

New Policy Designs and Instruments for a Whole of Government Approach in R&I

Second Thematic Report

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New policy designs and instruments for a whole of government approach in R&I

Second thematic report

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Thematic Report on New policy designs and instruments for a whole of government approach

European Commission

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New policy designs and instruments for a whole of government approach in R&I

Second thematic report

Written by Susana Borrás

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1. INTRODUCTION

This is the second thematic report of the Mutual Learning Exercise (MLE) on the application of the Whole of Government Approach (WGA) to the design and implementation of national research and innovation (R&I) strategies and plans.

The MLE is organised by the European Commission in close collaboration with ERAC delegates, in the context of the Horizon Europe Policy Support Facility (PSF).

This second thematic report is based on the discussions of the participants during the country visit to Bulgaria on 24th-26th April 2023 building on the presentations about Bulgaria and the discussion paper prepared before the visit.

1.1. About the whole-of-government approach in R&I

A WGA to policymaking refers to a collaborative and integrated process that focuses on a holistic approach to decision-making and implementation of public action.

This approach recognises that policies have cross-cutting impacts across multiple sectors and areas of governmental intervention. Therefore, it requires careful consideration of the design of processes and mechanisms that favour a better form of policy making, including the coordination between various departments and agencies to achieve the best outcomes.

By adopting a WGA, policymakers can ensure that policies are evidence-based, well-informed, and effectively implemented. This approach can also improve efficiency, by reducing duplication of efforts, and ensuring that resources are used in the best possible way.

Ultimately, a WGA is a guiding framework for creating policies that overcome barriers to collaboration and coordination, that focus on providing well-tuned policy outcomes, and that are responsive to the needs of R&I stakeholders and citizens.

A WGA recognises that research and innovation (R&I) policy often has cross-cutting dimension across various sectors and areas of government. The WGA can help to align R&I policy with broader government priorities, such as economic growth, social development, and environmental sustainability. It can also help to ensure that policies are responsive to the needs of different stakeholders of R&I policy, including researchers, entrepreneurs, businesses, and the public.

For these reasons, the WGA is particularly suitable to understand the horizontal and cross-cutting nature of R&I policy in the overall context of governmental action, and its relation to important governmental goals.

Therefore, a WGA to R&I policy can help to maximise the impact of R&I activities, foster collaboration and knowledge exchange among different stakeholders, and promote sustained, environmentally responsible, and inclusive growth.

In practical terms, a WGA to R&I policy may involve, among other, establishing new strategic approaches, cross-departmental committees or task forces to coordinate policy development and implementation, as well as engaging with stakeholders from various sectors to gather input and feedback.

The first report of this MLE,¹ identified five levels that define what the WGA means for R&I policy making.



Figure 1: Hierarchy in the R&I governance system for WGA

. Source: First thematic report: introduction and overview of the whole of government approaches in research and innovation.

At the highest level, is the **political leadership**. A WGA requires political leaders to actively promote collaboration and coordination between various governmental bodies, emphasising the importance of creating coordination across policy domains, in order to bring R&I policy closer to other policy areas in view of providing solutions to the problems in the innovation system, and to addressing complex socio-economic problems in various domain areas like the environment, energy, or agriculture.

The second level has to do with the reform of policy structures to underpin the WGA in R&I policy. A typical issue for R&I policy is the coordination across various ministries, most often between a ministry of science, research and/or education on the one hand, and a ministry of economy, industry and/or enterprise on the other. A WGA requires specific structural reforms that lead to an R&I policy that is stable, durable, and functional.

The third level of a WGA has to do with joined up strategies and their development. Multi-annual strategies, in which R&I policy is embedded, for socio-economic development and for addressing grand challenges are very important. These multi-annual strategies cover many

¹ European Commission, Directorate-General for Research and Innovation, Mutual learning exercise on the whole of government approach in research and innovation – First thematic report: introduction and overview of the whole of government approaches in research and innovation, Publications Office of the European Union, 2023, <https://data.europa.eu/doi/10.2777/92395>

areas and policy domains and are typically focused on a medium-term time span. Therefore, they can be seen as highly relevant forms of political guidance and priority-setting for specific public interventions. Currently, most EU Member States, as well as many specific ministries and/or agencies, have developed such multi-annual strategies, sometimes accompanied by budgetary allocations from specific funding streams (e.g. the European Structural and Investment Funds). The implementation of these multi-annual strategies is a key aspect of a WGA, mainly because these multi-annual strategies are in principle actionable, put into action and implemented for addressing the targets they have identified as priorities.

The fourth level of R&I governance from the perspective of WGA is the coordination between core R&I policy units. This refers to a close horizontal cooperation between ministries / agencies; and to a close vertical collaboration (regional governments, territorial agencies, municipalities). These horizontal and vertical collaborations can be developed in various ways, for example, developing joint approaches, creating joined-up policy instruments, engaging in consultations across different policy units on specific programmes or funding decisions, or by creating specific inter-ministerial units focusing on a specific topic.

Last, but not least, the fifth level of a WGA is the policy instrument level. R&I policy instruments take various forms, including public funding, regulatory measures, financial incentives, demand-side measures, information campaigns, etc. From the perspective of WGA, policy instruments must be considered, designed and implemented taking into consideration the problem they aim to address. It is also important to have a clear overview of the totality of instruments, mapping the specific portfolio of instruments in the overall R&I governance system.

This thematic report focuses on this fifth level of WGA.

In several ways, the policy instrument level is the most 'practice-oriented' level in the R&I governance system. The WGA has important implications for the way in which policy instruments are understood, designed and put into action. This is not only about policy instruments on their own individual terms, but also how they are combined with each other, and how are they inter-linked and aligned with the other higher governance levels defined in Figure 1. We delve into these matters below.

1.2. A new approach to policy instruments: two key aspects

There are various academic definitions and approaches on policy instruments.² Common to them is the understanding that policy instruments are the tools and techniques used by governments to ensure effect and support on specific goals for social, economic, environmental and other types of change.

This notion suggests that **policy instruments are purposeful forms of governmental intervention for achieving sets of goals**. Policy instruments are typically designed with one or more specific goals in mind.

The above definition has another relevant aspect, namely that **each policy instrument is unique and contextual**. It is unique in the sense that it has been designed and is being implemented in a specific governmental and socio-political situation, at a specific point in time, and in a specific politico-administrative tradition. Moreover, it is important to understand that policy instruments are the fruit of the options available at the time they were created.

² Howlett 1991; Hood 2008; Lascoumes & Le Galès 2007.

What is the contribution of the WGA in the context of the policy instruments? What are the aspects that the WGA contributes when thinking about designing R&I policy instruments?

Since the WGA aims at developing an encompassing view of policy instruments, it suggests at least two key aspects for a new approach to policy instruments:

1. The need to design and re-design individual R&I policy instruments to be problem-oriented and transformative;
2. The need for policy-makers to have a constant overview and to ensure the consistency of the mix of R&I policy instruments.

We examine these two aspects in the next sub-section.

A problem-oriented and transformative approach to the design of R&I policy instruments: the WGA suggests that policy instruments must be explicit and clear about the problems they aim at addressing and must be designed from a holistic and transformative perspective in view of contributing concretely to solve those problems. The design of policy instruments with WGA implies a new understanding of policy instruments (that they are transformative in terms of addressing 'old' and well-known complex problems with new perspectives) in a wider context (the societal context). The next sub-section examines how this unfolds in relation to the two large families of WGA R&I-related problems, and in view of the requirements of the WGA for R&I policy instruments to be 'transformative'.

Mapping the mix of R&I policy instruments to secure consistency: the WGA requires that policy makers should have an all-encompassing understanding and constant overview of all R&I policy instruments that are active at one time: their focus, nature, individual rationales, and scale. Whereas the monitoring and mapping of the R&I policy mix is something that has been discussed for decades, what is new is to understand that R&I policy instruments do not operate in a vacuum. Hence, the mapping must be wider with a problem-oriented approach and has to take into account that R&I instruments need to be complemented by instruments of other policies in order to have a chance of "transformational change" being achieved. Such a mapping provides an invaluable overarching frame of reference for policymakers about the ongoing forms and nature of public intervention, and about the resources that those instruments use (budgetary resources, man-power resources, etc.), as well as the organisational needs (what organisational structures are required for the implementation of each instrument). Hence, the WGA helps to secure a consistent governmental intervention.

1.3. About this thematic report

This thematic report aims at reporting the discussions and the mutual learning gained during the country visit to Bulgaria, particularly focusing on the question of policy instruments and instrument mixes for a WGA. The remainder of the report is structured as follows. The next section summarises the Bulgarian R&I system and policy as a background to help contextualise the country visit.

Section three delves into the problem-oriented and transformative nature of R&I policy instruments from the perspective of WGA. The section identifies two main families of problems in R&I policymaking: economic problems and grand challenges. In so doing, it includes examples from relevant instruments as well as the insights gained from the country visit to Bulgaria.

The fourth section deals with developing an appropriate mix of policy instruments. As the previous section, this section includes insights from the learning gained during the country visit to Bulgaria. The final section provides some suggestions and recommendations gained from the discussions with the experts and national delegates during the same visit.

2. Background related to the country visit: key features of Bulgaria's R&I system and policy

Based on recent reviews, and, in particular, the 2023 edition of the European Innovation Scoreboard (EIS 2023)³, Bulgaria can be currently considered as an 'emerging innovator' (i.e. falling in the lowest performing group of innovators according to the EIS definition; achieving less than 70% of EU average in the total EIS index). Over the last decades, Bulgaria has faced difficulties to increase its overall innovation performance, and therefore to reduce its gap with other EU member states, particularly with the EU innovation leaders. In 2016-2022, Bulgaria's innovation performance has stagnated and even decreased slightly. However, the EIS 2023 edition reveals very positive developments – it concludes that between 2022 and 2023 Bulgaria was among the countries with the highest overall increase in innovation performance, second only to Czechia.⁴ The strong increase in 2023 results in an overall increase of more than 10% in innovation performance of Bulgaria in the period of 2016-2023.

One of the main features that characterises the Bulgarian R&I system is the low level of overall R&D expenditure in relation to GDP, which was 0.77% in 2023, in contrast to the EU-27 average of 2.25%. More specifically, public R&D expenditure remains one of the lowest in the EU, at 0.26% of GDP. The level of private investment on R&D (business R&D expenditure per GDP) is also among the lowest, at 0.51% of GDP in 2020.⁵

Aware of this, the Bulgarian Government has recently announced its intention to gradually increase public R&I spending to reach the target of 1% of GDP in 2025. Likewise, it has also set the goal to increase gross expenditure on R&D (GERD) to 3% in 2030. Both targets will require a substantive and sustained increase of funding in R&I activities.

Considering other structural features, as experienced during the country visit in Sofia, the Bulgarian R&I system suffers from a significant level of institutional fragmentation of public science and research organisations and their funding. This fragmentation is likely to have an impact on the output in terms of scientific publications. For example, as revealed by EIS 2023, there is a low share of Bulgarian scientific publications within the top 10% most cited worldwide as a percentage of total scientific publications per country. The same is true for patents as indicators of innovation outputs. Bulgarian inventors file a low number of patent applications relative to the overall economy of the country (0.51 patent applications per billion € GDP, which is the fourth lowest ratio in the EU).⁶

Science-business collaboration is scarce and not developed sufficiently, as shown by another output indicator, namely the share of public-private scientific co-publications, which is far below EU average. All the above means that Bulgarian industry depends strongly on foreign technology and knowledge, and that there remains unexploited potential regarding university/academia-industry collaboration.

Bulgaria has undergone recent efforts to map its policy instrument mix, gaining a good overview of the current instruments and their features. Likewise, Bulgaria has recently defined a national roadmap for research infrastructure (2020-2027), and a number of relevant

³ See the European Innovation Scoreboard 2023 (EIS 2023): https://research-and-innovation.ec.europa.eu/statistics/performance-indicators/european-innovation-scoreboard_en.

⁴ See EIS 2023 Final Report, p. 5.

⁵ EIS 2023, EU countries and neighboring countries database (see data annex to the main EIS report).

⁶ Ibid.

strategic plans towards 2030 (the National Development Programme Bulgaria 2030; the National Strategy for Research Development 2021-27, among other).

Moreover, during the country visit, the participants learned about a number of recent initiatives, the most relevant of which are the plans to create a new Innovation Council in Bulgaria, and the efforts of the Bulgarian Academy of Sciences stimulating science-business collaboration (see more about these two initiatives in boxes about case 1 and case 3). In a similar vein, significant efforts towards interdisciplinary research are illustrated by the “Clean and Circle” Centre of Competence led by Sofia University.

These efforts towards a more coordinated overview, and the concrete initiatives towards science-business collaboration, and interdisciplinary research are important initial steps in view of aiming at a coherent policy-making and a suitable design of policy instruments and instrument mix from a WGA in Bulgaria.

In the next sections, this thematic report focuses on the design of problem oriented and transformative innovation policy instruments applying a WGA, and in so doing, it brings forward relevant cases of mutual learning from Bulgaria and other EU Member States & associated countries.

3. Problem-oriented and transformative policy instruments for the whole-of-government approach

3.1. Problems of low innovation performance

As mentioned in the introduction, the WGA implies that policy instruments are governmental tools designed for solving problems, and therefore they must be clear and explicit about the problems they aim to address. Problems have to be related to the needs of the country (or region) and based on a collective diagnosis about what are the most relevant and urgent problems.

A first immediate question therefore is: what problems does R&I policy aim to address?

The extensive scholarly literature about R&I policy has answered this simple question from many different angles, depending on the nature of problems they refer to, and depending on the specific nature of each of these problems.

Two large families of problems seem to emerge from the literature, namely problems about low innovation performance (affecting economic growth and competitiveness), and problems about the grand challenges (affecting society and the planet).

Problems associated to low levels of innovation performance affect economic growth and competitiveness of a country (or a region). This has to do with the observation that R&I levels are key drivers for growth, industrial competitiveness, and job creation in our economies. For this reason, much of the economic literature has focused on designing policy instruments as specific tools of governmental intervention aiming to solve problems that associate R&I with economic growth. In other words, the first large family of problems that R&I policy instruments focus on are problems about the various weaknesses in the R&I system. Solving them is assumed to be conducive to economic growth.

Adopting a system of innovation approach and designing R&I policy instruments with a WGA means that these instruments have to focus on specific problems of the innovation system. There is a large diversity of innovation systems, implying there is a need to adapt the policy mix because there is no one-size-fits all;⁷ hence, instruments must be designed based on the identification of the problems that affect each specific innovation system, taking into consideration its specific features.⁸

The **low intensity of R&I performance in the economy, is an overall problem in national innovation systems**, which manifests itself in many different ways and in specific problems, such as:

1. Inadequate levels of private and public investment in R&D activities in the economy.
2. High uncertainty and long-time lag between R&D investment and private returns-on-investment, particularly in capital- and highly-skilled labour-intensive industrial sectors like biotech or nanotech.

⁷ Tödttling and Trippel 2005.

⁸ Borrás and Edquist 2019.

3. Insufficient levels of science, technology, engineering, mathematics (STEM) skills of the population.
4. Brain-drain of STEM-educated people.
5. Unexploited potential due to insufficient levels of university-industry collaboration and other innovation-driven networks.
6. Low levels of technology-driven entrepreneurship and start-up.
7. Insufficient levels of knowledge spill-overs in the economy, particularly in some regions.
8. Low levels of risk-willing venture capital in early and mid-term phases of innovative firm creation.

The problem-oriented design of R&I innovation policy instruments takes into consideration the nature of these problems and country needs in the context of each specific national system of innovation. This is a holistic approach in the sense of taking the innovation system perspective when designing a specific R&I policy instrument.

As mentioned above, Bulgaria's recent definition of goals aiming to increase R&I funding to address the inadequate levels of private and public investment in knowledge creation and innovation, as well as the recent efforts to enhance science-business collaboration through the increase of the innovation capacity of the Academy of Sciences, are important steps to address its problems of low innovation performance (see more on this topic below).

3.2. Focus: policy instruments for science-business collaboration

A relevant example for this MLE are the policy instruments to foster science-business cooperation. Many countries seek to promote a stronger collaboration between their universities and public research centres with the business community. This collaboration is highly important in view of maximising the potential offered by the new knowledge and research produced in these scientific and applied research institutions, bringing the results closer to new innovative solutions and products that have market and/or societal applications.

There are many barriers to collaboration between the scientific and the business sectors due to different incentives and motivations, time-lags, and organisational logics. Several policy instruments aim at overcoming these barriers to collaboration in various ways, such as providing incentives, creating new institutional and organisational frameworks, and/or supporting new approaches for collaboration. Some of the most relevant policy instruments for science-business collaboration include:

- a) **Funding R&D collaborative university-industry projects:** governmental agencies provide funding on a competitive basis to specific collaborative R&D projects developed by consortia of universities, public research organisations and private firms.

Example: The USA programme "Small Business Innovation Research" (SBIR), created in 1982, and managed by the "Small Business Administration" (SBA) agency, is one of the most emblematic examples of these types of instruments. The programme provides funding for small businesses to engage in R&D with universities and federal research institutions. It is generally perceived as a good case of a policy instrument towards small firms, supporting the commercialisation of scientific knowledge of universities, and giving small businesses access to scientific and technical expertise. Over 175,000 awards have

been made since the programme's inception, totalling over \$50 billion in funding. Recent evaluations point as well at aspects that require improvement⁹.

- b) **Supporting Universities' Technology Transfer:** These are programmes mainly targeting universities in order to facilitate the transfer of their research outcomes to industry partners. These programmes can include the support for the creation of technology transfer offices in universities, the support of incubators for university start-ups, or/and for the creation of science or technology parks inside/close to universities.

Example: In the United Kingdom, the Higher Education Innovation Fund (HEIF) provides funding to universities to support knowledge exchange activities, including the establishment and operation of technology transfer offices. In Spain, the Science and Technology Parks Law provides a framework for the establishment and operation of university technology parks, with the goal of promoting innovation and technology transfer.

- c) **Regulatory frameworks:** these are policy instruments that seek to establish clear and favourable regulatory conditions for university-industry collaboration. For instance, governments can introduce policies that reduce bureaucracy and streamline administrative procedures for industry partners, promote openness and transparency in R&I partnerships, and an intellectual property rights framework that protects the interests of all parties and favour exploitation of results.

Example: In Denmark, the Act on Research and Innovation from 2003 provides a framework for collaboration between universities and industry, including guidelines for intellectual property rights and the establishment of public-private research partnerships.

Overall, policy instruments that promote university-industry collaboration can provide significant benefits for both parties, including increased innovation, economic growth, and improved societal outcomes.

CASE 1: Bulgarian Academy of Sciences initiatives for science-business collaboration

As part of Bulgaria's National Recovery and Resilience Plan, supported by the EU, the Bulgarian Academy of Sciences (BAS) has recently engaged in important efforts to strengthen science-business cooperation in order to increase the innovation capacity of the Academy. The main goal is to strengthen BAS's innovation capacity and its active participation in the national research and innovation ecosystem to accelerate the economic transformation of the country.

The initiative focuses on two areas: the low carbon and circular economy, and digitalisation, with specific priorities including low-carbon and circular economy, recycling, clean technologies, modern digital technologies, and intelligent security systems for data exchange and communications.

The initiative includes measures addressing specific objectives, such as establishing institutional structures and tools for effective relationships between BAS and business; developing BAS's research potential by increasing skills and qualification in the field of innovation; modernising infrastructure related to the transfer of green and digital technologies; creating innovative solutions by scientific teams of BAS in response to concrete topics defined by businesses; establishing sustainable long-term relations with business through joint PhD training; strengthening country's participation in R&D calls announced by European and other institutions; protecting BAS's intellectual property in the field of green and digital technologies to facilitate commercialisation of scientific results; and fostering the internationalisation of BAS's R&D system in the field of green technologies.

⁹ <https://nap.nationalacademies.org/read/26376/chapter/1#iii>

CASE 1: Bulgarian Academy of Sciences initiatives for science-business collaboration

The indicative funding for this initiative is €23m from the Recovery and Resilience Facility plus national co-funding.

Table 1: Bulgarian Academy of Sciences initiatives for science-business collaboration

3.3. Problems in society: the grand societal challenges

The second ‘family’ of problems are those about the society at large, and not only about economic growth or industrial competitiveness. The literature has characterised these problems as ‘wicked problems’, meaning, problems that are complex, open-ended and intractable.¹⁰ In recent years, following the formulation by the United Nations (UN) of the millennium goals in 2000, and the sustainable development goals (SDGs) in 2015, there has been an increased attention among policy makers to these types of problems.

The increasing focus on ‘wicked problems’ means that R&I policy is increasingly seen as an important element for addressing them. Given their society-centric approach, rather than economic-centric approach, these problems are usually named ‘grand societal challenges’.

Well-known examples of grand societal challenges are:

- **Environmental sustainability:** this involves addressing anthropogenic induced problems such as climate breakdown, biodiversity loss, and resource depletion through the development of sustainable technologies and practices.
- **Health and well-being:** this includes developing new treatments for diseases, improving access to preventive healthcare, and addressing health inequalities.
- **Social inclusion:** this involves developing innovative solutions to address social and economic inequalities, such as poverty, unemployment, and discrimination.
- **Digital transformation:** this includes addressing issues such as data privacy, cybersecurity, and the digital divide.
- **Urbanisation and mobility:** this involves developing solutions to manage urban growth and improve transportation systems, addressing issues such as traffic congestion, air pollution, and accessibility.

These societal challenges can be addressed through problem-oriented R&I policy. The approach involves identifying specific problems or challenges, and then using R&I to develop solutions that are practical, effective, and socially acceptable. It can also take the form of setting a positive goal, so the problem / challenge identified leads to a goal or target being set. The ultimate goal is to create a more sustainable, equitable, and prosperous society.

Several recent studies have analysed the nature of these problems and their solutions, in view of developing specific policy strategies that involve a WGA in R&I policy. Some of these studies underline that problems and solutions might be subject to dispute, high levels of complexity, and high levels of uncertainty; or might be uncontested, well-defined, and well-

¹⁰ Head 2008.

informed.¹¹ Depending on their nature, R&I policy makers might design different types of approaches. Moreover, the literature has also studied the various types of mission-oriented R&I policies in relation to the nature of the problems, highlighting the need to design specific policy instruments in view of that variation.¹² Hence, R&I policy is being framed as transformative.¹³

From the perspective of a WGA approach to R&I policy instruments, most of these problems are being addressed through the development of mission-oriented policy instruments.

One immediate question that might emerge from the previous distinction is whether economic problems and grand challenge problems are related or not. Here the answer is straightforward: they are highly interrelated. As we will see in cases 2 and 4 below in this report (about the CDI Swedish programme, and the E-Pilot Norwegian programme), some policy instruments aim at addressing both – they develop funding projects on green technologies ultimately aiming at generating both social and economic value.

3.4. Focus: new transformative R&I policy instruments

Having identified the two families of problems that are generally at the core of R&I policy-making and having discussed that these two families of problems are related to each other, it is now important to consider what the WGA contributes in terms of the understanding that R&I policy instruments should be designed to be transformative.

The WGA, with its encompassing and wide perspective, brings an important novelty, namely, the understanding that the R&I policy instruments are there for addressing problems, and that addressing those problems means a transformation of the innovation and socio-technical systems that those instruments target.¹⁴

In general terms, the WGA brings at least three important broad principles about policy instruments as transformative instruments:

- that R&I policy instruments **must be constantly attuned to each other and to the challenges** they target in the innovation system and/or in a specific sectoral system,
- that R&I policy instruments **must have a systemic approach** when designing specific courses of public policy intervention, and
- that R&I policy instruments **must actively target transformations in the sectoral socio-technical systems** of production and consumption related to the challenges they aim at addressing.

In **practical terms, ‘transformative’ means that R&I policy instruments have the following specific features:**¹⁵

- **Directionality:** transformative R&I policy instruments identify specific problems they aim at addressing, with the intention to actively contribute to the transformation of sectoral systems and their interactions (like the agro-food system, the energy system, the

¹¹ Wanzenböck, Wesseling et al. 2020.

¹² Wittmann, Hufnagl et al. 2021.

¹³ Chataway, Chux, et al 2027; Schot and Steinmueller 2018; Grillitsch, Hansen and Madsen 2021.

¹⁴ Cagnin, Amanatidou et al. 2012; Weber and Rohracher 2012; Klerkx and Begemann 2020.

¹⁵ Cagnin et al 2012; Weber and Rohracher 2012; Diercks et al 2019; Borrás and Schwaag Serger 2022.

transport system) to solve those identified problems. The policy instruments have a specific direction, but this direction can be defined in different ways: top-down by an initial definition of missions, or bottom-up by open-ended agendas of problems giving the space for experimentation and multiple possible solutions.¹⁶

- **Experimentation and risk-taking:** transformative R&I policy instruments seek to generate possibilities for experimentation in the search for new solutions. In other words, the policy instruments embody new ways of approaching collective challenges in the innovation system and/or in sectoral socio-technical systems. This is related to the understanding that the solutions to those complex problems are often not known,¹⁷ and that experimentation is needed for finding new solutions.
- **Portfolio embeddedness:** transformative R&I policy instruments are not operating alone, but in conjunction with other instruments (from R&I policy and other policy fields) and with specific goals; hence, their transformative nature is related to the extent to which they are defined to be actively embedded in relevant policy making contexts.
- **Cross-agency collaboration:** transformative R&I policy instruments are anchored in continuous efforts of adaptation and collaboration across relevant agencies. The more broad-ranging a policy instrument is, the more cross-agency collaboration might require.
- **Epistemic boundary spanning:** transformative R&I instruments encourage and support cross-disciplinarity and interdisciplinarity transcending traditional disciplinary boundaries, in order to mobilise and pool different knowledge bases and epistemic communities that will allow for new approaches to address complex problems.
- **Wide stakeholder involvement:** transformative R&I policy instruments are responsive to the needs of the society at large and to the needs of specific stakeholders as well. Hence, it requires a participatory approach not only to the design of the instrument, but also in the R&I consortia/partnerships for its implementation.
- **Flexible and/or possible extension of timeframe of project funding:** solving complex problems in the innovation system and in socio-technical systems is not possible in few years. Transformative R&I policy instruments provide flexible funding frames, allowing some adaptation according to the evolution of projects/initiatives.
- **Project clustering:** transformative R&I policy instruments seek actively the clustering of individual R&D projects or similar initiatives, in order to stimulate synergetic effects for more transformative potential.

CASE 2: The “Challenge-Driven Innovation” programme from Sweden as a transformative policy instrument

The “Challenge-Driven Innovation” (CDI) programme is a policy instrument created in 2011 and managed by Vinnova, the Swedish research and innovation agency. It is one of the first R&I funding programmes to focus on grand challenges and was inspired by the 2009 Lund declaration under the Swedish EU Presidency which encouraged R&I to be more focused on the grand challenges afflicting our societies¹⁸.

¹⁶ Robinson and Mazzucato 2019; Larrue 2021.

¹⁷ Wanzenböck, Wesseling et al. 2020.

¹⁸ <https://www.vr.se/download/18.3936818b16e6f40bd3e5cd/1574173799722/Lund%20Declaration%202009.pdf>

CASE 2: The “Challenge-Driven Innovation” programme from Sweden as a transformative policy instrument

The CDI programme funds projects put forward by broad constellations of partners (firms, universities, public research organisations, public utilities, civil society, etc) which work together on R&I activities in order to address specific grand challenges and contribute to achieving the SDGs.

The programme funds projects based on a number of criteria, among which:

- The projects must have a clear ambition to address real problems related to the Agenda 2030 sustainable development goals, as well as a clear market potential.
- The projects must have a strong focus on user needs and involve users in the project consortia.
- The projects must have an international perspective and must be interdisciplinary.

Generally, the CDI programme can be considered a transformative, because:

- It has a **directionality** as projects are formulated in a bottom-up manner in large variation of areas related to the SDGs.
- It supports **experimentation** and risk-taking because it embodies and encourages new ways of approaching collective challenges in the innovation system and/or in socio-technical systems.
- It encourages projects with **broad epistemic boundaries**, actively seeking interdisciplinary solutions and new approaches.
- It has a **wide stakeholder involvement**, because the project consortia include civil society and other new R&I actors, particularly in view of involving the users and ‘problem-owners’ in the co-creation of new solutions.
- It has **flexible and long funding scheme**, as projects are funded according to three levels of stage-gate funding.
- It has recently started **clustering projects** in order to reinforce their potential transformative effects.

Recent reviews of this programme consider it a front-runner in terms of transformative policy instruments,¹⁹ and in terms of achieving its goals to contribute to solutions for Agenda 2030.²⁰

Table 2: The “Challenge-Driven Innovation” programme from Sweden as a transformative policy instrument

Furthermore, it is worth noting that a WGA is not only about the definition and creation of transformative R&I instruments. It is also about their embeddedness with other elements in the governance system, and in particular, to the overall strategic goal-setting by the government and its organisational anchoring.

A relevant example from Bulgaria is the “Clean and Circle” Centre of Competence led by Sofia University, which is an interdisciplinary centre bringing among other biologists and engineers working together to solve environmental problems, for example, improving the

¹⁹ Borrás and Schwaag Serger 2022.

²⁰ Rambøll 2019.

energy quality of sludge produced from wastewater in order to use it as energy sources in incineration plants, or efforts to find new uses to production waste materials such as glass. The project is working close together with wastewater management plants, incineration plants, and private firms.

4. The policy instrument mix in a WGA perspective

4.1. Variation and incrementality of policy instruments

The second important aspect from the perspective of WGA is the understanding that individual policy instruments operate in combination with other instruments, in specific portfolios of instruments. Each country has a differentiated policy instrument mix, which derives from past choices and interventions.

Overall, there is a large diversity of R&I policy instruments. The literature on public administration offers the view that they can be organised around three main categories: regulatory instruments, economic instruments, and soft instruments. Popularly known as 'carrots', 'sticks' and 'sermons'.²¹

- Regulatory instruments: changing legal incentives and conditions.
- Economic instruments: providing concrete economic incentives/disincentives.
- Soft instruments: raising awareness.

As discussed, the holistic perspective on R&I policy instruments means that instruments are clearly targeting specific problems. Some of these problems are economic and associated to various forms of weaknesses in the innovation system.²²

There is a large variation of the types of problems and the types of instruments, which can be organised in many ways:

- Various policy instruments might be targeting the same problem from different angles, or
- One policy instrument might be targeting various different problems.

Moreover, policy instruments tend to be incremental, meaning that in many countries it is easier to create new policy instruments, than it is to terminate existing ones.

This incrementalism and variation mean that there is a high degree of complexity of policy instruments. For that reason, from the perspective of a WGA, it is important for policymakers to constantly keep an eye on the policy instruments deployed.

4.2. Mapping the instruments and securing overview

Mapping the R&I instruments may initially look like an easy task, but it might not prove to be in practice. Some policy instruments may be small and difficult to trace; whereas others are very large and visible. Likewise, it might be difficult to draw the specific boundaries of R&I policy instruments, as some of the instruments have been designed with other purposes in mind. They may, nevertheless, have an important effect on innovation-related dynamics in the economy and in the society. An example is public procurement regulations, which have important potential effects on innovation-related problems like technological lock-in. Another

²¹ Bemelmans-Videc, Rist et al. 1998.

²² Borrás and Edquist 2013.

possible difficulty in the mapping of policy instruments has to do with the granularity and level of detail of the data that is necessary for mapping.

During the past years, there have been considerable efforts to map R&I policy instruments. One of the most significant efforts in this regard is the so-called “STIP Compass”²³, which is a searchable database of approximately 9,000 R&I policy instruments in more than 50 countries. This database is the fruit of a collaboration between the EU and the OECD. Currently, it is the most reliable cross-country data available, and for that reason, it constitutes an invaluable source for mapping and tracing the features of most significant R&I policy instruments in individual countries, as well as for identifying some general trends across countries.

The recent Bulgarian experience in mapping R&I policy instruments²⁴ is related to current efforts to create a new Innovation Council as a way of securing overview and coordination.

CASE 3: New Innovation Council in Bulgaria – enhancing policy instruments’ overview & coordination

Bulgaria is currently in the process of establishing a new Innovation Council, which is intended to be co-chaired by the Ministry of Education and Science, and the Ministry of Innovation and Growth.

The current draft legal proposal to create this new council suggests that it would mainly have an advisory role to the Bulgarian government. Its main task will be to ensure an overview and coordination of R&I policy instruments and their implementation, not only across these two main ministries but also across other sectoral ministries and policies too.

The proposal is that this new council (as an advisory body) will be formed by various representatives from the ministries and by representatives from business, science, and experts.

Given the fragmentation of current policy instruments, it is expected that the benefits of creating this new council would be to enhance the overview and monitoring of policy instruments in Bulgaria, as an important steppingstone for enhanced R&I policy coordination, and ultimately improve the possibilities for a successful implementation of multi-annual plans.

Table 3: New Innovation Council in Bulgaria – enhancing policy instruments’ overview & coordination

4.3. Identifying possible dysfunctionalities

From a WGA perspective, the mapping of policy instruments should facilitate the identification of and redress of possible dysfunctionalities. These dysfunctionalities might be:

- **Overlap and duplication:** several policy instruments (particularly funding ones) might have a significant amount of overlap, aiming at similar goals, targeting the same grantee groups, and using very similar funding mechanisms.
- **Fragmentation:** this is a situation where several of the R&I instruments are very small and/or are too scattered across different funding agencies.

²³ STIP Compass: <https://stip.oecd.org/stip/>

²⁴ Aridi, et al 2020.

- **Skewed distribution of the instrument mix:** the situation where most instruments focus on a specific dimension or a specific set of problems (e.g. the creation of new knowledge or support to innovative firms) and much less so to other important functions (e.g. fostering the availability of venture capital or efforts to attract the STEM-educated diaspora in order to reverse brain drain).
- **Too generic instruments, not addressing the real problems or needs** of the economy or society. Some policy instruments might have been created a long time ago with a very generic purpose, and without targeting the specific problems that afflict the economy and society. In other cases, the nature of the problem might have changed through time, but the policy instrument has remained the same.
- **Lack of consistency:** here the dysfunctionality has to do with the lack of consistency between the instruments, and between the instrument mix and the overall policy strategy, in terms of “how they are aligned with each other, thereby contributing to the achievement of policy objectives.”²⁵

Overall, the literature has approached these possible dysfunctions from different angles. Some authors focus on the aspects of consistency (how well aligned the instruments are) and comprehensiveness (how extensive and exhaustive the instrument mix is).²⁶ Some other authors focus on the directionality of instrument mix towards an overall strategy, as well as on the extent to which the instrument mix facilitates policy experimentation processes to address problems in the economy and society.²⁷

4.4. The instrument mix in the policy design

The policy instruments mix is part of the overall governance system in which they operate. This MLE has identified different levels in the governance system, starting from the political leadership conducive to WGA, and followed by policy reform to underpin WGA, joined up strategy development, coordination at ministry/agency level by multi-level governance mechanisms, and last but not least, transformative policy instruments.

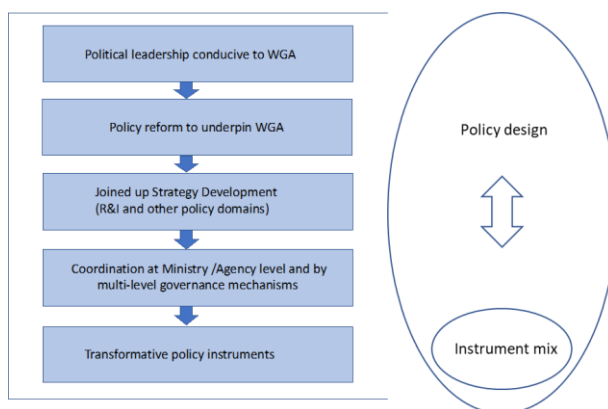


Figure 2. Policy design and the policy instruments mix in the WGA context

In recent years, several European countries have become aware about the importance of having a **well-functioning and fit-for-purpose policy mix**. This increased awareness has

²⁵ Rogge and Reichardt 2016.

²⁶ Rogge and Reichardt 2016; Bach and Hansen 2023.

²⁷ Magro and Wilson 2019.

manifested itself in a series of initiatives based on the assessment of R&I policy mixes. Several European countries have partly re-organised and restructured their R&I policy instruments, seeking to redress some identified dysfunctions and weaknesses, typically overlaps and duplications. Two practical ways of approaching this are worth mentioning:

- **Joint programming:** When two or more funding agencies develop and manage jointly a funding programme, in order to generate synergies and provide better service to researchers and innovators. One example of joint programming is the Pilot-E programme in Norway (see case description 4).
- **Re-structuring instruments and agencies:** When governments decide to re-organise and re-structure the existing instruments and/or agencies. One example of re-structuring is the Danish merging of three funding agencies into a new, larger agency (see case description 5).

CASE 4: Pilot-E programme from Norway – a case of joint programming

Pilot-E is an example of a successful case of joint programming. It is a relatively small funding scheme that supports R&I projects about green innovation. The programme is a “fast track from concept to market”, funding specific projects of collaborative consortia, mostly firms.

The programme is run jointly by three agencies in Norway: Research Council of Norway, Innovation Norway, and Enova. The first call for proposals was launched in 2016. Each call for proposals has a specific theme related to green innovation, such as: Zero-emissions maritime transport, zero-emissions land-based good transports, the energy system of the digital age, sustainable industrial processes, zero-emissions in the building and construction sector, etc.

Projects must comply with the following criteria:

- Cover the entire pathway from research to full-scale demonstration
- Have a plan for market introduction of the new green solution
- Fall under the thematic area of the call for proposals
- Establish a steering group, including anticipated customers

Relevant features of the implementation of Pilot-E:

- Strong collaboration across the 3 Norwegian agencies managing the programme jointly
- Strong thematic clustering of the individual projects in portfolio boards
- Strong directionality and coherence between Pilot-E thematic funding and overall Norwegian R&I policy strategy
- Policy-makers follow-up closely the development of the individual projects

Table 4: Pilot-E programme from Norway - a case of joint programming
Source: Borrás and Schwaag-Serger (2022); and Larrue (2021).

CASE 5: The Danish “Innovation Fund” – A case of restructuring the policy instrument mix

In 2014 Denmark terminated three research funding agencies (the Danish Council for Strategic Research, the Danish National Advanced Technology Foundation, and the Danish Council for Technology and Innovation) and their respective funding programmes.

Shortly after, it created a new funding agency, the Innovation Fund, and new funding instruments. The decision to terminate the three previous agencies and to create the new Innovation Fund was made after several reports about policy instrument mix and R&I governance system, which pointed at significant overlaps between the three agencies and their respective R&I funding policy instruments.

The Danish government initiated a political debate on the matter. There was a general agreement that the system was too complex and fragmented, and that it needed to be restructured to better support innovation and economic growth.

The Innovation Fund was created in 2015 and designed to be a more focused organisation. This new agency is currently responsible for managing and allocating public funds through various different new R&I funding instruments, such as the “*Innomissions*” funding programme (supporting large research partnerships in four missions for green innovation defined by the Danish parliament); the “*Mission booster*” programme (funding SMEs participation in the four green missions), or the “*Innoexplorer*” programme (supporting employees in public research, education institutions and hospitals, who have achieved research results that have strong commercial potential).

Table 5: The Danish “Innovation Fund” – A case of restructuring the policy instrument mix

Source : <https://innovationsfonden.dk/en>.

5. Recommendations and lessons learnt

5.1. Recommendations emerging from the country visit to Bulgaria

A general impression from the visit to Bulgaria is the current efforts for building capacity in the R&I system. There seems to be a strong and aligned mind-set overall among civil servants about the needs to enhance the Bulgarian R&I system, and in particular about the need to improve and attune the policy instruments in view of that overall goal.

The country visit offered the opportunity to learn about a number of specific initiatives of Bulgarian R&I policy (e.g. the efforts to build the innovation capacity of the Bulgarian Academy of Sciences, or the proposed legislation to create a new Innovation Council). These are indicative signs that Bulgaria is taking the first steps in the right direction towards a whole of government approach (WGA).

However, a number of important weaknesses remain, and those deserve continuous attention and action from policy-makers. Among them:

- Given the low performance of the Bulgarian innovation system, it is important **to increase substantially R&I public funding levels during the next years**. This is a goal that the Bulgarian government is committed to, and it is therefore paramount a continuous effort in this direction. Increasing levels of R&I public funding is a steppingstone for a WGA in R&I policy.
- There is the **need for political leadership taking strategic decisions for investing in the Bulgarian R&I sector**, which requires the prioritisation at the highest governmental level. As mentioned earlier in this report, the WGA does not happen in a vacuum, and it is key to acknowledge that there is an important political context to it, as visualised above in figures 1 and 2.
- As mentioned in this report, there is an **(excessive) reliance of Bulgaria on EU funding (RRF, ESIF, etc.) which is finite, time-limited**, and will be probably soon redirected towards new emerging priorities. For this reason it is paramount that Bulgaria focuses on reducing this reliance on EU funding, and increases substantially its national investment in the R&I sector.
- **Need to enhance science-business collaboration through joint programming**. In spite of recent efforts, there is still a strong gap between science and business. This divide is most visible in public funding schemes, which continue to be separated, funding either academia (scientific research), or business (business-oriented research and innovation). Joint programming (e.g. through the co-funding and the co-managing of specific science-business collaborative programmes), is a WGA experience that would be very relevant for Bulgaria.
- There is a **need to put more emphasis on the needs of the firms and of society**. A WGA requires not only a better alignment and holistic approach from the top of policymaking, but very importantly a better consideration and attention to the needs and demands for solutions that business and society actually need. This requires establishing clear dialogue channels that allow those needs to be clearly identified and communicated.

- As it has been mentioned above, the Bulgarian R&I policy is fragmented and lacks continuity. For that reason, another important recommendation is to **secure simplification and continuity of R&I policy**, strengthening it through decided political commitment through time.

5.2. Lessons learnt from the cases on policy design and instruments for a WGA

This Mutual Learning Exercise has offered the opportunity to exchange experiences about policy instruments and policy designs that are related to a whole-of-government approach in R&I policy. In particular, the five cases presented and discussed bring forward a number of useful lessons. The most relevant of which are:

1. Lessons about cross-sector collaboration instruments and designs for WGA in research and innovation policy:

The Bulgarian Academy of Sciences (BAS) initiatives for science-business collaboration highlight the importance of cross-sector collaboration in research and innovation policy. The lessons learned include:

- Collaboration enhances innovation capacity: BAS's engagement with businesses show that collaborations between academia, industry, and government can strengthen the innovation capacity of research institutions. By actively participating in the national research and innovation ecosystem, BAS can contribute to the economic transformation of the country.
- Comprehensive approach for success: The BAS-related initiative encompasses various measures, such as establishing institutional structures, developing research potential, modernizing infrastructure, fostering relationships with businesses, and internationalizing R&D efforts. This holistic approach ensures that multiple aspects of research and innovation are addressed for sustainable and impactful outcomes.
- Targeted focus areas drive progress: The specific initiative "Clean and Circular" showcases the importance of addressing specific priorities aligned with societal and economic needs. By concentrating efforts on relevant areas, governments can drive meaningful progress and allocate resources effectively in a WGA.

2. Lessons about transformative R&I policy instruments with a WGA:

Sweden's "Challenge-Driven Innovation" (CDI) program serves as a transformative policy instrument, offering valuable lessons on how research and innovation policies can be designed to address grand challenges from a WGA perspective. Key lessons include:

- Alignment with societal goals: By focusing on the United Nations' Sustainable Development Goals (SDGs), the CDI program ensures that projects contribute to broader societal objectives. This alignment helps create a sense of purpose and increases the impact of research and innovation activities.
- User-centric approach: Emphasizing user needs and involving users in project consortia enables the development of solutions that address real problems. By engaging various stakeholders, including users, the CDI program promotes co-creation and ensures that the resulting innovations are relevant and market-oriented.

This user-centric approach is core to the understanding of developing policy instruments with a WGA.

- Interdisciplinary collaboration: Encouraging projects with broad epistemic boundaries and interdisciplinary solutions fosters innovative thinking and the exploration of new approaches. The CDI program recognizes the value of diverse perspectives and encourages collaboration across disciplines to tackle complex challenges effectively, by cutting across various disciplines and policy areas beyond R&I policy.
3. Lessons about enhancing policy instruments overview and coordination for a WGA policy design:

The case of Bulgaria's New Innovation Council highlights the significance of designing WGA in new policy instruments in order to achieve a better overview and to enhance actively the coordination across government. The key lessons from this case include:

- Improved policy coordination: The establishment of the Innovation Council will help enhancing the overview and coordination of research and innovation policy instruments across ministries and policy sectors. This coordination will help working towards achieving more coherence, will also avoid fragmentation, and will hopefully enable effective implementation of multi-annual plans.
 - Stakeholder involvement: Involving representatives from various ministries, businesses, science, and experts in the new Innovation Council will help promoting inclusive decision-making by bringing diverse perspectives to the policy development process. This participatory approach is core to the WGA as it will help a comprehensive understanding of policy needs and challenges.
4. Lessons about joint programming as a useful instrument for WGA:

Norway's Pilot-E program serves as a successful example of joint programming in research and innovation. Key lessons include:

- Collaborative governance: The joint management of the program by three funding agencies emphasizes the importance of collaboration and coordination among multiple stakeholders. This collaborative governance structure ensures effective implementation and leverages the expertise and resources of each agency in a true WGA.
 - Thematic focus: By defining specific thematic areas related to green innovation, the program maintains a clear direction and coherence with the overall national R&I policy [strategy](#), securing synergy and concrete form of coordinated public support. Pilot-E thematic clustering of funded projects, and its strong market orientation contribute to the program's success in accelerating the development and market introduction of new green solutions.
5. Lessons about restructuring the policy instrument mix towards a WGA:

Denmark's restructuring of its policy instrument mix through the creation of the new "Innovation Fund" in 2015 offers valuable insights about how governments can practically implement a WGA. Key lessons include:

- **Simplification and focus:** Streamlining and consolidating multiple agencies and funding instruments into a more focused organization, the Innovation Fund, helps eliminate overlaps, reduce complexity, and ensure a more coherent and efficient allocation of public resources.
- **Support for various stakeholders:** The introduction of funding programs like "Mission booster" and "Innoexplorers" highlights the need to support different stakeholders, such as SMEs and employees in public research institutions, to foster innovation across the ecosystem. By providing specific funding opportunities, the Innovation Fund addresses the diverse needs of actors involved in research and innovation.

In summary, the lessons learned from these five cases emphasize the value of cross-sector collaboration, targeted focus areas, user-centric approaches, interdisciplinary collaboration, policy coordination, joint programming, and restructuring for effective research and innovation policy implementation.

These specific lessons can guide governments in adopting a whole-of-government approach and maximizing the impact of their research and innovation efforts. They also bring forward some general recommendations too.

5.3. General recommendations

A whole-of-government approach (WGA) in research and innovation policy requires careful consideration of policy design and policy instruments to maximize its potential. In continuation from the lessons learned above, the following recommendations provide a general take aways reflecting key aspects of problem-oriented and transformative instruments, as well as the importance of a consistent policy mix.

1. Problem-oriented instruments:

A WGA necessitates identifying and addressing the problems that hinder innovation performance within the broader innovation system. To effectively target these issues, policy instruments should adopt a problem-oriented perspective. This involves:

- **Identifying specific problems:** Governments need to analyse the root causes of low innovation performance, such as inadequate levels of research and development (R&D) investments, insufficient science-business collaboration, or low levels of technology-entrepreneurship. By understanding these challenges, policymakers can design instruments that directly address and mitigate them.
- **Taking a holistic perspective:** Problem-oriented instruments should consider the innovation system as a whole, recognizing the interdependencies and cross-cutting impacts of various sectoral policies. This holistic approach ensures that policy responses are comprehensive and tackle systemic issues rather than isolated symptoms. For instance, policies may aim to address not only R&D funding gaps but also barriers to technology transfer and commercialization.

2. Transformative instruments:

In addition to problem-oriented instruments, a WGA in research and innovation policy requires a focus on addressing complex societal challenges, often referred to as grand

challenges. These challenges demand transformative approaches to drive significant changes in socio-technical systems. Key considerations include:

- Targeting societal challenges: Policy instruments should align with wider societal goals and focus on addressing major societal issues, such as climate change, sustainable energy, or healthcare accessibility. By targeting these challenges, governments can mobilize research and innovation to drive transformative change and deliver meaningful societal benefits.
- Enabling system-level transformations: Transformative instruments go beyond incremental improvements and aim to reshape socio-technical systems, cutting across various policy sectors in order to offer solutions to long-term complex problems. For example, transitioning to renewable energy sources or creating sustainable mobility systems involves fundamental changes in infrastructure, regulations, and consumer behavior. Policy instruments must support and incentivize such transformations through a mix of funding, regulatory frameworks, and collaborative initiatives, and through devising more joint-programming and coordinated efforts.

3. A consistent policy mix:

A crucial aspect of a WGA in research and innovation policy is the coherence and consistency of the policy mix. Governments should ensure that the combination of policy instruments avoids duplication, overlap, or unbalances. Key considerations include:

- Mapping and assessing the policy mix as a first step towards WGA: Regularly evaluating and mapping the existing policy instruments helps identify any inconsistencies or inefficiencies. Governments should assess the policy landscape to understand how different instruments interact and whether adjustments are needed. This analysis can help streamline and optimize the policy mix for better coordination and impact towards a WGA.
- Avoiding duplication and overlap: Policy instruments should be designed to complement and reinforce each other rather than duplicating efforts or creating unnecessary overlaps. By ensuring coherence, governments can maximize the efficiency and effectiveness of their research and innovation policies.
- More collaborative and coordination efforts: Creating venues for joint programming, re-structuring old policy instruments, and creating overview and coordination ensures more efficient governmental action, more synergetic outcomes of public policy, and that diverse needs and challenges in the research and innovation ecosystem are addressed comprehensively, as a key for achieving WGA.

In conclusion, to leverage the potential of a whole-of-government approach in research and innovation policy, policymakers should focus on problem-oriented and transformative instruments while ensuring a consistent and balanced policy mix.

By adopting these recommendations, governments can enhance the impact of their research and innovation policies and contribute to sustainable economic growth, societal well-being, and transformative change.

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This report discusses the concept of a whole of government approach (WGA) and its application to research and innovation (R&I) policy design. The WGA emphasizes a collaborative and integrated process that considers the cross-cutting nature of policy. This report focuses on the importance of problem-oriented and transformative policy instruments in realizing the potential of WGA in R&I policies. Problem-oriented instruments target specific issues within the innovation system, such as low levels of investment, inadequate collaboration, and limited technology-entrepreneurship. Transformative instruments address complex societal problems and involve the transformation of socio-technical systems. Furthermore, the report emphasizes the need for a consistent policy mix that avoids duplication, overlap, and unbalances. Lastly, it reports the outcomes of the visit to Sofia in April 2023, where delegates had the opportunity to learn from Bulgarian initiatives, and exchange views with various national delegates and experts.

Studies and reports

