bartlett/public-purpose/wp2018-06*

# FINANCE AND FUNDING

Research and innovation missions should not be narrowly viewed as a financing instrument. If framed in ambitious ways they can crowd-in other forms of finance. But for this to happen the eco-system of financing between public and private actors, and the financing framework at the European level, must be understood. The public part of the eco-system will include research funding, public venture capital funds as well as procurement instruments aimed at SMEs (e.g. SBRI – see box 4), national and regional public banks (e.g. Kreditanstalt für Wiederaufbau in Germany, or the Asian Development Bank) and the European Investment Bank. The European Commission has launched the European Innovation Council[15], introducing dedicated programme managers and blended finance of grants and equity investments to support breakthrough innovations that can contribute to mission objectives. On the private side it will include the entire financing landscape from private venture capital, to innovation funds in investment banking. As the private sector tends to be risk-averse, bold mission-oriented funds that are willing to invest in the more uncertain part of the technological and market landscape (and areas with high capital intensity) can have a crowding-in role. Futhermore, it is important to consider how to share not only risks but also the rewards.

## 1. COORDINATING INSTRUMENTS TO CROWD-IN FINANCE ALONG THE FULL INNOVATION CHAIN

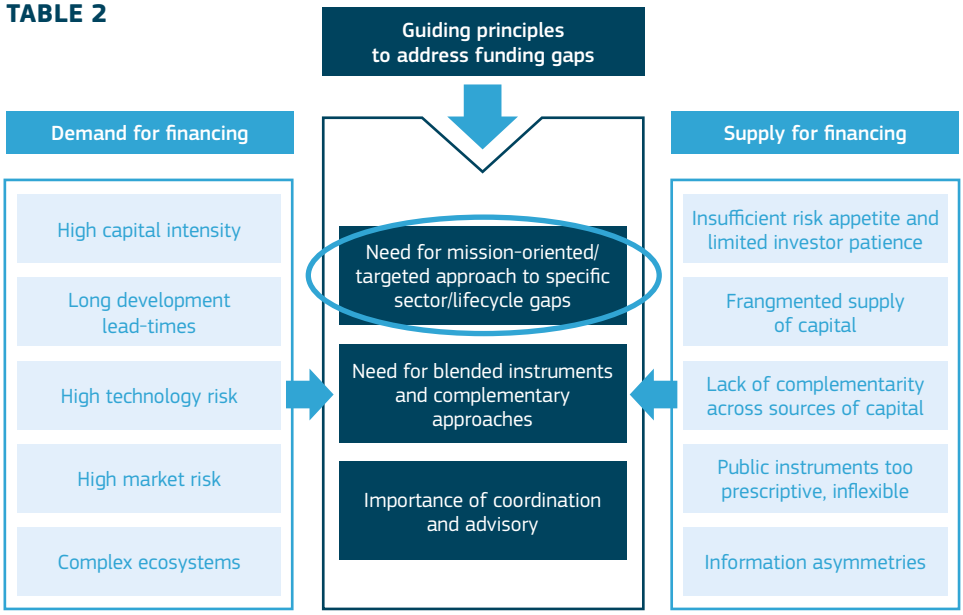
To understand the crowding-in process that can be galvanized from missions, it is key to understand the different levels of risk across the entire innovation chain. Mission-oriented finance can both help coordinate the types of financing that are appropriate for each level of risk, and can also take on the 'investor of first resort' role in the areas of highest risk and capital intensity (see table 2).

Missions will bring together a wide range of R&I activities, from blue-sky, fundamental research projects to market deployment actions. Each of these activities requires a different type of financial support. It is important to have a wide range of funding instruments available to suit different areas of this risk landscape. For example, grants may be more appropriate for visionary, early stage R&I, while equity investments may be suitable for technology based firms looking to scale up. On the other hand, debt instruments such as long-term loans may be better for lower-risk, incremental activities.

Early-stage public funding helps to create and shape new markets and nurture new landscapes which the private sector can develop further. Indeed, from advances such as the internet and microchips to

[15] Available online at https://ec.europa.eu/research/eic/index.cfm

**TABLE 2**




*Source: European Investment Bank*

biotechnology and nanotechnology, many major technological breakthroughs — in both basic research and downstream commercialisation — were only made possible by direct public investments that were willing and able to take risks before the private sector was willing to do so. In other words, public funding can, if structured well, lead to a dynamic 'crowding-in' effect.

To achieve market-creating innovation, in particular in areas such as deep tech, Europe suffers from a systemic failure in its ability to provide the large-scale venture capital needed. At the same time it is important to learn the negative lessons — such as those in biotechnology — from impatient venture capital when it is too exit-driven[16, 17]. What is required in addition to venture capital is patient strategic long term venture capital[18].

Public institutions need to support companies to identify suitable financial instruments and to develop financing plans that are appropriate for the stage of development a firm is at. European R&I missions should aim to bring greater focus and streamlining of the ecosystem of current innovation funding programmes. They should make them more accessible to both businesses and civil society, acting as a bridge with funds that can lead innovative projects in close to market stage to market (see boxes 8 and 9).

[16] Pisano, G. P. (2006), Science business: The promise, the reality, and the future of biotech. Harvard Business Press.
[17] Lazonick, W., & Tulum, Ö. (2011), 'US biopharmaceutical finance and the sustainability of the biotech business model'. Research Policy, 40(9), 1170-1187.
[18] Mazzucato, M. (2013), The Entrepreneurial State. Anthem Press.

## 8. BREAKTHROUGH ENERGY VENTURES EUROPE

The Breakthrough Energy Ventures Europe (BEV-E) is a cooperation between the European Commission and the private sector Breakthough Energy Ventures group to invest €100 Million (€50 Million each) in patient capital in high risk, breakthrough energy technologies.

Through this fund, based on an equity funding mechanism, high risk investments are made in European companies developing ground-breaking clean energy technologies. The use of 'patient' capital means private investors are not expecting an immediate return from their initial investment but rather a long-term reward.

In addition, to ensure effective financial support for missions, the different financing instruments available to the implementation of missions should not only provide a seamless landscape throughout the innovation chain. They should also be coordinated in terms of their scope. The mission objectives should give direction to the objectives of the financing instruments, so that in each stage of the innovation cycle those projects aiming to contribute to a mission will have clear possibilities to apply for public financial support.

*Recommendation 13:* **The establishment of venture capital funds (in both the private and public sectors) that are aligned with missions should be promoted. They should pay attention to the need for patient, not impatient long-term finance.**

*Recommendation 14:* **Policy instruments and finance should be made available for the delivery of missions is long-term, supporting innovation through the life of the mission and being tailored to each stage of the innovation process.**

### 2. ALIGNING FUNDING AT EUROPEAN, NATIONAL AND REGIONAL LEVEL

The EU's unique multilevel governance system is well suited to mission-oriented policies: member states and regions can experiment within larger EU-wide missions and the lessons can then be shared across member states. Different institutions will be better placed to provide different types of finance. This reinforces the idea of the 'networked *entrepreneurial state*[19]' which is not comprised of one ministry or agency, but rather by a set of decentralised interactions between different agencies across the entire innovation chain, in turn interacting with private actors.

[19] Mazzucato, M. (2013), The Entrepreneurial State. Anthem Press

## 9. THE EUROPEAN INVESTMENT BANK NOVEL FINANCING MECHANISMS

The European Investment Bank already has a record of investing in mission-oriented innovation projects and has successfully implemented novel financing mechanisms with the European Commission (such us the InnovFin Infections Diseases Finance Facility). This may hold interesting perspectives for the financing of missions, both in terms of structure and finance products. The EIB's ability to leverage its own public financing to attract private co-investment enables a significant impact to be achieved from limited public resources.

The EIB is well placed to nurture knowledge and expertise and to coordinate stakeholders in the investment ecosystem, in particular national public investment banks. In the context of climate change, this approach is well aligned with the recently published EU High Level Expert Group report on Sustainable Finance which calls for the establishment of 'Sustainable Infrastructure Europe' as a new capacity building organisation sitting within the EIB. It will help to reduce bottlenecks to private finance by spreading best practices across member states on sustainable infrastructure projects. Another example is InnovFin Advisory, where the EIB deploys financial advisory and financial structuring expertise in support of innovative companies, investors and the wider European innovation ecosystem.

However, currently there is significant fragmentation in terms of the available innovation financing streams and instruments at both pan-European and member state level. A company seeking finance faces a complex array of different national and European options. With the aim of amplifying the impact of missions throughout the innovation cycle, the coordination of funding streams at the European, national and regional level is of the utmost importance.

An interactive process between EU, Member State and sub-national levels is not straightforward. The potential synergic effect, described as the difference between the total effect of the action of a set of cooperating objects, and the sum of the individual effects these objects would have if they operated separately, depends on many variables. The various levels of government can have different regulatory frameworks requiring harmonization, mismatches on the time-frames of the parallel funding programmes that need to be syncronised or even political priorities that go in a different direction. Therefore, it is of strategic importance in a mission-oriented approach to align policy priorities across different levels of the EU's governance system in order to

maximise synergies in publicly financed programmes. Thanks to synergies it is possible to strategically combine financing from different European and local instruments, guaranteeing territorial effects at national and regional level of European missions, while avoiding, at the same time, double funding.

*Recommendation 15:* **To maximise the impact of missions, the coordination of European, national and regional funding streams needs to be optimised.**

### 3. CROWDING-IN OTHER SOURCES OF FINANCE

As budgets are limited, missions need to be designed in ways that crowd-in investment and inspire and mobilise other forms of finance. Understanding how this has been done well requires learning from different experiences with financial institutions willing to provide a strategic combination between short-, medium- and long-term finance alternatives.

Missions provide a fertile innovation environment, encouraging bottom-up innovations. Crowdfunding and philanthropic funding could become key in such a context to 'plug the investment gap'.

Crowdfunding could be particularly interesting for missions as they aim to inspire and connect with citizens, potentially raising the opportunity for citizens to engage financially. Different state actors, including national and local governments, and international development agencies, have taken different approaches to crowdfunding in partnership with private actors, with a view of experimenting, 'learning by doing' and understanding what works and what does not work[20]. The hope is to channel more money through crowdfunding as part of their future innovation and aid programmes. However, there are concerns around the risks associated with private citizens investing and potentially losing money. Governments do not want to be perceived as 'picking winners' or make mistakes by supporting crowdfunding projects that could fail (see box 10).

*Recommendation 16:* **Missions should actively promote interaction with EU-wide crowdfunding platforms to finance mission-oriented, bottom-up experimentation.**

Philanthropic funding can have two functions: not only providing additional finance but also acting as a critical friend in guiding the missions themselves through their grant-making to ensure they take into account wider civil society needs and values. Philanthropic foundations can also provide funding for social movements and civil society campaigns that can play an important role in supporting bottom-up innovations. As an example, the Ellen MacArthur Foundation's emphasis on the circular economy provides a powerful framework

[20] In the UK, the government has invested £5 million through the equity platform Crowdcube, is co-investing £100 million through selected peer-to-peer loan platforms (Funding Circle, Zopa, Ratesetter etc.) and is co-investing £1m of Aid money through selected energy access crowdfunding platforms (e.g. TRINE, Global Giving, KIVA etc.). Local councils are also working with local crowdfunding platforms e.g. Swindon Council (UK) has launched two solar bonds with Abundance Generation (a renewable energy focussed crowdfunding platform in the UK).

## 10. EUROPEAN CROWDFUNDING STAKEHOLDERS FORUM

The European Commission has set up a European Crowdfunding Stakeholders Forum to obtain assistance in the development of policies for crowdfunding and has presented a proposal for regulation of the crowdfunding market (for debt and equity) to allow platforms to operate across Europe (by applying for a European passport license). The proposal aims to harmonise the European crowdfunding market solving the issues associated with cross-border investment and improving the protection regime for crowd investors.

for missions focussed on ecological sustainability which otherwise might be captured by particular sectoral interests.

The philanthropic sector is diverse and fragmented. European foundations operate with a variety of funding models, governance structures and geographical remits. Some foundations have set up mission-based organisations to tackle clear global challenges. These organisations mix state and private funding with in-kind or direct support from industry. In order to maximise the opportunities to join forces, public organisations implementing a mission-oriented approach should ensure that their funding programmes are set up in a way which allows for cooperation with foundations, in an ad-hoc manner or on a structured partnership basis.

*Recommendation 17:* **Flexible options should be offered to engage foundations in governing missions, ensuring there are synergies and a lack of duplication in research funding.**

# CONCLUSION

Europe shows scientific leadership, technological excellence, capacity to deal with complexity, ambition to lead on societal challenges and has a wide range of financing instruments. Missions provide a solution, an opportunity and an approach to better connect with citizens, making it more visible how science, research and innovation contribute to the challenges they are faced with on a daily basis. Furthermore, it will increase the impact of public investments in research and innovation activities.

This opportunity is, at the same time, an exciting and demanding challenge. Public actors should move out from their comfort zone, think outside of the box of "market failure" frameworks and be prepared to take the risks of co-creating new markets, not just fixing existing ones.

Missions must be co-created to inspire society at large to focus on long-term societal issues. To be impactful missions need to have widespread legitimacy and acceptance. This greater public engagement, in every stage of the innovation chain, requires to be correctly balanced with an effective portfolio management of these missions with flexible governance structures that enable cross-sectoral and cross-institutional coordination.

This dynamic will attract private investment opportunities and crowd-in other sources of financing in highly uncertain, high risk innovative activities. Mission-oriented policies can show the direction and drive private investment that is based on the perception of future growth opportunities.

From the need to address climate change to rethinking our care systems, missions must be governed in a dynamic way harnessing the full power of European creativity. The key to this will be the ability of public sector organisations, across all member states, to embrace the process of experimentation and exploration that is central to overcoming inertia and creating systems of innovation for the missions to be accomplished. "Mission Possible" in Europe!

# ABOUT THE AUTHOR

**Mariana Mazzucato** (PhD) is Professor in the Economics of Innovation and Public Value at University College London (UCL), where she is Founding Director of the UCL Institute for Innovation & Public Purpose (IIPP). IIPP is dedicated to rethinking the role of public policy in shaping both the rate of economic growth and its direction—and training the next generation of global leaders to build partnerships that can address mission-oriented societal goals.

She is winner of the 2014 New Statesman SPERI Prize in Political Economy, the 2015 Hans-Matthöfer-Preis, the 2018 Leontief Prize for Advancing the Frontiers of Economic Thought and the 2019 All European Academies Madame de Staël Prize for Cultural Values. She was named as one of the '3 most important thinkers about innovation' by the New Republic, and is on The Bloomberg 50 list of 'Ones to Watch' for 2019.

Her highly-acclaimed book The Entrepreneurial State: debunking public vs. private sector myths (2013) investigates the role of public organisations in playing the 'investor of first resort' role in the history of technological change. Her 2018 book The Value of Everything: making and taking in the global economy (2018) brings value theory back to the centre of economics in order to reward value creation over value extraction. It was a 2018 Strategy & Business Book of the Year and was shortlisted for the 2018 Financial Times and McKinsey Business Book of the Year prize.

She advises policymakers around the world on innovation-led inclusive growth and is currently a member of the Scottish Government's Council of Economic Advisors; the UN's Committee for Development Policy (CDP), the Leadership Council of the Sustainable Development Solutions Network (SDSN), SITRA's Advisory Panel in Finland, and Norway's Research Council. She is currently a Special Advisor for the EC Commissioner for Research, Science and Innovation, Carlos Moedas.

### About the UCL Institute for Innovation and Public Purpose (IIPP)

IIPP is a department within University College London (UCL) — founded in 1826 to solve grand challenges —and part of The Bartlett faculty, known internationally for its radical thinking about space, design and sustainability. IIPP is dedicated to rethinking the role of public policy in shaping both the rate of economic growth and its direction—and training the next generation of global leaders to build partnerships that can address mission-oriented societal goals.

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The European Commission, through Carlos Moedas, Commissioner for Research, Science and Innovation, invited Professor Mariana Mazzucato to draw up strategic recommendations to maximise the impact of the future EU Framework Programme for Research and Innovation through mission-oriented policy.

This report is the result of Professor Mazzucato's reflections based on her research, with inputs through a consultation process with internal and external stakeholders of the European Commission.

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