

**From mission definition to implementation:
Conceptualizing mission-oriented policies
as a multi-stage translation process**

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Abstract

The promise of mission-oriented innovation policies (MOIP) to address some of the grand societal challenges as a cross-sectoral and interdisciplinary approach to innovation policy with increased directionality has raised high hopes. However, the complexity attached to MOIP constitutes a challenge, both for policy-makers and innovation scholars. Seeking to enhance our understanding of MOIP and the diverse policy choices and challenges involved, we propose a conceptualization of missions as multiple, interconnected translation processes that span from a societal challenge as the starting point to impacts as the ultimate translational stage. We argue that adopting a process-oriented perspective is well-suited to account for the interdependencies and complex feedback dynamics among the different stages during the realization of MOIP. The proposed framework aims to support the development of frameworks for impact assessment, but also yields relevant insights for policy-makers implementing MOIP.

1 Introduction

Over the past years, mission-oriented approaches have attracted considerable attention in innovation policy debates. In a nutshell, mission-oriented innovation policy (MOIP) aim to effectively address pressing societal challenges and propel the transformation of socio-technical systems. While the popularity of MOIP among policy-makers and scholars has constantly grown, awareness and understanding of the far-reaching implications that MOIP entail for agenda-setting, policy design, governance, implementation, and assessment have remained rather low.

Whereas research has provided different facets of the challenges and requirements for MOIP formulation, design and implementation, a comprehensive analytical framework that covers all these steps is still lacking. In consequence, discussions have often centred on selected aspects of MOIP, without integrating these perspectives and accounting for the dynamics of MOIP realization. This paper addresses some of these challenges by investigating the following question: How can the different sources of complexity of MOIP be conceptualized in order to increase analytical rigor and to support the political and administrative processes needed for successful mission-oriented innovation policies?

The paper aspires to a conceptual contribution, proposing a comprehensive and process-oriented analytical perspective on MOIP that contributes to a better understanding of the inherent complexity towards the materialization of impacts in MOIP. It argues that the realization of MOIPs should be conceptualized as a multiple-staged translation process from a grand societal challenge to mission-specific impacts. Thereby, we draw on the argument by Kroll (2019), following which the results of complex policies are shaped by multiple translations processes that need to be kept analytically apart. For this purpose we combine insights from empirical studies of MOIP with policy studies, adding a stronger procedural perspective.

We distinguish between three interrelated but distinct translation processes that shape MOIPs, related to (1) mission definition, (2) mission design, and (3) mission implementation. By disentangling the distinct dynamics and consequences thereof, we present a conceptual framework to provide a better understanding of the overarching dynamics that characterize MOIPs. This framework aims to contribute to a more systematic analysis of MOIPs. Further, we hope to support policy-makers by highlighting potential pitfalls in the implementation process, and lay the foundation for evaluation frameworks for transformative policies like MOIP.

Following this introduction, the following section highlights the need for a better understanding of the dynamics of MOIP that is closely linked to existing challenges for impact

assessment. Seeking to enhance analytical rigor, we subsequently argue for the adoption of a process-oriented perspective on MOIP that manifests itself in multiple translation processes. This provides more granularity and a more comprehensive picture of the specific choices and challenges involved at each procedural stage. Moving towards an integrated perspective, the following section focuses on the interactions between different translation processes. The final section summarizes the key insights and outlines the implications for scholars studying MOIP, impact assessment and policy-makers.

2 The need for a process-oriented perspective

The concept of MOIP bears the promise of shifting Science Technology and Innovation (STI) policies towards a broad and transformative approach in order to address and possibly solve grand societal challenges, moving beyond economic goals (Kuhlmann and Rip 2014). This directionality is the key characteristic of mission orientation and truly the ultimate goal to be kept in sight throughout the entire policy process. MOIP seeks to mobilize actors and resources in a cross-sectoral and interdisciplinary way, providing a comprehensive and integrated approach that emphasizes directionality and intentionality towards a clearly defined goal. Over the last years, many countries and international organizations have sought for a re-orientation of their STI policies towards mission-oriented approaches.

Whereas expectations towards MOIP approaches are high, we observe two connected shortcomings: firstly, despite the popularity of the MOIP label, there is still no established consensus on the guiding principles of mission orientation among academia and policy makers. Even though the so-called "new mission orientation" has been the topic of debate for more than a decade, including valuable efforts to identify key characteristics based on comparative analyses (Kuittinen et al. 2018a; Larrue 2021), it still seems that 'theory is running ahead of practice'. This conceptual deficit is also reflected by a second shortcoming: the very limited empirical evidence concerning the costs and benefits of MOIP in form of evaluations (Larrue 2021). Despite first attempts in this direction (Wesseling and Meijerhof 2020), an established analytical framework for conceptualizing and measuring the impacts of MOIP is still missing (Weber and Polt 2014, p. 9; Hekkert et al. 2020, p. 77; Amanatidou et al. 2014). Developing such a framework is complicated by several factors. This includes the broad scope of MOIP, the interconnectedness of policy goals and instruments, a common time-lag in regard to impacts, the multiplicity of analytical levels, new emerging requirements for evaluation, as well as the empirical diversity of missions with varying levels of ambitions and degrees of transformativity (e.g. Amanatidou et al. 2014; Kuittinen et al. 2018a; Weber and Polt 2014; Wittmann et al. 2021).

At the same time, the growing interest in MOIP has led to a growing number of conceptual and empirical insights from different theoretical perspectives and national contexts. This includes a variety of topics, including the heterogeneity of mission types and goals (Polt et al. 2019; Wanzenböck et al. 2020; Wittmann et al. 2020a), their boundaries (Hekkert et al. 2020; Wittmann et al. 2020c; Wesseling and Meijerhof 2020), differences in governance arrangements and policy instruments (Janssen 2020; Wittmann et al. forthcoming) and international comparative case studies (Kuittinen et al. 2018b; Larrue 2021). The analysis of these works have contributed to pinpointing obstacles and challenges for the realization of MOIP at different stages. The connection between the stages, however, have received rather limited attention. This is unfortunate, given the key importance of these linkages in the policy process. These connections, which we call "translation processes" in the following, may contribute to a better understanding how the interplay of the various stages jointly contributes to the success (or the absence thereof) of missions. While there is abundance of literature on policy making per se, this research has mostly clinged to the heuristic of the "policy cycle" as a sequence of stages like 'agenda setting, policy formulation, policy adoption, implementation, evaluation and termination [...] and frameworks [which] focus on distinct stages of the policy process" (Weible et al. 2012, p. 3).

Hence, what is missing is a framework to better understand and systematize the different interdependencies between the mission stages and the materialization of impacts. We aim to fill this gap by developing a process-oriented perspective on MOIP realization, to increase analytical rigor of analysis and connecting the debate about MOIP implementation with impact assessment. Our framework builds on the idea of Kroll (2019), who traces deviations from the anticipated outcomes in EU Regional Policy back to multiple sources that need to be kept analytically apart. He argues that attempts to measure impacts against initial ambitions might fall short of anticipating the process of translation and interpretation in-between, calling for a process-oriented perspective. Otherwise, he concludes, "it remains impossible to tell whether an innovation strategy was already flawed in ambition, wrong decisions were taken on thematic areas of action, or if, indeed, one is witnessing a technical failure in the choice of measures" (ibid, p. 636),

Departing from the idea of multiple loosely coupled streams of implementation and policy debate that is driven by their own path-dependent logic, he emphasizes the process-character of such translation processes that leads to new impulses "into an existing path-dependent system of narratives and support policy practices" (ibid, 637) between the level of strategic agenda (setting sphere of politics and political discourse), the level of thematic orientation (political administration), and the level of actual implementation (executive level of agencies/implementation of programs). To conduct a comprehensive

analysis this requires the assessment of the consistency of activities within each levels, as well as the coherence of the translation process between different levels.

Taking up the idea that the materialization of impacts can be shaped by different translation processes, this conceptualization provides us with a useful perspective to unravel the complex dynamics of MOIPs. Following Kroll (2019, p. 637) we understand the translation process as "as a process of ideation, negotiation and decision-making that is driven and governed by multiple actors". We believe that this perspective adds valuable insights for MOIP which typically cut across different thematic areas and institutional responsibilities:

MOIP can be seen as a process of multiple translations, departing from the underlying societal challenge (e.g. aging society and more deadly cases of cancer) towards the desired impacts (e.g. reduction of avoidable new cases of cancer by early detection (awareness building) and an improved lifestyle (better prevention measures).

All steps are ideally targeted at a clear normative goal (directionality). This procedure is not to be understood as a linear process but one that includes feedback loops. Further, these translations are shaped by actors involved at different levels and with different roles during the realization of MOIP. Depending on the topic, various national ministries as well supra-national or sub-regional authorities (regional, local), specialized agencies, representatives of affected industry branches, civil society, etc. may be involved.

Secondly, besides an increase in the number of involved actors, negotiation processes along MOIP at different levels should gain importance. Introducing directionality through the inclusion of political and normative goals that may be contested by some actors facilitates a politicization of MOIP compared to traditional innovation policies (Boon and Edler 2018; Hekkert et al. 2020). Moreover, the paradigm change towards MOIP may be a gradual process conflicting with established routines, practices and responsibilities. In practice, many research and innovation policies constitute a mixture of elements from different paradigms (Arnold et al. 2019, p. 53), implying that the transition towards MOIP is no abrupt but a gradual process involving considerable learning processes among involved actors.

Delineating these different dynamics analytically and exploring the interaction of different actors and rationales provides the opportunity to explore possible drifts in priorities and approaches. Moreover, a process-oriented perspective can help to open the analysis of MOIP systematically for insights from policy studies, like research dealing with different elements of the policy cycle (cf. Jann and Wegrich 2017), the debate on the composition of and necessity for systemic instruments (Smits and Kuhlmann 2004; Wieczorek and Hekkert 2012; Daimer et al. 2012).

3 Conceptualizing MOIP as multi-stage translation processes

In case of mission-oriented policies, we argue that there exist three main steps of translation that occur along the way from deriving a mission out of a societal challenge and turning policy inputs into impacts that take place at different analytical levels and represent different dynamics. This tri-partite perspective can be also found in Larrue et al. (2019) distinguishing between strategic orientation, policy coordination and policy implementation. In the following section we discuss these steps in greater detail, discussing their origins, influencing factors and arising challenges (see table 1).

- Step 1: Mission formulation: Translation of societal challenges into specific missions with dedicated priorities
- Step 2: Mission design: Translation of mission goals into a specific set of instruments, activities and coordination structures
- Step 3: Mission implementation: Translation of mission activities into impacts

From our perspective there are several aspects that matter with regard to these steps at all times: firstly, despite the appeal of "newness" (MOIP as a new generation of policies with directionality), traditional unsolved challenges of coordination and political leadership that have been debated for decades are also relevant in the context of MOIP, which overlap with many existing approaches of fostering STI (Arnold et al. 2019). Secondly, actively integrating and working with a multitude of actors at different levels and subsystem to make MOIP a reality is a mission in itself, but acknowledging different perspectives, belief systems and normative assumptions of actors as part of a translation process might ease tension and misunderstanding. And thirdly, MOIP is a demanding and complex concept in itself, imposing high requirements for policy-making and discussion processes, calling for (strategic and reflexive) learning capacity by policy makers on the one hand, and more systemic and formative evaluation schemes to be provided by the community of scholars.

3.1 Mission formulation: Translating (societal) challenges into missions

The first translation process that occurs with regard to missions is the translation of grand societal challenges into dedicated missions. Despite ambitious goals, no mission is equivalent to the underlying societal challenges, but prioritizes and weighs certain aspects it seeks to achieve, while displaying certain boundaries and diminishing the role of other aspects related to a societal challenge. Larrue (2021, p. 9) points out that missions

can be considered as a narrowing down process that in many instances starts from "challenge areas" instead of missions. While missions and societal challenges are often understood as directly connected, the relationship is often more complex in practice. In line with this Larrue (2021, p. 34) has highlighted that "[t]he relation between the nature of challenges and the design of MOIPs is still largely unexplored", even though research has pointed to the importance of the process of mission formulation (Janssen et al. 2020; Wittmann et al. 2020b).

Table 1: Key characteristics of translation processes

	Mission formulation	Mission design	Mission implementation
Key actor	strategic level (high-level politics, public discourse)	political administration	executive level of administrations, funding agencies, etc.
Type of translation process	narrowing down societal challenge to specific mission goal	choosing an adequate instrument mix and coordination structures fit for purpose to meet the goals	effective and efficient implementation and coordination of instruments
Issues of negotiation	legitimacy, directionality, level of ambition stakeholder involvement and representation	actor and resource mobilization combination of different types of instruments, instruments of different types, generations etc. coordination structures	administrative feasibility, cognitive gaps, strategic capacity, systemic understanding
Influencing factors	political and institutional context	ideational frames, belief systems existing policies participating actors	administrative capacity and resources for learning/evaluation coordination structures

The process of negotiating mission goals is closely linked to the strategic level of policy-making deciding about priorities of a mission, pointing to the importance of actor constellations and processes as key factors driving mission formulation. The nature of the underlying character and the cross-cutting character of MOIP imply a wide range of potentially relevant stakeholders for missions. A first issue of negotiation in this context is the question about: who is involved at which stages and to what extent do these actors actively participate in formulating missions and their priority. Policy literature in general and

research on agenda setting in particular have pointed to the diverse challenges arising in this context that can shape outcomes (Schot and Steinmueller 2018; Kuhlmann and Rip 2018).

A second issue of negotiation is the question of scope and ambition. The concept of MOIP is closely linked to the perceived legitimacy (Larrue et al. 2019) and the felt urgency of a societal challenge (Janssen et al. 2020) calling for ambitious and comprehensive mission goals. However, not every mission is set out with a transformative ambition aiming at changing an entire socio-technical systems as such but some surely do. Therefore it is evident as the directionality imposed by MOIP favoring a certain direction leads to a politicization of the policy, favoring some outcomes over others might occur and needs to be acknowledged (Boon and Edler 2018; Hekkert et al. 2020). Creating room for contestation, especially MOIPs formulating transformative goals challenge rather risk averse authorities to try for 'policy innovations' (Howlett 2014) and inhibit considerable costs and redistributive consequences for some stakeholders, resulting in potential opposition to these goals (Wittmann et al. 2020a).

Taking place at the strategic level, the choice of priorities and goals does not happen in a vacuum but is embedded into a broader social, political, economic and institutional context shaping the specific priorities and scope of missions. Edler and Salas Gironés (2020) explore the importance of ideational factors in shaping mission across different countries (case of mobility transition in Germany, the Netherlands, United Kingdom). Thereby, they find that the same overarching challenge in different (national) contexts is approached in multiple ways, highlighting different priorities and formulations (similar Larrue 2021). Even within single strategies, such as the German Hightech Strategy 2025, there exist different ways of linking missions to societal challenges. Wittmann et al. (2020) find evidence for different understandings on how the goals of missions are to be achieved, e.g. prioritizing scientific progress as the main driver of a mission or highlighting the importance of changes in human behavior. In practice, one can observe a considerably diversity of missions with regard to the level of ambition, the scope of goals etc. that are subsumed under the label of MOIP (Larrue et al. 2019; Polt et al. 2019; Kuittinen et al. 2018a; Wanzenböck et al. 2020).

At the same time, the negotiation process on goals and priorities may feed back into the perception of the overall societal challenge, affecting the perceived urgency, relevance etc. of this topic. This has been also outlined by Wanzenböck et al. (2020) who highlight the possibility of diverging views on solutions and/or problems that may evolve over time and potentially converge towards a shared perception.

Aiming to understand this translation process, we propose the following guiding questions:

- What is the concrete societal challenge that should be overcome by the mission?
- What are the aspects and areas with regard to the challenge that the mission prioritizes?
- Which parts of the challenge are not addressed by the missions?
- Is there an obvious and intended directionality resulting from translating a challenge into mission goals?
- What is the underlying understanding of the problem and its solution?
- What type of (systemic) change does the mission aim for? What role do STI policies relative to other approaches play in the socio-technical system relevant for the aspired change?
- Who are relevant stakeholders and are they involved in the process of choosing and defining mission goals?
- How is stakeholder input incorporated in this process? How open is the process of mission formulation for different interest groups?

3.2 Mission design: Translating goals into policy instruments and activities

The next translation occurs between mission goals and the operationalization of these goals into a set of specific policies and the development of adequate structures for exchange and coordination. In contrast to the process of mission formulation at the strategic level, the translation process of mission design is located at a lower level i.e. in involved ministries, agencies, street level bureaucrats (Hill and Hupe 2014; Lipsky 1980) and other stakeholders representing different subsystems and the way these actors operationalize the defined goals and opt for coordination structures.

To put missions into actions, an understanding on the instruments and coordination structures that are necessary to achieve the postulated goals is needed. Thereby, this translation step is centered on the identification, selection and mobilization of resources and inputs and the alignment of these activities towards the mission goal. At the same time, it creates the need for delineating the boundaries of a mission at an instrument-level, defining activities that contribute to the mission goals and are part of the governance arrangement of a mission and those that characterize the wider socio-technical system. Negotiation processes therefore are likely to center around several aspects. First of all, aiming for a broader cross-sectoral approach, MOIP require high level of commitments from different actors and their readiness to contribute to the postulated goals,

subordinating own resources and activities to the overarching goal of a mission. Lacking this commitment, there is little reason to assume that missions will differ systematically from earlier generations of innovation policies that were characterized by a strong top-down approach. Hence, besides the fact of providing resources the question is the way actors agree to coordinate their efforts through the creation of dedicated bodies of exchange.

Secondly, complex interventions in many cases require a bundle of different measures, implying that missions are more than the sum of their individual components and thus are defined by the interplay of the different instruments. They supposed to do so by applying a variety of policy instruments that 'span different stages of the innovation cycle from research to demonstration and market deployment, mix supply-push and demand-pull instruments, and cut across various policy fields, sectors and disciplines' (Larrue 2021, p. 11). A final issue of negotiations links to the coordination of activities and actors, finding adequate governance arrangements for steering mission implementation.

This translation process may be affected by different aspects:

First of all, actors may differently interpret the way of how to achieve to the postulated goals. Edler and Salas Gironés (2020) point to the importance of different policy traditions, beliefs about the role of the state and ownership of a problem. This aspect is closely linked to the understanding of the possible solutions (Wanzenböck et al. 2020). In particular, it touches upon the question to what extent a mission may go beyond the confines of STI policy and employ additional means such as regulation in order to facilitate the required changes (see e.g. EFI 2021 for a discussion) . In this regard, especially the choice of actors taking a leading role for a mission might impose a certain narrative/approach that shapes the mission design.

Secondly, missions are rarely built from scratch but are embedded into an established field of policy measures and activities (Larrue 2021, p. 9), so that missions are likely to be a combination of past and present policy instruments or are even built around existing policies. Empirical works highlight that missions often rely on previously existing policies that are only selectively accompanied with new instruments (Janssen 2020; Wittmann et al. forthcoming). Mission design therefore is not only about designing new interventions, but purposefully combining and adjusting existing interventions. Therefore, the input of MOIPs in many instances will be characterized by different modes of institutional change, such as layering or refurbishing of different past and present policies and activities (cf. e.g., Hacker 2004; Thelen and Streeck 2005; Kern and Howlett 2009; Mahoney and Thelen 2010). This ties in with the observation of Rose (1990, p. 263) that 'Policy-makers are heirs before they are choosers'.

- Who takes the lead for mission design (and implementation)?
- What actors and resources are mobilized for goal achievement?
- What activities, measures and instruments are part of the mission realization?
- To what extent does the mission build on existing instruments? How are these instruments aligned with mission goals?
- What is the relative role of STI instruments compared to other types of policy instruments?
- What are the means to achieve the mission goals?

3.3 Mission implementation

The final stage of translation focuses on the materialization of mission impacts through the implementation of instruments and activities. Having designed a set of interventions, the implementation process can be considered as the translation of policy inputs into impacts. Thereby, it focuses on the level of instrument implementation (effectiveness/efficiency) and the coordination between different instruments and activities that is often located at ministries or funding agencies, thus asking for capacities at the individual (or partly at the organizational level) (cf. Considine et al. 2014; Wu et al. 2017); to bring these instruments into realization. In contrast to mission design focusing on the choice of instruments and their combination to maximize the potential synergies, this step focuses on the outputs of instruments and the coordination of activities contributing to an alignment of activities towards the postulated goals. In this context, Hüsing et al. (2017) highlight the importance of a bottom-up alongside a top-down perspective that focuses on the project level and explores to what extent goals are addressed and achieved with the employed programs and activities.

There are multiple determinants regarding mission implementation. First of all, it links to capacities and resources of the involved actors implementing these programs. This includes the avoidance delays of the implementation of measures, poor handling of the interdependency of different parts of the policy mix, or balancing bottlenecks. At the same time, (internal) learning processes, reflexivity and evaluation of on-going measures may constitute an input both for the implementation of the mission informing the overall instrument mix MOIP (Larrue 2021).

Shifting the focus towards the implementation of a mission, the final translation process deals with the question how inputs into a mission can contribute to achieving the desired mission goals. For further analysis, we rely on the following guiding questions:

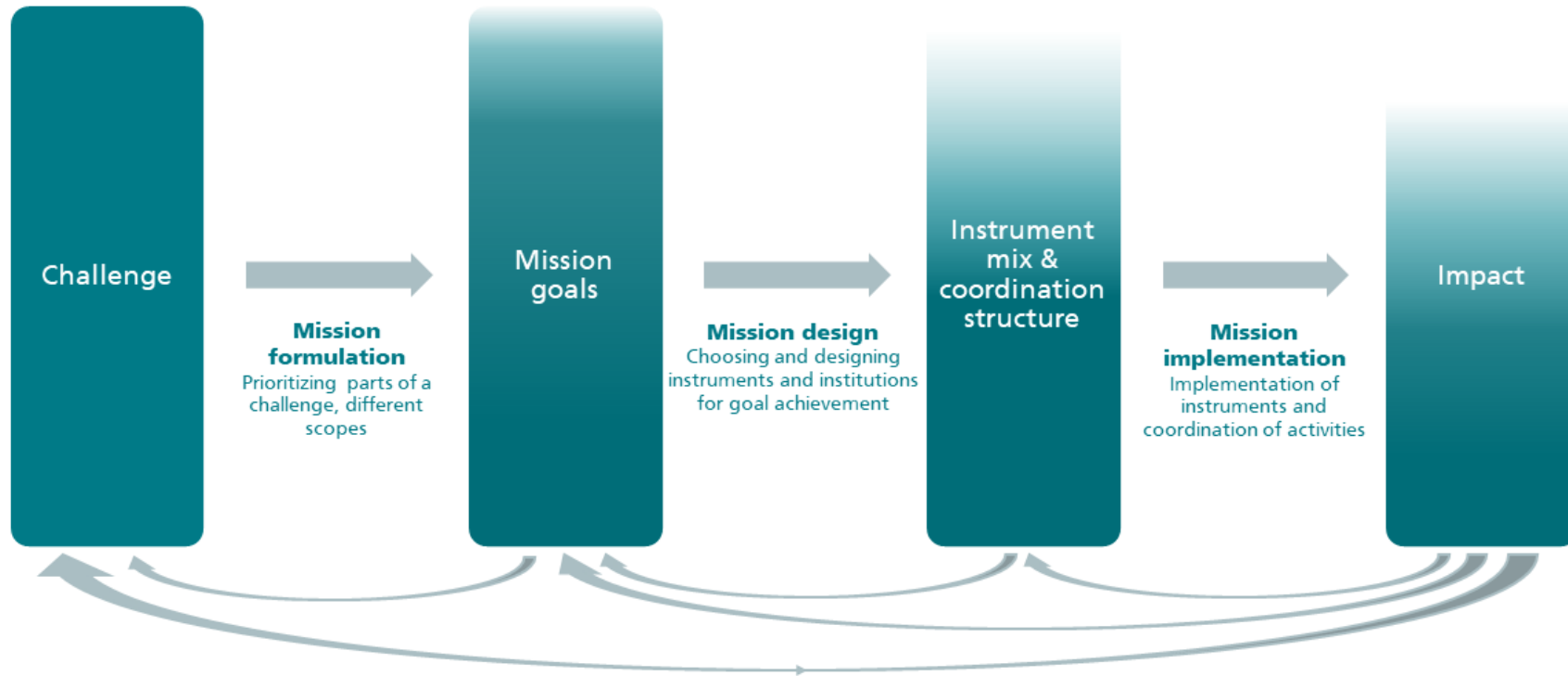
- How (effectively) is the implementation of individual measures carried out?
- Do instruments reach the relevant groups and provide the anticipated results?
- How does the coordination between different instruments play out in practice?
- How does implementation reaction to changes, exogenous shocks and other challenges for implementation?
- How does the monitoring of the mission progress feedback into the mission implementation?
- What role do learning and feedback processes play? What elements of the mission (goals, inputs, implementation procedures) do they affect and how?
- How do the implemented instruments mobilize other activities and actors to undertake activities in line with the mission

4 Towards a perspective of interconnected translation processes

In the previous sections we presented the three main translation processes constitutive for MOIP: mission formulation, mission design, and mission implementation. Each of these involves specific actors and skills and is associated with specific political and technical challenges. While highlighting the analytical value from distinguishing these different processes, we believe that only an integrated view on the entire process provides a holistic picture of the dynamic of MOIPs. Thereby, we acknowledge that missions hardly follow a simple linear logic from design to effect, but rather are characterized by multiple interaction and feedback loops between different translation processes (see figure 1). In this section we describe possible interactions, spill-overs and feedback dynamics that may arise from these translation processes.

Mission formulation is closely linked with the subsequent processes of mission design and implementation. This ties in with the argument by Kroll (2019) that the absence of impacts can have multiple origins. Problems at earlier stages may cascade down to subsequent stages of mission implementation, as dynamics in many instances are hard to reverse. First of all the development of a powerful narrative and a well-designed process of mission formulation is a key prerequisite for actor and resource mobilization and therefore can shape mission design and implementation. A compelling mission goal may strengthen the legitimacy and therefore enforce a higher commitment of involved actors to contribute to the goals and a broader instrument mix. In contrast, missions with poorly defined and ambiguous goals may not only limit the ability to mobilize actors for a shared goal but also opens room for negotiation and contestation, providing actors with agency to interpret the goals according to their own preferences.

Figure 1: Translation processes and interdependencies



Source: own elaboration

In turn, mission formulation processes can hardly be thought of as independent of the feasible options for mission design, implementation and assessment. In other words, if policy-makers do not have suitable instruments at their disposal for implementing an ambitious mission in a comprehensive fashion, this certainly feeds back into mission formulation. In a similar way, long-standing existing policy approaches may shape the understanding of goals and solutions, resulting in missions being centered around these policies. Moreover, mission implementation may necessitate an adjustment of goals and mission design, making them more or less ambitious or even altering the character altogether. We contend that the success or failure of specific instruments may feed back into the (re)formulation of mission objectives and instrument mixes. For example, if a policy instrument fails to trigger behavioral change on the society level needed for system transformation (e.g. in the context of decarbonization), mission goals may be "cut back" retrospectively to fit a more narrow technology-focused, accelerated type mission. In a similar vein, there might occur a narrowing down of the portfolio approach, once promising solutions emerge during implementation.

Finally, the results of MOIP may feed back in different ways into the process. Positive results may reinforce the positive narrative of a mission and its legitimacy and credibility of intention, strengthen actor commitment and mobilization. Positive results may also contribute to an increasing convergence of perspective of solutions and problems, shifting missions towards a higher level of alignment (cf. Wanzenböck et al. 2020). Needless to say that besides such virtuous circle, missions may be also affected by a vicious circle of not materializing results that may undermine a mission's legitimacy and decrease actor mobilization, while opening up the discussion about goals, legitimacy of a mission.

Distinguishing between different analytical stages, the chronology and interdependencies might be less clear in practice, allowing dynamics to interact and also to run the opposite direction. In consequence, mission formulation and design in many instances can be understood as co-evolving processes. This implies that missions are no static policies, but should be considered as developing over time and exhibiting different characteristics along their development (Janssen et al. 2020; Hekkert et al. 2020).

5 Conclusion

This contribution proposed to conceptualize the realization of MOIPS as a multiple-staged translation process, starting from a grand societal challenge and evolving into mission specific impacts. First of all, this conceptualization allows to analytically disentangle different steps and dynamics at different levels that characterize MOIP and thereby allows to reduce the complexity of MOIP from an analytical perspective.

We perceive these translation processes as connected, because the results of one translation process has profound implications for the subsequent development. Problems related to the choice of a mission, such as a poor mission definition may also 'cascade' down to the anticipated impact. While this is not to deny that missions may evolve over time, e.g. because of learning process or external factors once taken decision shape the developments of missions in the long run. Accounting for the interdependencies of different translation processes limits the risk of overly attributing responsibility e.g. to the input/policy mix or implementation activities, while ignoring more fundamental challenges that are linked to the formulation of a mission.

For researchers studying the realization and impacts of MOIP this paper provides an analytical clarification for systematically disentangling the dynamics in MOIP at different levels and identifying the specific dynamics related to them. At the same time, it raises awareness for the importance of path-dependencies in this process, highlighting the need for a comprehensive understanding of MOIP. Secondly, it connects the study of MOIP more closely to the strand of literature of policy studies that can provide useful insights for the different dynamics and processes that characterize complex policies such as MOIP.

Regarding the development of framework of impact assessments, this paper emphasizes the pitfalls of a too narrow approach that ignores the dynamics that may affect the materialization of impacts at different stages. A mission undermining the key pillars of the MOIP approach, such as the mobilization of private actors and resources will face considerable challenges from the very beginning. Aiming to understand the impacts of mission therefore should not depart from mission goals as such, but incorporate the process and context of mission formulation into its perspective to adequately capture the context in which a mission emerged.

For policy-makers our framework seeks to clarify the different procedural steps and point to the specific challenges and pitfalls that are connected with each of them. Thereby, it can support the process and implementation by making possible consequences of decisions more explicit. By doing so, it can help to contribute to answering the stronger need for ex-ante evaluation and a different, more formative focus of evaluation (Teirlink et al. 2011; Amanatidou et al. 2014; Weber and Polt 2014). Against the background of Larrue's comparative analysis that "[f]ew of MOIP initiatives have set objectives that have the expected mission characteristics: clear, bold and inspirational, with wide societal relevance, ambitious but realistic, targeted, measurable, time-bound and solution neutral" (Larrue 2021, p. 9) the path-dependency of such decisions outlined in this contribution calls for a careful planning of the process from the very beginning.

6 References

- Amanatidou, Effie; Cunningham, Paul; Gök, Abdullah; Garefi, Ioanna (2014): Using Evaluation Research as a Means for Policy Analysis in a 'New' Mission-Oriented Policy Context. In *Minerva* 52 (4), pp. 419–438.
- Arnold, Erik; Aström, Tomas; Andréasson, Helen; Nielsen, Kalle; Wain, Martin; Tofteng, Maja; Røtnes, Rolf (2019): Raising the Ambition Level in Norwegian Innovation Policy. Final Report. technopolis group.
- Boon, Wouter; Edler, Jakob (2018): Demand, challenges, and innovation. Making sense of new trends in innovation policy. In *Science and Public Policy* 45 (4), pp. 435–447.
- Considine, Mark; Alexander, Damon; Lewis, Jenny M. (2014): Policy design as craft: teasing out policy design expertise using a semi-experimental approach. In *Policy Sciences* 47 (3), pp. 209–225. DOI: 10.1007/s11077-013-9191-0.
- Daimer, Stephanie; Hufnagl, Miriam; Warnke, Philine (2012): Challenge-oriented policy-making and innovation systems theory: reconsidering systemic instruments. In Fraunhofer Institut für System- und Innovationsforschung (Ed.): *Innovation system revisited - Experiences from 40 years of Fraunhofer ISI research*. Stuttgart: Fraunhofer Verlag, pp. 217–234.
- Edler, Jakob; Salas Gironés, Edgar (2020): How do framing and ideas influence the design of missions? A comparative analysis between Germany, the Netherlands, & the United Kingdom. EU-SPRI virtual session on Shaping System Transitions - Insights from practice. 5th of June 2020, 2020.
- EFI (2021): Gutachten zu Forschung, Innovation und technologischer Leistungsfähigkeit Deutschlands 2021. Edited by Expertenkommission Forschung und Innovation (EFI). Berlin. Available online at https://www.e-fi.de/fileadmin/Assets/Gutachten/2021/EFI_Gutachten_2021.pdf, checked on 5/12/2021.
- Hacker, Jacob S. (2004): Privatizing Risk without Privatizing the Welfare State: The Hidden Politics of Social Policy Retrenchment in the United States. In *American Political Science Review* 98 (2), pp. 243–260.
- Hekkert, Marko P.; Janssen, Matthijs J.; Wesseling, Joeri H.; Negro, Simona O. (2020): Mission-oriented innovation systems. In *Environmental Innovation and Societal Transitions* 34, pp. 76–79.
- Hill, Michael J.; Hupe, Peter L. (2014): *Implementing public policy. An introduction to the study of operational governance*. 3. ed. Los Angeles: SAGE Publications.
- Howlett, Michael (2014): Why are policy innovations rare and so often negative? Blame avoidance and problem denial in climate change policy-making. In *Global Environmental Change* 29, pp. 395–403.

- Hüsing, Bärbel; Kulicke, Marianne; Wydra, Sven; Stahlecker, Thomas; Aichinger, Heike; Meyer, Niclas (2017): Evaluation der „Nationalen Forschungsstrategie BioÖkonomie 2030“. Wirksamkeit der Initiativen des BMBF - Erfolg der geförderten Vorhaben - Empfehlungen zur strategischen Weiterentwicklung. Abschlussbericht. Edited by Fraunhofer Institut für System- und Innovationsforschung. Karlsruhe.
- Jann, Werner; Wegrich, Kai (2017): Theories of the policy cycle. In Frank Fischer, Gerald J. Miller (Eds.): Handbook of public policy analysis: Routledge, pp. 69–88.
- Janssen, Matthijs (2020): Post-commencement analysis of the Dutch 'Mission-oriented Topsector and Innovation Policy' strategy. Utrecht University - Copernicus Institute of Sustainable Development. Mission-Oriented Innovation Policy Observatory (MIPO). Utrecht. Available online at <https://www.uu.nl/sites/default/files/Post-commencement%20analysis%20of%20the%20Dutch%20Mission-oriented%20Topsector%20and%20Innovation%20Policy.pdf>, checked on 4/29/2021.
- Janssen, Matthijs J.; Torrens, Jonas; Wesseling, Joeri; Wanzenböck, Iris; Patterson, James (2020): Position paper. 'Mission-oriented innovation policy observatory'. Copernicus Institute of Sustainable Development, Utrecht University. Utrecht. Available online at <https://www.uu.nl/sites/default/files/MIPO%20position%20paper%20-%20v21-05-2020.pdf>, checked on 11/2/2020.
- Kern, Florian; Howlett, Michael (2009): Implementing transition management as policy reforms: a case study of the Dutch energy sector. In *Policy Sciences* 42 (4), pp. 391–408.
- Kroll, Henning (2019): How to evaluate innovation strategies with a transformative ambition? A proposal for a structured, process-based approach. In *Science and Public Policy* 46 (5), pp. 635–647.
- Kuhlmann, Stefan; Rip, Arie (2014): The challenge of addressing Grand Challenges: a think piece on how innovation can be driven towards the "Grand Challenges" as defined under the prospective European Union Framework Programme Horizon 2020: European Research and Innovation Area Board (ERIAB). Available online at https://iris.utwente.nl/ws/files/5140568/The_challenge_of_addressing_Grand_Challenges.pdf, checked on 6/1/2021.
- Kuhlmann, Stefan; Rip, Arie (2018): Next-Generation Innovation Policy and Grand Challenges. In *Science and Public Policy* 45 (4), pp. 448–454.
- Kuittinen, Hanna; Skov Kristensen, Frank; Pelkonen, Antti; Lehenkari, Janne; Goetheer, Arjen; van der Zee, Frans et al. (2018a): Mission-oriented research and innovation. Assessing the impact of a mission-oriented research and innovation approach: Final report. European Commission - Directorate-General for Research and Innovation. Luxembourg.

- Kuittinen, Hanna; Unger, Maximilian; Türk, Andreas; Polt, Wolfgang; Fisher, Robbert; Domini, Alberto et al. (2018b): Mission-oriented research and innovation. Inventory and characterisation of initiatives: Final report. Edited by European Commission. European Commission. Luxembourg.
- Larrue, Philippe (2021): The design and implementation of mission-oriented innovation policies. A new systemic policy approach to address societal challenges. OECD. Paris (OECD Science, Technology and Industry Policy Papers, 100). Available online at <https://doi.org/10.1787/3f6c76a4-en>.
- Larrue, Philippe; Machado, Diogo; Yoshimoto, Takuro (2019): New mission-oriented policy initiative as systemic policies to address societal challenges: analytical framework and types of initiatives. Edited by OCED. OECD. Paris.
- Lipsky, Michael (1980): Michael Lipsky. Street-Level Bureaucracy: Dilemmas of the Individual in Public Services. New York: Russell Sage Foundation, 1980 (10).
- Mahoney, James; Thelen, Kathleen Ann (Eds.) (2010): Explaining institutional change. Ambiguity, agency, and power. Cambridge: Cambridge University Press.
- Polt, Wolfgang; Weber, Matthias; Biegelbauer, Peter; Unger, Maximilian (2019): Matching type of mission and governance in mission-oriented R&I policy: conceptual improvement and guidance for policy. Eu-SPRI Conference. Rome, 06.06.2020. 2019 EU-SPRI CONFERENCE – Science Technology and Innovation Policies for Sustainable Development Goals. Actors, Instruments and Evaluation, 2019. Available online at https://www.researchgate.net/publication/334277744_Matching_type_of_mission_and_governance_in_mission-oriented_RI_policy, checked on 9/25/2019.
- Rose, Richard (1990): Inheritance Before Choice in Public policy. In *Journal of Theoretical Politics* 2 (3), pp. 263–291. DOI: 10.1177/0951692890002003002.
- Schot, Johan; Steinmueller, W. Edward (2018): Three frames for innovation policy. R&D, systems of innovation and transformative change. In *Research Policy* 47 (9), pp. 1554–1567.
- Smits, Ruud; Kuhlmann, Stefan (2004): The rise of systemic instruments in innovation policy. In *International Journal of Foresight and Innovation Policy* 1 (1/2), pp. 4–32.
- Teirlink, Peter; Verbeek, Arnold; Delanghe, Henri; Heijs, Joost; Sachwald, Frédérique; Bayhan, Deniz et al. (2011): Optimising the research and innovation policy mix: The practice and challenges of impact assessment in Europe. Findings from FP7 OMC-net project 234501. Available online at https://www.academia.edu/1140284/Optimizing_the_research_and_innovation_policy_mix_The_practice_and_challenges_of_impact_assessment_in_Europe, checked on 2/13/2020.
- Thelen, Kathleen Ann; Streeck, Wolfgang (2005): Beyond continuity. Institutional change in advanced political economies. Oxford, New York: Oxford University Press.

- Wanzenböck, Iris; Wesseling, Joeri H.; Frenken, Koen; Hekkert, Marko P.; Weber, K. Matthias (2020): A framework for mission-oriented innovation policy: Alternative pathways through the problem–solution space. In *Science and Public Policy* 47 (4), pp. 474–489. DOI: 10.1093/scipol/scaa027.
- Weber, Matthias; Polt, Michael (2014): Assessing mission-orientated R&D programs: combining foresight and evaluation. In *Fteval - Journal for Research and Technology Policy Evaluation* (39), pp. 5–10.
- Weible, Christopher M.; Heikkila, Tanya; deLeon, Peter; Sabatier, Paul A. (2012): Understanding and influencing the policy process. In *Policy Sci* 45 (1), pp. 1–21. DOI: 10.1007/s11077-011-9143-5.
- Wesseling, Joeri; Meijerhof, Nick (2020): Development and application of a Mission-oriented Innovation Systems (MIS) approach (Working Paper). Available online at https://www.uu.nl/sites/default/files/Wesseling%20and%20Meijerhof%202020_working%20paper.pdf, checked on 4/29/2021.
- Wieczorek, A. J.; Hekkert, M. P. (2012): Systemic instruments for systemic innovation problems: A framework for policy makers and innovation scholars. In *Science and Public Policy* 39 (1), pp. 74–87.
- Wittmann, Florian; Hufnagl, Miriam; Lindner, Ralf; Roth, Florian; Edler, Jakob (2020a): Developing a Typology for Mission-Oriented Innovation Policies. Fraunhofer Institut für System- und Innovationsforschung. Karlsruhe (Discussion Papers Innovation System and Policy Analysis, 64), checked on 8/25/2020.
- Wittmann, Florian; Hufnagl, Miriam; Lindner, Ralf; Roth, Florian; Edler, Jakob (2021): Governing varieties of mission-oriented innovation policies: A new typology. In *Science and Public Policy* (published online before print). DOI: 10.1093/scipol/scab044.
- Wittmann, Florian; Hufnagl, Miriam; Roth, Florian (2020b): Governing mission-oriented innovation policies. Workshop Summary. Fraunhofer ISI-Utrecht University Workshop. Utrecht, 20th February, 2020. Available online at https://www.uu.nl/sites/default/files/uu_workshop_summary_isi_draft.pdf, checked on 1/8/2021.
- Wittmann, Florian; Hufnagl, Miriam; Roth, Florian; Yorulmaz, Merve; Lindner, Ralf (forthcoming): Second Mission Analysis Report of the Scientific Support Action to the German Hightech Strategy 2025: Zooming in: Translating missions into policy instruments. Fraunhofer Institute for Systems and Innovation Research ISI. Karlsruhe.

- Wittmann, Florian; Roth, Florian; Hufnagl, Miriam (2020c): First Mission Analysis Report of the Scientific Support Action to the German Hightech Strategy 2025. Setting the stage: Positioning the missions in the socio-technical system. Fraunhofer Institut für System- und Innovationsforschung ISI. Karlsruhe. Available online at <https://www.isi.fraunhofer.de/content/dam/isi/dokumente/ccp/2020/Hightech%20Strategy%202025%20-%20first%20mission%20analysis%20report.pdf>, checked on 4/28/2021.
- Wu, X.; Ramesh, M.; Howlett, M. (2017): Policy capacity. A conceptual framework for understanding policy competences and capabilities. In *Policy and Society* 34 (3-4), pp. 165–171. DOI: 10.1016/j.polsoc.2015.09.001.