

Mission-oriented innovation policies in Europe: From normative to epistemic turn?

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Mission-oriented innovation policies in Europe: From normative to epistemic turn?

Rainer Kattel and Mariana Mazzucato

Abstract:

Mission-oriented policies have taken Europe by storm. Their widespread application vindicates placing missions at the heart of the so-called normative turn in science, innovation and technology policies. This article is concerned with whether the normative focus on directionality is accompanied by the epistemic turn – the way knowledge is created and used by public institutions – necessary to implement such policies. Richard Nelson implicitly argued for such a turn in his seminal *Moon and the Ghetto*, and it is increasingly dominant in academic discussions of missions. This article is based on a literature review, interviews with policymakers and participatory observations from workshops with policymakers. It shows that, first, far from being a uniform policy practice, missions are being implemented in quite different ways, largely depending on contextual factors. Second, it argues that while some interesting practical examples of the epistemic shift exist, most missions are implemented through existing institutions and policy schemes. Missions are understood through incumbent epistemological and analytical tools, and accordingly, many missions are constrained to business-as-usual practice and incremental changes in working methods. This article argues that experimentation and learning around missions will be hampered unless the capability and analytical gaps are consciously targeted.

JEL codes: O25, O38.

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1. Introduction: the return of missions¹

While up until the 1980s, mission-oriented innovation policies played a critical role in the post-war recovery and growth of developed and developing countries, they became decidedly less important in the wake of Thatcherite-Reaganite economic policies and public sector reforms (Foray, Mowery and Nelson 2012; Mazzucato 2016). However, during the 2010s and early 2020s, missions have made a strong comeback: governments in Europe and elsewhere are increasingly turning their attention towards tackling ‘grand challenges’ or ‘wicked issues’, such as climate change, through science, technology and innovation (STI) policies (Borras and Edler, 2020; Mazzucato, Kattel and Ryan-Collins, 2020). The key driver behind challenge-driven STI policy initiatives is the ambition to achieve a particular type of economic growth (e.g., smart, inclusive, sustainable), and this is a direct admission that economic growth has not only a rate but also a direction and can, thus, have multiple different directions (Mazzucato 2017). Policymakers have a choice, for instance, of how quickly and how to decarbonise economic sectors. These alternative pathways include diverse trade-offs, spillovers and dynamic efficiency changes across sectors. Thus, as Stirling argues, it is not about picking the one and only direction of change, but a wider directionality that includes and enables multiple competing and complementary pathways (Stirling 2009) and experimentation along the way.

In policy practice, the European Union has arguably been the leading policy actor in bringing missions back. For over a decade, the EU has attempted to re-orient its STI agenda towards the grand challenges (Soete et al. 2017). From the Lund declaration in 2009 onwards, the EU has attempted to tackle what has been called ‘orientation failure’ inherent in its innovation policies (Daimer, Hufnagl and Warnke 2012). In 2021, the EU’s Horizon Europe R&D funding programme commenced. It is committed to spending 53.5 billion euros until 2027 through Horizon Europe’s second pillar called “Global Challenges and European Industrial

Competitiveness”, which includes five mission areas,² and encouraging member states to refocus their STI policies according to the mission-oriented approach (Mazzucato 2018; European Commission 2023). This so-called ‘normative turn’ in STI policies is likely to be reinforced by COVID-19 responses that promise to build back better (Mazzucato et al. 2021) and the various implications of the war in Ukraine. However, while the EU and other leading economies have promised to increase public spending on various challenges they face, the debate on effectively aligning and absorbing these funds is only beginning (Mazzucato, Carreras and Mikheeva, 2023). As important policy directionality is, capacities to implement and achieve ambitious goals is as important.

Particularly in the academic discourse, we can see a convergence of normative and epistemic turns. Thus, for instance, Janssen et al. (2021) argue that ‘missions are subject to problem-based governance, which encompasses the various efforts focused on directly adapting socio-economic systems dealing with the societal challenge... Missions are also in dialogue and tension with the structures and arrangements involved in innovation governance..., which impact upon the rate, direction, and quality of activities in the innovation system’ (Janssen et

1 The research for this paper has been partially supported by the Horizon 2020 project Growinpro, OECD Observatory of Public Sector Innovation and Vinnova. We would like to thank Alberto Inda Razo, Diana Morales Aristizabal and Miran Lorca De Urarte for their help with the research for this article; and participants at the EuSPRI 2021 conference for their feedback on an earlier version of it.

2 One of the authors, Mariana Mazzucato, wrote two key reports for the European Commission in the run up to the Horizon Europe (Mazzucato 2018 and 2019). The mission areas are: Adaptation to Climate Change: support at least 150 European regions and communities to become climate resilient by 2030; Cancer: working with Europe’s Beating Cancer Plan to improve the lives of more than 3 million people by 2030 through prevention, cure and solutions to live longer and better; Restore our Ocean and Waters by 2030; 100 Climate-Neutral and Smart Cities by 2030; A Soil Deal for Europe: 100 living labs and lighthouses to lead the transition towards healthy soils by 2030. The European Commission’s official missions homepage is here: https://research-and-innovation.ec.europa.eu/funding/funding-opportunities/funding-programmes-and-open-calls/horizon-europe/eu-missions-horizon-europe_en.

al. 2021; Björk et al. 2022). Hekkert et al. (2020) have proposed a mission-oriented innovation system as 'the network of agents and set of institutions that contribute to the development and diffusion of innovative solutions with the aim to define, pursue and complete a societal mission' (Hekkert et al. 2020). Similarly Tödtling et al. (2021) have applied a mission-oriented logic to regional innovation systems where mission orientation 'constitutes the wider regional (territorial) framework, reflecting the capacity of regions to address various and partly interrelated challenges' (Tödtling, Tripl and Desch 2021). These arguments indicate that ambitious policy goals such as missions require rethinking some of the foundations of how public organisations gather and analyse information, and appraise and evaluate policy interventions – the epistemic foundations of policy making.

The aim of this article is to investigate the emerging mission-oriented innovation practice in Europe, with a particular focus on whether there is a convergence of normative and epistemic turns as the abovementioned conceptual developments suggest. The article takes its vantage point from Nelson's admonition that while we can send a man to the moon, we continue to grapple with solving the problems on earth (Nelson 1977). Nelson implied that to tackle socio-economic challenges we need a different epistemic framework. This article explores whether the emerging practice in Europe is any closer to discovering such new epistemic frameworks. We will show that while there is plenty of evidence of the normative turn, the epistemic one seems to be much rarer in actual policy practice.

We focus on Europe as it is arguably the forerunner in such policy practices, while offering a variety of capitalist and politico-administrative systems. To answer these questions, the article is based on systematic literature review, interviews with policymakers in selected countries and discussions from a number of workshops with policymakers from Europe. As many such policies have been initiated only during the past few years, the article is explorative in its nature; it will provide a snapshot of emerging practices and issues.

The article is structured as follows: the next section briefly introduces the research design; this is followed by a summary of the main findings; and the article concludes with a discussion of the emerging challenges around mission-oriented innovation policies in the European context.

2. Research design

The article takes an interpretivist and hermeneutical approach to understanding knowledge in social sciences as a process of sense-making (Maykut and Morehouse 2002; Drechsler 2004). In this case, the sense-making includes a literature review, interviews with policymakers and participatory observations from workshops with policymakers.

The literature review draws on both academic databases as well as the rapidly expanding analytical collections developed by the OECD (2021), the European Commission and academic research institutions such as Fraunhofer (Wittmann et al., 2021), the Mission-Oriented Innovation Policy Observatory (Hekkert et al. 2020)³ and the Mission-Oriented Innovation Network at the UCL Institute for Innovation and Public Purpose (UCL IIPP)⁴. Importantly, the article does not cover actual policy documents as these have been discussed in great detail in Fisher et al. (2018), Bertelsmann Stiftung (2021) and Larrue (2021). Rather, the article utilises a

3 The observatory is located at Utrecht University. See: <https://www.uu.nl/en/research/copernicus-institute-of-sustainable-development/mission-oriented-innovation-policy-observatory>.

4 More info here: <https://www.ucl.ac.uk/bartlett/public-purpose/partnerships/mission-oriented-innovation-network-moin>.

literature review approach to supplement the abovementioned policy reviews.

The scope of the literature review consists of academic papers, book chapters and publications between 1990 and 2020. The initial search was carried out on titles and abstracts for Boolean search strings⁵. The search strings were clustered around two sets of issues: first, articles discussing innovation and innovation policy and missions, societal challenges, SDGs, transformation and transition; second, articles discussing STI organisations, new ways of working (e.g., service design) and capabilities. The aim of using multiple keywords was to ensure the broad inclusion of literature over the past two decades and across various disciplines. In summary, the screening and selection processes identified a total of 660 references and excluded 389 references, yielding a corpus of 271 references for inclusion in qualitative synthesis as of August 2022.

The academic literature review was complemented by, first, 23 interviews with stakeholders in Sweden, the UK and Latvia⁶; and, second, by key takeaways from a series of workshops the OECD Observatory of Public Sector Innovation (OPSI) and UCL IIPP carried out in 2020 and 2021;⁷ and by workshops carried out by UCL IIPP's Mission-Oriented Innovation Network during 2022 and 2023.⁸

The choice of countries covers both traditional types of capitalisms in the sense of varieties of capitalism literature (liberal and coordinated market economies; Hall and Soskice 2001) and a hybrid type from Central and Eastern Europe (Karo 2011). The three countries also fall into different administrative traditions (Peters 2021): Anglo-American, Scandinavian and mixed traditions. In addition, in the European Union innovation scoreboard, these countries fall into three different performance groups (leaders, strong and moderate performers, respectively). Thus, these three countries should give us diverse input for discussing mission-oriented innovation policies in Europe.

3. Main findings

This section is structured into four segments according to dominant keywords and concepts found in the literature review, the interviews and workshops:

- 1) what are the main drivers of mission-oriented policies;
- 2) what kind of support structures are used to facilitate missions;
- 3) what are the specific tools and methods used in missions; and
- 4) what kind of skills and capacities are deemed necessary for missions.

5 The data sources used in this study include the following electronic databases and manual sources: first, core electronic databases: Scopus, Web of Science, EBSCO, ProQuest, Wiley; and second, manual searching in Google Scholar, hand-scanning of related websites, e.g., OECD, European Union, Nesta UK, etc.

6 The interviews were carried out during 2021 and focused on lead agencies (UKRI in the UK; Vinnova in Sweden; and Investment and Development Agency of Latvia). The UK case has been discussed in detail in McLaren and Kattel (2022) and the Swedish one in Kattel (2022).

7 Over 150 civil servants, economists, business leaders and policymakers from 36 countries took part. For further details, see summary in Conway (2020).

8 The workshops are captured in case studies and blogs available at <https://www.ucl.ac.uk/bartlett/public-purpose/partnerships/mission-oriented-innovation-network-moin>.

3.1 What drives mission-oriented policies?

In emerging policy practice, governments are utilising mission-oriented innovation to target a wide range of challenges, from basic scientific advances (e.g., combating cancer) to modifying human behaviour (e.g., food systems). This has led to various attempts to describe mission-oriented innovation types, particularly focusing on what kind of challenges missions are attempting to tackle (Fisher et al. 2018; Wittmann et al. 2021). These typologies find that missions are either attempting to accelerate existing STI practices (e.g., supporting applied research in batteries for sustainable transportation) or set 'transformative' goals that aim to radically change existing systems (e.g., supporting transition to a circular economy). Another way to differentiate is to look at how and by whom missions are designed and implemented. Thus, for instance, OECD's recent research categorises missions by their level of intervention (centre of government, ministry/agency, programme, ecosystem) (Larrue 2021). A third way to look at mission taxonomy is implementation. There are, for instance, top-down coordination missions (such as Germany's High-tech Strategy 2025), sectoral coordination missions (such as the Topsectoren approach in the Netherlands), place-based vision- or consensus-building missions (such as Missions València 2030) and user-centric behavioural missions (such as the food and street missions developed by Vinnova in Sweden).

While these typologies are useful for understanding the rapidly evolving missions landscape, it is also clear that there is no common classification of missions. On the contrary, missions seem to become an umbrella term that covers multiple transformation- and challenge-oriented policy approaches. There are, however, a number of common drivers behind missions:

First, it is increasingly clear to many decision-makers that societal challenges are 'wicked'. As Wanzenböck et al. 2020 have elaborated, factors that make challenges wicked are a high degree of contestation, complexity and uncertainty. While it is unclear whether such characteristics are useful in actual policy practice (Levin et al. 2012; Peters 2017; Peters and Tarpey 2019), the contestation, complexity and uncertainty underlying such challenges as climate emergency make the 'wickedness' perhaps the key driver of adapting missions as a policy approach.

Second, siloed policy design and implementation processes are perceived to be key obstacles in tackling the abovementioned complexity of policy challenges. Accordingly, the mission-oriented approach promises a new way to coordinate policies within the STI field and in a broader sense (Kattel and Mazzucato 2018; Wittmann et al. 2021). Importantly, missions do not superimpose a top-down approach to STI or another policy arena, but rather seek to balance overall goal-setting with bottom-up experimentation and open-ended pathways on how to achieve the goals (Mazzucato, 2021). This is the reason why, in practice, mission design often focuses on stakeholder engagement and co-creation. Slotting missions into existing policy-making infrastructure, such as tasking existing STI agencies to implement missions, risks with 'mission washing' – existing policies receive a new label. Accordingly, coordination remains one of the key challenges in mission practice. A case in point is the EU's Horizon programme in which missions are part of one of its pillars, without being coordinated with, for instance, the EU's Green Deal.

Third, particularly in the area of STI policies, there is a growing sense of the ineffectiveness of some of the existing policy tools (OECD 2015). Specifically, over the past couple of decades, STI policy has been guided by the idea of increasing the (external) competitiveness of economies and this has led to analytical frameworks seeking to understand better the impact of individual policy measures (Kattel et al. 2018, 2020; Tödting, Trippel and Desch 2021). Such an approach has relied on the idea of market failure as the dominant justification for STI interventions. However, market failure-based interventions are seen to have two main problems:

first, they tend to focus on individual measures rather than policy mixes (Edler et al. 2016) and thus create a false sense of causality; and second, the market failure approach re-enforces a reactive focus on STI policies, which makes coordination of various policies particularly challenging. In this context, a missions-oriented approach is understood as an ex-ante market-shaping policy that enables, as a common goal, the design and implementation of a policy portfolio of various actions oriented towards a wider directionality.

3.2 Key support structures of missions

Mission-oriented innovation policy is supported and delivered by three often interlinked policy structures: institutional entrepreneurship, specific funding mechanisms and procurement.

3.2.1 Institutional entrepreneurship

As Grillitsch et al. argue, 'Institutional entrepreneurs understood as actors who initiate changes that lead to a divergence from existing institutions are thus essential for providing directionality' (Grillitsch et al. 2018). Accordingly, one of the key challenges for mission-oriented innovation is promoting institutional entrepreneurship to change the status quo of policy practices and actively instil overt normative policy goals. In practice, this can take various forms of institutional entrepreneurship. Importantly, institutional leadership can emerge through repurposing existing institutions or creating new ones. For instance, Germany's KfW plays an important role in its mission practices, but in Scotland, the newly created national development bank has taken up a similar role.

As mission-oriented innovation often targets 'wicked' policy issues with coordination challenges, one of the most often used support mechanisms for missions is the creation of new coordination structures. Thus, for instance, the European Union has created mission boards for each of its five missions.⁹ However, mission governance can be implemented and supported through the evolution or repurposing of existing coordination mechanisms. The Netherlands introduced the so-called Topsectoren approach in 2012 in order to strengthen coordination and collaboration between various STI system actors. The nine sectors that were selected were based on R&D and export-intensive domains like agrifood logistics, life sciences and health, and high-tech systems and materials, among others.¹⁰ While the primary goal of this approach was originally to improve the match between the knowledge demands of innovative firms and the activities of research institutes, it gradually shifted towards more transformative goals as the Mission-oriented Topsector and Innovation Policy (MTIP), now containing 25 missions within four themes. While much of the Topsector governance has evolved into MTIP governance, perhaps the most marked difference is the creation of mission teams: 'They are positioned as the engines for driving changes, as formally their tasks include the developing, executing and organizing – through engaging various ecosystem actors – of both the missions and the multi-annual innovation programs' (Janssen 2020). Similarly, the UK's 2017 Industrial Strategy introduced the Industrial Strategy Challenge Fund, 23 goal-oriented 'challenges', each led by a challenge director from the industry (McLaren and Kattel 2022).

Creating new leadership posts within existing organisations can also provide institutional entrepreneurship for mission directionality. Thus, for instance, the Swedish innovation agency Vinnova created a new post for the director of strategic design in order to rethink its approach to innovation policy. Vinnova, established in 2001, can be seen as a relatively standard innovation policy agency, advising the government on innovation policy, and designing

⁹ For further details, see: https://ec.europa.eu/info/research-and-innovation/funding/funding-opportunities/funding-programmes-and-open-calls/horizon-europe/missions-horizon-europe/mission-boards_en.

¹⁰ The original sectors and processes are briefly described here: <https://www.topsectoren.nl/innovatie>.

and implementing innovation support measures (Chaminade and Edquist 2006). However, as it turned its attention to mission-oriented innovation policies in the late 2010s, Vinnova did something quite different to standard innovation agencies. It created the director of strategic design position and hired a designer for this post. Drawing on the criticism of typical technocratic policy design processes, a more engaged innovation practice was developed in detail for the Swedish missions (Hill 2022). Taking the mission themes of healthy sustainable mobility and healthy sustainable food as their starting points, Vinnova coordinated intensive co-design sessions across Sweden, with up to 400 different stakeholder organisations engaged in 'actors workshops' (Hill 2020). Similar to the Dutch case, the Swedish application of missions can also be understood as a layering of missions into the existing, evolving policy practice and an effort to move beyond the competitiveness paradigm (Rohracher, Coenen and Kordas 2022).

When we look at mission-oriented innovation through the broader lenses of public sector reform, we can detect that many governments are attempting to establish innovation and policy labs as institutional entrepreneurs. This reflects the adaptation in the public sector of new working practices from (strategic) design, and agile software development practices from private and third sectors. As recent studies have shown, such practices are mostly taken up by new, often peripheral public organisations in the form of public sector design, digital and innovation labs (Hill 2015; Bason 2017; Tönurist, Kattel and Lember 2017; Mergel, Ganapati and Whitford 2020). These working practices focus on agile processes such as prototyping and experimentation, relying on epistemological frameworks from action research and ethnography rather than economics or public policy analysis (van Buuren et al. 2020). In addition to Vinnova, Latvia has also explicitly turned to design to develop its mission approach. Local governments such as the London borough of Camden have also relied on design as the key practice in mission development. This indicates that deeply anchoring experimentation into the mission practice requires different epistemic frameworks and related capacities in public organisations.

3.2.2 Funding mechanisms

There is emerging evidence that public funding for missions yields the largest multiplier compared to other policy interventions (Deleidi, Mazzucato and Semieniuk 2020; Dosi et al. 2021). However, missions are being funded through multiple avenues: first, governments are repurposing or upgrading existing funding mechanisms or institutions to be more mission-oriented or to serve a specific purpose in a mission-oriented policy mix; second, new funding mechanisms have been introduced; governments can also, third, create entirely new funding institutions such as mission-oriented public banks; and fourth, particularly for green missions, 'greening' central banks and financial regulations has become a pivotal area through which sustainability transition is supported.

One example of repurposing or upgrading is the abovementioned policy evolution in the Netherlands, where sectoral coordination and cooperation policies have gradually evolved into a mission-oriented policy mix targeting a variety of missions (Janssen 2020). Similarly, in 2017 the UK government launched a new Industrial Strategy that included four mission areas (clean growth, ageing society, future of mobility, and artificial intelligence and data economy) and introduced the Industrial Strategy Challenge Fund (ISCF) which focuses on 23 challenges across the mission areas.¹¹ The ISCF, in turn, is part of a larger National Productivity Investment Fund established in 2016. Also in this case, mission funding evolved within a wider change in the STI funding and institutional landscape (McLaren and Kattel 2022).

Similarly, the European Investment Bank (EIB) has become one of the main providers of long-

11 For further details on the ISCF, see <https://www.ukri.org/our-work/our-main-funds/industrial-strategy-challenge-fund/>.

term finance, as well as risk-sharing, in the EU and has been taking the lead in key policy areas, such as in climate action finance (by committing to dedicating 50% of financing to climate action by 2030) (Mazzucato and Mikheeva 2020). Further, the EIB is the lead implementing and advisory partner in the InvestEU Programme, one of the key components of the EU financing framework designed for 2021-2027.

However, governments can also repurpose existing institutions, such as state-owned companies (Gasperin et al. 2021). For instance, the Danish public energy company Ørsted has adopted a wholesale renewable energy strategy. By the end of 2019 Ørsted had invested DKK 193 billion in renewable energy and has been hailed as the 'first green energy major' (Sheppard 2020). During this shift, it revamped the industrial landscape within offshore wind in Denmark (Algers and Kattel 2021; Voldsgaard and Rüdiger 2021).

Governments can also create entirely new funding mechanisms. Thus, for instance, in 2021 Denmark's Innovation Agency published a call for roadmaps for mission-driven green partnerships. The fund 'encourages all relevant stakeholders across the Danish research and innovation system to come together to contribute their expertise, and propose a realistic and robust path towards the development of cutting-edge solutions within the four missions – ranging from strategic research to commercialization, with a focus on short-, mid- and long-term impact.'¹² The call is funded by DKK 700 million of public money.

As an example of a new mission-oriented institution, in 2020 Scotland created 'a mission-led development bank providing patient capital to build a stronger, fairer, more sustainable Scotland.'¹³ The bank is capitalised with £2 billion of public funds and focuses on three missions (achieving a just transition to net-zero carbon emissions by 2045; extending equality of opportunity through improving places by 2040; harnessing innovation to enable our people to flourish by 2040) (Mazzucato and Macfarlane 2019).

One topic that has received growing attention in the academic debate is the role of central banks and financial regulators in addressing climate-related financial risks (Campiglio et al. 2018). Since the 1990s, central banks have narrowed their mandates to focus on price stability and limited their interventions to adjustments of the reference interest rate. However, since the Global Financial Crisis of 2008, central banks have increasingly used a wider range of 'unconventional' measures, including quantitative easing and various other short- and longer-term liquidity programmes to stimulate the economy. The extensive use of these tools – often with sectoral conditions (e.g., certain re-financing lines offered by the European Central Bank (ECB) are only available to Eurozone banks if they commit to financing SMEs or other non-financial corporations) – has raised questions about central banks' market neutrality and independence. This, in turn, has led to suggestions that central banks might do more to direct finance towards green growth. Despite the large potential, research suggests that the ECB's corporate bond purchases mirror the investment choices of financial markets and thereby have so far mostly favoured large carbon-intensive companies (Matikainen, Campiglio and Zenghelis 2017; Jourdan and Kalinowski 2019). In fact, the ECB portfolio is currently contributing significantly to biodiversity loss (Kedward, Ryan-Collins and Buller 2021).

3.2.3 Procurement

For the first generation of mission-oriented policies, public procurement was a key means of supporting public (military) missions (Mowery, 2012). The current wave of mission-oriented

12 Further details are available here: <https://innovationsfonden.dk/en/news-press-jobs/now-open-call-roadmaps-mission-driven-green-partnerships>.

13 The quote is from the website of the new public bank: <https://www.thebank.scot>. See also Mazzucato and Macfarlane (2019).

thinking allocates an even wider role for public procurement. As argued by Lember et al., 'Public procurement is increasingly seen as a horizontal policy measure that should be applied across the public sector and regardless of the characteristics or missions of public agencies' (Lember, Kattel and Kalvet 2015; Mazzucato 2020).

The idea is that by placing a sophisticated demand on markets, preferably through functional requirements and standards (Edquist and Zabala-Iturriagoitia 2020), public procurers can introduce strong incentives for private providers to come up with new solutions or to upgrade their production-related processes in order to cope with the demand made by government.

Procurement can, in theory, be used in the context of missions in at least two ways: procurement as part of the policy mix versus procurement as an organisational practice to achieve policy goals.

First, we can talk about procurement that is directly related to mission implementation. For instance, sustainability-focused missions that are explicitly implemented through specific targeted green procurement practices or tenders aimed at inducing increased private R&D spending in carbon-neutral technologies. This use of procurement corresponds to the normative approach to policymaking: the normative policy goals are expressed through the demand created via the procurement (Mazzucato 2020).

Alternatively, procurement can serve missions as an organisational practice of relating to the markets. Thus, for instance, public digital agencies' agile procurement practices help these agencies achieve their policy goals (Fernandez-Monge Cortazar et al. 2021; Kattel and Takala 2021). This use of procurement corresponds better with epistemic changes in policymaking: procurement enforces different feedback loops for policymakers.

In mission practice, the normative approach is used almost exclusively, particularly in the form of green public procurement (GPP) (Cheng et al. 2018), yet the field is quite undertheorised and researched (Testa et al. 2012; Chiappinelli and Zipperer 2017).

3.3 Emerging tools and methods

In principle, as there are multiple pathways for the mission-oriented approach to be used in public policy, it can rely on a wide variety of policy-making tools and methods. However, there are a number of quite specific tools and methods that are increasingly favoured by public organisations implementing missions:

First, many mission-oriented approaches attempt to bring new ways of working into the public sector, particularly around experimentation and stakeholder engagement. As mentioned above, such approaches rely on strategic design and similar approaches with mostly qualitative tools and methods.

Second, missions typically rely on a portfolio approach of investment into projects. Rather than viewing policy effectiveness through the lenses of single interventions and respective risk mitigation activities, a mission-oriented approach seeks to tackle uncertainty through supporting multiple solutions to a policy problem.

Third, governments are seeking ways to evaluate missions in new, public value and spillover-focused frameworks and methodologies. These might include qualitative approaches such as systems thinking and quantitative approaches such as investment multipliers and agent-based modelling.

All three sets of tools and methods rely on key differentiation between market failure-fixing (cost-benefit analysis) and market shaping as justification of public sector activities (Kattel et al.

2018, 2020; Mazzucato and Ryan-Collins 2019). Table 1 summarises these two approaches to policy justification and how they lead to very different assumptions about policy processes and tools, including measurement and evaluative frameworks.

Table 1: Market-failure versus market-shaping approaches to policy

	Market-fixing	Mission-oriented
Justification for the role of government	Market or coordination failures: <ul style="list-style-type: none"> ▪ Public goods ▪ Negative externalities ▪ Imperfect competition/ information 	All markets and institutions are co-created by public, private and third sectors. The role of government is to ensure markets support public purpose
Policy appraisal	Ex-ante cost-benefit analysis (CBA) – allocative efficiency assuming static general relationships, prices etc	Focused on systemic change to achieve mission – dynamic efficiency (including innovation, spillover effects and systemic change)
Underlying assumptions	Possible to estimate reliable future value using discounting/monetisation of externalities/risk assessment; the system is characterised by equilibrium behaviour	Future is uncertain because of potential for novelty and non-marginal change; the system is characterised by complex behaviour
Policy evaluation	Focus on whether specific policy solves market failure and whether government failure is avoided (Pareto-efficient)	Ongoing and reflexive evaluation of whether the system is moving in the direction of the mission via achievement of intermediate milestones. Focus on the 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: Adopted from Kattel et al. 2018.

3.3.1 New ways of working and knowing

A market-shaping approach utilises, in theory, quite different epistemology of what and how we know about policy-making processes and their impact. This has brought the attention of policymakers to learning from and incorporating new methods and analytical tools such as strategic design, complexity economics, foresight, policy labs, etc (Tönurist, Kattel and Lember 2017; Mergel, Ganapati and Whitford 2020; van Buuren et al. 2020). As we have shown above, Vinnova coordinated intensive co-design sessions across Sweden, with up to 400 different stakeholder organisations engaged in 'actors workshops'. The underlying principle for the extensive engagement process is to generate a different kind of knowledge base for innovation policy action, closer to 'users' of specific policy outcomes, such as school pupils, teachers and parents. Latvia's mission creation approach has taken a similar, design-led approach focusing on user workshops and policy tools open for experimentation (such as using regulatory sandboxes for mission implementation), yet most governments develop and implement missions in predominantly traditional ways.

Public sector capacity is typically defined as the set of skills, capabilities and resources necessary to perform policy functions, from the provision of public services to policy design and implementation (Wu, Howlett and Ramesh 2018). Contemporary missions assume the simultaneous existence of capacities to plan for the long term, for large-scale coordination and agile experimentation (Kattel 2022; McLaren and Kattel 2022). Such complex sets of capacities indicate the changing role of the state in socio-economic transitions (Borrás and Edler 2020) and the importance of 'reflexive governance' (Rip 2006). As summarized by Fisher et al 2018: "Mission-oriented R&I initiatives must be reflexive and flexible enough, so that they can be reassessed and adapted to new developments and challenges, or possibly ceased." Particularly green transitions and missions have focused on "transformative capacities" (Borrás et al., 2023) and, more specifically, on what does transformation means for street level bureaucrats (Braams et al., 2023).

Importantly though, mission-oriented policies are implemented in specific country contexts and thus, capacities reflect existing strengths and weaknesses. For instance, in countries with strong innovation systems such as Sweden, policymakers are faced with coordinating a number of policy actors from central and local governments and engaging with incumbent industrial leaders. By contrast, catching-up countries such as Latvia can move perhaps more quickly as stakeholder groups are smaller. On the other hand, the implementation can rely on fewer actors in both the public and private sectors.

While in academic discussions, there is much attention given to the capacity for missions, in policy practice, it is rare that public organisations in charge of missions invest in organisational and individual learning and training.

3.3.2 New approaches to appraisal and evaluation

As Janssen et al 2021 argue: "it seems disproportionate to base evaluations entirely on the extent mission goals are achieved", and accordingly, there is "the need to develop reflexive and formative evaluation approaches for assessing and adapting the ways missions relate to systemic transformation" (Janssen et al., 2021; Sharpe et al., 2021).

Thus, for instance, the UK's government added a chapter on how policy-makers could evaluate transformative change in 2020 to its policy evaluation and appraisal guidance (so-called Green Book). The new guidance for transformational change evaluation draws on the idea of systems mapping: "Where significant transformational change is an objective it is important to map the key systems effects and research the likelihood, magnitude and location of tipping and leverage points." Similarly, Sharpe et al call for a "risk opportunity analysis" – "a more general form of

cost-benefit analysis appropriate for situations of non-marginal change, heterogeneous actors, and fundamental uncertainty" (Sharpe et al., 2021).

Another relevant way to appraise and evaluate dynamic efficiencies, and hence missions, is the application of public value in this context. For instance, building on the market failure concept, Bozeman has developed the idea of public value mapping, explicitly focusing on public value failures which occur "when core public values are not reflected in social relations, either in the market or public policy" (Bozeman, 2002). While these are essentially negative assessment criteria, public value mapping can also be used to gauge the market-shaping impact of public organisations. A well-known example is the UK's BBC which uses public value tests to understand and justify its impact on the economy and society (Mazzucato et al., 2020).

However, the mission practices tend to predominantly use existing monitoring and evaluation tools despite strong theoretical arguments for developing new tools (Rohracher, Coenen and Kordas, 2022).

4. Discussion: "big science for big problems" vs "small pieces loosely joined"?

The previous generation of mission-oriented policies has often been characterised by a 'big science for big problems' mindset epitomised in the Moonshot mission (Ergas, 1987). The current iteration of missions is based on much more nuanced theoretical scaffolding emphasising the social and intractable nature of challenges which require broad experimentation in tackling them (Mazzucato, 2021). In practice, this seems to mimic a 'small pieces loosely joined' landscape, to use a phrase from David Weinberg's eponymous book. In some cases, such as Vinnova, this seems a conscious choice: missions are not practised as large state projects but rather as society-wide efforts (to transform mobility, for instance) of multiple smaller tests and experiments to learn what works in different contexts (for instance, in transforming mobility), to be scaled in due course. In this case, the lead agency's role is that of mission orchestration (Danish Design Center, 2021). In practice, such a role seems to be quite challenging as typical innovation agencies do not possess strong capacities in stakeholder networking and managing the ecosystem.

The academic discourse and policy practice certainly converge around the normative turn, particularly in STI policies. One would struggle to find a European country not attempting to implement a version of missions – at least on paper and/or in policy rhetoric. The actual policy practice tends to be more uneven. One can also argue that the COVID-19 pandemic and the war in Ukraine have reinforced the need for normative frames, as witnessed by massive recovery and green transition investments on both sides of the Atlantic. There are, however, also the first signs of 'mission creep', as some public organisations and policymakers are using missions as a label for their existing policies and ideas without actual engagement with the underlying concepts.

On the other hand, the epistemic turn predicted by the academic discourse is rarely to be found in policy practice. There are interesting attempts (e.g., Vinnova's focus on strategic design), but predominantly missions are implemented through business-as-usual practice. As discussed above, missions are mostly implemented by existing organisations and often by augmenting and upgrading existing interventions. Thus, incrementalism is to be expected. Particularly, large-scale experimentation within missions seems to be very challenging for public organisations

Accordingly, we can question whether the mission practice has moved beyond the challenge posed by Richard Nelson in the late 1970s: why can we go to the moon but not solve the problem of ghettos (Nelson 1977)? As discussed above, Nelson's contention is that in order to apply missions for socio-economic challenges, the academic and policy practice need to be based on a new epistemological footing. While one can read Nelson's call for action as a way to bring social science's epistemological foundations closer to those of natural science, we can also make the exact opposite argument: social sciences need epistemological foundations aligned with experimentation needs posed by policy practice. In any case, the mission practice seems to lag behind in this regard severely.

One potential reason for this lag might be the missing discussion of the impact of various public administration reforms (e.g., the new public management reforms of the 1990s and 2000s) on the capacities of STI agencies (Kattel et al. 2023). The new public management (NPM) reforms that the majority of Western governments implemented in the 1990s and early 2000s – and in some cases are still implementing – focused on increasing public sector effectiveness through introducing various business practices into public organisations (Hood 1991; Drechsler 2005; Lapuente and Van de Walle 2020). In many instances, such reforms led to an over-emphasis on short-term savings, narrow performance targets and too decentralised public actors (Pollitt and Bouckaert, 2011). As a correction to NPM reforms, public organisations have sought re-emphasise the idea of public value they are proving to citizens, including via STI policies (Bozeman, 2002; Bozeman and Fukumoto, 2019; Mazzucato and Ryan-Collins, 2019) and how the value is co-created with citizens and other stakeholders (Osborne, Radnor and Strokosch, 2016). Particularly responsible research and innovation approach to STI has sought to incorporate norms and values into the innovation discourse and brought societally desirable innovation outcomes, or directionality, to the centre stage (Stilgoe, Owen and Macnaghten, 2013; Rip, 2016). However, much less attention has been paid to how NPM and similar reforms have changed the epistemological foundations of STI and other public sector agencies. And while the mission-oriented approach can be seen as a way to build stronger 'reflexive' capacities within public organisations (Rip, 2006), this is rarely the case in policy practice. Most missions rely on either incremental change in existing governance structure or are layered on top of existing policies and institutions.

5. Conclusion: Where do missions go from here?

Mission-oriented policies have taken Europe by storm. Far from being a uniform policy practice, however, missions are being implemented in quite different ways, largely depending on contextual factors. Economist Hyman Minsky once quipped that there are as many types of capitalisms as there are varieties of Heinz pickles – namely, 57. As it turns out, one could say the same thing about mission-oriented innovation policy: there are as many varieties as there are countries designing and implementing it. The widespread application is vindicating missions at the heart of the so-called normative turn in STI and public policy-making at large. This article is concerned with the question of whether such normative focus on directionality is accompanied by an epistemic turn required – as argued by academics since the late 1970s – in order to enable policy learning from a wide range of experimentations under the umbrella of the mission. While some interesting practical examples of such a shift in actual missions exist, most missions are implemented through existing institutions and policy schemes. Missions are thus understood through existing epistemological and analytical tools. And accordingly, many missions are constrained to business-as-usual practice and incremental shifts. Indeed, missions as a shift to the way we understand policy-making as a bottom-up experimentation towards solving the deeper challenges societies face risk being overrun by political events such

as inflation, the living of cost crisis and indeed the return of the more traditional mercantilistic industrial policy.

Policy organisations need to take mission implementation much more seriously, both in terms of investing in capability development and, in particular, in learning how to work in different ways. The shift cannot be expected to be easy, yet unless the capability and analytical gaps are consciously targeted, experimentation within missions will remain hampered. Thus, the success and impact of many missions might be much lower than expected.

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