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Research Report

Mission-oriented innovation policy: From ambition to successful implementation

Perspectives - Policy Brief, No. 02 / 2021

Provided in Cooperation with:
Fraunhofer Institute for Systems and Innovation Research ISI

Suggested Citation: Lindner, Ralf et al. (2021) : Mission-oriented innovation policy: From ambition to successful implementation, Perspectives - Policy Brief, No. 02 / 2021, Fraunhofer-Institut für System- und Innovationsforschung ISI, Karlsruhe, https://doi.org/10.24406/publica-fhg-416799

This Version is available at:
https://hdl.handle.net/10419/247782

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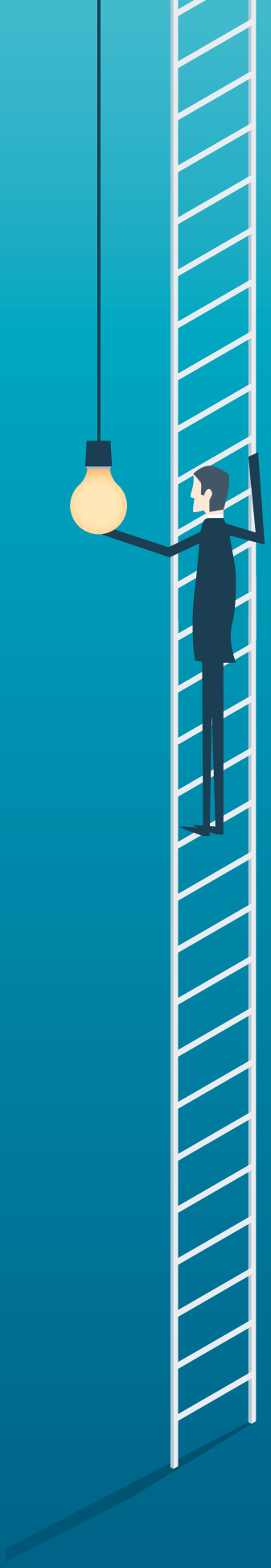

Mission-oriented innovation policy

perspectives

policy brief

2-2021

Fraunhofer ISI

Mission-oriented innovation policy

From ambition to successful implementation

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Content

Background and motivation

The major problems facing society, the so-called »Grand Challenges«, call for mission-oriented innovation policy. We aim to make a conceptual contribution here and identify the main components.

Mission-oriented innovation policy has become an important element of research and innovation policy strategies in many countries of the Organisation for Economic Cooperation and Development (OECD) as well as at European level. The topic now ranges far beyond innovation policy circles and has found its way, for example, onto the election programs of several German political parties. The reason behind this policy approach's rapid rise is the growing urgency to develop and implement solutions to the most important societal challenges (see [1]). Mission-oriented innovation policy certainly has the potential to deliver effective contributions to solving highly complex and challenging problems, such as the decarbonization of industry, the switch to climate-neutral mobility or the development of sustainable food production. However, successful mission-oriented innovation policy is extremely demanding and complex in terms of the conditions it requires; in particular, there must be fundamental further development in how policies are designed and implemented.

» Successful mission-oriented innovation policy is very demanding with regard to the conditions it requires.

The paradigm reorientation of some research and innovation policy began more than a decade ago. Since then, there have been increasing calls for the stronger orientation of research and innovation toward the development of contributions to solving the grand societal challenges. Given the pressing problems we are facing, there is now a widespread conviction that innovation policy, in particular, should no longer be limited to primarily economic goals such as competitiveness and growth, but must deliver targeted contributions to solving society's problems. The stronger »directionality« of research and innovation policy interventions follows the insight that the »invisible hand of scientific research« alone will not be enough to achieve the required orientation toward needs and problems. Indeed, against this background, numerous strategies, funding measures and programs have been established that are specifically aimed at environmental and societal problems and needs. While the aim was to generate potentially useful knowledge, concrete societal impacts and implementing the new scientific and technological knowledge mostly remained outside the scope of research and innovation policy.

Against the backdrop of this broad, but largely unspecific orientation of research and innovation policy toward the »Grand challenges«, the mission-oriented innovation policy approach developed in light of the urgency of the problems. In many respects, this concerns using concrete objectives to operationalize and specify the general problem orientation. This is linked to the aspiration to apply knowledge and innovation more quickly and more effectively to solving problems. Consequently, there are numerous requirements concerning the processes and structures of policy design and implementation associated with a serious and ambitious mission-oriented innovation policy, which, when viewed dispassionately, are hardly being fulfilled in present research and innovation policy practices, apart from a few exceptions in the OECD world.

Defining mission-oriented innovation policy

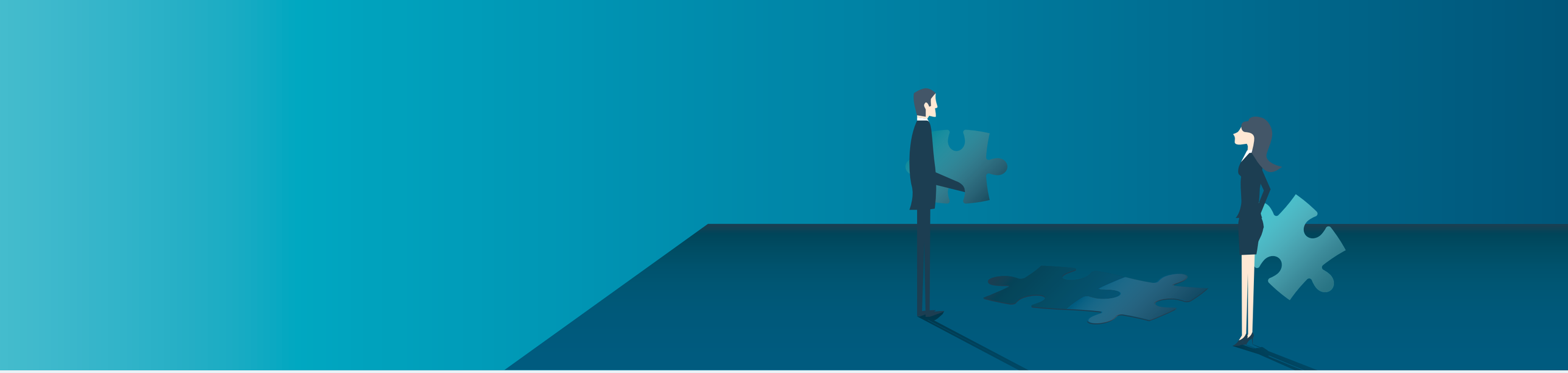
»We understand mission-oriented innovation policy as a cross-sectoral and cross-policy approach to achieving ambitious and clearly formulated goals via the generation and application of knowledge and innovation that address pressing societal challenges. The goals must be clearly defined as well as being measurable and verifiable, and they must be implemented within a clearly defined timeframe. Only when missions aim at behavioral and structural change, in addition to generating knowledge and innovation, do they contribute to comprehensive system transformations. Practices, actors and institutions must all be reconfigured as a result of the transformations.«

With this policy brief, we want to draw attention to the prerequisites needed for successful policy in the ongoing debate on mission-oriented innovation policy, and make a conceptual contribution to the further development of current approaches. We base this on an ambitious understanding of mission-oriented innovation policy, which aspires to make effective contributions to comprehensive system transformations. The functional contributions of research and innovation can vary in this context depending on the mission and problem concerned. Accordingly, explicit, strong and mission-specific links must be established to other policy fields beyond science, technology and innovation (STI) policy. For some missions, this may mean that STI policy plays only one role, albeit an important one, alongside others.

We begin with a brief summary of the core statements of this policy brief. The main section then examines the numerous new and far-reaching requirements for the strategy formulation, governance, implementation and impact assessment of policy that accompany ambitious mission orientation – meaning one that supports and advances system transformations. Subsequently, we present the four main components that are essential conditions for successful mission-oriented innovation policy. Where empirical findings are available, we illustrate the conceptual starting points using selected examples of national and international practice. We begin with a brief outline of the core statements.

Our perspective is primarily a German one. However, many of the proposals are likely to be relevant in other political contexts as well.

» Four components for successful mission-oriented innovation policy.



Core statements

The summary provides an overview of the core statements of this policy brief in order to present the state of research and the main components – the requirements – of mission-oriented innovation policy.

In order to rapidly realize the necessary transformative change in the context of a defined mission, very specific research, technology and innovation policy measures are needed that are explicitly geared toward this transformation. These must be linked in an intelligent way with the design of sectoral policies in crucial fields of transformation, such as energy, mobility or food. Mission policy is extremely demanding in terms of its requirements, and needs a conscious decision to change the way policy is designed and implemented. Such conscious decision-making is also associated with costs and administrative disruption – effective mission-oriented innovation policy comes at a cost. Mission-oriented innovation policy also demands a great deal of the actors involved in STI policy. When guided by mission orientation, innovation policy becomes more political, more complex, cooperation-intensive and reflexive. This policy brief identifies four main, closely interrelated strategic components that represent key success factors for mission orientation and that should provide the actors who want to shape mission-oriented innovation policy with practical guidance.

01

Broad activation of society

Mission-oriented innovation policy requires broad societal involvement. All the relevant groups must be incorporated and mobilized for the mission goals to meet the considerable demands for societal legitimacy. To achieve this, there should be intensive political debates about the goals. Consciously linking these to widely supported agendas such as the United Nations' Sustainable Development Goals (SDGs) can help to increase acceptance of the corresponding missions. It is also important to meet the expectation that missions will be designed in a joint process. Intensive public communication with strong political signals and convincing narratives should accompany a successful mission policy.

02

Strategy processes to formulate goals

Mission-oriented innovation policy requires comprehensive processes to formulate and structure goals. Formulating mission goals – in a clear, quantified and verifiable manner and with a fixed time horizon – is one of the most important elements of mission-oriented innovation policy. Both the process and the outcome of formulating goals have significant implications for the subsequent effectiveness of the mission policy. It is very hard to compensate mistakes made at the beginning of mission development in later phases of implementation. The conception and implementation of comprehensive strategy processes to formulate and design a mission are correspondingly important. Depending on the starting situation, this concerns the actual formulation of the goals and/or translating goals into a viable mission design. In this context, it is important to define a coordinated and compatible mix of existing and new measures that is suitable for advancing the desired transformations.

03

Coordinated mission management

Mission-oriented innovation policy requires coordinated mission management. The cross-departmental and cross-policy nature of transformative missions leads to a significantly increased need for political and administrative coordination – both horizontally and vertically. To meet this need, the basic prerequisites for effective coordination must be created. In order to achieve this, the relevant units in the ministries must be provided with sufficient resources. A cultural change in the ministerial administrations that rewards cooperation and collaboration is also needed. To this end, serious consideration should also be given to measures relating to organizational structure, for example, transferring the responsibility missions to central offices such as the Federal Chancellery, reassigning departmental responsibilities or outsourcing implementation responsibility to dedicated innovation or mission agencies.

04

Flexibility, reflection und experimental learning

Mission-oriented innovation policy requires scope for reflection and experimental learning. Due to the considerable complexity of the interdependencies, successful mission policy requires more than just ex-post performance measurement. What is needed above all are approaches to mission support that are formative, enabling reflection and learning, that continuously monitor mission implementation and, in the event of undesirable developments, influence the adaptation and further development of the implementation strategy. The opportunities offered by experimental approaches should also be exploited so that the insights gained can be incorporated into the further improvement of mission instruments.

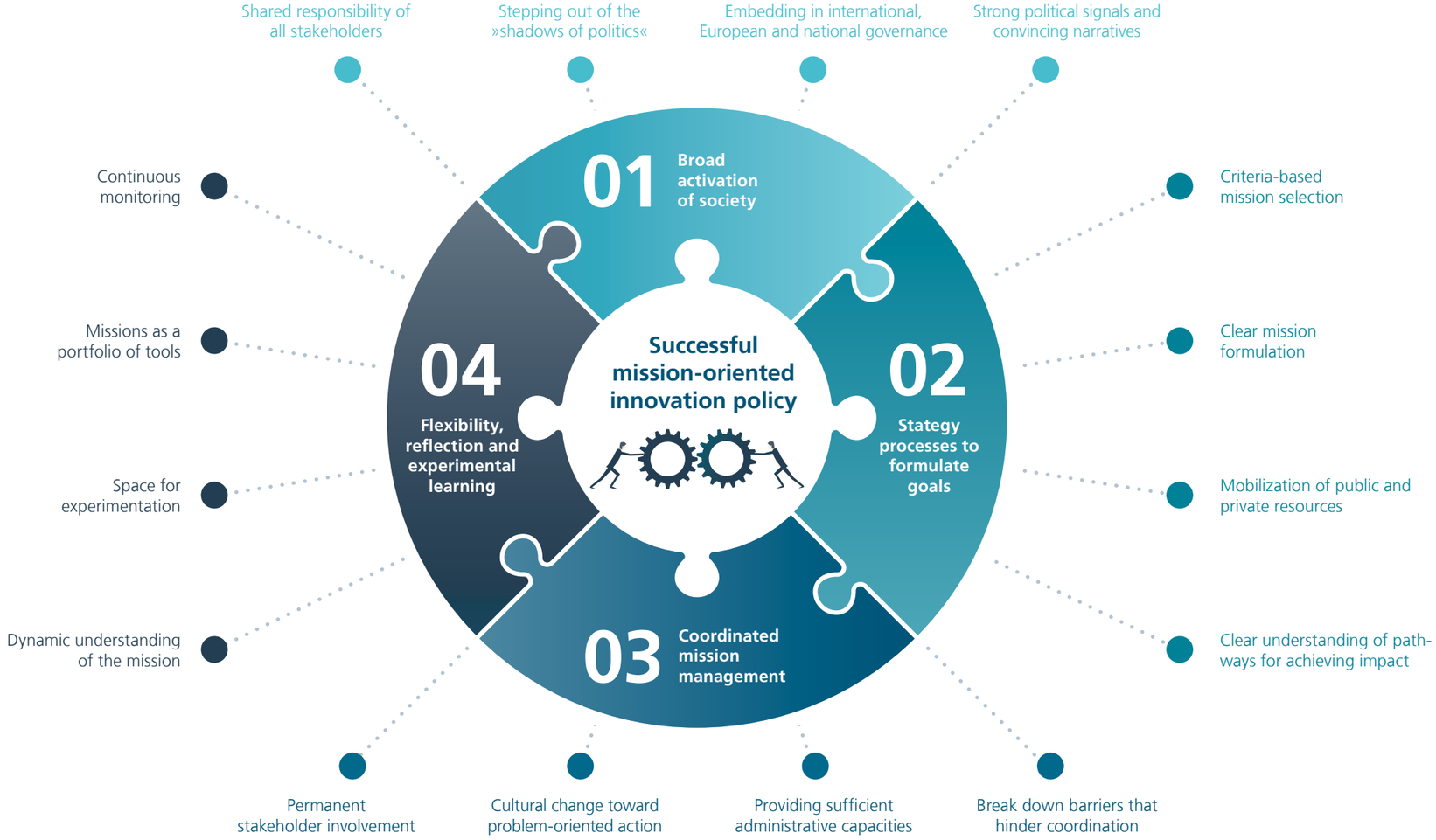
Main components

The requirements for a successful mission-oriented innovation policy.

Challenges

- Orientation toward societal goals
- Cross-policy and cross-sector approach
- Broad stakeholder support needed
- Politicization and high legitimacy requirements
- Impact-oriented tool kit
- Significant level of agreement and coordination needed

Recommendations



In detail

In this longer version, we go into more detail about the basic issues and core elements of mission-oriented innovation policy, explaining the background as well as the components, and providing both definitions and examples.

What are the challenges facing a mission-oriented innovation policy?

Mission-oriented innovation policy represents a paradigm shift that not only manifests itself in the form of transformational objectives, but also requires a new form of policy design and action on the part of public and private actors. High demands are placed on policy design and implementation, which often conflict with the existing assumptions of actors and established practices. In the following, we outline what we consider to be the central challenges in the context of the situation in Germany.

Distinct objectives through a clear focus on impact

The distinctive nature of mission-oriented innovation policy derives first and foremost from the need to set concrete, measurable objectives to be achieved within binding time frames. The objectives must be defined in such a way that they aim to achieve the most concrete results possible. Non-specific, rather vague objectives, such as improving the knowledge base in a research field, promoting a particular technology or increasing the innovative capacity of an industry or a region, which characterize the approach of the majority of conventional STI policies, do not qualify as mission orientation. Ambitious mission-oriented innovation policy is about achieving concrete, long-term societal effects that contribute to system transformation and thus to solving pressing societal problems. In this way, mission-oriented innovation policy that promotes transformation reaches far beyond the traditional rationale of STI policy, such as knowledge generation or the improvement of framework conditions, and requires in particular that closer attention also be paid to the actual application and broad diffusion of solutions. In addition, the desired change can usually only come about over a longer period of time; mission-oriented innovation policy can therefore generally not develop its full potential within the framework of a legislative period. Accordingly, it is important to develop a concept of system change over a period of time.

» Mission-oriented innovation policy aims to achieve concrete, long-term societal impact

Cross-policy and cross-sectoral approach

Closely linked to the transformative aspirations of mission-oriented innovation policy is usually the need to consciously design measures across policy fields and sectors. Even if STI policy can make a substantial contribution to solving societal problems, it cannot usually do so alone, but only in close coordination with other policy areas and actors. For example, the development of sustainable mobility systems in rural areas requires not only measures for focused knowledge and technology generation, but also and above all, appropriate investment in infrastructure and the implementation of effective regulatory frameworks. The traditional division of responsibilities between the promotion of research, innovation support, and sectoral policies, which operate in a largely disconnected manner and are reflected in comparatively well-defined departmental lines of responsibility, must be further developed in the context of mission orientation in favor of holistic, integrated approaches. The challenges facing the actors involved are therefore equally great: to overcome departmental silos and develop common perspectives.

Broad stakeholder support
In order to be able to make useful contributions to complex system transformations, mission-oriented innovation policy depends on the active support and participation of those groups of actors who are most affected by the planned changes or who will have to put the changes into practice. For example, the decarbonization of industrial production processes can hardly be achieved without the cooperation of the relevant companies. In order to achieve ambitious mission objectives, government interventions must therefore also be geared toward effectively mobilizing private stakeholders to help achieve the objectives. The latter play a central role in addressing societal challenges in the course of mission-oriented innovation policy, especially in the development and implementation of technological innovations. In Germany, as in most industrialized nations, the private sector provides the largest share of financial expenditure for technological innovations. An exclusively top-down mission policy that relies solely on public funding will generally fall short. At the same time, a broad and serious mobilization of actors offers the opportunity for the relevant stakeholders to take responsibility for implementation as genuine partners.

» The central objectives and course set by missions must be the subject of public debate.

Politicization and high legitimacy requirements
Since an ambitious mission policy aims to have a concrete impact on the transformation of systems, it is linked to significantly stronger socio-economic and socio-cultural interventions compared to classic STI policy. This goes hand in hand with a higher degree of public attention and politicization, since more groups of actors and sectors of society are tangibly and directly affected by the desired changes. This also means that, in addition to innovation, it may be necessary to initiate exnovation, in other words, the termination of existing practices – even if this is associated with costs for individual groups of actors. Overall, there are therefore increasing requirements for the legitimization of the interventions to be implemented within the framework of mission-oriented innovation policy. For this reason, the central objectives and directions that are at the core of missions must also be the subject of broad-based public debates.

Impact-oriented tool kit
In order to fulfill the aspiration of mission-oriented innovation policy, the interplay of research and development, innovation support, investments, and measures to change behavior and institutions is required. This means not stopping at the generation of knowledge and innovation, but also working toward concrete system transformations. In addition to traditional research and technology funding, instruments thus become more important that are aimed at the rapid diffusion and widespread application of the solutions developed, the creation of new markets, the stimulation of demand, and supporting this with a regulatory framework. What is needed, therefore, is a judicious combination of classic, more supply-side oriented STI policy measures with other types of instruments.

Significant level of agreement and coordination needed
In view of the expansion of the political field of action outlined above, the broadening of the landscape of actors and the differentiation of measures, mission-oriented innovation policy requires a high degree of cooperation and coordination. Most systems of government show deficits in coordination within and across departments. If, as in the German context, powerful departments with high degrees of political autonomy and the mechanisms of coalition government are added to this, departmental egoism and tendencies toward silo formation are not surprising. In addition, the organizational cultures of many ministerial administrations are characterized by highly structured and hierarchical processes that generate formulaic coordination processes and make fact-based cooperation difficult.

At the same time, the federal structure of the Federal Republic of Germany means that, for many policy issues, the scope for action also lies at the level of the states and municipalities, while ambitious missions and agendas are increasingly being defined and implemented at the EU level and beyond (for example, Sustainable Development Goals, EU Mission Areas, EU Green Deal). Effectively addressing the major societal challenges thus requires close interaction between the various levels of political governance. Missions, with their comprehensive aspirations, are designed in such a way that mission objectives can evolve and framework conditions can change. Therefore, openness to new insights and the adaptability of current mission policy are important.

Provided there is sufficient political resolve, the challenges outlined are solvable and must be overcome in order to successfully design and implement missions. Based on the challenges identified, this policy brief presents a number of starting points and conceptual approaches that can help ambitious mission policy to succeed.

» Effectively addressing the major societal challenges requires close cooperation between the various levels of government.

Which components are essential for successful mission-oriented innovation policy?

Missions are very diverse in nature. This diversity arises from the nature of the objectives aimed at, the degree of transformation desired, and the tools required to implement a mission (see [10]). Neither a universally applicable blueprint of an ideal mission design nor a specific implementation scheme exists. Accordingly, procedural elements are central to a mission policy that develops a common understanding, specifies objectives, and agrees on implementation steps. The following components focus on four interdependent areas that are essential for successful mission-oriented innovation policy: broad societal activation, comprehensive strategy processes for mission formulation and design, coordinated mission management, and reflection and experimental learning. For each of these four areas, we outline possible approaches and courses of action that can provide those actors who want to shape mission-oriented innovation policy with guidance and that connect with existing discourses on mission orientation (see [2, 3, 4, 8, 9, 11]).

Box A

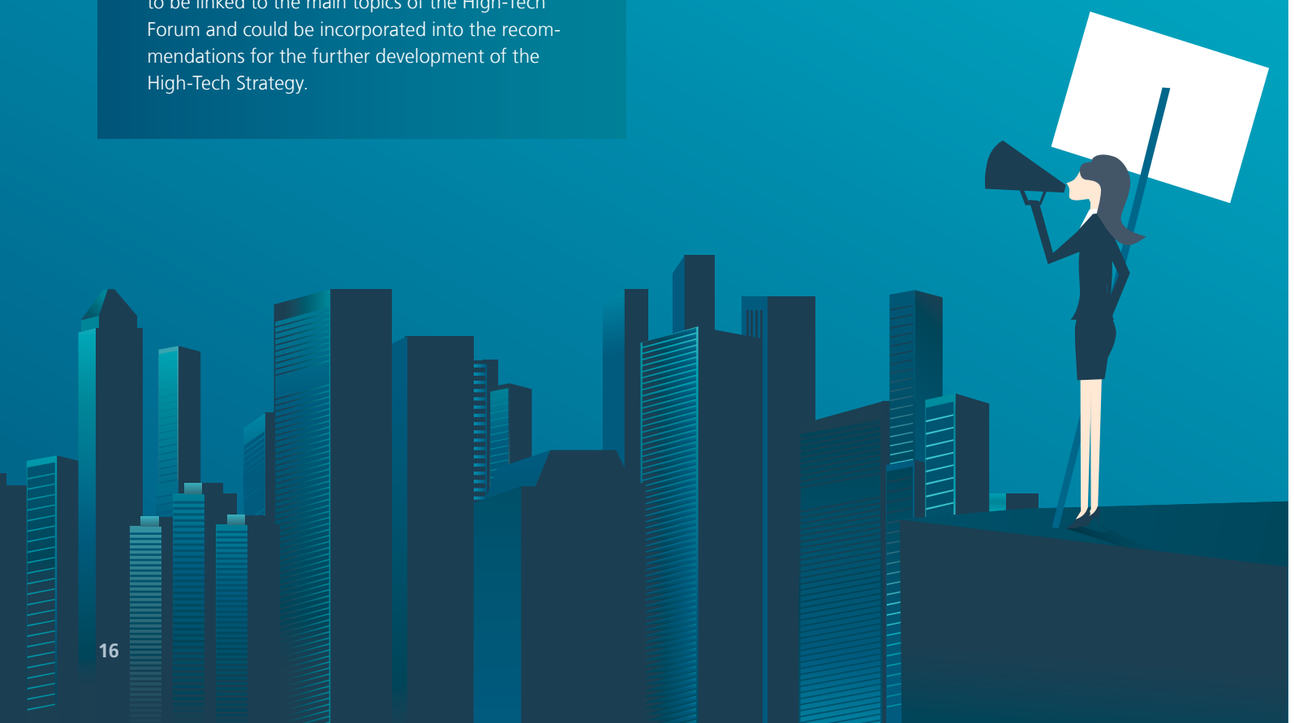
Thematic regional dialogues as one possibility for citizen participation

In 2020, interested citizens and other actors from society, business and academia were invited to develop joint solutions to societal problems in seven regional dialogues.

These were designed and conducted by Zebralog and Fraunhofer ISI as a pilot process for citizen participation for the German Federal Ministry of Education and Research (BMBF), in order to find out about different societal perspectives on selected topics and to process these for further developing the federal government's High-Tech Strategy.

In parallel to the on-site and online dialogues, there was also the opportunity to participate via a website (www.mitmachen-hts.de).

In each dialogue, participants formulated core messages for the High-Tech Strategy and presented them to the ministries in a results dialogue. The core messages focus on addressing societal challenges, a shift in future skills and new approaches of a culture of risk-taking and innovation. The impulses from the participation process were able to be linked to the main topics of the High-Tech Forum and could be incorporated into the recommendations for the further development of the High-Tech Strategy.



01

Broad societal activation

The mission-oriented approach results in increased requirements concerning legitimacy and support from different political and societal forces. While classic innovation policy approaches primarily rely on the effective collaboration of industry, academia and government, the measures required for mission-oriented innovation policy go far beyond this group, often referred to as the »triple helix«.

Mission policy that promotes successful, real transformations can only succeed if it integrates the relevant actors from academia, industry, civil society and public institutions. This should already be considered when selecting missions. When designing and implementing missions, there are different approaches available in order to win over a broad and varied group of actors as active partners to achieve the mission goals. Particular importance is attached to the question of how to increase the ownership of the actors needed for the mission's success. In an ideal case, the mission is seen as the way to realize both common interests and those particular to individuals. The best way to achieve this is to already incorporate key actors when formulating the mission (see Box A »Regional Dialogues«).

The legitimacy of missions can also be increased by linking them to established and broadly accepted policy processes and agendas. Finally, intensive political communication with credible signals and strong narratives is an essential component to get all the groups of relevant actors »on board«. The explicit aim here is to also get ordinary citizens involved in the missions.

Trigger societal discussion and mobilization

With their comprehensive transformative aspiration and clear substantive direction, ambitious missions require significantly more legitimacy compared to conventional innovation policy approaches. This implies a focus on problems and possible solutions that are regarded as generally relevant, because not every topic or problem is suitable to be developed into a mission. Missions without the corresponding potential to mobilize the public and relevant stakeholders, which are relegated to niches and remain within the framework of pure STI policy, have little prospect of fulfilling the hopes placed in them. Indeed, missions need the relevant mobilization and broad public consensus as a mandate for the desired transformation – a transformation in which there may also be losers, for instance through the exnovation of existing solutions and practices such as certain production processes or markets.

For the STI actors, this means that they have to step out of the »shadows of politics« and engage in a broad public debate about mission goals and pathways. While identifying urgent societal challenges may be largely uncritical, there can be huge differences in how society understands the underlying problems and possible solutions. For example, what role should changes in behavior play in relation to technological innovations? Engaging in a corresponding, even controversial discussion is therefore the foundation for developing convincing missions that can be advocated and promoted by political actors in the long term.

» STI actors must step out of the »shadows of politics« and engage in broad public debate.

Box B

Stakeholder participation, joint declaration of objectives and communication in combating cancer

The National Decade Against Cancer, which brings together the various stakeholders active in the field of cancer research, offers a tiered system of participation: On the one hand, the mission partners, who helped to develop the joint declaration of objectives and who are actively involved in the working groups. On the other hand, the wider circle of mission supporters, who are committed to the declared objectives and have access to the current developments and activities of the National Decade Against Cancer.

In the context of the National Decade, which is also the main vehicle for the »Combating cancer« mission in Germany's High-Tech Strategy 2025, a joint declaration of objectives was drawn up by the stakeholders involved from federal ministries, federal state representative offices, expert associations, foundations, company and patient representatives, in which (partially) quantified goals were given and possible contributions by the partners are outlined and communicated externally via a project website.

Increase ownership

Clarifying which actors to include in a mission should be done as early as possible in the strategy process. If important groups are overlooked or approached too late, it is easy to »miss the boat« for good integration. It is not possible to say which the relevant stakeholder groups are, as this depends on the mission's characteristics (for example, primary focus on industry or end consumers). Commitment to common goals is an effective means of ensuring ownership in addition to participation in the mission formulation process.

Right from the outset, the goal must be to establish joint ownership for the mission's overall success among all the actors involved instead of a mere compilation of individual activities. Creating a profound understanding of the system can help to break down existing silo perspectives. This also supports the development of a coherent communication of the mission to the outside world (see Box B »Stakeholder participation«).

In addition to participating in the political process of mission design, an effective means to ensure ownership of the relevant actors is to generate joint outputs in which all those involved acknowledge their responsibility for the mission's success and document their concrete contribution toward this (see Box B »Stakeholder participation«). This can go as far as certain sectors or individual enterprises clearly committing themselves to mission-relevant goals, for example by promising investments, making commitments to change product portfolios or guaranteeing changes in production processes.

Strong signals, convincing narratives

An essential element of mission-oriented innovation policy is to send strong, clear and credible signals to industry and society. These signals can consist of assigning special priority to a challenge in political communications, for example in official communiques, government strategies or other highly visible activities. Another option is to set visible (positive/negative) market incentives, for instance, announcing new taxes or tax exemptions, or launching innovative, long-term funding programs. This can help the private sector and civil society to recognize the determined political will to change things and to adapt accordingly.

» Clear and credible signals are required.

Very ambitious, transformative missions in particular usually require fundamental changes in economic value creation processes, institutional arrangements and individual behaviors. For example, it is hard to imagine a sustainable food supply without far-reaching changes in the agricultural sector and individual consumption. Likewise, it will be almost impossible to achieve a sustainable transformation of the mobility sector just with new technologies and service offerings; mobility behavior as a whole has to change. This is why clear and credible signals are necessary in the specific case, for example, as to whether or by when the phase-out of internal combustion engines should take place in order to trigger corresponding investments by industry and consumers.

To achieve this, convincing and attractive narratives must be developed that translate ideas into future visions and give the mission legitimacy. Demonstrating the urgency of the need for action is just as important here as pointing out the opportunities associated with a successful transformation.

At the same time, it is important to manage expectations: the communication accompanying mission policy must not create expectations that cannot be fulfilled, but rather formulate goals that are achievable with the underlying instruments and do not ignore global interdependencies. Missions should be ambitious, but not deteriorate into political pipe dreams. This also implies that the respective initiators of missions can credibly claim to advocate the desired transformation goals. This also means showing the limits of their own contribution and highlighting how their own mission fits into the broader narrative. Particularly when missions address global developments and challenges, such as climate change or the application of artificial intelligence, it should be made clear that, while national innovation policy on its own cannot solve these challenges completely, it can certainly make concrete and substantial contributions to shaping these future issues.

Build on existing policy processes

A very promising way to ensure the mobilization of a broad actor base and secure the legitimacy of missions may be to better align national, international and sub-national policy agendas. At global level, the SDGs provide a widely accepted, political framework for dealing with the key societal challenges of our time. One possibility would be to align German mission policy more closely with the SDGs. This would increase the international coherence of political communication as well. Similarly, there are numerous efforts and initiatives at European level in the area of mission policy. As the largest and economically strongest EU member and important driver of the European integration process, Germany is an influential player in this regard and other EU states often take their cues from it. Accordingly, Germany's mission policy should always be closely linked to the strategy processes at EU level in order to promote intensive coordination and, not least, to avoid giving mixed signals and ensure the credibility of Europe's ability to act.

02

Strategy processes to formulate goals

For a mission to succeed, a comprehensive and systematic process of mission formulation and design must be drawn up and begun in good time. Defining concrete goals and measures is particularly important. This process influences missions' legitimacy and the mobilization of actors and lays the foundation for the desired impacts.

In order to realize their full potential, missions require the development of a coordinated portfolio of measures, which is supported by all the stakeholders if possible. Without a profound understanding of the goals to be achieved and how to get there, missions remain little more than political visions. Accordingly, it is not very promising to develop missions without a strategic process at the level of goals and implementation. In the following, we distinguish between the question of which missions should be selected and how to formulate them, and how to tackle their design.

Choose the right missions

In view of the multitude of societal challenges, the first question is which of these should be addressed using mission policy approaches? While the decision for or against specific missions is always also strongly dependent on the respective context, we regard four aspects as the main guiding principles for selecting missions.

First, a high level of urgency: Being able to mobilize the relevant actors requires the selection of problems that are commonly regarded as urgent, in other words, there is a perceived high demand for change and, at the same time, this area is assigned high societal importance. Strategic foresight helps to identify challenges and prioritize the need for action for missions.

» Without a profound understanding of the goals to be reached and how to get there, missions remain little more than political visions.

Box C

Comparing mission formulation processes

In the Netherlands, central thematic areas and overarching objectives were defined in a political process. This included setting guidelines in the coalition agreement of 2017 as a starting point.

Formulating and specifying these goals at sectoral level was done with the close involvement of key stakeholders, who committed themselves to concrete goals and their implementation through suitable measures and resources within the framework of the Knowledge and Innovation Covenant (KIC). In addition to using established structures (so-called top sectors) to incorporate existing actors, an effective factor to mobilize stakeholders, according to the participants, was the clear and credible signal of future changes on the part of government.

Once broad topics or mission areas had been selected within Horizon, the European Framework Programme for Research and Innovation, high-ranking mission boards with representatives from academia, politics, research and society were established that were intended to develop proposals for narrowing down missions and their implementation.

This meant that some parts of the decision-making process were externalized and outsourced to an autonomous panel of experts. This deliberately removed them from the political negotiation process, which was often perceived as not transparent enough.

Second, missions need clear leadership by an institution that can credibly advocate the transformative aspiration of a mission and is accepted across sectoral boundaries as a partner by the relevant stakeholders. Without a clearly assigned leader, it is harder to mobilize other actors and increases the risk of missions remaining »one-dimensional« in their implementation.

Third, existing measures with the potential to support missions should be utilized. Missions rarely address novel challenges, and are more likely to tackle problems that are embedded in a complex system of existing policy measures and stakeholders. Missions should be developed taking these activities into account, instead of creating parallel structures that, in a worst case, overlap.

Fourth, a certain selectiveness with regard to missions seems appropriate in view of the challenges to mission governance. Given the background of the necessary resources and the visibility and legitimacy of missions, it seems more likely that a smaller number of deliberately selected and intensively addressed missions (or »mission areas« as they have been formulated at EU level) will lead to success than a small-scale approach with a large number of thematically heterogeneous missions.

Clear formulation of missions

Starting from the premise that mobilizing stakeholders is a key prerequisite for the success of missions, it stands to reason that involving interest groups and stakeholders at an early stage will secure their acceptance and commitment (»buy-in«) by them identifying themselves with the missions' goals and regarding these as their own. At the same time, this taps into relevant expertise in the respective problem area. Two possible approaches should be distinguished here (see Box C »Mission formulation processes«).

First approach: Here, stakeholders can already be integrated during the goal formulation process, meaning that goals are negotiated and jointly developed with the relevant stakeholders. While this approach can increase stakeholders' identification with the goals, it also contains the risk of unequal representation of relevant actors and that far-reaching goals may be blocked or watered down by individuals.

Second approach: Goals can also result from the political process (for example, targets defined on the basis of a coalition agreement), recommendations by experts or superordinate strategies (international climate treaties etc.), so that the stakeholders here are more involved in the concrete design (and definition of sub-goals), and the aim is more a common understanding of how to achieve the goals.

While there is the general recommendation to formulate clear but ambitious goals (see [2, 3, 4, 6]), this is often difficult to implement in practice. Formulating mission goals means reducing highly complex, societal challenges to specific policy targets and then translating these into concrete activities. In line with this policy brief's call for ambitious mission policy with transformative goals, we see the need to formulate ambitious and far-reaching goals that go beyond mere technology support and consider sectoral structures and patterns of behavior as well.

»
Formulating mission goals means reducing highly complex societal challenges to specific targets and concrete measures.

Box D

Criteria for defining goals
(based on [7])

Goal hierarchy: In addition to the main objective of a mission, there are often several sub-goals that should contribute to achieving it. A clear hierarchy of goals is especially important to identify any conflicting goals as early as possible.

Specific goals: Mission goals must be defined as specifically as possible, not least to enable their objective verification. If goals are set for long periods of time, it may be necessary to supplement the overarching goals with phased interim targets.

Goal complexity: Conflicting goals occur primarily with complex missions. It can be assumed that there will be a large number of interdependencies in transformative missions, in particular. System mapping approaches are one way to better understand the complexity of demanding missions and identify potentially conflicting goals early on (see Box E »Systems Mapping«).

Goal orientation: A key question when formulating goals is how ambitious the defined targets should be. Generally, mission goals should not be too easily attainable, but always be realistically achievable, especially as overambitious or unrealistic goals can have a negative effect on the credibility of a mission as well as the motivation of the stakeholders involved.

Goal commitment: In view of the systemic complexity of missions and continuously changing social dynamics, explicit goal adjustments should be expected over time. It is important to consider under which conditions deviations are allowed from the agreed mission goals, for example, due to unforeseen events. Generally, a high degree of goal commitment is desirable as this prevents deviation from the defined goals in the event of minor changes in the political context (changing political majorities, budget shortages, for example). On the other hand, missions must also be able to adapt to new challenges, integrate new social preferences and learn lessons from implementation.

The basic prerequisite is the formulation of clear and verifiable (quantified or at least qualified) targets in a clearly defined timeframe based on the overarching vision or objective, which can be communicated and used to guide the actions of all the actors involved. Mission goals should therefore satisfy the central criteria of viable goal definition (see Box D »Criteria for defining goals«). Since mission goals can often only be achieved after a long time, it is essential to define relevant milestones or regular checkpoints that allow reviews within the framework of political legislature periods. These milestones or interim goals can be used to determine whether a mission is progressing in the right direction. This can also alleviate the tension between long-term goals and short-term political and electoral cycles. The mission process must also be open to changing its goals and adapting to new societal and political dynamics.

From mission goal to implementation

Mission formulation is only the first step. Translating the formulated goals into concrete activities is the second main element of the strategy process that also requires a great deal of attention and sufficient resources. Without this specification, there is the risk of goals and measures becoming uncoupled and drifting apart. Missions are complex (see [11], p. 67-68). They are therefore rarely achieved by one type of intervention and instead require the coordinated interaction of different instruments. They are more than just a collection of loose individual measures thematically related to the mission (see [3], p. 43). In order to achieve a target-oriented, coherent and complementary mix of policy measures, it is crucial that the actors involved develop a shared vision of impact pathways suitable to achieve the goals and define clear responsibilities. This presumes that the relevant stakeholders are involved during this stage at the latest, in order to work out the implementation pathways to goal achievement.

Depending on the mission's aspiration, this means involving actors far beyond traditional research and innovation fields and an understanding of which types of measures are suitable for achieving the postulated goals. For instance, it is rarely possible to achieve targeted behavioral changes through STI policy measures alone; this requires intentional links with other types of instruments (especially regulation and information) to create the appropriate framework.

It is important to consider that missions rarely address completely new problems, but in the vast majority of cases build on existing, often unrelated policies (see [5]). Accordingly, a mission-oriented approach does not necessarily mean the creation of completely new activities and measures, but encompasses rather the targeted combination, realignment and supplementation of existing measures in order to address the overarching goal of a mission. This requires a comprehensive analysis of existing measures and identification of those activities that can contribute to the formulated goals.

In addition, missions should also aim to mobilize the resources of public and private actors, meaning they should also try to get private companies to make voluntary commitments to achieving the goals within the scope of their possibilities. The full potential of most missions can only be exploited by combining the contributions of public and private actors. However, this also means that a corresponding change in the role of these actors is required, which is much more demanding than a top-down policy, in which private actors are only seen as funding recipients.

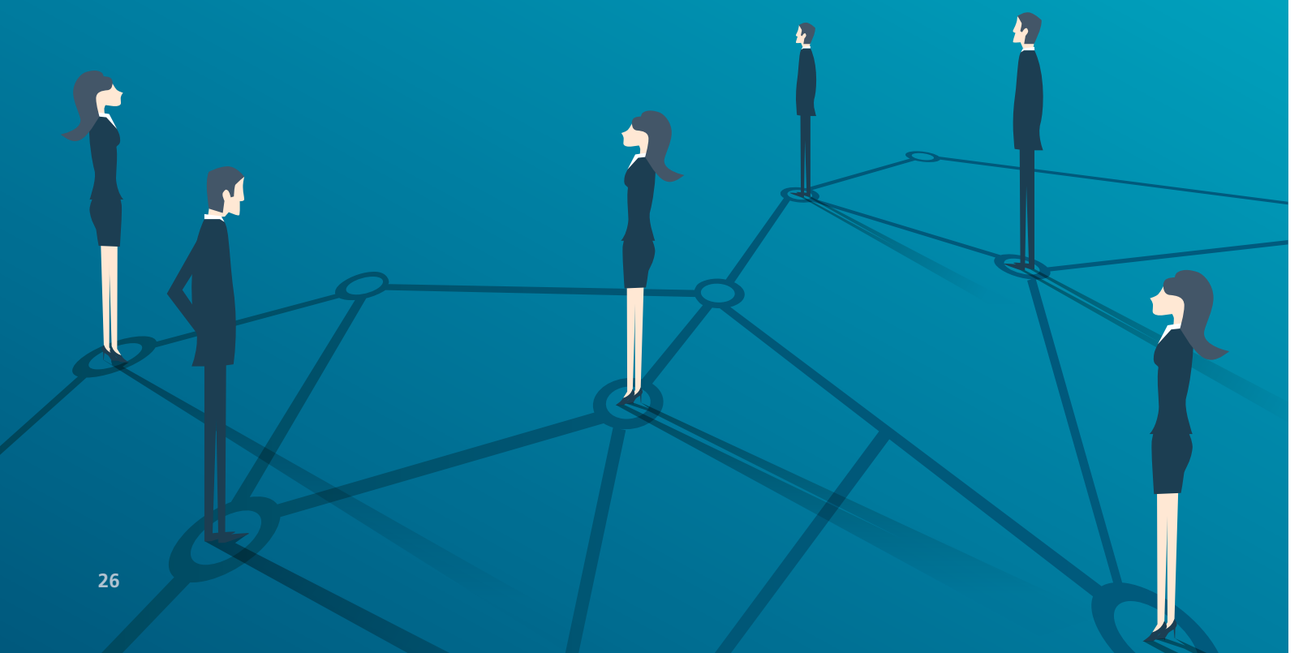
» A mission-oriented approach is a clever combination of existing and novel instruments.

Box E

Systems mapping in British mission policy

The term systems mapping describes different methodological approaches to utilize systems thinking for the analysis and further development of political instruments and strategies. The starting point of the systems mapping process is usually a societal challenge or a complex socio-technical system. Different problem areas, key technologies, and relevant actors and policy measures are identified with the involvement of various experts and stakeholders, and the connections between the individual system elements are highlighted and structured.

The UK Department for Business, Energy and Industrial Strategy (BEIS) uses a problem-centered systems mapping approach to illustrate complex constellations of stakeholders and topics within the framework of the national »Grand Challenges« programme, to critically review existing measures, and to develop new, holistic solutions with stakeholder groups in joint workshops. Several series of workshops were held with stakeholder groups that were supported by the use of specific mapping software.



03

Coordinated mission management

By their very nature, transformative missions fundamentally span departments and policy fields. Due to the pronounced cross-cutting character of mission-oriented innovation policy, effective coordination structures and processes are an essential prerequisite for successful mission implementation. The requirements for this go far beyond the coordination of conventional classic STI policy within and between ministries.

Measures must be coordinated across different policy levels. In addition, effective mission management relies on the involvement of implementing partners in industry and civil society. Accordingly, there is a great need for new mechanisms and entities to manage the multi-layered aspects of coordination. In order to provide an adequate response to the increased demands for greater horizontal and vertical coordination and stakeholder involvement in the context of mission implementation, comprehensive structural and cultural changes are needed, as well as the development of additional organizational capacity.

Adequate capacities and cultural change as basic prerequisites

In order to be able to carry out the complex and multifaceted tasks of coordination and agreement, sufficient resources must be available to the key players, such as the departments in ministries. An explicit warning must be given against mission management being carried out »as an aside« to day-to-day business. In addition to the allocation of adequate human resources, it must be ensured that the responsible units have the necessary methodological and process competencies (in-house or via service providers) in order, for example, to be able to competently and purposefully manage demanding processes of interaction, even with external stakeholders (see [3], p. 52).

In addition, the successful implementation of mission-oriented innovation policy requires a change in culture and awareness in politics and in public administration, since the success of this policy approach is crucially based on the willingness of the players involved to tackle societal challenges together and to view the challenges from a systemic perspective rather than from a strategic departmental one. Where currently silo thinking and competition often dominate political and operational logics of action, a culture of cooperation must be established that not only encompasses the collaboration of different departments and ministries, but also aims at constructive partnerships with other players and stakeholders. For example, the creation of independent mission budgets could provide an incentive to initiate integrated programs or pilot measures that (also) test new forms of cooperation. A prerequisite for this is that the allocation of funds be linked to measures that explicitly include a structure that promotes cooperation and thus functions as a bridge to the existing activities of individual players.

» A collaborative culture must be established.

Adaptation of organizational structures to the specific requirements of the mission

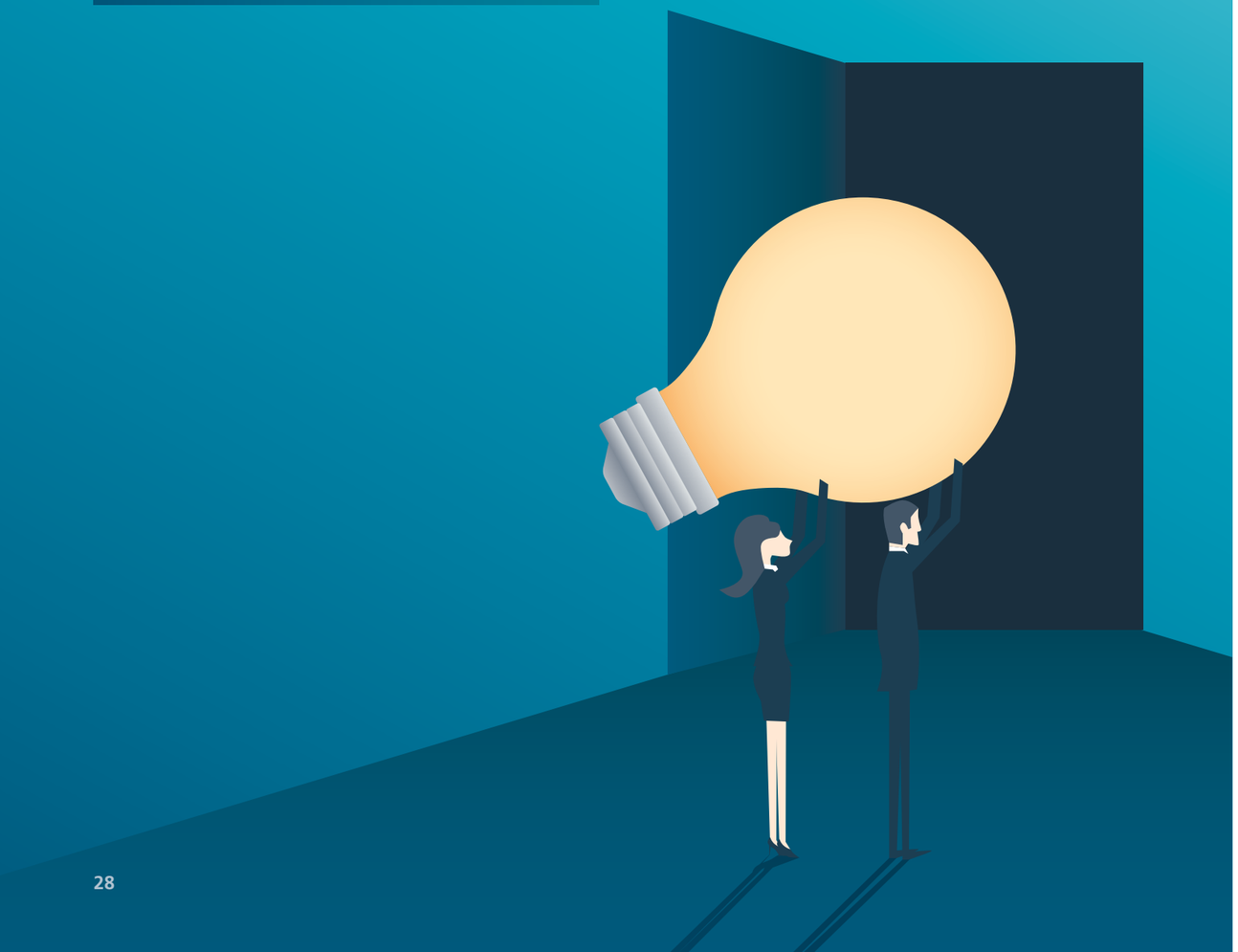
While mission management with clearly defined accountabilities counteracts a fragmentation of responsibilities, the question arises as to which organizational solutions can be used to meet the increased need for coordination between different ministries in the implementation of missions and to promote closely interlinked cooperation.

An initial starting point for improving mission management is to establish specific, mission-related steering groups that operate across departments and ministries and include the organizational units relevant to a mission and their staff. These mission-specific steering groups or task forces (see [3], p. 51; [9], p. 143) are given the necessary influence by the involvement of high-ranking ministry representatives (for example, at the level of secretary of state or department heads). Ideally, they should build on the elements already discussed, such as broad stakeholder participation and ministerial cultural change. This is because mission orientation also requires a departure from the policy of the »lowest

Box F

Changing departmental responsibilities as one way to integrate topics

The Austrian Federal Ministry for Climate Action, Environment, Mobility, Innovation and Technology (BMK) brings together responsibilities that were previously scattered across several departments under one roof in a »climate protection ministry«. Created in the course of the coalition negotiations between the conservative Austrian People's Party (ÖVP) and the Austrian Green Party, the activities of the former Ministry for Transport, Innovation and Technology were merged with environmental and energy issues in 2020, and in this way a closer link was forged between innovation topics and specialized policies.



common denominator« due to cumbersome processes of established coordination procedures within and between departments. At present, these are often exhausted in bureaucratic drafting processes and offer too little opportunity for productive issue-oriented compromise across departmental boundaries (see [3], p. 45 ff).

Following a similar logic, but going considerably further, is the possibility of tailoring ministries more closely to selected problems (see Box F, »Departmental responsibilities«), (see [3], p. 51). Such a change in departmental responsibilities can serve to concentrate mission management within a single ministry, thus internalizing coordination processes and restructuring them in the process. Alternatively, it is also conceivable to place missions directly with the Federal Chancellery and thus remove them from direct departmental competition (see [9], p. 145). To a certain extent, this centralization would also offer the possibility of »cooperation in separation,« that is, individual ministries would act within their own areas of competence and structure how well individual measures dovetail with mission achievement. At the same time, this high-level political anchoring would send a signal of political priority for the mission both internally and externally.

If the tasks are so complex that it does not make sense to organize them along existing structures, mission management can be outsourced to institutional structures suitable for this purpose, for example by commissioning specially created innovation or mission agencies (see [8], p. 9; [9], pp. 147-148). This removes the coordination of a mission from departmental competition and avoids duplication, reduces efficiency losses and allows systemic policies to be implemented.

Ensure stakeholder involvement on a permanent basis and adapt as necessary

The need to involve key stakeholders as well as those at the local and regional level does not end with mission formulation and design, but must be established on a permanent basis in order to maintain the exchange of information on ongoing implementation processes, to be able to agree on necessary modifications to mission implementation, and to guarantee sufficient scope for reflection and learning. The involvement of these players should not be regarded as a necessary evil, but rather as a valuable source of guidance that is helpful in overcoming complex challenges. To make this possible, advisory bodies that accompany the mission provide an opportunity to continuously involve and listen to the key stakeholders, who can thus contribute their expertise to the further development of the mission. In addition, graduated forms of stakeholder involvement are also conceivable, which bind stakeholders more closely to the mission even without co-decision-making powers (see Box B »Stakeholder participation«).

» The involvement of stakeholders has to be regarded as a valuable source of guidance.

Box G

Innovation agencies

In numerous countries, innovation agencies that work on behalf of ministries have played a key role in implementing STI policies for decades through the administrative tasks they perform. However, so far, there are only a few prominent examples of how innovation and research agencies can help to shoulder the responsibility for system transformation when accompanying the paradigm shift towards a transformative, goal-oriented and autonomous implementation of mission-oriented innovation policy.

Two international examples could be a role model for Germany: The Swedish Vinnova agency, with its Challenge-Driven Innovation Program, and the Japanese Science and Technology Agency, which is currently implementing its mission-oriented mandate and developing programs that establish it as a responsible nexus between ministries, industry and the science system (nexus approach). Both agencies can rely on staff with extensive (and in some cases long-standing) expertise and specialist knowledge of the key stakeholders in science and industry.

In Germany, the role of project management agencies has so far been limited to the administrative management of funding programs and the provision of science-specific (strategic) know-how to ministries. Following international examples, Germany could also establish new types of agencies to act as pivotal mission-specific players and that drive the implementation of the approach by working across departments and with specialist information.

This would require an extended mandate compared to existing project management agencies, one that includes the strategic development and operational implementation of selected missions, and expanded competencies suitable for missions. The political responsibility would remain with the ministries responsible for these agencies.

04

Flexibility, reflection and experimental learning

Setting binding, unambiguous and verifiable objectives is only the starting point of a successful mission. It must be backed up by suitable concepts for evaluating and measuring impact in a reflexive manner, which also serve to adapt the mission and its implementation over time. In view of the complex interrelationships of effects and a dynamically changing environment, such a measurement of success cannot be based solely on static, ex-post approaches. Rather, it is necessary to record the implementation of mission-oriented innovation policy by continuously monitoring and reflecting on the intermediate steps achieved.

In the context of a reflexive, evolving strategy, it must be ensured that ongoing learning is facilitated during the implementation of relevant measures. Furthermore, that insights are gained, which can be used to adapt and optimize the ongoing mission policy in a flexible manner. The realization of transformations through missions is – as described above – associated with demanding specifications for the task of mission formulation and design as well as coordination. In view of this complexity, it is essential to understand missions not as rigid policies with linear impact dynamics, but as dynamic and experimental approaches that can evolve over time as new conditions and insights emerge. This also means acknowledging that not every approach or mission will be successful (see [3], p. 52). Instead, some of the essential characteristics of missions include learning, trial and error, and readjustment. Accordingly, we argue for an explicitly adaptive and reflexive mission policy that understands these characteristics as important prerequisites for making missions successful and developing them further.

The reflexive, experimental character of the implementation

With their aspiration to initiate transformative change, missions take a broad approach that combines different measures and activities toward an overriding objective. The great opportunity of the mission-oriented approach lies in the fact that its portfolio approach, which encompasses various measures, sectors and policy areas, provides the freedom to experiment and try out different potential solutions and is not held back by the failure of individual measures (see [9], p. 148). In order to seize this opportunity, a work and error culture is required that is prepared to accept the failure of individual measures and activities as part of mission implementation and to use this as an opportunity to improve the mission design. A move toward this approach begins at a number of different stages:

In order to strengthen the idea of a portfolio of measures forming the basis for missions, it is necessary to develop a common understanding of the mission and a commitment on the part of the actors involved. Only the understanding of a collaborative mission creates the basis for seeing missions not as a collection of individual measures, but as a systemic approach that works as a whole toward change. Under these conditions, the failure of individual measures should not be seen as the problem of individual departments or ministries, but rather as providing insights for the mission as a whole. Consistent outward communication of the mission can make an important contribution to this (see Box B »Stakeholder participation«).

Missions should actively use the potential of experimental approaches (real-world laboratories, pilot and model projects, regulatory sandboxes, etc.). It is crucial here not only to try out possible approaches, but in particular to consider how the insights gained from these experiments can be used for the continuing process of mission implementation. This should be part of the strategic mission planning process from the outset. It includes the provision of adequate resources for ongoing evaluations and potential perpetuation of promising approaches. This is the only way to ensure the continued reflexive development of mission implementation and learning

»

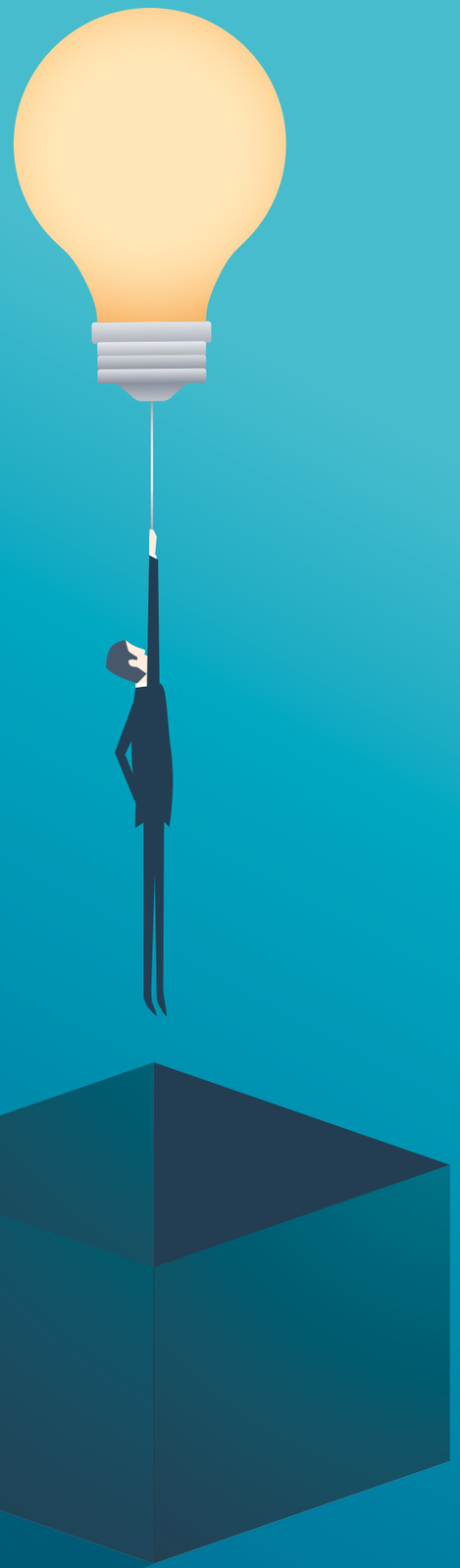
The great opportunity of the mission-oriented approach lies in its portfolio, which encompasses measures, sectors, and policy areas, allows room for experimentation, and is not thwarted by failure.

Box H

Real-world laboratory approaches

Based on an ideas competition in 2019, a new funding concept for real-world laboratories (»living labs«) in the field of the energy transition was developed by the German Federal Ministry for Economic Affairs and Energy (BMWi) in its 7th Energy Research Programme. With an overall budget of up to 600 million euros, the programme makes it possible to test promising solutions on an industrial scale under real-life conditions, even if they do not fully comply with existing legal framework conditions.

In addition, with the »Living lab strategy«, the BMWi has developed an approach that aims to test the potential of digital solutions unrelated to specific topics and to contribute to a better understanding of appropriate regulation. This is being supported by the »Living labs network,« among other things, which is intended to promote networking and exchange among the stakeholders involved.



from approaches with varying degrees of success (see Box H, »Real-world laboratory approaches«).

Monitoring in the context of reflexive and iterative processes

A basic prerequisite for an explicitly adaptive and reflexive mission policy, which understands the early recognition of undesirable developments as an important prerequisite for making missions successful, is a suitable approach for continuously recording the current state of implementation.

Since key decisions are already made in the early phases of mission formulation and concretization, ongoing support in the form of monitoring must be considered from the outset as part of implementation (see [3], p. 52; [4], p. 15, [9]). All actors participating in the mission must be actively involved in this process. This implies defining regular »checkpoints« in the implementation process, establishing clear responsibilities and processes for dealing with the results of monitoring, and creating a clear structure for managing the mission (see [3], p. 43 ff).

In view of their multidimensionality and long time horizons, the focus of the ongoing monitoring of missions should be on a process-oriented, formative approach with the strong use of ex-ante components (for example, in mission design). The primary objective is not so much to evaluate the success of the mission as such, but rather to strengthen the collective understanding of the mission among the actors involved. With regard to the active monitoring of the mission, the aim is, on the one hand, to continuously record the current status of implementation and to identify any need for adjustment. On the other hand, ongoing monitoring and strategic foresight, especially horizon scanning, can help to identify emerging challenges, classify them analytically and make suggestions for the appropriate adaptation of mission implementation. Moreover, in view of the delayed measurability of direct effects, the process-oriented perspective can also help to communicate the progress of the mission to stakeholders and the general public, thus taking into account the increased legitimacy requirements of missions.

The ongoing monitoring, strategic foresight and regular evaluation of all measures provide the basis for being able to adjust the strategic approach and the entire funding portfolio if necessary. Resources should be specifically reserved for these regular reviews and further developments of the implementation strategy. The availability of adequate resources is a basic prerequisite for creating the necessary learning opportunities within the framework of a reflexive strategy.

» Monitoring, strategic foresight and evaluation provide the basis for adjusting the strategic approach as needed.

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Imprint

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