New mission-oriented policy initiatives as systemic policies to address societal challenges

Analytical framework and typology of initiatives

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This document presents the analytical framework and typology of initiatives of the CSTP project on the design, funding and implementation of mission-oriented policy initiatives to address societal challenges. Based on this document, revised according to the comments received during the CSTP meeting, the STP team will conduct fieldwork and analysis in close collaboration with member countries.

Delegates are invited to comment on this document and participate in the project by contributing country or policy initiative case studies, supporting the development of country mission-oriented policy profiles and/or organising consultation events on mission-oriented policies to address societal challenges.

This document is a contribution to Output Result 1.3.2.1 of the 2019-20 Programme of Work of the CSTP.

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1. This document presents the analytical framework and typology of initiatives of the CSTP project on the design, funding and implementation of mission-oriented policy (MOIPs) initiatives to address societal challenges in different national and thematic contexts. The project is composed of three complementary parts:

i. Definition, identification and categorisation of the different types of MOIPs;

ii. Analysis of the national factors (institutional, financial, political, etc…) that foster or impede the development and implementation of MOIPs;

iii. In-depth cases studies of the design, funding and governance of selected types of MOIPs.

2. The project will result in:

i. a practical framework for identifying, analysing and benchmarking MOIP country landscapes and initiatives;

ii. a typology of MOIPs describing the specific design features of MOIPs;

iii. in a sample of countries, a national ‘Mission-orientation policy profile’ that includes

   a. an analysis of the framework conditions for mission-oriented policy, including use of relevant STI statistics;

   b. an inventory of MOIP initiatives, with their main characteristics and links to the EC-OECD STIP-Compass database. This inventory will use the typology mentioned above;

iv. in-depth case studies of MOIP initiatives including an analysis of their genesis, specific features, as well as their main challenges and opportunities;

v. an online decision-support making/knowledge base on MOIPs.

3. Drawing on these elements, the project will produce general recommendations on the design, funding mechanisms and modes of governance of MOIPs in different national and thematic contexts.

4. This document deals with the first part. It develops an analytical framework and typology of MOIPs to address societal challenges and tests this framework on a sample of initiatives. To do this, the document follows a two-pronged approach (Figure 1):

i. Step 1: Based on existing conceptual and empirical work, the document starts by proposing a functional definition of MOIPs that allows discriminating MOIPs from other types of policies, while being flexible enough to encompass the diversity of MOIPs. This definition is decomposed in its basic components in order to draw implications on the specific functions that MOIPs are expected to fulfil at different levels of national innovation systems. The results of this analysis are consolidated in the so-called ‘terms of reference’ of MOIPs;

ii. Step 2: The document pre-identifies different categories of policy initiatives that are broadly relevant to the definition of MOIPs. Using notably the OECD Innovation Policy Reviews and the

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1 See the project’s Terms of Reference in DSTI/STP(2019)8.

2 This component of the project is funded by the European Commission under Framework Programme Horizon 2020.
EC-OECD STIP Compass database, a first series of initiatives belonging to the different categories are matched against the ‘terms of reference’ of MOIPs in order to identify their specific attributes for addressing societal challenges.

Figure 1. The two-pronged methodological approach to characterise different types of MOIPs

5. This analytical framework and categorisation should not be considered as definitive. It is a starting point that will guide and structure subsequent fieldwork conducted at the level of selected national innovation systems and specific MOIP case studies. The results of which will feedback into the final analytical framework.
2 An analytical framework to study MOIPs

2.1. Background

6. Developed and developing countries are facing mounting societal challenges that will determine to a great extent people’s life and well-being in the not too distant future (OECD, 2016[1]). Research and innovation activities are expected to contribute significantly to solving these challenges by, for instance, reducing CO2 emissions, finding new solutions to improve health and healthcare or mitigating the negative effects of urbanisation in low-income countries. The 17 Sustainable development goals (SDGs) have become in many countries the political framework of reference to address these societal challenges. They provide broad directions for change and are progressively shaping research and innovation policy agenda, as demonstrated by the analysis of the STI strategies in a number of countries (OECD, 2018[2]). The translation of these strategic frameworks into actual policy action is a slower process as it involves significant reallocation of resources and policy reforms. Nonetheless, a number of government bodies have created or re-oriented STI policy initiatives in the last decade to tackle specific societal challenges. Progress in renewable energy for instance (wind and solar energy technologies, electric and hybrid vehicles), where efforts started much earlier, demonstrate that continuous investment pays off.

7. However, despite progress, doubts persist among scholars, policymakers and, not least, increasingly aware and engaged citizens, as to whether this reorientation of the existing policy framework is sufficient to deliver results that are commensurate with the level of challenge faced by modern societies.

8. In particular, the policy landscape remains largely fragmented across different public interventions, owing at least in part to silos between governmental bodies at ministry and/or agency levels. This fragmentation results in numerous policy initiatives addressing related but dispersed objectives with specific emphasis on certain disciplines, sectors or stages of the innovation process. This is detrimental to the ability of national policy frameworks to deliver on the societal challenges in two respects:

- Societal challenges raise multifaceted and complex scientific, technological and socio-economic issues that require various inputs from different disciplines and sectors. They also intervene in areas where markets do not yet exist and will require intervention along the entire innovation value chain, with multiple feedback loops between these stages as various generations of innovations are developed, tested and improved;
- When dealing with issues such as climate change or aging, innovations will have to be embedded in a wider set of co-ordinated social, economic and political changes contributing to a genuine socio-technical or sustainable transitions/transformation (Geels and Schot, 2007[3]); (Fagerberg, 2018[4]); (Schot and Steinmueller, 2018[5]).

9. The necessity to drive such paradigmatic changes has led many authors to call for new types of policy intervention that are able to cope with failures that go far beyond those that characterise markets (e.g. information asymmetries, or limited appropriability of knowledge) and structural systems (e.g. lack of investment in infrastructures, or weak ‘static’ capabilities in firms and administrations). Addressing societal
challenges rises the issue of how to cope with various types of societal transformational system failures and what should be the role of governments in doing so (Weber and Rohracher, 2012[6]) (see Table 1).

### Table 1. Types of failures associated to the transformation of societal systems

<table>
<thead>
<tr>
<th>Type of failure</th>
<th>Failure mechanism</th>
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</table>
| Directionality failure  | ➢ Lack of shared vision regarding the goal and direction of the transformation process  
                           ➢ Inability of collective co-ordination of distributed agents involved in shaping systemic change;  
                           ➢ Insufficient regulation or standards to guide and consolidate the direction of change  
                           ➢ Lack of targeted funding for research, development and demonstration projects and infrastructures to establish corridors of acceptable development paths |
| Demand articulation failure | ➢ Insufficient spaces for anticipating and learning about user needs to enable the uptake of innovations by users  
                                ➢ Absence of orienting and stimulating signals from public demand  
                                ➢ Lack of demand-articulating competencies |
| Policy co-ordination failure | ➢ Lack of multi-level policy co-ordination across different systemic levels (e.g. regional–national–European or between technological and sectoral systems  
                                ➢ Lack of horizontal co-ordination between research, technology and innovation policies on the one hand and sectoral policies (e.g. transport, energy, agriculture) on the other  
                                ➢ Lack of vertical co-ordination between ministries and implementing agencies leads to a deviation between strategic intentions and operational implementation of policies  
                                ➢ No coherence between public policies and private sector institutions; No temporal co-ordination resulting in mismatches related to the timing of interventions by different actors |
| Reflexivity failure      | ➢ Insufficient ability of the system to monitor, anticipate and involve actors in processes of self-governance  
                           ➢ Lack of distributed reflexive arrangements to connect different discursive spheres, provide spaces for experimentation and learning  
                           ➢ No adaptive policy portfolios to keep options open and deal with uncertainty |


10. This new policy approach called for by many should involve better orientation and co-ordination of different research and innovation policy measures, which directly impacts the scale and scope of public intervention. First, this approach should allow a concentration of national resources on issues that are deemed of higher importance for the future. Although this is of course not in any way a guarantee of effectiveness of public policy (and even less of efficiency), scale is usually sought to tackle more ambitious problems and/or accelerate progress. More generally, fragmentation of funding among a variety of priorities is a weakness commonly identified in many STI public policy evaluations and OECD Innovation Policy Reviews. Second, this approach should enhance the coherence of policy actions in different policy fields and across levels of government by linking formally different policy measures or creating new ones with extended remit. This enables, in principle, a decoupling between the large needed scope of policy measures and the necessarily limited boundaries of existing public organisations, often tied to their respective mandates, target groups, scientific areas and technological portfolios.

11. Taking advantage of an existing concept, this type of policy approach that aims to better orientate and co-ordinate public interventions in order to address ambitious societal goals has been labelled under the term of ‘new’ mission-oriented policies (Soete and Arundel, 1993[7]) (Mazzucato, 2017[8]).
2.2. Definition of ‘new’ mission-oriented policies

2.2.1. Proposed functional definition in this study

12. Although the use of the term ‘mission-orientation policies’ dates back the end of 1980s, significant amount of mostly conceptual work has been devoted since the 2000s to rejuvenate this concept and clarify its definition and content (see Annex A). This momentum accelerated and became more concrete in the 2010s when the European Commission started discussing the application of this approach for the design of part of the next Framework Programme Horizon Europe. The high-level group of leading experts chaired by Pascal Lamy (President Emeritus of the Jacques Delors Institute) recommended in 2017 that the next framework programme should focus on a few large-scale research and innovation ‘missions’ which would encompass an entire portfolio of activities, rather than individual call topics, in order to address global challenges (European Commission, 2017[9]). Based on this injunction and the results of the interim evaluation of the ongoing Horizon 2020 programme – which appeared still geared toward the achievement of knowledge-related objectives rather than the resolution of societal challenges (European Commission, 2017[10]) – the Commission launched two strands of studies that set the basis of the concept and undertook a first inventory of mission-oriented policy initiatives in advanced and emerging countries (Mazzucato (2017[8]), European Commission (2018[11]) and Kuittinen H., Polt W. and Weber M (2018[12]).

13. Building on this existing body of academic work, mission-oriented research and innovation policies (MOIPs) are defined in this project as a co-ordinated package of research and innovation policy measures aiming to address societal challenges. They possibly span different stages of the innovation cycle from research to demonstration, cut across various policy fields and are implemented in order to meet ambitious and concrete goals in a defined timeframe.

14. Rather than being based on a substantive and clear-cut definition, the concept of mission-orientation is constructed as a composite of different elements identified mainly deductively. It refers to the objective of the policy (addressing societal challenges), its content (a co-ordinated bundle of policy instruments) and some implementation characteristics (goals and timeframe). Each of the elements combined in this concept has its specific roots, be it the literature in terms of grand/societal challenges, the research on policy mixes or even programme management and evaluation. Figure 2 shows the basic ‘debunking’ of this definition along the three main dimensions of strategic orientation, policy co-ordination and policy implementation.
2.2.2. Mission-orientation as a systemic process

15. Figure 2 above introduces the idea of mission-orientation as a policy process involving different stages and levels. Figure 3 provides a schematic view of a MOIP along the three system levels of strategic orientation, policy co-ordination and implementation. The process starts with the selection of a specific societal challenge to be addressed via the design and implementation of one or several missions. The missions are developed through an inclusive process that involve the public authorities, all actors that have responsibilities in the delivery of related products and services, as well as a variety of relevant stakeholders that are or might be impacted by the societal challenge. Missions include not only substantive elements as to where to go, what to achieve in a certain timeframe (broad mission statement, objectives and targets), but also the arrangements as how to achieve these objectives (governance of the mission, mode of policy intervention, funding streams, etc.).

16. The mission(s) guide and support the different projects and activities, some of them competing with each other to meet the objectives (for instance in the case of alternative socio-technical options).
2.3. The ‘terms of reference’ of MOIPs

2.3.1. Functions and challenges of MOIPs

A set of important implications for policymaking underpins the definition of mission-oriented policies in terms of the functions they are expected to fulfil at each level of the system. Table 2 presents these functions and the associated challenges for policymakers and involved stakeholders.

Table 2. Main components of the definition of mission-oriented policies and their main implications

<table>
<thead>
<tr>
<th>Level of MO policy process</th>
<th>Main functions</th>
<th>Challenges</th>
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### 2.3.2. Basic requirements for mission-oriented policies

18. Using the available literature and existing case studies, Table 3 presents for each level/stage of the mission-oriented policy process the functions, basic requirements for and the related attributes of mission-oriented policies, derived from the functional definition of MOIPs proposed in this document.

19. This analytical exercise focuses on the *specific* attributes of MOIPs relatively to other type of policy approaches (such as for instance thematic calls for proposal, single-stage innovation support instruments, etc…). This does not mean that MOIPs should not also be looked at against more traditional objectives, for instance the ability of the policy to foster excellence, science-industry relationships and other types of knowledge exchange. These traditional requirements being well documented elsewhere in the literature, the document deals with them only to the extent that mission-oriented dimension alters them. For example, while the need for well-designed evaluations does not only apply to MOIPs, this project focuses on what types of *specific* evaluation arrangements (e.g. systemic evaluation, or policy mix evaluation) should be undertaken to evaluate MOIPs, in place of, or in addition to, traditional single instrument evaluations.
Table 3. Functions, basic requirements and expected attributes of mission-oriented policies

<table>
<thead>
<tr>
<th>System level</th>
<th>Mission-orientation functions</th>
<th>Basic requirements to achieve the functions</th>
<th>Corresponding attributes to achieve the functions</th>
</tr>
</thead>
</table>
| Policy orientation | Informing and selecting specific societal challenge(s) and strengthening legitimacy of focused policy intervention towards clear and precise objectives | • A wide group of stakeholder (including citizen) are engaged in the building of a consensus on the societal challenge(s) to be prioritised | • Legitimacy  
  o Diversity of stakeholders engaged  
  o Nature and contribution of stakeholders |
| | | • Clear orientations and strategic guidance for developing appropriate policy intervention are informed and selected | • Directionality  
  o Number of prioritised challenges  
  o Scope of challenges  
  o Type of challenge  
  o Broad objectives |
| | | • The translation of orientations in concrete actions (including budget appropriations) are set by a body (Parliament, high-level committee, cabinet, etc.) with strong authority | • Leadership  
  o Type and status of body enforcing the priorities |
| | | • Specific and well-articulated goals, with clear timeline and milestones, are derived from the broad objectives | • Intentionality  
  o Clarity of objectives  
  o Comprehensiveness and precision of performance targets  
  • Temporality |
| | | • The targets and means of intervention to meet them can be revised at different stages of the process (predetermined milestones) based on feedback from monitoring and evaluation | • Flexibility  
  o Process and information channels for monitoring progress toward goals  
  o Process and rules for revising/updating goals  
  • Process and rules for performance-based management (stage-gate approach, etc...) |
<table>
<thead>
<tr>
<th>System level</th>
<th>Mission-orientation functions</th>
<th>Basic requirements to achieve the functions</th>
<th>Corresponding attributes to achieve the functions</th>
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<tbody>
<tr>
<td>Policy co-ordination</td>
<td>Ensuring consistency of public interventions between different policymaking institutions covering different policy fields in order to reach common objectives</td>
<td>- Several policy bodies covering different policy fields (e.g. ministries, agencies) and in charge of different portfolio are involved in the design and conducting (decision-making and funding) of the policy</td>
<td>- <strong>Horizontality</strong>&lt;br&gt;  o ‘Breadth’ of the policy fields covered (sectors/thematic areas)&lt;br&gt;  o ‘Depth’ of the policy fields covered (stages of the innovation chain)&lt;br&gt;  o Variety and adequacy of the instrument portfolio co-ordinated to achieve the objectives</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- The decisions regarding the intervention (objectives, modalities, level of resources) are taken collectively by the involved policy bodies and are binding to them</td>
<td>- <strong>Intensity</strong>&lt;br&gt;  o Degree of co-ordination between the different policy actors&lt;br&gt;  o Degree of integration of the different instruments&lt;br&gt;  o Degree of integration of budgets</td>
</tr>
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<td></td>
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<td>- Policy bodies and stakeholders co-ordinate their plans (e.g. via a portfolio approach) to cover a larger spectrum of alternative options/development paths, share associated risks and learn from success and failure</td>
<td>- <strong>Exploratory</strong>&lt;br&gt;  o Range of alternative (technological and non-technological) options supported to achieve given objectives&lt;br&gt;  o Environment set up to allow fair competition between the various options, narrow-down the scope of options based on experimentation and learn from non-selected options</td>
</tr>
<tr>
<td>System level</td>
<td>Mission-orientation functions</td>
<td>Basic requirements to achieve the functions</td>
<td>Corresponding attributes to achieve the functions</td>
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<tr>
<td>Policy</td>
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| implementation | Supporting and monitoring projects and activities covering different sectors/areas, stages of the innovation cycle and/or disciplines to address common objectives | • The policy initiates/supports/enhances/explores a diverse set activities mixing different disciplines, sectors and areas, across the whole space of the innovation spectrum, from (oriented) basic research to demonstration and early market creation, as needed to solve the selected challenge | • Interdisciplinary diversity  
  o Number and ‘distance’ between the different scientific fields involved in the activities  
  o Various exchanges, transfers and co-operation between scientific fields  
 • Cross-sectorial diversity  
  o Number and ‘distance’ between the different industrial and service sectors/areas involved in the activities  
  o Various exchanges, transfers and co-operation between sectors and areas (including producers and users)  
 • Innovation cycle diversity  
  o Scope of the activities supported by the policy (from oriented basic research to demonstration and market launch, inc. via regulatory reform)  
  o Forward and backward loops between different activities at different stages  
  o Continuity of the support across stages of the innovation cycle  |
|              |                               | • Public and private stakeholders involved in the different facets of the initiatives (phases of the innovation process, sectors, markets, etc.) are mobilised to contribute to the decision-making and funding process of the initiative | • Leverage  
  o Private funds and other types of contributions raised from private sector  
  o Level of engagement and co-operation of public and private partners in the governance and/or supported projects and activities  |
|              |                               | • The policy is endowed at the outset with input and output indicators as well as evaluation procedures adapted to its systemic nature, in order to assess its results and learn from its implementation in view of continuous improvement | • Measurability and evaluability  
  o Indicators set to measure progress, outcomes and impact  
  o Evaluation procedures developed and diffused at the policy outset  
 • Reflexivity  
  o Mechanism and procedures to use evaluation and monitoring results to inform decision-making (revision of objectives, adaptation of operating procedures, etc.) |
20. One of the key difficulties in this exercise consists in determining precisely the expected attributes of MOIPs without being too normative as to how to fulfill these expectations with different policy modalities. These demanding terms of reference should be considered as applying in full only to an ideal type of MOIPs. Hence, few initiatives – if any – are expected to ‘tick all boxes’. In reality, different policy initiatives intervene at one or two of the three levels and are better suited to fulfill some specific functions at each level. Some initiatives intervene upstream in the system (dealing with identification and legitimisation of societal challenges), while others are focusing on the programming and/or policy implementation functions. In most countries, different functions are fulfilled by different sets of initiatives that together, at national system level, compose a mission-oriented approach.

2.4. Preliminary typology

21. There is considerable diversity in the ways governments attempt to respond effectively to societal challenges through the design and implementation of MOIPs. As explained in the introduction (Section 1) the objective of this document is to provide a better understanding of this diversity by categorising different types of MOIPs, using the reference framework developed in this section.

2.4.1. Positioning mission-oriented policies in the overall STI policy landscape

22. The importance of ‘new’ mission oriented policies should not be overestimated. This is especially true since the initiatives that come the closest to the definition of MOIPs used in this study are almost very new, or are based on former initiatives that have been recently reformed to adapt to this approach. And these initiatives will certainly remain modest in the future and will coexist with – and sometimes encompass or influence – other ‘non-oriented’ policy instruments. As claimed by several policymakers in previous discussions held in the context of this project, not all policies will be mission-oriented, which sometimes seems to underpin some discussions between scholars that study MOIPs, as it is often the case when a new policy concept arises (the same statement applies for instance to the related concept of ‘transformative innovation policies’). This statement in no way diminishes the importance of these initiatives in terms of their potential societal impact.

23. A first step before attempting to develop a typology consists in positioning mission-oriented policy initiatives in the context of all initiatives that aim to support research and innovation. According to the definition used in this project, mission-oriented policies must involve a fair degree of strategic orientation and policy co-ordination, which are reflected / embedded in specific policy implementation instruments (see Figure 4). Hence, it excludes, indirect support measures (e.g. R&D tax credits), the purely bottom-up initiatives (e.g. investigator-led research schemes, open innovation support measures such as vouchers, etc...) and the initiatives relying upon single instruments without specific horizontal co-ordination mechanism (e.g. thematic research programmes, a ministry’s innovation procurement programme, etc...). This of course does not imply that the activities supported via these neutral and/or single policy instruments cannot be not relevant to societal challenges.

24. Indirect measures alone represent an important share of research and innovation instruments and schemes, both in terms of number of instruments and amounts of funds allocated. Funds allocated through indirect support schemes represent the equivalent of 14% of all support reported for R&D in a group of about 35 countries (including OECD countries) that have set up such R&D tax incentives. When considering only schemes for companies, they overweight funds allocated through direct support instruments in several of these countries (OECD, 2017[13]). Other bottom-up innovation support measures also represent a wide number of instruments as they attend to a range of needs in companies and research.

3 For instance during the CSTP High-Level Roundtable session ‘Are mission-oriented programmes an efficient way for government to influence research and innovation?’, April 4-5, 2019, OECD.
institutions. Direct STI policy instruments, in the forms of financial, technical or regulatory measures, are the main intervention tools used to implement MOIPs. However, MOIPs should not be confused with all public support to applied or targeted research and innovation activities. At this early stage of development of these policies, MOIPs in fact account in almost all countries for only a small part of the direct STI policy measures, those that include clear orientations in the form of objectives and targets, as well as specific coordination arrangements to link together different modes of public intervention.

2.4.2. National patterns of mission-orientation

25. However, mission-oriented policies are not just one additional type of policy instruments in national policy mixes. They have a specific status in that they – as the definition suggests – bundle together various policy instruments. The three-level analytical framework proposed in this study allows a more complex and dynamic understanding of the position of MOIPs in the STI policy landscape (see Figure 44). The MOIPs that provide an overarching strategic framework (with the definition of specific missions) can encompass or influence other policy instruments, including ‘single’ instruments and other MOIPs implemented at policy coordination or implementation level. Likewise the coordination initiatives, such as the various types of public-private thematic platforms and intergovernmental groups, operate, in principle, under the guidance of the upper-level overarching strategies and support the policy coherence of schemes and programmes at implementation level.

26. Such dynamic and multi-level understanding of MOIPs draws the emphasis not only on each initiatives but also on the linkages between them and the overall coherence across the ‘chain’ of mission-orientation. The analysis of MOIPs in a country should therefore be conducted at both levels of specific initiatives and the entire policy landscape in order to identify different ‘national patterns of mission-orientation’. Depending on countries and areas, the MOIP approach can for instance be more or less institutionally integrated: in some cases, the different functions are grouped within one initiative with their specific mandates, resources and instruments; in other, more frequent, cases, the functions are distributed among different initiatives that operate at different levels. These patterns, still in their infancy in many countries, are far from frozen, they evolve continuously as governments and their partners learn from their successes and failures.4

4 Templates and mission-orientation country policy profiles have been developed to analyse and present these evolving patterns. These are presented in another document.
2.4.3. Types of mission-oriented policies

27. Identifying MOIP initiatives is a challenging task: as previously mentioned they are not defined in essence, but rather as a set of ‘attributes’ which they may have in full or (most likely) in part. The definition is therefore to be used as an open and flexible benchmark, corresponding to an ideal-type of MOIPs. It is not a normative assessment grid but a tool for characterisation and mapping of MOIPs in the set of possible MOIP attributes. Various initiatives share some of the characteristics (the MOIP attributes, i.e. legitimacy, directionality, flexibility, etc.) of this ideal-type and differ in others. Type of MOIP initiatives are defined as variations in the set of attributes of MOIPs.

28. Although it should be used openly and flexibly to identify the different types of MOIPs, it is necessary to draw some limits so that not all policy initiatives fit the definition. Figure 5 sets some minimal conditions in the three dimensions of the analytical framework.

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5 The term ideal-type (also known as ‘pure type’) should here be understood as an analytical tool in the sense it was given by the sociologist Max Weber. It is an abstract model defined as a set of characteristics, used to approximate reality by selecting and accentuating certain of these characteristics, in the present case the different attributes of MOIP initiatives.
29. A preliminary scan of the policy initiatives that could complete these minimal conditions was made on the basis of past OECD innovation policy reviews, the EC-OECD STIP-Compass and the Observatory on mission-oriented initiatives. This led to the identification of eight categories of initiatives, as well as corresponding examples (Table 4).

Table 4. Categories and examples of relevant schemes and programmes by Type of mission-oriented policies

<table>
<thead>
<tr>
<th>Type of mission-oriented policy initiatives</th>
<th>Category of initiatives</th>
<th>Possible examples</th>
</tr>
</thead>
</table>
| Mission-oriented policy initiatives for strategic orientation | Mission-oriented national STI Strategies | - The Mission-oriented UK industrial strategy (United Kingdom)  
- The Long term plan for research and higher education (Norway)  
- The New High Tech Strategy (Germany)  
- The Mission-driven Top-Sector policy (The Netherlands) |
| Mission-oriented policy initiatives for policy co-ordination | Cross-sectoral mission-oriented policies | - Energiewende (Germany)  
- The Hydrogen energy Initiative (Japan)  
- The Health Sector Growth Strategy for Research and Innovation Activities |
| Mission-oriented policy initiatives for policy implementation | Precompetitive research consortia | - The Advanced Battery Precompetitive research consortia (United States) |

7 See [https://stip.oecd.org/stip.html](https://stip.oecd.org/stip.html).
8 This observatory was developed by the Joint Institute for Innovation Policy (JIIP) and its partners in the context of the Study “Mission-Oriented Research and Innovation, Inventory and characterisation of initiatives” commissioned by the European Commission in 2017. Resources can be found at: [http://www.jiip.eu/mop/wp/](http://www.jiip.eu/mop/wp/).
9 This list of categories will evolve in the course of fieldwork.
<table>
<thead>
<tr>
<th>Niche-scaling user-led programmes</th>
<th>The challenge-driven initiative (Sweden)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delegated community programmes</td>
<td>The Strategic Innovation Programme (Sweden)</td>
</tr>
<tr>
<td>Mission-oriented agencies' programmes and moonshots</td>
<td>DARPA ‘Challenge’ programmes (United States)</td>
</tr>
<tr>
<td></td>
<td>The NIH’s oriented programmes (United States)</td>
</tr>
<tr>
<td></td>
<td>Pilot-E (Norway)</td>
</tr>
<tr>
<td>Large ‘umbrella-type’ national programmes</td>
<td>The Programme Investissement d’avenir (France)</td>
</tr>
<tr>
<td></td>
<td>The Cross—ministerial strategic innovation programme (Japan)</td>
</tr>
<tr>
<td></td>
<td>The new Energy Research Initiative (ERI)</td>
</tr>
</tbody>
</table>

30. The three following sections of the document present successively the three stages of mission-orientation, using the conceptual framework developed in this section. In each section, it first recalls the conceptual basis, and then introduces the corresponding types of MOIPs and, for illustration only at this stage, corresponding cases of initiatives proposed in Table 4.
3. Mission-orientation at strategic orientation level

31. This section deals with the ‘upper’ level of mission-orientation that provides the initial impulse and broad policy directions. As set out in section 2, the main function to be fulfilled at this level is to inform and select specific societal challenge(s) and strengthen the legitimacy of focused policy intervention on the selected challenge(s).

3.1 Conceptual background

32. The deliberation on and selection of the societal challenge on which to focus efforts often occur at the highest level of a national policy system and is a diffuse process where multiple actors intervene, from politicians and policymakers to experts and citizen. Although MOIPs are often driven by a sense of urgency (European Commission, 2018[11]), the time and effort dedicated during this early stage of the selection and definition of the challenge is a key driver of its sustainability across change of governments and success when being implemented.

33. It involves reaching a wide consensus on the broad objectives to be pursued, which will allow:
   - Engagement and ownership from public and private actors. The needed level of resources, the scope of intervention as well as the potential deviation from traditional policy practice call for important effort at the outset to involve a broad array of actors in the selection and definition of the challenge. Many of these actors will be essential for the success of the policy to be implemented, be it simply for complementary investments and pooling of intervention instruments. Another dimension of social acceptance that is often overlooked is the articulation with the demand, as the public involved – in different ways – in the public debate are also the future users/consumers of the new products and services to be developed (Boon and Edler, 2018[14]);
   - Acceptance of concentration of resources on the policies set to address the selected challenge. Although not all MOIPs ‘start big’ and some governments favour a more gradual ‘learn and scale-up’ approach, one would expect a certain level of prioritisation of budgetary resources, as ‘big problems’ often requires ‘big money’. Such decision needs to be accepted not only by public actors involved in the budget negotiations – first of all the Ministry of finance in most countries – but also by taxpayers and citizens at large. It is therefore essential to trigger and promote societal debates with extended public participation, so that their specific knowledge and interests contribute to the selection of the challenge and ‘shaping’ of its definition. High-level political constituencies are essential to trigger and animate democratic debates in different arenas and ensure the legitimacy of the choices made.

34. One key issue relates to the level of granularity of the challenge. All challenges can be represented as a problem tree and countries can intervene and set their own objectives at any position in the tree. Positioning the challenge at a lower position in the problem tree is hardly neutral as it reduces the scope of potential options for solving the broader challenge but make the policy more concrete and feasible. When selecting the challenge to be addressed, governments thus face a trade-off: the challenge must be
broad enough to engage a broad set of actors across policy fields and sectors without ‘picking winners’, but sufficiently concrete and well-defined so that it provides strong orientation and is ‘actionable’, i.e. it can be translated into and monitored against precise goals and expected deliverables (Mazzucato, 2018\[15\]). There is clearly no one best way on how to achieve this as it is a highly political process involving multiple articulations with the society at large. Two main parameters can however be identified at this stage: i) the size and level of resources of the country – a small country will choose a realistic challenge to tackle, in line with its possible contribution; and ii) the governance level of the system at which the selection is made. While such broad prioritisation would be expected to occur at the highest level of the system, in reality the process can for instance be initiated by a ministry or an agency as part of its own strategy with a view to enlist a broader scope of actors as its activities unfold. In that case, the selected challenge will also be narrowed down to be consistent with its scope of action. The same type of arguments apply to the number of challenges.

35. Challenges can be of scientific, technological and/or societal nature. As previously mentioned and largely discussed in the literature, the ‘new’ MOIPs focus on societal challenges, by definition, in contrast with the generations of MOIPs of the 1960s and 1970s most often directed towards technological breakthroughs or those in the 1980s and 1990s geared towards economic competitiveness (Kuittinen H., Polt W. and Weber M., 2018\[12\]). A significant amount of work has outlined the specific features of societal challenges: they are complex, open-ended, uncertain/unpredictable, multidimensional and systemic. This ‘wicked nature’ is the raison d’être of ‘new’ MOIPs as they require a new type of policy approach, better co-ordinated and targeted. However, in practice, most countries try to conciliate in their policy both objectives of raising national competitiveness and contributing to societal challenges, in order to ensure buy-in from private actors as well as from public actors with different policy agendas.

36. They also vary in terms of their degree and type of ‘wickedness’. For instance, in their memorandum the expert group on the Economic and Societal Impact of Research (ESIR) differentiates between two broad categories of challenges: i) those addressing a challenge, which is potentially solvable and can therefore be relatively easily reduced to discrete or verifiable goals. Examples of this type are the ‘moonshot’ programmes or the development of the Ebola vaccine. ii) those addressing a challenge where solutions are unknown and the problems escape simple definition – wider societal problems such as sustainability or migration come into this category. To each of these two categories of challenges corresponds different types of missions. The first type of challenges would be addressed in a MOP aiming at accelerating progress, whereas the second type would require a programme aiming for a transformation of the entire economic or socio-technical system (ESIR, 2017\[16\]). Another taxonomy of societal challenges is developed by Wesseling et al (2019\[17\]) based on their level of contestation (diverging problem framings due to different claims, conflicts of interests, etc...), complexity (lack of clarity about responsibilities due to the multi-dimensional nature of the problem) and uncertainty (lack of or fragmented knowledge related to the problem).

37. So far, the literature has remained rather at the conceptual stage. The box below provides some elements drawn from some of the very few authors who have ventured into studying the operational procedures that could be used for selecting challenges.
Box.1. Criteria and process to select challenges

Mazzucato in her study commissioned by the European Commission proposes five criteria to select a challenge (Mazzucato, 2018[18]). They should be:

- Bold, inspirational with wide societal relevance in order to engage the public at large;
- Targeted, measurable and time-bound to clearly frame the mission;
- Ambitious in terms of research and innovation actions but realistically feasible within the timeframe;
- Cross-disciplinary, cross-sectoral and cross-actor innovation;
- Open to multiple, bottom-up solutions.

Arnold et al. (2019[19]) in a recent report delivered to the Research Council of Norway (RCN) propose the following steps:

- A broad consultation, spanning citizens, business, the state and the research community, to identify a set of societal challenges that could be tackled and to ensure the social legitimacy of including them among possible candidates;
- A selection process, reducing the number of challenges to be considered to, perhaps, half a dozen;
- A foresight exercise, involving panels of informed citizens and stakeholders in creating desirable scenarios involving intervention, setting out the expected impacts and explicitly identifying the unique contributions the country could make and the benefits to this country (in business as well as social terms) of doing so;
- A final selection process, which assesses the proposed scenarios and selects perhaps three for implementation, based primarily on the amount of economic benefit thought likely to accrue to the country;
- The government has to own the selection process and its results and devote considerable effort to communicating the results of its process back to the citizens, showing how this connects with the original consultation.

3.2. Mission-oriented initiatives for strategic orientation

38. The main type of MOIPs that intervene primarily at the level of strategic orientation are the mission-oriented National STI strategies.

3.2.1. Mission-oriented national science technology and innovation strategies

39. As revealed by a recent OECD survey on the governance of public research policy, most OECD countries have STI strategies explicitly referencing societal challenges. Out of the 35 countries surveyed, 33 (94%) have a national STI strategy or plan in place and meeting major societal challenges is an objective in most of these strategies (30 of 33 strategies) (OECD, 2018[20]). Although valuable, this statistics does not provide insights about the quality and relevance of strategic orientation in these countries. Innovation policy reviews show that in many countries the lack of strategic orientation does not lie in the absence of an STI strategy but in the multiplication of strategies, providing mix – sometimes conflicting – signals. Moreover, the status and format of these strategies also often make them in practice more like communication documents in a context of national political turf than effective strategic guidance documents.

40. To be used as a MOIP tool, or at least as part of a mission-oriented approach, some minimal requirements should be met.
Table 5. Main implications of mission-orientation requirements for national STI strategies (preliminary and non-exhaustive)

<table>
<thead>
<tr>
<th>Component</th>
<th>Attributes of mission-orientation initiatives</th>
<th>Selected implications for national STI strategies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strategic orientation</td>
<td>• Legitimacy • Directionality • Leadership</td>
<td>• Mechanisms for consultation with stakeholders and relevant authorities in diverse policy fields • Objectives reflecting broad consensus in the society on the way forward and the role of STI activities in the chosen development path</td>
</tr>
<tr>
<td>Policy coordination</td>
<td>• Intentionality • Flexibility • Horizontality • Intensity • Explorativity</td>
<td>• Translation of the broad objectives and priorities set in the Strategy into concrete targets to be reached in a defined (mid- to long-term) timeframe (either in the Strategy • Provisions for holistic co-ordination of the interventions falling under the targeted priorities • Arrangements for experimentation of different development paths to reach these objectives</td>
</tr>
<tr>
<td>Policy implementation</td>
<td>• Diversity • Leverage • Measurability and evaluability • Reflexivity</td>
<td>• Provisions for revision and adaptation based on lessons-learned from implementation and evaluation</td>
</tr>
</tbody>
</table>

41. The most obvious type of national STI strategies that fits the definition are those that are structured around missions (Table 6). So far, only few of them do so, and most of these are still at a very early stage. All of them are currently under development and they have yet to develop (or have just developed, in the case of the Netherlands) their operational plans and governance setting. Most other national STI strategies do not explicitly refer to missions but can have some mission-orientation attributes, such as for instance the setting of clear and time-bound targets and/or the establishment of inter-ministerial groups to ensure coordination of public actions and monitor their implementation.

Table 6. Main national STI strategic framework structured around explicit missions

<table>
<thead>
<tr>
<th>Country and name of the strategic framework</th>
<th>Missions</th>
<th>Background information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mission-Oriented UK Industrial Strategy (United-Kingdom)</td>
<td>Focus on four Grand Challenges decided by government in May 2018: • The Clean Growth mission: to at least halve the energy use of new buildings by 2030 • Mission for AI and Data Economy: to use data, Artificial Intelligence and innovation to transform the prevention, early diagnosis and treatment of chronic diseases by 2030. • Mission for Ageing Society: to ensure that people can enjoy at least five extra healthy, independent years of life by 2035, while narrowing the gap between the experience of the richest and poorest • Mission for Future of Mobility: to put the UK at the forefront of the design and manufacturing of zero-emission vehicles, with all new cars and vans effectively zero-emission by 2040.</td>
<td>Developed by the UCL Commission on Mission-Oriented Innovation and Industrial Strategy (MOIIS), chaired by Professor Mariana Mazzucato and Lord David Willetts. Launched in May 2019</td>
</tr>
<tr>
<td>Mission-Driven Top Sector Policy (The Netherlands)</td>
<td>25 missions addressing four challenges: • Energy transition and sustainability: • Agriculture, water and food: • Health and Care</td>
<td>The Top Sectors policy was originally launched in February 2011, then revised in 2018 under the name of ‘Mission-Driven Top Sector Policy’</td>
</tr>
</tbody>
</table>
For instance, the energy transition and sustainability is addressed via 2 missions:
• Cut the country’s greenhouse gas emissions by 49% in 2030, rising to 95% in 2050, compared with 1990.
• A sustainably driven, fully circular economy in 2050. The objective for 2030 is to achieve a 50% reduction in resource use.

The top sectors collaboratively worked on concrete Knowledge and Innovation Agendas (KIAs), delivered in July 2019. Five KIAs produced, one for each of the challenge, and an additional one on key enabling technologies

On the basis of the KIAs, Knowledge and Innovation Contracts will be drawn up by November 2019. These include agreements between public authorities, businesses, knowledge institutions and potentially civil society organisations on the use and distribution of public and private funds for research as well as on valorisation and market creation.

The new High-Tech Strategy (HTS 2025) include 12 missions
• Fight cancer.
• Digitally network research and care - for intelligent medicine.
• Substantially reduce plastic inputs into the environment.
• Extensive greenhouse gas neutrality of the industry.
• Sustainable circular economy
• Preserve biodiversity.
• Building battery cell production in Germany.
• A safe, networked and clean mobility.
• Good living and working throughout the country.
• Technology for humans.
• Apply Artificial Intelligence to the application.
• New sources of new knowledge.

The High-Tech Strategy (HTS) was launched in 2006. It was revised in 2010 and 2014. The New High-Tech Strategy was launched in 2018. Interim assessment of the High-Tech Strategy 2025 undertaken in 2019

Part of the new Framework Programme Horizon Europe (2021-2027) will be structured around five European research and innovation missions:
• adaptation to climate change, including societal transformation
• cancer
• healthy oceans, seas, coastal and inland waters
• climate-neutral and smart cities
• soil health and food

The Commission held a call for feedback on missions which was open for contributions from 22 February 2018 until 4 April 2018. Five panel of experts (mission boards) have been appointed in July 2019. Each mission board consists of 15 experts, including the chair. They help specify, design and implement each mission by the end of 2019.

Two national missions have been set:
• The Genomics Health Future’s Mission (GHFM)
• Great barrier reef mission

The mission on Genomics was proposed in 2018 the Australia 2030 strategy. It has a $500 million budget over 10 years. An expert advisory committee has been appointed for developing the operational plan of the mission

The Long-Term Plan for Research and Higher Education (LTP) (Norway)
42. The Norwegian Long-Term Plan for Research and Higher Education (LTP) was presented to the Parliament in October 2014. Although there have been STI strategic documents in the past (notably the ‘White Papers’), this strategic enterprise is unprecedented in Norway due to several ‘built-in’ features: it has a long-term (10 years) perspective, it aims to serve as a plan and not only a strategy (it includes concrete actions for the first four years), it covers a broad policy spectrum (not confined to the policy fields in the remit of the Ministry of research and education [MER]).
Mission-oriented features of particular interest:

- High-level legitimacy;
- Interministerial co-ordination at the political and administrative level in each priorities via dedicated co-ordination groups;
- 10-years strategy revised every four years;
- Some attached budget and actions for 4 years period.

The German New High Tech strategy

43. The German High Tech Strategy was launched in 2006, setting a general guideline for the German governments and its ministries. The overarching objective of the strategy is to sustain the country’s position in global competition centred on research and innovation. Improving the framework conditions to technological innovation was the initial thematic focus of the strategy, emphasising knowledge transfer between science and industry and investments in skills upgrading and firms’ internationalisation (European Commission, 2018[21]). The initial target of the mission was to increase Germany's total intramural R&D expenditures to 3% of GDP, which was first met in 2015. In 2010 and 2014, the mission has been expanded, broadening the concept of innovation by going beyond competitiveness and science and technology goals. The revised strategy included concepts such as social innovation, placing society as a central player in Germany’s innovation system, and new objectives such as promoting innovation activities that contribute to face global societal challenges.

44. In the New High Tech Strategy (‘German High Tech strategy 2025’), the national strategy was redesigned to be firmly anchored around twelve concrete missions.10 As a revised overarching goal, the government wants to increase spending on research and development in Germany to 3.5 percent of GDP by 2025.

- Mission-oriented features of particular interest:
  - Broad and encompassing scope, including not only technological innovation but also social innovation;
  - Structured around 12 missions;
  - Act as a strategic framework for bundling public investment across ministries according to commonly defined priorities;
  - High-Tech Forum comprising members of universities, research institutions and the business sector to provide guidance and make specific recommendations for implementing and advancing the Strategy.

Dutch Mission-driven Top Sector and Innovation Policy

45. The Dutch Government launched the Top Sectors approach in February 2011 with the goal of promoting innovation for international competitiveness and emerging social challenges. Through the Top Sectors approach, the Dutch government further strengthens the international position of nine sectors in which the Netherlands has a competitive advantage.11 The approach concentrates public resources on nine sectors and promotes co-ordination of activities in these areas by businesses, government and knowledge institutes.

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10 The 12 missions are accessible here: [https://www.hightech-strategie.de/de/missionen-1725.html](https://www.hightech-strategie.de/de/missionen-1725.html) (accessed on 01/06/2019)

11 The nine identified top sectors are accessible here: [https://www.government.nl/topics/enterprise-and-innovation/encouraging-innovation](https://www.government.nl/topics/enterprise-and-innovation/encouraging-innovation) (accessed on 02/06/2019)
46. The Top Sector and Innovation Policy was revised in 2018. It is now focused on four major societal themes, which together cover 25 missions with precise objectives to be met by Top Sectors partners. The top sectors have developed concrete Knowledge and Innovation Agendas for each of the four themes. These agenda set out on which knowledge and innovation challenges the top sectors will focus over the years ahead, and what their priorities will be, with a view to realise the missions under each theme.

- Mission-oriented features of particular interest:
  - Structured around 25 missions, to be implemented cooperatively by several top sectors;
  - Involvement of a broad range of stakeholders in designing and implementing the Dutch Top Sectors strategic framework;
  - Specific agenda in each Top Sector, including a strategic plan and suggested policy instruments across ministerial portfolios;
  - Strategic missions are formalised in bi-annually updated innovation contracts.
4 Mission-orientation at policy co-ordination level

47. This section deals with the level of mission-orientation that forms the ‘engine’ of the mission-oriented policy approach. As set out in section 2, the main function to be fulfilled at this level is to ensure the consistency of public interventions implemented by different policymaking institutions covering different policy fields. This is achieved via different modes of co-ordination of public interventions across policy fields in order to reach concrete objectives and targets in a defined timeframe.

48. These modes of co-ordination can pertain to mechanisms, institutions and arrangements whose objective is uniquely or mainly to perform the needed co-ordination, or be embedded in other initiatives that pertain to the levels of strategic orientation or policy implementation. This section considers only the first type.

4.1. Conceptual background

49. In essence, policy co-ordination allows to:
   - Avoid, reduce or mitigate mutual adverse consequences of interventions designed and implemented between different policy actors;
   - Avoid gaps resulting in unattended needs from potential beneficiaries;
   - Pool financial resources, share risks and bring together information and expertise in order to be more effective in understanding and dealing with problems of common interest.

50. Although these simple principles make a strong case for co-ordinated policies, policy co-ordination is one of the oldest and remain the most prevalent challenge for governments, as demonstrated in OECD innovation policy reviews in the STI policy field and by an abundant literature in science policy for all policy fields (Peters, 2018[22]). It has become an even more pressing concern since the 1980s with the diffusion of the New Public Management doctrine and its focus on ‘agencification’ and the creation of individual programmes. This has called for more elaborated co-ordination arrangements to ensure the consistency of decentralised governance and policy systems.

51. More recently, four drivers have further increased the STI coordination imperative:
   - The linear view of the innovation process, although still deeply anchored in many national innovation systems, has become increasingly challenged. There is no natural flow of knowledge and technology that transform good ideas in relevant research, valuable innovation and economic and social impact. The innovation chain needs a variety of backward and forward linkages, which need to be constructed and properly coordinated to be effective;
   - The so-called ‘wicked problems’ caused by societal challenges have made the need for a ‘joined-up government’ even more necessary. As stated by Peters, ‘attempting to deal with a problem such as climate change or sustainable development requires the involvement of much of government, and hence co-ordination’ (Peters, 2018[22]);
STI policies and instruments have become more differentiated, addressing specific identified failures, from the support to basic ‘free’ research to the support to social entrepreneurship, the promotion of international collaborative research or the provision of problem-solving expertise to low tech SMEs, to name only a few. As many of the problems and gaps these specific instruments interact (not least because their communities of beneficiaries might overlap or complement each other to produce social and economic development), it is essential that the different strands of innovation policy and associated policy instruments fit together. This is particularly difficult to achieve, particularly in regard to policies whose primary objectives are other than innovation (OECD, 2010[23]) and/or among policy bodies intervening in different sectors (as it is the case for policies addressing societal challenges), which can be less knowledgeable about the specificities of research and innovation;

Many OECD countries have moved towards increased regionalisation of STI policy, with more competencies and resources for supporting research and innovation devolved to sub-national authorities. This shift towards local level is the result of two main policy trends (OECD, 2011[24]): first, a paradigm shift in regional policies that favours knowledge-based regional economic development strategies. Second, there is a growing recognition of the adequacy of the regional level dimension to harness localised assets and improving policy impacts. The multiplication of innovation clusters, for instance, results from this recognition of the importance of place-based innovation policies.

Against this backdrop, different types of co-ordination co-exist. Horizontal co-ordination relates to the arrangements aiming to increase the coherence of decisions between different policy fields, across political and administrative silos. The boundaries between different policy fields usually correspond to various interventions implemented to support sectors (agriculture, industry, digital affairs, etc…) or stages in the innovation chain (basic research, applied research, innovation, demonstration). Vertical co-ordination aims to make policy actions more coherent across levels of government. As mentioned above this has become a more pressing concern in many countries and is by constitution a crucial issue in federal countries.

4.2. Mission-oriented initiatives for policy co-ordination

The different types of MOIPs which intervene primarily at the level of policy co-ordination are:

- Cross-sectoral mission-oriented policies;
- Public-private co-ordination platforms;
- Interministerial co-ordination groups.

4.1.1. Cross-sectoral mission-oriented policies

Depending on countries and specific thematic areas, cross-sectoral mission-oriented policies can be closer to a thematic strategy or a policy. Their main specificity is to provide guidance and a co-ordination environment for all actors pertaining to a given area. This thematic focus somewhat facilitates co-ordination as they intervene in a more coherent environment, with a lower number of actors and less disparate objectives.

Energiewende

An example of approach relying on the co-ordination of multiple policy areas is the energy transformation initiative in Germany, widely known as the Energiewende. Energiewende represents Germany’s planned transition to a low-carbon, nuclear-free economy, which goes beyond just transforming
Germany’s energy production system. The initiative includes, for example, a transformation of Germany’s energy consumption and distribution aiming at increasing energy efficiency and reducing emissions.

- Mission-oriented features of particular interest:
  - Multi-level governance structure (federal/landers);
  - Dedicated energy transition platforms for continuous interministerial co-ordination and dialogue with stakeholders;
  - Strong linkages to policy implementation.

**Japanese Hydrogen Energy Initiative**

56. The Japanese Hydrogen Energy initiative is a joint enterprise by the government and industry, which started in 2015 and will terminate in 2040. It was motivated by the 2011 Earthquake and Tsunami disaster, which led Japan to look for alternative – non-nuclear – sources of sustainable energy. The main objectives of the initiative is to transform the Japanese energy system towards hydrogen-based energy system in order to diversify energy sources, cut carbon dioxide emissions, and cope better with natural disasters. The government aims to maintain the global leadership of Japan in the nascent fuel cell technology industry and foster economic growth.

- Mission-oriented features of particular interest:
  - A cross-sectoral political governance structure with intensive involvement of private sector and academic communities;
  - Linkages to a portfolio of supply and demand side policy instruments in the area of Hydrogen and fuel cells.

**4.1.2. Public-private and interministerial co-ordination platforms**

57. As governments searched for new modes of co-ordination more flexible and less heavy than large programmes and research consortia, they increasingly relied on co-ordination platforms where a wide range of stakeholders in a technological area gather regularly to discuss common challenges and opportunities, from research to demonstration and regulation.

**The 21-Platforms in Norway**

58. The so-called ‘21-Platforms’ or ‘21-Forums’ have been created since 2001 at the initiative of the Norwegian government to serve as advisory bodies and stakeholder forums in priority areas such as oil and gas, climate, energy and marine research. The objective of the 21-forum strategy processes is to obtain strategic advice from industry, research and other actors to develop STI policies that prepare for industries and a society of the 21st century. More precisely, the 21-forums create a strategy for their area through consensus among the participants, support corresponding political priorities and promote the co-ordination of activities within their respective area.

59. The 21-strategies are formulated by committees that serve as advisory bodies and stakeholder forums. The committees are appointed by the government ministries and with representatives from businesses, research institutions and public administrations. The committees both formulate strategies for R&D and innovation and serve as forums for strategic collaboration. For some 21-forums, the committees function as permanent advisory bodies that advise the government on the implementation of the strategic

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12 The “21-forums” are OG21 (oil and gas), Energi21 (energy), Klima21 (climate), Maritim21 (maritime), Hav21 (marine), Bygg21 (construction), HelseOmsorg21 (health and care, see Box 5.3) and Skog22 (forestry).
recommendations, and may be given the task of updating the strategies. In other 21-forums, the process ends with the release of the strategic report.

- Mission-oriented features of particular interest:
  - Allows the relevant community of actors to design, monitor and revise a strategy in their area via a permanent secretariat (not in all 21-Platforms);
  - Linkages to policy implementation via an action plan drafted by the government.
5 Mission-orientation at policy implementation level

60. The various activities undertaken at implementation level cover different sectors, disciplines and/or stages of the innovation cycle.

5.1. Conceptual background

61. Whereas policy orientation and policy co-ordination feature at the core of the STI literature, the specific challenges of policy implementation remains somewhat overlooked. Most of the academic work on this issue relate to developing countries, focusing on problems such as the shortage of policy capabilities, the lack of political and administrative continuity and the bureaucratic burden.

62. Two of the reasons for this relative paucity of academic work on STI policy implementation are the diversity of implementation tools and the importance of practical contingencies on successful implementation. The two characteristics of this stage of the policy cycle renders generalisation more challenging, hence maybe a certain prudence of scholars before addressing this issue.

63. Although closing this gap goes of course far beyond the scope of this project, it is important to consider how in practice some policies and programmes have been implemented (hence not only conceived/designed and co-ordinated) and, when information is available, for what results.

64. This can be done notably by paying particular attention to:

- **Policy instruments.** As previously mentioned, an important part of mission-oriented policies consists of co-ordinating existing policy instruments in a different way (in a nutshell: more oriented and holistic).

- **Organisational dynamic capabilities.** The implementation of a mission-oriented policy approach might require significant changes within policy bodies, notably research and innovation agencies. While this project is mainly on the inter-organisational consequences of mission-orientation, it can draw for instance on work conducted by the OECD Observatory of public sector innovation (OPSI) on the use of systems thinking, strategic design, open innovation within the public sector in the context of MOIPs. The question of the public sector dynamic capabilities needed for implementing a mission-oriented policy approach has also been studied by a few scholars (Kattel and Mazzucato, 2018 [25]) (Karo, 2018 [26]). To a great extent they reflect the requirements that have been presented at the level of the whole system (e.g. leadership, engagement, flexibility, etc...). Some action research projects like the one currently conducted at Vinnova can also bring interesting insights;

- **Evaluation of mission-oriented policies.** So far, existing work has been mainly confined to making a case for a change of evaluation practices to adapt to the specificities of systemic policies (Arnold, 2004[27]) and go beyond single instruments evaluation (meta-evaluation, evaluation of systems,

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policy-mix evaluation, etc.), identifying the different types of ‘system-oriented innovation policy evaluation’ and the limited number of such evaluations in practice (Borrás and Laatsit, 2019[28]).

5.2. Mission-oriented initiatives for policy implementation

65. The different types of MOIPs that intervene primarily at the level of policy implementation are:

- Large public-private integrated programmes;
- Delegated community programmes;
- Mission-oriented agencies’ programmes and projects.

5.3.1. Precompetitive research consortia and programmes

66. These large-scale programmes are set to gather a significant part of relevant public and private in an emerging area to support research and innovation activities and achieve commonly agreed-upon objectives. This category encompasses a wide variety of different designs, from the Pre-competitive research consortia in the 1980s and 1990s to nowadays’ more flexible and modular arrangements. The justification of the former initiatives largely relied on their ability to mitigate and internalise knowledge spillover through co-operation, share risks, and enhance/preserve firms’ incentives under conditions of low appropriability of results and high uncertainty. The justification of the more recent programmes focuses on the co-ordination of wide interdisciplinary and cross-sectoral programmes to meet ambitious objectives that are considered out of reach of single instruments.

The United States Advanced Battery Consortium

67. Pre-competitive research consortia are formed by manufacturing companies, often with the support of government, for the purpose of conducting shared research on new technologies for the benefit of the consortium's member companies. These – often large-scale – public-private programmes were especially popular in the United States and in Japan to improve national competitiveness in key sectors such as semi-conductors (the VLSI and Sematech consortia) in the 1980s and to respond to growing environmental concerns in 1990s. For instance, the U S Advanced Battery Consortium was launched in the 1990s by the Big Three automakers and the federal authorities (Department of Energy and Department of Commerce) to establish common performance targets for electric vehicles battery and support various options of battery technology available at the time. This systemic approach enabled a systematic exploration of the technology landscape and reduce uncertainty on the best options for battery technology. Since then the consortium has gone through several structural changes, but still operates with the same objective.

- Mission-oriented features of particular interest:
  - Structure of governance and management process allowing for strong linkages between the government, the carmakers (users), the battery manufacturers (suppliers) and the national laboratories (basic research and test);
  - Strong demand articulation via common targets and test procedures defined with the carmakers;
  - Strategy of systematic exploration of the different available options in a normalised environment (targets and test procedures).
### 5.3.2. Niche scaling user-led programmes

68. An important common dimension of these programmes is the strengthening of the articulation with the demand, notably through the key role played by users in their governance and implementation at the very early stage of the projects.

#### The Challenge-driven Innovation initiative - Sweden

69. The Challenge-driven Innovation (Utmaningsdriven innovation - UDI) initiative was launched as a Swedish response to the 2009 Lund declaration on societal challenges. Precisely its initial objectives were to:

- Generate solutions that contribute to green and socially sustainable growth;
- Generate solutions that can be sold on the international market;
- Create new business opportunities/market segments or realise radical cost savings by developing new goods, services, processes or other solutions;
- Strengthen Sweden’s attractiveness for conducting research and innovation and attracting foreign direct investment;
- Increase Swedish participation in EU research programmes aimed at increased competitiveness.

70. To reach these goals, the programme was set up according to an innovative user-led design that allows supporting projects that are focused on the demand for society and industry (not the technology) and that are cross-sectoral in order to unleash undiscovered innovation opportunities on the market. Innovation programmes for societal challenges was not a novelty in Sweden, and neither was the involvement of users or the implementation of stage-gate project management approach. However, what was new was the combination of all these elements in a package deliberately designed as a response to Lund, focusing on problems defined by societal needs rather than technological targets and placing greater emphasis on widespread co-production.

- Mission-oriented features of particular interest:
  - Articulation with demand via early and active involvement of users in projects;
  - Stage-gate project management;

### 5.3.3. Delegated community programmes

71. Some governments have tried to delegate selected responsibilities related to strategic orientation and co-ordination to relevant stakeholders in key priority areas. Significant lessons learned for the governance of mission-oriented policies can be drawn from these initiatives that aim to support the development of ecosystems in targeted areas. Two initiatives falling under this type are the Finnish Strategic Centres for Science, Technology and Innovation (SHOKs), established in 2006, evaluated in 2014 and phased out gradually in 2015; and the Swedish Strategiska innovationsprogrammet (SIPs).

#### The Strategic Innovation Programmes initiative in Sweden

72. The Swedish SIO initiative was announced in the 2012 Research and Innovation Bill. Its aim is to improve international competitiveness and find sustainable solutions to global challenges by enhancing cross-sectoral interactions between the many varied actors and support research and innovation programmes or projects within each of these areas by developing bottom-up strategic innovation agendas. The innovation agency VINNOVA finances and selects these initiatives and, in a later stage, fund
programmes that are relevant to these strategies (OECD, 2016[29]). Hence, the SIO initiative is not only a bottom-up strategy formulation processes, it also includes specific arrangement for policy co-ordination and implementation within each area, closely linked to the agendas.

- Mission-oriented features of particular interest:
  - Delegation of the initiative and development of the research agendas to the relevant community of actors in each area;
  - Active role of the government (via agencies) as catalyser, not picking winners, but ‘supporting the building of and co-operation within communities in emerging areas;
  - Multi-stage approach with seed-funding for the development of the research agenda, selection and funding of the SIPs, and implementation of the SIPs via project funding.

5.3.4. Mission-oriented agencies' programmes and moonshot projects

73. Mission-oriented agencies are governmental organisations with a clear mandate to address specific missions. Mission-oriented agencies are one of the major types of research funding bodies, along with research councils and semi-public foundations for strategic research. They tend to be considered more closely aligned with policy objectives, while research councils can be seen as an expression of the Bush model, a model based on trust between politics and science and self-steering of science. Notwithstanding, mission-oriented agencies can still strongly dependent on the interest and support of the scientific community (Braun, 1993[30]). For example, mission-oriented agencies often use secondment practices to bring high-level scientists into the civil service for limited time periods, rely on scientific peer-review for project selection and align with national strategies for science (Mazzucato, 2018[31]).

74. Mission-oriented agencies leverage what has been called ‘mission mystique’ to engage its internal and external stakeholders. It consists of a coherent portfolio of emotive and cognitive elements with a mission at its core cause. The mission becomes immersed in a mobilising and supportive culture that produces a shared sense of identity and pride (Goodsell, 2011[32]). It is an honour to work in a mission-oriented organisation where ambitions for the use of innovation to solve societal problems are the ultimate goal. A key focus of mission-oriented agencies is often to promote ambitious, exploratory and ground-breaking projects (moonshots), which deploy a radical solution by developing a breakthrough technology to address a complex and enormous problem. The term ‘moonshot’ derives from the Apollo 11 space project, which landed the first human on the moon.

Table 7. Main implications of mission-orientation requirements for National Agencies (preliminary and non-exhaustive)

<table>
<thead>
<tr>
<th>Component</th>
<th>Attributes of mission-orientation initiatives</th>
<th>Selected implications for National Agencies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strategic orientation</td>
<td>• Legitimacy</td>
<td>• High-level of authority, for instance having their budgets and annual plans voted and approved in national parliaments</td>
</tr>
<tr>
<td></td>
<td>• Directionality</td>
<td>• Clear mandate to pursue their mission through discretionary/targeted policy instruments</td>
</tr>
<tr>
<td></td>
<td>• Leadership</td>
<td>• Capacity to leverage ‘mission mystique’ to inspire and motivate internal and external stakeholders in turn of a common goal</td>
</tr>
</tbody>
</table>

For Official Use
### Defence Advanced Research Projects Agency ‘challenge-oriented’ programmes

75. The US Defence Advanced Research Projects Agency (DARPA) was formed to address the problem of transformative ground-breaking innovation. Instigated in 1958 in response to the Sputnik shock, DARPA was created with the explicit mission of to ensuring that the US would never again face a national security ‘technological surprise,’ like Sputnik, due to failure to pay adequate attention to and stay focused on breakthrough technological capabilities (Bonvillian and Van Atta, 2011[33]). DARPA is not a broad research organisation or lab but a ‘moonshot projects’ agency. It promotes particular technology projects that contribute to the interests of the US Department of Defence (DoD), working primarily on the advanced stage of innovation, not on incremental or engineering efforts that other parts of DoD focus on. The model embodied by DARPA has inspired many mission-oriented agencies. For example, in 2007 the US Department of Energy created the Advanced Research Projects Agency—Energy (ARPA-E) to promote breakthrough innovation projects that contribute to meet energy technology challenges.

- Mission-oriented features of particular interest:
  - Robust financial support and wide expertise provided for ‘moonshot’ type of projects;
  - Leverage the organisation’s ‘mission mystique’ to attract highly talented programme managers as well as the most promising project applications;
  - Agile organisational structure, promoting risk-taking and giving authority to programme managers.

### National Institutes of Health oriented programmes

76. The NIH (National Institutes of Health) is the largest single funder of biomedical research in the world. The NIH’s stated mission is ‘science in pursuit of fundamental knowledge about the nature and behaviour of living systems and the application of that knowledge to extend healthy life and reduce the burdens of illness and disability.’ The mission comprises two different elements, often of difficult conciliation: the promotion of basic science and targeted mission-oriented health research. Long-lasting tensions between the science and health missions have persisted, but these factors together have helped the agency thrive, finding a balance between the two (Sampat, 2012[34]).

- Mission-oriented features of particular interest:
  - Balance and linkages between basic science and mission-oriented targeted research;
  - Important locus of interministerial co-ordination (e.g. during budget negotiations).
Pilot-E

77. Pilot-E was established in 2016 with the goal of being a ‘fast-track’ from idea to market, where selected projects receive simplified support throughout the whole technology development process from development to prototyping and commercialisation. It is defined as a public mission-oriented instrument addressing societal challenges by combining financial schemes from different governmental bodies and tailoring them for targeted projects. The Research Council of Norway, Innovation Norway and Enova are the responsible authorities to manage pilot-E, providing co-ordinated support to selected projects. In its third call for projects (2018) Gassnova also participated. The bulk of the programme’s budget is provided by the Research Council of Norway and by the Innovation Norway. A flexible financial framework from Enova supplements it supporting market introduction activities.

➢ Mission-oriented features of particular interest:
  o Interagency programmes, putting together their resources and instruments for commonly defined objectives;
  o Continuous (seamless) support from research to market introduction using a combination of instruments (research grants, innovation grants, loans, investment support, introductory schemes and public procurement);
  o Wide scope encompassing various technologies for different market segments, with corresponding performance targets to be reached.

5.3.5. Transformative ‘umbrella’ programmes

78. These programmes gather a wide range of initiatives loosely co-ordinated under a common institutional framework. Their main feature is that they are aimed to integrate within a single programme the three levels of strategic orientation, policy co-ordination and policy implementation. They are in themselves a ‘meso-system of innovation’ dedicated to broad transformative objectives. Due to their scale and scope, such programmes are rare.

The Cross-ministerial Strategic Innovation Promotion Programme (SIP) - Japan

79. The cross-ministerial Strategic Innovation Promotion Programme (SIP) is a national project under the Council for Science, Technology and Innovation (CSTI). It was launched in 2014 for five years (2014-2019 – SIP1). SIP’s second term (SIP2) started in 2018 and will last for another 5 years. Its objective is to promote the advancement of science, technology and innovation in Japan, to revitalise Japan’s economic growth and bolster Japan’s industrial posture in the world, while helping to address Japan’s five grand-societal challenges identified in the Fourth Basic Plan on Science and Technology (2011-16).

80. The programme aims to leverage industry-academia-government co-operation in order to efficiently transform basic research into commercialisation for powerful and strategic advancements in Japan’s STI.

➢ Mission-oriented features of particular interest:
  o Dedicated structure of governance to reach common broad objectives in specific thematic programmes, following specific R&D execution plans developed by each programme;
  o Operational autonomy and decision-power of programme directors;
  o Overall and programme specific monitoring and evaluation.
The ‘Investments for the Future’ Programme (Programme d’investissements d’avenir)

81. The Programme d’investissements d’avenir (PIA) was implemented in 2009 and covers the period 2010-2020, with an initial budget of €35bn. It aims to prepare France for future challenges (competitiveness, environment, health, etc…) and to renew its growth potential by investing in higher education and training, research, industry and SMEs, sustainable development and digitisation.

➢ Mission-oriented features of particular interest:
  o Wide ‘system-level’ programme with transformative goals and high legitimacy;
  o Pluri-annual and extra-budgetary financial resources;
  o New dedicated instruments to support different types of activities following novel policy approach (outside the traditional funding streams);
  o Monitoring and multi-level evaluation by a dedicated agency under a common framework.

Austrian Energy research and innovation strategy (ERI)

82. The new Energy Research Initiative (ERI) was launched in 2016 with the overall mission of contributing to the decarbonisation of the Austrian energy system. The mission is operationalised via the sustainability programmes run by the Federal Ministry of Transport, Innovation and Technology, such as ‘City of Tomorrow’, and ‘Mobility of the Future’ and the activity of the Austrian Climate and Energy Fund. ERI is the innovation component of a larger mission-oriented programme called ‘Integrated energy and climate strategy’, also known as ‘Mission 2030’. ‘Mission 2030’ gathers coordinated efforts by four different federal ministries, representing the Austrian share in attaining the European energy and climate change objectives defined in the Paris Agreement.

➢ Mission-oriented features of particular interest:
  o Wide ‘system-level” programme with transformative goals and high legitimacy;
  o Well-defined and measurable targets with specific time window;
  o Interministerial co-ordination through clearly distributed responsibilities.
6 Conclusions

83. The prime objective of this document was to develop an ‘actionable’ analytical framework to both apprehend the diversity of the MOIPs currently in place in various countries and propose practical fieldwork tools to characterise their specific attributes to address societal challenges. In a forward-looking perspective, this framework should also be used by policymakers and stakeholders not only to interrogate current practices, initiatives and institutions but also to collectively interact on the preferable ways to move forward and improve mission-orientation. To do this, the framework provides resources for structured discussions, without providing any one-best-way.

84. The analysis of a sample of cases using the framework should be considered as preliminary and ‘light-touch’, and primarily aimed at testing and improving the analytical framework and categorisation of MOIPs. This work relied on desk review using available resources, in particular some recent OECD Innovation policy reviews, the JIIP Observatory of mission-oriented policies and the EC-OECD STIP Compass. More precise analysis of cases can be undertaken using the analytical framework and, of course, more cases can be added, including in new categories of MOIPs.

85. Based on this preliminary work, the next step is to systematically scan through the policy landscape in a sample of voluntary countries – preferably those represented in the project Steering Group – in order to:

- Identify all MOIPs relevant to the categories proposed in this document;
- Identify MOIPs that do not correspond to the proposed categories of MOIPs and adapt the analytical framework accordingly;
- Based on desk review and a few targeted interviews, match the identified MOIPs in the different categories against the list of requirements. If necessary, adapt the list of attributes to capture all features that determine these initiatives’ impact on government’s ability to effectively address societal challenges.

86. The result of this analysis, along some statistical work, should allow a systematic ‘mapping’ of mission-orientation policy in the sampled countries at the different levels of national STI systems. These maps should provide a broad and precise overview of the different ways in which these countries address societal challenges through different types of systemic policies. It will also allow identifying potential gaps and opportunities for policy learning by comparing the different countries’ practices. Finally, a cross-comparison of these maps should help identify national and/or thematic patterns of mission-orientation, in relation to the relevant institutional contexts in which they are embedded.

87. This work will be done in parallel to the investigations conducted in in-depth case studies at country and initiative levels. Both strands of work will benefit each other to improve both the framework and the case study policy recommendations.
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(n.a.) (n.d.), X.


Larrue, P. (2003), *Coping collectively with the exploration/exploitation trade-off in research consortia*, Edward Elgar.


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Annex A. Definitions of mission-oriented policies in the literature

88. The first reference of mission-orientation was applied to the type of activities being supported, not to the policy itself. Weinberg (1967[35]) describes “Mission-oriented R&D” as “big science deployed to meet big problems”, where large-scale investments are needed in the early stages of a new technology. Similarly, Mowery “Mission-oriented R&D” is funded by public agencies to support their activities (Mowery, 2010[36]).

89. However, in most cases, the mission-orientation qualifies a specific type of policy, which has changed with the overall economic and social context. Initial references to “Mission-R&D policy” remained intimately linked to objectives of national sovereignty in part because defence-related R&D is among the most important components of “mission-oriented R&D”. The term “mission” even reveals strong connotations with military operations. (Schlenoff, Weiss and Steves, 2010[37]).

90. An initial definition of ‘mission-oriented technology countries’ was proposed by Henry Ergas (Ergas, 1987[38]) as those engaged in the search for international strategic leadership. Defence accounts for a high share of government expenditure on R&D in these countries. National sovereignty and technological leadership provide the major rationale for MOIPs and, to a lower extent, missions can also be used to meet technological needs in civilian markets. Common examples of MOIP include the ‘Manhattan Project’ or the ‘Apollo Programme’. The dominant feature of MOIPs as initially defined by Ergas is its concentration in terms of decision-making, number and types of technologies, projects and participants. The concentration element makes MOIPs non-neutral/directional as they entail investments with a preferential decision in terms of technological choice, purposely affecting the path of technological development in a specific direction. The centralisation of decision-making is a requirement to set clear goals managed and monitored by a particular government agency, which has considerable amount of discretionary power. Concentration also extends to the range of supported firms, since only a small number of firms tend have the technical and managerial resources required to participate in such programmes. Overall, in MOIP ‘a few bets are placed on a small number of races; but together, these bets are large enough to account for a high sham of each country’s total technology development programme (Ergas, 1987, p. 194[38]).

91. The growing urgency to face grand-societal challenges such as climate change in the 1990s and at the beginning of the 2000s has triggered an interest in deploying new policies that replicate the ‘mission-oriented’ design of the Manhattan or the Apollo programmes to fight global challenges. This was coined in the so-called Maastricht Memorandum as a ‘new mission for science and technology policy’ (Soete and Arundel, 1993[39]). While ‘old mission-oriented projects’ targeted the areas of nuclear, defence, and aerospace programmes, ‘new mission-oriented projects’ support environmentally sustainable development. In ‘old mission-oriented projects’ the mission was defined in terms of the number of technical achievements with little regard to their economic feasibility. In ‘new mission-oriented projects’, the mission is defined in terms of economically feasible technical solutions to particular environmental problems. Examples include policies with the mission of helping countries cut greenhouse-gas emissions by developing and commercialising carbon-free primary power technologies (Hoffert et al., 1998[40]; Michaelson, 1998[41]), develop hydrogen energy (Dunn, 2002[42]), or biofuels (Somerville, 2006[43]).

92. Against this backdrop, Freeman (1996[44]) refers to ‘new mission-oriented projects’ in the context of a ‘systemic model’ of innovation policy. This model is needed in order to enable a worldwide transition to a ‘green technoeconomic paradigm’. New mission-oriented projects require a wide range of participants including government, private firms and consumer groups contributing to influence goal setting and the
direction of technical change. In order to successfully fulfil the defined mission, a systemic model should be in place with a coherent portfolio of complementary instruments.

93. Mowery, Nelson and Martin (2010) stress that programmes using missions to target global challenges need a markedly different policy design than ‘old’ mission-oriented programmes. The challenges posed by global challenges such as climate change or global pandemics are of different nature from those posed by the development of an atomic bomb or moon landing. The Manhattan or Apollo projects were designed, funded, and managed by a few federal agencies, using mostly supply-side instruments to achieve a specific technological solution for which the government was effectively the sole customer. Systemic global challenges require efforts from several agencies, deploying supply and demand side instruments that aim to achieve a global mission for which humanity is the ultimate customer. Ultimately, Mowery (2012) suggests that the defining characteristic of mission-oriented R&D programmes seeking to address global challenges is the requirement of an extensive public support in the demonstration and adoption of selected projects.

94. Foray (2018) characterises ‘new mission-oriented R&D support programmes’ as policies that reconcile the need for centralised strategic co-ordination, selection, and establishment of priorities, with the logic of decentralised and entrepreneurial implementation required to address global systemic challenges. This characterisation is defined in the context of regional smart specialisation strategies (S3), considered by Foray to fit in the MOIP category.

95. For Kattel and Mazzucato (2018) and Mazzucato (2018), mission-oriented policies focus by definition on concrete problems to be solved, introducing the key dimension of ‘directionality’. MOIPs rely on two pillars: First, setting a purpose for public investments, the ‘big problems’; and second, act as enablers by creating conditions for new markets: enabling spillovers from ‘big science’ in form of new demand and supply.

96. In the JIIP report commissioned by the European Commission (European Commission, 2018), mission-oriented R&I initiatives are characterised as being ambitious, exploratory and ground-breaking in nature, often cross-disciplinary, targeting a concrete challenge, with a large impact and a well-defined timeframe. More specifically, they have a clearly defined (societal or technological) goal with preferably qualified and/or quantified targets and progress monitored along predefined milestones. Directionality and intentionality of these initiatives is what differentiate them from other types of policy initiatives.
### Annex B. Presentation of MOIPs test cases

**Mission-oriented initiatives for strategic orientation**

**National STI strategies**

**Table 8. The Norwegian Long-Term Plan for Research and Higher Education 2015-2024**

<table>
<thead>
<tr>
<th>Component</th>
<th>Main mission-orientation features</th>
</tr>
</thead>
</table>
| **Strategic orientation** | - Directionality - The strategy is structured around three overarching government objectives for (STI) policy: developing research communities of outstanding quality; enhanced competitiveness and innovation; and tackling major societal challenges. The LTP also includes four broad thematic priority areas (Climate, environment and clean energy; Seas and oceans; Public sector renewal, better and more effective welfare, health and care services; Enabling technologies). It therefore assigns a prominent place to societal challenges, not only as one of the three overarching priorities, but also in the four thematic priorities that incorporate many of these challenges  
- Intentionality - The strategy has also set broad horizontal targets (R&D intensity of 3% of GDP by 2030; increase the number of recruitment positions by 500 by 2018; increase appropriations to research infrastructure by NOK 400 million; increase appropriations to support Norwegian participation in ‘Horizon 2020’ by NOK 400 million)  
- Legitimacy - The thematic priorities and targets were developed via various consultation steps, including a call for input from various stakeholder and institutional actors, as well as significant interactions between the Ministry of education and research and relevant ministries in a number of working groups and other negotiations and hearings. This process led to a government decision and its presentation to the Parliament  
- Leadership - The MER remains the body primarily in charge of the LTP’s development and revision |
| **Policy co-ordination** | - Horizontality - The LTP is an attempt to encourage a more strategic and co-ordinated policy approach in the STI policy field, where co-ordination has been traditionally considered as ‘weak’ (Arnold and Mahieu, 2012[50]), due to a high degree of autonomy of individual Norwegian ministries in their respective fields (the so-called ‘sector principle’)  
- Intensity - The LTP had some concrete effects on horizontal co-ordination, notably through its role in high-level ‘LTP’ meetings chaired by the prime minister and in Cabinet discussions on STI issues, the establishment of some interdepartmental steering groups at administrative and political level in the different priority areas to develop and monitor the strategy; and via alignment work in the Research Council of Norway (RCN). As mentioned above, the discussion and drafting of the LTP itself have already contributed to closer government co-operation, since it was a government-wide activity |
| **Policy implementation** | - Policy mix diversity - As a strategic document, the LTP intends to guide policy implementation but does not embed intervention instruments  
- Reflexivity - The strategy is conceived on a four-year rolling basis and is revised every four years (it was revised in 2019) |

*Source: based on OECD (2017[51]).*
### Table 9. The German 2006 High Tech Strategy and 2010 New High Tech Strategy

<table>
<thead>
<tr>
<th>Component</th>
<th>Main mission-orientation features</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Strategic orientation</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Directionality - The new HTS focuses since 2014 on six ‘priority future tasks’: Digital Economy and Society, Sustainable Economies and Energy, Innovative Work Environment, Healthy Living, Intelligent Mobility and Civil Security</td>
</tr>
<tr>
<td></td>
<td>Legitimacy - Since 2014 the so-called High-Tech Forum was established comprising a broad range of stakeholders such as members of universities, research institutions and the business sector. The key task of the High-Tech Forum is to provide guidance and make specific recommendations for implementing and advancing the new High-Tech Strategy. The High-Tech Forum convenes three times per year. Apart from reporting back from the expert groups, the agenda includes discussion of topical research and innovation policy issues.</td>
</tr>
<tr>
<td><strong>Policy co-ordination</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Horizontality - The Strategy provides overall co-ordination, it is a co-ordinative umbrella framework for Germany’s federal government RTDI policies. It provide a framework for bundling public investment across ministries according to commonly defined priorities. The Federal Ministry of Education and research is responsible for co-ordination of activities regarding the definition of structural priorities in guidelines for activities</td>
</tr>
<tr>
<td></td>
<td>Verticality - The detailed planning of targets and measures in the respective thematic areas takes place under the aegis of the respective ministries in charge of specific areas, who set up stakeholder processes or co-ordinate with the German states themselves</td>
</tr>
<tr>
<td><strong>Policy implementation</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Policy mix diversity - It is not the aim of the Strategy to define concrete programmes and instruments as well as their respective targets in each and every detail, but to stimulate activities at a broad level, to allocate public funds to certain policy areas and to provide the necessary regulatory and legislative framework conditions, e.g. regarding IPR, or start-ups</td>
</tr>
<tr>
<td></td>
<td>Reflexivity - Since its first implementation in 2006 it has been revised or updated with every new legislation period</td>
</tr>
<tr>
<td></td>
<td>Measurability and evaluability - Progress report are regularly presented. No overarching impact evaluation of the HTS strategy in its thematic priorities has been undertaken</td>
</tr>
</tbody>
</table>

Source: Observatory on mission-oriented initiatives

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14 This observatory was developed by the Joint Institute for Innovation Policy (JIIP) and its partners in the context of the Study “Mission-Oriented Research and Innovation, Inventory and characterisation of initiatives” commissioned by the European Commission in 2017. Resources can be found at: [http://www.jiip.eu/mop/wp/](http://www.jiip.eu/mop/wp/).
Table 10. The Mission-driven Dutch Top Sector and Innovation policy

<table>
<thead>
<tr>
<th>Component</th>
<th>Main mission-orientation features</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strategic</td>
<td>• <strong>Directionality</strong> - The Top Sector policy was launched in 2011 and revised in 2018 to become the Mission-driven Dutch Top Sector and Innovation policy. The overall strategic goal of the Dutch Top Sectors approach is to promote innovation for international competitiveness and emerging social challenges. The decision to launch the approach was initially motivated by concerns over the countries’ international competitiveness, in particular, by the difficulties faced by Dutch exporters for expanding into emerging markets. The revised policy is now focused on 4 societal challenges: Energy Transition and Sustainability; Agriculture, Water and Food; Health and Care; and Security.</td>
</tr>
<tr>
<td>orientation</td>
<td>• <strong>Intentionality</strong> - 25 missions under these 4 themes have been drawn up by the relevant ministries in consultation with the top sectors, knowledge institutions, businesses, civil-society organisations and regional authorities for the four defined themes. These missions see to the translation of major societal challenges into concrete goals and ambitions. The top sectors have developed concrete Knowledge and Innovation Agendas for each of the four themes. These agenda set out on which knowledge and innovation challenges the top sectors will focus over the years ahead, and what their priorities will be, with a view to realise the missions under each theme. The KIAs also aim at strengthening competitiveness in these sectors. An Integrated Knowledge and Innovation Agenda (IKIA), which contributes to the missions, is also developed.</td>
</tr>
<tr>
<td></td>
<td>• <strong>Legitimacy</strong>: The agendas are developed by top sectors, in consultation with all the relevant partners in the field, such as businesses, ministries, the broad scientific community, knowledge institutions, NWO and regional public authorities. The diversity of background present in each team ensures that a broad range of stakeholders are involved in designing and implementing the Dutch Top Sectors strategic framework, and co-ordinated in turn of a common vision for each sector.</td>
</tr>
<tr>
<td></td>
<td>• <strong>Flexibility</strong>: Agendas span over 4 years, revised every 2 years.</td>
</tr>
<tr>
<td>Policy co-</td>
<td>• <strong>Horizontality</strong> – a wide range of government bodies are involved in the governance of the top sectors</td>
</tr>
<tr>
<td>ordination</td>
<td></td>
</tr>
<tr>
<td>Policy</td>
<td>• <strong>Policy mix diversity</strong>: various instruments falling under the responsibility of diverse government bodies are used to ensure that the missions are realized, such as regulations, procurement policy or financial and fiscal instruments.</td>
</tr>
<tr>
<td>implementation</td>
<td>• <strong>Leverage</strong>: The Knowledge and Innovation Contract includes agreements between public authorities, businesses, knowledge institutions and potentially civil society organisations on the use and distribution of public and private funds for research as well as on valorisation and market creation. They are based on drawn up on the basis of the Knowledge and Innovation Agendas and aim to ensure that knowledge institutions and the authorities invest jointly in R&amp;D and innovation.</td>
</tr>
<tr>
<td></td>
<td>• <strong>Measurability and evaluability</strong>: The government evaluates each proposed agenda, which includes a strategic plan and suggested instruments relevant to each top sector. The evaluation takes into account the level of ambition, the degree of commitment of stakeholders, the balance between social and economic agendas, and whether the objectives can be monitored and evaluated. The process of evaluation by the government at large helps sustaining policy co-ordination across different ministries.</td>
</tr>
</tbody>
</table>

Source: OECD (2014[52]).
Mission-oriented initiatives for policy co-ordination

Cross-sectoral mission-oriented policies

Table 11. The Energiewende

<table>
<thead>
<tr>
<th>Component</th>
<th>Main mission-orientation features</th>
</tr>
</thead>
</table>
| Strategic orientation | • **Directionality** - The goal of the initiative is to phase out Germany’s nuclear power plants by the end of 2022. It transform the energy system to become strongly reliant on renewable energy resources (min. 80% of the final energy consumption, min. 80% of the gross electricity consumption) and enhanced energy efficiency, and to reduce GHG emissions by 80-95% by the year 2050. This national initiative is an integrated policy that addresses all sectors of the economy in order to reach its objectives  
• **Intentionality** - These broad objectives have been translated into a detailed target architecture, with final goal set to 2050, and intermediate milestones in 2020, 2030 and 2040 |
| Policy co-ordination | • **Horizontality** - The main governing body is the Federal Ministry for Economic Affairs and Energy, in strong interactions with German Länder (multi-level governance) and other stakeholders. Twice a year meetings take place between the Federal Chancellor and the Federal Economic Affairs Minister with the presidents of the Länder in order to discuss the status of the energy reforms. The initiative has established five dedicated energy transition platforms (Energy Grids, Electricity market, Energy efficiency, Buildings, and Research and innovation) for continuous interministerial co-ordination and dialogue with stakeholders. The initiative mobilises many economic sectors and involves different technologies to achieve the transition towards an energy system relying on renewable energy sources and enhanced energy efficiency. Other participating authorities take Energiewende as a framework of reference to conduct relevant activities. The Ministry for Economic Affairs and Energy (BMWi) and the Ministry for Environment, Nature Conservation, Building and Nuclear Safety (BMU) typically draft most relevant legislation. The Ministry of Research and Education (BMBF) funds scientific and technological research in sustainability through e.g. its flagship FONA programme. The Ministry for Transport and Digital Infrastructure (BMVI) is responsible for legislation on transportation and the Ministry of the Interior, Building and Community (BMI) is responsible for urban planning and buildings’ energy efficiency. All new bills related with Energiewende follow a process of consultation between all relevant federal ministries to assure policy co-ordination. |
| Policy implementation | • **Leverage** - The initiative has concrete influence on policies being implemented. For instance; in its 6th Energy Research Programme, the German Federal Government outlined the principles and focus of its funding policy. It envisages concentrating funding to an even greater extent on those technologies that could contribute to the objectives of Energiewende.  
• **Measurability and evaluability** - The progress towards the targets set is monitored on an annual basis (monitoring report ‘Energy of the future’).  
• **Reflexivity** - Several adjustments have been made, especially to the renewable energy targets and feed-in tariffs after positive progress was made |

Source: Observatory on mission-oriented initiatives and Egenter, Russell and Wettengel (2017[53])

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15 This observatory was developed by the Joint Institute for Innovation Policy (JIIP) and its partners in the context of the Study "Mission-Oriented Research and Innovation, Inventory and characterisation of initiatives" commissioned by the European Commission in 2017. Resources can be found at: [http://www.jiip.eu/mop/wp/](http://www.jiip.eu/mop/wp/).
Table 12. The Hydrogen Energy Initiative

<table>
<thead>
<tr>
<th>Component</th>
<th>Main mission-orientation features</th>
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</thead>
</table>
| **Strategic orientation** | - *Directionality* - The initiative’s objectives are to: i) reduce the burden on the environment, cut emissions of carbon dioxide; ii) diversify energy sources; iii) generate beneficial economic ripple effects; and, iv) cope with natural disasters  
- *Intentionality* - These objectives are to be achieved through the development and wide-scale deployment of mini hydrogen plants at homes and businesses, a nationwide hydrogen distribution system coursing through the countryside, big advances in deployment and scale that would dramatically reduce vehicle and fuel prices, and the establishment of a carbon-free hydrogen manufacturing process  
- *Legitimacy* - A 3 stages plan has been devised through consensus-building among stakeholders in order to guide activities over the long term:  
  o Phase 1: dramatic expansion of hydrogen use and widespread diffusion of fuel cells  
  o Phase 2: introduction of hydrogen power generation and establishment of a large-scale system for hydrogen supply  
  o Phase 3: establishment of a carbon free hydrogen supply system using renewable energy sources and using carbon capture and storage (CCS) technologies for fossil-based hydrogen |
| **Policy co-ordination** | - *Horizontality* - The overall policy co-ordination resides with the Ministry of Economy, Trade and Industry (METI). The initiative has specific a cross-sectoral political governance structure with intensive involvement of private sector and academic communities:  
  o A Council for Strategy for Hydrogen and Fuel Cells (CSHF). The Council has 23 members from government, industry and research community. It maintains the strategic road map and reports to METI’s Agency of Natural Resources and Energy (ANRE). The Council functions as an advisory group for the government  
  o A regulatory reform committee operates within the cabinet office. The group’s role is to identify regulatory reforms necessary to implement the hydrogen society plan |
| **Policy implementation** | - *Policy mix diversity* - The initiative aims to guide government support via a large variety of supply and demand side policy instruments in the area of Hydrogen and fuel cells but is not formally linked to or embed modes of intervention |

Source: Observatory on mission-oriented initiatives
Public-private and interministerial co-ordination platforms

Table 13. The ‘Health&Care21 Strategy’

<table>
<thead>
<tr>
<th>Component</th>
<th>Main mission-orientation features</th>
</tr>
</thead>
</table>
| **Strategic orientation** | • *Directionality* - The 21-Forum in the health and care area produced the ‘Health&Care21 Strategy’ submitted to the government in June 2014. The three overall aims of the strategy were better public health, breakthrough research at a high international level and national economic and business development  
  • *Legitimacy* - This strategy was developed by the Health&Care21 Strategy Committee composed of 15 people appointed by the Ministry of Health and Care Services, representing industry, universities and university colleges, hospitals, regional health authorities, user organisations, and government agencies  
  • *Intentionality* - The Strategy identified five main priority areas – knowledge mobilisation for the municipalities, health and care as an industrial policy priority, easier access to and increased utilisation of health data, an evidence-based health and care system, a stronger emphasis on internationalisation of research |
| **Policy co-ordination**  | • *Horizontality* - the Health&Care21 Strategy Committee, which include different ministries  
  • *Demand-articulation* - In addition to the Health&Care21 Strategy Committee, the Ministry also established a ‘Strategic Forum on Health and Care Research and Innovation (Chief Executives’ Forum)’ |
| **Policy implementation** | • *Policy mix diversity* - Based on the strategy, the government drafted an ‘Action Plan for Implementation of the Health&Care21 Strategy’ in November 2015 in which it identified and committed itself to carrying out a number of initiatives to implement the Health&Care21 Strategy  
  • *Measurability and evaluability* - A Health Care 21 Advisory Board, with a dedicated Secretariat, funded by the Ministry of Health and Care Services and located at RCN, has an ongoing remit for overseeing the implementation of all the recommendations in the original strategy. This high-level, multi-stakeholder group, provides advice to Ministries and other users |

Source: based on OECD (2017[51]) and Schwaag Serger, Larrue and Smith (2017[54])

Mission-oriented initiatives for policy implementation

Public-private user-led programmes

Table 14. The United States Advanced Battery consortium

<table>
<thead>
<tr>
<th>Component</th>
<th>Main mission-orientation features</th>
</tr>
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</table>
| **Strategic orientation** | • *Directionality* - Broad objective by the US carmakers and the federal government to foster the development of electrochemical energy storage technologies within the US, that support commercialisation of electrified vehicle powertrains  
  • *Intentionality* - The broad objective has been translated in precise performance targets for batteries and other key components, to be tested under normalised test procedures developed by the consortium with DOE’s national laboratories. The targets and test manuals have become standards even beyond the boundaries of the consortium.  
  • *Flexibility* - The targets have been revised regularly to adapt to technical progress and changes in needs for electric vehicles |
Policy co-ordination

- **Demand-articulation** - The consortium engages automobile manufacturers, EES manufacturers, the National Laboratories, universities, and other key stakeholders intervening in the energy storage and electric vehicle value chain. This allows for the combined technical and financial resources of the DOE, automotive OEMs (FCA US, Ford, General Motors), technology development partners, and U.S. National Laboratories to jointly conduct advanced battery research and development on a cost shared basis. Specific governance structure: USABC Management Committee (MC), USABC Technical Advisory Committee (TAC), each composed of carmakers and DOE representatives, with clear mandates.

- **Explorativity** - During the 1990s, before the convergence towards lithium batteries, the consortium has systematically supported different teams (composed of battery manufacturers and national labs) developing and testing the various battery technologies. Systematic linkages with federal laboratories.

Policy implementation

- **Policy mix** - The consortium launches call for proposal and select projects on different technologies, keeping an open non-prescriptive technological approach to attain the goals commonly established for different components and types of vehicles, in a given timeframe (typical total programme budget - $1.0m to $Multi-millions - 50% cost share provided from USABC/DOE).

=> The consortium numerous funded projects over more than 3 decades has resulted in the successful commercialisation of various electrical energy storage technologies and increased presence of developers of these technologies within the US.

Source: Larrue (2003) and Elder (2016)

Table 15. The Cross-ministerial Strategic Innovation Promotion Programme (SIP)

<table>
<thead>
<tr>
<th>Component</th>
<th>Main mission-orientation features</th>
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</thead>
<tbody>
<tr>
<td>Strategic orientation</td>
<td><em>Directionality</em> - The objective of the programme is to enhance Japan’s scientific, technological and economic competitiveness, while also addressing five important societal challenges</td>
</tr>
<tr>
<td></td>
<td>o Clean and efficient energy system</td>
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<td></td>
<td>o Healthy aging society as a world leading nation</td>
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<td></td>
<td>o Cutting-edge next generation infrastructure</td>
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<td></td>
<td>o Resurgence of local region using regional resources and its potential</td>
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<tr>
<td></td>
<td>o Reconstruction from the Great Earthquakes in 2011</td>
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<tr>
<td></td>
<td>To achieve these broad objectives, the CSTI has selected based on interviews and hearings from experts in industry and academia:11 concrete research programmes with dedicated targets which aim to revitalise industry and address societal challenges (e.g. Innovative Combustion Technology; Next-generation Power Electronics; Structural Materials for Innovation; Energy Carriers; Next-generation Technology for Ocean Resources Exploration; Automated Driving System etc.). 12 programmes have been selected under SIP2, including 5 of direct relevant to societal challenges: Technologies for smart bio-industry and agriculture; Energy systems toward a decarbonised society; Enhancement of national resilience against natural disasters; Innovative AI hospital system). In each programme, specific R&amp;D execution plan (roadmaps) are designed to guide activities</td>
</tr>
<tr>
<td></td>
<td><em>Intentionality</em> – the 11 concrete research programmes have dedicated targets</td>
</tr>
</tbody>
</table>
**Policy co-ordination**

- **Horizontality** - The programme supports all stages of the innovation chain from basic research, applied research to demonstration (with different emphasis according to programmes). The programme has its own budget (€265 million for the 11 SIP1 programmes). Cross-ministerial co-ordination occurs at various levels CSTI (headed by the Prime minister) at the highest level; the Governing Board which ensures co-operation and consistency across the whole SIP programme (it meets about 20 times every year) and through Promotion Committees (composed of relevant ministries, funding agencies and research bodies etc.) within each programme.

- **Demand-articulation** - Deregulation: programmes collaborate with national strategic special zones where they can experiment regulatory reforms and regulatory agencies in so-called regulatory sandboxes.

Promotion committees under each programme have been frequently convened to discuss the effectiveness and efficiency of the programmes with the participation of the related ministries, regulatory agencies, industries, universities, companies, etc.

**Policy implementation**

- **Leverage** - Even though private funding or matching funding were not implemented in this program, several private firms joined the programme with their own research and financial resources.

- **Measurability and evaluability** - The programme evaluation was decided by Governing Board every year and its result was reflected in the next year’s budget for each program.

- A Programme Director (PD) is assigned to each program. The Programme Director is in charge of co-ordinating the R&D execution plan and supporting activities to achieve the plan, with the cooperation of Promoting Committee.

- Significant programme flexibility due to the decision-making power of each Programme Director. They can for instance compose R&D teams and make open calls anytime they needed.

### Table 16. The Challenge-driven Innovation initiative

<table>
<thead>
<tr>
<th>Component</th>
<th>Main mission-orientation features</th>
</tr>
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| **Strategic orientation** | • **Directionality** - UDI was structured around four societal challenges identified during the course of consultations with a broad range of stakeholders in the Swedish innovation system:  
  o Future healthcare – stimulating business opportunities and social benefits for better health and care  
  o Sustainable attractive cities – finding new solutions in areas such as environment, energy, transport and community building  
  o Information society 3.0 – developing new and secure IT solutions and services that can be accessed by more users  
  o Competitive production – attaining flexible, resource-efficient and integrated production of sustainable goods and services  
  • **Intentionality** – targets are developed at the level of projects |
| **Policy co-ordination** | • **Horizontality and verticality** - VINNOVA is responsible for managing the UDI programme. Depending on projects, other relevant agencies play an active part, e.g. the Swedish Transport Administration Trafikverket is involved in several traffic and city-related projects. VINNOVA is advised by a programme committee, an externally appointed group that assists with strategic development and assessing applications |
Policy implementation

- **Demand-articulation** - Early-stage customer involvement in projects. The UDI programme succeeded in both attracting a significant number of project applications and launching increasingly focused and substantial projects involving a broad range of R&I stakeholders across Sweden, including public-sector authorities such as municipalities to serve as users and test beds for innovative solutions to societal challenges.

- **Measurability and evaluability** - Stage-gate project management in three stages with increasing funding:
  - Stage 1: initiation. The goal of this stage is to refine a project idea and develop the network of actors around a societal challenge. Proposals are solicited for projects within the four broadly defined challenge areas.
  - Stage 2: collaboration. The goal here is development and integration of partnerships that successfully achieved stage 1 requirements.
  - Stage 3: follow-up investment. The objective at this stage is to test, implement and utilise the results of the project evaluated positively at the end of the stage 2.

- **Leverage** - VINNOVA finances most of the involvement of universities and institutes. Municipalities and companies other than SMEs largely funded their own involvement. SMEs, county councils and university hospitals receive significant contributions from VINNOVA, but largely finance their own participation.

Source: OECD (2016[29]).

**Delegated community programmes**

Table 17. The Strategic Innovation Programmes initiative in Sweden

<table>
<thead>
<tr>
<th>Component</th>
<th>Main mission-orientation features</th>
</tr>
</thead>
</table>
| Strategic orientation | • **Directionality** – Vinnova funded the stakeholders active in a certain area to jointly formulate a vision and objectives and defined needs and strategies to help develop a particular innovation area (strategic research and innovation agenda - SIAs). Strategic Innovation Programmes (SIPs) were selected to implement parts of these strategic agendas. The government therefore does not decide which areas are deemed strategic. It is decided through establishing bottom-up processes allowing the innovation actors themselves to define priority areas, with government facilitating the process (provision of seed funding) and establishing a framework of selection criteria reflecting societal challenges, high scientific quality, collaboration, cross-disciplinary and co-financing.  
• **Legitimacy** - Government agencies (VINNOVA in particular) encourages and supports a process that allows a broad range of innovation stakeholders to formulate Strategic innovation agendas (SIAs), within areas they deemed strategic. This considerable breadth distinguishes SIOs from earlier VINNOVA sectoral support programmes or parallel initiatives such as the Strategic Vehicle Research and Innovation programme, all of which tended to involve a more limited set of industry players. A systematic review of the strategic innovation agendas concluded that many stakeholders were involved in drafting the agendas and they demonstrated genuine commitment to the project. |
| Policy co-ordination | • **Horizontality** - The programme allows wide, public-private, community-level co-ordination in different challenge areas. For instance, in the forestry sector, communities that had submitted ten separate agendas eventually submitted a combined proposal |
Policy implementation

- **Policy mix diversity** - The SIPs design and launch calls for project proposals (perhaps one or two calls every year for each SIP) and oversee the implementation of the resulting projects. Once launched, responsibility for the selection of projects to be funded once again lies with the panels of independent experts constituted by VINNOVA.
- SIPs also conduct a range of other activities: holding regular meetings of core participants to review progress and take management decisions;
- **Measurability and evaluability** - Once the SIAs have been developed and selected, the government organises calls for programmes (SIPs) following these research and innovation agendas. SIPs are responsible for devising, co-ordinating and funding activities in line with the corresponding SIA. Funding for each SIP is provided initially on a three-year basis, with the possibility of renewal for a maximum of nine further years based on review processes every three years.
- **Reflexivity** - SIPs organise regular (e.g. annual) consultations with the SIP communities to continuously assess needs and priorities.

Source: OECD (2016[29]).

**Mission-oriented agencies’ programmes and moonshot projects**

Table 18. Defence Advanced Research Projects Agency’s innovation programmes and challenges

<table>
<thead>
<tr>
<th>Component</th>
<th>Main mission-orientation features</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Strategic orientation</strong></td>
<td>• <strong>Directionality</strong> - Since its foundation, DARPA has held to the singular and enduring mission of making pivotal investments in breakthrough technologies for national security purposes. DARPA explicitly reaches for transformational change instead of incremental advances</td>
</tr>
<tr>
<td><strong>Policy coordination</strong></td>
<td>• Much of the co-operation at the organisational levels takes form through a tacit respect for DARPA’s ‘mission mystique’. DARPA’s programme managers exemplify a form of what are known in organisational literature as ‘street-level bureaucracies’, contributing to the DARPA’s cause with self-intrinsic motivation. In street-level bureaucracies, tacit rules emerge out of the culture of the organisation. The organisation’s culture is shaped by the backgrounds from which agents are drawn, the training they undergo within the organisation, the existing discussion and debates, and ultimately by the way their decisions are evaluated by their colleagues and superiors</td>
</tr>
</tbody>
</table>
| **Policy implementation** | • **Leverage** - DARPA does not perform its engineering experimentation in isolation. It works within an innovation ecosystem that includes universities and other public research organisations, private firms and governmental partners. DARPA is known to embody a series of tacit rules implemented at in a bottom-up approach by programme managers. The informal set of values embodied in the organisation’s culture contributes to make its implementation more agile and highly effective. The DARPA ruleset includes:  
  o A flat, non-hierarchical organisation, with empowered programme managers  
  o A challenge-based research model  
  o Emphasis on selecting highly talented, entrepreneurial programme managers (PMs) who serve for limited (3–5 year) duration  
  o Research is performed entirely by outside performers, with no internal research laboratory  
  o Projects focus on a ‘high-risk/high payoff’ motif, selected and evaluated on what impact they could make on achieving a demanding capability or challenge  
  o Initial short-term funding for seed efforts that scale to significant funding for promising concepts, but with clear willingness to terminate non-performing projects |

Source: Bonvillian and Van Atta (2011[33]).
Table 19. The National Institutes of Health's oriented programmes

<table>
<thead>
<tr>
<th>Component</th>
<th>Main mission-orientation features</th>
</tr>
</thead>
</table>
| Strategic orientation | - **Directionality** - The NIH is a mission-oriented agency striking an interesting balance between the funding basic science and mission-oriented targeted research. The main strategic orientation of the NIH is to fund science research through investigator-initiated research grants. However, a small but non-trivial share of NIH funding is not investigator-initiated, but instead solicited via requests for applications, consisting of mission-oriented type of instruments.  
- **Legitimacy** - Unlike most science funding agencies in the United States, NIH budgets are generally free from 'hard' earmarks from Congress that specify and set aside funds for particular diseases or institutions. However, increasingly since the 1990s Congress has included 'soft' earmarks, or non-binding language in reports accompanying the bills urging or encouraging research on specific diseases. These requests for research directionality form most of the mission-oriented initiatives of the NIH |
| Policy coordination | - **Horizontality** - Co-ordination of activities across the health policy area starts when the discussions for the NIH budget formally begins. The NIH Director co-ordinates with other agencies within the Department of Health and Human Services (the executive agency of which NIH is a part), and with individual Directors of NIH Institutes and Centres to prepare a budget for next fiscal year. Generally, the meetings and negotiations start during the summer and last over the months, typically focused about overall numbers for each Institute and Centre, and what is needed for past and future commitments.  
Co-ordination across policy can take place in the US Congress. In the spring, Congress begins hearings on the NIH budget. While several committees are involved, the most important are the House and Senate Appropriations Committees. Congress usually increases the President's request for NIH funding, particularly when the President does not control Congress. After the House and Senate versions of the bills are reconciled and the President signs the budget, and each Institute and Centre gets a separate appropriation. |
| Policy implementation | - **Policy mix diversity** - The bulk of NIH's funding consists of investigator initiated (non-targeted) grant applications, which are submitted for funding to a central office (Centre for Scientific Review), and then are assigned to particular review groups and Institutes/Centres based on fit. Review groups can take into account considerations other than scientific excellence, including ‘health’ considerations. However, in practice deviating from the scientific merit scores is rare.  
Mechanisms such as grants for research centres, clinical trials, and R&D contracts, tend to be more directed in nature and more aligned to the agency's health mission. These instruments are usually solicited by the NIH through requests for applications, are reviewed by peer review committees in the Institutes rather than in the Centre for Scientific Review, and are often funded as contracts in which NIH officials have more power in determining project direction than they do with investigator initiated grants.  
They also tend to be used more in problem-oriented research efforts. Examples of initiatives of mission-oriented nature include the ‘artificial heart’ and ‘war on cancer’ programmes, both consisting mostly of R&D contracts rather than on investigator initiated grant applications. |

Source: Sampat (2012[3]).

Table 20. Pilot-E

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<thead>
<tr>
<th>Component</th>
<th>Main mission-orientation features</th>
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</thead>
</table>
| Strategic orientation | - **Directionality** - Pilot-E’s strategic orientation derives from Norway’s Energi21 national strategy. The mission of the Pilot-E is to develop and put to the market new solutions in energy and transportation in a given timeframe.  
- **Intentionality** - Targeted calls for proposal, with specific performance goals to be reached |
Policy co-ordination

- **Horizontality** - The Research Council of Norway, Innovation Norway, Gassnova and Enova (together in the Pilot-E Board), combine multiple policy instruments and areas of expertise to provide comprehensive support to selected projects. For example, teams composed by members of all the authorities participate collaborate from project selection to follow-up, bringing together knowledge of different scientific disciplines and business areas to fulf the programme’s mission

- **Leverage** - Funding co-ordination enables the PILOT-E scheme to give companies predictable financing. Instead of having to apply for different support instruments for each phase of technology development, companies are guaranteed support until their product is firmly placed into the hands of the customer

- **Demand-articulation** - Each selected project has a steering group with 3-5 participants, including a programme manager and representative from expected customers / end users. Projects need to include a road to market strategy, and have measurable milestones that form the basis for payment of support from Pilot-E. Milestones need to be aligned with the thematic guidelines of each call and with the mission of the programme

Policy implementation

- **Policy mix diversity** - combination of multiple policy instruments (research grants, innovation subsidies, development grants, risk loans, regulatory interventions. PILOT-E also includes a demand side tool, consisting of demand incentives. Once the solution is ready for commercialisation a representative from potential customers / end users can qualify for funding from Enova to use the technology

The Research Council and Innovation Norway provide the bulk of the funding for Pilot-E’s selected projects, while the funding for projects related with CCS technologies is at responsibility of Gassnova.

- **Measurability and evaluability** - Programme managers have the flexibility and authority to cut funding if projects do not reach the agreed milestones and start deviating from the programme’s mission

Source: Volla (2019[17]) and Internet websites.

**Transformative ‘umbrella’ programmes**

**Table 21. Programme d’investissements d’avenir**

<table>
<thead>
<tr>
<th>Component</th>
<th>Main mission-orientation features</th>
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</table>
| **Strategic orientation**        | • **Directionality** - Broad transformative objectives, translated into specific thematic objectives in an interministral governance setting. The mid-term evaluation of the PIA concluded that the PIA has allowed an increase of interministerial decision-making for developing the programme priorities  
• **Intentionality** - Progressive increase of budgets dedicated to sustainable development and green growth (about 15% in PIA1, 50 % for PIA 2, 60 % for PIA 3)  
• **Leadership** - The PIA is piloted, managed and monitored by one dedicated organisation (the Secrétariat général pour l'investissement), positioned under the Prime minister office |
| **Policy co-ordination**         | • **Horizontality** - The PIA has its own extra-budgetary pluri-annual budget and its specific governance bodies involving interministerial and interdepartmental co-ordination on different levels: overall programme level (by the comité de pilotage interministériel [COPIL]), levels of different sub-programmes, level of specific call for proposals  
The PIA covers a wide range of sectors and includes a mix of new instruments (creation of new institutions, such as the SATTs for improving knowledge transfer, ITEs, IRTs) and provision of additional funding for existing instruments |
Policy implementation

- **Policy mix diversity** - The different initiatives are operated by various existing organisations for faster implementation. This also allows the use of different approaches per sector, per institutions and per technology, linked to common target issues (e.g. car of the future) and monitored in a common framework
- **Exploratory** - The PIA has also embarked on several experimental projects designed to test and, where appropriate, demonstrate the viability of innovative models for supporting research and innovation
- **Measurability and evaluability** - Monitoring by the Secrétariat général pour l’investissement under a common framework. An evaluation of the PIA is currently being conducted. It includes evaluation of specific instrument and themes, as well as an overall synthesis

Sources: France Stratégie (2016) and OECD (2014).

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**Table 22. Energy research and innovation strategy (ERI)**

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<tr>
<th>Component</th>
<th>Main mission-orientation features</th>
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| **Strategic orientation** | - **Directionality** - The Austrian ERI Strategy focuses on the technological and societal challenges of the energy system. It has four thematic areas with two underlying themes. The four sectoral thematic areas include energy systems and nets, buildings and urban systems, industrial systems, and transport and mobility system. The two supporting thematic fields are conversion and storage technologies, and transition and social innovation processes  
  - **Intentionality** - ERI is integrated in the overall 'Mission 2030', having a well-defined position within the mission’s strategic objective of reducing greenhouse gas emissions in 36%. ERI contributes to the research, innovation and competitiveness dimension of ‘Mission 2030’. This includes the optimisation of civil infrastructure to cover all energy needs via renewable energy and promotion of smart energy systems and grids to make local and regional energy supply 100% renewable. ERI is also responsible to promote technological developments that improve the efficiency of energy generation, allowing emissions to decrease while maintaining constant output. In the area of mobility, ERI is responsible for promoting e.g. R&D in technologies that enable low-emission vehicles, lightweight construction or automated transport  |
| **Policy co-ordination** | - **Horizontality** - ‘Mission 2030’ gathers actions promoted by four different federal ministries, thus ERI’s well-defined sub-targets within ‘Mission 2030’ acts as a form of governance co-ordination. For example, while the overall goal of mission2030 is decreasing emissions by 36% by 2030 compared to 2005, the specific contribution of ERI’s sub programme ‘Mobility of the Future’ is to reduce emissions in the transport sector by approximately 7.2 million tones of CO2 equivalent to around 15.7 million tones of CO2 equivalent  
  ERI’s co-ordination consists of synchronising the efforts the Climate Fund, ‘Cities of Tomorrow’ and ‘Mobility of the Future’. The organisational structure of the authorities in charge of managing ERI’s programmes can act as a form of co-ordination. The Austrian Research and Promotion Agency (FFG) is the common managing authority of the programmes ‘Cities of Tomorrow’ and ‘Mobility of the Future’ at the political responsibility of the BMVIT. Having a common agency (FFG) managing the two programmes can promote co-ordination between the two. The management of the Climate Fund is at responsibility of a board appointed by BMVIT, and the Minister for Sustainability and Tourism. The direct presence of the BMVIT on the management of the Climate Fund can contribute to facilitate co-ordination between Climate Fund and the programmes under political responsibility of the BMVIT |
- **Policy mix diversity** - The implementation of the ERI gathers co-ordinated actions from four different authorities, covering expertise over multiple scientific and sectorial areas, as well as different technological development stages.

  FFG and the Austrian Federal Promotion Bank (AWS) are responsible for implementing ‘Cities of Tomorrow’, focused on decarbonising cities. FFG is the national funding institution for private R&D in Austria, and AWS supports firms in the area of Intellectual Property Rights, licensing agreements and optimal funding and financing mix though additional grants and low-interest loans.

  FFG and the AustriaTech are responsible for implementing ‘Mobility of the Future’, focused on decarbonising the transport sector. AustriaTech’s contribution is particularly relevant to develop innovative public procurement solutions and for the identification and removal of barriers for business innovation in the mobility sector.

  The contribution of the Climate Fund to ERI is mainly through the funding of targeted scientific research via the ‘Austrian Climate Research Programme’.