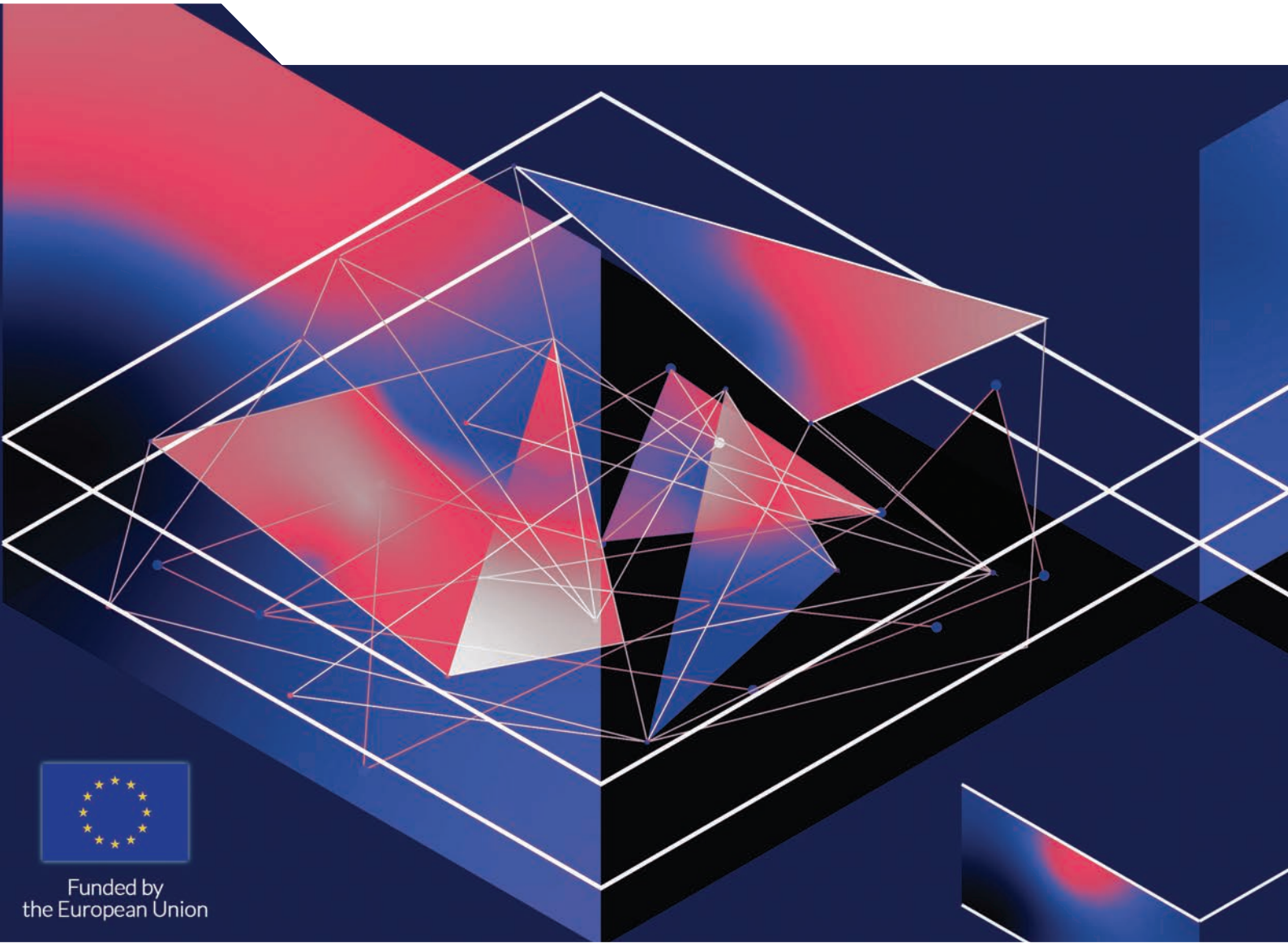
OECD Public Governance Reviews

Tackling Policy Challenges Through Public Sector Innovation

A STRATEGIC PORTFOLIO APPROACH



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BETTER POLICIES FOR BETTER LIVES

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Foreword

Governments deal with complex challenges in society that are often wicked in nature – that is, constantly changing and difficult to solve. The core work of the public sector thus requires a capacity to innovate. Yet, innovation in the public sector has tended to be poorly understood and weakly tied to government reforms. Its practice remains inconsistent and unreliable; it neither occurs systematically nor is it supported.

To address this, the OECD Observatory of Public Sector Innovation (OPSI) has put forward a Public Sector Innovation Facets model covering four types of innovation – mission-oriented, anticipatory, adaptive, and enhancement-oriented innovation. These different types of innovation are connected to core values of the public sector, including the ability to achieve goals, to continuously improve, to be responsive to citizens' needs and to explore future risks and uncertainties. This report provides a systematic overview of the knowledge base on conceptual frameworks and approaches to public sector innovation. The findings of the research were validated in innovation facet-specific workshops with OECD member countries between December 2020 to May 2021. In these workshops, the drivers and barriers were discussed in addition to additional tools and methods generated by the participants. Close to one thousand experts participated in the workshops over the seven-month period.

The report argues that working with innovation in this format requires a portfolio approach. Otherwise, it is not possible to support different types of innovation simultaneously in line with strategic goals. Without structured and conscious support across a portfolio, public sector organisational practices can unbalance innovation efforts and result in bias toward the status quo. A portfolio approach to innovation – managing multiple activities, support structures, and investments – is a way to spread risk, mitigating the loss if one investment fails, as others might succeed. It is also a way to identify and analyse synergies among actions, evaluate results beyond single interventions and avoid lock-in to ineffective or unsuitable innovation strategies.

While innovation portfolio management is an emerging topic, and well-developed tools do not exist to help public sector organisations review innovation activities in a coherent way, the report provides an objective overview of the tools and methods currently in use and highlights the gaps for further development.

More investment is needed to develop public sector innovation portfolio approaches further, as understanding of public sector innovation in governments matures and the tools and methods applied become more sophisticated. Successful public sector innovation portfolio management is key to tackling 'wicked' problems (green transition, ageing, etc.) that require systemic action, anticipation and adaptation to change.

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Executive summary

The scale and complexity of the challenges governments are facing today require public institutions to adopt novel ways to think and implement public policies. This means being able to develop innovative responses to tackle long terms transformations such as those related to aging societies and automatisation of work while keeping the public sector productive and responsive to urgent needs. In short, governments cannot remain static, they need to continuously adapt their strategies to changing circumstances and environments, systematically and actively explore new possibilities, experiment, and continuously learn as part of a broader governance system.

As public sector innovation continues to be institutionalised, new frameworks are needed to help government make a more strategic and deliberate use of innovation to achieve policy goals. Forty-two countries who have adopted the OECD's Declaration of Public Sector Innovation have recognised that innovation is multifaceted (i.e. different challenges requires different innovative responses) and that a systemic portfolio approach to innovation that is tailored to the relevant needs, goals and priorities is needed.

Work to date has examined the drivers and factors influencing innovation in the public sector, but does not help governments make strategic choices about what types of innovation to invest in or assist to build support structures in line with the problem at hand. This report fills this gap by introducing the notion of a portfolio approach to innovation as a management device which involves "investing in, fostering and leveraging an appropriately diverse range of innovative activities so as to offset the risks that some innovative responses will not work or will be unsuitable" (OECD Innovation Declaration); and describing ways this can effectively be applied in organisational setting to ensure innovation efforts achieve their intended goals.

The report is divided in two parts. The first part provides an introduction to the Innovation Facet model which can be used to explore the purpose and intent of innovation activites along two dimensions (directionality and certainty), and how they work in practice (Chapter 1). It then discusses portfolio management as an approach to address how different facets can be pursued at the same time in public sector organisations (Chapter 2). Portfolio management – which is a well-known device in the financial sector – is a dynamic decision-making process, which involves regular reviews of activity and ensures coherent distribution of resources (investment, time, human capital, etc.) between strategic options.

The report illustrates examples of how it can be used by public sector organisations to reap varied benefits including: avoiding innovation fragmentation and single-point solutionism; tackling risk aversion and learning at the portfolio level; identifying synergies between projects and activities; building value chains among projects and programmes; and layering activities connected to complex reforms. Innovation portfolios can support planning across ecosystems and provide regular checks to avoid lock-in – essential for addressing today's 'wicked' problems. They also build synergies between innovation actions, as shifts like the green transformation, aging populations and digital societies demand systemic approaches, mission orientation, and anticipating and adapting to change in real time.

The second part of the report provides an in-depth review of the present state-of-the-art evidence connected to each facet (Chapters 5-8): main challenges; drivers; support structures; tools and methods; skills and capacities; and implementation challenges. For each facet, the report also explores both the theoretical foundations in the literature as well as the practical implementation challenges and open questions for further research. Each innovation facet chapter was based on a full or semi-systematic review. In the case of adaptive innovation and mission-oriented innovation, a full PRISMA methods was applied (described in detail in Annex A); the other facets build on semi-systematic review methods and snowballing methods, as OECD had conducted prior research into these areas.

By bringing these elements together, the report provides new evidence on what innovative approaches and instruments governments can use to respond to emerging challenges in a timely manner. The report argues that there is a rising need for specificity and precision in how different factors are supported at individual, organisational and systems levels. This would also make the strategic response and support of innovation more tailored to government needs.

As a complete view of research on public sector innovation facets, the report comes with Policy Briefs on each of the innovation facets and the portfolio approach, which describe the findings in a succinct, action-oriented manner: enhancement-oriented innovation,[1] adaptive innovation,[2] mission-oriented innovation[3], anticipatory innovation[4] and innovation portfolio approaches.[5]

Notes

[1] For more information, see https://oecd-opsi.org/wp-content/uploads/2021/10/Innovation-Facets-Brief-Enhancement-Oriented-Innovation-2021.pdf.

[2] For more information, see https://oecd-opsi.org/wp-content/uploads/2021/10/OECD-Innovation-Facets-Brief-Adaptive-Innovation-2021.pdf.

[3] For more information, see https://oecd-opsi.org/wp-content/uploads/2021/10/OECD-Innovation-Facets-Brief-Mission-Oriented-Innovation-2021.pdf.

[4] For more information, see https://oecd-opsi.org/wp-content/uploads/2021/10/OECD-Innovation-Facets-Brief-Anticipatory-Innovation-2021.pdf.

[5] For more information, see https://oecd-opsi.org/wp-content/uploads/2021/10/OECD-Innovation-Facets-Brief-Innovation-Portfolios-2021.pdf.

Part I Addressing public policy challenges through public sector innovation

1 Connecting purpose with solutions - Introduction to the Public Sector Innovation Facet model

New models are needed to connect public challenges on one side to decisions of appropriate interventions on the ground that leverage innovation, on the other. This chapter describes the underpinnings of the OECD's Public Sector Innovation Facets model, its theoretical foundations and connection to public sector values. Directionality and certainty are the dimensions that influence the taxonomy of public sector innovation when it is described in a strategic, action-oriented way. Public value theory is used to connect the purpose of innovation to substantive value that governments aim to achieve. Through theoretical and empirical work undertaken by the OECD, a model for public sector innovation is introduced, encompassing mission-oriented, enhancement-oriented, adaptive and anticipatory approaches.

Background

A growing need for public sector innovation

The social, economic and ecological challenges that confront societies today require novel solutions from the public sector. As governments explore how to adapt the foundations of governance and democracy for the 21st century, innovation is becoming an imperative for staying ahead of the curve. In a context of high volatility and complexity, mastering innovation becomes critical to continually developing and delivering solutions that meet the fast-changing needs of the public (OECD, 2017[1]).

As governments become aware of the need to mitigate and leverage the high rate of societal and technological change, they remain ill-equipped to innovate and anticipate signals from the external environment before possible challenges become realities (Tõnurist and Hanson, 2020[2]). Many approaches to public sector innovation attempt to retrofit business innovation models to the public sector, leading to misapplied methods and incompatible measurement, especially in comparative studies between governments, public organisations and sectors (OECD, 2019[3]).

While the OECD finds governments doing exciting things that demonstrate the ever-present potential for innovation (OECD, 2020[4]), innovation practice remains inconsistent and unreliable. It is neither supported nor occurs systematically. The OECD's and other international databases record increasing evidence of innovative approaches in the public sector.[1] However, codification of this "craft" knowledge into practical guidance for making public sector innovation happen is limited. Public servants across OECD countries demand more in-depth knowledge about the approaches, techniques and tools to identify, generate, implement, evaluate and diffuse public sector innovation.

Responding to this need, this report offers insights on a new action-oriented model supporting decision making based on the Public Sector Innovation Facets model.

The objective of a model for public sector innovation

The Public Sector Innovation Facets model systematises the approaches and instruments that governments use to drive public sector innovation. The goal is to connect these to strategic aims in the public sector (e.g., solving problems, making the public sector more efficient and effective, adapting to needs and preparing for future risks). It investigates questions such as: What types of public sector innovation exist? How are innovative ideas generated in the public sector? Which methods are used to support investment in innovative projects? What capacity and resources are required for public sector innovation? Which tools do public sector organisations use to identify threats and/or opportunities in their external and internal environments?

The model emerges from the need to provide decision-makers with underpinnings and evidence for public sector innovation, and to show that systemic support for innovation is possible. However, to make it work, the varied aims and functions of innovation must be recognised. The model supports governments' innovation efforts by building and refining conceptual frameworks, and developing innovation capacities to accelerate learning, navigate uncertainty and manage high level of risks. Consequently, the main objectives of the Public Sector Innovation Facets model are to:

- Create a knowledge base on conceptual frameworks and approaches to innovation in the public sector that acknowledge the varied strategic aims of innovation.
- Build an action-oriented innovation theory anchored in empirics, evidence, and based on peer-to-peer exchange, international practice and knowledge-sharing.
- Collect an empirical evidence base using case studies (at national and local government level) on different approaches to innovation.

- Develop “How-to” guidance, toolkits and training material for designing, supporting and implementing innovative solutions in government.
- Structure a portfolio approach to support innovation strategy, decision-making and management of multiple types of innovation.

The Public Sector Innovation Facets model was developed by the OECD Observatory of Public Sector Innovation (OPSI), and synthetised in different formats in 2018.[2] The model covers four types of innovation – mission-oriented, anticipatory, adaptive, and enhancement-oriented – based on the **directionality** or the level of **certainty** connected to the innovation process (the conceptual origins of the model are described in 1.2 outlined below). The theory behind the Public Sector Innovation Facets model was tested with member countries and based on empirical evidence derived specifically from the public sector together with government partners (OECD, 2018[5]; 2019[6]).

It builds on OPSI’s previous work on the key determinants of system change in national public services (the innovation determinants framework) and the typology of innovative responses to public service challenges (resulting in the innovation facets model) (Kaur et al., 2022[7]; OECD, 2018[5]). The research conducted combines action research and co-design (learning from public sector innovation reviews and ongoing innovation cases while participating in their development) and user-specific, change-oriented approaches (meaning that the usefulness to public managers and action-oriented approach was central to theory development). To develop, iterate and test this model in practice, OPSI worked with internationally recognised centres of expertise on public sector innovation. OPSI facilitated practice-led reflections on specific innovation types across a broad range of EU and non-EU countries between 2018-2021 including Sweden, Brazil, Norway, Finland, Israel, Denmark and Latvia (OECD, 2019[6]; 2021[8]; 2021[9]; 2020[10]). Collaborations with public sector organisations served to prepare case studies and learning material from their direct experiments and experiences with innovation practices. Core research partners co-designed work and co-authored outputs, while project partners experimented with the theoretical model and mechanisms to provide peer feedback and empirical validation. Expert observers and peers provided critical analysis and feedback, advised on integrating research and lessons from experimental practice, contributed case study content, and participated in events.

Public Sector Innovation Facets: A conceptual model

Innovation in the public sector can take many forms. Over years of research at the system level of public sector organisations, the OECD’s Observatory of Public Sector Innovation (OPSI) developed a multi-faceted innovation model.[3] This section will cover the theoretical underpinnings of the model and its linkages to innovation theory.

OPSI defines public sector innovation as “the process of implementing novel approaches to achieve impact” (OECD, 2017[11]). In the broadest terms, public sector innovation comprises three components: **novelty**, **implementation** and **impact**. This definition takes Schumpeter (1934[12]) as its starting point: new combinations of new or existing knowledge, resources, equipment (“novelty”), and other factors with the aim of commercialisation or application (“implementation”). While private sector innovation usually aims to gain competitive advantage, the same metric cannot be applied in the public sector. Thus, “impact” usually means a shift in public value (OECD, 2019[13]). In general, public value represents a normative consensus of prerogatives, principles, benefits and rights that can be attributed to both governments and citizens (Jørgensen and Bozeman, 2007[14]), and linked to a variety of values like effectiveness, transparency, participation, integrity and lawfulness. Not all public value has a clearly distinguishable cost/monetary benefit dimension (Tangen, 2005[15]). Hence, not all public sector innovation projects are developed with efficiency or productivity as a goal (Kattel et al., 2018[16]).

This definition of innovation in the public sector distinguishes it from everyday changes in organisations. For example, prototypes, pilots and experiments are often framed as innovation in the public sector, but they cannot be considered as such de facto. This also sheds light on the limits of labs in the public sector that do not factor implementation into their work (Tõnurist, Kattel and Lember, 2017[17]; McGann, Blomkamp and Lewis, 2018[18]). This issue becomes bigger as the work and funding of innovation become more project based and impacts are not scaled up, diffused or even evaluated (OECD, 2018[19]) (Chapter 2 discusses this in more detail, in the context of innovation portfolios). Thus, it is difficult to know which public value shifts beyond the obvious – positive and negative – innovation brings about. Often this is a matter of perception, rather than fact (Thøgersen, Waldorff and Steffensen, 2021[20]).

Beyond general issues with conceptualising innovation in the public sector, there are ways to classify innovation below the broad Schumpeterian definition. For example, innovation can be defined by its explorative or exploitative nature (e.g., transformative or sustaining innovation (Christensen, 1997[21])), extent of change (e.g., radical or incremental innovation (Freeman and Perez, 1988[22])), object (e.g., product, service, process, business model innovations etc. (Geissdoerfer et al., 2018[23])), or input costs (e.g., frugal innovation or reverse innovation (Hossain, 2018[24]; Govindarajan and Euchner, 2012[25])). Radical innovation can be subdivided into path-breaking, first-mover, pioneering or lead innovations (Klarin, 2019[26]) and so on. These innovation types have different approaches, support system, tools and methods.

With the myriad of innovation approaches, which classification should public sector organisations rely on to support innovation in government? The answer depends on whether the purpose is **descriptive** (to explain why things happen) or **directive** (to produce an innovative outcome and guide, govern or influence it). A lot of literature on private sector innovation addresses why innovation happens (how innovation systems emerge and operate, which patents set new technology pathways etc.). Innovation knowledge here is generally defined as the study of how innovation takes place, the important explanatory factors, and social and economic consequences (Fagerberg, Fosaas and Sapprasert, 2012[27]). The OECD has several public sector models with a descriptive purpose, for example the public sector determinants model (OECD, 2018[5]) and the anticipatory innovation governance model (Tõnurist and Hanson, 2020[2]). While many academics aim to explain if and why innovation in the public sector happens (De Vries, Bekkers and Tummers, 2016[28]), the literature on public sector innovation concentrates on practical issues and policy advice, such as whether innovation labs should be set up, how to utilise innovation in policymaking, and what barriers need to be tackled (Cinar, Trott and Simms, 2019[29]; Lewis, McGann and Blomkamp, 2020[30]; Bason, 2018[31]; Pólvora and Nascimento, 2021[32]). This is partially connected to the background of the researchers involved; often situated in public policy, public administration or policy design etc. aiming to improve governance (van Buuren et al., 2020[33]; Demircioglu, 2017[34]). While practical, innovation is still treated in these analyses in a fairly uniform manner, at most emphasising the importance of service innovation over product innovation or the internal-external nature of innovation in the public sector (Chen, Walker and Sawhney, 2020[35]). Recent systematic review by Buchheim, Krieger and Arndt (2020[36]) shows that there has not been enough attention on different innovation types in public sector organisations and public sector managers have not been heedful of different innovation characteristics. Hence, both academic research and practical application of innovation in the public sector has some rather large blind spots that make it difficult to steer innovations especially on the organisational level. This is invariably because innovation in the public sector is a much newer topic compared to private sector and is not as advanced domain in terms of both research and practical application. Furthermore, for a long time doing things 'innovatively' was not seen core tasks for the public sector; while competitive advantage in the private sector has always legitimised innovative action. This report tries to take a step further and compile an evidence base around public sector innovation that heeds to the different purposes of innovation.

As a policy advisor, the OECD is interested in the strategic outcomes of innovation and the ability to steer it toward governments' goals. Hence, the proposed classification is clearly more directive than descriptive, although a lot of practical work in countries has been already done (see previous section) to understand

how and why innovation happens in the public sector context. There are also practical needs as to why directive models that help strategically steer innovation efforts in the public sector are needed.

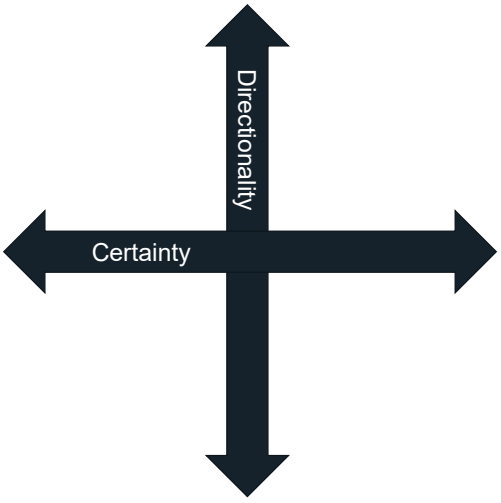
Dimensions of innovation

Because the outcomes of public sector innovation cannot be as clearly defined as in the private sector (Kattel et al., 2018[16]), there is a need to make a practical case that legitimises the process. This is amplified by the belief that public sector employees are risk-averse and less innovative due to individual characteristics and selection effects – though little empirical evidence exists to back this claim (Lewis, Ricard and Klijn, 2018[37]). Risk and uncertainty connected to innovation in the public sector often become a central issue in addition to other environmental barriers that influence the types of innovation attempted (Cinar, Trott and Simms, 2019[29]; Cinar, Trott and Simms, 2021[38]). When the starting point for public sector innovation is more directive, and strategic action becomes the principal concern, two dimensions of innovation come into focus:

1. **Directionality**: how much top-down steering of innovation is desirable
2. **Certainty:** how much uncertainty the organisation can tolerate and how much emphasis to place on stability versus more radical change

These dimensions create a two-by-two matrix in which to classify public sector innovation (Figure 1.1). Though a simplification, it helps see innovation taxonomies from a strategic action perspective of how much direction is set and how high is the risk tolerance or need to engage with uncertainty.

Figure 1.1. Axes of classification for public sector innovation



Note: The axis points to increased certainty (to the left) and directionality (vertically).

Directionality has been a topic of debate for the past decade in the field of innovation policy, usually aimed at simulating innovation outside the public sector (Edler and Boon, 2018[39]). With focus on sociotechnical transitions, responsible innovation and the need for innovation to contribute to societal goals, new terms such as “mission-oriented”, “policy-induced” and “challenge-led” innovation, and dedicated innovation systems have entered the discussion (Hekkert et al., 2020[40]; Thapa, Iakovleva and Foss, 2019[41]). Setting a direction requires governments to pay more attention to policy coordination, and ensure consistency, coherence and comprehensiveness across policy mixes.

Does that mean all innovation should be directed from the top? Arguably not. Room should remain for bottom-up novelty, creation and deployment, illustrated by the increased interest in adaptive innovation theory (Kirton, 1976[42]) and complex adaptive systems (Dooley, 1997[43]). Simply put, however clear the socio-economic goals, robust the targets or well-framed the challenges, complex systems can change these and raise barriers not captured or identified before. Hence, supporting creativity, problem-solving and adaptability is as important to innovation as is setting concrete goals.

However, the importance of both ends (directed and undirected) of the directionality spectrum is poorly understood in government contexts. The public sector, dependent on dominant administrative, ideological trends and paradigms, often views and values directionality differently at different times. Negative experiences and policy lock-in spurred decades of mostly undirected policies where the best-articulated ideas win support and investment from the public sector (Lindner et al., 2016[44]; Kattel and Mazzucato, 2018[45]). A recent normative turn emerging through the influence of international organisations such as the European Commission is again putting directionality at the forefront of the agenda (Mazzucato and Kattel, 2020[46]). Nevertheless, it is important to stress that both goal-oriented and bottom-up activity – responsive innovation that is not directed but adaptive – should be supported in the public sector.

Certainty is the other dimension of innovation to examine. Innovation can be defined by its explorative (e.g., transforming) or exploitative (e.g., sustaining) nature (Christensen, 1997[21]). Certainty concentrates around these roles, which can be also viewed through Schumpeter's Mark I and Mark II patterns of innovation (Breschi, Malerba and Orsenigo, 2000[47]). Mark I innovation is characterised by "creative destruction" based on challenging incumbents and disrupting current modes of production, organisation, and distribution. Mark I connects to exploration: i.e., things emerging on the horizon rather than making the current system more effective or more efficient. Mark II innovation is described as "creative accumulation" characterised by widening and deepening of innovations, models and approaches already adopted, and is often associated with larger organisations. Mark II can be seen as an exploitative activity: i.e., building on established, more radical prior innovations.

In terms of short-term gains, exploitative innovation is a more certain activity while exploration requires a higher tolerance for risk. However, in the long-term, organisations need both to be sustainable. As such, governments and public sector organisations are not immune to socio-economic paradigms and business models that impact innovation practices (Dosi, Fagiolo and Roventini, 2010[48]; Perez, 2003[49]). Exploration and creative destruction happen regardless of public sector organisations' engagement of it. Governments are challenged by change in various ways, requiring various types of innovation and have different innovation needs depending on the systems, for instance the welfare or labour regimes, they work in (Spasova et al., 2019[50]). Thus, there is a role in public sector innovation for both exploration (higher uncertainty) and exploitation (lower risk) activities. This is not to say that improving existing services and systems comes without risk. On the contrary, the biggest failures in government often relate to projects becoming too big to fail and unable to take technological and social development into account (Tõnurist and Hanson, 2020[2]).

Purpose of innovation

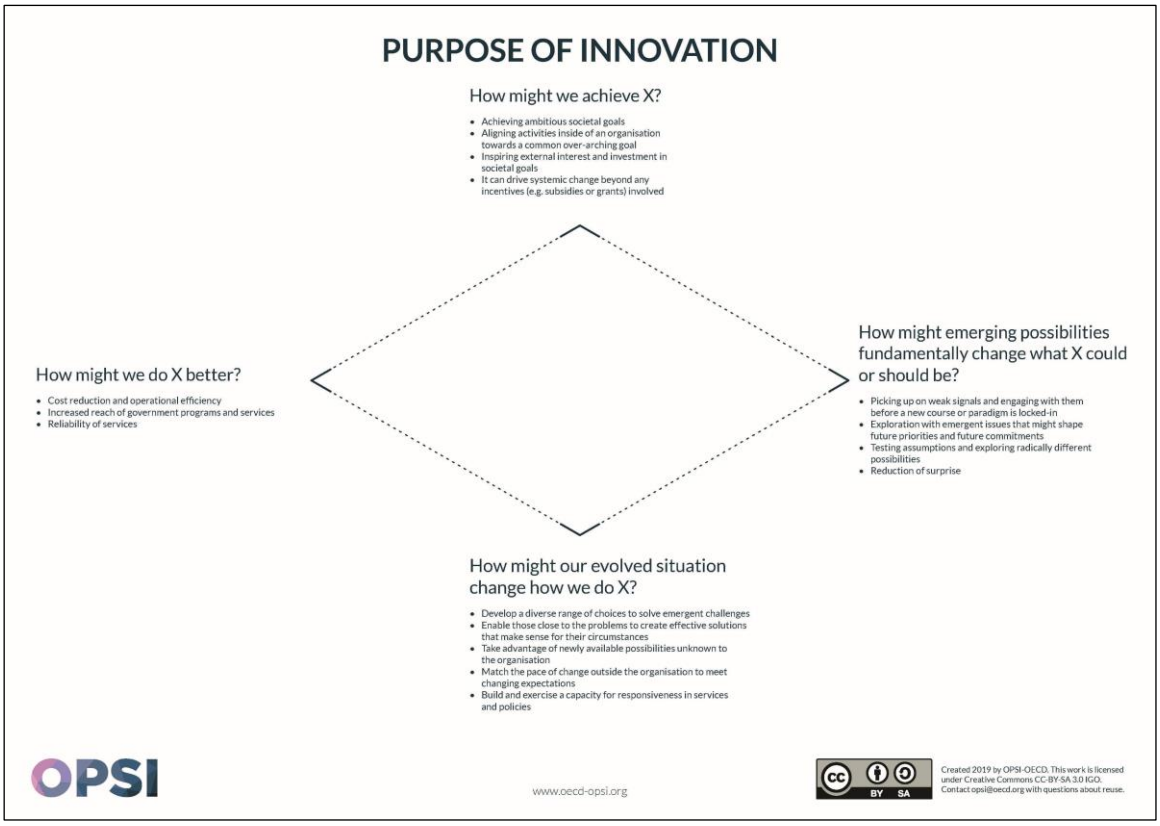
Having established the dimensions of directionality and certainty, one must link them to why the public sector innovates. The OECD's starting point here is the public value theory (Moore, 1995[51]), connecting the dimensions to values the public sector might aspire to when undertaking innovation. Public value can be defined by both the value the public sector seeks to attain and the value added to the public sphere (Moore, 2013[52]; Benington and Moore, 2011[53]). The public value framework is complex[4] because values can be influenced positively and negatively at the same time. In the interest of simplicity, it helps to concentrate on "prime" or "substantive" values of the public sector, which can be pursued for their own right, and leave aside those instrumental in achieving other values. According to Beck, Jorgensen and Bozeman (2007, p. 373[14]), "The central feature of a prime value is that it is a thing valued for itself, fully

contained, whereas an instrumental value is valued for its ability to achieve other values (which may or may not themselves be prime values).” Similarly, substantive values differ from transitory values as they hold true even if day-to-day missions and goals shift (Rosenbloom, 2014[54]).

Various authors have proposed categories for prime values – e.g., ethical, democratic, professional and people (Kernaghan, 2003[55]) – and there is no consensus on the topic (Fukumoto and Bozeman, 2019[56]). Furthermore, prime values can be more moral-ethical, utilitarian, political-social, and so on. In the absence of consensus, this part of the model relies on empirical tests in countries to determine the types of prime values government organisations placed on directive/un-directive and certain/uncertain innovative activities (OECD, 2019[6]; 2021[8]; 2021[9]; 2020[10]). In workshops and validation sessions, the OECD asked public servants to describe the value their organisations and government were called to demonstrate and then classified these into broader categories. Through this approach four categories of questions emerged that connect to prime/substantive values of government (Figure 1.2), and can correspond to the innovation axes outlined in Figure 1.3 (below):

1. **Political-social value:** How can government achieve the ambitious societal goals that it is called upon to tackle?
2. **Moral/ethical value:** How can government continuously improve and do things better with the public funds entrusted to it?
3. **Citizen-centric values:** How can government account for and respond to evolving citizen needs and environmental changes?
4. **Transformational values:** How can government explore future risks and uncertainties, so that it and its citizens are future-ready?

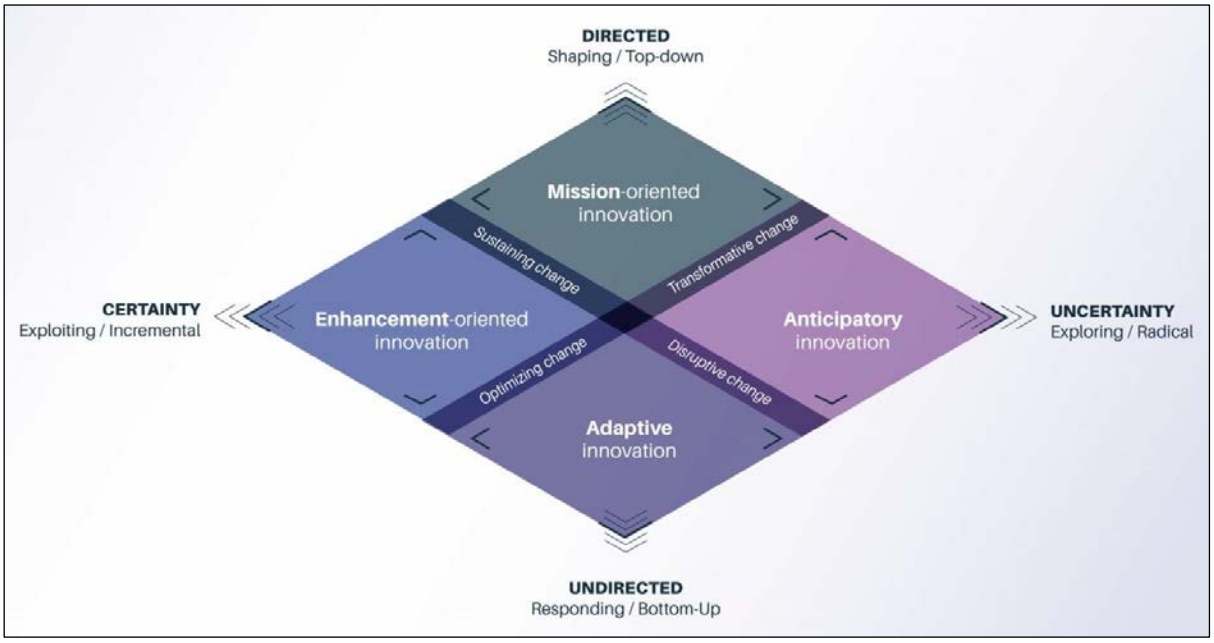
Figure 1.2. Purpose of innovation in the public sector



Source: OECD.

This empirical identification can connect substantive values to the purpose of innovation – that is to say, the core values and key issues that call the public sector to innovate – and demonstrate how the dimensions of directionality and certainty interact with these. The resulting Public Sector Innovation Facets model (Figure 1.3) shows that the more top-down an organisation's directive process, the more it addresses the governments' ability to achieve agreed societal values (mission-orientation). The less directive that process, the more adaptive government is to citizens evolving needs and environmental shifts (adaptation). Similarly, the more certain and exploitative the innovation, the more it corresponds to government's value of being an effective and ethical manager of public goods (enhancement-orientation), and the more uncertain the process, the more government innovates for the purpose of transformative change that cannot be avoided and needs preparation (anticipatory innovation).

Figure 1.3. Public Sector Innovation Facets model



Source: OPSI.

Together, these approaches form the Public Sector Innovation Facets model, so called because there are no clear boundaries between the resulting perspectives, or "facets". This means that all organisations should aim to support all facets of innovation in some way. The model should not be used to categorise activity but to explore its purpose and intent, as well as how innovation works in reality:

1. **Enhancement-oriented innovation** upgrades practices, achieves efficiencies and better results, and builds on existing structures without challenging the current system.
2. **Adaptive innovation** tests and tries new approaches to respond to a changing operating environment and citizen needs without a pre-determined direction.
3. **Mission-oriented innovation** sets a clear outcome and overarching objective for addressing a specific, time-bound and concrete challenge.
4. **Anticipatory innovation** explores and engages emergent issues that could shape future priorities and commitments and may be highly uncertain in nature.

The Public Sector Innovation Facets model describes the intent of different innovation activities in the public sector. Consequently, organisations should aim to support all four facets in some way as part of an innovation portfolio approach (Chapter 2).

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Notes

[1] For more information, see https://oecd-opsi.org/case_type/opsi/.

[2] For more information, see https://oecd-opsi.org/blog/innovation-is-a-many-splendoured-thing/.

[3] For more information, see https://oecd-opsi.org/projects/innovation-facets/.

[4] Beck Jørgensen and Bozeman (2007[14]) outline 72 values across several categories, including: public sector contribution to society; transformation of interests to decisions; relations between public administration and politicians; relations between public administration and its environment; intra-organisational aspects of public administration; behaviour of public sector employees; and relationship between public administration and citizens.

2 Working with innovation portfolios

This chapter introduces the concept of innovation portfolios and innovation portfolio management, and asks how innovation facets with varying level of directionality and certainty can be steered in the same organisation. Without structured and conscious support across a portfolio, public sector organisational practices can unbalance innovation efforts and result in bias toward the status quo. At the same time, innovation portfolio management is an emerging topic, and well-developed tools do not exist to help public sector organisations review innovation activities in a coherent way. Nevertheless, successful public sector innovation portfolio management is key to tackling 'wicked' problems (green transition, aging, etc.) that require systemic action, and anticipating and adapting to change. The chapter outlines the general functions of innovation portfolio management and proposes avenues for further research and tool development.

Innovation is an uncertain investment: there is no guarantee that any single innovation activity will deliver impact, can be implemented in a predictable way, or will avoid unintended or unanticipated consequences. In an uncertain world, overreliance by public sector organisations on a single strategy can result in a precarious situation, as a change in circumstances (e.g., a crisis or disruption) might make a promising or dependable approach suddenly unreliable or unsuitable. Furthermore, large reforms and goals cannot be achieved by single initiatives or programmes. They require concerted innovation across different organisations both within and outside the public sector. An overview of these activities across a portfolio of interventions builds clarity among an ecosystem of actors around the intent of innovation. As this is an emerging topic, this chapter defines innovation portfolio management and its benefits before jumping into the theoretical underpinnings of an innovation portfolio approach. Based on emerging literature, the main functions of innovation portfolio management are covered in cases identified through qualitative research.

As such, this chapter builds on the semi-systematic literature review carried out in summer 2021, in addition to interviews with current innovation portfolio practitioners. The former were identified during the 2020 OPSI "Government after Shock" conference during an OECD facilitated portfolio workshop session. Prior to the workshops participants were given tools to facilitate their own portfolio discussion in their own organisations using the OECD's Portfolio Exploration Tool (see further in Box 2.14, Chapter 2) (OECD, n.d.[1]). Following the conference, an external researcher conducted semi-structured interviews with the portfolio workshop participants at the "Government after Shock" conference. This was followed up by case study interviews conducted by the OECD during the summer of 2021. Consequently, the chapter is based on the desktop analysis, qualitative case study analysis and explores how public sector leaders and managers can understand the variety of innovation types that happen in reality in conjunction and in competition with each other. The chapter specifically concentrates on how a portfolio approach to innovation can serve as sense making, coordination and decision-making devise.

Innovation portfolio management

Portfolio management is a dynamic decision-making process that involves regular reviews of ongoing activities and ensures coherent distribution of resources (investment, time, human resources, etc.) between strategic options (Box 2.1). A portfolio approach to innovation – managing multiple activities, support structures, and investments – is a way to spread risk, with numerous investments to mitigate the chance of loss if one investment fails, as others might succeed. It is also a way to identify and analyse synergies between actions, evaluate results beyond single interventions and avoid lock-in to ineffective or unsuitable innovation strategies.

Box 2.1. What does portfolio management involve?

Innovation portfolio management involves a variety of practices to detect, assess and develop new opportunities by managing resources across selected projects, programmes or other interventions. Innovation portfolios include the following aspects:

- **Portfolio logic and perspective** provides strategic focus on a diversity of activities by connecting short-term actions to long-term goals, rather than focusing on individual projects.
- **Responsibility distribution** identifies accountable areas for innovation portfolio management and its components.

- **Knowledge co-ordination** integrates, synthesises and translates subject expertise between disciplines. This includes outreach to partners and knowledge external to the organisation.
- **Tailored project investments** recognise that different types of innovation can require different types of funding. Most small-scale projects do not require heavy investment, while transformational efforts might need consistent and extensive funding.
- **Co-ordination of innovation activities** provides an overview of the innovation lifecycle, including identification challenges, and evaluation of expected impacts and costs. It also establishes stage-gate (gatekeeping) controls to ensure continuity of the process and effective resource optimisation.
- **Holistic view of innovation efforts** helps develop a shared vision of innovation activities and find common understanding and systemic linkages across the entire innovation portfolio.

Source: Holden, A. et al. (2018[2]), *Developing Innovation Portfolios for the Public Sector*, https://www2.deloitte.com/content/dam/insights/us/articles/4727_Innovation-portfolios/DI_Innovation-portfolios.pdf; Nagji, B. and G. Tuff (2012[3]), "Managing your innovation portfolio", https://hbr.org/2012/05/managing-your-innovation-portfolio; Meifort, A. (2016[4]), "Innovation portfolio management: A synthesis and research agenda", https://doi.org/10.1111/caim.12109; Cooper, R., S. Edgett and E. Kleinschmidt (1997[5]), "Portfolio management in new product development: Lessons from the leaders-I", *Research Technology Management*, Vol. 40, pp. 16-28.

In the public sector, investing in several innovations and focusing on activities that draw on different types of innovation can increase the chances of achieving a desired or intentional result. Of course, investing in innovations connected to the same issue could increase costs and result in redundancy. But when viewed from a portfolio perspective, these costs appear as investments in strategic options, rather than one-off bets with no guarantee of success. Some innovations are more likely to pay off, while others can be opportunities for learning. What matters is success at the portfolio level, which implies that riskier and learning-friendly innovation environments can also be supported. From a strategic perspective, a well-coordinated portfolio of projects is a better bet than a single, all-or-nothing effort, especially if the operating environment is uncertain and public sector organisations cannot be confident about where (or when) an innovative response is needed. This approach can also avoid a longstanding problem with innovation in the public sector: that projects become too big to fail, with investments continued on the assumption that they will lead to success due to a lack of alternatives.

In response to these pressures and challenges, public sector organisations in OECD countries and beyond are experimenting with portfolio approaches to innovation. Portfolio approaches can maintain distinct simultaneous activities and supports for both current operations (exploitation) and new opportunities (exploration). With differentiation and equilibrium between activities, an organisation can be more flexible, adaptable and responsive to disruptive contexts. Consequently, to set an overall direction for innovation, it is necessary to have a systematic view of efforts and an ability to steer them at a portfolio level. A portfolio approach is therefore a way to moderate the stream of different innovations within a system.

Nevertheless, as many approaches are still at an early stage of development, there is a diversity of perceptions and practices regarding innovation portfolios in public sector organisations.

Portfolio approaches to innovation management arise mostly from reflections by practitioners on emerging needs. For example, Sitra (2020[6]) in Finland adopted innovation portfolio approaches in response to the realisation that previous innovation management approaches were short-sighted, fragmented and ineffective (see Box 2.2). Meanwhile, Climate KIC, an organisation supported in part by the European Institute of Innovation and Technology (EIT) and focused on innovation to mitigate and adapt to climate change, acquired a new understanding of the strategic role of the public sector in directing innovation (see Box 2.6). At the global level, the United Nations Development Programme is pioneering portfolio

approaches to coordinate complex international and local, public sector and third sector stakeholder landscapes (UNDP, 2022[7]).

Box 2.2. Relational sense-making in Finland

Sitra is Finland's public innovation fund, operating as both a think-tank and an investment company. It employs approximately 180 people and works on topics such as climate change, data, democracy and the circular economy. Sitra adopted an innovation portfolio approach to systematise and develop its capacities for renewal. Portfolio management provides a way to experiment with individual projects within a wider framework of multiple experiments. Sitra's portfolios include strategic goals and user interviews to understand the broader context and relevance of projects. These highlight the "pain points" and desired outcomes of innovation work. At their core, the portfolios map all ongoing projects in the relevant area, establishing links with the overall strategic goals they support. Portfolio approaches also enable "relational sense-making": the idea that understanding an innovation ecosystem depends on knowledge spread among different individuals. By joining together, they create a greater, shared understanding that would be otherwise unattainable.

Source: OECD interview (2021).

The main benefits of innovation portfolios are:

- **Avoiding fragmentation and 'projectification'**. A project-centric view of innovation can be problematic, and public sector organisations struggle with 'projectification' (Box 2.3): the division of policy problems into smaller, manageable, time-bound actions without an overview of their collective impact. In isolation, innovation activities that need to fit into neat project formats influence the types of problems considered suitable for innovation. For instance, pre-determined timeframes can imply that the main target of innovation is not to uncover the most effective or creative solutions, but to make projects work within the given time span.
- **Tackling risk-aversion and learning on the portfolio level**. Innovation portfolio management can provide a view over a range of projects, which facilitates resource dissemination and increases the tolerance for risk and investment in organisations. This involves the ability to distribute risk among multiple investments while developing new intelligence and skills to move swiftly in the unknown. Failure, which is a natural part of innovation, becomes more manageable when viewed at a portfolio level.
- **Finding synergies between projects and activities**. Portfolios do not perform in isolation. Rather, they form part of an organisational or systemic context. Portfolio approaches to innovation can highlight the breadth of available resources and actors (not only in the public sector but also in the private and third sectors), to reallocate them in accordance with public value. A benefit is the setting of objectives and prioritisation of resources, even when the innovation activities themselves are unclear, such as when using part of the innovation portfolio to stress-test current policies and services, or responding to rapidly changing technological context or user needs.
- **Building value chains between different project areas.** The processes associated with portfolio management bring operational clarity and understanding of the entire innovation value chain, allowing practitioners to evaluate the potential to scale up innovation. They can also mobilise partners, sources of knowledge and resources to help innovation activities move between exploration to exploitation.

- **Keeping tabs on layered activities connected to big reforms**. Innovation portfolios can be analysed at the team/unit, organisational or ecosystemic level in terms of both innovation activities and desired impacts. The types of the impact pursued by public sector innovation determine the level at which the innovation activity should be analysed. Portfolio approaches provide ways to coordinate, measure and align innovation at multiple levels towards an overall strategy.
- **Planning across ecosystems**. Portfolios offer a holistic view of innovation efforts and the systemic capacity for solution-based design to address complex problems. In many cases, challenges span several sectors and require alignment of innovation activities across ecosystems, such as innovation in basic research and local action to achieve the climate transition (Box 2.4). In multi-project environments, performance should be considered in a joint manner rather than divided between projects, programmes and portfolio.
- **Avoiding lock-in and capture by innovation fads and fashions**. Due to the complex nature of 'wicked' problems, innovations linked to these challenges must be open-ended and interconnected, and avoid rigid, pre-determined models and pathways to solutions.

Theoretical underpinnings of a portfolio approach

Given the diverse and shifting environment in which public sector organisations operate, it is unwise to lean heavily on a narrow approach to innovation. Relying on a single strategy or solution will limit an organisation's capacity to balance managing current operations (exploitation) with engaging new opportunities (exploration). While exploitation enhances knowledge and expertise when searching for efficiency, exploration means experimenting to find the most novel solution for a transformational change (Andriopoulos and Lewis, 2009[8]). Equilibrium between these modes allows a more flexible, adaptable and responsive approach to disruptive contexts (Turner, Aitken and Bozarth, 2018[9]). This aptitude is associated with the notion of "ambidexterity" (Andriopoulos and Lewis, 2009[8]; O'Reilly and Tushman, 2013[10]; Koryak et al., 2018[11]) – a dynamic capability organisations need in the face of complex and uncertain scenarios.

Most private sector innovation portfolio management literature (e.g., Sicotte, Drouin and Delerue (2014[12])) tends to draw upon Teece, Pisano and Shuen's (1997[13]) "dynamic capabilities" framework: the capacity to reshape existing resources into novel solutions to address a changing operational environment. While there are many examples of how private sector organisations handle ambidexterity and grow dynamic capabilities (Birkinshaw, Zimmermann and Raisch, 2016[14]; Randhawa, Wilden and Gudergan, 2021[15]), the adroit management of exploration and exploitation activities in the context of public sector organisations is at an early stage of development, especially when it comes impact on innovation processes. To set a direction for innovation, an organisation needs a systemic view of innovation efforts (Osborne and Brown, 2013[16]). Central to this reflection is a portfolio approach to moderate the stream of different types of innovation (Popadić, Pučko and Černe, 2016[17]). Yet there are diverse perceptions of this practice, considering the variety of factors and of contexts in which they could be employed.

The private sector uses innovation portfolios to transform vague ideas into novel activities, often by spreading risk at the level of investment in innovation. Nagji and Tuff (2012[3]) describe innovation portfolio management as an overview of multiple projects that facilitates resource dissemination and increases the tolerance for risk and investment in organisations. This involves distributing risk among multiple investments while developing intelligence and skills to move in the unknown (Nagji and Tuff, 2012[3]). In this line, Meifort (2016[4]) highlights four perspectives in relation to portfolios: (1) optimisation – developing a list of projects based on strategies inspired by financial sector stock portfolios, finding the most suitable combination of projects; (2) strategy – turning plans into action by allocating resources in alignment with the organisational target; (3) decision-making – initiating a deliberative process that includes stage-gate controls to engage with the constantly changing environment; (4) organisational – develop multi-level

strategic perspectives to coordinate the views of different departmental decision-makers while respecting budget constraints.

In the public sector context, however, a project-centric view of innovation can be problematic. Public sector innovation and policy pilots often struggle with 'projectification' (Lundin et al., 2015[18]; Hodgson et al., 2019[19]; Midler, 1995[20]) (Box 2.3). Innovation activities that must fit into neat formats influence the types of problems considered suitable for innovation. Public sector innovation becomes forced into established timeframes. In such cases, the goal becomes not to uncover the most effective or creative solutions, but to make them work in the given time span (Hodgson et al., 2019[19]). Pre-determined timeframes might be too short for measuring long-term impact, decreasing the usefulness of evaluation. Without measures for long term impact, it is difficult to coordinate with other projects in the wider ecosystem and monitor progress against the overall organisational purpose.

Box 2.3. The problem of 'projectification'

'Projectification' is the reliance on project-management methods to organise activities (Midler, 1995[20]; Packendorff and Lindgren, 2014[21]). This approach organises a company around projects as central elements for arranging work. However, such a project-based mentality can lead to:

- organisational de-integration with services defined by teams rather than the whole organisation
- service fragmentation with purpose dispersed across disjointed assignments
- lack of consistent organisational transformation because activities follow a project-to-project mindset
- political disincentives when project results are limited to the duration of a political agenda
- standardisation of policy targets in terms of both implementation and evaluation limits innovation
- instrumental and rationalised approaches to the innovation process overshadow social aspects of the goals
- limited time to implement operations and deliver results within the project timeframe

Source: Hodgson, D. et al. (2019[19]), *The Projectification of the Public Sector*, Routledge, Abingdon.; Midler, C. (1995[20]), "'Projectification' of the firm: The renault case", *Scandinavian Journal of Management*, Vol. 11/4, pp. 363-375; Packendorff, J. and M. Lindgren (2014[21]), "Projectification and its consequences: Narrow and broad conceptualisations", https://doi.org/10.4102/sajems.v17i1.807.

Given the diversity of values the public sector pursues and the partnerships it needs to develop, public innovation portfolios must be broader than individual projects or investments. Considering the complex nature of 'wicked' problems, innovation must be open-ended, inter-connected and without pre-determined pathways to solutions (Rittel and Webber, 1973[22]). The innovation portfolio management process aims to align all projects in the portfolio to an overall strategy (Box 2.4). Advancing a shared purpose while creating insights to produce impact on a broader scale is a desirable feature of innovation portfolios in the public sector (Seppälä, 2021[23]). This holistic view of the innovation efforts outlines the need to both look at innovation portfolios from an organisational level and analyse the systemic ability to design solutions by mobilising the whole ecosystem to address complex problems. The private sector analyses this through the concept of 'alliance' portfolios, which look at complimentary relationships and diversity of sources of knowledge and resources (Cui and O'Connor, 2012[24]). In the public sector, it could be even broader: innovation portfolios can encourage societal transformation by connecting projects for strategic goals and creating an enabling and collaborative environment (Seppälä, 2021[23]). A proactive and cooperative approach is preferable for dealing with complex systems.

Box 2.4. Managing the climate transition through a portfolio approach in Sweden

Viable Cities is a strategic innovation programme hosted by the Royal Institute of Technology (KTH), aligned with other Swedish innovation agencies such as Vinnova (see also Box 5.14) and the Swedish Energy Agency. Their funding amounts to EUR 100 million over 12 years (2017-2030), largely dedicated to grants. The programme focuses on making cities climate-friendly and sustainable.

Viable Cities adopted a portfolio approach in conjunction with a mission-oriented innovation framework to achieve a systemic view of the climate transition. The portfolio approach counters siloed and fragmented efforts that do not sufficiently contribute to climate transition. The programme identified 'projectification' (Box 2.3) as an obstacle to innovation work. Therefore, portfolios are not conceptualised as a list of projects and include everything deemed relevant to the mission, such as challenges, needs, barriers or future options. Further aspects might include investment plans, learning and people.

The innovation portfolio approach encourages Viable Cities members and partners to develop a portfolio strategy together. It is hoped that portfolios with an "open interface towards other portfolios" will create a common language and framework, facilitating discussions and exchange of ideas. The portfolio of Viable Cities could thus become compatible with those of other organisations. Aside from being an internal tool for capacity-building, the portfolio also aligns with agencies working on similar projects. However, ensuring compatibility among portfolios requires understanding the varied international, national and municipal institutional levels at which they operate. Viable Cities focuses on city-level innovations where concrete implementation measures are taken.

Source: OECD interview (2021).

Drawing on the discussion above, innovation portfolios can be analysed at the team/unit level, organisational level or wider ecosystem level in terms of both innovation projects and the strategic impacts they seek. The dimension of impact targeted determines the level at which innovation activity should be analysed. On the other hand, processes associated with innovation portfolio management improve operational clarity and understanding of the whole process (Cooper, Edgett and Kleinschmidt, 2001[25]; Schultz, Søren and Talke, 2013[26]; Teller et al., 2012[27]; Kock and Gemünden, 2016[28]). Innovation portfolio management can thus increase organisational transparency while allocating available resources and actors in accordance with the organisational mission.

Lessons from the private sector

The theoretical underpinnings of an innovation portfolio approach presented above reveal a reliance on private sector experience in conceptualising innovation portfolio management, and that this might present limitations. Portfolio management methods were first applied in the financial sector with a view to steering investment decision-making (Martinsuo and Dietrich, 2002[29]). Although public sector organisations increasingly use private sector performance metrics, they are also influenced by political and bureaucratic dynamics (Crawford, Simpson and Koll., 1999[30]; Parker and Bradley, 2000[31]; Turner and Keegan, 1999[32]; Boland and Fowler, 2000[33]). Therefore, these theoretical models have not proven effective in the public sector context, and the public sector's requirements for project portfolio structures and tools have yet to be identified (Martinsuo and Dietrich, 2002[29]).

Public sector organisations are influenced by internal political factors and external public expectations (Määttä and Ojala, 1999[34]). The internal political pressure is created by voters covering the social-economic context of the decision-making process. External public expectations concern activities such as infrastructure and services like education, healthcare, and market-based services for citizens and businesses. To provide high-quality services to citizens, these two aspects of leadership must align. As a result of the interplay between budget constraints and effectiveness, the public sector resists change in political, economic, and technological areas (Määttä and Ojala, 1999[34]). Yet public sector organisations increasingly operate in rapidly changing and complex environments, needing to adapt swiftly to new contexts. Portfolio approaches in the public sector thus aim to steer investment while coordinating and balancing innovation activities that satisfy both internal and external pressures.

In the private sector, evaluating investment options in portfolios is associated with reducing risk (Nagji and Tuff, 2012[3]). Portfolios in this context usually face resource allocation trade-offs, conflicts between exploitative and explorative activities in organisational routines, bound risks and more uncertain investments (Stettner and Lavie, 2014[35]). The objective is to build a portfolio that ensures the greatest total performance and distributes resources across a diversity of activities. Innovation portfolio management must contend with shifting contexts, opposing strategic goals and the uncertainty of external factors that affect organisational performance (Cooper, Edgett and Kleinschmidt, 2002[36]).

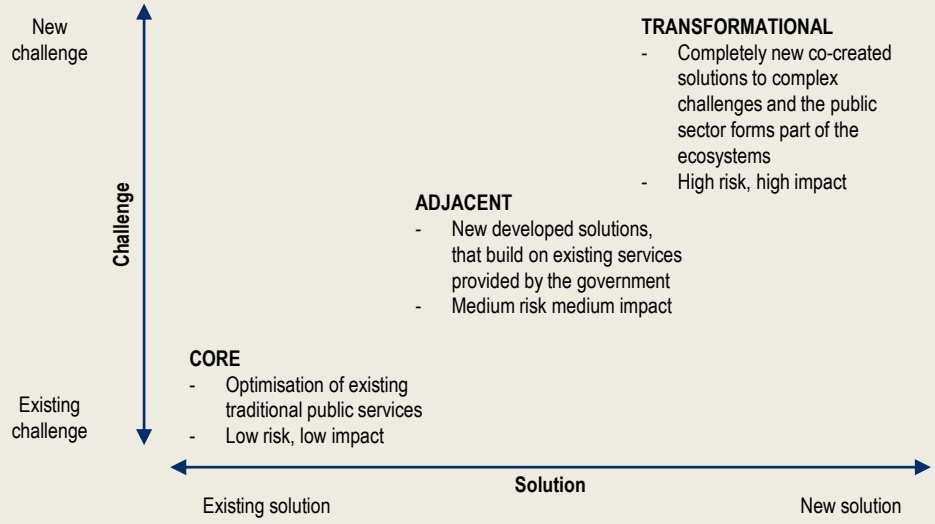
This suits the corporate context where day-to-day processes are optimised and follow a clear line from problem analysis to strategy formulation and execution. The work is typically organised in such a way that funds and efforts follow pre-planned and defined life cycles and milestones (Elenbaas, 2000[37]; Salapatas, 2000[38]). Hence, private sector innovation portfolios often rely on the innovation funnel model, the innovation ambition matrix model, the options portfolio model and the project impact feasibility model (Box 2.5) to make investment decisions. Decision criteria can include uncertainty, risk, feasibility, impact (e.g. variety across different markets, technologies, product categories and project types), and temporality (long-term projects versus short term investments). Usually, the goal is to maximise the monetary value of the overall portfolio, achieve a balance of projects across the criteria and ensure that the portfolio reflects the strategy of the business (Cooper, Edgett and Kleinschmidt, 1999[39]). However, these models tend to bias the portfolio towards investment and financial value logic. In addition, focusing on cost- and project-based models means that large organisations tend to favour exploitation activities over exploration. Consequently, many of these models have been critiqued for biases and blind spots, for both the public and private sectors.

Box 2.5. Private sector innovation portfolio models

The ambition matrix model

The ambition matrix model provides a framework for monitoring ongoing initiatives and the amount of money invested. It assesses innovation based on novelty in the market (Nagji and Tuff, 2012[3]). This matrix identifies three categories of innovation: core, adjacent and transformational. Core innovations are improvements of existing solutions. Adjacent innovations are solutions improved and applied to a new context. Transformational innovations are new solutions that serve new markets.

Figure 2.1. The ambition matrix model



Source: Adapted from Holden, A. et al. (2018[2]), *Developing Innovation Portfolios for the Public Sector*, https://www2.deloitte.com/content/dam/insights/us/articles/4727_Innovation-portfolios/DI_Innovation-portfolios.pdf.

The options model

The options model assesses the portfolio through a series of options that consider the level of uncertainty (Nagji and Tuff, 2012[3]). Uncertainty is very low in the core business, moderate in platform launches and highest in seeking new solutions and markets. Instead of being restricted to risk, which typically rules out many forms of experimentation, the rationale behind options portfolio investments looks beyond uncertainty to also highlight what organisations can gain in terms of knowledge from an innovation investment (Nagji and Tuff, 2012[3]).

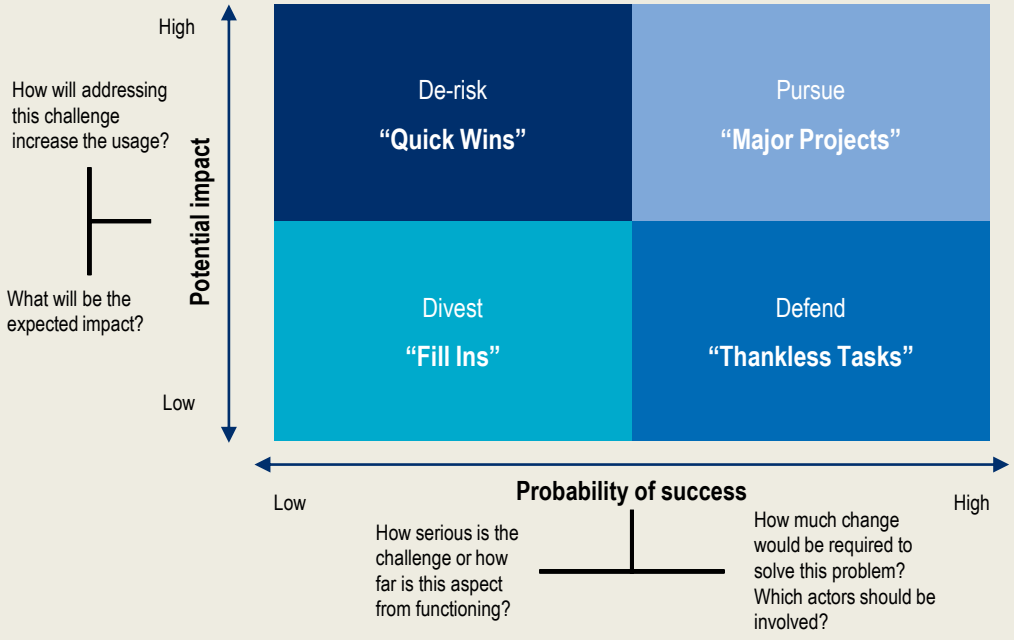
Figure 2.2. The options model

Source: Adapted from Holden, A. et al. (2018[2]), *Developing Innovation Portfolios for the Public Sector*, https://www2.deloitte.com/content/dam/insights/us/articles/4727_Innovation-portfolios/DI_Innovation-portfolios.pdf.

The impact-feasibility portfolio model

The impact-feasibility portfolio model is used when innovation projects focus primarily on investment returns. In such a model, an organisation compiles innovation initiatives based on their potential overall impact and probability of success. It continually evaluates the portfolio using return-on-investment analyses (Nagji and Tuff, 2012[3]). In contrast to the ambition matrix, such frameworks offer an accurate evaluation of viability and impact, instead of relying on the most novel solution (Holden et al., 2018[2]).

Figure 2.3. The impact-feasibility model



Source: Adapted from Holden, A. et al. (2018[2]), *Developing Innovation Portfolios for the Public Sector*, https://www2.deloitte.com/content/dam/insights/us/articles/4727_Innovation-portfolios/DI_Innovation-portfolios.pdf.

Source (Box): Holden, A. et al. (2018[2]), *Developing Innovation Portfolios for the Public Sector*, https://www2.deloitte.com/content/dam/insights/us/articles/4727_Innovation-portfolios/DI_Innovation-portfolios.pdf; Nagji, B. and G. Tuff (2012[3]), "Managing your innovation portfolio", https://hbr.org/2012/05/managing-your-innovation-portfolio.

Functions of innovation portfolios

Innovation portfolio management combines a range of techniques for detecting, assessing, and developing new ideas by managing resources across projects (Cooper, Edgett and Kleinschmidt, 1997[5]). This section analyses the following functions of innovation portfolios: creating new knowledge and space for sense-making; mapping innovation portfolios to create a holistic view; creating a diverse supply of innovation; measuring and evaluating the status of the innovation process; and ensuring efficient project co-ordination and portfolio stewardship.

Creating new knowledge and space for sense-making

Spreading organisational assets across a spectrum of activities creates intelligence through practice and collaboration. Holden et al. (2018[2]) point out that innovation investments are not only made to receive the

biggest return on investment, but often as a strategic move to learn and develop knowledge about emerging goods or processes. Innovation portfolio management thus improves clarity and understanding of innovation activity (Cooper, Edgett and Kleinschmidt, 2001[25]).

First, expanding innovation activity across a set of projects widens the organisational or systemic perspective. Innovation portfolios influence the long-term perspective as it is crucial to determine the viability of future initiatives and resource dissemination. While many innovations happen on an ad-hoc or provisional basis (Kock and Gemünden, 2016[28]), innovation portfolios can make sense of and reflect on their long-term impacts. Portfolios therefore offer perspective on innovation that aims to remodel society rather than simply provide the financial means to execute operations. Portfolios also put the focus on learning from innovation failures, reframing the negative connotation of innovation failure in the public sector.[1] The public sector already plays this role in many cases, providing "patient capital" for research and development (Cooper, Edgett and Kleinschmidt, 1997[5]). But the same logic does not yet apply to public sector activities themselves. Achieving that requires a variety of skills. Analytical ability is essential for developing core and adjacent innovations, while transformational innovations usually require discovery and idea definition (Nagji and Tuff, 2012[3]).

Second, innovation portfolios offer an overview and understanding of ongoing activities and create space for sense-making (Box 2.6). Sense-making in this context means the ability to identify needs for innovation, and ownership of problems and initiatives, using this process to develop organisational expertise (Weick, Sutcliffe and Obstfeld, 2005[40]). Through a structured understanding of innovation needs, portfolio owners can pick up on patterns of significance for organisations or ecosystems (ibid.). In other words, sense-making means understanding, arranging and interpreting complex environments to provide a comprehensible view of current endeavours (Weick, Sutcliffe and Obstfeld, 2005[40]). When confronted with complex situations, managers need "to change what 'facts' they pay attention to and 'frame' new course of action" (Fligstein, 2006, p. 950[41]) within their innovation portfolio.

Box 2.6. Climate KIC

Climate KIC is a Knowledge and Innovation Community (KIC) co-funded by the European Union to identify and support innovation to mitigate and adapt to climate change. Climate KIC is also involved with the Transition Cities project, in which eight European cities form thematic clusters around the topics of energy networks, mobility and buildings. The need to understand, map and visualise the activities of the innovation system motivated Climate KIC to use an innovation portfolio approach looking at governance structures, and the skills and types of activities in the cities. A mapping exercise and formulation of a portfolio were the starting point for discussing and creating alignment around a common vision. A common vision creates an opportunity to develop an action plan, especially relevant where various organisations respond to different funding calls. In this case, a portfolio overview enabled project managers to adopt an ecosystemic perspective when conceptualising problems and strategies.

Source: OECD interview (2021)

Sense-making broadens the institutional view of paths and possibilities within and beyond the existing innovation portfolio, to compare potential investments and chose the most viable (Chôra Foundation, 2021[42]). These pathways shape and trace new forms of exploration rather than leading to the discovery of forgotten or ignored information. This practice generates assets and capabilities for the organisation to gain new skills and expand its perspective, resulting in more tolerance for constant shifts and uncertainty. However, by generating new knowledge and ways of learning, sense-making challenges traditional structures and bureaucratic frames (Kvilvang, Bjurström and Almqvist, 2020[43]). The ability to balance

business-as-usual against challenging the status quo and searching for novel solutions for potential scenarios is a capacity connected to "innovation's dilemma" (Christensen, 1997[44]) and can influence portfolio positioning between exploratory versus exploitative actions.

In the innovation facets sense, enhancement-oriented innovation and mission-oriented innovation receive more high-level leadership attention due to their need for high investment levels and political visibility. This could mean that anticipatory and adaptive action, while important to organisations, are discounted in the broader portfolio. Balancing innovation activities and analysing them in a broader context must thus be part of organisational sense-making activities.

Mapping a holistic view of innovation

Another relevant aspect of portfolios is to create a holistic 'portfolio mindset' (Smithson, 2010[45]). Innovation portfolios present innovation assets and activities from different perspectives and enable organisations or systems to swiftly shift resources such as investments, talent and leadership to more promising opportunities in quickly changing contexts (Box 2.7). Innovation portfolios enable management decisions based on knowledge of all initiatives in the portfolio and how each connects and contributes to the overall long-term strategy (Kester et al., 2011[46]). This requires innovation portfolio managers to monitor and map innovation activities so that decisions can be made holistically. A portfolio mindset gives strategic focus both across organisational siloes, programmes and projects, and across the whole organisation or ecosystem by contributing to more all-inclusive thinking and mobilisation of resources towards broader goals. Portfolios allow decision-makers to optimise resources across projects and tailor them in accordance with new contexts or changes in the operating environment. Innovation portfolios reveal options while making sense of current actions, initiating social dialogue and rethinking shared purposes while allocating resources. The public sector has applied this, for example, to the field of education planning for schools and sharing their resources across districts by developing portfolio networks (Campell, 2012[47]) (Box 2.8).

Box 2.7. Innovation mapping in Gipuzkoa, Spain

The provincial council of Gipuzkoa initiated the Building the Future programme in 2015 with the aim to work collectively to detect and address future challenges facing the province. The programme is built on an open and collaborative governance model, with structures for understanding needs and ideas, proposing and initiating experimental projects, and learning from and scaling up results. It uses an innovation portfolio approach to identify connections and align and gain synergies between co-creation activities. In 2019, the provincial council began work to support and further a collaborative governance approach for the programme, focused on developing participatory processes of understanding and interpreting, co-creating and scaling, and learning and development for systemic transformation. These efforts were catalysed by the Climate KIC's (Box 2.6) selection of Gipuzkoa as one of eight Deep Demonstration projects, which provide a standard process and support for system innovation. The initial phase included clarifying intent with the owners of challenges, mapping the system of existing initiatives and connections between them, and analysing the innovation portfolio. This approach improves understanding of the actors across the programme, builds a common language for them, and identifies innovation needs and intervention points for change. Initial anchoring work (with political leaders and other challenge owners), to establish a collective strategic intent and understanding of the system, will provide a base for further work on managing and catalysing change through innovation.

Source: OECD interview (2021).

Box 2.8. Portfolio mindset transforming school education in the United States

To enhance the quality of education and make it more inclusive, four urban school districts in the United States (New York, New Orleans, Chicago, and the District of Columbia) explored models for novel educational frameworks. These models were developed based on the idea of "portfolio school districts" to learn and exchange expertise and practices with the best-performing schools, and to replicate them at under-performing institutions. The aim of the portfolio districts approach was to generate sustained progress by combining multiple approaches from different actors in the educational system (e.g., local schools, educational bodies, non-profit organisations, firms and universities). The portfolios were adapted to the needs and requests of the different areas. The schools, not the districts, were responsible for distributing resources to provide high-quality learning environments for their students. The institutional diversity was considered particularly beneficial for generating new approaches and skills to meet the needs of pupils. There was no standard procedure for developing a portfolio district, which typically started with exchanging practices and was later adjusted to needs and context.

Source: Hill, P., C. Campbell and D. Menefee-Libey (2009[48]), Portfolio School districts Project: Portfolio School Districts for Big Cities: An Interim Report, Center for Reinventing Public Education.

Creating a diverse supply of innovation

Innovation often involves risk and uncertainty. Creating a diverse supply of innovation activities and expertise in an organisation's or ecosystem's portfolio spreads financial risk and develops higher adaptability to changing contexts. Portfolio management is often associated with financial strategies, as the primary concern of investors is to lower portfolio risk (Fabozzi and Markowitz, 2011[49]). In the investment community, theories connected to investment risk and return are an essential component of sound portfolio management as they form a basis for the investment strategy (Elton, Gruber and Busse, 2004[50]). Rather than putting big amounts of money in one place, it is advisable to build a varied portfolio of several investments. This is called diversification – a risk-reduction strategy that allocates investments over a wide variety of financial tools, sectors and other categories in a portfolio (Ansoff, 1957[51]).

In the public sector, short-term financial, reputational and programmatic risks play a role in shaping innovation portfolios. While diversification in investment portfolios can be a standard approach to mitigating risk, in the public sector it requires a change in the outlook of innovation efforts: from perceiving innovation as a distinct activity to considering it part of the whole organisation (Holden et al., 2018[2]). A diverse innovation portfolio allows governments to deal with individual failures by leveraging rewards across the portfolio to compensate losses and continue funding further rounds (Mazzucato, 2011[52]; Rodrik, 2015[53]). Furthermore, financial arguments might not be the only considerations public organisations need to consider in diversifying their innovation portfolios. Strategic aims connected to goals and challenges might justify higher risk tolerance due to their broader value proposition (Laplane and Mazzucato, 2020[54]).

Another benefit of innovation portfolio diversification is the ability to adapt or lead a public sector organisation's innovation activity in a different direction when faced with a threat to its mission, remit or purpose. For risk preparedness, organisations and systems must diversify supply and allocation of budget, technology, human resources and knowledge across innovation activities (Box 2.9). Some risk reduction is possible through allocation optimisation and redundancy across innovation activities supporting similar outcomes. The purpose of diversification is to reduce the instability of the portfolio by offsetting a poorly performing innovation activity with a better one. This creates 'portfolio agility' (Sull, 2009[55]):[2] the capacity to switch resources swiftly and efficiently from less to more favourable fields of work. In decision-making, agility contributes to portfolio optimisation by detecting activities unsuitable to new contexts and prioritising

more promising opportunities (Kester et al., 2011[46]). This requires is enough buy-in from senior leaders to address power balances within organisations if reallocations and changes are needed (Kuilboer, Ashrafi and Lee, 2016[56]). Hence, a key portfolio activity is to create an sufficient supply of innovation to support both long- and short-term needs, and adequate investment in diverse innovation activities overall.

Box 2.9. Resource allocation across Lund's innovation portfolio in Sweden

Future by Lund (FBL) is an innovation platform for the Swedish municipality of Lund. It aims to implement governance mechanisms that support stakeholder dialogue about collective assets, activities and strengths of the local innovation ecosystem. FBL plans to introduce clearer processes to identify problems and opportunities for collective action across different focus areas. It will also address the curation and strategic development of a portfolio of innovation activities across multiple organisations, actor groups and thematic boundaries.

As a first step, FBL is mapping innovation assets and collaborative innovation activities (leveraging the OECD's Public Sector Innovation Facets model, among others). With this base, FBL will facilitate dialogue between stakeholders to set a collective direction and identify possibilities to align efforts and resources or initiate activities.

Over the past seven years, FBL developed its role through work on longer-term and future-oriented development activities (i.e., anticipatory innovation), co-ordinating and facilitating collaborative action where multiple organisations see potential but resources are thin and collaboration is essential for progress. Structured processes of innovation portfolio management will be important to reveal and provide evidence of the ripple effects and continued legitimacy for this role.

Source: OECD interview (2021).

Taking these arguments into account and drawing on the diversification strategy, the OECD Observatory of Public Sector Innovation (OPSI) developed the four-facet innovations model[3] (Chapter 1), which looks at public sector innovation portfolios beyond financial aims (including, missions, adapting to citizens need, ensuring value for money, and preparing for uncertain events and investments outside the private sector). Governments should not strictly focus on innovation portfolio balance. Organisations should develop each of the facets, but depending on their organisational goals the weight of each in the portfolio may differ. They should have multiple ongoing innovation activities aligned with the strategy or purpose of the organisation while investing in other types of innovation to avoid lock-in and stay in touch with citizen needs. A good portfolio has elements of all the innovation facets. Reflecting diversification strategies used by the financial industry, public sector organisations should spread their innovation efforts across the facets while developing organisational abilities in various directions. As governments are expected to act in a challenge-driven and anticipatory way, different evaluation models will help them assess return on investment beyond monetary terms.

Measuring and evaluating innovation portfolios

It is important to evaluate the success of innovation portfolio implementation, taking into consideration the type of innovation, the expected accomplishments and lessons learnt. The measurement and evaluation of individual innovation projects is distinct from that of innovation portfolio management. The 'stage-gate process' is a mechanism to control and evolve innovation efforts from rough ideas through to implementation (Cooper, 1990[57]). Stage-gate processes can evaluate innovation projects and activities at regular intervals to ensure they fit new contexts and align with organisational purpose (Holden et al., 2018[2]). The evaluation process ensures effective resource management and establishes benchmarks to assess project performance. Reflection on the results helps create knowledge and inform future directions of projects.

In contrast, measurement and evaluation of the whole portfolio of projects requires a different approach. Innovation portfolio managers, who might be responsible for analysis, decision-making or both, should measure and evaluate how the portfolio performs in delivering impact against the organisation's remit, purpose, or mission. While it is notoriously difficult to track, measure and evaluate, innovation portfolio managers should develop mechanisms to address a few key questions: (1) Is the portfolio aligning activities and projects with the overall organisational purpose or mission?; (2) Is the portfolio creating and maintaining distinct and suitable strategies for managing different types of innovation activity?; (3) Are new linkages across innovation activities being made and is learning happening between them (Box 2.10)?; (4) Are innovation activities in the portfolio shifting based on identified gaps, changed operating environments, or new opportunities or threats? Finally, as a meta-evaluation question, innovation portfolio managers should consider whether portfolio analysis is sufficiently connected with decision-making about how resources are allocated to innovation activities.

Box 2.10. Portfolio learning in Chicago, United States

The Office of Innovation forms part of the City of Chicago and is assigned the role of a "fixer" when problems arise in departmental innovation processes. The impetus to use innovation portfolios stemmed from the realisation that innovation teams did not possess a mandate to innovate, largely because public sector innovation was not perceived as possible or legitimate. The Office of Innovation was created to centralise innovation assistance and introduce relevant performance metrics. A second motivation was to improve the continuity of projects by fostering institutional memory and longevity, regardless of changes in the political administration. To this end, the Office of Innovation created a database of innovation projects, which tracks ideas, successes and failures, and provides a systemic overview of progress. This approach encourages a culture of learning and understanding failure as a normal aspect of innovation work.

Source: OECD interview (2021).

Ensuring efficient project co-ordination and portfolio stewardship

The increasingly interconnected nature of public policy calls for new concepts to help public servants adapt (Lindquist, 1992[58]; Paquet, 2009[59]). Especially in the context of innovation management, the state has an important role in shaping and steering technological and economic development towards a societal vision. In this context, stewardship means the interrelated attitudes, roles and behaviours that public sector leaders enact and promote to help their organisations adapt to the evolving context in which they operate (Wilson, 2013[60]).

Although the concept of stewardship is not new to the public sector, a scarcity of empirical studies limits understanding and application of this notion by public leaders in their organisational context. Stewardship as proposed by Kass (1988[61]) describes the capability of public servants to gain public trust with effective and ethically sound behaviour while building synergies and collaboration at a team, organisation or ecosystem level. The role of the steward is to balance the long- and short-term perspective of projects, and enhance the visibility and coordination of innovation activities. The purpose of innovation portfolios is to transform plans into strategic actions (Eggers, 2012[62])).

Whereas innovation might arise from different units in an organisation or actors in a system, it is essential to maintain interconnection between activities while balancing the approaches of different decision-makers – considering them pieces of a broad strategy or mission (Cooper, Edgett and Kleinschmidt, 1997[5]). In multi-project environments, different types of performance should be considered jointly rather than distinguishing among projects, programs and portfolios (Müller, Martinsuo and Blomquist, 2008[63]). Portfolios do not perform in isolation. Rather, they are part of a broader organisational context (ibid.). Their role can be assessed from the perspective of balancing conflicting interests based on the strategic actions of the organisation (Müller, Martinsuo and Blomquist, 2008[63]). Thus, portfolio decisions should be in line with the organisational or ecosystem strategy (Turner and Müller, 2005[64]).

The success of the portfolio stewardship role becomes evident in the interpretation and alignment of strategic actions and balancing of conflicting interests within the organisation. Innovation portfolios are thus a fundamental part of decision-making (Loch and Bode-Greuel, 2001[65]), especially for large, coordinated efforts (Box 2.11). Consequently, a dynamic decision-making process involves regular reviews of ongoing projects in the portfolio, ensuring suitable resource distribution between projects or activities (Mathews, 2010[66]) and contributing to organisational learning and institutional memory of what works in which contexts and why. Other stewardship functions include setting objectives for different parts of the portfolio, owning decisions, facilitating learning across activities and with internal and external actors, identifying systemic patterns and windows of opportunity, and establishing priorities for available resources (Fricke and Shenhar, 2000[67]) These enhance co-ordination based on broader strategic aims.

Box 2.11. Innovation co-ordination in Helsingborg, Sweden

In 2019, Helsingborg (population approximately 110 000) launched H22, a city-wide innovation initiative to improve quality of life for all residents. The administrative structure of the city comprises nine departments and approximately 12 000 employees, and innovation is the responsibility of the individual departments. As a result, primary importance was given to co-ordinating their efforts and creating a framework for cross-departmental work. This was the central reason for adopting innovation portfolios.

Helsingborg strives to include diverse types of innovation in its portfolio. This includes idea-driven innovation: the city identified 17 challenges to encourage mission-driven innovation. Meanwhile, possibility-driven innovation focuses on the unknown potential of certain technologies, such as blockchain or Artificial Intelligence. Weekly cross-departmental meetings co-ordinate initiatives and Helsingborg uses external websites, the intranet and other channels to disseminate information and encourage participation among large segments of society.

Source: OECD interview (2021).

Tools and methods

Various fields, including the public sector, introduce portfolio practices to coordinate and steer organisational efforts to enhance performance (Roussel, Saad and Erickson, 1991[68]; Dye and J.S., 1999[69]; Cooper, Edgett and Kleinschmidt, 2001[25]; Martinsuo and Dietrich, 2002[29]). There is a wide variety of frameworks and tools for managing a portfolio (Cooper, Edgett and Kleinschmidt, 1997[5]; Roussel, Saad and Erickson, 1991[68]). Tools can be placed inside the government or outside, such as outsourcing services in the form of inter-ministry committees, working groups, central and inter-strategy departments, representing different ways to steer public management (Van De Walle and Groeneveld, 2011[70]). Managing in complex contexts, as in the case of public sector, often means that governments must simultaneously lead towards several goals using a variety of tools.

Portfolio practices in the public sector can be supported using tools designed to illustrate the distribution of resources and activities, promote understanding of portfolio activities, and oversee complex innovation systems. However, in practice there is a lack of mature tools for developing innovation portfolios across functions in the public sector. Evaluation, measurement and benchmarking tools are particularly needed. At present, tools tailored to risk management, resource allocation and understanding the underlying ecosystems connected to innovation portfolios are being trialled in the public sector following their use in the private sector.

Risk-balance and resource allocation

One of the functions of innovation portfolios is to create a risk tolerant environment in which managers can balance high risk opportunities with more promising projects (Morris, 2010[71]). In this sense, innovation portfolios in the public sector function in the same way as portfolio management for any other kind of investment and require a profound understanding of the innovation activities involved to allocate resources efficiently (Kock and Gemünden, 2016[28]).

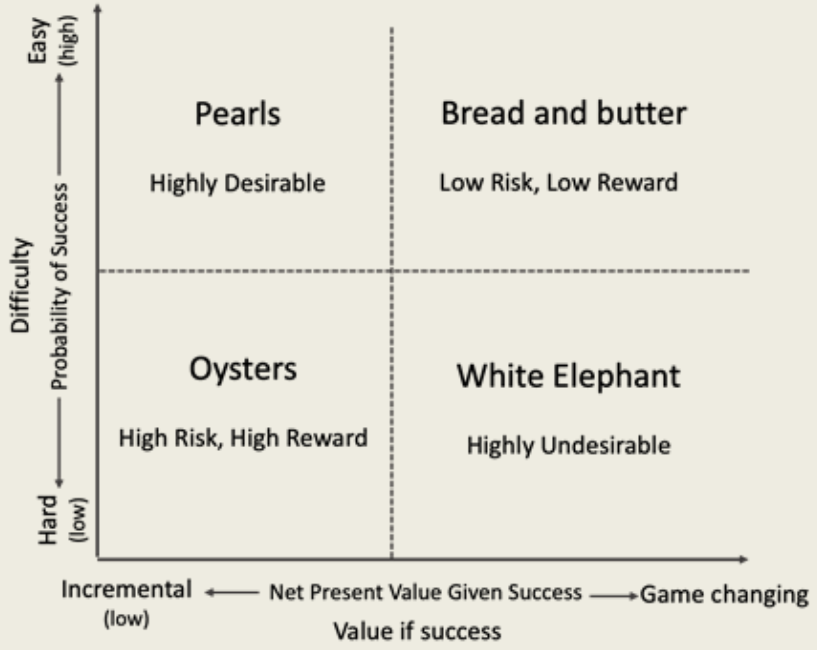
One tool is the Risk-Reward Bubble diagram (Cooper, Edgett and Kleinschmidt, 1999[39]) (Box 2.12). Its main criterion is the added value and possible impact an initiative could have for the organisation or ecosystem. The diagram shows decision-makers the trade-offs between a single initiative and its effects on the portfolio (Cooper, Edgett and Kleinschmidt, 1999[39]). Adding a project decreases the resources available for others, which requires careful distribution of assets. The model shows the “dynamic decision-making process” in action: projects should be documented and compared, and resources balanced across a variety of activities (Cooper, Edgett and Kleinschmidt, 1999[39]). The archetypes in the diagram display the probability of success and reward associated with different activities. A balanced portfolio enables the organisation to concentrate on certain sectors or business areas, and manage the related risk (Doorasamy, 2015[72]). Hence, the archetypes are helpful for framing a portfolio.

Box 2.12. Risk-Reward Bubble diagram in portfolio management

The Risk-Reward Bubble diagram depicts the balance of resource allocation and projects in a portfolio. It plots and classifies prospective projects as follows:

- **Pearls** – core projects with high probability of success expected to produce big rewards.
- **Oysters** – projects with strong potential, but needing capital, energy and sometimes cutting-edge innovation, where the possible reward is big but the odds of success are very low.
- **Bread and butter** – simple, minor projects likely to succeed but bring little reward.
- **White elephants** – projects that absorb enormous resources but offer almost nothing in return.

Figure 2.4. The risk reward public diagram



Source: Adapted from Cooper, R., S. Edgett and E. Kleinschmidt (1999[39]), "New product portfolio management: Practices and performance", https://doi.org/10.1016/S0737-6782(99)00005-3.

An example of resource and risk allocation in the public sector, the US government 10x agency funds innovation exploration activities and uses stage-gating funding to learn and assess exploitative potential over time (Box 2.13) and invest resources accordingly. As a result, projects and activities funded at highest levels have a lower risk of failing to implement because early warning signals or insurmountable barriers were resolved during earlier stage-gates.

Box 2.13. Investing in public sector innovation portfolios in the United States

10x is a US government organisation that drives innovation projects in the public sector with a unique, portfolio approach to selecting, developing and scaling innovation investments. Its biannual call for ideas invites all federal government employees to briefly describe in a few sentences the problem they are attempting to solve. This low-barrier approach draws on employees' knowledge and can circumvent chains of command that might complicate the communication of insights. 10x applies specific criteria to select projects based on these submissions: the organisation aims for moon shots and transformational ideas, but also makes its selection based on feasibility (e.g., whether the ideas require more seed funding than 10x can supply). 10x accepts failure as an essential part of innovation that should be seen as normal and beneficial when it occurs fast and achieves progress or learning. Otherwise, even promising projects can be shut down early on.

Selected projects move through three phases. In the first phase, 10x conducts an investigation to understand the problem space. The second phase narrows the selection of projects by applying stricter criteria and asking what problem needs to be solved and what the solution entails. This phase requires

deeper research and development, and a grasp of the current state of the field, the contextual fit, the timelines involved, regulatory issues and how the innovation might scale. In the third phase, the project team must make a case to 10x investments for further funding. This involves rigorous scrutiny and most proposals are deselected at this stage. At this stage, 10x requests a prototype or solution uncovered in the previous phase. The 10x team works with a portfolio of projects in each round and allocates resources to balance creating safe-to-fail spaces for exploration and learning with lower-risk resource allocation to solutions that are most likely to scale.

Source: OECD interview (2021).

Understanding current portfolio activities

Assessing the current state of the portfolio offers a clearer view of what processes and methods already exist, identifies gaps, and creates a strategy for launching the portfolio management process in line with the organisational vision. This shared vision will guide decisions taken across the organisation, aligning them with the organisational objective (PMI, 2013[73]). Portfolio management is a continuous process. Unlike individual projects or programmes that have planned start and end dates, portfolios require constant monitoring of activities to help the organisation respond to change and uncertainty (PMI, 2013[73]). This requires tools for understanding the bigger picture of ongoing innovation activities within an organisation or ecosystem, and for generating evidence to make decisions at a portfolio level.

One tool that supports decision making at a portfolio level is the Portfolio Exploration Tool (PET) developed by OPSI (Box 2.14). The PET helps consider and comprehend the different innovation activities in an organisation or ecosystem. It is based on the Public Sector Innovation Facets model, which differentiates between four types of innovation activities (Chapter 1). The PET allows for self-assessment of capacities and innovation types in an organisation or ecosystem. The results provide an overview of innovation patterns and help teams or systems develop a more deliberate innovation strategy in which excessive focus on one type of innovation does not limit the ability to respond to future challenges.

Box 2.14. Portfolio Exploration Tool

The Portfolio Exploration Tool (PET), developed by OPSI and funded by the European Union's Horizon 2020 programme, is a self-guided digital tool to map the innovation activities and the capabilities of an organisation or ecosystem.

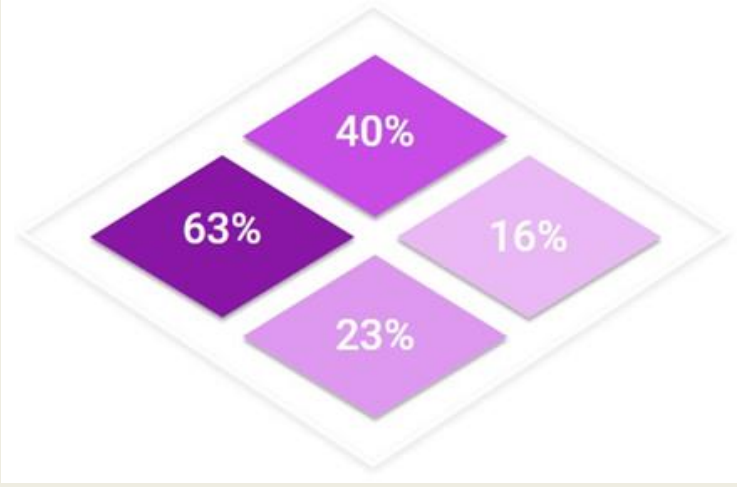
PET comprises three parts. Module 1 represents a quick snapshot of the organisational capabilities for innovation. Module 2 goes further by providing a project-based mapping of innovation types. Module 3 is a deep portfolio analysis based on the data obtained from a broad perspective.

The resulting overview of innovation strengths helps select systemic and structured innovation. The PET also assesses the directionality of organisational activities and indicates possible gaps in innovation approaches and asset management. The tool is based on the OECD's Public Sector Innovation Facets model developed.

Another purpose of the tool is to build a global repository of user data to inform OPSI's long-term research on innovation developments and patterns. This exercise enables OPSI to deepen its analysis of innovation theory and understand trends and patterns of innovation through the prism of the daily challenges that public sector organisations face.

Figure 2.5. Results of a PET analysis

Organisational tendencies toward enhancement-oriented, mission-oriented, adaptive and anticipatory innovation based on user input data



Source: OECD (2021[74]), *Public Sector Innovation Facets: Innovation Portfolios*, https://oecd-opsi.org/wp-content/uploads/2021/10/OECD-Innovation-Facets-Brief-Innovation-Portfolios-2021.pdf; OECD (n.d.[75]), *Analyse Your Organisation's Innovation Portfolio*, https://oecd-opsi.org/pet.

Managing complex systems

Portfolio management requires complex, multi-level organisational governance because it usually involves several decision-makers and units with different strategic visions and goals (Cooper, Edgett and Kleinschmidt, 1999[39]; Meifort, 2016[4]). Complexity theory, as applied to public management, offers an approach to understanding the factors that enable managers to make more effective decisions (Rhodes and MacKechnie, 2003[76]). Complexity theory and public management share a perspective on monitoring and providing feedback when steering behaviour in organisational systems. This advocates for a holistic perspective from which public service should be developed.

Complex adaptive systems (CAS) consist of independent elements that act as an integrated body and develop new knowledge based on experience while adapting to a changing environment (Holland, 2006[77]). CAS increase their survival ability by adapting to shifting circumstances based on dynamic networks of interactions. Complex systems support understanding and anticipating the most difficult societal problems (e.g., climate change, the COVID pandemic). In a CAS, the system and its stakeholders cannot be separated; the system is more than just an aggregate of actors or elements (Dooley, 1997[78]). The different components of the system must be coordinated and connected, leading to the creation of new knowledge that is otherwise difficult to obtain by simply observing single interactions.

Many public sector organisations operate in environments of ambiguity, involving multiple interconnected stakeholders and systems. Portfolio management thus requires tools to understand and manage complex systems. One example is the Cynefin framework (Box 2.15) used in collective sense-making to facilitate collective decision-making (Kurtz and Snowden, 2003[79]).

Box 2.15. The Cynefin framework

Cynefin is a decision-making tool to make sense of unknown problems by offering new perspectives on old challenges. Its usefulness lies in exploring and creating knowledge on emerging ideas by arranging decisions in five domains:

- **Obvious (known knowns)** – options are clear and there are causal connections. This is the domain of best practices where problems and solutions are rational and clear to everyone.
- **Complicated (known unknowns)** – different approaches to the same problem can be valid, and causal relationships remain. Decision-making starts with making sense of the situation, exploring good practices, usually with expert analysis, and selecting the best response. Viewpoints from different backgrounds are relevant to choosing the best solution.
- **Complex (unknown unknowns)** – there are no experts and the focus is on practices that emerge from communication between agents. The best approach is to probe-sense-respond. Finding the optimal solution requires experimentation and considers failure as part of learning.
- **Chaotic (unknowable unknowns)** – there is no causal relationship and the environment is disorganised and turbulent. Criteria to make decisions are unclear as there are no best practices to explore. The approach is to act fast and firmly to mitigate the chaos, sense the impact and respond. It is possible to enter this domain deliberately to unlock opportunities for innovation.
- **Disorder (not determined)** – it is unclear which of the previous categories dominates and it is difficult to make sense of the situation. People usually rely on individual decisions and aim to gain understanding and move into a known domain to adopt adequate measures.

Figure 2.6. The Cynefin framework

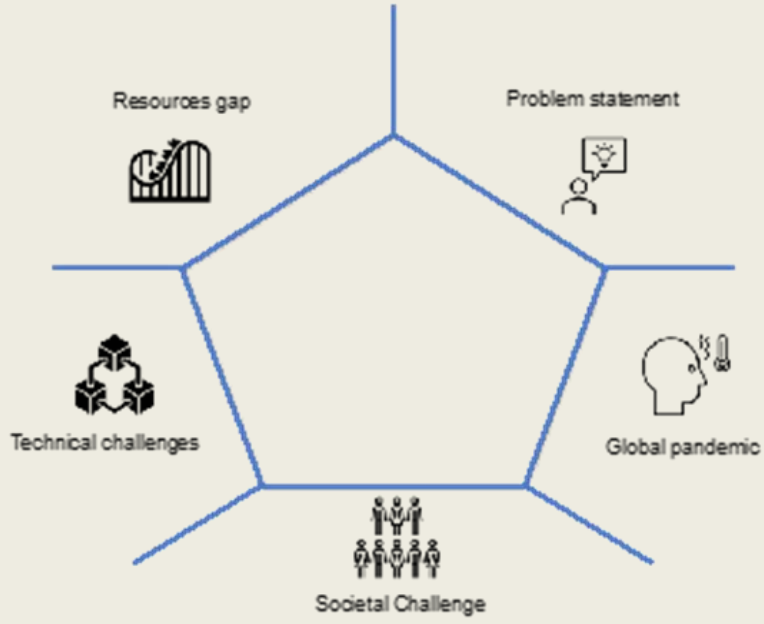
Source: Kurtz, C. and D. Snowden (2003[79]), "The new dynamics of strategy: Sense-making in a complex and complicated world", *IBM Systems Journal*, Vol. 42, pp. 462-483.

Another approach to developing understanding of innovation activities is to analyse the different sub-systems within a complex environment. The Pentagon framework is used in systems thinking and multi-faced complexity management (Akgün, Van Leeuwen and Nijkamp, 2012[80]) to address the idea that public sector management should be developed in a context of partnership and coordination. The Pentagon framework visually captures the interactions in a system that can produce an impact on a wider ecosystem level (Box 2.16).

Box 2.16. The Pentagon framework for ecosystem management

Governments often operate in complex, uncertain and interdependent contexts. Public sector organisations do not perform in isolation but instead are part of a broad, interconnected ecosystem. The Pentagon framework supports a nuanced comprehension of complex sub-systems through clear delineation of the problem and influences within an ecosystem. It help teams narrow challenges, and map and shape measurements to address future performance.

Figure 2.7. The Pentagon framework



Source: EIT Climate-KIC (2016).

Using portfolios to balance innovation

Finding a balance between different types of innovation activities in organisations is difficult. However, the ambidexterity to balance exploring and exploiting innovation is desirable for long-term organisational success (Raisch et al., 2009[81]): successful organisations find equilibrium between reinforcing current operations and searching for new opportunities. In the public sector context, an organisation faced with significant levels of uncertainty requires a provisional approach to reflect on possible outcomes before heavily engaging a certain idea or project. To achieve success over time, most organisations need to

sustain a variety of innovation activities that enable them to consider varied alternatives (O'Reilly and Tushman, 2013[10]).

Duncan (1976[82]) proposes that organisations achieve ambidexterity in a gradual manner and adapt their structures over time to balance conflicting alignments in accordance with the organisational purpose. In contrast, Tushman and O'Reilly (1996[83]) argue that organisations should explore and exploit at the same time in the context of quick change by developing the "ability to simultaneously pursue both incremental and discontinuous innovation and change results from hosting multiple contradictory structures, processes, and cultures within the same firm" (Tushman and O'Reilly, 1996, p. 24[83]). Thus, they suggest that exploration and exploitation should take place in separate units connected by a shared goal (Tushman and O'Reilly, 1996[83]).

At the same time, Stettner and Lavie (2014[35]) suggest that organisations spread their resources in exploring emerging areas of work while focusing on standard practices by designing a portfolio that gives an overview of organisational activities. Raisch et al. (2009[81]) note the need for more in-depth understanding of the connections and tensions between exploitation and exploration. This can be done using portfolio practices to gain insights into future and ongoing activities that the organisation is developing.

Another approach is to balance innovation portfolio gaps inside organisations with partnerships and collaborations with stakeholders strong in areas the internal portfolio lacks (Chesbrough, 2006[84]). This is known as inbound open innovation (Majhi et al., 2020[85]). This requires an organisation's absorptive capacity to understand what is missing in its innovation portfolios and integrate external knowledge. Human resource practices, internal learning mechanisms, international diversification and corporate governance rules can play a role in the ability to source knowledge externally (Ardito et al., 2020[86]). In many cases, these relationships are a must because impacts are co-created in a public service setting.

According to Rhodes (1996[87]; 2012[88]), governance should be equal to a space where actors communicate and co-operate. Supporting this view, Klijn and Koppenjan (2012[89]) suggests that an emphasis on connection between organisations to enhance co-operation and collaboration to deliver better services is among the most relevant functions of governance (Agranoff and McGuire, 2001[90]; Torfing, 2012[91]; Rhodes, 1997[92]). This is echoed in literature on collaborative innovation inside the public sector over the last decade (e.g., Sørensen and Torfing (2011[93]); Crosby, 't Hart and Torfing (2017[94]); Wegrich (2019[95])).

Consequently, portfolio balance can be archived within a broader innovation ecosystem, rather than only inside the organisation. This makes it necessary to make sense of portfolios within a network or ecosystem perspective, rather than assess projects or programs individually.

Action points and takeaways

Innovation portfolio management is assuming an increasingly central role in the public sector. While innovation portfolios – whether managed or not – already exist, their effectiveness in delivering on governments' long-term goals is currently more ad hoc than deliberate. Much more investment is needed in innovation portfolio approaches, as is uptake in public sector organisations where practical lessons can be learnt. Many political, institutional and social factors can influence innovation portfolio composition in the public sector that might not even merit consideration in the private sector.

Portfolio approaches help address a variety of issues connected to innovation management in the public sector, such as risk aversion, failure, fragmentation, alignment of action across policy cycles, etc. But portfolio approaches in the public sector are only now developing, and there is a need for more research, testing and development of different models to address diverging needs. Tools and methods are essential to help visualise, monitor, evaluate and act regarding innovation portfolios. There are obvious limitations

to the innovation portfolio management tools available today given the variety of portfolio approaches and the broad contexts to which they can be applied. The tools and methods are still too abstract and distant from day-to-day challenges in the public sector, with little or no empirical testing and validation. There is also a distinct lack of comparative research to compare portfolio management experiences with other organisations, or tools and methods shared in the same ecosystem. These questions require exploration in theory and practice.

Of course, tools are only useful if the people and roles they support are positioned to steward innovation portfolios – including those that span across and between organisations. The role of an innovation portfolio manager is not only analysis and decision-making, but also collective sense-making, shared learning and agenda-setting. This role is particularly important for innovation that supports grand societal challenges and missions such as green transformation. Spanning local, regional and national and even supranational bodies, innovation portfolio managers encourage uptake of innovation activities not only among public actors, but also among firms, citizens and the third sector. A systemic view of innovation efforts is vital to allow the public sector and its partners to gauge whether their efforts are sufficient to meet the challenges involved in such missions.

Portfolio practices can also help organisations avoid traditional innovation pitfalls, such as incentivising people not to draw attention to risks, addressing failure on a project basis, and favouring exploitation over exploration and short-term gains over long-term investment. An adequate and intentional supply of innovation activity across a portfolio is important for the public sector to avoid the biggest risk of all: the inability to adapt or lead when faced with a threat to its mission, remit, or purpose, thereby missing the opportunity to create public value or address the biggest global challenges of our time.

Performed well, innovation portfolio management is a continuous activity that spans institutions. Innovation portfolios can be examined within and between units and teams, and across entire organisations. The key question is how to build synergies between these practices that translate into learning and decision making supportive of innovation across the whole organisation. Research is needed on differentiated models of innovation stewardship and portfolio management, not only to fit different organisations but also to meet the needs of government called to steer innovation for the public sector or an ecosystem as a whole.

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Notes

[1] Traditionally, innovation failures in the public sector are penalised more than successes are rewarded (Feller and Feller, 1981[97]), contributing to a culture of risk-aversion and fear of failure often highlighted as barriers to innovation (Bloch and Bugge, 2013[96]).

[2] Sull (2009[55]) identifies three types of organisational agility: operational, portfolio, and strategic agility.

[3] See https://oecd-opsi.org/projects/innovation-facets/ for detailed information about the OPSI innovation facets model.

3 Innovation portfolios in policy making systems

This chapter refocuses the discussion of innovation facets and portfolios from an organisational to a systems level. Innovation exists in nested structures influenced by individual, team, organisational and systemic factors. Partnerships and collaborations, place-based characteristics, political priorities, and regulatory and accountability systems all play a role in the innovations undertaken and their likelihood of success. This chapter examines how the capacity to innovate in policymaking systems interacts with the innovation facets approach and how innovation portfolios can be created at a system-wide level.

Differences in public administrations account for differences in the quantity, quality and type of innovation in a country (OECD, 2021[1]; 2021[2]). However, the nature of a country's public administration is only one factor affecting the quantity and quality of innovation. Many economic, legal, cultural and historical factors determine the kind of innovation that is initiated, implemented and scaled up.

This chapter asks which systems-level factors are important for investing in different innovations, and if and how a country's public sector innovation portfolio can be studied or steered. In private sector innovation research, many streams look at the systems level and its influence on innovation, with some also outlining a role for the state. For example, the National Innovation System concept (Lundvall, 2007[3]) sees innovation as the outcome of co-creation, with the state as part of a broader system. Similarly, the Quadruple Helix framework (Carayannis, Goletsis and Grigoroudis, 2018[4]) sees the state as one actor alongside universities, industry and the public. The most pronounced analysis of the connection between the state and innovation is spearheaded by Mazzucato's (2013[5]) work on the "entrepreneurial state". This analysis acknowledges that states are not merely part of an innovation ecosystem but rather active drivers and promoters of innovation and economic change. Their institutional set-up influences what types of innovation processes are possible and likely, even in the absence of directed state action. At the same time, political-institutional structures can also be barriers to successful innovation. Connected research on 'technology innovation systems' (Hekkert et al., 2007[6]) and 'sociotechnical transitions' (Geels et al., 2017[7]) connects state action, investment and structures to specific types of innovation – either technological or transition-oriented.

These perspectives are largely missing in the public sector. As argued in Chapter 1, research on public sector innovation tends to look at innovation as a bundle and analyse systemic barriers to innovation without differentiating between innovation types or strategic intent (Cinar, Trott and Simms, 2019[8]; 2021[9]; Scott, 2020[10]). At most, studies distinguish between radical or incremental innovation, usually from a measurement angle and need to differentiate outcomes (Bugge and Bloch, 2016[11]; Fuglsang, 2010[12]). Newer studies look at the need to balance exploration and exploitation activities (Cannaerts, Segers and Warsen, 2019[13]), but usually from an organisational perspective (Chapter 2) rather than a policymaking or systems level. Alternatively, research concentrates on a singular type of innovation, usually based on the process or inputs applied, and analyses how it interacts with broader structural elements (e.g., collaborative, technology-enabled, co-creation, experimentation (Misuraca and Viscusi, 2015[14]; Torfing, 2018[15]; McGann, Blomkamp and Lewis, 2018[16]).

To establish what influences innovation intensity in a system, it is important to analyse how innovation capabilities emerge in a policymaking system and what supports them (Clausen, Demircioglu and Alsos, 2020[17]; Vivona, Demircioglu and Raghavan, 2020[18]). However, it is also crucial to bridge the gap between the intent to create public value through innovation (Chapter 1) and the types of innovation the government system supports. Namely, it is important to examine policy intent as a part of public sector innovation portfolios to see if innovation activities and purpose line up.

Steering public sector innovation systems

One might argue that most innovation activity in the public sector is undertaken by organisations, teams and "hero" innovators going against the system. But the practice of public sector innovation has been professionalising and institutionalising in recent years. Strong signals of this are the adoption of the Declaration on Public Sector Innovation (OECD, 2019[19]) by OECD member countries in 2019 and the emergence of formal public sector innovation networks and strategies in many countries (Box 3.1).

Box 3.1. The OECD Declaration on Public Sector Innovation

To date, the OECD's Declaration on Public Sector Innovation was adopted by 42 countries. It outlines five principles and associated actions to help governments support the public sector's capacity to innovate at individual, organisational and systemic levels:

1. **Embrace and enhance innovation within the public sector** – highlight the importance of innovation, showcase how it can help governments achieve their goals, and establish stewardship, resources and support mechanisms for innovation to occur.
2. **Encourage and equip all public servants to innovate** – foster a culture conducive to innovation, encourage entrepreneurial and experimental approaches that require risk-taking, recognise and support skills and capacity development for innovation, and develop support structures, processes and working conditions for innovation to flourish.
3. **Cultivate new partnerships and involve different voices** – connect diverse actors, build partnerships, engage, co-create, and listen to and integrate new and emerging voices into policy, service design and decision-making.
4. **Support exploration, iteration and testing** – support experimentation and exploration where no clear solutions exist, test new approaches, nurture a diverse portfolio of innovation activities, and commit to learn from results and experiences of innovative practice.
5. **Diffuse lessons and share practices** – systematically learn from innovation activities and experience with innovative practices, foster networks for learning, peer support and idea sharing, create feedback loops, and develop evaluation practices to learn from and steer the innovation process and assess the value of outcomes.

Countries that adopted the Declaration translated them for their own context (e.g., Finland), issued guidance on how to use its principles in practice (e.g., Greece) and adopted innovation guidelines inspired by the Declaration (e.g., Portugal, Spain).

The OECD is developing a playbook to accompany the Declaration, to operationalise and contextualise the principles; support countries in translating the principles and commitments into action; offer options for action and improvement; showcase how innovation can solve public policy issues and improve public outcomes; take country actions around Principle 4; and identify capacity gaps for innovation in public sector systems and connect with resources (e.g., OPSI case study database, toolkits, methods, etc.).

Source: OECD (2019[19]), *Declaration on Public Sector Innovation*, https://legalinstruments.oecd.org/en/instruments/OECD-LEGAL-0450.

The responsibility to develop and coordinate the public sector innovation system lies with various central government entities – prime minister's offices (e.g., Germany); line ministries with horizontal coordination functions such as finance, treasury boards or ministries of interior (e.g., Canada, Iceland, Ireland, Korea, Finland, Norway, Slovenia); central innovation labs and units (e.g., Estonia, Denmark, Portugal) – or is shared between actors (e.g., Latvia, New Zealand, Sweden). Their coordination can be either centralised or decentralised (OECD, 2018[20]; 2021[1]) and they can have diverging functions, mandates and roles. For example, many central innovation units have purview over specific aspects of the innovation process (e.g., human resources and training, innovation diffusion, experimentation), but do not control all the relevant factors. They might also not be tasked with removing systemic barriers or creating drivers for public sector innovation.

When countries start to work on innovation strategies, it allows them to look at the agenda more systemically, connect strategic aims to public sector innovation, establish collaboration with stakeholders in the system and address desired aspects of the innovation portfolios (OECD, 2021[1]). While rudimentary, these functions supporting public sector innovation already exist in OECD countries and are becoming more systemic. This indicates a need to understand how innovation is happening across the public sector and how to steer its execution in practice.

OECD work on the systems level includes the Innovation Determinants model (OECD, 2018[20]) and its second-generation iteration: the Innovative Capacity Framework (Box 3.2). The latter includes a state-of-the-art overview of innovation barriers and drivers in the public sector, and is an evolving tool the OECD aims to test in country contexts through surveys and studies. The aim is to create more robust empirical evidence around these concepts and measure the effects of different variables that influence public sector innovation in different country contexts. (To date, the model does not outline how these variables influence the four facets of innovation, leaving another research gap to fill.) In parallel, the OECD is looking into anticipatory innovation governance and mission-oriented innovation through the recently created Mission Action Lab (MAL), which conducts facet-specific, system-level analysis, as in Finland (Tõnurist, 2021[21]) and through mission simulations and boot camps.[1] As research in this area is still emerging, the following discussion is based more on hypothesis than empirical evidence.

Box 3.2. The OECD Innovative Capacity Framework

The Innovative Capacity Framework is a resource to help governments understand and collect data on what influences the public sector's capacity to achieve its goals and improve public outcomes using to innovation. The framework offers a methodology to examine countries' innovation systems, particularly in context-based research. It enhances comparability between countries' experiences at different levels while recognising the specific contexts in which innovation takes place. The framework improves understanding of what factors play a role in enabling or hindering public sector innovation and how they can ensure that innovative practices "stick" and achieve their goals.

Systems lens to public sector innovation

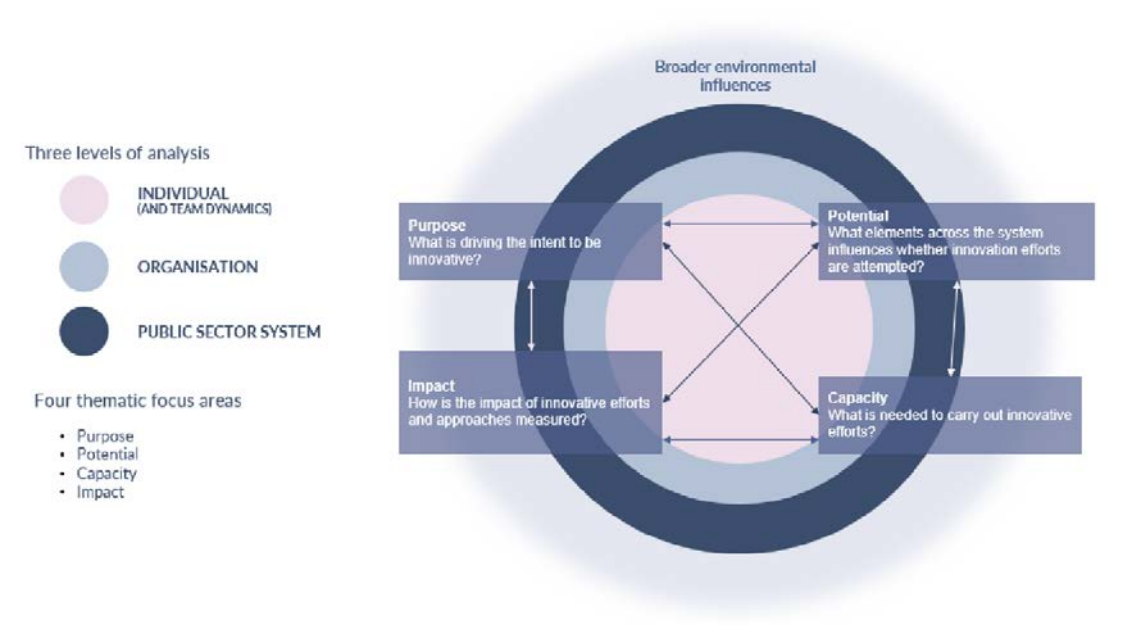
The framework views public sector innovation through a systems lens to help governments understand what factors drive innovative efforts and their dynamics. OECD experience and evidence from innovation studies and scans (OECD, 2020[22]; 2021[2]; 2019[23]; 2021[1]; 2018[20]), led to acknowledgement that innovation requires specific structures, mechanisms and relationships to function as an instrument to achieve public purpose.

The framework introduces interactions (Figure 3.1) between three levels of analysis (individual, organisation and system) and four focus areas (purpose, potential, capacity and impact). The model aims to make the factors that influence the system at each level explicit to an assessable, operational or improvable degree, overlaid against the thematic focus areas.

The questions that underpin the framework are:

- **Purpose** – What drives the intent to innovate?
- **Potential** – What determines whether innovation efforts are attempted?
- **Capacity** – What is needed to carry out innovative efforts?
- **Impact** – How is the impact of innovative efforts understood and how does it inform future practice?

Figure 3.1. Levels of analysis and focus areas



Source: Kaur, M. et al. (2022[24]), "Innovative capacity of governments: A systemic framework", https://doi.org/10.1787/52389006-en.

These areas are then examined to determine which factors influence innovative activity at each of the three levels. Action depends on what entity at which level should be steered in what way to increase the desired outcomes. The factors and variables are presented in Annex B in Table A B.1.

Source: Kaur, M. et al. (2022[24]), "Innovative capacity of governments: A systemic framework", https://doi.org/10.1787/52389006-en.

How the innovation facets interact with systemic capacity to innovate

As outlined in the in-depth analyses of each innovation facet (Chapters 4-7), different drivers, support structures, tools and methods, skills and capacities, and challenges spur and influence different types of innovation (Table 3.1). As described by Kaur et al. (2022[24]), the capacities and conditions required of public sector systems depend on the innovation facet. For example, creating an environment for enhancement-oriented innovation will likely be favoured by austerity, focus on service delivery, attention to behavioural insights, digitalisation and the like. In contrast, adaptive innovation could have strong environmental drivers, such as global crises and economic shocks experienced by the entirety of a public sector system, but might need legitimacy to create the structures and funding mechanisms for continuous testing and iteration. Mission-oriented innovation, meanwhile, will require both structural change in public sector organisations and cross-government coordination, as well as revamping procurement, budgeting and other systemic factors. Finally, anticipatory innovation is likely to demand the largest appetite for risk, dedicated spaces and creative evaluation mechanisms. Yet these different facets can all exist at the same time in the same system.

Table 3.1. Overview of the innovation facets

	Enhancement-oriented innovation	Adaptive innovation	Mission-oriented innovation	Anticipatory innovation
Main drivers	• Resource constraints and austerity • New Public Management (NPM) paradigm (efficiency, user centricity, cost-benefit-analysis, competition) • Digitalisation	• Environmental (citizen/political demands; threat; collaboration) • Organisational (resources, open/learning culture, experimentation) • Individual (openness, knowledge/skills)	• Complex policy challenges • Failure of traditional policy mechanisms • Social movements • International organisations	• Complex problems • Novel societal and technological developments • Uncertainty • Opportunity costs • Rapid change
Support structures	• Efficiency-focused evaluation and auditing • Performance measurement systems • Standard innovation capacity building and knowledge management, • Digital infrastructures and information technology (IT) governance, and • Funding and budget requirements (cost-benefit-analysis)	• Supportive public procurement, processes, organisational responsibilities and project • Adaptive governance strategies • Infrastructure • External relationship and partnership • Space for experimentation • Learning	• Institutional entrepreneurship • Repurposing of existing co-ordination mechanisms • Existence of transformative change agents • Higher risk tolerance and patient capital • Targeted procurement frameworks	• Action-oriented foresight system • AIG approaches (e.g., functioning authorising environment) • Linkages between foresight and innovation
Tools and methods	• Lean, Six Sigma methods • Project management and quality improvement • Open innovation • Behavioural Insights (BI) approaches	• User centric tools • Design thinking • Agile as a methodology	• Market fixing vs market creating tools and methods • Participatory methods • Systems thinking and funding tools • Experimentation • Portfolio approaches	• Exploratory (e.g., scenarios, course of action analysis) • Imagination and creativity (e.g., visioning) • Innovation (e.g., prototyping, experimentation) • Validate (developmental evaluation)
Skills and capacities	• Digital skills, attention to senior leadership	• Participatory leadership	• Direction setting skills • Dynamic capabilities	• Foresight expertise • Creativity skills • Leadership skills • Communication
Challenges	• Overly focused on process optimisation • Too inward looking • Output-based approaches and risk avoidance	• Contextual practice, broader lessons difficult to draw out • Difficult tie with traditional public sector processes (strategy, budgetary procedures, ex ante cost-benefit-analysis)	• Mission washing • Strong government silos • Incumbent actors and power relationships • Narrow, policy field specific (e.g., STI) interventions	• Risk-aversion, rule-driven and stable structures • Impact gap between foresight and policy planning • Government silos

Supportive elements, such as performance reviews that include innovation, innovation funding rules, regulation, auditing and evaluation practices, influence different types of innovation in different ways. It is also possible for path dependencies and feedback to be so strong in certain organisational contexts that they override systems-level factors. For example, organisations in data-rich environments, like tax offices,

have developed dynamic capabilities and lead in enhancement-oriented innovation through digitalisation (Lember, Kattel and Tõnurist, 2018[25]). Further, technology and digitalisation can create their own support measures and legitimatisation (Mergel, 2019[26]).

The assumption is that a diverse innovation portfolio is likely to deliver the best public outcomes in the short, medium and long terms.[2] The challenge is to steer public sector innovation on the systems level without creating biases for innovation that does not align with the system or organisational need to innovate.

This means understanding which factors support one innovation facet or another. It also means deciding whether that crowds out needed innovation or favours practices the government wants to invest in for political reasons. However, innovation goals at the government level are rarely clearly defined or linked. This makes it difficult to compare the importance of one innovation facet over another, for example weighing up mission-oriented innovation against adaptive innovation. Environmental signals, such as crises and immediate threats, are therefore likely to bias the innovation portfolio, as shown in the effect of the COVID-19 crisis on innovation investments (OECD, 2020[27]).

One way to overcome this is to analyse the systemic factors and measures in place, and qualify their effect on innovation facets as potentially positive, negative or neutral to see if these can be balanced in some way. However, a lack of evidence around these assumptions make this analysis difficult. Furthermore, even on an organisational level, innovation portfolio tools and methods are lacking to help organisations make sense of their innovation portfolios and link them to factors that influence them on an individual, organisational or a systems level. This becomes more evident at the level of organisations/units that coordinate public sector innovation activities. With the Public Sector Innovation Facets model, OPSI works with countries to develop tools that organisations and public sector innovation coordinating bodies can use to make sense of innovation portfolios and the reasons behind them (Box 3.3). However, this work is only in its early phases and more evidence is needed to make the approaches actionable and draw conclusions.

Box 3.3. Innovation portfolio workshops as a heuristic tool

In 2017-18, the OPSI developed a workshop for public sector organisations and coordinating bodies to engage with the Public Sector Innovation Facets model. The aims of this workshop, facilitated by the OECD, were to:

- build shared understanding of innovation in government organisations
- build the capacity of government staff to recognise and differentiate types of innovation
- analyse a current portfolio of innovation activities
- uncover how different innovation activities are supported (or not)
- explore possible approaches to current innovation activities
- evaluate innovation portfolio balance
- develop an action plan to maintain, reorient, or create new activities or investments

The workshops required participants to collect and identify their country's innovation activities (at project and initiative level) and classify these into the innovation facets based on their parameters. This helped to map the current innovation portfolio orientation, discuss why such an orientation emerged, and set the stage for discussing the need to re-orient the portfolio and the levers to do so.

Workshops were carried out in Sweden and Finland to test the approach (and on occasion as part of sectoral policy, e.g., systems analysis for the education system of Wales) and as part of the OECD's innovation scans activity in Israel, Latvia, Norway and elsewhere.

They delivered insights to stakeholders across government in terms of portfolio biases and blind spots, leading to activity following the session.

Source: OECD (n.d.[28]), *A Workshop Based on the Innovation Facets Model*, https://oecd-opsi.org/facets-workshop/.

The Public Sector Innovation Facets model provides a framework for considering whether an innovation system is aligned with its needs and goals, and offers ways to start building on the strengths and address the weaknesses of a policymaking system. It allows system stewards to draw on the approaches and capacities reflected in each organisation's facets maps to support policy development and outcomes.

How the innovation facets interact with policymaking systems

If public sector innovation is professionalising and becoming more institutionalised, it is not yet ingrained across policymaking at large. Most innovation in the public sector is not classified as such (e.g., under reforms, policy innovations and development projects) because its usual channels – labs, innovation units, etc. – rarely participate in bigger reform efforts (McGann, Blomkamp and Lewis, 2018[16]). Rather, links between innovation and government action are more apparent in bottom-up approaches where the gap is smaller between designers, citizens, service improvement and creative teams (Lewis, McGann and Blomkamp, 2020[29]). However, that does not mean innovation is unimportant in strategic policymaking or that the use of innovative tools and methods would not improve the quality of policy and its implementation.

Policymaking is a discrete, stage-gate process where bureaucrats tend to solve 'known problems' using policy analysis and formulation, decision-making, policy implementation, and monitoring and evaluation (Cairney, 2016[30]). While research generally describes it as a technocratic process, this assumption has received a lot of criticism (Cairney, Oliver and Wellstead, 2016[31]; Howlett, 2009[32]; Bogenschneider and Corbett, 2011[33]). Real life processes are much messier, from problem framing (based on evidence or emotion) to the ways policymakers learn or how feedback lags behind decision-making (Considine, 2012[34]; Head, 2013[35]). Nevertheless, rationalist and technocratic assumptions about policymaking and evidence-based agendas can make it difficult to integrate innovation into policymaking practices.

Nonetheless, there can be windows of opportunity for integrating adaptive, anticipatory, mission-oriented and enhancement-oriented innovation. The COVID-19 crisis raised interest in adaptive and anticipatory processes, although the specifics of how these can work in policymaking structures without the legitimising need of a crisis remain vague. Complex societal challenges and future-oriented policymaking break the mould of policy, expanding beyond organisational mandates both conceptually (into adjacent policy areas) and temporally (into possible future scenarios). They therefore present structural challenges for governments organised around mandates and grounded in public accountability. To address them, governments need commensurate governance supports for policymaking in these spaces.

Complex, horizontal societal challenges are the easiest area to make the case for integrating facet-specific innovation. The climate crisis and socioeconomic transitions call for systemic change in policymaking towards transformative policy design and appraisal (Mercure et al., 2021[36]). They require a holistic, whole-of-government approach, recognising that problems are interrelated and depend on both bottom-up and top-down innovation. This means, for instance, that countries' climate goals can serve as a test case for a mix of enhancement, adaptive and anticipatory innovation: optimising the efficiency of existing power sources, looking to grassroots ideas and technological changes, and exploring uncertain but plausible scenarios. This requires, more alignment and coordination in policymaking and implementation, allowing governments to also enhance their innovation portfolio approaches. Some tactics connected to this are outlined in Table 3.2 below.

Table 3.2. Interaction of Public Sector Innovation Facets with policymaking systems

Aspects	Implications
Assumptions	• The innovation facets are driven by a range of intents and provide the system with different lessons and experiences. • This model provides a language for examining innovation systems, and allows decision-makers to consider the alignment between goals and activities.
Strategies and tactics	• The varied strategies and tactics that characterise the innovation facets require different capacities. • Innovation can be integrated in the system through policy and policy transfer, creating networks, and disseminating practices. This could include learning structures, communities of practice, communicating pathfinder successes, and capturing and highlighting innovations based on innovation facets or innovation portfolios (for example driven by missions)
Meta-strategy and governance	• Public policy problems characterised by horizontality, uncertainty, and complexity pose structural challenges for governments' operating models. • Innovation can be integrated in the system through mission-oriented and anticipatory innovation governance models, allowing the pursuit of public policy goals to extend beyond organisational mandates and present-day certainty. Mission-oriented innovation is itself a tool to connect capacities across and beyond government. • Ensure that agenda-setting considers uncertainty by including futures thinking in top-level strategic planning. Capacity and insight from domain-specific organisations should flow upwards into priority and mission design.
Usage	• Organisations in the public sector will have a variety of strengths and weaknesses in different types of innovation. • Innovation can be integrated in the system by mapping organisational and aggregate capacities as a starting point for investment, innovation support and enterprise design decisions.

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Notes

[1] Read further about MAL here: https://oecd-opsi.org/projects/mission-oriented-innovation/.

[2] See https://oecd-opsi.org/innovation-portfolios-examples/.

4 Towards a strategic, action-oriented innovation portfolio

This chapter discusses the need to make a strategic link between government purpose and innovation and highlights the next steps in analysis for both the influence different types of innovation in the public sector and the challenges they bring to an innovation portfolio approach.

There is a direct strategic link between why government undertakes innovation and its core values. This report makes a case for a directive (rather than descriptive) public sector innovation model that is strategic, action-oriented and geared towards substantive public value outcomes. Putting two innovation dimensions – directionality and certainty – and substantive public value goals at the core of government action, the report offers theoretical foundations for the Public Sector Innovation Facets model. Reviews of the facets show that each innovation type has different characteristics, and is driven and facilitated by different processes, factors and structures in the public sector. They also require different skills and capabilities from public sector employees (see further in Part II of the report):

- **Enhancement-oriented innovation** is driven by public sector constraints on resources and costs, the influential principles of New Public Management – a market-driven public administration paradigm, and by digitalisation and the adoption of new technologies. There are numerous enabling conditions for enhancement-oriented innovation, including out-based evaluation and auditing and performance measurement systems. Developing digital skills within public sector organisations, as well as the adoption of new digital or funding infrastructures, can also sustain enhancement-oriented innovation in the public sector. Governments have adopted a variety of tools and methodologies to stimulate and manage enhancement-oriented innovation – such as lean and six sigma methodologies, project management and quality improvement methods, open innovation and behavioural insights approaches. Enhancement-oriented innovation's compatibility with existing paradigms and the overall status quo of an organisation or system makes it one of the less contested and easily promoted types of innovation in the innovation facets model.
- **Adaptive innovation** is driven by environmental, organisational and individual drivers lead to the adoption of adaptive innovation in government. These often include external crises, the opportunity to experiment and the ability to make fast decisions. To sustain adaptive innovation in the public sector over the long term, there is a need for adaptive organisational structures, decentralised governance structures, enabling infrastructure, networks and partnerships, space for experimentation, and evaluation and feedback mechanisms. In a hierarchical system such as in most government settings, leadership plays a significant role in creating space for adaptive innovation. This creates the possibility for readiness to respond to change, the ability to innovate at a fast pace. Usually, ad hoc support for adaptive innovation is not enough and a governance framework that allows adaptation and undirected innovation to take place needs to be put in place. Individual skills and willingness to engage with adaptive innovation are also crucial. In environments demanding both stability and the need to act quickly, such as during crises, adaptive innovation supports public administrations by simultaneously strengthening resilience and building adaptive capacity. In addition, adaptive innovation can help avoid fragmentation of experimental practices and systematise innovative action in government.
- **Mission-oriented innovation** is driven by the urgency around the biggest grand challenges of our age and the failure of traditional policy and governance mechanisms to address these. While many factors influence missions, current evidence shows that mission-oriented innovation is often supported by three interlinked policy structures: institutional entrepreneurship and mission governance that enable collaboration and experimentation; available funding for a portfolio of missions; and the adoption of outcome-based procurement. The implementation of mission-oriented innovation is still an emerging practice and can in principle rely on a wide variety of policy-making tools and methods. The implementation methods increasingly favoured by public organisations are experimentation and stakeholder engagement, a portfolio approach to funding and governance of projects, and new public value and spill-over-focused evaluation frameworks. Mission-oriented innovation addresses key current policy and wider public sector challenges: it ensures inclusive governance, progressive politics, generative environments and systemic impact.

- **Anticipatory innovation** is driven by uncertainty and complexity surrounding policy problems, need to make decisions under fast-based socio-technical change and opportunity costs of doing nothing. The necessary conditions for facilitating anticipatory innovation in the public sector are strong foresight ecosystems closely connected to innovation governance structures, and working methods that embed anticipatory innovation in day-to-day processes. Diverse methodologies exist to capture each aspect of the iterative process of perceiving, making sense of and acting on emerging futures. Research shows that far more tools exist to perceive and make sense of futures, than for converting insights into action and evaluating outcomes. In order to build anticipatory innovation capacity, governments must be able to draw on subject matter expertise, imagination and an appreciation of emergence and complexity. Communication of anticipatory insights and sustained demand for anticipatory innovation from senior leadership in government is essential.

However, many blind spots and practical challenges have yet to be addressed. In the area of enhancement, open questions pertain to measurement: Do the innovations deliver the efficiency and effectiveness outcomes they proclaim? Discussion has advanced on the topic of public sector productivity, but much less has been has been done to demonstrate the empirical effects. Hence, it is unclear where long-term versus one-time productivity gains through enhancement-oriented innovation can be made, or when the public sector is just externalising costs to enterprises, stakeholders and other parties.

Similarly, little is known about how adaptive processes could be integrated into policy approaches beyond service delivery. Definitions used in the field confuse tools and methods-based approaches (agility) with adaptability and resilience, and governance structures and support. This ambiguity and focus on individual success factors (e.g., the role of leaders) make it difficult for government to act and create structural support systems. Some governments push the agenda under an agile governance banner, but unease remains with traditional steering mechanisms (budget, regulations, strategic planning). There is little evidence about the skills and competences that support adaptation among public servants not in leadership roles. These are often discussed from a methods perspective – design thinking, experimentation, agile methodology – but not the capacities and capabilities to make them work in a public sector environment. Furthermore, while adaptive innovation enhances understanding of the depth and scope of policy problems, it tends to be highly contextual, based on tools and methods applied. Hence, its ability to diffuse and reach scale remains unexplored.

Mission-oriented innovation enjoys the most attention from policymakers and politicians. There is high-level support from international organisations for harnessing the approach towards socio-economic challenges. The concept is moving beyond its science, technology and innovation origins to encompass the whole governance system. However, the approach lacks governance structures and a toolbox suitable for different contexts. The heightened attention and political potential mean mission-oriented innovation is racing time to prove itself and could burn out if delivery does not meet expectations. Hence, “mission washing” (requalifying programmes and governance structures as missions) is becoming evident. To be successful, mission-framing approaches must be followed quickly by implementation frameworks covering the specifics of tools, methods and governance, which could require upheaval of current structures.

In the area of anticipatory innovation, international organisations such as the OECD already invest in developing tools, methods and governance approaches. In addition, research in member countries helps understand how to integrate these into existing governance structures and change steering mechanisms to put anticipatory innovation into action. The COVID-19 crisis created an appetite for these approaches in public sector organisations. But there are barriers to anticipatory innovation in traditional policymaking and many of these will remain because it challenges existing service models, engages scenarios that might not be addressed by current structures, and produces transformative ideas that can be uncomfortable or contradict current commitments. That said, the approach can contribute to policymaking by stress-testing, visioning etc., which make established processes more robust and future-ready. Anticipatory innovation faces a blind spot connected to competition and silos within the foresight and innovation communities. While both have extensive toolboxes, the fields rarely overlap, and bridges and value chains between them

are lacking in the public sector. Thus foresight tends to not deliver actionable insights and faces an impact gap, while innovation does not pick up on insights and works at the margins of transformative change.

Empirical research into making the innovation facets work in practice has yet to be generated. Beyond the individual facets, this is also clear when looking at how public sector organisations support different types of innovation at the same time. Taking a portfolio approach, governments and organisations can prioritise different types of innovations at different times. For example, an environmental protection agency might invest in a mostly mission-oriented innovation portfolio while simultaneously enhancing its current systems, looking for ways to meet stakeholder needs and making sense of signals in the field. Hence, "portfolio balance" is desirable for organisations to avoid lock-in, user dissatisfaction, technological disruption, etc. Ongoing innovation portfolio management connected to decision-making helps avoid fragmentation and 'projectification' of innovation activities, builds on synergies and value chains between actions (e.g., establishing missions within the bigger innovation portfolio), spreads risk and engages uncertainty at the portfolio rather than the initiative level, and connects actions to ecosystems-level activities.

How to do so is still emerging. While private sector tools and methods for innovation portfolio management exist, they concentrate on financial returns, single organisations and short timelines. They thus tend to be unsuitable for the public sector context, where cost-efficiency is only one outcome among many public values that innovation serves, where impacts are often co-created with external ecosystem partners, and where the timelines for impacts (especially in relation to 'wicked' problems) are much longer. Public sector organisations are experimenting with innovation portfolios, but work on tools and methods is needed to update innovation portfolio management. There is also need to create new insights through empirical, action research by designing and testing public-sector-focused portfolio management approaches, and validating them in different settings. Specific, purpose-driven, cross-government portfolio management tools could also be necessary to make mission-oriented innovation work in practice.

Importantly, innovation facets and portfolios at an organisational/unit/team level interact with more system-wide innovation perspectives. Most analyses in the public sector look at innovation as something to be increased in total, not as something influenced by different public values, purposes or strategic aims. The latter are often analysed among other drivers and barriers to innovation on the systems level. While this report offers a directive approach to innovation and proposes a model for steering innovation in line with core government purposes, that does not mean governments are beyond the descriptive phase of innovation. Seeing innovation as a general outcome variable and factors that impede innovation as targets to overcome is a step in the right direction. But there is room for innovation systems capacity models to be more precise and purposeful, and to analyse how factors at individual, organisational and systems levels simultaneously support different types of innovation in different ways. This would also make the strategic response and support of innovation more nuanced.

Innovation should become accessible to all public servants, and the innovation facets approach could make this more attainable. In different government roles, the skill and capacity needs for different facets of innovation may be different. A strategic planner might need support in mission-oriented and anticipatory approaches to account for the complexity of their working methods, while frontline bureaucrats might benefit from adaptive methodologies and understanding of internal systems that impede the user experience and create inefficiencies. Putting innovation capacity and management support in the context of innovation facets could create opportunities for more tailored and effective support for innovation across the public sector.

Part II Working with the public sector innovation facets: An in-depth analysis

5 Enhancement-oriented innovation

This chapter introduces the concept of enhancement-oriented innovation as part of the Public Sector Innovation Facets model. It presents evidence about this innovation facet drawing on three areas that engage with the facet most: incremental innovation, digitalisation and public sector productivity. Enhancement-oriented innovation is driven by public sector constraints on resources and costs, principles of New Public Management (a market-driven public administration paradigm), and digitalisation and adoption of new technologies. Numerous structures support enhancement-oriented innovation, including evaluation, auditing and performance measurement systems. Developing digital skills within public sector organisations, and adoption of new digital or funding infrastructures can sustain enhancement-oriented innovation in the public sector.

General description

Enhancement-oriented innovation is public sector innovation to improve and upgrade existing practices and structures without significantly altering current systems. This is generally done by working within existing knowledge, processes and functions to answer “How might we do X better?”

There is neither a concept of enhancement-oriented innovation in public administration literature, nor a single criterium or exhaustive list for identifying this type of innovation. As defined in the OECD Observatory of Public Sector Innovation's (OPSI) facets model, the following qualify innovation as enhancement-oriented:

- It engages with change connected to current services, processes and systems in the public sector.
- It results in innovation (rather than mere change), meaning it must be new to the context, implemented, and have an impact (whether positive or negative) on public value (OECD, 2018[1]).
- It seeks to achieve greater efficiency, effectiveness and value for money.

It is important to emphasise the distinction between business improvement and enhancement-oriented innovation. Since enhancement-oriented innovation results in innovation rather than mere change, it does not always equate to improvement. Improvement carries normative value and implies positive effects. While innovation can enhance current systems, it might not necessarily result in overall improved conditions or outcomes. For example, digitising a service might increase cost efficiency but come at the cost of decreased privacy or other values.

Based on this definition, enhancement-oriented innovation includes established concepts in the literature, such as incremental innovation and improvement innovation (Table 5.1) but remains broader than these. These types of innovations may not be radical or disruptive but are widespread in the public sector and can have a significant impact on government operations and delivery of public services.

Enhancement-oriented innovation often includes structured planning and learning processes to consolidate insights and build on them (Table 5.3). Some common methods are lean management, process improvement, quality control and behavioural insights approaches. These vary in scope but can cut across domains of public sector activity and be implemented at almost all levels of government.

The challenge

Faced with the growing complexities of the digital age (Benay, 2018[2]) and with decreasing levels of public trust (OECD, 2021[3]), governments seek to find new and better ways to optimise public sector organisations, processes and services (De Vries, Bekkers and Tummers, 2015[4]). Rapid technological change, austerity policies and rising expectations of government services increase pressure on the public sector to serve citizens better, faster and more efficiently while minimising costs (Mulgan and Albury, 2003[5]). Governments are expected to extend choice in services, tailor these to user needs, and be evidence-informed in service allocation and decision-making (McGann, Wells and Blomkamp, 2021, p. 299[6]). The wave of behavioural insights in policy calls the public sector to address challenges from within: tweaking services to incentivise positive behaviour (OECD, 2017[7]). This aligns with the call for “smart” services using technology to optimise provision and accessibility (Velsberg, Westergren and Jonsson, 2020[8]). In many countries, these factors lead to a high volume of incremental public sector innovations or *bricolage* (Bugge and Bloch, 2016[9]; De Vries, Bekkers and Tummers, 2015[4]).

Under these pressures, governments are expected to deliver more with fewer resources (Andersen and Jakobsen, 2018[10]). Public sector organisations must continuously enhance their operating systems while demonstrating efficiency, user-centricity and value for money.

The approach

To understand the nature of enhancement-oriented innovation in the public sector, OPSI researched academic and policy literature, and collated experiences from public sector practitioners. This section of the report shows the main themes of enhancement-oriented innovation in the public sector. It is structured as follows: (1) General description of the facet; (2) Main drivers of enhancement-oriented innovation in the public sector; (3) Enabling factors; (4) Tools and methods; (5) Skills and capacities needed; (6) Policy and implementation challenges; and (7) Unanswered questions. The rest of this introduction covers how enhancement-oriented innovation relates to the current public sector literature, in particular established concepts such as incremental innovation, digital government, and public sector productivity.

Research findings

This report introduces enhancement-oriented innovation as a concept in the Public Sector Innovation Facets model. The concept does not exist as a distinct term in literature discussing public sector innovation, but it relates to several research streams. Enhancement-oriented innovation engages with current structures, is new to the context, and has an impact on public value. Search terms based on the definition of enhancement-oriented innovation were used to identify relevant research streams in public sector literature. These included: *efficiency*, *productivity*, *exploitation* and *effectiveness*. The research finds that literature on public sector ambidexterity, incremental innovation, improvement innovation, digitalisation and productivity provides discussions relevant to this innovation facet (for definitions see Table 5.1).

Table 5.1. Definitions of concepts relevant to enhancement-oriented innovation

Term	Definition
Ambidexterity	"The ability to balance and reconcile the interdependent processes of innovation and optimisation" (Gieske et al., 2020, p. 343[11]).
Improvement innovation	"Reflecting an increase in the prominence (or quality) of certain characteristics without changing the structure of the system of competences" (Djellal, Gallouj and Miles, 2013[12]).
Incremental innovation	"Involves discontinuous change to products and services ... [and] takes place within the existing production paradigm" (Osborne and Brown, 2013, p. 5[13]).
Productivity	"Calculated as the ratio of all the outputs produced by a given organisation divided by all the inputs or the resources used in producing those outputs" (Dunleavy and Carrera, 2013, p. vii[14]).

Based on data from the OECD OPSI case study library, enhancement-oriented innovation is one of the most widespread innovation types in the public sector. It shares many outcome measures and objectives with private sector innovations (Bugge and Bloch, 2016[9]), including cost reduction objectives, quality improvement, and the need to meet citizen demands while dealing with limited human or financial resources (Arundel, Bloch and Ferguson, 2019, p. 795[15]). There are connections between enhancement-oriented innovation and the New Public Management paradigm

Incremental innovation and ambidexterity

Scholars working on incremental innovation and ambidexterity discuss the optimisation of existing processes, services and structures in the public sector (Barrutia and Echebarria, 2019[16]; Boukamel, Emery and Gieske, 2019[17]; Osborne and Brown, 2013[13]). This research illuminates the distinction and balance between enhancement-oriented innovation and business improvement.

Enhancement-oriented innovation is wider than incremental innovation, but some practices can be characterised through it. According to Osborne and Brown (2013, p. 5[13]), incremental innovation "involves discontinuous change to products and services" and "takes place within the existing production paradigm". Enhancement-oriented innovation includes innovation that changes current products and services but with

the strategic aim of bettering the current system. One of the main challenges discussed in the literature on incremental innovation is the distinction between innovation and regular business development. Within the public sector literature, this distinction is reflected in the concept of incremental versus radical innovation. Thus, practices connected to enhancement-oriented innovation can be characterised by their focus on the optimisation of existing structures within organisations' conventional way of doing things.

Research on ambidexterity reveals how organisations balance their operations between the improvement of current activities (exploitation) and the pursuit of new, more radical approaches (exploration) (Barrutia and Echebarria, 2019[16]; Boukamel, Emery and Gieske, 2019[17]; Cannaerts, Segers and Warsen, 2020[18]; Choi and Chandler, 2015[19]; Matheus and Janssen, 2016[20]; Palm and Lilja, 2017[21]). Gieske et al. (2020[11]) show that while exploitation initially has a greater impact than exploration on public sector performance, it has diminishing returns when organisations over-optimise. Yet, "efficiency creep" bias in organisations favours efficiency-oriented investments over innovation investments (Magnusson, Koutsikouri and Paivarinta, 2020[22]). While organisations should balance exploitative and explorative activities, evidence suggests that exploration is a more significant force for stimulating innovation (e.g., Boukamel et al. (2019[17]); Cannaerts, Segers and Warsen (2020[18]); Gieske et al. (2020[11]); (Magnusson, Koutsikouri and Paivarinta (2020[22]); Matheus and Janssen (2016[20]); Palmi et al. (2020[23])). For example, the Swedish Social Insurance Agency (SIA) was able to favour exploration activity and structural ambidexterity thanks to the creation of an innovation hub in its IT department, which provides employees with a "safe space" to generate innovative ideas (Magnusson, Koutsikouri and Paivarinta, 2020[22]).

In most cases, enhancement-oriented innovation can be connected to exploitative innovation that aims to improve existing processes and services without fundamentally challenging established ways of thinking. In the literature, Halvorsen and Hauknes (2005, p. 5[24]) coined the term "efficiency-led innovations" to describe product innovations in the public sector that are "initiated [...] in order to make already existing products, services or procedures more efficient". The desired results from optimisation using enhancement-oriented innovation are thus typically related to increasing efficiency.

Digitalisation and e-government

The search terms returned several articles on digitalisation in the public sector, which show that digitalisation projects motivated by optimisation and efficiency can be connected to enhancement-oriented innovation. Digitalisation in the public sector is characterised by different maturity phases. At initial stages, digitalisation involves moving paper-based processes and procedures online (e-government). When organisations advance further, towards digital government, technology is used to design, operate, and deliver services for increased trust and wellbeing (OECD, 2014[25]). Therefore, the initial stages of digitalisation are arguably more linked to enhancement-oriented innovation while later stages can be considered more closely linked to adaptive (Chapter 6) or anticipatory (Chapter 8) innovation.

Research finds that e-government initiatives can serve as "carriers for innovation", central in the creation of new products and services, contributing to the "improvement of the quality and efficiency of internal and external business processes" (Bekkers, 2013, p. 260[26]). The consensus is that most digitalisation efforts in the public sector are focussed on driving incremental rather than transformative efficiencies and innovations (e.g., Chen, Feng and Chou (2013[27]); Madzova, Sajnoski and Davcev (2013[28])). This appears to be the case especially at the local level, where government agencies mainly adopt and exploit technological innovations to achieve improvements in existing processes (Luna-Reyes et al., 2020[29]). Examples include the digitalisation and online availability of forms and documents, online communication with citizens, and online payments of utility bills, fines and taxes (Norris and Reddick, 2013[30]).

Box 5.1. Pro-active family benefits in Estonia

The government of Estonia developed an IT system that aggregates information from various national registries and databases, continuously and proactively offering social benefits to qualifying families and individuals after key life events. The system ensures that all families are automatically and seamlessly offered benefits if eligible – without having to apply for them.

Before the platform was developed, it took on average two hours for a government official to process an application. Now, eligible users simply log-in to the platform and receive the benefits immediately. Given the platform's success, it is being replicated in other areas of social security in the country.

Source: OECD (2019[31]), *Pro-active Family Benefits - Estonia*, https://oecd-opsi.org/innovations/proactive-family-benefits/.

However, some scholars caution that excessive and often exclusive focus on the exploitative, efficiency-led dimension of digitalisation projects risks limiting their true, transformative potential. A more balanced approach embracing exploration can better serve public organisations in achieving broader goals (Magnusson, Koutsikouri and Paivarinta, 2020[22]; Magnusson et al., 2020[32]; Magnusson, Paivarinta and Koutsikouri, 2020[33]; Matheus and Janssen, 2016[34]; 2016[20]). Successful digital transformations are the foundation for greater simplicity, efficiency and effectiveness in the delivery of public services (Greenway and Terrett, 2018[35]).

The paradigmatic shift from e-government to digital government results in an approach to public sector digitalisation with more holistic objectives. The concept of digital government more broadly encompasses "the use of digital technologies, as an integrated part of governments' modernisation strategies, to create public value" (OECD, 2014[25]). In this view, the optimisation of public services, internal processes and operations through digitalisation in the public sector serve to improve the user experience and strengthen trust in government (Downe, 2020[36]). An example of this broader concept of digital government is the OECD Digital Government Policy Framework (OECD, 2020[37]) (see below).

The example of e-government provides evidence of how enhancement-oriented innovation evolves and how it relates to other innovation facets. While the pursuit of efficiency and effectiveness can drive the spread and implementation of digitisation projects in an initial phase, these can evolve to serve broader objectives and reach more complex goals. Throughout this process, enhancement-oriented innovation and its guiding principles can be a path to other innovation facets by stimulating greater risk taking, openness to new technologies and anticipatory innovation. However, the opposite can also be true: excessive focus on efficiency gains might end up making obsolete processes more efficient. As a result, enhancement-orientation could limit the potential of innovation and prevent more radical change.

Box 5.2. The OECD Digital Government Policy Framework: Six dimensions of a digital government

The OECD Digital Government Policy Framework (DGPF) was developed based on analysis of peer learning and describes the essential characteristics of a digital government. The six dimensions are: (1) digital by design; (2) data-driven public sector; (3) government as a platform; (4) open by default; (5) user-driven; and (6) proactiveness. The DGPF states that while successful digital transformations are crucial for driving enhancement and efficiency in public sector organisations, they also encompass values such as user-centricity and transparency.

Figure 5.1. Digital government principles

Source: Based on OECD (2014[25]), *Recommendation of the Council on Digital Government Strategies*, https://legalinstruments.oecd.org/en/instruments/OECD-LEGAL-0406#dates; OECD (2020[37]), "The OECD Digital Government Policy Framework: Six dimensions of a Digital Government", https://doi.org/10.1787/f64fed2a-en.

Productivity

The relationship between enhancement-oriented innovation and productivity in the public sector is less clear. Discussion of public sector productivity raises questions around the impact of enhancement-oriented innovation: Do efficiency gains from enhancement-oriented innovation equate to increased productivity? If so, where are the productivity gains realised and how can they be measured?

Distinguishing productivity from efficiency

The discussion of efficiency and productivity gains from enhancement-oriented innovation are hindered by blurred lines in the theoretical and practical distinction between the two concepts. Productivity is "a ratio between the volume of output and the volume of inputs. In other words, it measures how efficiently production inputs, such as labour and capital, are being used in an economy to produce a given level of output" (OECD, 2021[38]). In practice, Dunleavy (2021[39]) defines efficiency as incremental innovation that manifests in cost and service reductions, while productivity relates to more substantive and long-term service improvements (Table 5.2).

Public sector innovations such as introducing common procurement standards or shifting services to digital channels are examples of an efficiency focus that result in short-term, one-time improvements in productivity. According to Tõnurist and Hanson (2020[40]), "These 'transactional' improvements can be considered as playing with the quantity of the particular variables in the productivity formula (less input, more output, better outcome), whereas transformational improvements are able to change the variables and/or the underlying formula of how inputs lead to outputs and outcomes." Innovations that change the input-output equation lead to longer-term productivity improvements, for instance, by reducing the input needed to produce an output (e.g., using shared services to reduce the number of staff required to

complete a task) or improving the quality of the outputs (creating electronic tax forms that are easier for citizens to complete) (Dunleavy and Carrera, 2013, p. 12[14]).

Table 5.2. Distinction between productivity and efficiency outcomes from public sector innovation

Criterion	Productivity	Efficiency
Frequency of analysis	Every year (or more often, e.g. quarterly, episodically in big and ad hoc if data allow), but needs a run of five years (or efficiency reviews say 15 quarters) to show a consistent trend	Episodically and ad hoc; and incrementally via internal audit
Focus	Improving substantive service outputs in terms of volume and/or quantity	Cutting costs or ceasing activities
'Production frontier'	Constantly expanding	Fixed
Results	New services, new customers, increase in capital intensity, innovation, stable staff numbers	Harder/faster work for staff; cutting jobs, worsened working conditions
Mantra	Focus on finding production system, technology, organisational or service-character changes that meet three goals at once: • Better quality for customers/citizens • Simpler processes for staff • Cheaper production for the agency	Do only what we (legally) must, at the lowest possible cost

Source: Dunleavy, P. (2021[39]), "What public sector productivity is and why it matters".

Consequently, the impact of enhancement-oriented innovation should distinguish between "discussions about efficiency or value for money" and public sector productivity measured via "systematic accumulation of data on organisational performance" (Dunleavy and Carrera, 2013, p. 12[14]). The Tietokiri project launched by the government of Finland illustrates this distinction (Siltanen and Passinen, 2020[41]). The project uses data to detect the impact of operational practices on productivity increases across government. First, shared services providers (such as the Treasury) collect operational data common to all government departments (e.g., IT spending or procurement) and combine it into a government-wide dashboard. Analysis of the data seeks to understand whether isolated investments lead to broader productivity gains, such as how new office space concepts impact staff sickness and absence. Tietokiri shows that while tracking individual investments shows efficiency gains (e.g., cost saved on real estate), only the analysis of aggregate data can track productivity gains across governments (e.g. higher presence in the government workforce). The outcomes of enhancement-oriented innovation can thus be short-term or longer-term, more or less substantive, and depend on the type of innovation introduced.

Realising and measuring productivity gains

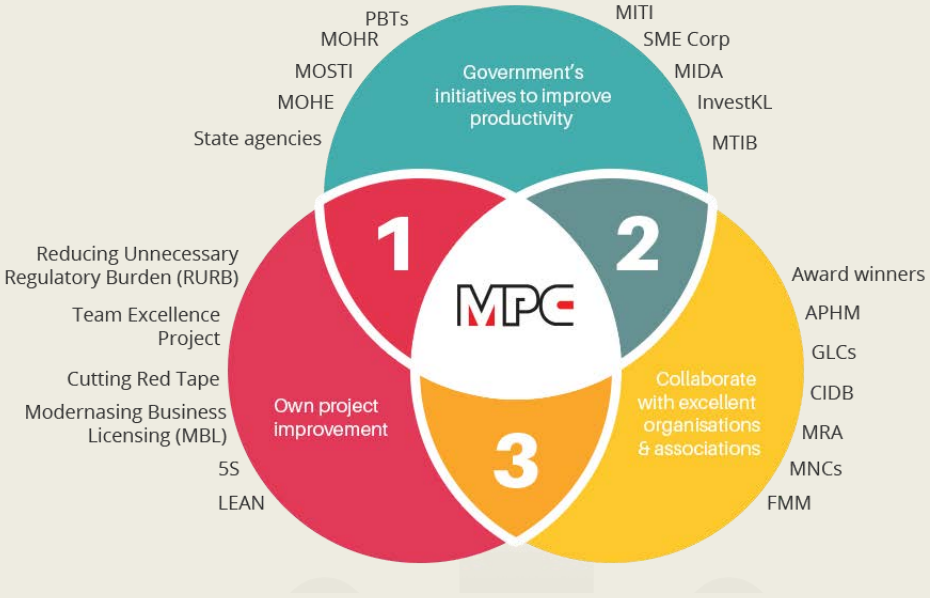
Most OECD research on productivity looks at the private sector, and productivity in the public sector remains under-researched (Lau, Lonti and Schultz, 2017[42]). Yet improving public sector productivity is a political priority for many countries. As public finances remain fragile and the dependency ratio in public services soars (e.g., due to ageing populations), governments must either add resources or maximise productivity (ibid). However, productivity outputs are difficult to define and track (Lau, Lonti and Schultz, 2017[42]), and the relationship between inputs (such as enhancement-oriented innovation) and outputs is not well measured. An increase in input does not necessarily result in increased output (Dunleavy, 2017[43]).

This research finds that, while the links of enhancement-oriented innovation to efficiency can be established, links to increased productivity are tenuous and not guaranteed. Some governments introduced enhancement-oriented innovations systematically to achieve whole-of-government productivity gains (see case study on the Malaysia Productivity Corporation).

Box 5.3. Malaysia Productivity Corporation (MPC)

The Malaysia Productivity Corporation (MPC) is a government organisation set up under the Ministry of International Trade and Industry with the aim of "unlocking potentials of productivity". Through case studies, the MPC introduces public and private organisations to best practices in regulatory reform and the digitalisation of public services to improve productivity. The case studies are available online in the Benchmarking Online Networking Database (BOND) and contain success stories of project improvements that resulted in greater productivity.

Figure 5.2. MPC's tasks



Source: Malaysia Productivity Corporation (n.d.[44]), *About Us*, http://bond.mpc.gov.my/bond2/pages/about-us.html.

Applications of enhancement-oriented innovation

Analysis of the literature finds that examples of enhancement-oriented innovation cluster in three categories: (1) process innovations; (2) product or service innovations; and (3) structural innovations (Table 5.3). These derive from previous attempts to categorise public sector innovation types (Bugge, Bloch and Mortensen, 2011[45]; De Vries, Bekkers and Tummers, 2015[4]; Halvorsen and Hauknes, 2005[24]) and, although they effectively frame enhancement-oriented innovation, they are often observed in more radical and transformative innovation as well. These examples of enhancement-oriented innovation stand out from other innovation types in their focus and compatibility with organisations' existing processes, products, services or structures. They seek to improve the context in which they are applied rather than aiming to disrupt or question existing systems.

Process innovations

Enhancement-oriented process innovation aims to improve the quality and efficiency of internal and external processes (Bekkers, 2013[26]; De Vries, Bekkers and Tummers, 2015[4]). Often, process

innovations use digital infrastructures "to construct new and more flexible relations and distributed autonomy" within organisations (Øvrelid and Kempton, 2020[46]). Examples are process digitalisation, open innovation and adoption of technologies such as blockchain.

Product and service innovations

Enhancement-oriented product and service innovation improves customers' use and access to public services (Bugge, Bloch and Mortensen, 2011[45]). This can take the form of one-stop-shops or full-service digitalisation (Box 5.4).

Box 5.4. Telemedicine in OECD countries: An example of efficiency-led innovation

Telemedicine promises cost reductions, knowledge sharing and patient empowerment, but it entails significant uncertainties and potential for inefficiencies and regional inequalities. Experience from OECD countries shows that most barriers are institutional and cultural rather than technological, and a supportive policy environment for telemedicine must address digital and geographical divides, scale-up through sustained financing, and promote clarity through guidelines. The use of digital tools and platforms, design thinking, and experimentation to deliver medical services can increase inclusivity and user involvement, and the usability and accessibility of medical services.

Source: Oliveira Hashiguchi, T. (2020[47]), "Bringing health care to the patient: An overview of the use of telemedicine in OECD countries", https://doi.org/10.1787/8e56ede7-en.

Structural innovations

Enhancement-oriented structural innovation primarily re-thinks how public entities and agencies can be organised better (Bekkers, 2013[26]), including "improvements to management systems or workplace organisation" (Bugge, Bloch and Mortensen, 2011, p. 3[45]). Shared service centres, optimised regulation and adoption of lean management practices are manifestations of this. An example can be found in Denmark, where, in 2008, the government established administrative shared service centres to (1) manage payroll, finance and travel administration for all public employees, and (2) host, administer and maintain IT services for several state organisations (OECD, 2010[48]).The literature includes several examples of process, product and service, or structural innovations, which typically occur where the approach to the optimisation of a system is integrated. For example, Ortiz-Barrios and Alfaro-Saiz (2020[49]) describe the creation of Emergency Care Networks in local healthcare systems in Spain in response to rising demand for emergency services and long wait times for patients. The networks combine the optimisation of technology, workflows and collaboration (Ortiz-Barrios and Alfaro-Saiz, 2020[49]).

Table 5.3. Types of enhancement-oriented innovation

Category	Sub-topic	Papers
Process innovation – improves the quality and efficiency of internal and external processes, especially via the use of digital infrastructures	Process digitalisation	Øvrelid and Kempton (2020[46]); Tansley et al. (2014[50])
	Citizen involvement and crowdsourcing	Carstensen and Langergaard (Carstensen and Langergaard, 2014[51]); Loukis et al. (2015[52])
	Open innovation	Mergel (2015[53]); Niehaves (2011[54]); Pedersen (2018[55])
	Innovative technology adoption (e.g., blockchain, artificial intelligence, mobile technology)	Cagigas et al. (2021[56]); Kuziemski and Misuraca, (2020[57]); Liu and Li (2011[58]); Malhotra and Anand (2020[59])

Category	Sub-topic	Papers
Product / service innovation – enriches a public sector organisation's services and/or improves customer experience	Service digitalisation	Arfeen, Khan and Ullah (2012[60]); Maphumula and Njenga, (2019[61]); Mittal (2020[62]); Roy (2017[63])
	One-stop-shops	Poddighe, Lombrano and Ianniello (2011[64])
	Innovative technology adoption, e.g., artificial intelligence, Internet of Things	Kuziemski and Misuraca (2020[57]); Velsberg, Westergren and Jonsson (2020[8])
Structural/organisational innovation – restructures and reorganises management systems in public organisations	Shared services and management	Aalto and Kallio (2019[65])
	Quality improvement	Mättö (2019[66])
	Management innovation	Bello et al. (2018[67]); Fabic, Kutnjak and Skender (2016[68]); Fabic, Kutnjak and Fabic (2017[69]); Moreira Neto et al. (2019[70])
	Lean management	Alosani (2020[71]); Janssen and Estevez (2013[72]); Poddighe, Lombrano and Ianniello (2011[64])
	Optimised regulation	Arriola Peñalosa et al. (2017[73])
Mixed innovations – involves two or more of process, product and service, or structural innovations	Process and service	Juell-Skielse and Wohed (2010[74]); Maluleka and Ruxwana (2016[75]); Mittal (2020[62]); Petersone and Ketners (2017[76])
	Process and structural	Mouzakitis et al. (2017[77])
	Process, service and structural	Ortiz-Barrios and Alfaro-Saiz (2020[49])

Main drivers in the public sector

The literature reveals that enhancement-oriented innovation in the public sector is motivated by several factors. It can stem from the need to operate on a reduced budget and "do more with less" (Olejarski, Potter and Morrison, 2019[78]). It can be caused by digitalisation and the adoption of new technologies and infrastructures (De Vries, Tummers and Bekkers, 2018[79]). In high-income countries, it can be motivated by the New Public Management (NPM) paradigm pushing public sector organisations to run operations and services more efficiently and at lower cost, provide incentives for performance and increase user-centricity (Damanpour, Walker and Avellaneda, 2009[80]).

Reduction of resources and costs

The role of cost and resource reductions in spurring innovation is a subject of debate. Some authors agree that reduced fiscal capacity is an important variable in explaining public sector innovation (e.g., Bello et al. (2018[67]); Overmans (2018[81])). Others are less optimistic about the role of budget cuts in organisations' innovative capacity or the positive impact of innovation. Demircioglu and Audretsch's (2017[82]) analysis of the Australian public service finds that lower budgets do not contribute to the likelihood of innovative activity, better explained by factors such as experimentation, a desire to address low performers and the existence of feedback loops. Nevertheless, several authors provide evidence of cost-motivation (e.g., austerity measures) that accompanies enhancement-oriented innovation (De Vries, Bekkers and Tummers, 2015[4]).

Box 5.5. Translation service for migrants in Portugal

Portugal's High Commission for Migration (ACM) implemented a Telephone Translation Service (STT) that works with a database of 95 translators and interpreters to offer migrants free, immediate or scheduled translation in 68 languages. The service is integrated across public agencies and provides citizens with information on various services, including social security, healthcare, police, and immigration and border services. The challenges identified with implementing such a service include

mindset issues (e.g., not knowing where to start when one wants to change a process or a service); structural problems (e.g., dealing with limited staff or budget to bring about change); and user-involvement issues, mostly concerning difficulties faced when trying to involve citizens or civil servants to make sure that innovations match their demands and needs.

Source: High Commission for Migration of Portugal (n.d.[83]), *Telephone Translation Service (STT)*, https://www.acm.gov.pt/-/servico-de-traducao-telefonica.

In describing the implementation of shared management teams in English district councils, Bello et al. (2018[67]) find that budget pressures are an important part of the rationale guiding these types of structural innovations. Similarly, Overmans (2018[81]) explores the response of Dutch municipalities to the growing climate of austerity resulting from the 2007-08 global financial crisis. Overmans finds that, when faced with budget cuts and rising costs, innovation is the main response of local public managers to run their organisations in an efficient and cost-effective way. These conclusions are shared by Sorensen and Torfing (2017[84]), who maintain that the cost savings derived from the public innovation agenda make it an attractive option for governments under fiscal stress. However, not all innovations spurred by budget cuts are structural or strategic. Elliott (2020[85]) reaches this conclusion in exploring organisational change in the UK public sector. Elliott's analysis based on interviews with public sector managers from Wales and Scotland reveals how austerity and budget cuts only lead to piecemeal change, which is not strategic and does not bring about structural improvements in public sector operations.

New Public Management

Organisations strongly influenced by New Public Management (NPM) adopt enhancement-oriented innovation in the expectation of greater efficiencies, cost reduction and higher performance levels (Diefenbach, 2009[86]; Hood and Dixon, 2013[87]). NPM reforms are often driven by the objective of increasing innovative capacity, saving on costs, and a desire to achieve higher levels of organisational performance and effectiveness in the public sector (Calogero (2010[88]); Damanpour, Walker and Avellaneda (2009[80]); Demircioglu and Audretsch (2017[82]); Wallis and Goldfinch, (2013[89]). The literature reveals how enhancement-oriented innovations resulting from NPM reforms take the form of process and managerial innovations (De Vries, Tummers and Bekkers, 2018[79]; Walker, 2014[90]). NPM leads to the adoption of performance management, cost-efficiency measurement and business case logic tools (see section on tools and methods). Especially in Anglo-Saxon countries, NPM is characterised by frequent outsourcing and contracting of service provision to the private sector (Wallis and Goldfinch, 2013[89]) (see section on enabling factors).

However, the mechanism for increasing internal innovation capacity is usually the creation of market-based incentives, which mostly lead to cost cutting via service or personnel cuts and rarely contribute to increased service quality or internal capacity (Dunleavy et al., 2006[91]). Dunleavy et al. (2006, p. 484[91]) maintain that the "perverse incentives" and short-term managerial savings objectives associated with NPM reforms in the last decades limit rather than stimulate effective administrative change and innovation. For example, NPM favours short-term changes and does not support the development of innovation capabilities.

Some authors are more cautious in evaluating the effect of NPM on public sector innovation. In their analysis of the drivers of innovative behaviour in the Flemish Employment Agency and other Dutch public agencies, Verhoest, Verschuere and Bouckaert (2007[92]) conclude that the pressures brought about by NPM alone are not sufficient to understand the observed public sector innovations. Rather, innovation in these organisations is guided by political pressures and legitimacy threats, and NPM is just one of many factors that drive enhancement-oriented innovation.

The impact of innovations nested in the NPM paradigm is therefore a subject of debate. The authors above did not qualify innovation – radical, incremental or facet-based – in their analysis, meaning that effects related to specific innovation facets are difficult to bring out. Nevertheless, there is a strong argument that NPM favours enhancement-oriented innovation over other types of innovation in the public sector. This is not to say that the conditions for the latter have been ideal, as many opportunities for timely improvements have been missed (e.g., in adopting telemedicine). Although the efficiency-focused nature of these reforms would appear to inevitably lead to enhancement-oriented innovation, the effect of NPM on enhancement-oriented innovation is speculative.

Digitalisation, and new technologies and infrastructures

The literature emphasises the role of ICT and digitalisation in stimulating and driving innovation in the public sector (e.g., Bubou, Japheth and Gumus (2018[93]); Madzova, Sajnoski and Davcev (2013[28])). Many technology-driven innovations fall under the enhancement-oriented innovation facet, with objectives and impacts that include increased effectiveness in service delivery, greater efficiency, and improved transparency within the parameters of existing services and products. Examples include digital tools used in tax administration processes (De Vries, Tummers and Bekkers, 2018[79]; Maphumula and Njenga, 2019[61]), the creation of municipal web portals and mobile applications, the personalisation of citizen services, and the more general use of ICT to enhance strategic planning processes and improve inter-agency partnerships and collaborations (Luna-Reyes et al., 2020[29]). Similar objectives are outlined by Christodoulou et al. (2018[94]), who examine data-driven innovation in the public sector, and highlight how living labs, smart cities and e-participation can increase the quality and efficiency of services, and overall levels of trust in government.

Box 5.6. Singapore's APEX platform

Singapore developed a whole-of-government platform that establishes common application programming interfaces (APIs) and allows government agencies to share data and services among themselves and with external entities. The initiative aims to increase adoption of API technology within government by simplifying secure data-sharing, making API management user-friendly and increasing the visibility of available APIs.

The platform was developed with the Agile methodology to iteratively and incrementally design, build and validate features. Its success enables public agencies to rapidly deploy APIs, propagating data for consumption for other organisations, and stimulating innovative projects both within and outside the public sector. APEX ultimately enables the interoperability of government systems, enhancing uniform governance, and strengthening consistency and reliable performance.

Source: OECD (2017[95]), *APEX – Singapore*, https://oecd-opsi.org/innovations/9587/.

E-government includes many of these concepts and cases, and is often associated with technological, process, service and organisational innovations typical of enhancement-oriented innovation (Bekkers, 2013[26]; De Vries, Tummers and Bekkers, 2018[79]). However, not all technology adoption and digitalisation projects lead to enhancement-oriented innovation. Organisational structures and existing capabilities can impact the design of technological structures (Bailey and Barley, 2020[96]; Kattel, Lember and Tõnurist, 2020[97]). For example, a heavily centralised organisation might be more likely to implement a command-and-control design in its IT architecture, while an organisation with flat hierarchies might replicate these in their digitalised processes (Kattel, Lember and Tõnurist, 2020[97]). This implies that the drive for

enhancement-oriented innovation provided by digitalisation will depend on the context and organisational setting were the projects are implemented.

Box 5.7. Transformational government

Transformational government (t-government) focuses on the "ICT-driven business process reengineering and design" of government operations to achieve e-government objectives (Janssen and Estevez, 2013, p. S2[72]; Weerakkody, Janssen and Dwivedi, 2011[98]). Parisopoulos, Tambouris and Tarabanis (2014[99]) find that t-government is characterised by nine elements: (1) user-centric services; (2) joined-up government; (3) one-stop government; (4) multi-channel service delivery; (5) flexibility; (6) efficiency; (7) increased human skills; (8) organisational change and change of attitude of public servants; and (9) value innovation. Their analysis of European countries reveals that few t-government initiatives exploit the paradigm's full potential – with an over-emphasis on efficiency, silos and joined-up government (ibid.) typical of enhancement-oriented innovation. T-government faces several impediments to implementation in public sector organisations, including insufficient IT governance and skills, lack of coordination and organisational readiness to business process engineering, excessive fragmentation and technical complexity (van Veenstra, Klievink and Janssen, 2011[100]).

Source: Janssen, M. and E. Estevez (2013[72]), "Lean government and platform-based governance - Doing more with less", *Government Information Quarterly*, Vol. 30/Suppl. 1, pp. S1-S8.

Therefore, the literature highlights how enhancement-oriented innovation in the public sector is driven by three main factors: budget considerations, digitalisation processes, and NPM logic and reforms. It finds that reactive enhancement-oriented innovation resulting from budget cuts and NPM pressures can be fragmented and lack directionality. In contrast, where digitalisation with strategic intent is the impetus for innovation, the results appear more frequently to be part of long-term, structured change.

Enabling factors

Support structures are the mechanisms established within organisations to sustain enhancement-oriented innovation in the public sector. They are broader than the drivers for enhancement-oriented innovation discussed in the previous section and different from external factors and conditions that support or hinder innovation. The literature shows that support structures which create favourable conditions for enhancement-oriented innovation are: (1) evaluation and auditing; (2) performance measurement systems; (3) capacity building; (4) digital infrastructure and IT governance; and (5) funding and budget structures.

Evaluation and auditing

Auditing and evaluation processes can stimulate enhancement-oriented innovation by prompting improvement in public organisations' processes and procedures (Kells and Hodge, 2011[101]). This can occur in all three phases of the auditing process. Initially, the prospect of an audit can prompt the need to innovate to improve administrative processes. Later, participation in the auditing process can help staff learn about performance and think about which enhancement-oriented innovations to adopt. Lastly, the findings and recommendations of an audit can provide insights into underperformance and, under certain conditions, lead to performance-enhancing innovations (Kells and Hodge, 2011[101]).

At the same time, performance audits run the risk of prompting an excessive focus on standards, measurement and compliance, which could lead to overly cautious, anti-innovative behaviour and ultimately hinder public service delivery (Bawole and Ibrahim, 2016[102]). Auditing mechanisms alone do not encourage enhancement-oriented innovation by default. Whether auditing stimulates or limits innovation can depend on contextual factors such as the nature of the auditing process (Kells, 2011[103]; Kells and Hodge, 2011[101]; CAF, 2020[104]) (Box 5.8).

Box 5.8. The Common Assessment Framework as a driver of innovation in Vienna

> *"The CAF is an easy-to-use, free tool to assist public-sector organisations across Europe in using quality management techniques to improve their performance [...] based on the premise that excellent results in organisational performance, citizens/customers, people and society are achieved through leadership driving strategy and planning, people, partnerships, resources and processes." (EUPAN Secretariat, 2021[105])*

The Common Assessment Framework (CAF) provides guidance for modernising public administration, especially through cultural change. Its foundations include 'Principles of Excellence' and the UN Sustainable Development Goals. The CAF enables organisations to manage their organisational and cultural change to ensure quality management focused on generating impacts based on values of sustainability and partnership. An example of the CAF in action is the Smart City Vienna project, a process of continuous development that demonstrates the impact of the CAF in the Vienna Public Administration. It is the city's sustainability strategy, built on the interest of citizens, maximising quality of life through social and technological innovations, and grounded in sustainability and the SDGs.

Source: Sejrek-Tunke, E. (2021[106]), "Vienna city administration: Towards total quality management"; EUPAN Secretariat (2021[105]), "CAF - Common Assessment Frameworkhttps://www.eupan.eu/caf/.

Performance measurement and management

Performance measurement in the public sector usually happens across pre-defined tasks, which can influence public servants' incentives to engage with novel value-added activities (Heinrich and Marschke, 2010[107]). Due to lack of good-quality indicators, performance measurement tends to be output-centric and have difficulty grappling with non-routine situations (Kattel et al., 2014[108]). The inherent bias in performance measurement and management systems thus tends to be efficiency and effectiveness of current systems, rather than trying to quantify something new or uncertain.

Consequently, enhancement-oriented innovation can be facilitated through rigorous performance management evaluation. Fabic, Kutnjak and Skender (2016[68]) find that new systems for measuring and evaluating employees' performance are a common management innovation in Croatian local government agencies that seek to improve operational performance. Indeed, such activities can contribute to managers' efforts to respond to low performance by establishing constructive feedback mechanisms to motivate both low- and high-performing employees, and increase the overall likelihood that innovative activity will increase efficiency (Demircioglu and Audretsch, 2017[82]). Importantly, Jacobsen and Andersen (2014[109]) find that the perception of performance management tools can explain their effectiveness in terms of organisational performance. The role of managers and their ability to create incentive structures can therefore influence how employees perceive, react and perform when confronted with performance management programmes and structures (Jacobsen and Andersen, 2014[109]).

Greater capacity to aggregate performance data can also create incentives for enhancement-oriented innovation. According to Rogge, Agasisti and De Witte (2017[110]), increased uptake of big data analytics in government agencies will enhance the effectiveness of performance management systems and performance dashboards, boosting efficiency, increasing productivity and innovation, and optimising the measurement of these variables. Performance dashboards are a useful way to display and communicate such information. These visual display tools provide organisational elements, indicators and objectives in a clear, consolidated format (Maheshwari, Maheshwari and Janssen, 2014[111]). Potential benefits include increased connections between individual activities and overall outcomes, and reduced complexity in organisational practice (ibid.). However, their design and implementation in the public sector depends on local factors and must consider a variety of challenges which, if unaddressed, can have adverse effects on performance and lead to internal disagreements (ibid.).

Box 5.9. Personnel Management Innovation Diagnosis Indicator in Korea

In 2014, the new Korean Ministry of Personnel Management (MPM) was tasked with public management innovation. This increased demand for effective and responsive public personnel management. In 2015, Personnel Management Innovation Diagnosis Indicators were developed to assesses public management innovations in each government organisation and provide feedback to enhance innovation capability. The measurement consists of distinct fields (implementation capacity, balanced public management, human resource development and work environments for improvement), and sub-indicators. With participating government bodies and external experts, the Ministry sets indicators that are adjusted on a yearly basis, and organises workshop to spread best practices and set benchmarks.

Source: OECD (2019[112]), "Measuring public sector innovation: Why, when, how, for whom and where to?", https://oecd-opsi.org/wp-content/uploads/2019/05/Measuring-Public-Sector-Innovation-Part-5b-of-Lifecycle.pdf.

Innovation capacity-building and resource management

In the context of building innovation capacity, public servants can be empowered to take small risks that improve efficiency and effectiveness in their areas of responsibility. Fernandez and Moldogaziev (2011[113]) find that, when coupled with training and development, this discretion can contribute to the diffusion of innovation across and within public sector organisations. Similarly, Overmans (2018, p. 359[81]) finds that psychological slack – defined as public servants' "ability to redirect brain capacity to new activities and their level of comfort to operate in uncertain environments" – can be crucial in identifying opportunities for efficiency-led innovation at the municipal level. This is important for enhancement-oriented innovation as employees tend to have the most experience with their organisations' internal processes and services and might thus have the most innovative ideas for how to improve them and enhance their efficiency. These structures can be important for stimulating bottom-up adaptive innovation too (Chapter 5).

In addition, learning processes and knowledge management can impact the innovativeness, operational performance, quality and efficiency of public sector organisations (Al Ahbabi et al., 2018[114]; Balasubramanian, Al-Ahbabi and Sreejith, 2019[115]; Liu and Li, 2011[58]). If learning structures allow for information-sharing and acting on opportunities for innovation and greater efficiency, they can facilitate enhancement-oriented innovation. Learning capacity is the "collective capacity to accumulate tacit and explicit knowledge" and key to stimulating public organisations' innovative capacity (Boukamel, Emery and Gieske, 2019[17]; Gieske, Van Buuren and Bekkers, 2016[116]). Hashim et al. (2020, p. 5[117]) find that greater learning capacity in (especially multidisciplinary) teams can "boost information sharing, team understanding, and dedication to develop new products or services".

In this context, knowledge management systems – defined as "systematic approaches to find, understand, and use knowledge to achieve organisational objectives" (Cong and Pandya, 2003, p. 27[118]) – also provide important structures for enhancement-oriented innovation. This can occur via a focus on current processes, people and efficiency, which is typical of knowledge management processes in public sector organisations (Cong and Pandya, 2003[118]; Arora, 2011[119]; Riege and Lindsay, 2006[120]). Knowledge management systems contribute to the pursuit of improvements and a "trial-and-error" culture (Gaffoor and Cloete, 2010[121]) that, in turn, drive enhancement-oriented innovation. However, the private-sector nature of knowledge management methods requires public organisations to adapt them to their context and challenges (Massaro, Dumay and Garlatti, 2015[122]). Indeed, given the accountability and stakeholder relationships that characterise the public sector "blindly applying private sector knowledge management tools and models may be counterproductive" (Massaro, Dumay and Garlatti, 2015, p. 531[122]).

Innovation capacity can also be pooled in centralised governance structures or outsourced to increase efficiency. However, the outsourcing of innovation processes to labs or consultants can lead to lower internal acceptance and less sustainable innovation when compared to those resulting from internal capacity and employees (Boukamel, Emery and Gieske, 2019[17]). Evidence of the efficiency of shared services is found in Aalto and Kallio (2019[65]), who describe the implementation of corporatised shared services in Finnish municipalities as a means for cutting the costs of human resource and accounting functions, and as a gateway for more customer-oriented, efficient municipal support services.

Digital infrastructure and information-technology governance

Digitalisation can stimulate process innovations that make public sector organisations more efficient at an operational level (Øvrelid and Kempton, 2020[46]). Cordella and Paletti describe how the deployment of information and communication technology (ICT) can increase the efficiency of coordination within public organisations by making communication channels simpler and faster and "making internal production more efficient, enhancing standardisation and automation" (Cordella and Paletti, 2018, p. 7[123]). In studying the Internet of Things (IoT) implementation in Danish municipal road cleaning services, Velsberg, Westergren and Jonsson (2020[8]) find that new digital infrastructures can enhance overall efficiency and effectiveness of services by automating existing processes, even if the processes themselves do not change.

Concurrently, however, the lock-in effects of digital infrastructure can mean that governments limit their opportunities to innovate and switch to more effective, interoperable systems (Public Administration Select Committee, 2011[124]). Often there exist no other options on the market (Stuermer, Krancher and Myrach, 2017[125]), nor capability to manage contracts, (Lundell et al., 2021[126]). Large, long-term contracts with specific suppliers can make maintenance costs rise, leading to overall inefficiencies and obsolete systems.

That said, digital teams tend to have a mandate to innovate. The role of Chief Information/Digital Officer typically carries the expectation to reconcile efficiency and innovation to boost organisational performance (Magnusson, Paivarinta and Koutsikouri, 2020[33]). The governance of new digital infrastructure is therefore often geared towards generating the benefits expected of digitalisation (e.g., an increase in the number of cases handled), and proving that investment in digitalisation can lead to effective, enhancement-oriented outcomes and innovation (Magnusson, Paivarinta and Koutsikouri, 2020[33]) (Box 5.10).

Box 5.10. Digitalising tax services in Austria

The Austrian tax administration launched a digital tax administration and chatbot integration on the FinanzOnline platform. FinanzOnline showcases more than 20 years of incremental improvements and is the most used e-government portal in Austria. The customer service strategy of the tax administration is to present a single front-end to all target groups through the FinanzOnline platform. Most recently, through a new implementation approach that focuses on the user rather than working around legal

changes, the team created applications for smartphones, and the platform started supporting video chats and was integrated in the broader ICT landscape of the Austrian government.

Source: CEF Digital (2019[127]), "Austria's FinanzOnline service", https://ec.europa.eu/cefdigital/wiki/display/CEFDIGITAL/2019/07/25/Austria%27s+FinanzOnline+service.

Funding and budget structures

Increasingly constrained public finances have led governments around the world to focus budgetary evaluation on efficiency and effectiveness (Maroto, Gallego and Rubalcaba, 2016[128]), and develop funding programmes with cost-saving targets (Bhatia and Drew, 2006[129]). An analysis of Norwegian municipalities by Madsen, Risvik and Stenheim (2017[130]) found that performance-oriented budgets are among the most widely adopted tools to improve organisational performance. Although the success of efficiency- and performance-based evaluations in the public sector is limited (Maroto, Gallego and Rubalcaba, 2016[128]), they can create the conditions for implementing efficiency-led innovations, possibly leading to their prioritisation over other innovation facets.

Limited budgets can also push organisations to innovate within existing structures, optimising processes and adopting methods to improve outputs without increasing costs and resources, and avoiding structural change (Antony, Rodgers and Cudney, 2017[131]). Moreover, the enhancement-oriented focus of many public sector ICT and digitalisation projects entails that funding programmes in this field – which are increasingly widespread in the US (Vonortas, 2015[132]) and Europe (European Commission, 2020[133]) – favour enhancement-oriented innovations. A public sector innovation scan of Denmark conducted by the OECD OPSI revealed the benefits of making a business case for innovation to secure funding for enhancement-oriented innovation (OECD, 2021[134]). The country's budgetary processes – based on private sector measures and project-oriented funding streams – were found to favour incremental and enhancement-oriented innovation at the expense of broader and more complex facets, such as mission-oriented innovation (OECD, 2021[134]).

Tools and methods

Enhancement-oriented innovation can be supported using tools and methods that enhance the public sector's ways of working, such as lean and Six Sigma methodologies, or project management and quality improvement methods. It can also be facilitated using tools that make ideation and delivery of enhancement-oriented innovation more efficient, such as open innovation or behavioural insights approaches. These tools, described below, represent trends in the literature, but they are not exhaustive of the methods that can support enhancement-oriented innovation.

Lean and Six Sigma methodologies

Originating from the car manufacturing sector in the 1980s, lean methodologies entail optimising costs and reducing waste via a focus on customer needs and value (Bhatia and Drew, 2006[129]). A subset of these, Six Sigma approaches entail a five-part DMAIC (Define-Measure-Analyse-Improve-Control) methodology, through which organisations identify issues and implement solutions (Antony, Rodgers and Cudney, 2017[131]). The rapid diffusion of lean methods in the public sector over the last decades prompted debate in public governance literature over their effectiveness and appropriateness (Madsen, Risvik and Stenheim, 2017[130]). According to Elias (2016[135]), lean approaches in non-competitive contexts require adaptation to be effective and incorporate a view of customer value compatible with the public sector and in line with citizens' expectations. Other authors are less cautious, maintaining that lean approaches "can

be embraced by all public sector organisations to create efficient and effective processes to provide enhanced customer experience and value at reduced operational costs" (Antony, Rodgers and Cudney, 2017, p. 1402[131]).

The cost reduction and optimisation focus of lean methods foster process innovations typical of enhancement-oriented innovation. Implementation of lean approaches by the Dubai Police was effective for stimulating process innovation, boosting organisational performance and improving overall quality of service (Alosani, 2020[71]). Lean principles were also found to improve the timeliness and effectiveness of public healthcare services (Ortiz-Barrios and Alfaro-Saiz, 2020[49]), with reductions in patient wait times at an Indian hospital of up to 57% (from 57 to 24.5 minutes) (Antony, Rodgers and Cudney, 2017[131]). Moreover, lean approaches in a Scottish local government council contributed to the creation of new data collection processes that cut costs and enhanced productivity, saving the council over £60,000 per year (ibid.).

Lean approaches can therefore be a response to budget pressures in local administrations, leading to the creation of one-stop-shops and other service innovations with potential to increase efficiency and improve identification of citizen needs (Poddighe, Lombrano and Ianniello, 2011[64]). Further, lean methods inspire the 'lean government' approach: a platform-based public governance paradigm of involving external actors in public policy processes to deliver services by "doing more with less" (Janssen and Estevez, 2013[72]). To deliver value to citizens with fewer resources, the approach enhances innovation by coordinating information flows, mobilising actors to stimulate coordination, and constantly monitoring operations (Janssen and Estevez, 2013, p. S1[72]).

Project management and quality improvement methods

An example of quality improvement and management methods in enhancement-oriented innovation is the Common Assessment Framework, a tool to help European public organisations improve performance using knowledge management and other ways to enhance effectiveness and customer orientation (EUPAN Secretariat (2019[136]); see also the Common Assessment Framework (CAF, 2020[104])). Although some authors express doubts about integrating quality management with innovation, a survey of Swedish public servants analysed by Palmi et al. (2020[23]) found that the two can concur. If well managed, Total Quality Management practices can strengthen the conditions for innovation in the public sector (Palmi et al., 2020[23]) and ultimately stimulate enhancement-oriented innovation. Further proof is found in Mättö's (2019[66]) analysis of quality improvement at a municipally owned real-estate management organisation in Norway. Implementation of the CAMP (collaborative approach for managing the project cost of poor quality) method helped identify shortcomings in organisational practices, and generate ideas and administrative and technological changes to boost their effectiveness (Mättö, 2019[66]).

There are, however, concerns about the approach to its implementation. In the private sector, excessive focus on customer-related practices, typical of total quality management, can lead to merely incremental innovations and ultimately hinder organisations' creativity (Honarpour, Jusoh and Nor, 2018[137]). Similarly, in public organisations, excessive focus on costs and efficiency can limit the long-term, anticipatory innovation capacity of organisations, and limit their portfolio of innovations to enhancement-oriented innovation.

Organisational processes for quality management are another way public organisations optimise operations amid fiscal distress (Zokaei et al., 2010[138]). Among these, the PRINCE2 approach divides processes into packages and streams to focus on their interdependencies and their timely, on-budget completion (Bartlett, 2017[139]). Developed by the UK Central Computer and Telecommunications Agency (CCTA) as a standard for ICT project management in the UK government, the tool is hailed for contributing to project success and innovativeness in the private sector (Saad et al., 2013[140]; Yakovleva, 2014[141]). However, evidence of its effects on public sector innovation is inconclusive, with some dubbing it too focused on cost monitoring to bring about creative and innovative solutions (Bartlett, 2017[139]).

Box 5.11. Procurement pre-certification for innovative research in Korea

In 2020, South Korea redesigned its public procurement model in the ICT field, enabling the Ministry of Science and ICT to mobilise stakeholders to proactively shape innovation sourcing.

The platform fast-tracks implementation of public procurement for innovative products by pre-certifying them via expert panellists from other ministries, thereby breaking silos and increasing the process' efficiency and timeliness. Over 3 000 expert panellists covering 24 technical sub-fields are involved in pre-certifying products for innovation procurement. This is in addition to assistance available from researchers and scientists participating in 60 000 public research and development projects annually.

The innovation improved the quality of services to citizens, adding credibility to the public procurement process and delivering more innovative ICT solutions with greater potential socio-economic impacts.

Source: OECD (2020[142]), *Procurement Precertification for Innovative Research*, https://oecd-opsi.org/innovations/procurement-precertification-for-innovative-research/.

Service blueprinting is another process-modelling approach related to quality improvement and enhancement-oriented innovation. It involves graphical representation of an organisation's service delivery process, aiming to promote creativity in problem-solving and clarify the needs of both the service's users and the staff behind it (Radnor et al., 2014[143]). The technique has potential for higher education, helping universities redesign their courses and administrative processes, and improving students' overall satisfaction with their academic experience (Ostrom, Bitner and Burkhard, 2011[144]). Service blueprinting was used by the University of Derby to redesign student enrolment, improving administrative efficiency (via faster processing of student matriculations) and student satisfaction (which increased from 32% to 68%) (Radnor et al., 2014[143]). By highlighting these two dimensions of services' delivery, the approach clarified the "central role of the student (service user) in co-producing the enrolment process and the impact that this role had upon the efficiency and effectiveness of this process" (Radnor et al., 2014, p. 419[143]).

Open innovation

Open innovation and citizen crowdsourcing entails opening public organisations' innovation processes to external stakeholders, using knowledge from outside organisational boundaries to improve processes and services, increase legitimacy, and strengthen citizen participation in the public sphere (Niehaves, 2011[54]; Pedersen, 2018[55]). Although the absence of competitive market logics in the public sector offers a better context for opening innovation processes than in the private sector, public open innovation initiatives often result in less radical outcomes (Mergel, 2015[53]). The approach tends to produce innovations focused on increasing the effectiveness and efficiency of public service delivery, enabling public organisations to understand the needs of citizens and cutting the costs of innovation processes (Mergel, 2015[53]). Open innovation approaches tend to be most attractive for their ability to solve complex issues with limited personnel and constrained budgets (Seidel et al., 2013[145]).

Pedersen (2018[55]) finds that a substantial number of initiatives in public open innovation tend to focus on optimising existing resources and using citizen knowledge to improve the effectiveness of public services. Examples include "apps that help parents track school buses", "apps that help citizens locate bicycles provided by local government for sharing" or "apps that through nudging focus on getting drivers to drive safely" (Pedersen, 2018, p. 5[55]). Other examples of open innovation are civic hackathons: events that bring together computer programmers to collaborate on software or ideas that address a specific public challenge (Almirall, Lee and Majchrzak, 2014[146]; Mu and Wang, 2020[147]). Hackathons can help

governments achieve greater performance efficiency and public accountability, and lower the costs of contracts with large ICT companies (Yuan and Gasco-Hernandez, 2021[148]).

Behavioural insights

The Behavioural Insights (BI) approach can help public organisations be more efficient and increase the cost-effectiveness of their operations. Notably, work by the UK Behavioural Insights Team (BIT) helped the British tax agency (HMRC) collect an additional £200m via the mere insertion of the sentence "Nine out of ten people pay their tax on time" in solicitation letters to taxpayers (Cabinet Office Behavioural Insights Team, 2012[149]).

Box 5.12. Behavioural sciences in healthcare in Australia

In the health sector, BI-informed letters were applied in a trial involving Australian general practitioners (GPs) to diminish the number of antibiotic prescriptions and reduce the risk of antimicrobial resistance and medicine ineffectiveness. Consisting of letters sent to GPs with information on the dangers of antimicrobial resistance, the intervention led to an estimated reduction of 126 352 prescriptions after six months, equivalent to a reduction of 9.3% to 12.3% based on the different letter types.

Source: Australian Government (2018[150]), "Nudge vs Superbugs: A behavioural economics trial to reduce the overprescribing of antibiotics", Behavioural Economics Team.

BI were applied in several experiments in Australian hospitals, in which behaviourally informed reminder letters and text messages ahead of patients' appointments showed potential to generate significant cost savings (NSW Government, 2019[151]). Behavioural 'nudges', or "behavioural science techniques for changing individual behaviour in pursuit of policy objectives", have been useful to incentivise citizens towards desired outcomes in both more effective and cost-efficient ways compared to traditional economic incentive tools (Benartzi et al., 2017, p. 1041[152]).

An important element of the BI approach to public policy is the concept of 'sludge', defined as "excessive or unjustified frictions that make it difficult for consumers, employees, employers, students, patients, clients, small businesses and many others to get what they want or to do as they wish" (Sunstein, 2020, p. 3[153]). Although conceptually underdeveloped, Sludge Audits can be effective in enhancement-oriented innovation to understand an organisation's transaction costs, identify the type of sludge embedded in its operations and evaluate the cost of these frictions (Sunstein, 2020[153]; Shahab and Lades, 2021[154]).

Skills and capacities

Knowledge and skills can promote better understanding of public organisations' problems, foster public servants' capacity to devise solutions to them (Fernandez and Moldogaziev, 2011[113]) and thus contribute to enhancement-oriented innovation. The absence of market feedback mechanisms in most public sector dynamics leads to greater reliance on internal capabilities to create value and remain relevant (Clausen, Demircioglu and Alsos, 2020[155]), heightening the importance of building capacity and skills. The literature reviewed revealed two distinct, yet interconnected categories of skills: employee skills, and leadership and managerial skills.

Employees

Enhancement-oriented innovation processes can benefit from the digital skills and learning capacities of public sector employees.

Digital and ICT skills

As digital technologies spread throughout the public and private sectors, the digital and ICT skills of public employees become ever more important to guarantee that services are delivered effectively and in line with citizens' expectations (OECD, 2020[37]). Importantly, public servants' digital skills contribute to more effective knowledge transfers, which help limit organisational inefficiency and break silos (OECD, 2021[156]) that may hamper innovation. Governments' investment in the skills and data capabilities of its employees can maximise the benefits of innovative technologies for the efficiency and effectiveness of public service delivery (Mittal, 2020[62]).

Investing in ICT capacity and ensuring that all staff – not just technology experts – possess sufficient knowledge about the role of technology in enhancing government services and processes can lead to better design and delivery of public policies (UK House of Commons, 2011[157]). Public officials' user skills can also "spread a digital mindset throughout the public sector workforce" (OECD, 2020, p. 10[37]) and ensure that the productivity and efficiency potential of innovative technologies are fully exploited. This is relevant to public employees' knowledge skills in the field of data (OECD, 2021[156]): fostering an understanding of the sourcing and use of data in public servants' everyday work can improve operational effectiveness and increase public value (OECD, 2021[156]).

Box 5.13. Escola Virtual: Online training in digital tools for engaging the public in Brazil

Investment in training public servants can develop the skills and tools for a responsive, proactive digital government that gathers insights into user needs, and facilitates citizens' engagement and access to real-time information. The Brazilian National Public School of Administration (Escola Nacional de Administração Pública or ENAP) developed Escola Virtual, a platform with free online courses open to public servants and citizens seeking training in public services.

Escola Virtual offers courses covering areas such as management, innovation, commissioning, information technology, web design, open government, and data mining and analysis. The platform can ensure that public servants respond quickly and effectively to public requests, and that innovative technologies are employed to satisfy citizens' evolving needs and contribute to public value.

Source: OECD (2020[37]), "The OECD Digital Government Policy Framework: Six dimensions of a Digital Government", https://doi.org/10.1787/f64fed2a-en.

Learning capacities

Gieske, Van Buuren and Bekkers (2016, p. 11[116]) distinguish between first-order learning, taking place "within existing mind sets, assumptions, and norms" and second-order learning, focused on "changing underlying assumptions" of how the organisation operates. In the context of enhancement-oriented innovation, first-order learning is particularly relevant as it can optimise current processes and improve them via existing knowledge resources. At the individual level, learning capacity can be characterised by "tolerance of ambiguity and change, openness to experience, unconventionality, and self-reflectiveness" (Gieske, Van Buuren and Bekkers, 2016, pp. 11-12[116]), which contribute to the innovative capacity of civil servants. At the organisational level, learning capabilities can be stimulated by knowledge management

and learning processes that improve organisational performance, reconfigure existing resources (Luna-Reyes et al., 2020[29]) and enable enhancement-oriented innovation.

Leadership and management

Leadership skills are another important capacity for the spread of enhancement-oriented innovations in public sector organisations. Standardisation in the innovation profession is led by the International Organization for Standardisation (ISO), which developed the ISO 560000 series to support the development of organisations' and their leaders' innovation capabilities (Hanson et al., forthcoming[158]). This later inspired Vinnova, Sweden's innovation agency, to develop its Innovation Management Support Programme, offering professional training and certification for public organisations and innovation professionals (Hanson et al., forthcoming[158]) (Box 5.14).

Box 5.14. Innovation management support in Sweden

Vinnova, Sweden's Innovation Agency, supports public sector entities, companies, non-government and civil service organisations to undertake innovation. This support spans several domains, including financial (EUR 310M annually) and capability-building, and is a core part of the agency's role. Through the support provided, Vinnova aims to secure and strengthen the effectiveness and longevity of innovation. In one way, this is operationalised through the Innovation Management Support Programme (IMSP) focused on realising and improving outcomes for Vinnova-funded innovation projects.

A growing practice is forming around innovation management and becoming more formalised. It looks at the systematic management of and support for innovation, and how they can be operationalised. Efforts at the international level aim to standardise the practice of innovation management, but it is not yet widespread in public sector administrations.

IMSP was initiated in 2018 as a pilot programme. Its aims included: strengthening the capacity and processes of organisations and Vinnova-funded projects to innovate effectively; encouraging cross-sector collaboration between organisations to overcome silos and lock-ins; creating the conditions for creativity and innovation to flourish; and providing expertise and coaching to innovation partners. Supports were packaged and delivered in modules based on a needs assessment. At first, support focused on several diverse yet specific projects and initiatives.

In 2021, the IMSP began focusing more broadly on Vinnova's strategic priority areas (missions) to address long-term, complex and horizontal societal challenges. Recognising this, Vinnova now experiments with structures to support multi-actor action and research, and encourages its funded organisations to engage both in projects and their underlying policy, governance and systems.

Source: Hanson, A. et al. (forthcoming[158]), "Innovation management in the public sector: The case of Vinnova Sweden's Innovation Management Support Programme", *OECD Working Papers on Public Governance*, OECD Publishing, Paris.

Public sector managers are central to coordinating and initiating process innovations (Walker, 2014[90]), and to creating conditions that stimulate the creativity of employees to encourage change (Damanpour and Schneider, 2009[159]). In line with the characteristics of enhancement-oriented innovations, management support is a strong driver of organisational performance, enhancing effectiveness, efficiency and accountability in e-government systems (Chen et al., 2019[160]).

This appears to be especially the case at lower levels of leadership, from where a majority of innovation comes (Borins, 2000[161]). Supervisors and middle-managers tend to be more involved than senior managers in the internal mechanisms of their organisations, and will focus on internally targeted

innovations to improve processes and enhance efficiency at the micro and meso levels (Demircioglu and der Wal, 2021, p. 4[162]). Through employee empowerment practices that provide enhanced task knowledge, managers can also foster innovative ideas about how to improve internal processes at lower hierarchical levels (Fernandez and Moldogaziev, 2011[113]).

Policy and implementation challenges

Enhancement-oriented innovation's compatibility with existing paradigms and status quo of an organisation makes it one of the less-contested and easily promoted innovation facets in the model. Nonetheless, various challenges are associated with its adoption and implementation.

Diffusion of what works

The focus of enhancement-oriented innovation on existing processes or services offered by an organisation could give rise to issues of diffusion. The literature refers to these as compatibility issues in which the diffusion of an innovation depends on how successfully it adapts to the working methods and characteristics of a given context (Barlow, 2013[163]). Diffusion might therefore be limited due to the innovation's incompatibility with contexts other than the dominant one. For example, standardisation was an issue with e-procurement in Portugal, where unstandardised platforms caused inefficiencies in procurement management across agencies (Barlow, 2013[163]). Incompatibility might therefore result in 'pockets' of innovation invisible to others or limit the potential of enhancement-oriented innovation to improve other public organisations or departments.

Over-specialisation

Operation and process optimisation can have a curvilinear relation to performance, initially driving but later hampering public sector organisations' performance (Gieske et al., 2020[11]). This can result from excessive focus on inward-looking, results-based approaches and risk avoidance that makes organisations unable to confront changing scenarios and future challenges (Gieske et al., 2020[11]; Gieske, Duijn and van Buuren, 2020[164]). Because enhancing existing activity can leave an organisation blind to shifts and changes in the environment, it is important to consider complementing enhancement-oriented innovation with capacity for anticipatory innovation (Chapter 7). Similarly, by contributing to specialisation in specific processes across different departments or teams, enhancement-oriented innovation runs the risk of enlarging divergence within the organisation, jeopardising shared ways of work and functioning.

Over-investment

By improving existing practices, enhancement-oriented innovation also risks overshadowing the need for structural changes that can occur via other innovation facets. Many successful organisations tend to ritualise effective practices, getting stuck in 'success traps' and falling behind in their ability to provide effective, up to date services (Choi and Chandler, 2015[19]; Colville and Carter, 2013[165]). An example of this can be found in the perceived success of the United States' Medicaid health insurance programme in providing prenatal assistance to pregnant women (Choi and Chandler, 2015[19]). Many states tend to measure the programme's success via the number of eligible women, without evaluating their satisfaction, and using the programme's political popularity as a reason to not seek more innovative ways of reaching those in need (Choi and Chandler, 2015[19]). Enhancement-oriented innovation can contribute to such dynamics by providing short-term, often cost-effective solutions that hide organisations' larger issues, and improve the status quo just enough for it to keep on functioning.

Open questions

The literature and case studies revealed the widespread focus of public organisations on initiatives and projects connected to enhancement-oriented innovation. However, some questions remain unresolved and deserve further attention in future research on the topic.

First, the many disparate literature streams related to enhancement-orientation – including incremental innovation, improvement and ambidexterity – can contribute to conceptual confusion. Such confusion is exemplified by the apparent tension in a substantial number of papers between improvement and efficiency and innovation. Although innovation can contribute to improving operations and making processes less costly, excessive focus on efficiency is often described as detrimental to innovation (e.g., Bawole and Ibrahim (2016[102])). Further research could focus on untangling and exploring these streams to understand how they can be observed and how they overlap in practice.

There is opportunity for further research on public sector productivity and its connection to enhancement-oriented innovation, and how to measure it in practice. The problem is usually that, while productivity is measured inside the public sector, external costs are rarely taken into account. Not all additional costs are projected in business cases. *Ex ante* situations are not well analysed, which makes evaluating success difficult. This requires further conceptualisation and further analysis of who benefits and who might lose out from enhancement-oriented innovation. Perversely, lack of efficiency and effectiveness in the public sector can spur innovation in the private sector, but this does not mean that the cost and benefits will be borne by the same entities.

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6 Adaptive innovation

This chapter introduces the concept of adaptive innovation as part of the Innovation Facets Model. Adaptive innovation is about testing and trying new approaches in response to a changing operating environment. This chapter draws on a review of literature in the space of adaptive and agile governance, outlining the main dimensions relevant to governments: readiness to respond to change; the ability to innovate at a fast pace; and a governance framework that allows adaptation and innovation to take place. Environmental, organisational and individual drivers lead to the uptake of adaptive innovation in government. These include external crises, the opportunity to experiment and the ability to make fast decisions. To sustain adaptive innovation in the public sector over the long term, the chapter highlights the need for adaptive organisational structures, decentralised governance, enabling infrastructure, networks and partnerships, space for experimentation, and evaluation and feedback mechanisms.

General description

Adaptive innovation requires realising that things happen which do not fit with what is expected. It starts with the question: How might evolving circumstances change how we do [X]? An organisation strong in adaptive innovation plays with and tests new approaches to a changing operating environment. In this case, the purpose of innovation might be the discovery process itself, driven by new knowledge or the changing environment. When the environment changes (sometimes due to innovation by others, such as new technology, business models or practices), innovation that helps adapt to the change can become necessary. An example is the use of social media by government organisations to interact with citizens, initially through bottom-up initiatives. Sometimes, this type of innovation challenges the status quo and existing missions, which can create internal tension.

The challenge

Growing interdependencies and fast-paced change characterise today's globalised world. In the last 15 years, crises such as the economic crisis and global migration crisis demonstrated how systems in place can be challenged by situations with many unknowns. Moreover, technological change impacts the way governments interact with citizens. To date, these are still unforeseeable. More recently, COVID-19 tested governments' ability to cater to the needs of citizens while trying to bring the pandemic under control (Janssen and van Der Voort, 2020[1]; Moon, 2020[2]). The pandemic also emphasised the need for governments to react quickly and in the face of extreme uncertainty.

The approach

In a fast-changing world, government needs to be responsive while providing stability for societies and communities in the face of uncertainty. To deal with a dynamic environment and improve (digital) service delivery to citizens, governments seek agile and adaptive approaches (OECD/MBRCGI, 2020[3])

To understand trends in adaptive innovation, the OECD Observatory of Public Sector Innovation (OPSI) conducted research and invited public servants to discuss their experiences and give examples of adaptive innovation in the public sector. To understand the research themes in this type of innovation, a review was conducted following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) method (Moher et al., 2009[4]).

This section of the report highlights the themes of adaptive innovation in the public sector. Insights are provided on: (1) General description of the facet; (2) Main drivers of enhancement-oriented innovation in the public sector; (3) Enabling factors; (4) Tools and methods; (5) Skills and capacities needed; (6) Policy and public service challenges; and (7) Unanswered questions. The next section describes how adaptive innovation is discussed in the research and how it relates to concepts such as agile governance.

Definitions in the literature

To highlight trends in adaptive innovation, it is necessary to understand the definitions of adaptive innovation used in the literature. The results show that no overarching definition of adaptive innovation exists. Instead, there are three different approaches (Table 6.1) to adaptation: (1) the capacity to be adaptive to change; (2) as an innovation approach to respond to change; and (3) as a governance framework that allows adaptation and innovation to happen.

Table 6.1. Approaches to adaptation in the public sector

Approach to adaption	Research streams	Themes
Adaptive capacity	Climate change adaptation, adaptation to ecological issues	Strengthen resilience, reduce vulnerability, innovation as a by-product
Adaptive innovation	Reforms, global development	Entrepreneurial logic, innovate pro-actively
Adaptive frameworks	Digital government	Adaptive governance

Adaptation as adaptive capacity

A large body of research approaches adaptation as the need for public organisations to build adaptive capacity, mainly in the face of extreme events. Here, adaptive capacity is described as the outcome of activities aimed at lowering risk (Reinhardt and Drennan, 2019[5]), reducing vulnerability (Crosweller and Tschakert, 2021[6]; Zhang, Welch and Miao, 2018[7]), and strengthening the resilience of organisations and societies (Drennan and Morrissey, 2019[8]; Van Dooren, 2011[9]). Most efforts to build adaptive capacity appear in reaction to specific issues at hand, such as the need to adapt to climate change.

Moreover, building adaptive capacity can take an organisational and an ecosystems view. The former is connected to the need for public organisations to maintain organisational fit with stakeholder preferences:

> *"We define adaptation as the organisational capacity to implement changes that restore or maintain a fit with the ever-changing expectations and values of key stakeholders. We thus define adaptation as a goal-oriented activity, and not as the random outcome of small changes" (Boin et al., 2017, p. 665[10]).*

Within public organisations, the individual level is important to adaptive capacity. Employees influence the adaptation of public organisations and must be considered in adaptive approaches (Buick et al., 2015[11]; Matthews, Ryan and Williams, 2011[12]; Plimmer et al., 2021[13]). Particularly, when managers show responses that are not adaptive, they are likely to decrease the overall level of organisational adaptation (Matthews, Ryan and Williams, 2011[12]). Moreover, adaptation to build resilience is also discussed on an individual level. Here, it is presented as one component of employee resilience (Plimmer et al., 2021[13]), defined as follows:

> *"[An adaptable employee] reacts with proper urgency in threatening situations, finds "workarounds" by engaging and building trust within networks, uses specific skills such as stress management and re-prioritisation, turns problems inside-out to find new approaches, [and] can act without having to know the whole picture" (Plimmer et al., 2021, p. 5[13]).*

Public services often depend on and are connected in complex relationships with providers in the private and third sectors. Adaptation as a capacity therefore needs to be looked at from an ecosystems perspective, as services may fail when partners cannot adapt at the same rate. Moreover, in the face of external change, especially environmental risks, vulnerability might not be evenly distributed among actors. Therefore, building adaptive capacity does not end with public organisations but considers different sectors and stakeholders, as adaptation appears differently depending on "the purpose, context, and scale of particular actions, whether at the household, community, sector, region, or country scale" (Va Dany, Bowen and Miller, 2015[14]). Here, research highlights public organisations' need to consider community-based solutions to adaptation (Drennan and Morrissey, 2019[8]).

Box 6.1. Collaboration to build adaptive capacity in the Netherlands

The Netherlands' Delta Programme links short-term decisions to long-term climate change and aims to keep strategies flexible and ready to switch if future scenarios change beyond defined parameters. It

embraces a collaborative approach to strengthen resilience and build adaptive capacity in the areas of flood risk management, freshwater supply and spatial use in the face of climate change.

For example, Amsterdam Rainproof is a platform raising awareness on rainwater management and seeking practical solutions for rainwater storage in smart urban spaces (OECD, 2019). It includes efforts by central government, provinces, municipalities, district water boards, Rijkswaterstaat and NGOs.

The approach entails creating a common basis for regional work and national integration using:

- regional approaches
- specific responsibilities for all branches of government involved
- involvement and acceptance-building among stakeholders/interest groups
- joint fact-finding
- collect creative and innovative ideas

Source: CLC (2020[15]), *The Delta Programme*, https://www.clc.gov.sg/docs/default-source/commentaries/bc-2020-08-the-delta-programme.pdf; OECD (2019[16]) (2019), *Public Value in Public Service Transformation: Working with Change*, https://doi.org/10.1787/47c17892-en.

Where adaptation is understood as adaptive capacity, the concept is largely a way to reduce harm and strengthen resilience, rather than intending to produce innovations. However, innovation is likely to emerge as a by-product of adaptive measures. Moreover, building adaptive capacity is embedded in an ecosystems view that includes different stakeholders and sectors.

Adaptation as an innovation approach

A small body of research (three of 74 research articles, excluding grey literature) understands adaptation as a pro-active approach to innovate. Here, the goal of adaptive innovation is to produce more effective and functional public measures. Moreover, adaptive action links to the entrepreneurial logic applied in international development or to reform processes (Andrews, 2015, Cummings, 2015, Greve et al., 2020). The rationale behind adaptive innovation is to enhance the effectiveness and functionality of reforms and measures (Andrews, 2015[17]; Cummings, 2015[18]; Greve et al., 2020[19]).

The evidence indicates that a body of literature connects adaptation to entrepreneurial logic (Cummings, 2015[18]), understood as:

> *"Rather than a predesigned programme with a log-frame of expected outputs and outcomes, […], entrepreneurial logic allows iterative learning and adaptation, and for objectives to be adjusted according to experience" (Cummings, 2015, p. 317[18]).*

At the same time, results to date show that adaptation as an innovation approach is mainly applied to global development (Andrews, 2015[17]) and reform studies (Cummings, 2015[18]; Greve et al., 2020[19]).

Box 6.2. Adaptive innovation for global development in the United Kingdom

LearnAdapt is a collaboration between the UK Department for International Development (DFID), the Overseas Development Institute (ODI) and Brink management consulting to improve adaptive development programmes. The initiative builds on experiences in global development and encourages experimentation, continuous learning and adjustment to needs on the ground.

It applies approaches from the development and technology sectors, including adaptive management and innovative methodologies such as agile, lean and human-centred design. It builds flexible tools based on collaboration with public servants to manage knowledge and engage stakeholders to bring out innovations and deliver change in diverse and complex contexts. Among other things, it seeks to develop publicly available tools and opportunities for shared learning on adaptive management for the wider development sector.

An example using participatory learning techniques is "How to design and facilitate learning-focused meetings": https://usaidlearninglab.org/library/designing-and-facilitating-learning-focused-meetings

Note: Further information at https://www.usaidlearninglab.org/cla-toolkit.
Source: LearnAdapt (2017[20]), "LearnAdapt: A synthesis of our work on adaptive programming with DFID/FCDO (2017–2020)", https://odi.org/en/publications/learnadapt-a-synthesis-of-our-work-on-adaptive-programming-with-dfidfcdo-20172020/.

Adaptation as a governance framework

Adaptive governance is characterised by "decentralised decision-making, efforts to mobilise internal and external capabilities, bottom-up (and top-down) decision making, wider participation to spot and internalise developments, and continuous adjustment to deal with uncertainty" (Janssen and Van Der Voort, 2016[21]). The concept is used in system theory, complex systems science and institutional theory, among others, connected to sustainability and climate adaptation research (Chaffin, Gosnell and Cosens, 2014[22]; Rijke et al., 2012[23]). In the public sector, adaptive governance is applied to digital government, notably driven by fast-changing developments in information and communications technology (ICT) disrupting environments and requiring governments to adapt (Janssen and Van Der Voort, 2016[21]).

Adaptive governance provides a framework for studies of governments' efforts in a digitised environment (Janssen and Van Der Voort, 2016[21]; 2020[1]; Mcbride et al., 2019[24]; Soe and Drechsler, 2018[25]; Wang, Medaglia and Zheng, 2018[26]). In this context, adaptive governance is associated with other approaches to deal with uncertainty, such as agile governance (Janssen and Van Der Voort, 2016[21]; Soe and Drechsler, 2018[25]; Wang, Medaglia and Zheng, 2018[26]). The concepts are sometimes used interchangeably, but they are not the same (Janssen and Van Der Voort, 2016[21]; Soe and Drechsler, 2018[25]; Wang, Medaglia and Zheng, 2018[26]). The next section distinguishes between them.

Adaptive vs. agile governance

Research shows an overlap between mentions of adaptive and agile approaches, especially in the digital government context. But few studies argue that they are the same (Greve et al., 2020[19]).

Agile software development

Responding to flaws in traditional approaches to software development in government, agile software development is described as the foundation for discussion of agility in government (Mergel, Gong and Bertot, 2018[27]). In 2001, seventeen software developers from the private sector came together to define the building blocks of the Agile Manifesto (Beck et al., 2001[28]), using the following definition:

> *"We are uncovering better ways of developing software by doing it and helping others do it. Through this work we have come to value: Individuals and interactions over processes and tools; Working software over comprehensive documentation; Customer collaboration over contract negotiation; Responding to change over following a plan" (Beck et al., 2001, p. 29[28]).*

Agile governance

A growing body of research understands agility as a project governance approach that consists of several dimensions and is embedded in organisational change processes (Dittrich, Pries-Heje and Hjort-Madsen, 2005[29]; Mergel, 2016[30]). Within the digital government context, most studies understand agility from a micro-level perspective embedded in a broader adaptive governance framework. Here, agile governance can result in higher levels of adaptiveness (Janssen and van Der Voort, 2020[1]; Mergel, Gong and Bertot, 2018[27]; Wang, Medaglia and Zheng, 2018[26]).

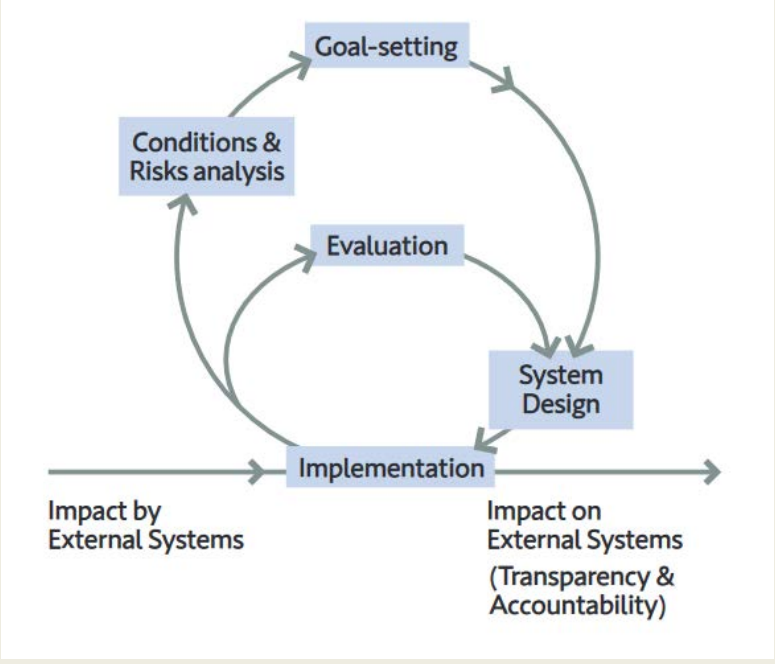
> *Agile governance is an "organisational culture and methods of collaboration to achieve higher levels of adaptiveness" (Mergel, Gong and Bertot, 2018, p. 291[27]).*

Box 6.3. Designing and implementing agile governance in Japan

The Study Group on New Governance Models in Society 5.0 was established under the Japanese Ministry of Economy, Trade and Industry (METI) in 2019, aimed at a governance model to achieve three goals: (1) Governance for innovation; (2) Governance of innovation; and (3) Governance by innovation.

> *"In order to govern our constantly-changing societies, we must implement, in various social systems, 'agile governance' that is designed to run cycles such as for 'goal setting', 'system design', 'operations', 'explanation', 'evaluation', and 'improvements' on a continuous basis and at rapid rates." (Study Group on a New Governance Models in Society5.0, 2021, p. III[31])*

Figure 6.1. Basic components of agile governance



Source: Study Group on a New Governance Models in Society5.0 (2021[31]), *Governance Innovation. A Guide to Designing and Implementing Agile Governance*, https://www.meti.go.jp/english/press/2021/pdf/0219_004a.pdf.

The OECD takes a holistic view and defines agility as embracing uncertainty and expecting to continuously learn and improve approaches based on what is learnt in order to prioritise adding value to users as quickly as possible (OECD, 2020[32]).[1]

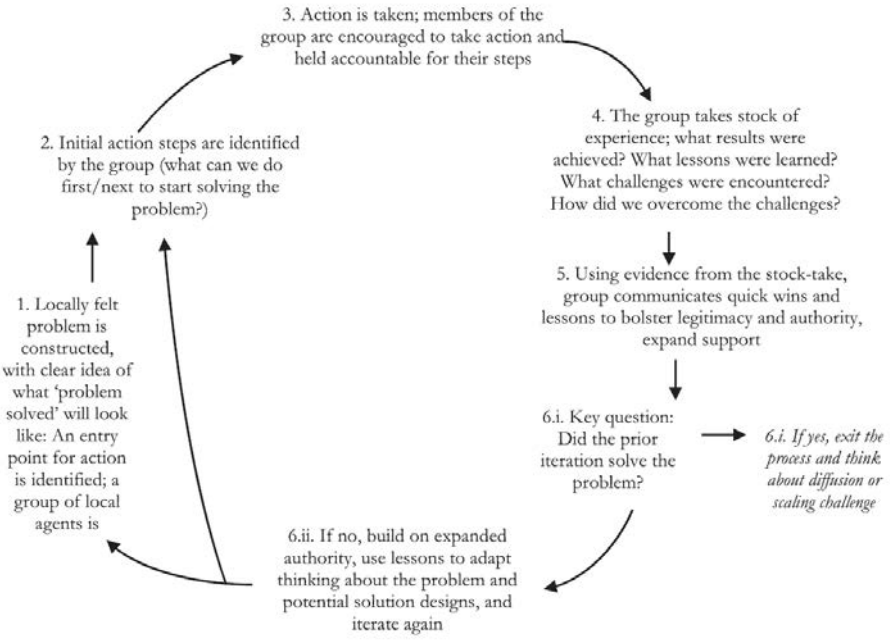
By starting small, with phases designed to build understanding through exploration, teams can research, prototype, test and learn about the needs of their users before building a service. This allows them to fail quickly and correct course in response. A service only goes live once enough feedback is gathered to demonstrate that needs are met and the service works. Fundamental to this is a continued understanding of the user's experience in a cyclical model of delivery. This allows policy and services to reflect needs, based on research conducted with users, considering diverse samples of the population and insights from societal data. Having knowledge of the issues at stake allows policy development to be guided by the needs of the public rather than top-down solutions devised in government offices.

Collectively, evidence suggests that agility, with its roots in software development, is mainly discussed in the digital government context. However, a growing body of literature uses agility as a holistic framework. This development can be observed in practice: Canada, Denmark, Italy, Japan, Singapore, the UAE and UK signed world's first Agile Nations agreement. The agreement explores agile innovation for the regulatory environment and policy making (WEF, 2020[33]). Moreover, Japan applies agile governance as a holistic framework to keep up with fast-changing technologies and enhance trust in a digitised society.

Agile and adaptive reforms

Characteristics defined as components of agility, such as iteration (Beck et al., 2001[28]; Koski and Mikkonen, 2015[34]; Mergel, 2016[30]; 2021[35]) are also found in studies of adaptation. For example, problem-driven-iterative-adaptation (PDIA) applied in reform processes incorporates features of agile methodology (Andrews, 2015[17]; Cummings, 2015[18]). In more recent studies of public management reform, agility is examined together with adaptivity (Greve et al., 2020[19]).

Figure 6.2. Problem-driven-iterative-adaptation (PDIA)



Source: Andrews, M. (2015[17]), "Doing complex reform through PDIA: Judicial sector change in Mozambique", *Public Administration and Development*, Vol. 35, pp. 288-300.

There is a need for conceptual clarity concerning the differences between agile and adaptive approaches. Further, not all discussion of agile and adaptive methods are related to innovation. As most studies integrate "agile" into "adaptive", and this report is concerned with innovation, the following sections refer only to "adaptive innovation".

Main drivers in the public sector

Three clusters that drive governments' adaptation practices appear in the literature: (1) environmental; (2) organisational; and (3) individual. Each of these operates at a different level (Table 6.2). Environmental drivers lie outside the public organisation and describe the context in which public agencies operate. Organisational drivers are inherent to the capacities and features of the organisation. Individual drivers provide information about the characteristics of individuals within public agencies that drive adaptation.

Table 6.2. Drivers of adaptation in the public sector

Cluster	Drivers	Examples
Environmental drivers	Demands (political/citizen)	Political support from higher levels for local climate change adaptation, a policy that supports the adoption of new approaches
	Threats	Environmental threats, COVID-19
	Collaboration	Intergovernmental networks, collaboration with stakeholders
Organisational drivers	Resources	Availability of funds to adopt new approaches Time to experiment with new approaches
	Organisational culture	Culture of continuous improvement Iteration and learning, teamwork
	Leadership	Opportunity to experiment, support bottom-up initiatives, provide overall vision
Individual drivers	Openness	Willingness to apply new methods/work practices
	Knowledge/skills	Ability to make fast decisions Stress management

Environmental drivers

Demands (political/citizen)

Environmental drivers of adaptive approaches lie outside the organisational boundaries of public agencies. Demands – either political, such as the demand to reduce emissions (Liu et al., 2013[36]), or citizen expectations concerning the speed of service delivery (Mergel, 2016[30]; Mergel, Gong and Bertot, 2018[27]) – are the most frequent drivers on the environmental level. Political demands refer to "the power dynamics and incentives that lead bureaucratic and political leaders to authorise or encourage more adaptation […]" (ODI, 2021[37]). Political support, both individual, in terms of individual political leadership (Greve et al., 2020[19]; Ubels, Bock and Haartsen, 2019[38]), and supporting policies, drive the uptake of adaptive approaches (Kalesnikaite, 2019[39]; Mergel, 2016[30]). Fitzgerald and Lenhart (2016[40]) show that political support from higher levels can stipulate local action for adaptation. Moreover, citizen demands play a significant role in the uptake of adaptive approaches in government, such as to restore citizen trust in government and increase responsiveness (OECD, 2014[41]).

Threats

Environmental and economic threats, such as flooding (Drennan and Morrissey, 2019[8]), hurricanes (Earle, 2018[42]) or health-related crises like COVID-19 (Moon, 2020[2]), stimulate adaptive action. A large body of literature deals with climate change-related threats that drive adaptation (Juhola, 2013[43]; Kalesnikaite, 2019[39]; Pot, Dewulf and Termeer, 2020[44]; Susskind and Kim, 2021[45]). It shows that environmental threats pose a particular challenge to the local level, as the first line of response usually occurs on-the-ground (Duijn and Van Buuren, 2017[46]; Kalesnikaite, 2019[39]; Reinhardt and Drennan, 2019[5]; Susskind and Kim, 2021[45]).

Box 6.4. Responding to COVID-19 in South Korea

The challenge of responding to the Middle East Respiratory Syndrome (MERS) in 2015 was described as an "organisational learning experience" for the South Korean government (Moon, 2020, p. 653[2]). Thus, when COVID-19 shook the international arena, South Korea had institutions in place that enabled the government to act adaptively. The Korean Center for Disease Control and Prevention (KCDC) was equipped to enable South Korea to carry out preventive testing rapidly and in large numbers. Previous challenges were incorporated as learning opportunities to adapt in the future.

Source: Moon, M. (2020[2]), "Fighting COVID-19 with agility, transparency, and participation: Wicked policy problems and new governance challenges", *Public Administration Review*, Vol. 80, pp. 651-656.

Collaboration

Collaboration often drives adaptive innovation and refers to work with stakeholders, such as NGOs and local communities (Chu, Anguelovski and Carmin, 2016[47]; Kalesnikaite, 2019[39]; Va Dany, Bowen and Miller, 2015[14]; Wang, Medaglia and Zheng, 2018[26]), and among governmental actors (Kalesnikaite, 2019[39]; Soe and Drechsler, 2018[25]). Working with stakeholders on the ground helps pick up signals early and address evolving needs.

Box 6.5. Intergovernmental collaboration for smart mobility in Estonia and Finland

The FinEst Smart Mobility project improved traffic flow between Helsinki West Harbour and Tallinn Old City Harbour with the help of smart mobility solutions. Instead of implementing pilot projects directly, FinEst Smart Mobility created a framework and procurement model to strengthen the quality of pilot projects, the application of latest technologies and the synergies of a shared testing environment.

With innovation labs as partners, specification and preparation were carried out before the procurement of pilot projects. Planners, mobility users and technology stakeholders were engaged in co-designing the use cases to ensure the quality of pilot projects from the user perspective and the best exploitation of emerging technologies. A central part of the preparatory work was setting up agile trials (i.e., mini-pilot projects) to probe mobility-related innovations during a three-month period. User groups to provide essential information about the mobility choices of ferry users were also established during this phase.

Source: Finestlink (2021[48]), "Finest Bay Area Project: yksityisrahoitteinen tunneli Helsingin ja Tallinnan välille", http://www.finestlink.fi/en/finest-smart-mobility/; Soe, R. and W. Drechsler (2018[25]), "Agile local governments: Experimentation before implementation", *Government Information Quarterly*, Vol. 35, pp. 323-335.

Organisational drivers

Organisational drivers refer to characteristics within public organisations, such as their structure and culture (De Vries, Bekkers and Tummers, 2016[49]).

Resources

Financial resources correlate with the adaptive capacity of public agencies (Kalesnikaite, 2019[39]; Zhang, Welch and Miao, 2018[7]). In the case of Cambodia, Va Dany and Miller (2015[14]) show that government organisations reported to not have sufficient funding to implement adaptation activities related to climate change. Moreover, insufficient financial and technical resources appear to pose a particular challenge to local governments (Susskind and Kim, 2021[45]).

Technical facilities also influence the adoption of adaptive approaches. Research argues that ICT systems need to allow integration with other systems and should be aligned with organisational change (Brewer, Neubauer and Geiselhart, 2006[50]; Dittrich, Pries-Heje and Hjort-Madsen, 2005[29]; Gong and Janssen, 2012[51]).

Box 6.6. APEX

APEX (also covered in Chapter 5, Box 5.6 for its relevance to enhancement-oriented innovation) is a whole-of-government Application Programming Interface (API) where public agencies can share data and services with other agencies and private entities. APEX simplifies API management by providing a portal through which users can initiate workflows for publishing and accessing APIs. In addition, APIs served through APEX appear in an API catalogue that can be browsed by other users.

Throughout the development process, the APEX team followed the Agile methodology to iteratively and incrementally design, build and validate features. This enabled the team to respond to user feedback and experiment with high-value features, resulting in a user-friendly and feature-rich product. The APEX professional services team also assists agencies in improving their standards of API design and security.

APEX supports a vision of innovative and integrated government services fuelled by a mindset of collaboration and data-sharing. Its success is evident in the number of projects and agencies it onboards daily. APEX has established itself as an enabler for agencies to deploy APIs and propagate data for consumption by other agencies and business enterprises to drive their own innovations.

Source: OECD (2017[52]), *APEX – Singapore*, https://oecd-opsi.org/innovations/9587/.

Finally, adaptive approaches require resources in terms of time, as for experimentation with new approaches (ODI, 2021[37]). The lack of time during day-to-day operations is as a barrier to adaptive innovation.

Organisational culture

Adaptive approaches require an organisational culture that allows teams to experiment (Fitzgerald and Lenhart, 2016[40]; Pinheiro, Maurer and Sillito, 2008[53]), and incorporates continuous improvement (iteration) and learning-by-doing (Koski and Mikkonen, 2015[34]; Pot, Dewulf and Termeer, 2020[44]). Moreover, as agile and adaptive approaches require collaboration – be it with the user or other stakeholders – an organisational culture that supports teamwork promotes the adoption of adaptive approaches (Wisitpongphan and Khampachua, 2016[54]).

Leadership

Certain characteristics of leaders are demonstrated to drive the uptake of adaptive innovation. For example, leaders can provide teams the opportunity to experiment with work practices and methods (ODI, 2021[37]; Pinheiro, Maurer and Sillito, 2008[53]). Moreover, they can support bottom-up initiatives of teams who want to experiment with new approaches (Berkani, Causse and Thomas, 2019[55]; Mergel, 2016[30]). Furthermore, leadership provides the overall vision of how these methods can be useful to the team/organisation and their projects (Dittrich, Pries-Heje and Hjort-Madsen, 2005[29]; Wisitpongphan and Khampachua, 2016[54]).

Individual drivers

The literature pays less attention to drivers of adaptive innovation at the individual level. Most frequently examined are individuals' openness and their knowledge/skills. Individuals' openness to participating in agile and adaptive innovation relates to their willingness to participate (Matthews, Ryan and Williams, 2011[12]; Senapathi and Drury-Grogan, 2021[56]). For example, individuals' willingness to participate is challenged when too much change occurs at the same time (Dittrich, Pries-Heje and Hjort-Madsen, 2005[29]; Senapathi and Drury-Grogan, 2021[56]). In challenging times, personal resources, such as employee resilience can foster successful adaptation to a changing environment (Plimmer et al., 2021[13]).

Several publications also consider the professionalism of individuals related to their job-related knowledge and skills, as in their ability to make fast decisions (Berger, 2007[57]) or manage stress (Plimmer et al., 2021[13]). Whereas leadership is especially important in the initiation process of agile and adaptive approaches, individual drivers were mostly studied after the decision to adopt agile practices had been made. Hence, public servants have an important role once the approach is implemented (see section on skills and capacities for a more detailed discussion.)

Enabling factors

Several studies discuss the structures and programmes necessary to support adaptive innovation in the public sector. Adaptive innovation requires (1) tolerant and decentralised organisational structure; (2) infrastructure (3); (4) relationships and partnerships; (5) space for experimentation; and (6) evaluation/feedback.

Organisational structure

Many studies mention organisational factors as barriers to the adoption of adaptive approaches. Berger (2007[57]) argues that hierarchy and a command-and-control structure hinder the adoption of adaptive approaches in government. Organisational structures such as public procurement (Russo et al., 2018[58]; Wisitpongphan and Khampachua, 2016[54]), processes (Gong and Janssen, 2012[51]; Mergel, 2016[30]) and organisational responsibilities (Clarke, 2020[59]; Liu et al., 2013[36]), as well as project orientations (Maccani et al., 2020[60]; Strojny, 2016[61]) need to be aligned with adaptive approaches. In contrast, Janssen and van der Voort (2020[1]) argue that organisational structures provide the stability decision makers need to carry out adaptive approaches. Hence, tension exists between the needs to act adaptively and maintain stability.

Adaptive governance is described as a framework that allows adaptation and adaptive innovation to happen. It is characterised by "decentralised decision-making, efforts to mobilise internal and external capabilities, bottom-up (and top-down) decision making, wider participation to spot and internalise developments, and continuous adjustment to deal with uncertainty" (Janssen and Van Der Voort, 2016, p. 4[21]). Adaptive governance is supported by decentralised governance structures and processes in public

organisations because decentralised governance structures emphasise public servants' autonomy in their day-to-day work (ODI, 2021[37]).

Table 6.3. Examples of adaptive governance strategies

Name	Explanation
Know the stakeholders and their capabilities	Identify patterns of participants, their interests and goals, and look at how their capabilities can be used (De Bruijn and Ten Heuvelhof, 2008[62]). Both internal and external organisational stakeholders and capabilities need to be identified.
Mobilise stakeholders and co-operate	Once you know the stakeholders, they need to be mobilised to work together. Bringing in new players can help gain novel insights. A coalition can have all the capabilities and resources needed or might have already developed useful solutions (De Bruijn and Ten Heuvelhof, 2008[62]).
Involve public and private parties	As a specification of the previous strategy, public and private parties can be involved, but attention should be given to the differences in objectives and the changes that are necessary (Klievink, Bharosa and Tan, 2016[63]; Klievink and Janssen, 2014[64]).
Self-organise	The strategy involves organisation with teams and actor groups that draw on various knowledge systems and experiences for the development of a common understanding and policies (Folke et al., 2005[65]).
Decompose complexity	Break a complex challenge into smaller, tangible problems that can be solved (Sutherland, Solingen and Rustenburg, 2011[66]). In agile software developments, sprints result in outputs and decisions about the next steps.
Keep options open	Make immutable decisions as late as possible to keep the options open and choose another direction if needed (Dym and Little, 2009[67]).
Keep infrastructure flexible	Providing infrastructure that is flexible and adaptive and can facilitate various directions over time (Janssen, Chun and Gil-Garcia, 2009[68]).
Shorten decision-making times	Inform higher-level decisions from the bottom-up and ensure quick reaction. Once innovations are spotted, decision-making must happen within a short time. Procedures allowing this should be in place, including decentralised decision-making.
Confront obstacles	Confront stakeholders with the consequences of not reacting to disruptive changes and maintaining the status quo.
Education and training	Education and training provide ability to react and are key to providing flexibility towards improvement and adaptation. The top of an organisation should be educated to become IT-savvy.

Source: Adapted from Janssen, M. and H. Van Der Voort (2016[21]), "Adaptive governance: Towards a stable, accountable and responsive government", *Government Information Quarterly*, Vol. 33, p. 4.

Infrastructure

Research refers to the technical and organisational features of infrastructure needed to support adaptation. Technical infrastructure enables an organisation to sense demands (Chen, 2009[69]) and provides authorities with the information necessary to act (Chatfield and Reddick, 2018[70]; Mackay et al., 2019[71]). For example, based on their case study of small island states, Mackay et al. (2019[71]) provide insights into the relevance of information infrastructure for climate change adaptation, as access to high-quality information is crucial.

Relationships and partnerships

In the face of external changes, especially environmental risks, vulnerability might not be evenly distributed among actors. Therefore, building adaptive capacity does not end with public organisations but considers different sectors and stakeholders.

Network arrangements are thus a support structure for adaptation, serving varied purposes. On one hand, members of networks can actively collaborate to improve their collective adaptive capacity (Juhola, 2013[43]). On the other hand, they can benefit from knowledge and/or best practices from other network members (Fitzgerald and Lenhart, 2016[40]; Kalesnikaite, 2019[39]). In her study of sea-level rise adaptation efforts of US governments, Kalesnikate (2019[39]) finds that "institutions of higher learning can help plan local action, while city-to-city collaboration can help in later stages, such as the implementation process" (Kalesnikaite, 2019, p. 880[39]). The author finds that building relationships as a support structure is particularly important to enable adaptive innovation at the local level:

> *"In the absence of financial support and technical advice from higher levels of government, collaborative action provides an alternative route for city governments to serve their communities. Because solutions to adapt to sea level rise are site-specific, cities can take advantage of local knowledge by working not only with other municipalities, but with nonstate stakeholders as well" (Kalesnikaite, 2019, p. 881[39]).*

Space for experimentation

Another support structure for adaptive innovation is the space and permission for experimentation in public sector organisations when it comes to piloting new practices. Governments are adopting laboratories as new approaches to policy and service design (Fuller and Lochard, 2016[72]; McGann, Blomkamp and Lewis, 2018[73]). One type, innovation labs, are publicly funded units that reside outside the formal institutional boundaries of government (Timeus and Gascó, 2018[74]), and can be rooms for experimentation. Following successful experimentation, approaches can be transferred to the practice of government (Tönurist, Kattel and Lember, 2017[75]). McGann, Blomkamp and Lewis (McGann, Blomkamp and Lewis, 2018[73]) show that user-centred approaches such as design thinking and agile methods are frequently observed in innovation labs.

The literature examines the concept with a focus on digital government (Soe and Drechsler, 2018[25]). However, laboratories as units where measures are tested before being adopted on a large scale are also discussed in other contexts, like eco-districts in urban planning (Fitzgerald and Lenhart, 2016[40]).

Box 6.7. Experimentation with urban planning in Sweden

Malmö's industrial centre lost one-third of its jobs in the late 1980s and early 1990s, but today the city is a vibrant and sustainable urban area. The heart of this transformation is Western Harbour, an eco-district and regeneration zone. The area was developed as a testbed in the city's plan to become climate-neutral by 2020 and run entirely on renewable energy by 2030. The mayor envisioned using the eco-district concept as a model for future sustainable urban development throughout the city. Experimentation, supported by cross-departmental collaboration and dialogue with developers was key to promoting innovation in planning. For example, project managers from the environment and planning departments meet on a regular basis to discuss the delivery of more integrated projects.

Source: EBRD (2022[76]), *Green Cities Policy Tool*, https://www.ebrdgreencities.com/policy-tool/sustainable-eco-districts-malmo-sweden-2/.

New organisational units, such as digital government units, introduce new work practices into government, like Agile, which were not part of the standard toolbox of public administrations (Clarke, 2020[59]). Introducing flagship projects important for the public sector organisation's field of work can be a way to test how adaptive innovation could be better supported in existing organisational structures. Some countries try to support experimentation more structurally, with varying levels of success (Box 6.8).

Box 6.8. Government-wide experimentation efforts in Finland and Canada

Finland

In 2012, the Finnish parliament's Committee for the Future held hearings on new methods to steer policy, including uptake of an experimental culture. Subsequently, the Committee commissioned a special report, Kokeilun *paikka! Suomi matkalla kohti kokeiluyhteiskuntaa* ("Time to Experiment! Finland on its way to the Experimental Society"), which argued for rapid iteration, grassroots experiments and a strategic outlook focused on experimentation in government.

In 2015, Finland developed a framework for experimental policy design. Experimentation was incorporated into the strategic government programme "Finland, a land of solutions", and an experimental policy design programme was set up. The new approach allowed broader "strategic experiments" (formalised policy trials) – such as the ongoing basic income experiment – and grassroots experiments designed to build an "experimental culture" in Finland's public sector. A variety of grassroots and strategic experiments were supported between 2016 and 2018 through facilitation by the Prime Minister's Office and specific programmes in Sitra (for example, Ratkaisu 100) and in municipalities.

The initiative was high on the political agenda of the prior coalition, but the new government coalition of 2019 deprioritised experimentation and *de facto* disbanded the dedicated unit within the Prime Minister's Office, redirecting efforts to promote the use of behavioural insights and more traditional evidence-informed activities based on data analysis.

Canada

The Canadian government's interest in innovation and experimentation traces back to the Blueprint 2020 collective foresight exercise launched in 2013, prior to the 2015 elections and change in government. In 2015, the Prime Minister of Canada issued a mandate to the President of the Treasury Board of Canada Secretariat to support experimentation in government. This was followed by the Government's directive on experimentation, announced in the 2017 federal budget. It required federal departments to allocate a certain portion of funding towards experimental and innovative delivery approaches to improve outcomes for citizens. Impact Canada, under the Results and Delivery unit in the Privy Council Office, steered the directive, signalling the outcome-orientation of the initiative.

Impact Canada established a way for federal departments to allocate funding to innovative and experimental efforts. The initiative established terms and conditions to enable innovative policy and program approaches across all government departments, such as challenges, pay-for-success funding, and behavioural insights. Teams carried out experiments connected to content design (Health Canada), programme design (Heritage Canada), and visual and message design (National Resources Canada). Since mid-2018, support for experimentation moved towards the new Experimentation Works team in Strategic Policy within the Priorities and Planning Sector of the Treasury Board Secretariat. While there are niches of expertise in experimentation and support for its capacity across the government, the approach has not been adapted government-wide.

Source: Tõnurist, P. (2021[77]), *Towards an Anticipatory Innovation Governance Model in Finland*, https://oecd-opsi.org/wp-content/uploads/2021/09/Anticipatory-Innovation-Governance-in-Finland.pdf; Tõnurist, P. (2018[78]), "New approaches in policy design and experimentation", https://doi.org/10.1787/sti_in_outlook-2018-16-en; OECD (2017[79]), *Impact Canada*, https://oecd-opsi.org/innovations/impact-canada/; Government of Canada (2019[80]), *Experimentation Works*, https://www.canada.ca/en/government/publicservice/modernizing/experimentation-works.html; Experimentation Works (2019[81]), "Review of the Experimentation Works initiative (May 2019)", https://exp-works.medium.com/review-of-the-experimentation-works-initiative-may-2019-9426362f7b1e.

Evaluation and learning

Governments learn from experience to develop adaptive capacity. Earle (2018[42]) reports that the US government's response to Hurricane Sandy in 2012 was more efficient than to Hurricane Katrina in 2005. The government was able to act more quickly and coordinate more efficiently with stakeholders such as volunteer groups. Previous challenges were incorporated as learning to adapt to future disasters.

Box 6.9. Hypothesis laboratories in Sweden

Hypothesis labs are part of the city of Helsingborg's Research City project, which aims to incorporate research at a structural level and test ways of working on cross-sectoral challenges. They require cross-sectoral participants, ranging from researchers, managers and external companies to employees from different municipal departments. Each of the five labs test new ways of working and includes co-production with citizens, structured differently each time:

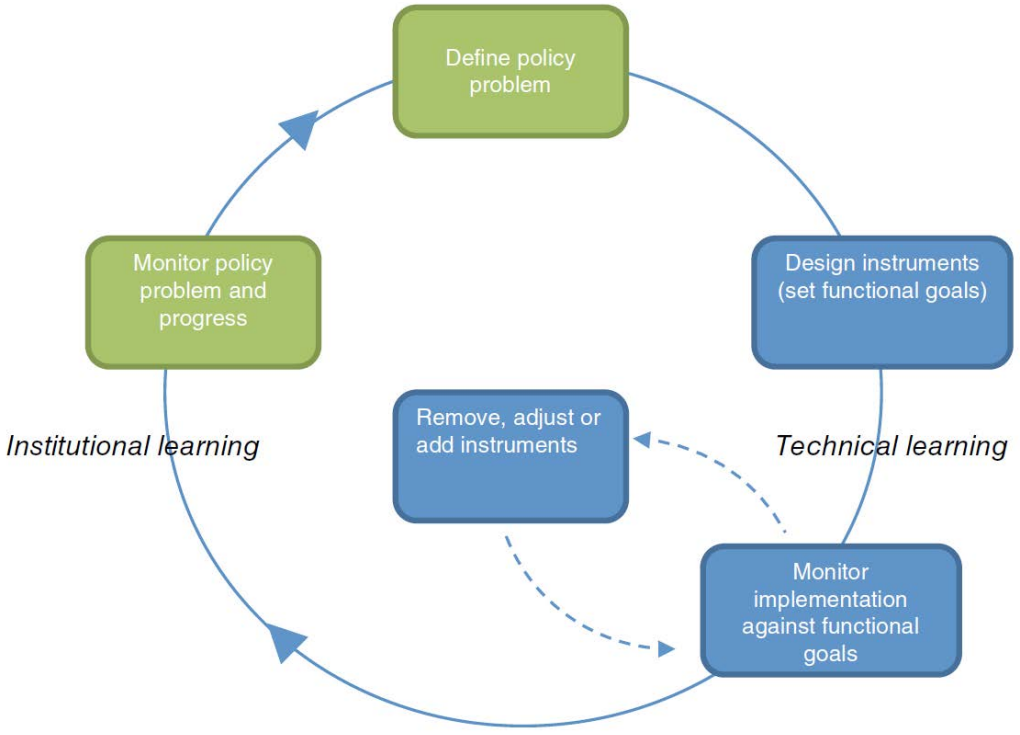
- **Citizens' Lab** tests methods of citizen inclusion to increase residents' participation in the planning and development of city districts. The lab fosters conversations between resource-weak and resource-strong citizens to improve relationships within the community.
- **Dementia-friendly Helsingborg** examines how the needs of people with dementia can be considered in planning and structuring urban space while raising awareness of dementia across society. The lab thus functions as a model for meeting the needs of other groups in society.
- **Data Lab** explores the legal and ethical possibilities for combining citizens' data to meet complex needs and identify new needs-based public services. The lab also explores artificial intelligence to help combine data from different departments to improve insights.
- **Designed Living Environment** brings together Helsingborg's culture and urban planning bodies, which rarely collaborate, following a national policy objective from 2018 that demanded better integration between culture, art and urban planning. An important element is to imagine how these two organisations could be reorganised to enable ongoing collaboration.
- **Self-regulating Teams** imagines alternative ways of organising the public sector. It draws on citizens' needs and builds regulation from the bottom up. The ideas generated in the lab are tested in municipal administrative bodies to stimulate collaboration between departments.

The labs' purpose is transformative learning: to establish new ways of working that will bring major changes in Helsingborg. The hypothesis labs put the learning process into practice.

Source: Helsingborg (n.d.[82]), *Invånarlabbet*, https://fou.helsingborg.se/category/den-utforskande-staden/invanarlabbet/.

Either evaluation mechanisms or learning facilitate building adaptive capacity. Evaluation mechanisms help organisations keep track of successes. Learning happens through evaluation, for example when a new work practice is introduced bottom-up (Berkani, Causse and Thomas, 2019[55]), when strategies need to be readjusted (Fitzgerald and Lenhart, 2016[40]), or for overall project governance (Crawford and Helm, 2009[83]). Learning as a principle can also be part of a broader framework of adaptation that enables institutional learning. Drawing on environmental and ecological studies, Carrey and Harris (2015[84]) discuss a double-loop-learning process[2] as part of the adaptive management cycle, where learning is fostered by evaluating instruments (technical learning) as well as the incorporation of constant evaluation into the overall monitoring process (institutional learning).

Figure 6.3. Adaptive Management for Joined-Up Governance



Source: Carey, G. and P. Harris (2015[84]), "Developing management practices to support joined-up governance", https://doi.org/10.1111/1467-8500.12169, p. 116.

Tools and methods

The literature on adaptation highlights two groups of tools: tools for collaboration and tools for anticipation. Much literature focuses on methods and tools for collaboration, such as agile and design thinking. Knowledge about the application of these methods in the public sector is largely based on studies that deal with public services, particularly in the digital government context, and less in literature that deals with environmental challenges. Moreover, as there is an overlap between literature on adaptive and agile approaches, studies have focused on agility as a methodology. Agile methodology refers to a project-governance approach that centres on collaboration and iteration, and on tools that incorporate agile principles, mostly developed in the private sector.

Tools for collaboration

User-centricity as a guiding principle

User-centricity lies at the core of agile and design thinking approaches (Bason and Austin, 2021[85]; Beck et al., 2001[28]). It aims to develop services and products that serve their users and take their needs into account through research. The agile methodology provides constant feedback from users concerning the result, aiming for "radical collaboration with the client in each phase" (Mergel, 2016, p. 516[30]). In design thinking, a human-centred approach is applied broadly to public service and policy issues (Bason and Austin, 2021[85]), whereas agile methodology focuses on the specific user at hand.

Box 6.10. User-centricity in public administration in Portugal

LabX, the Laboratory for Experimentation in Public Administration is a team at the Administrative Modernisation Agency in the Portuguese government. Created in 2017, LabX puts service-design centred on citizens at the core of its work. The phases of this methodology are: Investigate, Co-create and Experiment. User-centred design is the hallmark of LabX and highlights the importance of citizen participation across the Portuguese government.

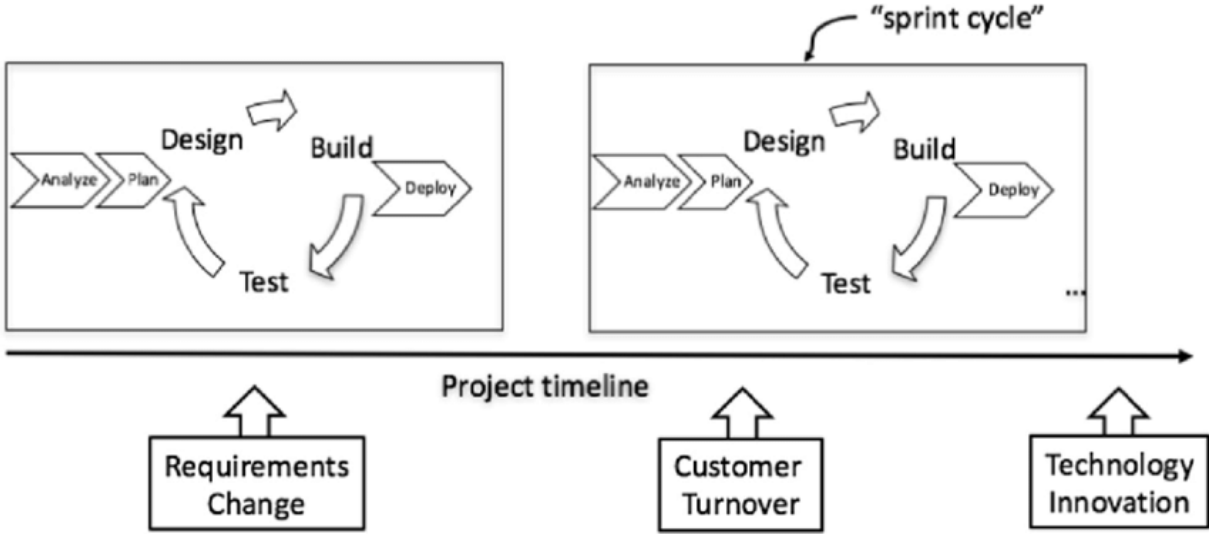
One proposal that came out of co-creation was the development of a single point of access that could make onboarding young people easier and facilitate access to digital public services, using more appropriate language and the development of mechanisms to support performance.

Source: Government of Portugal (n.d.[86]), *LabX*, https://labx.gov.pt/ (accessed on 24 March 2021).

Agile as a methodology

Agile practices and their underlying principles gained considerable interest in research and practice. They promise higher levels of adaptiveness (Janssen and van Der Voort, 2020[1]; Mergel, 2016[30]; Soe and Drechsler, 2018[25]; Wang, Medaglia and Zheng, 2018[26]). With roots in software development, agile practices have become established in non-software projects as well (Mergel, Gong and Bertot, 2018[27]; Strojny, 2016[61]).

Figure 6.4. Agile sprint cycles



Source: Mergel, I. (2016[30]), "Agile innovation management in government: A research agenda", *Government Information Quarterly*, Vol. 33, p. 514.

The traditional approach to governmental projects has been the waterfall approach. But this mode of planning – where one project phase is strictly executed after another and project outcomes are predefined – is not suitable to governments operating in a dynamic environment, such as digital government (Janssen and Van Der Voort, 2016[21]). In contrast, agile practices' focus on "user involvement, iterative and incremental development, [and] constant adaptation to the situation at hand" provide an alternative to waterfall project governance (Koski and Mikkonen, 2015, p. 41[34]). A common area where agile practices are applied is public procurement (Mergel, Gong and Bertot, 2018[27]; Soe and Drechsler, 2018[25]).

Several methods apply the principles established in the *Agile Manifesto* (Beck et al., 2001[28]), including Kanban[3] (Senapathi and Drury-Grogan, 2021[56]), Lean[4] (Mcbride et al., 2019[24]) and Scrum (Strojny, 2016[61]).

Box 6.11. The Scrum methodology of agile innovation in Germany

The Federal Office for Migration and Refugees in Germany (Bundesamt für Migration und Flüchtlinge) set up an information technology lab to deal with the high numbers of asylum applications from 2015 onwards. This office is one of the first German public authorities to implement the Scrum methodology in a structured fashion in its software development.

The Scrum process develops software in recurring cycles, known as sprints. This means that development periods with a fixed duration (typically two weeks) are planned by the team at the outset. The result of each sprint is a product or product increment that functions according to minimum criteria and performs indispensable basic functions. The Scrum method stands out in that specialists work with the development team, and the project can be adapted to changes very quickly.

Source: Federal Office for Migration and Refugees (n.d.[87]), "The IT Lab", https://www.bamf.de/EN/Themen/Digitalisierung/ITLabor/itlabor-node.html.

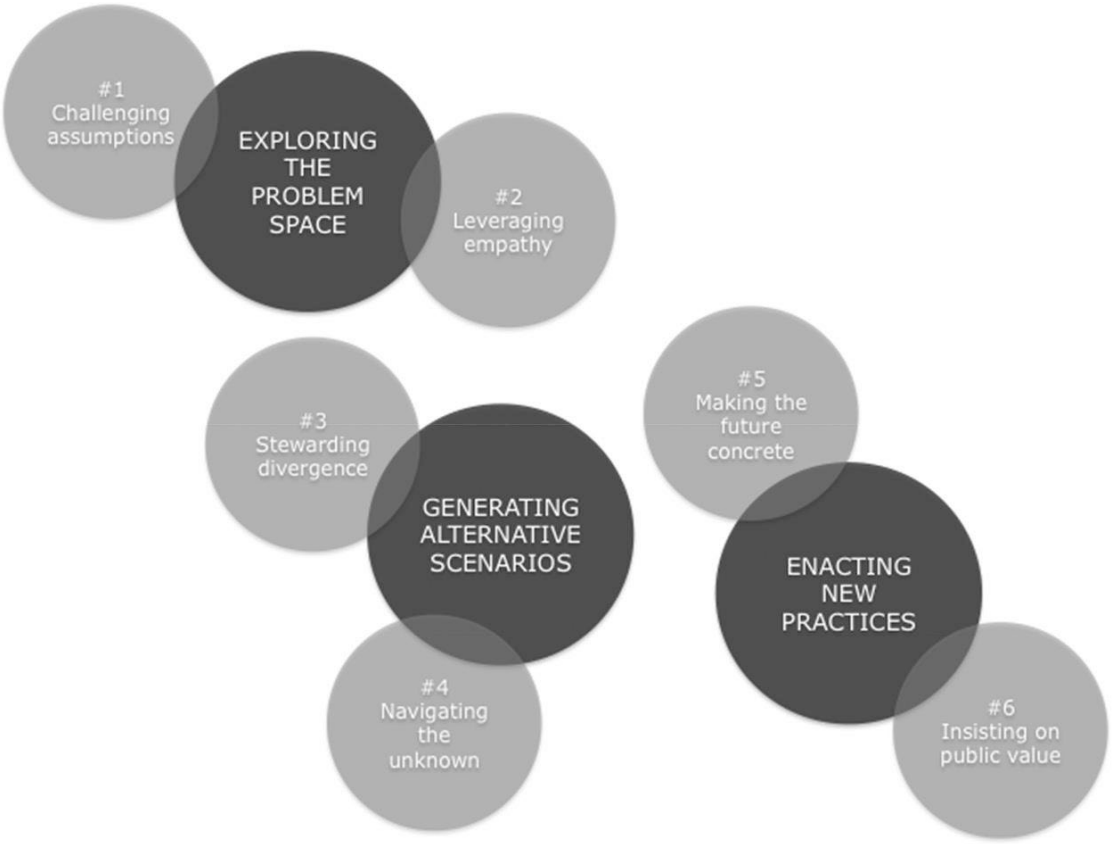
Design Thinking

Design thinking is a frequently observed approach in the public sector (Clarke and Craft, 2018[88]; Mintrom and Luetjens, 2016[89]). Bason and Austin (2021[85]) identify three dimensions in which design thinking is applied as an innovation approach in the public sector: They find that public administrators apply design thinking to (1) explore the problem space, (2) generate alternative scenarios and (3) enact new practices (Figure 5.5). In essence, design thinking centres on user perspectives and aims at "radically new solution paths" (Senapathi and Drury-Grogan, 2020[90]). Therefore, it challenges existing approaches to public service delivery and public governance (Bason and Austin, 2021[85]).

Clarke and Craft (2018[88]) describe the underlying principles of design thinking (Clarke and Craft, 2018, p. 112[88]):

> *Designs should not be envisioned as static outputs, but rather are best crafted with an appreciation for the reality that they will need to adapt and adjust over time;*
>
> *Designers and the targets of design are not strictly rational actors, and that behavioural insights into each of these players' worldviews, practices, and rational constraints produce more robust policy solutions; and*
>
> *Design is often a pluralistic activity, involving a diversity of actors within and outside government.*

Figure 6.5. Dimensions and engagements in public design projects



Source: Bason, C. and R. Austin (2021[85]), "Design in the public sector: Toward a human centred model of public governance", https://doi.org/10.1080/14719037.2021.1919186.

Tools for anticipation

Adaptation requires picking up signals to prepare for the future. Hence, it is not surprising that adaptation is closely linked to anticipatory practices and tools (Chapter 7). Scenario approaches, which are one of the most common strategic foresight tools, are particularly linked to adaption.

In addition to tools that aim for collaboration with clients and stakeholders, scenario-planning helps public administrations build anticipatory capacity in the face of climate change (Rickards et al., 2014[91]). Based on a study of projects for climate change adaptation in Australia, Rickards et al. (2014[91]) discuss scenario-planning as an approach that recognises the uncertainty that comes with climate change adaptation. In contexts of high uncertainty, scenario-planning enables decision-makers to incorporate a range of possible futures (Rickards et al., 2014[91]).

Box 6.12. A general scenario-planning process

Scenario-planning:

1. Define the scope of the exercise
2. Identify and analyse major external uncertainties
3. Reduce or cluster the uncertainties (into axes)

4. Develop, enrich and explore possible scenarios
5. Check for internal consistency and compare
6. Select final group of scenarios for further analysis

Strategy development:

7. Express and report scenarios
8. Assess the implications of the scenarios
9. Develop and select potential strategies

Source: Rickards, L. et al. (2014[91]), "The problem of fit: Scenario planning and climate change adaptation in the public sector", *Environment and Planning C: Government and Policy*, Vol. 32, p. 646, adapted from Tapinos, E. (2012[92]), "Perceived environmental uncertainty in scenario planning", *Futures*, Vol. 44/4, pp. 338-345.

Skills and capacities

The literature on adaptation reveals the skills needed from leadership and public servants, however, no systematic approach is observable.

Leadership

In hierarchical systems, such as government, leadership plays a significant role creating space for new approaches like adaptive innovation (Andrews, 2015[17]; Fitzgerald and Lenhart, 2016[40]; Mergel, 2016[30]; ODI, 2021[37]). Beyond this formal role, leadership styles shape employees' adaptability to change (Buick et al., 2015[11]). Evidence shows that, to build commitment, leaders must communicate a clear vision of what is ahead and how new approaches will influence the practices of the organisation (Chatfield and Reddick, 2018[70]; Dittrich, Pries-Heje and Hjort-Madsen, 2005[29]; Janssen and van Der Voort, 2020[1]; Matthews, Ryan and Williams, 2011[12]). Furthermore, leadership must be willing to take risks (Bishop and Savoury, 2004[93]; ODI, 2021[37]).

Moreover, adaptive approaches require a participatory leadership style (Brewer, Neubauer and Geiselhart, 2006[50]). Crosweller and Tschakert (2021[6]) suggest a relational leadership model that incorporates compassion and empathy in the face of extreme events such as disasters. The authors argue this can be supported by a communitarian, rather than an individualist approach to strengthening resilience. In the public sector, one manifestation is the growing acknowledgement that "hero-innovators" rarely exist and "distributed heroism" is required to realise and sustain innovation (Meijer, 2013[94]).

Managers' behaviour is decisive as to whether adaptive approaches such as design thinking can be sustained. In some cases, leadership turnover can lead to a departure from an innovative approach (Bason and Austin, 2021[85]). The case of France's Central Bank (Box 6.13) describes how leadership at different levels (middle management and directorate) sustained agile approaches in the organisation. Middle managers provided space for experimentation and were responsible for making sure that teams evaluated their successes. The evaluation results were then presented to the director of the Central Bank who decided they should become part of the core practices of the organisation.

Box 6.13. From experimentation to adaptation at the Central Bank in France

The French Central Bank transitioned from initial experimentation with agile practices to an organisation-wide adoption of agile ways of working (Berkani, Causse and Thomas, 2019[55]). At first, few teams autonomously introduced the Scrum methodology with no official management support. Following this first experimentation phase, evaluation found that projects applying agile methods were more successful (timewise and concerning the satisfaction of users). These results were then taken up by leadership and followed by an official decision to adopt agile practices. After the decision to adopt the innovation by management had taken place, the innovation was adapted and modified to fit the needs of the organisation.

Source: Berkani, A., D. Causse and L. Thomas (2019[55]), "Triggers analysis of an agile transformation: The case of a central bank", *Procedia Computer Science*, Vol. 164, pp. 449-456.

Employees

Employees' influence on a public organisation must be considered in adaptive approaches (Buick et al., 2015[11]; Matthews, Ryan and Williams, 2011[12]; Plimmer et al., 2021[13]). On a personal competence level, individuals must show willingness to participate in adaptive innovation practices (Matthews, Ryan and Williams, 2011[12]; Senapathi and Drury-Grogan, 2020[90]). On a professional competence level (i.e., where adaptation is linked to job-related tasks), design thinking and agile approaches require short cycles where decisions are made by cross-functional teams. This poses a challenge to public servants as it shifts hierarchical decision-making (Berger, 2007[57]).

Programmes are emerging in different countries as part of innovation management support (Table 6.4). Moreover, a mindset change is necessary to move from traditional approaches to new approaches that favour adaptation (Rose and Cray, 2010[95]; Senapathi and Drury-Grogan, 2020[90]). Plimmer et al. (2021[13]) show how adaptability connects to employee resilience. They conceptualise employee resilience based on three components: network leveraging, learning and adaptability. Adaptability is defined as a combination of job-related skills, such as stress-management and building trust with different networks.

Table 6.4. Components of innovation learning programs in Latin America

Case	Usina Pernambucana de Inovação (Brazil)	Design Academy for Public Policy (LabGobAR) (Argentina)	LABcapital: Online Public Innovation Course for Public Officials (Bogota, Colombia)
Services included in the innovation learning programme	• Advocacy and knowledge dissemination of public innovation • Innovation training and qualification • Evaluation of innovation projects and portfolios	• Iteration • Design thinking • Digital thinking • Data and evidence use • New narratives and cooperation	• Concept of innovation • Innovation in a public sector context • Tools to evaluate the culture of innovation in an organisation • A methodology for public sector innovation
Source	https://oecd-opsi.org/innovations/usina-pernambucana-de-inovacao/	https://oecd-opsi.org/innovations/design-academy-for-public-policy-labgobar/	https://oecd-opsi.org/innovations/online-public-innovation-course-for-public-officials-labcapital/

Source: OECD (n.d.[96]), *Strengthening Government Capacity to Innovate*, https://oecd-opsi.org/projects/innovation-skills/.

All the studies reviewed suggest a role for skills in relation to adaptive approaches. Moreover, the evidence suggests that adaptation requires new competences for leadership and public servants. However, research has paid more attention to the skills and capacities of leadership than those of public servants.

Policy and implementation challenges

While adaptive innovation occurs in public administrations around the world, the challenge is balancing adaptation and stability/resilience, and building a bridge from knowledge to practice based on experiences and conditions for success, as well as on the pitfalls when introducing approaches to adaptation.

Balancing adaptive innovation and stability/resilience

Public administrations deal with adaptation in different ways and contexts. Some of these link to strengthening resilience and building adaptive capacity in the face of challenging situations, while others aim to produce innovation. Adaptation research and practice apply interdisciplinary knowledge to adjust to new policy and public service challenges. Public agencies that deal with environmental challenges bring knowledge about building strong communities, partnerships and adaptive capacity, and strengthening the resilience of systems in face of threats. Meanwhile, public agencies that apply adaptive innovation work practices provide experience with how methods such as agility, user-centricity and human-centred design can be incorporated into government practices to enhance public service delivery.

But adaptability can sometimes come at the price of stability in public administration practice, especially when there is a need to act quickly (Janssen and van Der Voort, 2020[1]). Adaptive governance is characterised by “decentralised decision-making, efforts to mobilise internal and external capabilities, bottom-up (and top-down) decision making, wider participation to spot and internalise developments, and continuous adjustment to deal with uncertainty” (Janssen and van Der Voort, 2020, p. 4[1]). One way to balance adaptability and stability is to introduce an adaptive governance framework that incorporates fast processes and avoids fragmentation at the same time.

Adaptive innovation as a core practice

Adaptation can generate many different responses and approaches to experimentation and testing. However, it can be challenging to incorporate successes and lessons learned back into broader organisational practice. Practice and research show that adaptive innovation is often contained within specific remits (such as digital units, innovation labs, or one-off projects) rather than forming part of core practices in public sector organisations. Cycles are a challenge for practitioners. To avoid over-generalising some sort of evaluation mechanism at the instrument level, the institutional dimension has been discussed in the literature (double-loop-learning process). Here, adaptive management has been applied as a possible approach as it provides a basis for organisations to apply a double-loop-learning process (Rickards et al., 2014[91]).

Open questions

Multifaceted approaches and research streams

There is no common definition of ‘adaptive’ innovation observable in the literature. Adaptation is understood as (1) the need to build adaptive capacity and strengthen resilience, (2) an approach to produce innovation, and (3) a governance approach that allows adaptation and innovation to happen. Not all these are connected to innovation: whereas innovation can occur as a by-product to adaptive capacity, it appears as a goal of public measures and policies in innovative governance. Literature that deals with adaptation

as an innovative practice shows an overlap with mentions of agile methods (for example, in the digital government context and in reform studies). Adaptation is discussed in several contexts of the public sector, such as environmental studies, global development and digital government. These areas have in common that many public services are dependent on providers in the private and third sector and are often connected to these in complex relationships. However, much of the research in the different research streams (up to now) appears disconnected. Further research is needed to disentangle existing terminology and research, and provide a clearer definition adaptive practices and relation to innovation in the public sector context.

Drivers in the public sector

Drivers for adaptive innovation in the public sector appear on different levels: environmental, organisational and individual. Little research has focused on individual success factors of adaptation in the public sector. More precisely, little is known about the skills and competences of public servants who are not in a leadership role. An open question for further research concerns the types of skills and competencies public servants need for adaptive innovation in the public sector to thrive.

Support structures

Several studies discuss structures and programmes needed to support adaptive approaches in the public sector. The results show that no overarching understanding of these exists for each approach. Moreover, some structures – such as units that allow for experimentation, and relationships and partnerships – lie outside the formal boundaries of public organisations. In contrast, organisational structures inherent to public organisations appear as barriers to adaptive innovation. An open question for further research concerns how public sector organisations can support adaptive innovation structurally.

Tools and methods

Literature on adaptation notes two main tool groups: tools for collaboration and tools for anticipation. Much literature focuses on methods and tools of collaboration, such as agile and design thinking. Here, collaboration refers mostly to public sector efforts to produce design innovations. Knowledge of these methods in the public sector is largely based on studies that deal with public services, particularly in the digital government context and more research is needed on the tools and methods that are applied for adaptation purposes in other areas, such as environmental challenges.

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Notes

[1] This is reiterated in the Recommendation of the Council for Agile Regulatory Governance to Harness Innovation (OECD/LEGAL/0464) and Practical Guidance on Agile Regulatory Governance to Harness Innovation (C(2021)99/ADD1).

[2] "Double-loop learning occurs when errors are corrected by changing the governing values and then the actions" (Argyris, 2002, p. 206[97]).

[3] Kanban principles "Start with what you do now, agree to pursue improvement through evolutionary change, respect current processes, existing roles, responsibilities, and job titles, encourage acts of leadership at every level – from individual contributor to senior management" (Senapathi and Drury-Grogan, 2020, p. 3[90]).

[4] "The core idea behind the lean development cycle is that the organization should be able to learn as quickly as possible about whether or not their product will be well received […]" (Mcbride et al., 2019, p. 7[24]).

7 Mission-oriented innovation

This chapter introduces the concept of mission-oriented innovation as part of the Public Sector Innovation Facets model. It defines missions beyond a technology-centric view to align with broader societal challenges. Mission-oriented innovation serves the idea that societies should leverage innovation to achieve their ambitious goals, whether driven by governmental leaders or emerging from bottom-up political processes. While many factors influence missions, mission-oriented innovation is often supported by three interlinked policy structures: (1) institutional entrepreneurship and mission governance that enable collaboration and experimentation, (2) funding for a portfolio of missions, and (3) outcome-based procurement. The implementation of mission-oriented innovation is still emerging and can benefit from a variety of policy-making tools and methods.

General description

Academic and policy discussions use two definitions of mission-oriented innovation: (1) a narrow definition focusing on science, technology and innovation (STI) policies, and (2) a broader, public-sector reform-oriented definition.

The narrower view of mission-oriented innovation in STI policies dates to 1980s debates juxtaposing mission- and diffusion-oriented STI policies. Ergas (1987[1]) described mission-oriented technology policies focusing on "radical innovations needed to achieve clearly set out goals of national importance". He contrasted these with diffusion-oriented technology policies focused on "the provision of public goods, the principal purpose of these policies is to diffuse technological capabilities throughout the industrial structure, thus facilitating the ongoing and mainly incremental adaptation to change" (Ergas, 1987[1]). Accordingly, in the STI policy space, missions denote policies that target societal challenges with underlying economic logic: missions are a pathway to a different kind of economy and economic growth. In this view, missions are a way to find a new direction of growth for the economy and coordinate large scale public sector STI efforts towards achieving the new direction.

The broader view of mission-oriented innovation is more recent and locates missions in a discussion of public sector reform, about government that is more responsive and innovative in its public service provision. Here, missions target societal challenges with underlying public value logic: missions are a pathway to different ways of working across the public sector and creating better public value for citizens. In this view, missions are a way to reframe siloed policy practices and introduce new policy making methods and tools. As Jannsen and colleagues summarise, "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" (Jannsen et al., 2021[2]).

This report adopts a broad a broad definition of missions in accordance with these large coordination issues missions face (Box 7.1).

Box 7.1. Defining missions and mission-oriented innovation

Missions are initiatives that address grand societal challenges that are *cross-sectoral, ambitious*, *time bound* and *measurable*.

Mission-oriented innovation establishes a clear outcome regarding the above challenges and an overarching objective for achieving a specific mission (e.g., setting clear goals and roadmaps towards carbon neutrality, or mental health for young people).

Singular, unconnected interventions (e.g., challenges prizes, general applied research) are not considered missions, even though they can contribute to innovation aimed at achieving the mission.

Common to both the narrow and broad views of mission-oriented innovation is the idea that societies should leverage innovation to achieve clear, ambitious outcomes or goals, either coming from senior government leaders or emerging from bottom-up political processes. The goals serve as a driver and unifying force for innovation that guides actors (whether in one organisation or across government and sectors) to work together and generate learning and knowledge to achieve them. This mission can provide the umbrella and resources for experimentation. It facilitates a range of innovations, but there is a sense of what needs to be achieved, even if the path to get there is not determined or explicit.

The report describes findings on the key trends in mission-oriented innovation in the public sector in the following areas: (1) General description; (2) Main drivers of missions; (3) Enabling factors; (4) Tools and methods; (5) Skills and capacities; (6) Policy and implementation challenges; and (7) Open questions for further research.

The challenge

Before the COVID-19 pandemic, governments' attention already focused on tackling "grand challenges" and 'wicked' problems, such as climate change, through STI policies (Schot and Steinmueller, 2018[3]; Borrás and Edler, 2020[4]; Mazzucato, Kattel and Ryan-Collins, 2020[5]). The challenge-driven STI policy ambition to achieve a particular (smart, inclusive, sustainable) type of economic growth acknowledges that economic growth has both a rate and multiple possible directions (Mazzucato, 2017[6]). Policymakers have a choice, for instance, how quickly and how to decarbonise economic sectors. These pathways imply not only varying trade-offs but also different spillovers and dynamic efficiency changes.

As a result, starting in 2021, the EU's Horizon Europe research and development funding programme committed to spending EUR 5 billion to 2027 across five mission areas (Box 7.2) and encouraged member states to refocus their STI policies according to a mission-oriented approach (Mazzucato, 2018[7]).[1] Many other countries are experimenting along similar lines. Fisher et al. (2018[8]) list 137 ongoing mission-oriented research and innovation initiatives (includes private foundations) in 32 countries. The OECD provides an online dashboard of mission-oriented policies (Larrue, 2021[9]). This so-called "normative turn" i. STI policies (Daimer, Hufnagl and Warnke, 2012[10]; Uyarra, Ribeiro and Dale-Clough, 2019[11]) is likely to be reinforced by COVID-19 responses promising to "build back better" (Mazzucato et al., 2021[12]).

The EU attempted for more than a decade to re-orient its research and development agenda towards the grand challenges (Soete et al., 2017[13]). From the 2009 Lund declaration onwards, the EU attempted to tackle the so-called "orientation failure" inherent to its innovation policies (Daimer, Hufnagl and Warnke, 2012[10]). In this context, mission-oriented innovation offers a policy framework that enables the public sector to overcome endemic policy coordination challenges (Ergas, 1987[1]). The best-known past examples of mission-oriented policies – such as the Moonshot (Box 7.3) – show exactly that (Mazzucato, M., 2021[14]). Such policies succeeded at mobilising a variety of technological and innovation efforts under a single challenge and itemising it into a variety of missions with considerable spillover effects (Mowery, 2012[15]; Mazzucato, 2013[16]). In contrast to the previous generation of "Moonshot" missions, which focused on technological challenges (such as getting humans to the moon and back), the current generation of mission-oriented policies target a combination of societal and technological challenges (Arundel and Soete, 1993[17]; Soete et al., 2017[13]; Mazzucato, 2018[7]).

Box 7.2. European Union's five missions

In 2017-20, the European Commission adopted a mission-oriented approach to "maximise the impact of the future EU Framework Programme for Research and Innovation through mission-oriented policy" (European Commission, 2020[18]). These missions are "commitments to solve some of the greatest challenges facing our world" (European Commission, 2021[19]) through a diverse portfolio of research, policy, and legislative actions that could not be achieved by singular initiatives. Missions were chosen in the following areas:

- Cancer
- Adaptation to climate change, including societal transformation
- Healthy oceans, seas, and coastal and inland waters

- Climate-neutral and smart cities
- Soil health and food

The missions are anchored in the EU's research fund and the Horizon Europe framework programme for 2021-2027, and are governed by EU mission boards, consisting of high-level experts in the field. The missions were validated and targets set through engagement with the public to design, monitor and assess their success. They complement other major policy programmes such as the Recovery Package, the European Green Deal, Europe's Beating Cancer Plan, and the Sustainable Development Goals.

Source: European Commission (2021[19]), *EU Missions in Horizon Europe*, https://research-and-innovation.ec.europa.eu/funding/funding-opportunities/funding-programmes-and-open-calls/horizon-europe/eu-missions-horizon-europe_en#what; European Commission (2020[18]), *Mission-oriented Research & Innovation in the EU: A Problem-solving Approach to Fuel Innovation-led Growth*, https://research-and-innovation.ec.europa.eu/knowledge-publications-tools-and-data/publications/all-publications/mission-oriented-research-innovation-eu-problem-solving-approach-fuel-innovation-led-growth_en.

Box 7.3. Moonshot approach to missions

The United States' Apollo 11 programme in the 1960s is one of the most prominent examples of a mission-oriented approach. The Kennedy government set a bold vision within a clear timeframe, mobilised collaboration and co-operation for innovation across the public and private sectors, and planned and budgeted for long-term horizons. The programme benefitted from a strong public narrative (putting a man on the moon) and was a high-risk endeavour that required extensive experimentation and room to fail. Through systems engineering of the programme structure, the National Aeronautics and Space Administration encouraged interdisciplinary work by maintaining an overview of the whole programme and how different parts integrated. This required an overhaul of the entire organisational system to coordinate processes and inputs. Mazzucato argues that the principles from the moonshot approach can be applied to so-called "Earthshot" missions, which address current 'wicked' challenges, such as climate change challenges, that require large scale coordination and experimentation.

Source: Mazzucato, M. (2021[14]), *Mission Economy: A Moonshot Guide to Changing Capitalism*, https://marianamazzucato.com/books/mission-economy.

However, many governments and public agencies are looking beyond STI policies to utilise mission-oriented innovation. Various attempts to link fiscal policies to qualitative long-terms goals, such as well-being or the Sustainable Development Goals (SDGs) in general, represent a shift in policymaking towards tackling societal challenges through a coordinated effort. The influx of practices from systems thinking to strategic design, and creation of policy and innovation labs to embed such new practices in the public sector, signal a shift in the focus of public agencies towards citizen needs that often span the boundaries of individual ministries. While many such practices and organisations remain at the edge of the public sector, in some cases they lead to wide-ranging changes in civil service or public service provision (Mergel, Ganapati and Whitford, 2020[20]).

In an attempt to combine narrow and broader approaches to mission-oriented innovation, Hekkert and colleagues propose a mission-oriented innovation system as a "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[21]). Similarly, Tödtling and colleagues apply a challenge- or 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, Trippl and Desch, 2021[22]). The latter approach reflects on the idea of vulnerability, resilience and renewal at the core of (regional) innovation systems (Boschma, 2015[23]; Grillitsch, Asheim and Trippl, 2017[24]), which missions aim to tackle.

Box 7.4. The OECD definition and research of mission-oriented innovation policies

Faced with mounting societal challenges and acknowledging the limitations of traditional STI policies, such as weak directionality, lack of holistic co-ordination and fragmentation of the policy mix, several countries started experimenting with systemic interventions, commonly labelled "mission-oriented innovation policies" (MOIPs). MOIPs are defined as a co-ordinated package of policy and regulatory measures tailored specifically to mobilise science, technology and innovation to address defined objectives related to a societal challenge, in a defined timeframe. These measures span different stages of the innovation cycle, from research to demonstration and market deployment, mix supply-push and demand-pull instruments, and cut across policy fields, sectors and disciplines.

Source: Larrue, P. (2021[9]), "The design and implementation of mission-oriented innovation policies: A new systemic policy approach to address societal challenges", https://doi.org/10.1787/3f6c76a4-en.

The approach

The report describes findings on the key trends in mission-oriented innovation in the public sector in the following areas: (1) General description; (2) Main drivers of missions; (3) Enabling factors; (4) Tools and methods; (5) Skills and capacities; (6) Policy and implementation challenges; and (7) Open questions for further research.

Main drivers

Governments use mission-oriented innovation to target challenges from scientific advances (e.g., fighting cancer) to modifying behaviour (e.g., dietary habits). Attempts to describe mission-oriented innovation types vary by:

- **The kind of challenges missions tackle.** These typologies find missions attempting to accelerate STI practices, such as supporting applied research of batteries for sustainable transportation, or "transformative" goals that aim to radically change existing systems, such as supporting transition to circular economy (Fisher et al., 2018[8]; Wittmann et al., 2021[25]).
- **How and by whom missions are designed and implemented**. Recent OECD research categorises missions by their level of intervention (centre of government, ministry/agency, programme, ecosystem) (Larrue, 2021[9]).
- **How mission-oriented innovation is implemented.** Examples include top-down coordination (e.g., German's High-Tech Strategy 2025), sectoral coordination (e.g., the Netherlands Topsectoren approach), place-based vision- or consensus-building (e.g., Missions València 2030) and user-centric behavioural missions (e.g., Sweden's food and street missions by Vinnova).

While these typologies are useful to understand the mission-oriented innovation landscape, there is still no common classification of missions. Instead, common drivers are key to understanding why governments use mission-oriented innovation: (1) to address complexity; (2) as a coordination mechanism; (3) in response to the failure of traditional policy mechanisms; and (4) to increase policy effectiveness.

In terms of complexity, it is clear to many decision makers that societal challenges are "super wicked": policy problems where "time is running out; those who cause the problem also seek to provide a solution; the central authority needed to address it is weak or non-existent; and, partly as a result, policy responses discount the future irrationally" (Levin et al., 2012[26]). While it is not clear how to address these characteristics in policy practice (Peters, 2017[27]; Peters and Tarpey, 2019[28]), the complexity underlying challenges like the climate emergency is perhaps the driver of mission-oriented adaptation in government. For example, Australia's Drought Resilience Mission aims to reduce drought impacts using expertise in agricultural science, climate science and biosecurity as much as resilience in rural communities (Australian Ministry for Industry, Science and Technology, 2021[29]) (Box 7.5).

Box 7.5. Drought resilience in Australia

In 2021, Australia's national innovation agency, the Commonwealth Scientific and Industrial Research Organisation (CSIRO), launched the Drought Resilience Mission. It addresses climate extremes, predicted to increase in frequency and severity for the Australian land sector. Its objective is to build rural resilience and reduce drought impacts 30% by 2030. This goal assumes that climate-related challenges for agriculture will persist, but that impacts can be reduced through a mix of innovations, including on-farm innovation, off-farm risk management tools, and water security and resilience innovations in rural communities. The mission combines economic and climatology expertise in government agencies, the research sector, and industry and communities (such as the National Farmers Federation) working to address climate change, adaptation and mitigation. The private sector is crucial to delivering information, tools and technologies. CSIRO contributes expertise in the areas of agricultural science, hydrology, climate science, biosecurity, digital innovation and socioeconomics.

Source: Based on information from the Ministry for Industry, Science and Technology, Government of Australia (2021).

Recognising the need for coordination, policy makers are increasingly aware that the toughest policy challenges are interlinked. For example, vulnerability to climate shocks is often greater in areas of prolonged deprivation. Siloed policy design and implementation processes are perceived to be key obstacles in tackling the complexity of policy challenges. Accordingly, a mission-oriented approach promises to coordinate policies both within the STI field an in a broader sense (Kattel and Mazzucato, 2018[30]; Wittmann et al., 2021[25]).

In the area of STI policies, there is a growing sense of the ineffectiveness of some policy tools (OECD, 2015[31]). STI policy was guided by the idea of increasing (external) competitiveness with the reasoning that STI policies are effective in rectifying market failures. Such an approach has two problems: (1) it tends to focus on individual measures rather than policy mixes (Edler et al., 2016[32]), creating a false sense of causality and (2) the market-failure approach enforces a reactive view of STI policies. In contrast, a mission-oriented approach to STI policies offers a way to design and implement a portfolio of actions towards a wider goal.

The need to improve policy effectiveness also drives mission-oriented innovation. The New Public Management (NPM) reforms that Western governments implemented in the 1990s and early 2000s (and some still do) focused on introducing business practices into public organisations (Hood, 1991[33]; Drechsler, 2005[34]; Lapuente and de Walle, 2020[35]). Often, such reforms over-emphasised short-term

savings, narrow performance targets and excessive decentralisation of public actors (Pollitt and Bouckaert, 2011[36]). To correct NPM reforms, public organisations have re-emphasised the idea of the public value they provide, including via STI policies (Bozeman, 2002[37]; Bozeman and Fukumoto, 2019[38]; Mazzucato and Ryan-Collins, 2019[39]), and how that is co-created with citizens (Osborne, Radnor and Strokosch, 2016[40]). Responsible research and innovation approaches to STI incorporate values into the innovation discourse and put societally desirable innovation outcomes, or directionality, centre-stage (Stilgoe, Owen and Macnaghten, 2013[41]; Rip, 2016[42]). Mission-oriented innovation can strengthen such initiatives through stronger goal-orientation, increased focus on wider stakeholder engagement, and building stronger reflexive capacities within public organisations (Rip, 2006[43]).

Enabling factors

Mission-oriented innovation is supported by three often interlinked policy structures: institutional entrepreneurship and mission governance; funding; and procurement.

Institutional entrepreneurship and mission governance

Mission-oriented innovation needs institutional infrastructure to discuss, design and implement potential innovation systems (Mazzucato, 2016[44]). According to Grillitsch et al. (2018[45]), "institutional entrepreneurs understood as actors who initiate changes that lead to a divergence from existing institutions are thus essential for providing directionality". Accordingly, one enabling condition for mission-oriented innovation is institutional entrepreneurship directed towards missions. In practice, governments experiment with various forms of institutional entrepreneurship.

As mission-oriented innovation often targets 'wicked' policy issues with complex challenges and a need for long-term planning, one support mechanism is governance and coordination. The European Union created boards for each of its five missions.[2] Governance can also be implemented and supported by repurposing coordination mechanisms. The Netherlands introduced its Topsectoren approach in 2012 to strengthen coordination and collaboration between STI system actors (Box 7.6). The nine sectors were selected based on research- and export-intensive domains like AgriFood Logistics, Life Sciences and Health, and High-Tech Systems and Materials.[3] While the original goal was to match the knowledge demands of innovative firms and the activities of research institutes, it shifted toward transformation, such as Mission-oriented Topsector and Innovation Policy (MTIP), now containing 25 missions within four themes. While much of Topsector governance evolved into MTIP governance, the most marked difference is the creation of mission teams. According to Jannsen (2020[46]), "They are positioned as the engines for driving changes, as formally their tasks include the developing, executing and organising - through engaging various ecosystem actors – of both the Missions and the multi-annual innovation programs".

Box 7.6. The Topsectors approach in the Netherlands

The Netherlands introduced the Topsectoren approach in 2011 as an industrial policy for research, higher education and innovation through public-private collaboration in nine economic "Topsectors". Since 2018, the strategy focuses on 25 missions across four challenges: (1) Energy Transition and Sustainability; (2) Agriculture, Water and Food; (3) Health and Care; and (4) Security. The approach builds on experience and trust gained in each Topsector since 2011, linking sectoral initiatives to missions with strong potential impact such as reducing carbon emissions, enhancing digital security and increasing years of healthy life for individuals. The Topsectors developed an Integral Knowledge and Innovation Agenda (IKIA) in each challenge area to reach targets within a specific period. The

Ministry of Economic Affairs leads the reform and works with industry and authorities across policy fields to develop and implement the programme. The strategy is revisited every four years.

Source: OECD (2020[47]), *Mission Driven Top-Sector Policy*, https://stip-pp.oecd.org/stip/moip/case-studies/3.

Institutional entrepreneurship for mission directionality can also be provided by creating new leadership posts. Swedish innovation agency Vinnova created a Director of Strategic Design post to rethink its approach to transformative innovation policy. Established in 2001, Vinnova is a standard innovation policy agency, advising the government on innovation policy and designing and implementing innovation support measures (Chaminade and Edquist, 2006[48]). However, Vinnova did something different from standard innovation agencies when it turned to mission-oriented innovation in the late 2010s and created the position for a designer. Under the new leadership, drawing on criticism of typical technocratic policy design processes, a more engaged innovation practice was developed for the Swedish missions. Taking the themes of Healthy Sustainable Mobility and Healthy Sustainable Food as a starting point, Vinnova coordinated co-design sessions across Sweden with up to 400 stakeholder organisations in "actors workshops" (Hill, 2020[49]). This approach and the resulting missions garnered positive attention in the media (Orange, 2021[50]; Peters, 2021[51]) and from scholars.

Looking at mission-oriented innovation through lenses of public sector reform, many governments attempt transformative change through the creation of innovation and policy labs. This reflects the public sector's adaptation of working practices in (strategic) design and agile software development practices from the private and third sectors (see Chapter 5). As studies show, such practices are mostly taken up by new, often peripheral, public organisations in the form of public sector design, and digital and innovation labs (Hill, 2015[52]; Bason, 2017[53]; Tõnurist, Kattel and Lember, 2017[54]; Mergel, Ganapati and Whitford, 2020[20]). 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 policy analysis (van Buuren et al., 2020[55]). These trends led to the creation of a missions action lab at the OECD to help governments kick-start mission-oriented innovation.[4] In 2021, Vinnova established a rapid transitions lab for its food mission (implemented by Dark Matter Labs), aiming to "identify opportunities and pathways for Swedish food system actors to engage in a rapid transition, in response to the COVID-19 crisis. It will assess different strategies within the Swedish food systems, and support the design of more transformative strategies, practices, and institutions" (Dark Matter, 2021[56]).

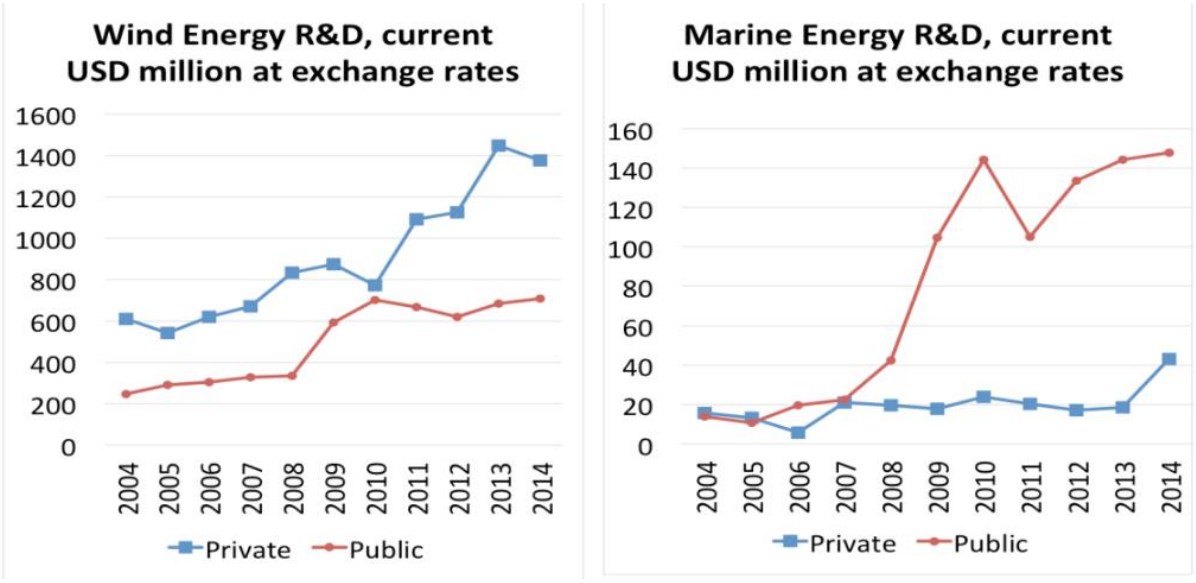
Funding missions

The financing and financial structure of an economy are not neutral: the type of finance received affects the types of investments made and activities pursued. There is an important difference between finance conducive for investment in the real economy and speculative finance, which prioritises high-risk, short-term capital gains through the trade of existing assets (Lazonick and Mazzucato, 2013[57]). Transforming economic structures implies re-orienting financial flows – through regulation, financial innovation, institution-building and deliberate policy coordination – towards investments in economic activities essential for structural change.

Figure 7.1 shows how and why mission-oriented public funding can make a difference in renewable energy technology. As Semieniuk and Mazzucato note, wind energy technologies are more developed than marine technologies, which have only deployed demonstration projects and are nowhere near being cost-competitive (Semieniuk and Mazzucato, 2018[58]). It is striking that the private sector finances the majority of less risky wind R&D while public funds dominate the riskier marine sector, suggesting that public funds are important in the early development of green energy (ibid.). This type of public direct investment has been found to mobilise private investment in renewable energy. According to Deleidi, Mazzucato and Semieniuk, Mission-oriented public investment does not only have a positive effect on private investment,

but also has the largest positive effect compared to other traditional policy tools (Deleidi, Mazzucato and Semieniuk, 2020[59]; Dosi et al., 2021[60]).

Figure 7.1. Global renewable energy investments in wind and marine energy R&D



Source: Semieniuk, G. and M. Mazzucato (2018[58]), "Financing green growth", *IIPP Working Paper*, No. 2018-04, Institute for Innovation and Public Purpose, London.

As transformational policy goals, missions need the financial ecosystem to support innovation. Missions are funded through multiple avenues, examples of which appear below: (1) governments repurposing or upgrading existing funding mechanisms or institutions to be more mission-oriented or serve a specific purpose in mission-oriented policy; (2) introducing new funding mechanisms; (3) creating new funding institutions such as mission-oriented public banks; (4) 'greening' central banks and financial regulations, a pivotal area through which sustainability transition is supported.

An example of repurposing or upgrading is the abovementioned Topsectors in the Netherlands, where sectoral coordination and co-operation evolved into a policy mix targeting a variety of missions (Jannsen, 2020[46]). Similarly, the UK government launched a new Industrial Strategy in 2017 including four mission areas (clean growth, ageing society, future of mobility, and artificial intelligence and the data economy) and introducing the Industrial Strategy Challenge Fund (ISCF) focused on 23 challenges across the mission areas.[5] The ISCF is part of a larger National Productivity Investment Fund established in 2016. In this case, mission funding evolved within wider changes in the STI funding and institutional landscape.

The European Investment Bank (EIB) is one of the main providers of long-term finance and risk-sharing in the EU, taking the lead in policy areas such as in climate action finance by committing to dedicating 50% of financing to climate action by 2030 (Mazzucato and Mikheeva, 2020[61]). 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. Governments can also repurpose existing institutions, such as state-owned companies (Gasperin et al., 2021[62]). For example, Danish public energy company Ørsted adopted a wholesale renewable energy strategy (Box 7.7).

Box 7.7. Mission-oriented investment in Denmark

The Danish public energy company, Ørsted, adopted a renewable energy strategy in 2008 to move from almost complete reliance on fossil sources for electricity generation. In 2009, the company launched the "85/15" strategy, which aimed to generate 85% of electricity from renewables and 15% from conventional sources by 2040. The firm optimised internal operations and coordinated its supply chain to become a leader in offshore wind power by 2013. Through partnership with Siemens Wind Power (SWP), it gained access to turbines in exchange for stable demand. Industrialisation of the supply chain, competition between upstream suppliers, and partnerships with institutional investors reduced uncertainty and costs for all energy actors. As a result, the firm changed the industrial landscape for offshore wind power in Denmark. In 2019, the 85/15 goal was reached 21 years ahead of schedule. In 2018, a new strategy planned investments of DKK 200 billion in renewable energy over 2019-25 to reach renewable capacity of 30 GW by 2030. By the end of 2019, Ørsted had invested DKK 193 billion in renewable energy and was being hailed as the "first green energy major".

Source: Voldsgaard, A. and M. Rüdiger (2021[63]), "Innovative enterprise, industrial ecosystems and sustainable transition: The case of transforming DONG Energy to Ørsted", https://doi.org/10.1007/978-1-4614-6431-0_160-1; Algers, J. and R. Kattel (2021[64]), *Equinor and Ørsted: How Industrial Policy Shaped The Scandinavian Energy Giants*, https://www.ucl.ac.uk/bartlett/public-purpose/publications/2021/mar/equinor-and-orsted-how-industrial-policy-shaped-scandinavian-energy-giants.

Governments can also create entirely new funding mechanisms. 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."[6] The call is funded by DKK 700 million of public money.

In 2020, Scotland created "a mission-led development bank providing patient capital to build a stronger, fairer, more sustainable Scotland."[7] The bank is capitalised with £2 billion of public funds and focuses on three missions: (1) achieving a "Just Transition" to net-zero carbon emissions by 2045; (2) extending equality of opportunity by improving places by 2040; and (3) harnessing innovation to enable people to flourish by 2040 (Mazzucato and Macfarlane, 2019[65]).

One topic that receives growing attention in academic debate is the role of central banks and financial regulators in addressing climate-related financial risks (Campiglio et al., 2018[66]). Since the 1990s, central banks 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 increasingly use a wider range of unconventional measures, including quantitative easing and other short- and longer-term liquidity programmes to stimulate the economy. The extensive use of these tools, often with sectoral conditions (e.g., refinancing by the European Central Bank (ECB) offered to Eurozone banks if they commit to financing SMEs or other non-financial corporations), raises questions about central banks' market neutrality and independence. This suggests that central banks might do more to direct finance towards green growth, especially since post-crisis stagnation and governments' inability to maintain public support for climate-aligned investment have hampered transition towards low-carbon technologies. The International Energy Agency (IEA) estimates that investment in low-carbon energy would need to grow two-and-a-half times by 2030 (from 35% to 65%) to meet the SDGs (IEA, 2019[67]).

Despite their potential, corporate bond purchases by the ECB mirror the investment choices of financial markets and mostly favour large, carbon-intensive companies (Matikainen, Campiglio and Zenghelis, 2017[68]; Jourdan and Kalinowski, 2019[69]). The ECB portfolio significantly contributes to biodiversity loss

(Kedward, Ryan-Collins and Buller, 2021[70]), and the ECB president signalled that central banks cannot remain neutral to climate change.[8]

Central banks could also coordinate more closely with industrial policy, for example by purchasing green bonds from development banks, green banks or similar public intermediaries such as the European Investment Bank (Kattel et al., 2020[71]). These could then finance lending for green infrastructure investments or green loans for small- and medium-sized companies. Green refinancing where central banks offer favourable interest rates for refinancing of green lending is another option, particularly in the Eurozone.

Box 7.8. Funding mission-oriented research in Nova Scotia, Canada

Nova Scotia is a smaller province of Canada with limited resources and funding for research. Research Nova Scotia was set up to organise and coordinate research activities with ten universities in the region. The initial funding was CAD 27 million. The mission-oriented research strategy launched in June 2020. The board of Research Nova Scotia determined four mission areas to frame the province's funding approach: (1) bioeconomy; (2) climate change adaptation and resilience; (3) healthy people and healthcare systems; and (4) improved quality of life for residents.

The missions approach developed over a year and involved building support, research and information gathering, and engagement with stakeholders to identify potential strategies and priorities of partners. Finally, mission areas were defined with the board that overseas the work. Besides the board, stakeholders included universities, private-sector partner organisations (for example, a venture capital firm), and relevant government departments (such for health and agriculture). One important challenge for implementing the missions framework is the dependence of universities on research funding from the federal level or the private sector, whose goals might not be in line with mission targets.

Research Nova Scotia's strategy finds a smaller number of missions more likely to achieve focus and acceptance by stakeholders. Research Nova Scotia's move from a traditional research organisation to being strategy- and mission-oriented provides economic development support across the full range of the innovation cycle, including early stage research.

Source: OECD Interview (2021); Research Nova Scotia (n.d.[72]), *Our Missions*, https://researchns.ca/our-missions/.

Procurement

Since WWII, public procurement is one of the key means of supporting the development of new technologies for public missions, especially in the military (Mowery, 2012[15]). It is also an important policy tool for industry creation, protection and overall industrial upgrading (Kattel and Lember, 2010[73]). The current wave of policy change allocates an even wider role for public procurement. As argued by Lember, Kattel and Kalvet (2015[74]), “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”.

Preferably through functional requirements and standards (Edquist and Zabala-Iturriagagoitia, 2020[75]), public procurers incentivise private providers to come up with new solutions or upgrade production-related processes to meet government demand. Public procurement can thus offer private providers a space to refine their ideas or existing products. By covering all or part of development costs while providing feedback, public agencies help enterprises drive down expenditure on production. Governments can also use public procurement to stimulate private providers to carry out R&D in areas where market interest is

muted by uncertainty, specifically around challenges such as ageing, environmental sustainability and health. Accordingly, procurement can support mission-oriented policies (Mazzucato, 2020[76]).

Green public procurement (GPP)[9] is an example of public sector purchasing power directed towards a challenge or mission. GPP is the process whereby public organisations buy goods, services and utilities based on best prices while incorporating environmental aspects into their award criteria (UNEP, 2017[77]). Such procurement practices increasingly feature rules of engagement, but the field remains under-researched (Testa et al., 2012[78]). Authorities in the EU spend around 2 trillion euros each year on public purchases, or 14% of GDP. Given this purchasing power, GPP holds potential to decarbonise the economy. In contrast to emission trading schemes with prices currently too low to effect a low-carbon transition, GPP offers a significant and immediate way forward (Chiappinelli and Zipperer, 2017[79]). As a positive spill-over, GPP can initiate the development of lead-markets for climate-friendly technologies and provide incentives for green innovation (Lember, Kattel and Kalvet, 2015[74]).

In the EU, all public procurement must follow the regulatory framework that harmonises rules across member states to level the playing field for businesses therein (European Commission, 2017[80]). The European Commission advocates for environmental considerations, but so far has fallen short of introducing environmental criteria for public procurement contracts. Nonetheless, the regulatory framework allows for the inclusion of environmental aspects through two main channels: (1) through considerations in the award procedure (as either award criteria or technical requirements); and (2) through costs imputed to environmental externalities as part of the concept of life-cycle cost (Chiappinelli and Zipperer, 2017[79]). For instance, Germany changed its national laws in 2016 to enable public clients to include strategic goals such as environmental requirements in the award criteria of the bidding process (Bundesregierung, 2016[81]). German public authorities can now practice GPP via their tenders.

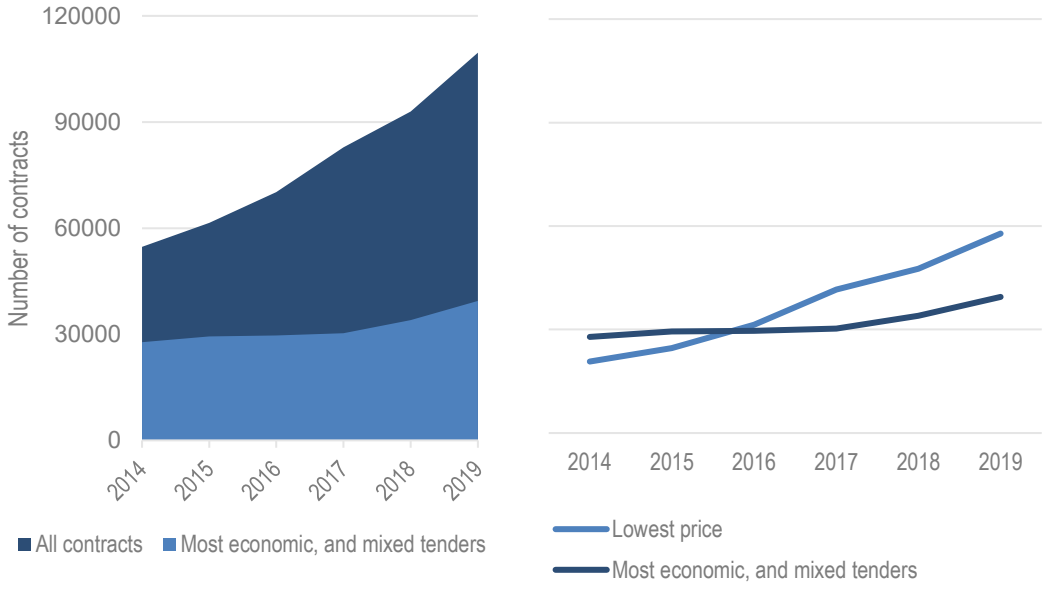
Incorporating environmental requirements in award criteria becomes possible using the Most Economically Advantageous Tender (MEAT) approach. Contrary to the lowest-price criterion, the MEAT method allows selectors to consider both total ownership and environmental costs. By using the MEAT criteria, public authorities can evaluate environmental technologies and their respective costs, which provides greater flexibility and ultimately more decision-making power than specifying technical requirements within a lowest-price tender. Additionally, a combination of technical requirements and environmental award criteria is also possible. While technical requirements are difficult to track on an aggregated basis, the award criteria are usually specified in the EU Tenders Electronic Daily (TED) database for government procurement, which holds information on all public tenders for each member state (European Union, 2020[82]).

As per Figure 7.2, the share of public tenders in Germany that used either the MEAT or mixed award criteria remains relatively low. Furthermore, the relative share of these public tenders became smaller in recent years relative to the share of other types of contracts, most specifically those based on lowest-price criteria. It is important to clarify that lowest-price tenders can incorporate environmental aspects through specified technical requirements. The share of tenders that potentially have GPP elements incorporated may therefore be underestimated. Nonetheless, Figure 7.2 indicates that the potential of GPP through award criteria in public tenders is not fully realised in Germany.

Another approach to mission-oriented procurement is to procure solutions to problems rather than specific existing products. Such ‘functional procurement’ is “procurement of products by an authority/unit that describes a function to be performed (or a problem to be solved) instead of describing the product that is to perform the function. That is, a public agency specifies what function is to be achieved rather than how the function is to be achieved” (Edquist, 2019[83]; Edquist and Zabala-Iturriagagoitia, 2020[75]). In Sweden’s 2016 National Procurement Strategy, the government is attempting to follow a proposal by Edquist specifying that “the proportion of the regular procurement volume (state, county and municipality) to be described in functional terms should increase by 5 percentage points every year over the next five years.

When 25% is achieved, the programme should be re-evaluated and new decisions made" (Edquist, 2019[83]).

Figure 7.2. Public procurement contracts in Germany, 2014-2019



Source: Kattel, R. et al. (2020[71]), "Challenge-driven economic policy: A new framework for Germany", https://www.ucl.ac.uk/bartlett/public-purpose/publications/2020/nov/challenge-driven-economic-policy-new-framework-germany.

Box 7.9. Mission-oriented procurement in Valencia, Spain

In 2019, the City Council of València set up Valencia 2030 to establish missions as the framework for innovation projects of the next decade. The first mission formulated under this framework officially approved is the Mission Valencia Neutral City. This mission targets three districts of the city and seeks to bring about the systemic transformation needed to make the whole city climate neutral. Valencia aims to be part of the European mission to make 100 cities climate neutral.

The City Council compiled a catalogue of possible missions, which form the starting point for political and social choice. Up to three missions will be selected by the government, and another three by the community. There was widespread support for adopting this framework in the city's legislature (94%). To conceptualise the stakeholders involved in the definition and implementation of missions, the city used the quadruple helix innovation model, and used traditional and social media to inform and include broader society. The Ambassadors Valencia 2030 scheme continuously involves these stakeholders.

A success factor is the connection between public procurement and innovation. The city recently set a goal to allocate at least 3% of the budget (EUR 6-9 million annually) for innovation-related procurement in the next three years, to pool funding and commission for outcomes rather than products.

Source: OECD interview (2021).

Another important example of mission-oriented or functional procurement is the application of agile practices in public sector IT purchases. The UK's Government Digital Service (GDS), founded in 2011, was able to successfully reform IT procurement (Kattel and Takala, 2021[84]) in response to widespread dissatisfaction with government IT. Following a series of high-profile IT failures, the UK Parliament's Public Administration Select Committee published a report in 2011 titled 'Government and IT – "a recipe for rip offs": time for a new approach' (UK Parliament, 2011[85]). The report highlighted a dearth of IT expertise, a lack of centralised, horizontal IT governance, and reliance on large-scale, long-term contracting with a small number of large private providers as driving IT failings in the government. At the same time the newly elected coalition government appointed internet entrepreneur Martha Lane Fox as the UK's Digital Champion, and commissioned her to review the government's online presence. Fox recommended that there be a new, central digital team in absolute control of the overall user experience across digital channels. It should be headed by a CEO reporting directly to the Cabinet Secretary. GDS reshaped digital procurement practices through spending controls (major government IT projects must receive GDS approval) and through the creation of a digital marketplace. According to the OECD, "in 2009 fewer than twenty companies retained 80% of the UK's £16 billion of annual IT spending. GDS has helped the UK digital, data and technology (DDaT) sector to evolve from a highly concentrated, uncompetitive market in 2009 to a highly diversified, competitive market; as of 1 October 2018 almost 5,100 suppliers are available to the UK public sector through the Digital Marketplace, over 92% of which are small and medium-sized enterprises (SMEs)" (OECD, 2018[86]).

Tools and methods

While the implementation of mission-oriented innovation remains an emerging practice, several tools and methods are increasingly favoured by public organisations for implementing missions. First, many mission-oriented approaches attempt to bring new ways of working into the public sector, particularly around experimentation and stakeholder engagement, including participatory methods. Second, missions typically rely on a portfolio approach of investment in projects. Third, governments seek ways to evaluate missions in new public value and spill-over-focused frameworks and methodologies.

All three sets of tools and methods rely on differentiation between fixing market failure and market-shaping as justification for public sector activities. Market failures are concerned with information asymmetries, transaction costs and frictions to smooth exchange, non-competitive markets (e.g. monopolies) or externalities (e.g. pollution), or coordination and information failures hampering investment (Rodrik, 1996[87]). Market-shaping is concerned with collective production (or co-production) of social and economic value (Mazzucato, 2018[7]).

The market-fixing perspective creates a particular orientation towards innovation and structural change. While elements of innovation policy (early-stage R&D in particular) can be considered public goods that justify the case for public policy provision, the private sector is assumed to be the more efficient innovator, possessing greater entrepreneurial capacity and better able to take risks, given the pressure created by competition. In contrast, the state is viewed as risk-averse and in danger of creating government failure if it becomes too involved in industrial policy by 'picking winners' (Mazzucato and Ryan-Collins, 2019[39]).

Market-shaping focuses on system-wide dynamic efficiency gains (including innovation, spill-over effects and systemic change) and thus is concerned with the best use of resources to achieve system-wide changes over time (Kattel et al., 2018[88]). As Sharpe et al. (2021[89]) argue, "A policy's dynamic effectiveness cannot be assessed by considering its potential outcomes at a moment in time, as is done by cost-benefit analysis. It can only be assessed by considering its effect on processes of change in the economy. These may include innovation, diffusion, growth, contraction, reorganisation, or replacement of one set of economic resources, assets or structures with another. It is therefore processes – the likely direction, rate, and magnitude of change – that should be the focus of analysis".

Table 7.1 summarises these two approaches to policy justification and how they lead to different assumptions about policy processes and tools, including measurement and evaluative frameworks.

Table 7.1. Market-fixing vs market-shaping

	Market failure/-fixing	Market shaping/mission-orientation
Justification for the role of government	Market or coordination failures: • 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 allocative efficiency assuming static general relationships, prices etc.	Focused on systemic change to achieve mission-dynamic efficiency (innovation, spill-over 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: Adapted from Kattel, R. et al. (2018[88]), "The economics of change: Policy and appraisal for missions, market shaping and public purpose", https://www.ucl.ac.uk/bartlett/public-purpose/publications/2018/jul/economics-change-policy-and-appraisal-missions-market-shaping-and-public.

New ways of working and knowing

Mission-oriented innovation is a collaborative policy approach and requires new ways of working, especially making room for experimentation, inclusion and participation of stakeholders from different sectors and levels. The mission-oriented or market shaping approach utilises quite different epistemology from the "what" and "how" of policy-making processes and their impact. This turned the attention of policy-makers to learning from and incorporating new methods and analytical tools such as strategic design, complexity economics, foresight, policy labs, etc. (Tõnurist, Kattel and Lember, 2017[54]; Mergel, Ganapati and Whitford, 2020[20]; van Buuren et al., 2020[55]). As shown above, Vinnova coordinated intensive co-design sessions across Sweden, with up to 400 stakeholder organisations engaged in 'actors workshops'. The principle for the 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.

Barcelona's attempt to rethink its smart-city approach after 2015 serves as another example of how methods from design and agile development are fused with a wider civic engagement processes for an overarching mission. Barcelona came to embody bottom-up urban transformation in terms of digital capitalism and urban planning (Morozov and Bria, 2018[90]). Ada Colau led Barcelona en Comú, a new political platform emerging from social movements with no ties to existing political parties, to a dramatic victory in the local elections of 2015 focusing on housing and environmental challenges through the promise to rethink Barcelona's approach to digital capitalism. Colau's city government has sought to operationalise alternative agendas around citizen data rights, setting out a proactive role for city governments as institutional champions and custodians of citizen data. Key to the success was extensive use of civic networks (including knowledge institutions) and creating a new Chief Technology and Digital Innovation Officer (CTIO) position within the city government. The CTIO was a new executive-level role, representing the elevation of digital strategy beyond IT. The programmes introduced under this government, promoting a vision of technology and innovation in cities centred around the notion of

"technological sovereignty" and citizen data rights, have been the focus of an increasing number of studies and discussions (Ribera-Fumaz, 2019[91]; Sadowski, 2020[92]; Charnock, March and Ribera-Fumaz, 2021[93]). Barcelona's urban and digital transformation initiatives are particularly influential in the European context of the re-emergence of industrial policy for the digital age.

Box 7.10. Participatory mission-setting in Barcelona, Spain

The Barcelona Metropolitan Strategic Plan (PEMB) is a multi-year plan for the city of Barcelona and the surrounding areas. In 2021, PEMB identified 68 challenges facing the region. PEMB is working to transform these into ten to twelve missions, and aims to define each mission with a view to four aspects: increasing (1) resilience, (2) prosperity and (3) cohesion, and (4) creating a smart metropolis. For instance, one of the missions addresses local food security and will aim to derive at least one-third of food consumption from local products.

Each mission there will have a pilot group consisting of civil society, academia, the public sector, the private sector and the media (quintuple helix model). Stakeholders were chosen through a survey, asking for a commitment to participate in the mission area. One challenge identified by PEMB is difficulty in creating a convincing narrative and societal support for projects on the level of the metropolitan area. Much policy discourse and literature on innovation projects needs to be adapted to the lens of a metropolitan context. Due to this challenge, engagement with stakeholders and exchange with similar organisations is particularly important. Through this participatory process, PEMB ensures that the transformation into missions is well-informed.

Source: OECD Interview; PEMB (n.d.[94]), *What is the Plan?*, https://pemb.cat/en/static/what_is_the_pemb/2/.

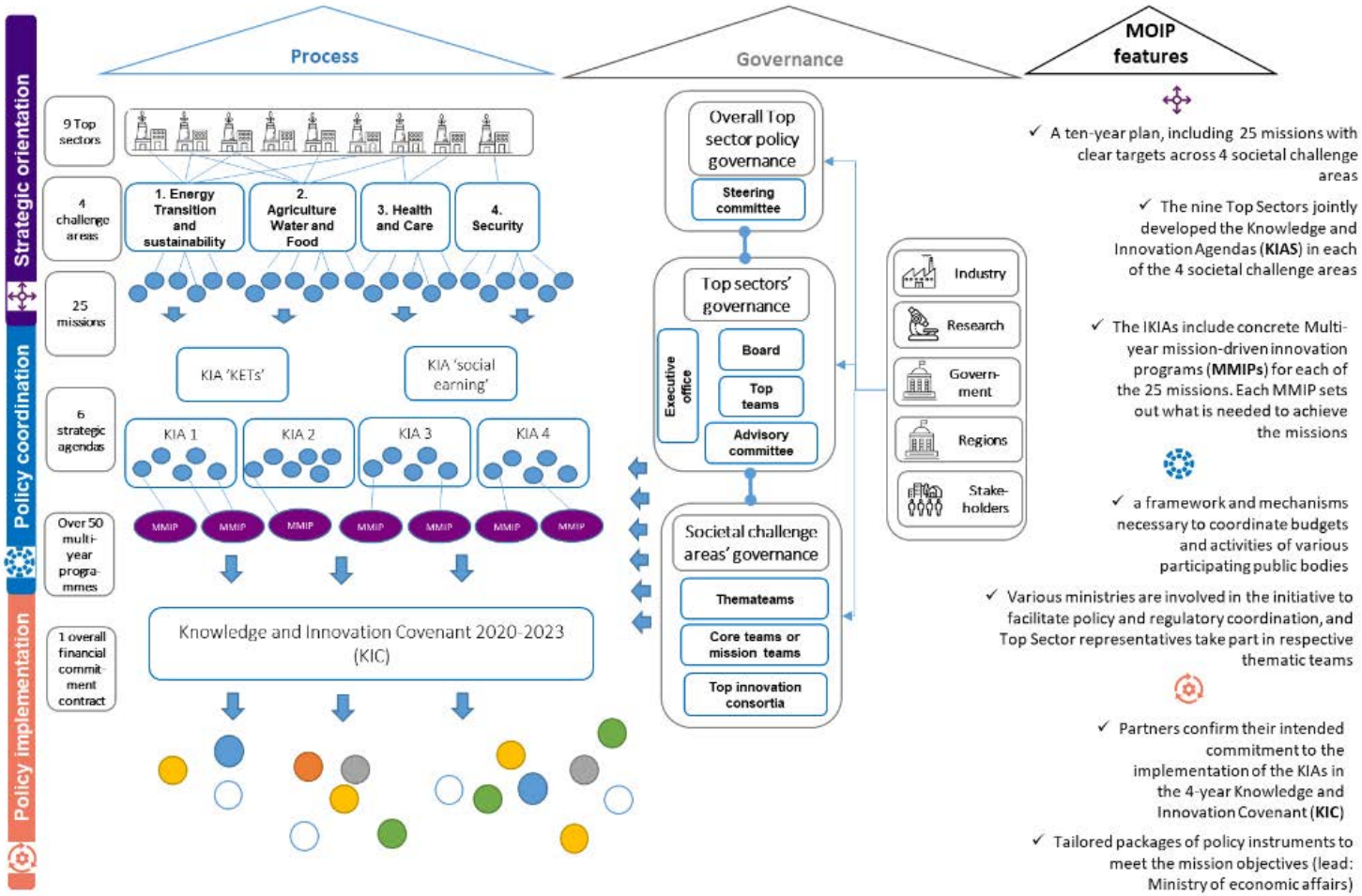
Portfolio approach to funding

Another aspect of the market-shaping approach is reliance on project and funding portfolios. While missions define problems to be solved, it is vital that mission-oriented investments have organisational flexibility to avoid lock-in into one type of solution – whether technological or otherwise. For instance, the US Defense Advanced Research Projects Agency (DARPA) relies on organisational structures that are flexible, adaptable, and able to foster bottom-up solutions. Since DARPA's success in the 1960s, the operational autonomy of mission-oriented funders is seen as a key to ensuring the best outcomes (Bonvillian, 2018[95]). While DARPA often serves as an example of the portfolio approach to mission-oriented investment, it is a rather unique organisation with the focus on military and security challenges, and an incomparable level of annual funding (Bonvillian and Van Atta, 2011[96]).

The portfolio approach to funding missions is also expressed by specifying mission themes and challenges within a theme, then funding multiple projects with complementary approaches to solve the problem. Such a structure can be seen in the case of the Dutch Topsectoren missions described in Figure 7.3.

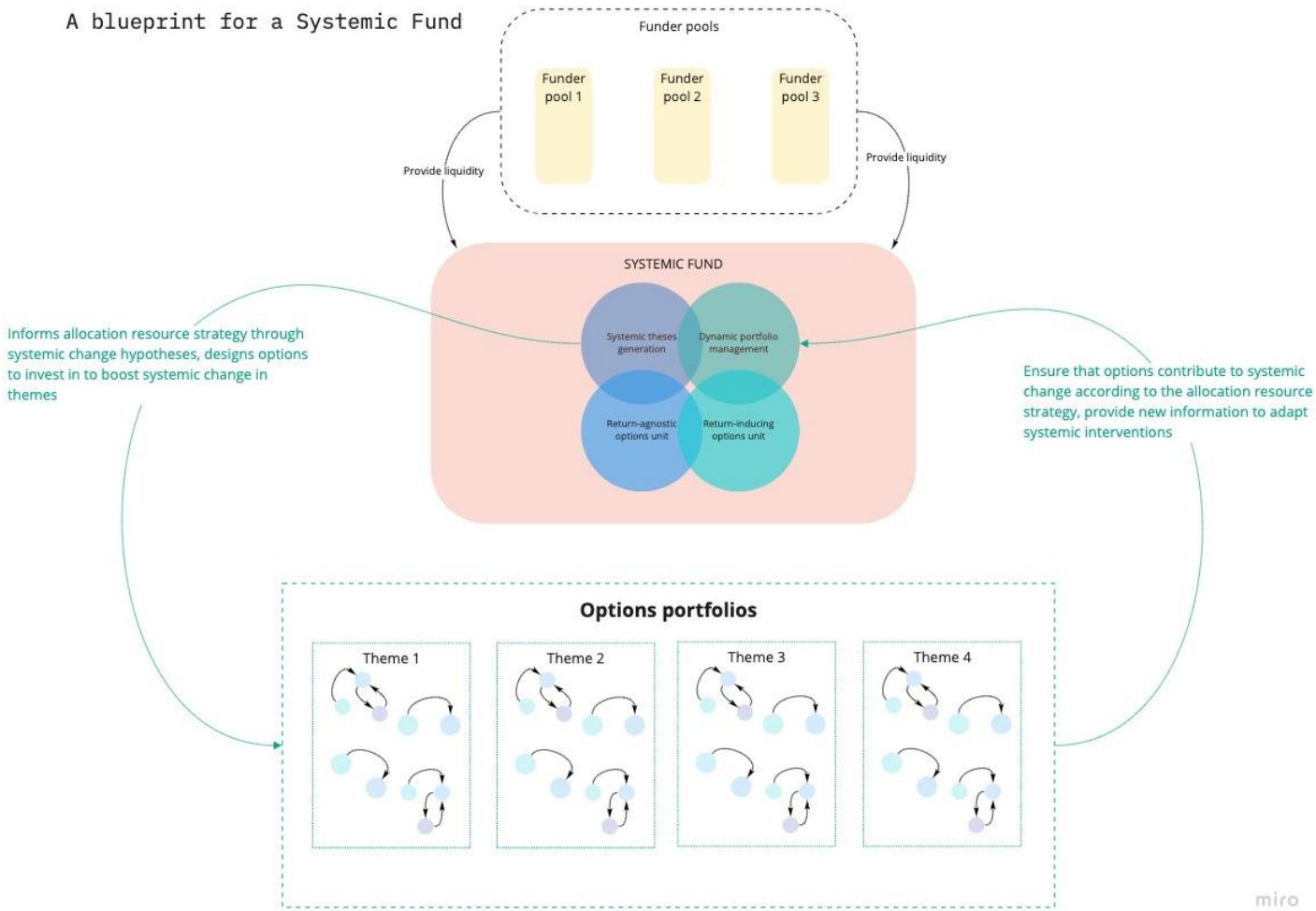
Multilateral organisations such as the UNDP are rethinking how they support development initiatives through a multitude of projects. The UNDP is looking into establishing a systemic fund: "financing structures that have the mandate to develop systemic portfolios and flexibly deploy financial resources" (Gurciullo, 2021[97]). As Figure 7.4 shows, such a fund pools funders around challenges to be addressed through a portfolio of solutions and projects.

Figure 7.3. Dutch mission-driven Topsectors and innovation process, governance and main mission-oriented policy features



Source: Larrue, P. (2021[9]), "The design and implementation of mission-oriented innovation policies: A new systemic policy approach to address societal challenges", https://doi.org/10.1787/3f6c76a4-en.

Figure 7.4. Blueprint for a systemic fund by the UNDP



Source: Gurciullo, S. (2021[97]), "Deploying systems finance for development. A multi-asset approach to accelerate SDG localisation", https://docs.google.com/document/d/1mIOOiXgwJSmDNPnMXjt_msc8rz5DT55lwWpnJ-MI6mw/edit?usp=embed_facebook.

Box 7.11. Bottom-up approach in the Province of Fryslan, Netherlands

The Province of Fryslan in the Netherlands created the Blue Delta mission to address rising sea levels. The province was motivation to adopt a missions framework by the perception that problems in previous projects mainly occurred on the institutional ("meso") level and that problems and solutions were conceptualised as linear. Missions addressed achieving change for interrelated challenges at all levels.

The province engaged the population in mission definition, kickstarted by a photograph taken from the International Space Station in 2018 that illustrated the region's vulnerability to climate change. Fryslan's history is defined by its relationship to the ocean, and the mission is connected to this narrative. Dialogue followed about the future of the region on topics of circular economy, water technology, and management and local communities. Finally, the province launched a series of bottom-up projects and co-operated with the University of Groningen to develop a method to assess new projects against the SDGs and other indicators. There is no formal process for updating and defining missions, but emphasis is placed on a dynamic and ongoing definition and evaluation of missions.

To stimulate co-operation within the region, the province launched an 'innovation table' to arrange meetings with experts, project owners, and idea holders to connect projects. Next, it redirected funding from current projects to early-phase ideation of project development. Finally, it helped start-ups use festivals as a testbed for their own products. It was particularly important to follow through on every ideation meeting and present clear concepts for the next stage of the implementation.

Source: OECD Interview; Province of Fryslan (n.d.[98]), *Blue Delta*, https://innovationislands.com/wp-content/uploads/2021/02/BLUE-DELTA-Fryslan-EN.pdf.

New approaches to appraisal and evaluation

Evaluation of mission-oriented innovation and other types of systemic policy approaches needs to capture holistic or systems-wide outcomes. Jannsen et al. (2021[2]) argue that "It seems disproportionate to base evaluations entirely on [whether] 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" (Jannsen et al., 2021[2]). In 2020, the UK government added a chapter to its guidance for policy evaluation and appraisal (*The Green Book*) describing how policy-makers could evaluate transformative change. The new guidance 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" (HM Treasury, 2022[99]). Sharpe et al. (2021[89]) 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".

Box 7.12. Cross ministerial innovation evaluation in Japan

Japan's cross-ministerial Strategic Innovation Promotion (SIP) programme supports the innovation cycle from research through early-market application and regulatory reforms and system changes. SIP relies on ex ante and post ante assessments. Policy evaluation is continuous and carried out before, during and after programme implementation through expert reviews and self-assessments. Indicators include: the effects of the implementation of SIP relative to target; budget management; cross-ministerial collaboration; co-operation between research and academic stakeholders; management effectiveness; expected spill-over effects; and Technology Readiness Levels in each research subject.

In addition, SIP evaluates: contribution to the social innovation; contribution to solving social issues; and clarity of commercialisation strategy. The evaluation looks beyond whether targets have been reached to consider the causes and success factors of the programmes. Assessment outcomes impact the budget allocation and can lead to research, governance or management changes.

Source: OECD (2020[100]), *Cross-ministerial Strategic Innovation Promotion Program (SIP)*, https://stip-pp.oecd.org/moip/?answerId=A13-15.

Box 7.13. Risk opportunity analysis

In situations of non-marginal change, risk-opportunity analysis can choose between policy options. The main steps in this process are:

1. System boundaries are delimited and all relevant interactions, and positive and negative feedbacks are identified; suitable models, if required, are chosen or designed;
2. The potential intended and unintended effects of policy options on the economy are assessed (see below), and uncertainty ranges estimated;
3. The risks and opportunities of options (most likely, and best- and worst-case outcomes) are compared along relevant metrics and dimensions (where probabilities may be quantifiable or unquantifiable). This includes consideration of systemic risk (breakdown of an existing system) and systemic opportunity (where policy generates a whole new system, or set of opportunities);
4. The preferred option is determined based on a qualitative judgment of the scale of the opportunities and risks, compared to the cost of the intervention. This will necessarily be subjective as it weighs outcomes in different dimensions, informed by an objective assessment of likelihood and magnitude of possible outcomes in each of the relevant dimensions;
5. The reasoning is recorded, including the decision-making body's assessment of the risks and opportunities. (This can be helpful for transparency and for learning from experience).

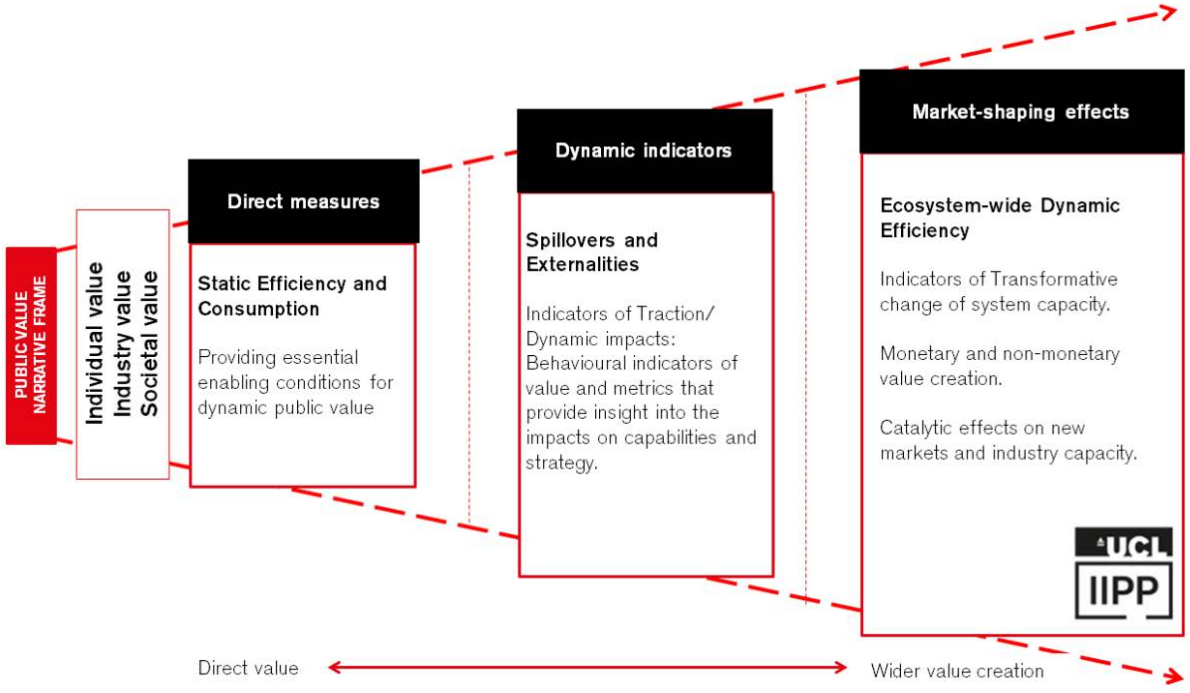
The potential effects of policy options on processes of change in the economy are assessed by:

1. Mapping the relationships between components of the economic system in terms of their reinforcing and balancing feedbacks;
2. Identifying the likely effect of policy interventions on system behaviour based on changes to the relationships between components (including by other policies that exist or are under consideration). This can be extended to a range of scenarios of cumulative causation that result from policy action, where longer-term effects are likely to be important to policy objectives;
3. Comparing likely effects in terms of:
    a. Direction of change (of any variables of policy interest)
    b. Magnitude of change (which may or may not be quantifiable)
    c. Pace of change
    d. Possible accumulation of risk and opportunity (option generation)
    e. Confidence, or range of uncertainty, in each of i to iv above.

Source: Sharpe, S. et al. (2021[89]), "Deciding how to decide: Risk-opportunity analysis as a generalisation of cost-benefit analysis", https://www.ucl.ac.uk/bartlett/public-purpose/publications/2021/jan/deciding-how-decide-risk-opportunity-analysis-generalisation-cost-benefit.

Another way to appraise and evaluate dynamic efficiencies, and hence missions, is the application of public value. Building on the market-failure concept, Bozeman (2002[37]) developed the idea of public value mapping, focusing on public value failures that occur "when core public values are not reflected in social relations, either in the market or public policy". Bozeman provides specific criteria that lead to public value failure: "(1) mechanisms for values articulation and aggregation have broken down; (2) 'imperfect monopolies' occur; (3) benefit hoarding occurs; (4) there is a scarcity of providers of public value; (5) a short time horizon threatens public value; (6) a focus on substitutability of assets threatens conservation of public resources; and (7) market transactions threaten fundamental human subsistence." (Ibid.) While these are essentially negative criteria of assessment, public value mapping can 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[101]). Mazzucato et al. (2020[101]) show how the public value mapping and market shaping perspectives can be brought together in a way that also links BBC's capabilities with its impact (Figure 7.5).

Figure 7.5. A prototype framework for assessing value creation



Source: Mazzucato, M. et al. (2020[101]), *Creating and Measuring Dynamic Public Value at the BBC*, https://www.ucl.ac.uk/bartlett/public-purpose/publications/2020/dec/creating-and-measuring-dynamic-public-value-bbc.

As Conway and Mazzucato (2021[102]) explain:

> *We found value for individuals was in their experiences as consumers (for example in the COVID crisis, providing three hours of educational content every day on mainstream channels via BBC Bitesize); value for society could be found in supporting a more inclusive and diverse culture (for example championing female sports presenters, placing women's football in the primetime schedule, and boosting disability representation on and off screen); and value in industry was shown by the BBC taking the kinds of risks necessary for new markets to emerge (for example, supporting R&D for new digital audio and video standards which ensures markets adopt new technologies around the world).*

Skills and capabilities

Mission-oriented innovation requires increased public sector capacity to support implementation – that is a new set of skills, capabilities and resources to perform policy functions from the provision of public services to policy design and implementation (Wu, Howlett and Ramesh, 2018[103]). Mission-oriented innovation requires, both, long-term capacities to keep sight of big, future-oriented and complex goals, and dynamic capacities to support immediate, collaborative and flexible solutions towards a mission. The COVID-19 response demonstrated the distinction between long-term capacities and dynamic or agile capabilities in the public sector. It also showed that implementation issues are as important as policy framings; the crisis-handling focused attention on public sector capacities and capabilities, and how these do not always correlate with the level of development. The new generation of 'post-growth' or 'normative' STI policies and broader applications of mission-oriented innovation must rely on a deeper and more nuanced understanding of public sector capacities and capabilities.

Long-term capacities are vital for strong responses to crises and include the capacity to set a direction for development, the capacity to govern and direct resilient production systems, and the capacity to build public service infrastructure. On the other hand, dynamic capabilities – such as the capability to anticipate, adapt and learn, the capability to harness citizen initiatives and innovation, and the capability to govern data and digital platforms – play an equally important role in crisis mitigation (Mazzucato et al., 2021[12]). The creative combining of long-term capacities, in the form of investments and institutional structures, and of dynamic capabilities are key for mission-oriented innovation too (Kattel and Mazzucato, 2018[30]).

The following five long-term capacities and dynamic capabilities are relevant in the context of mission-oriented policies (Fisher et al., 2018[8]; Kattel and Mazzucato, 2018[30]; Kattel et al., 2020[71]):

- **Institutional entrepreneurship –** Missions require political and managerial leadership to galvanise support and ensure implementation of complex policy processes. Accordingly, institutional capacities of leadership (e.g., political contestation practices open to new political leaders or means to purposefully create new public organisations to break institutional inertia or bring new skills into the public sector) play an important role in creation and implementation of missions.
- **Investment –** Mission-oriented innovation relies on long-term financial planning and investment. Capabilities around devising portfolios of investments and other financial instruments (e.g., financial regulations, grants) to fund public, private and third-sector actors are key for successful mission-oriented innovation. Such capabilities are relevant for public financial institutions, and research and innovation funding agencies. Typically, these agencies are at arm's length to the central government and succeed under conditions of operational autonomy.
- **Market-shaping –** These capabilities around policy structures and tools focus on (re-)shaping markets, such as through regulation, procurement, labour rules, etc. The capabilities are relevant for central government ministries and local government departments directly engaged in creating and implementing market rules and legislation.
- **Coordination, engagement and experimentation –** These are capabilities around new ways, such as innovation labs, to design policies and engage with stakeholders and citizens. The capabilities are typical for new types of public organisations, such as digital agencies, but also apply in welfare services and across the public sector.
- **Evaluation and continuous learning –** These capabilities use market-failure-based approaches (e.g. cost–benefit analysis) and integrate user research, social experiments and system-level reflection (e.g. dynamic efficiencies), and help govern portfolio approaches to investment and coordination and engagement. There is increasing focus on the changing role of the state in socio-economic transitions (Borrás and Edler, 2020[4]) and the idea of "reflexive governance" (Rip, 2006[43]) is increasingly important in the context of missions. As summarised by Fisher et al.

(2018[8]): "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. Evaluation and monitoring require criteria adapted to the mission, objectives and problems that they target".

Box 7.14. Mission-driven innovation management support in Sweden

Vinnova is the Swedish government's innovation agency. Driven by the European Union's Horizon Europe mandate for mission-oriented innovation, and numerous national and regional policies for sustainable transformation, Vinnova designs and tests new methods to stimulate innovation and apply the missions framework in Sweden and the Nordic and European context. Vinnova developed a design-led approach to mission-oriented innovation. Using top-down and bottom-up methods of co-creation, the innovation agency works with stakeholders across public, private and third sectors, and directly with citizens, to drive new forms of sustainable mobility.

While traditional sector-based approaches ensure efficiency in the subdivision and management of a problem, they emphasise downstream operational management over the ability to address upstream causes. Mission orientation engages with complexity in a coordinated, holistic and integrated way. Vinnova used a participatory approach to mission implementation.

With the help of front-line actors from across the public and private sectors, Vinnova identified four intervention points in the mobility system and framed concrete missions around these. Vinnova believes complex challenges like sustainable mobility require a portfolio of missions and activities. The co-design process of a mission is both informed by actors in the systems and serves to build a network for delivery, crowding-in expertise and capability around a place-based mission.

Source: UCL (2021[104]), "Vinnova Case study: A design-led missions approach", https://www.ucl.ac.uk/bartlett/public-purpose/case-studies/2021/jul/vinnova-case-study-design-led-missions-approach.

Policy and public service challenges

While the discussion above confirms the turn in the STI and wider policy landscapes towards an increasingly green focus, one conclusion is that there is no dominant mission logic (Fisher et al., 2018[8]; Larrue, 2021[9]). Rather, missions are conceptualised on top of wide-ranging policy discussions for more effective ways to tackle grand challenges. Thus, in narrower application – the realm of STI policies – missions can be an incremental rather than a radical step (Larrue, 2021[9]). Jannsen et al. (2021[2]) summarise mission-oriented innovation as inclusive governance, progressive politics, generative environment and systemic impact. These reflect the policy and public sector challenges related to mission design and implementation. A priority is creating and maintaining inclusive governance structures vital for the discussion, engagement and eventual legitimacy of missions.

Missions are political by nature; they reflect wider societal and political debates about the nature and direction of economic growth, innovation and public services. However, most STI or public service design and implementation processes are not open to such wide-ranging debates as they rely either on existing political, mostly top-down practices or on industry-led incremental development. Missions can act as a tool for wider coordination across multiple sectors and policy arenas. This, however, requires conscious attention in the form of institution and capability building. Finally, missions require a new market-shaping approach (and related capabilities) to investment, policy appraisal and evaluation.

Open questions

Research questions

Jannsen and colleagues summarise the research questions to advance understanding of mission-oriented innovation (Table 7.2).

Table 7.2. Premises and questions for empirical research on mission-oriented innovation

Topic	Premise	Questions for empirical research
Inclusive mission governance	Inclusion is necessary for legitimising missions vis-à-vis other stakeholders and essential for addressing the underlying challenge and harnessing capacity and resources from various groups.	How can governance arrangements create opportunities for participation and representation of diverse affected parties? To what effect do missions mobilise and coordinate these actors to address specific challenges? Which governance structures are successful in supporting transdisciplinary arrangements, solution development and adoption?
Progressive mission politics	Missions are inherently political and need to be treated as such. Attempts to frame missions as technocratic exercises are likely to spur controversies and resistance that undermine their aims.	Which forms of leadership contribute to more progressive mission politics (i.e., politics responsive to new insights), and which undermine them? How to balance different interests without becoming paralysed by continuous negotiations or entrenched controversies? In which political circumstances (e.g., amidst a controversy) are missions an (in)appropriate means for problem prioritisation and solution direction?
Generative mission environment	Mission-oriented Innovation Policy (MIP) does not operate in isolation, and depend on interacting with and mobilising a wider environment. Addressing the mission but neglecting the environment is insufficient to spur change and will likely lead to failures.	How can MIP effectively enact and reconfigure existing innovation system structures to generate mission-relevant innovation outputs? How do the formulation and the legitimacy of a mission statement influence the commitment of stakeholders? How to balance between opening new pathways (exploration) and advancing in specific directions (exploitation) when pursuing a mission?
Systemic mission impacts	MIP effectiveness depends on engendering new dynamics in socio-economic and innovation systems.	In what ways do missions impact socio-economic and innovation systems? Under which circumstances are missions (in)effective? What assessment tools and approaches are best for observing the dynamics activated and catalysed by missions? How to clarify MIP's often implicit theories of change, and how to trace the connections between higher order objectives (meeting ambition levels) and intermediary mission outcomes?

Source: Jannsen, M. et al. (2021[2]), "Promises and premises of mission-oriented innovation policy - A reflection and ways forward", https://academic.oup.com/spp/article/48/3/438/6298315.

A key research question emerging in this context is how policymakers can engage incumbents (industry, universities) in mission-oriented policy discussions where these incumbents, in particular in the private sector, lead R&D investments, such as in Germany (Kattel et al., 2020[71]). It is also important to understand how can countries without such strong incumbents engage in mission-oriented policy practices. Further research is needed to understand mission-oriented innovation in the context of varieties of capitalism, levels of development and economic specialisation.

Policy questions

Short-term, single-stakeholder approaches are insufficient in the context of wicked challenges such as climate change, cancer or clean oceans. Mission-oriented innovation can produce more effective ways to tackle the grand challenges facing governments today. This approach shifts missions away from a narrow focus on specific sectoral (e.g., STI) policies and places systemic change at the centre.

The premises of mission-oriented innovation addresses policy and wider public sector challenges. They ensure inclusive governance, progressive politics, a generative environment and systemic impact (Jannsen et al., 2021[2]). The creation and maintenance of inclusive governance structures, which form part of mission-oriented innovation, are vital for wider societal discussion and engagement, and legitimise efforts to act on grand societal challenges; for example, when mission-oriented innovation formulates grand challenges, like climate goals, as measurable, ambitious and time-bound targets (e.g. becoming carbon-neutral by 2030).

Missions are political by nature. They reflect wider societal and political debates about the nature and direction of economic growth, innovation and public services. For instance, the STI and wider policy landscape is undergoing a shift towards an increasingly green focus and responsible innovation. Traditionally, most STI or public service design and implementation processes are not open to such wide-ranging debates, as they rely on existing political and mostly top-down practices or industry-led incremental development. Mission-oriented innovation can help in this regard.

Missions can act as a tool for wider co-ordination across multiple sectors and policy arenas. Mission-oriented innovation can help policy makers engage incumbent actors (industry, universities) in mission-oriented policy discussions, especially in contexts where such actors, often in the private sector, lead in R&D investments (e.g. in countries such as Germany). In countries without strong incumbents, mission-oriented innovation can engage emergent actors in collaboration at different levels of development and/or economic specialisation.

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Notes

[1] European Commission's official missions homepage: https://ec.europa.eu/info/research-and-innovation/funding/funding-opportunities/funding-programmes-and-open-calls/horizon-europe/missions-horizon-europe_en.

[2] 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.

[3] The original sectors and processes are briefly described at https://www.topsectoren.nl/innovatie.

[4] Further information is available at https://oecd-opsi.org/projects/mission-oriented-innovation/.

[5] For further details on the ISCGF, see https://www.ukri.org/our-work/our-main-funds/industrial-strategy-challenge-fund/.

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

[7] The quote is from the website of the new public bank, https://www.thebank.scot. See also Mazzucato and Macfarlane (2019[65]).

[8] See, for instance, her speech from January 2021, https://www.ecb.europa.eu/press/key/date/2021/html/ecb.sp210125~f87e826ca5.en.html.

[9] See also the OECD's green procurement best practices: https://www.oecd.org/gov/public-procurement/Going_Green_Best_Practices_for_Sustainable_Procurement.pdf.

8 Anticipatory innovation

This chapter introduces the concept of anticipatory innovation as part of the Public Sector Innovation Facets Model. Anticipatory innovation creates and implements value-shifting changes in environments of deep uncertainty, particularly for the purposes of exploration and to shape future priorities. Governments opt for anticipatory innovation when trends might evolve with a high degree of uncertainty. The emerging field of anticipatory innovation expands the frontier of less action-oriented disciplines such as futures thinking and strategic foresight. It aims to make futures knowledge actionable by implementing innovations based on empirical experimentation.

General description

Anticipatory innovation creates and implements value-shifting changes in environments of deep uncertainty, particularly for the purpose of exploration and shaping future priorities (Tõnurist and Hanson, 2020[1]). Anticipatory innovation involves picking up on signals of change, exploring emergent issues, testing assumptions, and exploring radically different possibilities. It means implementation and learning that respond to the future iteratively as it unfolds.

Anticipation does not mean predicting the future; it is about asking questions about plausible futures, so that we can act in the present to bring about the kinds of futures we want (Guston, 2014[2]). It is a capacity to engage with alternative futures, based on sensitivity to weak signals, and an ability to visualise their consequences in the form of multiple possible outcomes (Miller, 2018[3]). As change agents, governments should recognise their role in introducing new technologies and innovations to grapple with upcoming challenges. The main contribution of anticipation lies in shaping people's perceptions about the future and developing their capacity to make sense of novelty (Miller, 2018[3]).

The challenge

To make policy is to think about the future. Governments require future-oriented innovations to respond in real time to complex challenges, such as climate change, aging societies and digital transformation. Every policy carries implicit or explicit notions of the context in which it will be implemented, the intended consequences and its potential effectiveness. These notions are often based on expectations, forecasts, predictions and assumptions – mental models – about how the world will look and work (Wack, 1985[4]).

Mental models facilitate decision-making, but they can also contain biases and blind spots (Pain et al., 2014[5]). Forecasts and predictions are not suited to situations of volatility, uncertainty, complexity and ambiguity because they project the future in a linear way not reflected in reality (Ramírez and Wilkinson, 2016[6]). It is possible to follow the line of an indicator such as GDP into the future, but that will not necessarily give an appreciation of the factors affecting or affected by it, or what they mean for an organisation.

Policymakers face a challenge maintaining continuity and confidence in the public system while rapidly adapting to quickly and constantly evolving demands, volatility and complex problems. For example, the deployment of new and disruptive technologies and digitalisation transform the production and distribution of goods and services, changing the status quo for economies and societies, and resulting in new inequalities (OECD, 2019[7]). This carries implications for the future of employment, skills, income distribution, trade and well-being (OECD, 2015[8]). Governments need to understand and anticipate the impacts of technology, change and innovation as well as the shifting expectations of citizens, companies and innovators, and their implications for public policy.

The validity of existing regulatory frameworks and the capacity of governments to adapt to change are being questioned. This requires an increasingly agile public sector, able to exploit the opportunities offered by technological change to improve rule-making and adapt to new realities and risks (OECD, 2018[9]). Governments need to guide society through uncertainty and technological change, which requires new forms of innovation governance that allow policy makers to respond to unforeseen events and technological change in real-time (Polchar, 2020[10]; Tõnurist and Hanson, 2020[1]).

The approach

This section of the report highlights the main themes of anticipatory innovation in the public sector: (1) main drivers of anticipatory innovation in the public sector; (2) support structures; (3) tools and methods; (4) skills and capacities needed; (5) policy and public service challenges; and (6) unanswered questions.

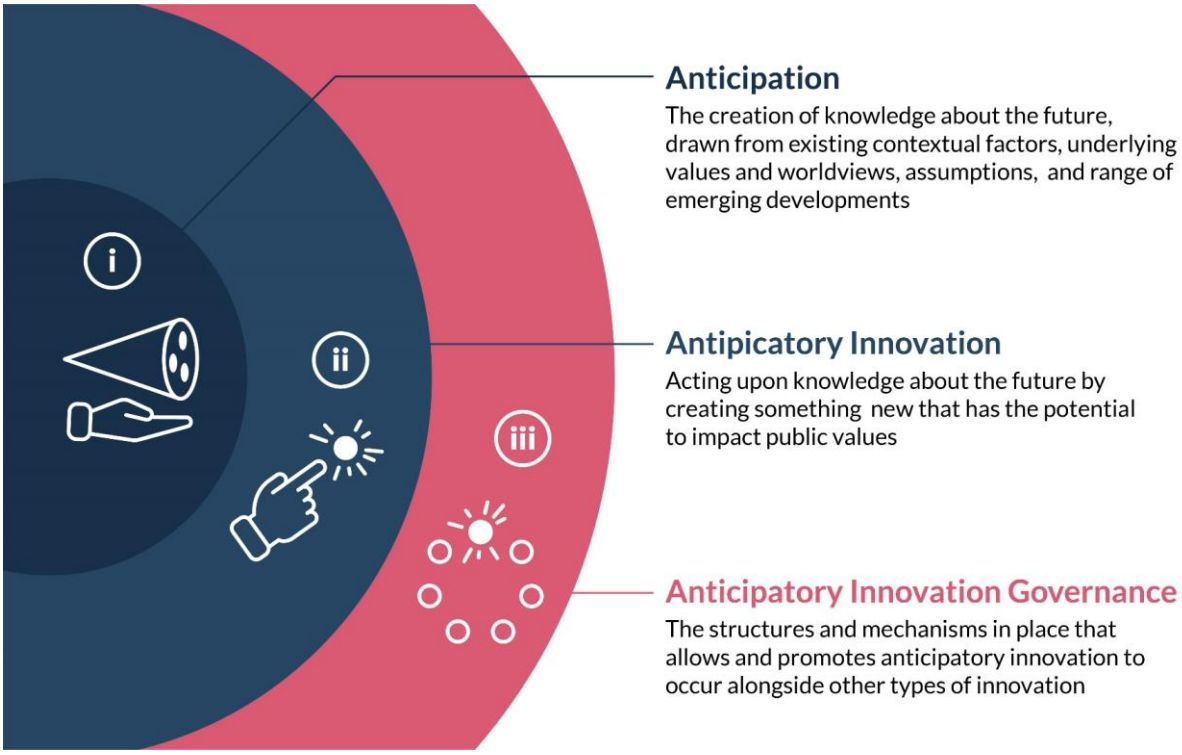
Definitions in the literature

Anticipatory innovation derives from foresight and futures thinking, the increased influence of which underpins a "future-readiness" approach entering policymaking (SOIF, 2021[11]). To reap the benefits, governments must learn to anticipate – to create knowledge about futures ahead – but also to make that knowledge actionable through concrete innovation in practice. To do so, governments need a governance approach to support future-oriented learning based on empirical experimentation.

This chapter analyses anticipatory innovation as a purpose-oriented intervention (it is to a degree normative in nature), whose value can only be realised when built into decision-making processes. Because ideas about the future have no intrinsic value alone, strategic foresight treats the future as a set of ideas to be used for specific purposes by specific organisations in specific contexts (Ramírez and Wilkinson, 2016[6]). In this action-orientation, anticipatory innovation differs from traditional futures approaches. This emphasis on purpose and application requires consideration of how the actors (in this case government) will use the insights generated – especially the decision-making processes that take the future into consideration.

Anticipatory innovation can overlap with adaptation. The distinction is that adaptive resilience or anti-fragility address unexpectedness in the known world, while anticipatory innovation focuses on preparing for and shaping the unexpected world (Nordmann, 2014[12]).

Figure 8.1. Core definitions



Source: OECD based on Tõnurist, P. and A. Hanson (2020[1]), "Anticipatory innovation governance: Shaping the future through proactive policy making", https://doi.org/10.1787/cce14d80-en.

Limitations of forecasting and prediction

> *"It is impossible to forecast the future, and it is foolish to try to do so. Most of the time, forecasts are quite good, and this is what makes forecasts so dangerous. […] The danger of forecasts is that usually they are right.*

> *Forecasts fail you just when you would need them most. Forecasts fail to anticipate major changes and major shifts […]. Shifts that make whole strategies obsolete." (Wack, 1985[4])*

Forecasts allow better understanding and anticipation of trends by analysing the factors underlying them and envisaging trajectories they could follow (Saffo, 2007[13]). However, forecasting has limitations. Some developments simply cannot be forecast because too little is known about the relevant factors. Many problems such as multilateral negotiations or the consequences of a pandemic are "undecidable": their outcomes can never be predicted by an algorithm regardless of the information inputs (Bianchini, 2018[14]). Many high-quality have turn out to contain errors (Pain et al., 2014[5]). Knowledge in a subject area is poorly correlated with the ability to predict the future within that domain, which makes it unwise to base decisions on predictions even by experts (Tetlock and Gardner, 2015[15]).

To address some limitations of the approach, forecasts can use probability or multiple projections to estimate the range of likelihood of an outcome. But this is often misinterpreted, and people can assume the middle of a range of outcomes is the 'real future', or discount improbable outcomes as not worth considering. Forecasts might also limit their scope to very specific events or outcomes in order to assess and learn from their accuracy (Tetlock and Gardner, 2015[15]). For example, a forecast might seek to estimate the probability that a country might experience a violent coup d'état within the next two years. But such specificity also limits how broadly the findings can be generalised for use in policy making; and still does not guarantee future success of the method.

Strategic foresight and the discipline of anticipation

Strategic foresight is the ability of an organisation to constantly perceive, make sense of and act upon ideas about future change emerging in the present (OECD, 2021[16]).

Foresight analysis is not about predicting one future but learning from a range of plausible, possible, and probable futures (Burrows and Gnad, 2018[17]). There are two stances: (1) predictive policy stances aim to project different future alternatives (exploratory foresight), while (2) prescriptive policy stances argue for taking action towards a particular result (normative foresight) (Patton, Sawicki and Clark, 2012[18]).

Strategic foresight involves identifying signals of change, making them instructive and considering the implications. The purpose is to challenge assumptions about the future and provoke reflection on new ways to achieve success.

Foresight abandons the idea that the future is ever fully knowable, and it accepts that there are always multiple versions of the future – some of them assumptions, some of them hopes and fears, some of them projections, and some of them emerging signals of change. All of them are incomplete and still forming in the present. Strategic foresight makes wise decisions possible despite uncertainty by generating and exploring different futures that could arise, and the opportunities and challenges they could entail. Organisations use those ideas to make better decisions and act in the present (Box 8.1).

Box 8.1. Futures scenarios in action in the Netherlands

The Dutch Ministry of Defence has a tradition of foresight activities, including through in-house generation and use for futures studies, and through partnership with external experts such as The Hague Centre for Strategic Studies and the Clingendael Institute. The report "Defensievisie 2035", published in 2020, outlines principles for action to prepare the armed forces for possible futures in which they might have to perform.

Part of the process of developing these principles for action is the creation and use of scenarios. The scenarios were developed with a 2025 time horizon and are intentionally fictional, but with strong plausibility and potential for impact. From these exploratory, contextual scenarios, several potential future situations were derived and analysed for the capacities and preparedness they would demand of the Dutch armed forces. As in all effective foresight processes, the scenarios are less important than the insights derived from them. Some of the needs to which the scenarios contributed insights include:

- Flexible performance: the ability to quickly mobilise, scale and function independently
- Authority through intelligence and information
- Transparency and visibility with a social conscience
- Greater specialisation within EU and NATO partnerships

Source: Based on information shared by the Netherlands Ministry of Defense (2010).

In the anticipatory innovation model, strategic foresight is a driver of insight and knowledge to inform experimentation and innovation, but is not enough on its own. With anticipatory innovation, the emphasis is on acting in the present with a future mindset (Mallard and Lakoff, 2011[19]). The aim is to steer development and technology while analysing and testing the boundaries of ethical, legal and social aspects of change (McGrail, 2012[20]). Anticipatory innovation governance should consider uncertainty (as opposed to risk) over extended timeframes and develop the capacity to mitigate it adaptively by changing actions today.

Strategic foresight is not a method, tool or decision support system. It is distinct from forecasting, risk assessment and strategic planning. Strategic foresight is different from traditional approaches to policy making in several important respects (Box 8.2).

Box 8.2. Principles of strategic foresight

The following points summarise the fundamentals of strategic foresight as a discipline:

- The future is not a fully formed, knowable entity that exists objectively somewhere else (Miller, 2018[3]). It is an emergent, socially constructed entity that exists – partially and subjectively – in the present. There is no absolute future, but there are many relative futures.
- The futures in the present take many forms: predicted, projected, preferred, path-dependent, probable, plausible and possible. Other paradigms of futures thought have also been proposed (Ahvenharju, Minkkinen and Lalot, 2018[21]). These make up the sum of human anticipation (Miller, 2018[3]).
- Anticipation is based on mental models and stories society believes about the future (Flowers, 2003[22]; Wack, 1985[4]). Strategic foresight seeks to challenge and enrich mental models and stories about the future to create knowledge upon which to act in the present.
- Strategic foresight helps to envisage solutions, stress-test plans to make them more robust, develop early-warning systems for threats and opportunities, and share and clarify visions of success (Wilkinson, 2017[23]).
- Strategic foresight is a form of collective intelligence that can only be generated and accessed through dialogue. It is not possible to passively "study the future" and hope to learn anything worthwhile (OECD, 2020[24]).

- Likewise, futures and foresight are always meant for someone (a user or users) and to serve some purpose (a use or uses). Defining users and uses is the foundation of effective foresight practice (Ramírez, Churchhouse and Hoffmann, 2017[25]; Ramírez and Wilkinson, 2016[6]).

Future consciousness (or a prospective attitude) is linked to five dimensions (Ahvenharju, Minkkinen and Lalot, 2018[21]):

1. Time perspective: length of time horizon, time orientation.
2. Agency beliefs: assumptions about being able to influence the future.
3. Openness to alternatives: consideration of various futures, dealing with uncertainty.
4. Systems perception: being aware of interconnectedness.
5. Concern for others: ethical consideration of futures beyond one's own reference group.

Adaptation vs. anticipation

Anticipatory innovation is more prospective and proactive than adaptation; it invites governments to explore and act towards desired futures rather than just adequately predicting or reacting to them. There is a connection between anticipatory innovation governance and adaptive management as there will always be risks that emerge suddenly, requiring government response. While adapting to changes in the current system, anticipatory innovation must explore options that could challenge how current systems function.

Main drivers in the public sector

Organisations often turn to futures studies during crises in the hopes of faring better next time. No discipline can make such a promise, but futures studies were developed to respond to times of turbulence, unpredictability, novelty and ambiguity (Ramírez and Wilkinson, 2016[6]). These themes inspire the sections that follow, as main drivers of anticipatory innovation in the public sector: (1) responding to novel societal and technological developments; (2) decision-making and planning in conditions of unpredictability; (3) making sense of complex policy problems; and (4) the cost of doing nothing in the face of rapid change.

Responding to novel societal and technological developments

The need for anticipatory innovation arises when governments must make decisions in environments where the direction and impact of change are unprecedented and unclear. For example, when commoditisation of GPS and mobile devices created the conditions for peer-to-peer economies and platforms, the impacts on social security, housing markets, tax gaps and fuel emissions took years to be understood. This is especially true for the deployment of new and disruptive technologies – such as the Internet of Things (IoT), gene editing, neuro-technologies, blockchain, platform technologies, advanced robotics and machine-to-machine learning etc. – which transform the production and distribution of goods and services with significant impacts for society and individuals (Love and Stockdale-Otárola, 2017[26]) (OECD, 2020[27]). Furthermore, the operating models digitalisation creates (platforms like Uber, AirBnB, SocietyOne, WeChat) challenge the status quo of both economies and societies. This process is not only characterised by the creation of new services and products, but also by creative destruction (Schumpeter, 1942[28]; 1934[29]). New technologies introduce new inequalities in society (e.g., Bertot, Estevez, and Janowski (2016[30])) which are as complex and uncertain as the underlying technological change. Thus, future employment, skills, income distribution, trade and well-being will look substantially different and are challenges for which governments must prepare.

Technologies themselves do not have a normative stance, but their 'design' limitations can positively or negatively influence individuals and society, and change them in fundamental ways. The potential impact of genetically modified organisms or the effect of nuclear energy on society are two examples. Governments must deal with not only the effects of these, but also unexpected societal reactions and impacts. Here the past might not be a good predictor of the future. Long-standing trends might cease and incremental change could be superseded by non-linear transformations: disruptive technologies, systemic financial failures, natural disasters or pandemics, or abrupt climatic shifts might fundamentally alter a nation's trajectory (Boston et al., 2019[31]). The uncertainty and risks created by rapid (technological) change cannot be directed by the private sector alone. Governments must take an active role in the change process, create partnerships and share risks.1

One important mechanism to enhance anticipatory innovation governance is engaging in societal technology assessment prior to formal regulatory process that raise questions about the potential benefits and costs and their distribution, the consequences for intellectual property, the pathways for greatest social benefit, and the sources of uncertainty in assessing the technology (OECD, 2020[27]).

Decision-making and planning in conditions of unpredictable uncertainty

Governments adopt anticipatory innovation to make decisions and plan under unpredictable conditions. For example, predecessors of some approaches to anticipation and foresight were developed in US strategic defence planning. Defending all US interests simultaneously would be prohibitively expensive, so decisions were needed about potential threats to focus on and prepare for. Administrations "selected" scenarios based on their strategic priorities and perceptions of the global state of affairs (Larson, 2019[32]).

Used in a sustained and systematic manner, scenario planning gave Royal Dutch Shell the ability to prepare for disruptions such as the 1973 energy crisis, the oil price shock of 1979, the collapse of the Soviet Union and the increasing pressure on companies to address environmental and social problems. It is not prescience that made these strategic foresight undertakings valuable, but their ability to challenge and change leaders' mental models before it was too late (Kleiner, 2003[33]; Wack, 1985[4]).

Governments have undertaken efforts since the 1980s to upgrade their institutional anticipatory capacity and proactiveness at several junctures (Fuerth and Faber, 2012[34]). Their interest in strategic foresight appears to grow in the aftermath of disruptions. Several foresight activities came from the 2008 financial crisis. Others emerged from the lessons of the COVID-19 pandemic. At least one consultation of expert opinion considered that "there is a sense of uncertainty and lack of clarity about where the world is going. […] Demand for the capabilities and expertise of foresight units and practitioners is growing" (SOIF, 2021[11]).

Making sense of complex policy problems

Governments increasingly face complex, 'wicked' challenges characterised by diversity, complexity and uncertainty (Camillus, 2008[35]). These features are termed "VUCA" (Stiehm, 2002, p. 6[36]), which refers to a world that is increasingly Volatile, Uncertain, Complex and Ambiguous. Complexity can result from both up- and down-stream challenges: from the global scale in which challenges manifest (e.g., the spread and cascading effects of the COVID-19 crisis) and the localised impacts and contextualised issues of production, jobs and public services. Awareness of these fundamental uncertainties has increased in society, industry and policymaking circles (Kuhlmann, Stegmaier and Konrad, 2019[37]). For example, climate change requires the expertise and coordination of policymakers involved in issues related to agriculture, water, and food security as well as immigration, diplomacy and defence (Kaufman, 2012[38]). Changes in one factor cascade through other systems and create uncertainties around outcomes. Global communications infrastructure and the social media environment that sits on top of it raise issues around traditional utility and telecommunications regulation, and thornier questions of cultural cohesion, individual

rights, national security and information warfare (Ventre, 2016[39]). Questions surrounding the creation, storage and ownership of the massive amounts of data generated through modern business and consumer technology require expertise in commerce and trade as well as in privacy, autonomy, and criminal liability (Braun et al., 2018[40]). Ongoing advances in artificial intelligence and augmented reality systems will have considerable impact on what (and how) public services are delivered while introducing as yet unknown challenges for the public sector (Berryhill et al., 2019[41]).

Governments turn to anticipatory approaches to make sense of intersecting and potentially conflicting challenges. Challenges that cut across multiple subject domains also require multi-faceted but coherent innovation (Box 8.3). One example is the IMAJINE Scenario Sketches developed by the European Commission. These scenarios capture the possible developments and consequences of spatial injustice in Europe, considering factors such as migration, climate change and political unrest. These "rich and useful visions" help regional policymakers develop more multidimensional and systemic solutions to tackle and anticipate geographic disparities.

Box 8.3. 'The Future of Work' in Australia

Launched in 2016, The Future of Work project set out to imagine the evolution of Australian jobs and labour markets to the year 2035. The focus is on digital technology disruption and a variety of drivers, including globalisation, demographic and cultural changes, health, and public well-being. The project resulted in the "Tomorrow's Digitally Enabled Workforce" report, and identified six megatrends and four scenarios that public and private organisations take as a point of reference in planning their future workforce (Hajkowicz et al., 2016[42])

Although the project did not provide specific policy recommendations, ministries integrated the megatrends and the findings of the report into their policymaking processes, with the Australian Government using them as inputs into the International Labour Organisation's Future of Work Centenary Initiative. Furthermore, the study influenced government agencies' narrative about how Australia's labour market would evolve in the upcoming decades. This highlighted the strength and importance of strategic foresight for public policy and led the Australian Government to take actions to increase its capacity in the field.

Source: Hajkowicz, S. et al. (2016[42]), *Tomorrow's Digitally Enabled Workforce: Megatrends and Scenarios for Jobs and Employment in Australia over the Coming Twenty Years*, http://delimiter.com.au/wp-content/uploads/2016/03/16-0026_DATA61_REPORT_TomorrowsDigiallyEnabledWorkforce_WEB_160128.pdf.

The cost of doing nothing in the face of rapid change

Failing to embrace and respond to complexity can come at a high cost for governments. Simplistic answers or quick fixes do not fit with changing reality (Burrows and Gnad, 2018[17]). The more change accelerates, the less certain and more difficult it becomes to forecast, creating a need to understand the consequences and implications of change and feed this back into decision-making (Ramos, 2017[43]). As technology (especially digital technologies) tends to develop faster than policy, structures and operating models can lag the problems they try to address. This calls for anticipatory innovation as an ex ante, real-time and iterative policymaking to influence the design of solutions.

Policymakers' interest in futures thinking and foresight methods intensified over the last decade (Minkkinen, 2019[44]). Futures thinking has been integrated into policy processes through explicit foresight or more implicit anticipation practices. At the same time, there seems to be fatigue and criticism of simple "futures talk" (Nordmann and Schwarz, 2010[45]) and future as an object of technical design (Nordmann,

2010[46]), as well as the aim to "future-proof" in practice. Consequently, consensus is emerging on the need to be more proactive: to improve government's ability to act in the face of change. But what will work in practice remains uncertain. Anticipatory innovation connects futures insights with action.

Enabling factors

Support structures are prerequisite to anticipatory innovation in the public sector. Foresight ecosystems are the broader institutional and social context in which anticipatory innovation is situated. Anticipatory innovation governance is the institutional capacity to support and deploy anticipatory innovation. Working methods are the daily processes that characterise and promote the practice of anticipatory innovation

Foresight ecosystems

Research is emerging around the organisational capacities and broader context of an organisation (ecosystem) that are conducive to foresight and anticipatory innovation (OECD, 2019[47]; SOIF, 2021[11]). Studies identify several characteristics of an ecosystem, and its actors and the roles they play. Common features include:

- **Culture, behaviour and embeddedness –** the mainstreaming of anticipatory innovation into everyday working practices
- **Processes –** the use of purpose-oriented interventions to generate futures knowledge and put it to use in innovation through prototyping and experimentation
- **Structures and institutions –** organisations that favour and reward the practices of anticipatory innovation
- **People, capacity, and skills –** the individual and collective mindset and experience to embrace uncertainty, explore alternatives and put anticipatory innovation into action
- **Leadership and demand –** decision-makers able and willing to engage with the (sometimes discomforting) knowledge and implications of anticipatory innovation

It is also common to see networks of practice in government foresight in ecosystems where anticipation is widely practiced (Box 8.4).

Box 8.4. National and international networks of practice in government foresight

National Foresight Network in Finland

Under the coordination of the Prime Minister's Office and Sitra (the Finnish Innovation Fund), Finland's National Foresight Network acts as a forum for discussion and coordination among the country's strategic foresight players. By bringing together ministries, government agencies, regional councils, private sector actors, academia and NGOs, the Network promotes the use of future perspectives and foresight data in the country's decision-making process at various governance levels. It is an open network holding monthly Foresight Fridays meetings that involve participants in trainings, presentations and networking events.

In the lead-up to parliamentary elections, it produced future scenarios envisioning Finland up to 2025, focusing on digitisation, the needs of an ageing population and the labour market reform. The scenarios were made available online and successfully brought discussions of the future into the electoral debate.

Figure 8.2. Main components and activities in Finland's national foresight system

Foresight networks in the EU

Numerous departments in EU institutions conduct strategic foresight activities, including the Commission, the Parliament and the Joint Research Centre. Vice-President of the European Commission Maroš Šefčovič chairs the Commissioners' Project Group on Better Regulation and Foresight, which provides political guidance to implementation of the strategic foresight mandate. The Secretariat-General and the Joint Research Centre lead implementation of the mandate (the latter drawing on its internal foresight capacities). The Commission's Strategic Foresight Network ensures long-term policy coordination between all Directorates-General. The Commission builds foresight co-operation and alliances with other EU institutions, notably in the context of the European Strategy and Policy Analysis System (ESPAS), reaching out to international partners and launching an EU-wide foresight network to develop partnerships that draw on Member States' public foresight capabilities, think tanks, academia and civil society.

The OECD Government Foresight Community

The OECD Government Foresight Community (GFC) brings together strategic foresight practitioners in the public sector from countries and international organisations. It strengthens foresight capacity by drawing on collective experience and bringing combined future insights to bear on key issues of our times.

The GFC meets at least annually to discuss developments in government foresight, exchange case studies on effective practices and network to identify potential collaborations. The most recent meeting was held in October 2020, in virtual format.

Source: Finland Prime Minister's Office and Sitra; OECD (n.d.[48]), *Our Work*, http://www.oecd.org/strategic-foresight/ourwork/; European Commission (n.d.[49]), *Strategic Foresight*, https://ec.europa.eu/info/strategy/strategic-planning/strategic-foresight_en.

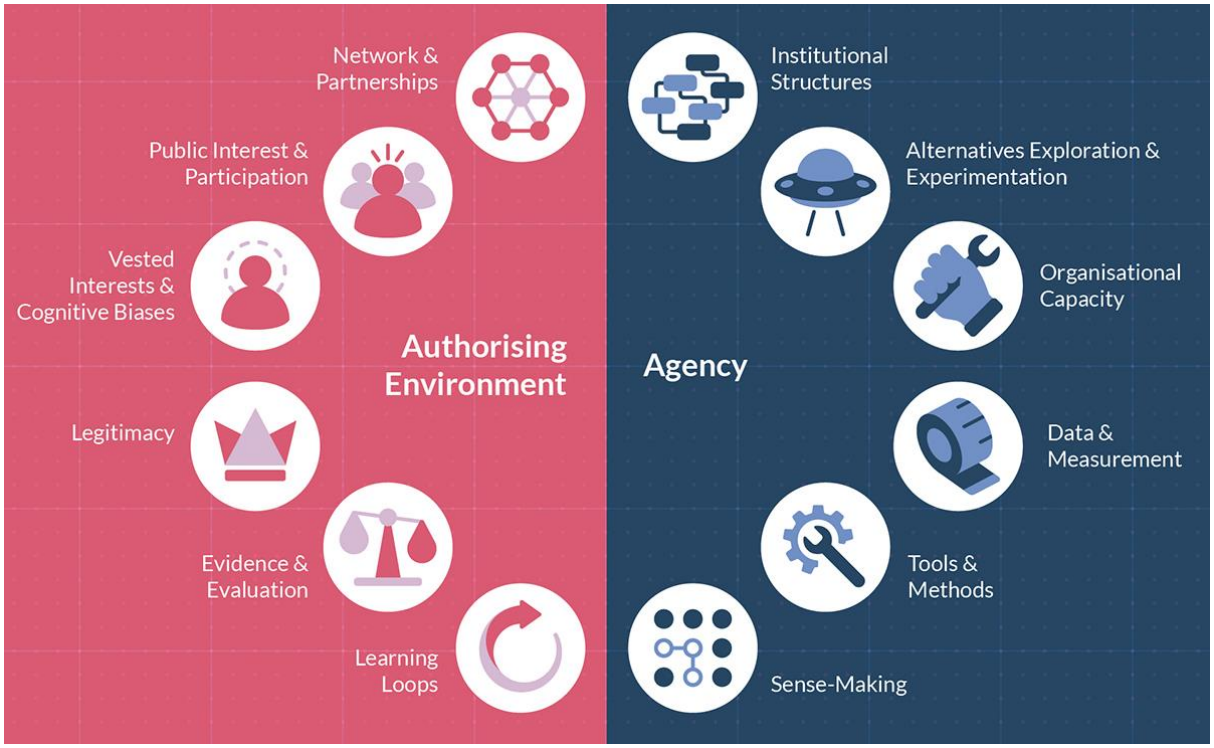
Governance using anticipatory innovation

Anticipatory innovation governance (Tõnurist and Hanson, 2020[1]) is how governments operationalise and use anticipation. It embeds the practice of strategic foresight into their way of working and makes it relevant to initiatives that create change. It is the capacity to explore options and spur novel and value-shifting products, services and processes.

Engaging in anticipatory innovation requires mechanisms inside government's core architecture and public sector innovation portfolios (Biermann et al., 2009, p. 31[50]; Fuerth and Faber, 2012[34]). Anticipatory innovation governance can be a systemic, interlocking web of widely shared principles, institutions and practices that shape decisions at all levels. This system should be able to function over time and adapt to changes.

The effectiveness of policy and policy systems depends on the 'appropriateness' of policymaking, which can be seen along three dimensions: analytical, political and operational (Bali, Capano and Ramesh, 2019[51]). Across these, policymakers need agency: the belief and channels to operationalise their actions (Hitlin, Jr. and G., 2007[52]), and an authorising environment that gives them the legitimacy to undertake anticipatory innovations that challenge established values (Alford, 2008[53]). These make up the general frame for anticipatory innovation governance mechanisms (Figure 8.3, Box 8.5).

Figure 8.3. Dimensions of agency and an authorising environment to ensure effective, sustained strategic foresight through anticipatory innovation governance



Source: Tõnurist, P. and A. Hanson (2020[1]), "Anticipatory innovation governance: Shaping the future through proactive policy making", https://doi.org/10.1787/cce14d80-en.

Box 8.5. Dimensions of anticipatory innovation

Authorising environments for anticipatory innovation

Authorising environments can be either internal to the organisation and informal in nature or formal or external (McLennan et al., 2021[54]). These environments often overlap and interact to produce authority and legitimacy in complex ways. The role and significance of authorising environments is discussed in public value debates (Alford, 2008[53]; Alford and O'Flynn, 2011[55]; Moore, 1995[56]; 2013[57]). It sets the limit of autonomy to shape what is meant by public value, and thus it can constrain what is possible in terms of anticipatory innovation in the public sector. Institutions that make up the authorising environment provide providing meaning and understanding of problems, and offer normative templates to validate specific behaviours and regulate actions by reward or sanction (Choi and Chang, 2009[58]). To be effective, public sector innovation need a powerful authorising environment and an effective framework to operationalise action (Adams and Hess, 2010[59]).

Agency for anticipatory innovation

Agency is the capacity to act and reflect on potential and past actions. It is based on competence (e.g., tools and methods, skills and capabilities) and on the collective belief in their usefulness in specific situations. Thus, agency can be situation-specific: perceptions of efficacy can depend on constraints, resources and opportunities in each setting, which determine managers' belief that they can act. Hence, starting points are: who are the agents within the anticipatory innovation governance system, what roles do they play, and what are their perceptions and attitudes?

People must be aware that they are facing uncertainty to be able to act. This relates to futures literacy (Miller, 2018[3]): being conscious about the future, meaning that policymakers engage with the future in a productive way.

Source: Tõnurist, P. and A. Hanson (2020[1]), "Anticipatory innovation governance: Shaping the future through proactive policy making", https://doi.org/10.1787/cce14d80-en.

Working methods

Governments develop protocols to practice and implement anticipation, foresight and anticipatory innovation. Some of these are broad frameworks guiding the overall process. For example, the Centre for Strategic Futures in Singapore developed a multi-phase process of Scout-Challenge-Grow to help the government go beyond prevailing assumptions, better manage risk and uncertainty, and improve resilience to possible shocks (Kwek and Parkash, 2020[60]):

- **Scout**: it is important that governments detect emerging trends, and define and name them so that everyone understands the trends in the same way and conversations and ideas can happen on that basis. Scouting in Singapore gave rise to thinking about gig-economy concepts before the phenomenon had emerged.
- **Challenge**: governments need the capacity and structures to challenge legacies, which are particularly hard-wired in governments. While it may be possible to point out problems, changing things requires policymakers to immerse themselves in the problem, imagine possible futures and empathise with pain-points to change legacy systems.
- **Grow**: a growth mindset encourages officials to think about how to plan for the far future. Formal training and experiential learning, and a revolving-door policy in the Centre for Strategic Futures

mean that many people across the Singaporean government advocate for this anticipatory approach – including now-senior leaders trained in foresight decades ago.

Other governments produce guidance, and detailed and comprehensive methodologies and standardised approaches to anticipation and strategic foresight. Examples include the Horizons Foresight Method of Policy Horizons Canada (2016[61]) and the Futures Toolkit of the UK Government Office for Science (2017[62]).

Tools and methods

The future can never be empirically studied by any tool and is therefore a socially constructed phenomenon with multiple perspectives and stances. As a result, diverse methodologies exist to capture the ways in which the future can be perceived, analysed, understood and acted upon (Masini and Goux-Baudiment, 2000[63]). These methods can have a passive or active stance on future developments. While some tools take an exploratory and descriptive stance, others incorporate a more prescriptive stance (Kreibich, Oertel and Evers-Wölk, 2011[64]).

There are methods and tools for each part of the process of perceiving, making sense of and acting on emerging futures (Box 8.6). These three parts are not sequential but rather aspects of an iterative process where each informs the others. Literature on tools and methods concerning ideas about plausible futures – particularly as applied to technological speculation (the perceiving and sense-making aspects) – outweighs the literature on tools and methods for converting insight into action (the action aspect).

Box 8.6. The 'Future of the Public Sector' in Slovenia

In collaboration with the Slovenian Ministry of Public Administration, the OECD Observatory of Public Sector Innovation (OPSI) developed scenarios to challenge and reframe assumptions and plans in Slovenia's public-sector human resources, and generate insights for discussion in the context of Slovenia's 2021 Presidency of the Council of the EU.

Figure 8.4. Anticipatory innovation prototyping

Example of public sector talent management

Source: Based on OECD (2021[65]), *Futures of Public Administration: Scenarios for Talent Management in Slovenia*, https://oecd-opsi.org/wp-content/uploads/2021/10/Slovenia_Talent_Management_Scenarios_Final.pdf.

In a first phase, scenarios were developed using a process that channelled expertise from public administrations and talent management in Slovenia, alongside OECD expertise in a range of domains. The scenarios served to spark imagination about the challenges and opportunities to which talent management might have to respond. Participants also expressed aspirational ideas about the kind of public sector they wish to see and the kind of society to which it should contribute.

Implementing the findings of this process involves envisaging and preparing experiments and innovative policy initiatives. This second phase involves prototyping workshops that connect visions of desired future states with alternative contexts presented by the scenarios, followed by responses crafted as actions with respect to strategic levers for the Ministry of Public Administration to alter.

Forecasting and horizon scanning

Anticipatory innovation needs knowledge to underpin potential developments. Indicators can help policymakers track events, spot trends and separate relevant information from noise (Burrows and Gnad, 2018[17]). Usually indicators must be observable, reliable, stable over time, valid and unique to the specific phenomena. Data requirements to track uncertain futures are difficult to define; especially, as one does not know what one should look for. However, information can be obtained, used and codified to support anticipation.

Horizon scanning is the foundation of any anticipatory process. It involves seeking and researching signals of change in the present and their potential impacts. However, horizon scanning alone is never a complete or impactful process; it can only increase awareness. The action-oriented and value-shifting aspects of strategic foresight and anticipatory innovation are carried out in response (Cuhls, 2020[66]).

Signals

Anticipation relies on strategic intelligence, and signal detection and classification (Lesca and Lesca, 2011[67]). Signal detection can involve active and passive scanning for signals – either sending out probes/questions and listening for answers, or periodically observing what is happening in general or what people are talking about – and aims to predict change in order to exploit new opportunities and avoid threats (Rossel, 2009[68]). Signals can be retrieved from experts and futurists, scientists and consultants etc., and increasingly from text-based or online data (e.g., through text mining). In technology, patent data remain the most widely applied sources for signal detection (Kim and Lee, 2017[69]).

It is noteworthy that effective signal detection depends on complexity, sense-making and strategic decision-making, which all effect the types and significance of signals captured. For example, the Cynefin framework (Kurtz and Snowden, 2003[70]) contextualises signals among five domains: (1) reliable causes and effects; (2) knowable causes and effects; (3) unknowable causes and effects (except in hindsight); (4) no cause or effect; and (5) transition (ibid). Interpreting signals in chaotic or complex situations can be improved when causal relationships can be described or determined with expert interpretation.

Weak signals

Weak signals are knowledge of changes that appear unsurprising or insignificant in the present, but could become surprising and significant in the future. Weak signals capture disruptions and developments not yet foreseen in “strong” evidence like trend data or experiments. Weak signals can be events, new technologies or practices pointing towards important discontinuities, warning signs, or new possibilities that can strengthen or wither over time. Examples of weak signals are found in technology developments, societal innovations, conflicts, demographic shifts, new rivals, new regulations, etc. (Kim and Lee, 2017[69]; Saritas and Smith, 2011[71]).

Web content analysis and text mining

The abundance of information available online represents a quantity of futures knowledge beyond any one person's or team's ability to search and curate. Increasingly sophisticated tools such as AI-driven horizon scanning and topic analysis work by gathering large amounts of text-based data from areas of the internet such as social media, blogs, news channels or government websites (Antons et al., 2020[72]; Lewis, 2020[73]). Such methods allow a broader search for knowledge than manual searching (Kayser and Blind, 2016[74]), while potentially avoiding cognitive biases that a human searching for information might experience, such as confirmation or availability bias.

Nevertheless, such methods bring challenges, including the signal-to-noise dilemma whereby a computer is not necessarily able to identify what a decision-maker might consider useful or irrelevant (Krigsholm and Riekkinen, 2019[75]). Improvements to the technology and its deployment seek to address these challenges (Jiang et al., 2016[76]).

Delphi

The RAND Corporation developed the Delphi method in the 1950s to forecast the impact of technology on warfare. The method entails experts anonymously replying to questionnaires and receiving feedback in the form of a statistical representation of the group response, after which the process repeats itself (Gordon, 1994[77]; Linstone, 1985[78]). The goal is to reduce the range of responses and arrive at something closer to consensus. The Delphi Method was widely adopted and is still in use (Helmer-Hirschberg, 1967[79]).

Real-time data monitoring and predictive analytics

Signal detection in anticipatory innovation governance requires real-time monitoring so governments can act and innovate quickly based on received signals. The concept of real-time monitoring systems is known in the field of disease outbreaks (Ramalingam, 2016[80]) and bolstered by the COVID-19 pandemic and associated track-and-trace technologies.

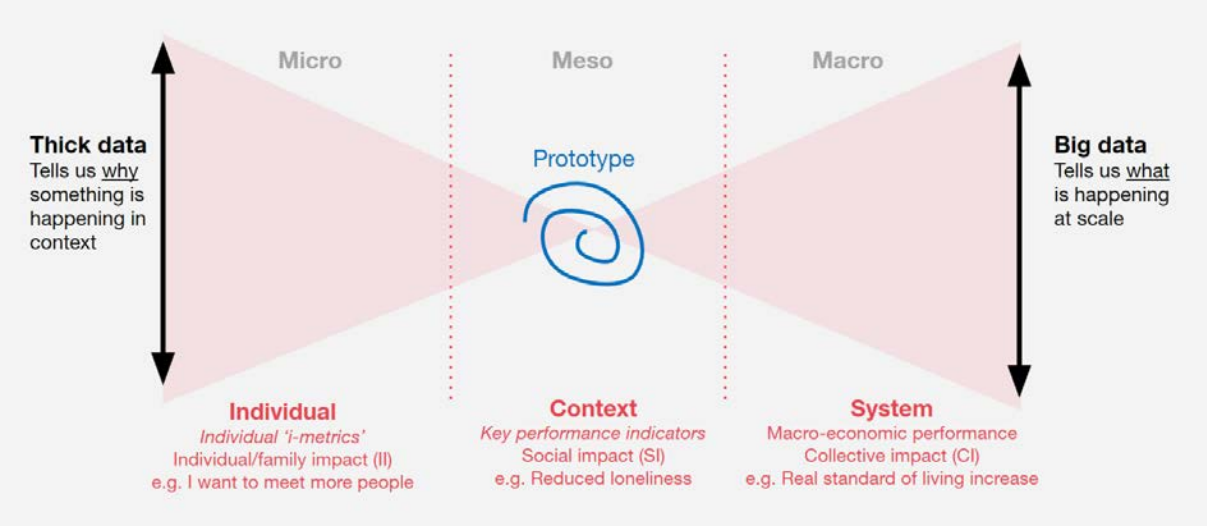
The recent push for data-based anticipation through predictive analytics and machine learning that utilise big data is unprecedented. It can provide new insight into the events, life experiences and trends in society as digital signals (Kowalkiewicz, Safrudin and Schulze, 2017[81]). Predictive analytics forecast what might happen in the future with an acceptable level of reliability and include what-if scenarios and risk assessment (Tate et al., 2018[82]). Examples include crowdsourcing maps for natural disasters, forecasting battlefield casualties, anticipating terrorism, predicting gang-related crimes or 'predictive policing' (Webb, Sellar and Gulson, 2019[83]). In education, learning-analytics platforms capture data from children's educational activities to track and algorithmically optimise their experience, predicting the future performance of the system and the student (Williamson, 2016[84]). In the Netherlands, predictive data dashboards make crime patterns visible. In this project, data supports a preventative approach to so-called systemically 'subversive crime' (*ondermijning*) by gaining insights into local and regional patterns within organised subversive crime, recognising possibilities and vulnerable sectors and areas, and recognising the lack of social resilience.

Thick data

'Thick data' allows researchers and policymakers to reflect on contextual complexity: why people do what they do or why certain things happen in certain contexts. Thick data is typically qualitative data that is ethnographically collected or analysed observational data. The UK policy lab is an example of the use of both 'big data' and thick data.

Thick data and other interpretations can be collected in many way, including crowdsourcing and user-generated data. Some examples of crowdsourcing projects include Magic Box, Futurescaper, HunchWorks and Futurium.

Figure 8.5. 'Big data' meets 'thick data'



Source: Siodmok, A. (2020[85]), "Lab Long Read: Human-centred policy? Blending 'big data' and 'thick data' in national policy - Policy Lab", https://openpolicy.blog.gov.uk/2020/01/17/lab-long-read-human-centred-policy-blending-big-data-and-thick-data-in-national-policy/.

MCDA

Though in name a set of methods around deciding and acting based on known inputs, principles of multiple-criteria decision analysis can be used for selecting and weighting factors and issues of relevance in anticipatory exercises such as scenario-building (Montibeller, Gummer and Tumidei, 2006[86]).

Visioning

Futures work must help understand and create the future. This requires techniques to understand change in the macro-environment, the operating environment and the organisation or community at hand. It also requires a shared vision for the organisation or community. The Institute for Alternative Futures evolved "aspirational futures" as techniques to enable this. While it shares similarities with other approaches, it emphasizes development of 'likely', 'challenging' and 'visionary' scenarios (Bezold, 2009[87]).

An important question for policymakers beyond what futures are plausible is which of them are acceptable to citizens: Which options should be explored? Anticipatory tools encourage people to ask whether and how innovations and moral principles interact and shape one another over time (Stahl and Coeckelbergh, 2016[88]). However, it is difficult to get people to envision morally challenging situations in the future (Lehoux, Miller and Williams-Jones, 2020[89]). Existing moral values influence which innovations are more likely to become embedded in society, while some innovations may challenge values of the public good or ethical acceptability (Boenink, Lente and Moors, 2016[90]). Morality and ethics can be included in the anticipatory innovation toolbox through ethical impact assessment (e.g., Wright (Wright, 2011[91])), ethical technology assessment (Kiran, Oudshoorn and Verbeek, 2015[92]), anticipatory technology ethics (Brey, 2012[93]), techno-ethical scenarios approaches (Swierstra, Stemerding and Boenink, 2009[94]) and moral plausibility frameworks (Lucivero, 2016[95]). In this way, emphasis on public engagement and process inclusivity can align science and technology with societal goals and needs (OECD, 2020[27]).

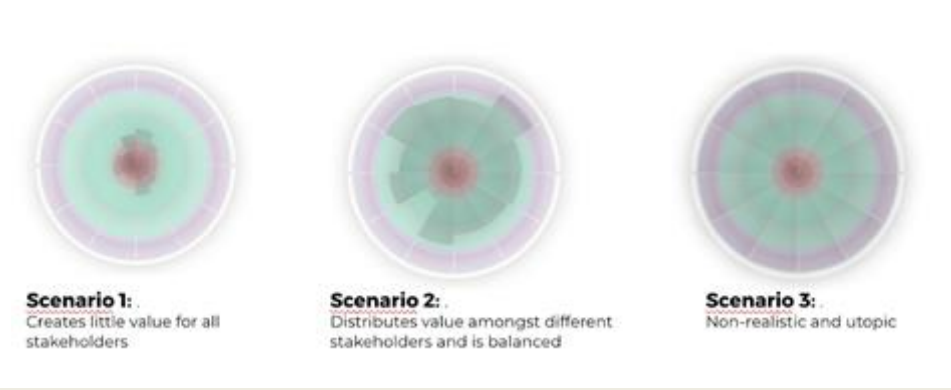
Box 8.7. The Value Wheel: A tool to innovate with a value-distribution approach

The *Value Wheel* (Del Prado, 2021[96]) is a tool for organisations to innovate while distributing the value they create among stakeholders. This framework challenges the traditional concept of value, which can no longer be considered exclusively economic, and thus maximising value no longer limited to maximising profits. The value created addresses different stakeholders (the planet, society, workers) and takes different forms, becoming subjective and systemic. Systemic value creation is subject to restrictions and constant tensions.

Once the value wheel is defined, proposed programmes and services can be evaluated. The notion of limited value creation is important because the projection exercise will need to consider that value must be distributed to all stakeholders and cannot be maximal for one.

Since its creation, the tool was used by at least ten multinational organisations in the mobility, health, international commerce and sectors.

Figure 8.6. The Value Wheel



Source: Fabernovel (2021[97]), "La Value Wheel, ou pourquoi la création de valeur est indissociable du partage de celle-ci avec l'ensemble de ses parties prenantes", https://www.fabernovel.com/contenu/la-value-wheel-ou-pourquoi-la-creation-de-valeur-est-indissociable-du-partage-de-celle-ci-avec-lensemble-de-ses-parties-prenantes.

There are more formative frameworks that set boundaries for future paths, such as the 'responsible research and innovation' (RRI) framework (Box 8.8). While it may seem obvious that innovation processes should respond to fundamental values in society, the implementation of ICT technologies demonstrates multiple cases of negligence in the right to privacy and data protection (von Schomberg, 2013[98]). Responsible anticipatory innovation would understand the dynamics influencing developments and avoid harmful consequences (Stilgoe, Owen and Macnaghten, 2013[99]).

Box 8.8. Responsible research and innovation framework

Responsible research and innovation (RRI) aims to be a transparent, interactive process that prompts dialogue between societal actors and innovators about the ethical acceptability, sustainability and societal desirability of innovation and its products. Unlike the wait-and-see approach of public policy, RRI expects positive impacts from technology and seeks what can be done to assure these. The

concept is grounded in (Burget, Bardone and Pedaste, 2017[100]; Stilgoe, Owen and Macnaghten, 2013[99]):

- **Ethical acceptability –** compliance with fundamental values and the safety of products in terms of acceptable risks.
- **Sustainability –** meeting the needs of the present without compromising the ability of future generations to meet their own needs.
- **Anticipation –** the ability to envision the future of research and innovation, and understand how current dynamics help design the future.
- **Inclusion –** engaging different stakeholders in the early stages of research and innovation.
- **Reflexivity –** reflecting on values and beliefs during research and development.
- **Responsiveness –** action in line with ethics, risks, transparency and accessibility.

RRI expects governments to:

- Deliberately focus research and innovation on achieving a social or environmental benefit.
- Ensure consistent, ongoing involvement of society throughout the innovation process.
- Assess and prioritise social, ethical and environmental impacts, risks and opportunities alongside technical and commercial considerations, now and in the future.
- Create oversight mechanisms to anticipate, manage and adapt to quickly changing problems, opportunities and circumstances.
- Value openness and transparency as integral to the research and innovation process.

Source: European Union (n.d.[101]), "Principles for responsible innovation", https://ec.europa.eu/information_society/newsroom/image/document/2016-4/sixth_cop_plenary_meeting_-_presentation_hilary_sutcliffe_matter_13334.pdf.

Running anticipatory innovation

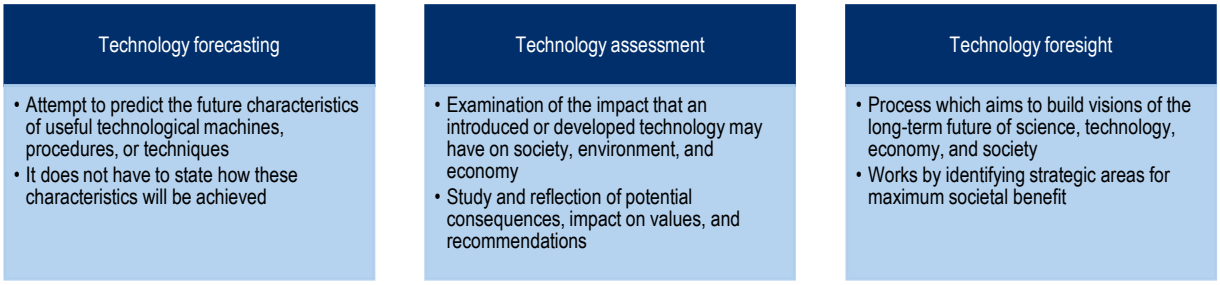
Many of the tools connected to creativity and imagination encourage speculation. They usually blend approaches between design, fiction and social dreaming (Dunne and Raby, 2013[102]) to bring forth a new 'discursive space'. These derive from a new generation of design thinking that is trans-disciplinary, commons-oriented, collaborative and participatory in nature (Ramos, 2017[43]). Some of these approaches present practitioners with living narrative context (stage craft, actors and scripts) that provoke people to question different types of futures (Ramos, 2017[43]).

There are many ways in which signals of emerging change can be developed through exploration and speculation. Examples include:

- **Futures wheels –** the futures wheel is a method of structured speculation about potential future developments and their consequences. It involves thinking of a small number of consequences for a given signal of change, then second-order consequences (the consequences of the consequences), third-order consequences, and so on. The consequences are discussed sequentially in cascade fashion, hence the term "cascade diagram" for a largely identical method (Policy Horizons Canada, 2016[61]).
- **Cross-impacting –** cross-impacting involves considering what might be the combined effect of two signals co-occurring, recognizing the complexity that makes future developments difficult to analyse and predict in isolation (Fuerth and Faber, 2012[34]).
- **Road-mapping and technology assessment –** predicting the path of new technologies is notoriously difficult, whether the context is government regulation, venture capital or academic

research. Various approaches to technology forecasting, assessment and foresight exist to this end (Figure 8.7).

Figure 8.7. Technology assessment in comparison to forecasting and foresight



Source: Nazarko, Ł. (2017[103]), "Future-oriented technology assessment", *Procedia Engineering*, Vol. 182, pp. 504-509.

Technology assessment takes a stance on normative matters such as democracy (Grunwald, 2019[104]). Though the discipline has existed for decades, a range of new anticipatory and upstream governance approaches have emerged. These can help explore, deliberate and steer the consequences of innovation at an early stage (OECD, 2020[27]). They allow responses to public concerns or changing circumstances along the development trajectory. From an industry perspective, upstream approaches can incorporate public values and concerns, potentially mitigating public backlash against technology (OECD, 2020[27]). In OECD countries, frameworks for upstream governance have entered policy debates, e.g. in the context of the Anticipatory Governance pillar within the U.S. Nanotechnology Initiative (OECD, 2012[105]).

Future-oriented technology assessment is a particular form, focused less on risk assessment and more on innovation governance with regard to emerging technologies (Nazarko, 2017[103]). Use of various forms of futures thinking, such as scenarios, visions, and alternative perspectives is becoming common in technology assessment (Lösch et al., 2019[106]).

Framing

The future is so full of possibilities that it is impossible for individuals or teams to make sense of even a small proportion of them adequately and determine which actions to take. Framing narrows the possibilities to focus on the most significant potential developments (Mukherjee, Ramirez and Cuthbertson, 2020[107]). Framing is often done unconsciously in the form of stories or 'mental models' (Wack, 1985[4]). However when unquestioned and untested, mental models of the future can make omissions and distortions that can be remedied in the present by 'reframing' (Ramírez and Wilkinson, 2016[6]). Several methods exist to challenge and reshape mental models of the future; the best-known of these is scenario planning.

Scenarios

Scenarios are alternative futures (usually in sets of three or four for comparison) in the form of snapshots or stories giving an image of a future context. They are deliberately fictional and should not be interpreted as predictions or recommendations (OECD, 2020[24]). Therefore, scenarios themselves have no intrinsic value; it is the process of creating and using them in the context of strategic dialogue that makes them worthwhile (Gordon and Glenn, 2018[108]). They are constructed for learning and taking action in the present (Ramírez and Wilkinson, 2016[6]). This is achieved by generating, testing and reframing ideas about how the future might be. Scenarios are more than just an extrapolation of a given trend, though they take trends into account by describing how the future might look if one or more trends were to continue (or change).

Scenarios are particularly widespread in the practice of strategic foresight, and multiple schools of thought exist on how they should be developed and used. Scenarios used at the OECD have three characteristics (Polchar, 2021[109]):

- **Exploration –** scenarios offer a safe space for experts to disagree and challenge each other's assumptions. Knowing that a scenario is not a future expected to occur frees discussion. Scenario dialogue discourages trying to be 'right' about what will happen. This is partly why scenarios come in sets. Exploring the future allows letting go of deeply held assumptions that can be unfounded and harmful if left unchallenged.
- **Context –** scenarios encourage consideration of how the future will feel; how it would be if the paradigms that govern thinking change. Whereas forecasting and predictions focus on individual metrics or events, scenarios allow consider the future as a whole, "the big picture".
- **Narrative –** scenarios can become powerful tools for creation and shared understanding about how to act within an organisation. By creating a set of experiences about the future with their own characters, events and logic, good scenario narratives are memorable enough to become part of an organisation's way of thinking.

Practitioners disagree on how actionable scenario analysis should be for policy guidance. For some, community learning is more important in framing assumptions and creating expectations of future action (Talberg et al., 2018[110]).

Box 8.9. Megatrends at the OECD

The OECD employs a megatrends framework with five categories, developed, adapted and used in strategic foresight engagements, for example to test the robustness of new national visions or discuss the outlook for the multilateral system. Structured strategic conversation is enabled using videos and cards. Below are examples of the cards used at the Global Strategy Group's December 2015 meeting, featuring an adapted version of the OECD megatrends framework.

Figure 8.8. Sample megatrends cards used at the OECD

Source: OECD (2016[111]), "Megatrends affecting science, technology and innovation", https://doi.org/10.1787/sti_in_outlook-2016-4-en.

Megatrends

The concept of megatrends can be traced back to Naisbitt (1984[112]), since when a plethora of organisations and publications adopted the term and variants of the associated analysis. Megatrends are broad, gradual shifts in multiple domains such as politics, economics, society, technology and the environment. They reflect more than one trend and are deeply rooted, representing a trajectory from the past into the future. Megatrends include climate change, rising inequalities, digitalisation and shifting geopolitical power.

Megatrends are not the only way to think about the future and cannot capture all relevant information or developments to make decisions. Disruptions and short-term shifts are important too. Megatrends also do not consider how shifting values could change the level of importance of given issues.

Causal layered analysis

A means of contextualising futures knowledge and framing it in terms of desired changes, Causal Layered Analysis examines the complex relationships between litany, causes, structure, discourse, metaphor, and myth (Inayatullah, 2004[113]).

Acting

Anticipatory innovation only makes sense if it leads to action: tools are needed to operationalise the futures that are explored. Moving beyond simple experimentation and innovation methodologies requires approaches such as the Anticipatory Action Learning, which merges participatory approaches and futures studies and opens "a transformational space of inquiry, the long-term and planetary future, with the everyday and embodied world of relating and acting" (Ramos, 2017, p. 830[43]). This includes anticipatory action learning (Inayatullah, 2006[114]), Inayatullah's (2008[115]) Six Pillars approach, and José Ramos' (2017[43]) Futures Action Model.

In the context of anticipatory innovation governance, futures tools must work in combination with innovation tools and methods so that different possibilities can be worked on in practice. Futures toolkits have existed in the private sector for some time (see e.g., Nodklapp's Actionable Futures Toolkit), and started to enter the public sector. An example is the Policy Horizons Canada method (Policy Horizons Canada, 2016[61]) or the Futures Toolkit launched by the UK's Government Office for Science in 2017.

However, anticipatory innovation needs a stronger linkage than some of these tools describe, with more direct routes from anticipation to experimentation and innovation. Anticipatory innovation needs different types of tools: ones that enhance creativity and imagination (e.g., visioning, historical analogy, gaming); promissory tools and methods giving licence to explore options (scenarios, course of action analysis); operational tools that allow testing in practice (e.g., adaption pathways); and epistemic tools that generalise and validate knowledge (e.g., developmental evaluation).

Stress-testing and wind-tunnelling

One mechanism through which anticipation delivers value is the possibility to rehearse future situations that have not materialised (Bason, 2017[116]; Ramírez and Wilkinson, 2016[6]). Policy stress-testing is used to see how well a set of policies or objectives stand up to a range of conditions. These objectives might already exist – in which case the exercise tests whether they are robust enough to deliver in a range of future market conditions – or stress-testing might be part of developing new objectives (Government Office for Science, 2017[117]).

Prototyping

Emanating from increased interest in design thinking and practice in policy (which lies beyond the scope of the present analysis) is the possibility to link anticipation and innovation through prototyping (Bason, 2016[118]). In the policy domain, a prototype is a small-scale concept of how to advance an objective in a way that can be implemented quickly, tested and learned from. Prototypes enable a policy to be viewed and experienced as material reality (Howard, Senova and Melles, 2015[119]; Ollenburg, 2019[120]). Prototypes have an advantage in anticipatory innovation because they can be implemented in advance of being needed (Buchanan, 2018[121]).

OPSI deploys prototyping in interventions using strategic foresight and anticipatory innovation to spur ideas about what could be possible and desirable to respond to future challenges and opportunities (Box 8.6).

Early-warning systems

How the types of data connected to anticipatory innovation get used influences the outcomes. Organisations must monitor their interaction with their social and ecological context as much as looking at external signals (Pickering, 2018[122]). Furthermore, how signals should be evaluated is not usually clear. Data processing is reflexive when assessment processes involve competing methods and perspectives, dialogue and deliberation (Dryzek and Pickering, 2017[123]).

Organisations use anticipatory processes to implement so-called early-warning systems that incorporate surveillance of emerging disruptions into the day-to-day decision-making of an organisation so that urgency does not displace importance in the prioritisation of issues (van der Steen, Scherpenisse and van Twist, 2018[124]). Such systems require close and ongoing integration, and interface between strategic framing to determine indicators; data gathering and analysis; identification of emerging disruptions; and communication to decision-makers (Schwarz, 2005[125]).

Judging success and failure in anticipatory innovation

The benefits of anticipatory activity are notoriously difficult to evaluate (Grim, 2009[126]). We do not have access to alternate realities in which multiple futures explored and acted upon through foresight can be compared. The benefits of foresight are often indirect, difficult to measure, rarely attributable solely to foresight interventions, and sometimes in the form of an absence of something negative rather than the presence of something positive (OECD, 2021[16]).

In these circumstances, practitioners argue that the clearest observable impacts of strategic foresight are in changes in the mental models of leaders, observable through the reframing of their dialogue (Flowers, 2003[22]; Wack, 1985[4]). Some scholars attempt to operationalise the concept of strategic reframing and measure the extent to which problems have been recast, irrespective of the solutions generated (Mukherjee et al., 2020). Others take the view that outcomes are too difficult to judge in terms of foresight impact, and advocate evaluating processes and structures in terms of a ‘foresight maturity model’ for organisations (Grim, 2009[126]).

Work by OPSI connects strategic foresight to anticipatory innovation through prototyping and innovation. Initiatives derived from such exercises offer the opportunity to test and evaluate effectiveness in terms of predefined objectives, and potentially to select control cases for comparison.

Skills and capacities

Individuals and institutions have an inherent sense of time and future, though it is usually unconscious and unstructured (Zimbardo and Boyd, 2008[127]). Anticipation and foresight are based on skills and capacities to make futures thinking conscious and deliberate (Polchar, 2021[109]). Governments must be able to draw

on the intellectual capacity and skills to implement strategic foresight thinking and apply it to policymaking (OECD, 2019[47]). The needed skills and capacities are subject-matter expertise, imagination, appreciation of emergence and complexity, leadership and implementation, and communication.

Subject-matter expertise

Familiarity with the factors and dynamics of a particular subject are essential as part of horizon scanning and framing of a set of future possibilities. However expertise in a particular subject does not correlate with prescience, and adequate explanations in hindsight are unreliable for prediction (Kahneman, 2011[128]). It is possible to train and improve the ability to forecast, but the skills associated not the same as those needed to develop subject matter expertise (Tetlock and Gardner, 2015[15]). Subject matter expertise must be complemented with anticipatory capacity (Box 8.10).

Box 8.10. Towards a strategic foresight system in Ireland

Building on Our Public Service 2020, the Irish government embarked on OPS2030, a new framework for development and innovation in Ireland's public service. Its goal is to ensure that Ireland's public service is fit-for-purpose to 2030 and beyond. It is critical that the Irish system of governance and public service are equipped and ready to meet challenges, recognise opportunities and work to benefit the social and economic well-being of citizens.

An agreed approach for assessing the steps to take under OPS2030 includes a foresight upgrade. In doing so, OPS2030 reflects on what the world might look like in 2030, the challenges and opportunities Ireland might face, the capabilities needed as a public service to navigate this new world. The government and its institutions wish to better anticipate changes that will emerge, to future-proof policies and embrace innovation as the expectation rather than the exception. As part of this, OPS2030 will develop foresight capacity to complement subject-matter expertise in the civil and public service.

Foresight practices exist in pockets of excellence in the Government of Ireland, with notable historical examples including the Technology Foresight Ireland exercise of the 1990s and the National Economic and Social Council in the 2000s. The coronavirus pandemic was a major factor in highlighting the need for strategic foresight and was for many the first experience with scenario planning. Despite foresight exercises in parts of government, there are few avenues for shared learning.

Officials identified numerous current and planned government strategies that could benefit from the reframing and reshaping that strategic foresight offers. These initiatives include the enterprise transformation strategy, the national research and innovation strategy and the national development plan for infrastructure. Numerous processes and networks, and the OPS2030 process itself, offer fertile ground for effective foresight practice to take root.

Source: OECD (2021[16]), *Towards a Strategic Foresight System in Ireland*, https://oecd-opsi.org/wp-content/uploads/2021/05/Strategic-Foresight-in-Ireland.pdf.

Imagination

There are many approaches to spurring creativity and imagination around which types of futures might be – some more normative and some less. Scenario methods can break through communication barriers between participants. They bring a variety of perspectives and development paths for the future (Gordon and Glenn, 2018[108]; OECD, 2020[24]). However, these methods risk a lack of action-orientation as they

usually have limited capacity to identify practical strategies towards futures. Techniques for anticipatory innovation include De Bono's (1999[129]) Six Thinking Hats Methodology.

Appreciation of emergence and complexity

Futures literacy is the "capacity to explore the potential of the present to give rise to the future" (Miller, 2007[130]). Foresight capacity is about skills, knowledge and tools, and an attitudinal willingness to engage with the abstract nature of the future (OECD, 2019[47]). It requires appreciation that future developments are not always a linear extrapolation of trends and that complex interactions engender deep uncertainty that make decisions irreducibly difficult (Marchau et al., 2019[131]), and that conventional tools and instincts are often inadequate (OECD, 2017[132]).

This requires individuals trained in the theory of multiple futures and their development, and the use of foresight methods such as horizon scanning and scenario planning. Foresight capacity further requires the skills to design and facilitate strategic dialogue with the purpose of using foresight to look ahead, challenge assumptions, and draw out implications for policy and strategy (SOIF, 2021[11]). Examples of specialist or semi-specialist roles might include (OECD, 2019[47]):

- foresight specialists to develop multiple plausible futures
- foresight process specialists to design and facilitate foresight interventions, processes and strategic dialogue
- policy researchers and programme managers to gather signals of change
- policy analysts to design and test policy proposals against multiple futures.

Several strategies are used to build these capacities in government: hiring public servants with expertise in strategic foresight or other fields emphasising systems thinking, complexity and the tools to recognise uncertainty; providing introductory and specialised training courses to public servants; and providing learning-by-doing opportunities for public servants at all levels to engage in foresight processes within and beyond their workplaces. In Singapore, a common practice is to place officials in central foresight institutions to gain experience, then deploy them across government to propagate their expertise. The Centre for Strategic Futures serves a training and consultancy role to support foresight mainstreaming across government (Centre for Strategic Futures, 2021[133]).

Box 8.11. Futures Literacy Labs

As described in *Transforming the Future* (Miller, 2018[3]), Futures Literacy Labs (FLL) are designed so that people make their anticipatory assumptions explicit and thereby reveal not only the determinants of the futures they imagine but also the attributes of the anticipatory systems and knowledge-creation processes they use when thinking about the future. FLL expose why and how people 'use the future'. This emerges from their interactions when participants learn to use the future. The starting point for perceiving and understanding anticipatory assumptions is to interrupt the routine action of using the future, to provoke the sense of a problem when imagining the future. This realisation kicks off the learning cycle that serves as the skeleton for building an FLL (Almirall, Lee and Wareham, 2012[134]).

Through structured learning-by-doing activities, people learn about the origins and power of what they imagine. By delving into topics they care about, from the future of health and well-being to the future of jobs and gender, they undertake learning that enables them to situate their hopes and fears in their history, culture, context and aspirations.

Futures Literacy Labs deploy action-learning and collective intelligence to co-create the meaning of sustainability, peace and inclusion, where people live, work [and play]. When people can decide why and how to use the future, they become able to detect and create the otherwise invisible: innovation and transformation. They become more at ease with novelty and experimentation, less anxious about uncertainty, humbler about controlling the future and more confident about being able to comprehend and appreciate the potential of change.

Source: Miller, R. (2018[3]), *Transforming the Future: Anticipation in the 21st Century*, Routledge; UNESCO (2020[135]), *Futures Literacy*, https://en.unesco.org/futuresliteracy.

Leadership and implementation

Any new approach or organisational change relies on sources of legitimacy and support to initiate action and provide the resources and changes to established practices that sustain the effort (Moore, 1995[56]; Moore and Khagram, 2004[136]). Sustained demand for foresight from senior levels of government and the public service can ensure that institutional changes, resource allocations and practices are put in place to enable the anticipatory innovation required for sound policies. Sustained high-level demand for anticipatory innovation can counterbalance the tendency to limit the work of considering and preparing for the future because of immediate daily pressures or reporting requirements (Fuerth and Faber, 2012[34]).

High-level support can also provide the permission for anticipatory innovation to explore provocative issues that challenge existing assumptions and policies. Adequate demand ensures that foresight is not carried out as an academic exercise, but rather informs the priorities and decision-making processes of government (OECD, 2019[47]).

Sources of high-level demand for strategic foresight in government include legislative commitments, parliamentary oversight, political commitments, championing by senior civil servants, institutionalised demand through committees or other bodies, or a combination of these (OECD, 2019[47]).

Communication

Anticipatory knowledge is inevitably abstract and does not lend itself to actions in the present. It is often a challenge to communicate futures knowledge in a way that balances comprehensiveness and comprehension (Hajkowicz et al., 2018[137]). Indeed, it can be effective to deliberately leave analysis incomplete to leave space for decision-makers to add their own agency and actions to the narrative (Flowers, 2003[22]). This agency and instrumental capacity are key to the empathy and empowerment leaders need so their actions require anticipation and have value (Wilkinson and Flowers, 2018[138]).

Box 8.12. Anticipatory Innovation Starter Kit: Translating and communicating to leadership

LabX's Anticipatory Innovation Starter Kit addresses challenges faced by civil servants and the public sector, such as:

- volatility, uncertainty and perception of urgency resulting from the COVID-19 pandemic
- ad-hoc routines and reactive approaches with 'presentist' options contributing to a feeling of helplessness towards the future, and to limited interest and skills in futures literacy

To address these, the toolkit takes a problem-solving, user-centric approach, which makes it actionable, modular and accessible to all public servants in a range of different fields. The toolkit is based on experimental principles, where co-creation and iterative development processes are key. Its learning-

by-doing nature makes it a starting point to engage users through a continuous self-improvement process. It is structured around four ways of framing/tackling problems: (1) alternative futures; (2) drivers of change; (3) vision; (4) strategy. The toolkit's expected outcomes include shortening the knowledge-action gap (through the Kit's actionable/contextual nature) and acting as a starting point for capacity-building by generating interest and awareness among beginners.

Source: Hanson, A. (2021[139]), "Anticipatory innovation tools and methods: Closing the impact gap", https://oecd-opsi.org/anticipatory-tools-closing-the-impact-gap/; LaBX (2020[140]), "Inovação Antecipatória", https://labx.gov.pt/projetos-posts/inovacao-antecipatoria/.

Policy and implementation challenges

Challenges to implementing anticipatory innovation in policy and public service practice range from translating foresight insights into action (the impact gap) and avoiding issues that are not imminent, to the Collingridge and innovator's dilemmas.

The impact gap

The deployment of an anticipatory system should generate useful and relevant foresight, and implementation based on the findings. But governments face barriers to the development and use of strategic foresight in the context of a culture dominated by forecast-based policy planning. As a result, high-quality policy-driven foresight is underused. There are numerous foresight publications from before 2008 about financial crises (Cooper, 2015[141]), from before 2016 about rising populism (Ministerie van Defensie, 2010[142]) and from before 2019 about pandemics that start in animals and bring the whole world to a standstill (U.S. National Intelligence Council, 2017[143]). Similarly, there are many more foresight works that imagine events that have not come to pass but can be used to help organisations prepare. The issue in all these cases is not a lack of useful foresight but a lack of use of foresight.

This challenge is dubbed the 'impact gap' (Polchar, 2021[109]). Some of the most common barriers to the use of foresight in the public sector include those relating to authorising environments and to individual agency. To overcome these, it is essential to implement strategic foresight in a context of anticipatory innovation that translates foresight and futures insights into action.

When risk-avoidance becomes issue-avoidance

Practitioners of anticipatory innovation note that just as trends, like design thinking, systems approaches, and innovation labs, are valuable, the forces that keep public-sector organisations in check as fundamentally stability-seeking, bureaucratic institutions are strong (Bason, 2016[118]).

Governments are generally known as risk-averse, rules-driven, based on stable structures and predictable decision-making (Brown and Osborne, 2013[144]). This is known as "minimal squawk behaviour" (Leaver, 2009[145]) – avoiding drawing attention to rising issues if there is no immediate pressure to do so. Avoiding risks is often justified for political and reputational reasons. However, it means that governments are not able to act quickly in the face of new challenges or be proactive in the face of new opportunities. Governments' response to transformative change is generally reactive at best. Governments are pushed from the position of 'wait and see' when hazards (moral, ethical or physical) materialise, or they are called upon to resolve issues between industry incumbents and new business models.

To find a different path, practitioners advocate exploring new approaches, organisational arrangements and leadership, and thinking about how to change the way the public sector operates.

The task is to lower barriers that pertain to inadequacies in the anticipatory innovation governance mechanisms explored earlier. These barriers take multiple forms (OECD, 2021[16]):

- **cultural barriers –** unreasonable expectations that experts will "reveal the future"
- **corporate barriers –** official 'zombie' futures that are believed implicitly without justification (Polchar, 2020[10]), insufficient support from leadership, insufficient learning loops
- **communication barriers –** experts of different disciplines lacking common language (Kekkonen, 2015[146])
- **competency barriers –** limited futures literacy
- **cognitive barriers and biases** (Schirrmeister, Göhring and Warnke, 2020[147]) – time silos, difficulty recognising complexity, avoidance of uncertainty, groupthink, recency and availability bias, lack or 'poverty' of imagination about the future (Miller, 2018[3]).

Box 8.13. Overcoming barriers to experimentation and innovation

During an engagement with the OECD Anticipatory Innovation Governance network, Nick Chesterley presented the Government of Canada's push for more experimentation. He distinguished between innovation (doing new things), and experimentation (how one can measure which things work).

Experimentation is needed because it creates evidence. The Canadian government supports experimentation through capacity building: connecting projects that want to experiment with people who know how to do it; support the experimentation community; and introducing incentives for experimentation at a systems level (e.g., through departmental surveys measuring experimentation).

The Canadian experience shows that common barriers to experimentation are:

- **Access to expertise –** gaining access to process and methodology expertise, and to resources and knowing how to navigate the system.
- **Data availability –** knowing what can be measured to validate whether something is working.
- **Openness to failure –** an experiment is most needed when there is a risk of failure, as the status quo is risky and can fail too.
- **Timelines –** it is easier to get things done in 2- to 3-year timelines.

It is difficult to establish examples of success because governments do not often get the chance to build something before it is urgent.

The Collingridge Dilemma

A barrier to adopting anticipatory innovation in governments is the Collingridge Dilemma, a concept described by Professor David Collingridge in 1980. Collingridge posited that there is always a trade-off between understanding the impact a given technology will have on society and the ease with which interested parties are able to influence the social, political and innovation trajectories of this technology. According to Collingridge (1980[148]), "When change is easy, the need for it cannot be foreseen; when the need for change is apparent, change has become expensive, difficult and time consuming".

From a governance perspective, this means that the point at which a new technology can most easily be regulated is also the point at which the least is known about the potential impact of that technology or the act of regulating that technology.[2] Hence, governments are in a double-bind situation. For example, governments currently aim to steer the application of facial recognition technologies and algorithmic biases

before these technologies are ubiquitous and create new challenges at a societal scale (Grace, 2019[149]). However, governments lack insights into how these technologies will impact their structures and activities.

Furthermore, the benefits and risks of new technologies do not fall on the same people. Governments must consider what kind of public values are important to persevere in the change process and how public value is affected through technological change (OECD, 2017).

Increased complexity and uncertainty *per se* do not disqualify traditional policy tools. However, they are unreliable when it is unclear which direction technological innovation will take. New tools are needed, such as normative codes of conduct, regulatory sandboxes and real-time technology assessments (Stilgoe, Owen and Macnaghten, 2013[99]). Regulatory sandboxes were adopted in Australia, Hong Kong, Malaysia, Singapore, the United Arab Emirates and the United Kingdom, especially for financial technology (FinTech). This requires governments to operationalise anticipatory insights and increase upstream engagement with technology developers and lead users.

The Innovator's Dilemma

Another challenge to anticipatory innovation is that organisations naturally concentrate on the immediate needs of their customer base and the presently feasible technological developments. This conundrum is coined the "Innovator's Dilemma" (Christensen, 1997[150]). The theory argues that investing in disruptive technologies is not a rational financial decision in established firms since disruptive technologies initially interest the least-profitable user base in the market. In the context of government, there is no incentive to invest in disruptive technologies that will initially benefit a minority of citizens or public servants.

As such, essential organisational dynamics devalue disruption and anticipatory innovation activity:

- **Resistance to change** – there can be resistance to radical innovations inside organisations if they conflict with established practices. Usually innovations that create new areas of engagement are more easily adopted.
- **Strategic intent –** current activities invariably have bigger financial portfolios than initiatives in development. In organisational terms, they outweigh new, smaller, radical projects.
- **User focus –** feedback from users and customers can steer organisations away from new products and services as they initially underperform in comparison to established products and services.

Consequently, there are many examples, from Kodak to Nokia, of market leaders who lost their positions in the market due to the abovementioned dynamics (Bouwman et al., 2014[151]; Lucas and Goh, 2009[152]).

Open questions

As an emerging field, anticipatory innovation and the related discipline of strategic foresight contain numerous incomplete or unexplored avenues of further research. These include the limitations of strategic foresight, measuring value, interactions with other disciplines and barriers to implementation.

Limitations of strategic foresight

Strategic foresight on its own does not solve problems, produce strategies or guarantee success. It enlarges but does not complete the picture of considerations for decision-makers and cannot force them to take notice. Strategic foresight requires a long, sustained effort to bear fruit and rarely generates breakthroughs in a single exercise. Futures studies can be implemented in unhelpful ways. For example, some foresight processes undertake excessive gathering and pondering over signals of future change, which comes at the expense of relevant selection, purpose-driven sense-making, strategic reframing, and

generation of ideas for concrete innovation and experimentation (OECD, 2021). There is a need to develop mechanisms to translate foresight knowledge into policy making processes.

Measuring the value of anticipatory innovation

There is no consensus on whether and how to measure the impact of anticipatory innovation in public governance. The fundamental problem is the lack of a control case for policy makers evaluate what could have happened or did not happen as a result of anticipatory innovation. Other points of discussion include whether it is possible to form ex-ante expectations of something whose true value can only be realised ex-post, and whether impacts should concern direct and concrete changes to policy action or can include changes in mind-set and framing of issues. Attempts are lacking to systematically assess the value of foresight and anticipatory innovation in theory and practice.

Interactions with other disciplines

As one of the four facets of public sector innovation, anticipatory innovation is related to the other three in terms of its directedness and the level of uncertainty it addresses. How anticipatory innovation interacts with other forms of innovation within an overall innovation portfolio has not yet been researched.

Likewise, while strategic foresight has clear and extensive relevance for anticipatory innovation, there are ways it can add value to the other three facets of public sector innovation. For example the aspirational nature of mission-oriented innovation could be guided by the visioning and back-casting methods of strategic foresight. Adaptive innovation could be informed by the signal-reading of horizon scanning. Study will be required to reveal all the possible connections and evaluate them.

Furthermore, there is intellectual cross-pollination between anticipatory innovation, strategic foresight and other disciplines, such as resilience (Goldstein, 2012[153]; Kaufman, 2012[38]; Linkov et al., 2018[154]; OECD, 2016[155]), systems thinking (Hodgson and Midgley, 2014[156]; Hynes, Lees and Müller, 2020[157]), behavioural insights (Ciriolo, 2019[158]) and risk assessment (Linstone, 1985[78]; OECD, 2019[47]). While distinct in their scope and practice, each of these exhibits synergies and trade-offs with the others. A comprehensive overview is lacking of how these activities combine and interact in the overall portfolio of knowledge-based public governance.

Implementing anticipatory innovation prototyping

A final field of incomplete research relates to implementing and embedding of anticipatory innovation within governments and the broader civic and societal ecosystems they inhabit. The barriers outlined above are one avenue for this research, particularly relating to the institutional, cognitive and communication conditions needed for anticipatory innovation to deliver value (OECD, 2019[47]; Schirrmeister, Göhring and Warnke, 2020[147]; SOIF, 2021[11]). This is relevant where policymakers prioritise issues according to subjective or intuitive perceptions of urgency rather than critical analysis of when action is needed – making the exploration of issues not already on the agenda a hard ‘sell’ (Fuerth and Faber, 2012[34]; OECD, 2021[16]).

As anticipatory innovation feeds into and off of imagination and creativity (Miller, 2018[3]), anticipatory innovation demands that governments encourage creativity. Extensive research for harnessing the creative capacity of the human mind (Baird et al., 2012[159]; Schooler et al., 2015[160]; Zedelius and Schooler, 2015[161]) exists but has not been tested in the public sector context.

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Notes

[1] See, for example, the OECD (2019) brochure “Regulatory effectiveness in the era of digitalisation”: https://www.oecd.org/gov/regulatory-policy/Regulatory-effectiveness-in-the-era-of-digitalisation.pdf).

[2] See OECD work on technology governance and regulating emerging technologies in the OECD Principles on AI and the Recommendation on Responsible Innovation in Neurotechnology (OECD, 2018[162]).

Annex A. Research methodologies

Research on enhancement-oriented innovation

The sources for the chapter on enhancement-oriented innovation were identified via a semi-systemic literature review made up of three phases. Firstly, the Web of Science and Scopus databases were explored by using key search terms related to enhancement-oriented innovation. In a second phase, the reference snowballing technique was adopted to find additional sources related to the relevant topics. Lastly, specific sources were obtained via conversations with experts in public sector productivity, workshops with practitioners from over 30 countries, and internal consultations with OECD innovation experts.

The initial search was conducted with the following search strings on both the Web of Science and Scopus databases:

- “public sector” +”innovation” +”efficien*”
- “public sector” +”innovation” +”productiv*”
- “public sector” +”innovation” +(“performance” AND “efficien*”)

To lower the number of results and increase their relevance, the keywords had to appear in either the title, the abstract or the article keywords. Eligible results were then further selected via the following criteria:

Year of Publication

Studies were included that were published during 2010 and 2021.

Language

Only studies written in English were included.

Publication status

Peer-reviewed articles, book chapters, books, or proceedings papers were counted as academic texts. Moreover, reports and grey literature were included.

Availability

Studies had to be available in full-text format (PDF).

The results were then manually screened and selected based on their relevance to the enhancement-oriented innovation facet. Together with the sources obtained from the additional expert inputs, a total of 197 sources were analysed for the review.

Research on adaptive innovation

The research on adaptive innovation was conducted based on the PRISMA method.

Identification of sources

Three main search strategies were used in the systematic literature review: First, Web of Science and ProQuest were used as the main data bases. Second, senior researchers in the agile and adaptive innovation field suggested further publications. To identify practical applications of the topic, a snowball-approach led to searching for grey literature published in the following data banks: OECD, IMF, World Bank. The initial search through the databases contained two search strings:

1. ((agil* OR adapt* OR "agil* innovat*" OR "adapt* innovat*") AND ("change" OR "change management" OR "reform" OR "change process" OR "upscal*" OR "implement*") AND (“public sector” OR “government” OR “public organi*ation”))
2. ((“citizen-led” OR “human-centered design”, OR “user-centric”) AND (“public sector” OR “government” OR “public organi*ation”))

Eligibility criteria

Studies from the original search were included in the systematic review if they met the following inclusion criteria: Abstract, title or keywords. In order to reduce the number of articles, the keywords had to appear in the abstract or title.

Year of publication

Studies were included that were published during 2000 and 2021. The Agile Manifesto (2001) later adopted into public administration research was published in 2001.

Field of study

Studies had to deal with agile and adaptive innovation and change in the context of the public sector. “Public sector” was defined as “those parts of the economy that are either in state ownership or under contract to the state, plus those parts that are regulated or subsidised in the public context” (Flynn, 2007: 2). Furthermore, within the Web of Science Core Collection data bank studies had to be published in journals related to the following categories: Public Administration, Management, Computer Science Software Engineering, Business, Information Science Library Science. Journals from management and computer science were included to cover the history of agile approaches with strong roots in software development and later adopted in organisational studies. Within the ProQuest data bank, results were filtered by theme (public sector/public administration).

Language

Only studies written in English were included.

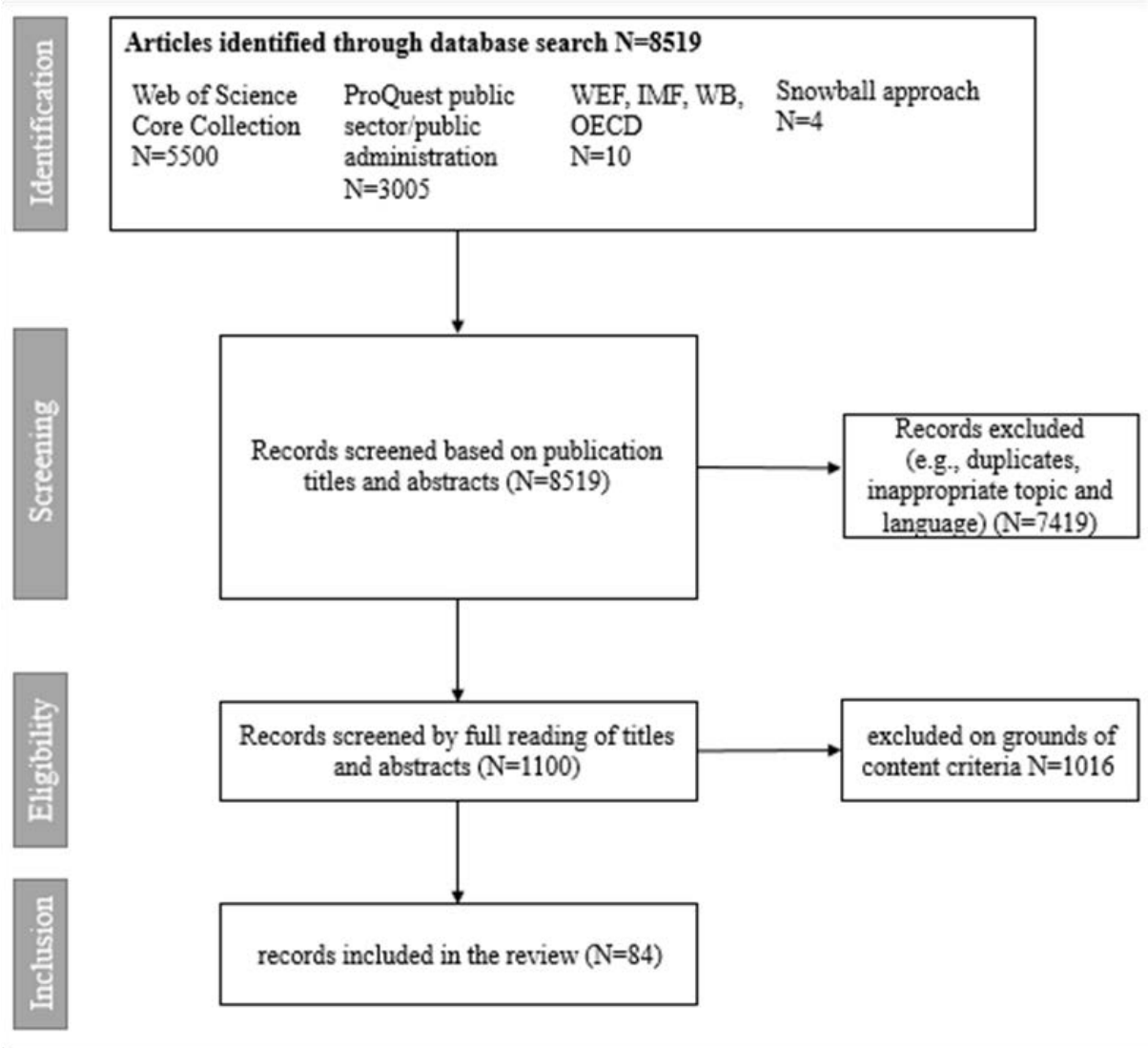
Publication status

Peer-reviewed articles, book chapters, books, or proceedings papers were counted as academic texts. Moreover, reports and grey literature were included.

Availability

Studies had to be available in full-text format (PDF).

Figure A A.1. PRISMA flow chart: research on adaptive innovation



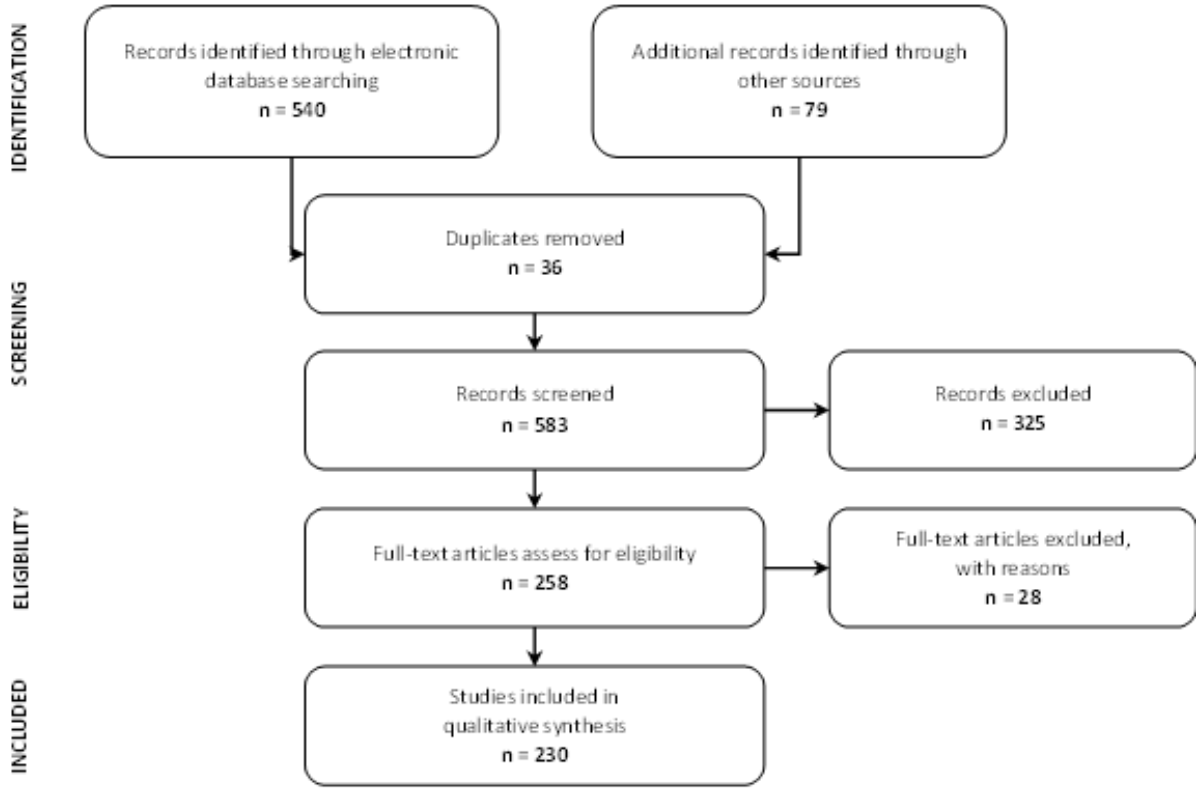
Research on mission-oriented innovation

The research on mission-oriented innovation is based on the PRISMA method.

Identification of sources

The review is based on the PRISMA reporting flow. In summary, the study screening and selection identified a total of 619 references, excluded 389 references, yielding a corpus of 230 references for inclusion in qualitative synthesis (see Figure A A.2).

Figure A A.2. PRISMA flow diagram of study's screening and selection



The initial search was carried on titles and abstracts for Boolean search strings. 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. The data sources used in this study include the following electronic databases and manual sources:

Core electronic databases: Scopus, Web of Science, EBSCO, ProQuest, Wiley

Manual searching: Google Scholar, hand scanning of related websites, e.g. OECD, European Union, Nesta UK, etc.

Search results were exported to a citation format and imported into a common repository hosted on EPPI Web Reviewer. The first parse of records screening on the EPPI platform identified and removed duplicates automatically. The remaining record set was manually screened by two independent reviewers and quality checked by the method of spot sampling and differences in resolution by a third reviewer. The study protocol for the screening activity was defined with three exclusion criteria (see Table A A.1) to prune records from the record set that did not fulfil the basic scope of the study. Where it was not possible to assess a criterion, the record remained was not excluded. The criterion would be assessed later based on the review of the reference's full text.

Table A A.1. Screening exclusion criteria for public procurement and innovation

Exclusion criteria	Description
Duplicates	A duplicated reference from multiple search results and cases where both book chapter and book exist, or a conference proceeding was also a journal publication. In such cases, only one is included in the record set.
Not mission-oriented innovation	Does not focus specifically on mission-oriented innovation, broadly defined.
Not STI agencies	Does not feature a discussion of STI agencies.

Year of Publication

The scope of the systematic review consisted of academic papers and book chapters and publications from policy organisations (e.g., the OECD) between 1990 and 2020.

Publication status

The eligible set of records were imported into a Zotero shared reference collection for further processing. A full-text assessment of each record identified a further 28 records for exclusion. Reasons for exclusion were either due to screening exclusion criteria (see Table A A.1) or the full-text document was unavailable in English.

A final total of 230 records satisfied the eligibility criteria in the study's PRISMA protocol for inclusion in the quantitative and qualitative analysis.

The 230 full-texts were then coded for keywords based on the research questions above and summarised in Table A A.2.

Table A A.2. Summary of keyword coding taxonomy

Policy targets	Policy logics	Policy tools and methods	Policy capabilities
Attaining SDGs	Creating missions	Stakeholder engagement	Public (dynamic) capabilities
Tackling societal challenges	Shaping / creating markets	Using policy mixes	Governance
Enabling smart specialisation	Complexity	Cross-sectoral coordination	Labs
Systems transformation		Experimentation	Entrepreneurial funders and change agents
Social innovation			New agencies

Assumptions applied to coding

Under policy targets, the guiding question is what kind of new policy targets are emerging that go beyond growth and competitiveness narratives (Schot and Steinmueller, 2018[1]). In order words, under this category, we should find the key drivers of mission-oriented innovation in the public sector. Closely associated with policy targets is the category of policy logics or epistemic frames. Market failure based STI policies that dominate the current policy landscape are often criticised for their shortcomings and indeed closeness to neoclassical economics (Lundvall, 2007[2]; Mazzucato, 2016[3]; Fagerberg, 2018[4]). Accordingly, we could expect an emergence of alternative policy logic underlying missions-oriented policies. For policy tools and methods we were interested in support structures, tools and methods associated with new policy targets (such as societal challenges) and policy logics (such as market-shaping). We were also interested in understanding whether new policy targets and logics and accompanying support structures, methods and tools, lead to new capabilities in public organisations. These were categorise these as policy capacities, 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 (Karo and Kattel, 2018[5]; Wu, Ramesh and Howlett, 2018[6]).

The overall set of sources is characterised by two key features: first, out of 230 sources, 161 are academic articles or book chapters; and second, most sources were published in or after 2015. As many European countries have started to develop explicitly mission-oriented policies in the aftermath of the European Commission's new Horizon Europe R&D programme published in 2020, it is to be expected that many sources in this review discuss missions from either a conceptual or normative standpoint. We would expect relatively few studies detailing more applied aspects of missions. Indeed, the academic sources tend to be mostly conceptual studies rather than empirical investigations of actual missions practices.

Research on anticipatory innovation

The sources for the chapter on anticipatory innovation were identified via a semi-systematic literature review made up of three phases. Firstly, existing seminal secondary and tertiary sources on anticipation and strategic foresight were consulted for the sources of their own analysis. This allowed for a comprehensive overview of the knowledge that has been created already in the field of anticipation and public sector innovation. In a second phase, specific sources were obtained via consultation of academic programmes and syllabi on anticipation, foresight, and futures literacy; as well as via conversations with experts in foresight, workshops with practitioners from over 30 countries, and internal consultations with OECD experts in multiple domains. Lastly, the reference snowballing technique was adopted to find additional sources related to the relevant topics.

Language

Only studies written in English were included.

Publication status

Studies included journal articles, as well as books and book chapters.

Availability

Studies had to be available in full-text format (PDF).

The results were then manually screened of and selected based on their relevance to the anticipatory innovation facet. Together with the sources obtained from the additional expert inputs, a total of 148 sources were analysed for the review.

Research on portfolios of innovation

The sources for the chapter on innovation portfolio management were identified via a semi-systematic literature review made up of three phases. Firstly, the Web of Science and Scopus databases were explored by using key search terms related to innovation portfolio management. In a second phase, the reference snowballing technique was adopted to find additional sources related to the relevant topics. Lastly, specific sources were obtained via conversations with experts in public sector productivity, workshops with practitioners from over 30 countries, and internal consultations with OECD innovation experts.

The initial search was conducted with the following search strings on both the Web of Science and Scopus databases:

- "public sector" +"innovation" +"portfolio"
- "public sector" +"innovation" +"manage*"

- “public sector” +”innovation” + (“portfolio” AND ”tool”).

To lower the number of results and increase their relevance, the keywords had to appear in either the title, the abstract or the article keywords. Eligible results were then further selected via the following criteria:

Year of Publication

Studies were included that were published during 1957 and 2021.

Language

Only studies written in English were included.

Publication status

Peer-reviewed articles, book chapters, books, or proceedings papers were counted as academic texts. Moreover, reports and grey literature were included.

Availability

Studies had to be available in full-text format (PDF).

The results were then manually screened and selected based on their relevance to the innovation portfolio management topic. Together with the sources obtained from the additional expert inputs, a total of 182 sources were analysed for the review.

References

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Annex B. Innovation Capacity Framework – Factors and variables

Table A B.1. Factors and variables connected to the Innovation Capacity Framework

	Individual	Organisational	Public sector system
Purpose What is driving the intent to innovate?	**Intrinsic motivation**: factors including individual aspirations (e.g. career goals, self-efficacy, prosocial behaviour), job significance, individual satisfaction and engagement **Extrinsic motivation**: factors including compensation and rewards (financial and non-financial), external recognition (e.g. awards), career incentives	**Institutional drivers**: Organisational mandate and accountability; missions; strategy, innovation needs assessment **Leadership and organisational culture**: leadership traits and mindset (e.g. vision and appetite for innovation); attitude towards uncertainty and ambiguity; general appetite for innovation, ethical standards **Change drivers**: external-to-the-organisation events prompting the need to change (economic cycles, legislative shifts, change in citizens and business demands, audits, media/press); tipping points or organizational barriers (e.g. silos and turfs; service delivery challenges)	**Government agenda:** political direction and priorities, austerity **Global challenges and missions**: urgency to action to respond to shared global goals and targets (e.g. SDGs); **International standards**: desire to adhere to common principles and standards (e.g. Recommendation on Digital Government Strategies, Indicators, Declaration of Public Sector Innovation) **Domestic dynamics and pressures**: public sentiment / trust, expectations, lobbying pressure, electorate mood, polling **Public sector reform agendas**: reform efforts indicate the need for new approaches/change theory **Public value, democratic principles and ethics**: action dictated by responsiveness to democratic and public values (e.g. human rights, freedom of speech, rule of law)
Potential What determines whether innovation efforts are attempted?	**Individual job design:** factors include thelevel and degree of individual autonomy, discretion and ownership of tasks; room allowed to exercise creativity **Work environment**: quality of team interactions (psychological and intragroup safety, consideration for biases and diversity), trust, opportunity for risk and failure **Perception of context**: Perceived openness and legitimacy for experimentation, incentives for innovation, awareness of strategy, perceived and actual rules and parameters	**Leadership practice and style**: clarity of permission to innovate, mechanisms for collaboration, approach to stewardship **Institutional settings**: position of the organisation (independence, identity, reputation, funding, stability, trust); shared norms and values that underpins collaboration (social capital) degree of insulation from political cycle **Strategy design approaches:** innovation explicit in strategy design (e.g balancing current and future); inclusion of user and staff perspectives and environmental signals **Decision making within the organisation**: approach to uncertainty and risk appetite and management; approval processes and delegations	**Political signalling:** mandates for innovation (Innovation Manifesto, Declaration), parliamentary/cabinet decisions, political climate; political-administrative interface **Contextual factors and governance dynamics:** type and quality of accountability (e.g. centralised vs decentralised models, direct or indirect accountability); decision making, vested interests **Existing public governance frameworks:** features of regulatory, human resource, audit, budgetary, digital frameworks; possibility to challenge rules/default settings

	Individual	Organisational	Public sector system
Capacity What is needed to carry out innovative efforts?	**Mindset**: entrepreneurial, curiosity, confidence, multidisciplinary, resilience **Practical ability**: Knowledge and capability, skills (e.g. data literacy, iteration, user-centricity, story-telling, insurgency), tools (methods, techniques, models) and resources (financial and non-financial) **Continuous learning and iteration**: Priority for experimentation, learning and failure, reflective practices, making individual plans to use learning for action (including training)	**Institutional conditions and supports**: funding, procurement policies and direct investment; data and knowledge management; IT/technology; partnerships and external engagement, innovation management supports, organisation demographics **Portfolio, program and project management approaches**: portfolio (facets) and project management, funding flexibility, change management strategy **Workforce strategy, practices and culture:** combinations of knowledge, expertise across workforce; HR policy, HR systems including for talent management, incentives for innovation, mobility, diversity, recruitment, learning & development, performance management; organisational and workforce culture	**Flexibility of rules and agile processes**: agile approaches to policy making, regulation and procurement, open to input from citizens, civil society and industry **Institutionalization of innovation**: Institutional embedding of innovation, formal bodies and roles (e.g. CIO), integration of innovation approaches (e.g. through internal directives, circulars), intermediation/advisory/support roles **Openness and connectedness**: networks (national and x-border), partnerships across sectors; open innovation; interoperability and data sharing
Impact How is the impact of innovative efforts understood and informing future practice?	**Individual experience**: perception of barriers to innovate, recognition and validation, previous experience to innovate **Individual performance:** informal and formal evaluations during performance assessment cycles, including innovation **Knowledge of results and impact**: feedback on output and behaviour, quality performance data, including of innovative efforts or activities, personal perception of making a difference.	**Organisation performance monitoring, audit and evaluation:** internal controls, practices and organisational perceptions and sentiment **Perceived impact**: external (user) feedback of innovation activities, efforts and practices in the organisation, media scrutiny	**Performance and evaluation**: Performance evaluation frameworks across departments and agencies (integrity, accountability, system outcomes and performance reporting approaches), scrutiny, evaluation and audit **Legitimacy mechanisms**: effectiveness of outputs, quality of governance and internal processes **Continuity of efforts:** innovation practices embeddedness in long-term reforms

Note: Work in development.

Source: Kaur, M. et al. (2022), "Innovative capacity of governments: A systemic framework", *OECD Working Papers on Public Governance*, No. 51, OECD Publishing, Paris, https://doi.org/10.1787/52389006-en.

OECD Public Governance Reviews

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A STRATEGIC PORTFOLIO APPROACH

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