Partnerships for Regional Innovation

PLAYBOOK

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Partnerships for Regional Innovation

PLAYBOOK

Foreword

by Mikel Landabaso Alvarez,

Director - Growth and Innovation, Joint Research Centre, European Commission

We are living in a period of historical change. Our economies and societies are challenged by the transition to a new green energy system, by a wide-spread digitalisation, and by the imperative to strategically reconsider our value chains and production systems. These ambitious objectives cannot be reached without transformative innovation.

The Commission's new Innovation Agenda places innovation at the centre of the EU policy agenda in an impactful way. We need innovation in every region and in every country, connecting with each other, including between advanced and less advanced regions, if we are to succeed in the green and digital transitions.

The Partnerships for Regional Innovation that we launch on a pilot basis with highly committed regions and countries are a central element of the Agenda.

This first edition of the Playbook is the initial orientation document to support the Pilot Action. It proposes three building blocks to develop the Partnerships and a wide menu of tools to support them. With its launch we pave the way for policy dialogue and co-creation with the territories which will participate in the Pilot throughout next year. The aim is to co-develop and test the approach and the selected practical policy tools against the realities of participating territories and, as a result, to develop concrete operational guidance.

The approach we propose in this Playbook for Partnerships for Regional Innovation can be a catalyser of EU and local efforts to enhance the coordination of regional, national and EU innovation policies to implement the green and digital transitions. The Partnerships are conceived as complementary to smart specialisation strategies to make way for a more impactful innovation policy.

As the Partnerships will be adapted to the needs and challenges of each territory, they can accelerate transformative outcomes by introducing local missions to coordinate actions under a coherent direction. The Partnerships will also focus on broad stakeholder engagement and mobilisation, introducing improved ways of working across governmental departments. They will also reinforce the capacity of regional and local innovation ecosystems, to support the networking of stakeholders and strengthen European sustainable value chains and deep-tech sectors.

The Partnerships will also foster multi-level governance, as well as synergies between policies and between funds. We need to make an optimal use of EU support to make the most of expenditure on innovation so that it contributes to the resilience and recovery of all EU territories and to the twin digital and green transition of Europe.

Innovation is the driver of European efforts to tackle sustainability. We need to work together with regions and Member States for the strongest impact on the ground, for convergence, and to deliver on the European Green Deal.

The Partnerships for Regional Innovation will help us achieve this. We cannot dictate innovation but we can cultivate it through these partnerships in order to unleash our local potential to deliver on both local and EU-wide challenges.

Partnerships for Regional Innovation

EXECUTIVE SUMMARY

Executive Summary

The European Green Deal and the unprecedented European effort to foster socio-economic transformation and build a resilient and long-term sustainable EU bring to the fore the need for an **upgraded role for innovation**. The deep transformations of production and consumption systems are a momentous occasion to innovate to build stronger, as well as cleaner and fairer economies and societies.

However, **the necessary transformations do not seem likely with innovation policy as usual**. To stand a fair chance of having the required impact, new innovation policies must address two important prerequisites: First, the **local and regional stakeholders including citizens, enterprises, knowledge institutions, local authorities must be meaningfully involved**. Second, policy must strive for **transformative, system-level, innovation** in enabling and accelerating the necessary transformations.

The European Commission and the European Committee of the Regions launch the **Partnerships for Regional Innovation** fully recognising the role of all levels of government in realising the European Green Deal. These are **renewed partnerships across all implicated stakeholders to align efforts and co-create transformation pathways**, as a means to amplify impact by working across silos.

The Partnerships for Regional Innovation aspire to become a strategic framework for innovation-driven territorial transformation, linking EU priorities with national plans and place-based opportunities and challenges. This framework considers societal wellbeing and environmental gains as essential purposes for innovation. This means going beyond, but not excluding, innovating for economic prosperity and calls for considering societal and environmental impacts of transformation throughout the whole policy intervention: from its conceptualisation to the action on the ground. The aim is to extend and amplify the strategic potential of innovation to inspire, influence and cross-fertilise other sectoral policies, such as industrial, employment, education, environmental and social policies, which have so far largely operated in silos.

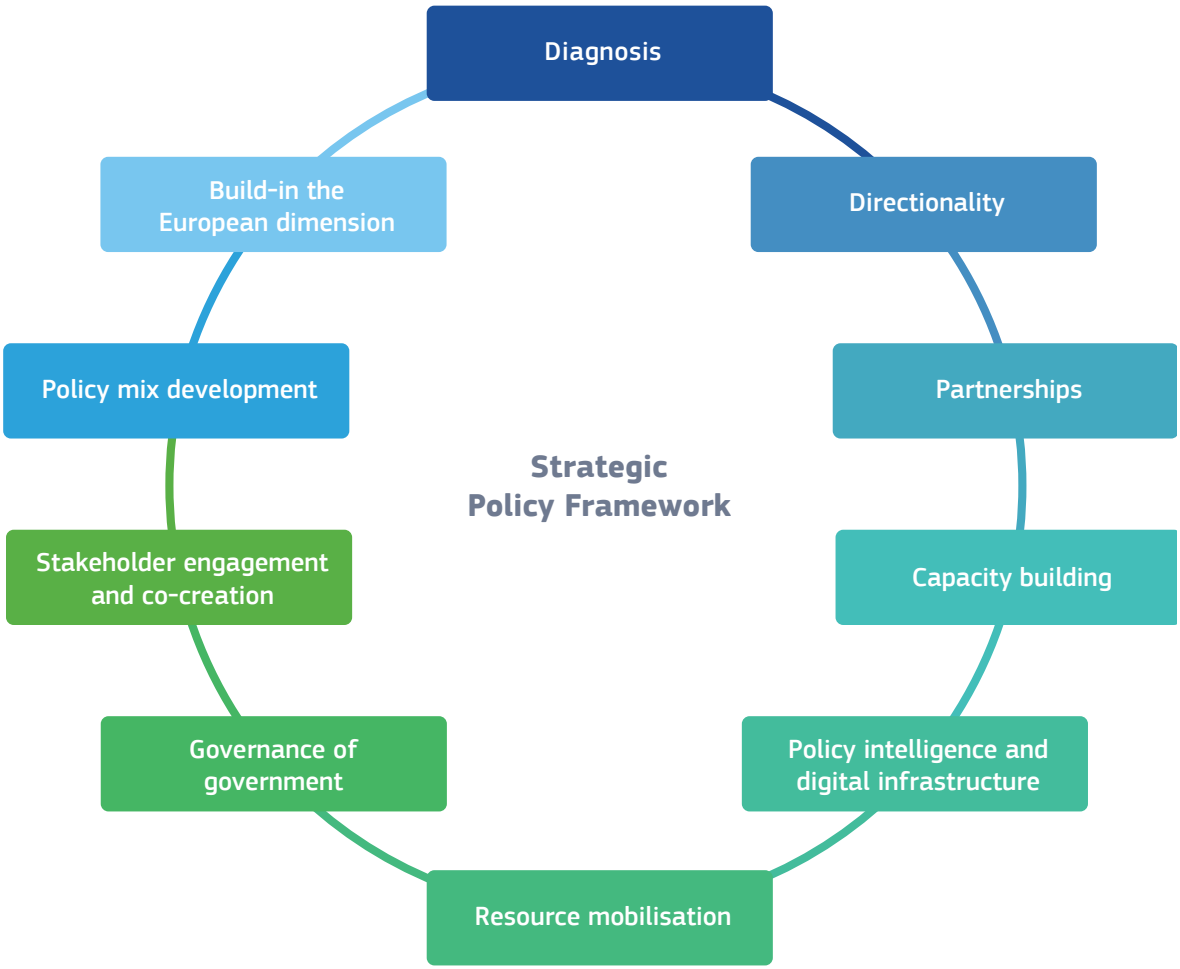
The Partnerships are launched as a pilot project, in a spirit of co-creation by practitioners, stakeholders and experts. This Playbook is the initial support document for a pilot phase engaging Member States, regions and groups of regions who have volunteered to co-develop and test the approach, centred on a selection of practical policy tools. These tools aim primarily at **enhancing the coordination and directionality of regional, national and EU innovation policies** to implement Europe's **green and digital transitions** and to **tackle the innovation divide in the EU.**

The partnerships will be designed from a **multi-level perspective**, paying attention to the needs of local, regional and national policy makers and **opening pathways for their closer alignment and cooperation**. In particular, they aim to address two types of fragmentation that affect the EU innovation ecosystem: the fragmentation of funding instruments and policies in territories, and misalignments between regional/national and EU initiatives.

To this end, **this Playbook proposes an approach to draw linkages across multiple policy domains and funding instruments, exploit synergies and address possible tensions to generate co-benefits for the economy, society and environment.**

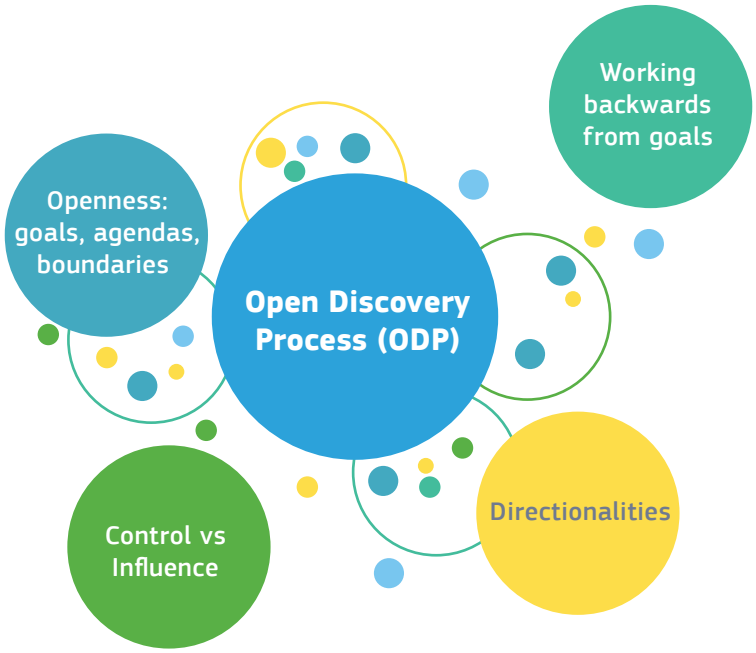
The initial approach is structured around three operational and interrelated building blocks: a Strategic Policy Framework, an Open Discovery Process, and a Policy and Action Mix. These are based on the JRC's experience with smart specialisation strategies over the past decade, state-of-the-art literature on innovation, including transformative innovation and sustainability transitions and the pioneering experiences of growing numbers of practitioners who are introducing more complete and transformative approaches as part of their innovation policies.

The **first** building block is a **Strategic Policy Framework**, adopting a so-called Whole-of-Government approach that allows broader and dynamic planning. The framework is presented from a broad perspective as a set of multiple policy domains and levels of governance, strategies and funding sources, structured around the following elements:



These elements, already present in EU policy-making, are now reconsidered through the lens of sustainability. This allows to translate the common EU and global challenges into local contexts, bring communities on board and adjust the scope of action so no place is left behind.

The **second** building block, an **Open Discovery Process**, enables engagement, deliberation and path co-creation with variable sets of stakeholders, repurposing the established participatory governance approach of smart specialisation towards sustainability, and also introducing new ways of working across silos, working backwards from desired economic, societal and environmental goals. Compared to the Entrepreneurial Discovery Process in smart specialisation, it more fully enables engagement with stakeholders, such as vulnerable groups affected by the transformation, users, grassroots and civic society organisations, among others. The specific composition of actors depends on the specific sustainability challenge.

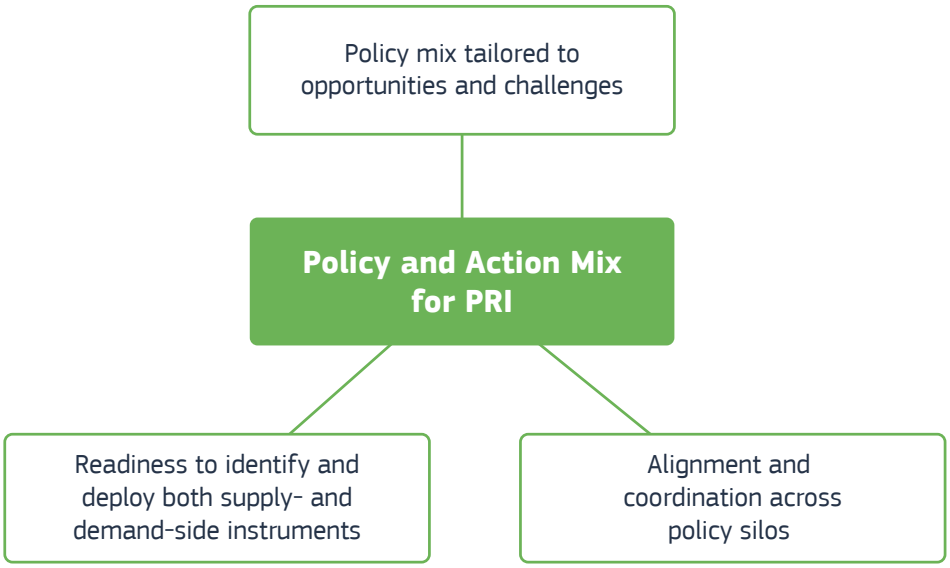


This second block embeds a core addition of the new PRI approach, namely the introduction of **local missions to coordinate actions under a coherent directional logic, enabling the exploration of broad-ranging policy mixes for system-level innovation**. These local missions could take the form of a proposed configuration outlined in this report: **CHallenge-Oriented Innovation paRtnerships (CHOIRs)**. **CHOIRs** are multi-stakeholder and, as far as the government is concerned, multi-department partnerships linked to specific territorial challenges with the aim of achieving impacts within established time frames.

The **third** building block, a **Policy and Action Mix**, mobilises additional instruments to publicly-funded projects, sequences interventions against other actions so that they result in synergies by design and, importantly, co-opts additional actions by stakeholders.

In the context of PRI, this last building block has three key features: (i) policy mix development as a response to opportunities and challenges identified during the

Open Discovery Process (ii) readiness to identify and deploy the right tool for the job, considering where possible both supply- and demand-side instruments (iii) the alignment and coordination of policy packages striving to also influence policies across policy silos and levels of governance.



In the Playbook each building block is linked to a wide range of tools for **conceptualising, diagnosing, designing** and **initiating** PRI as part of a long-term process of exploration, experimentation and competence development. Each of the building blocks will have to be adjusted considerably to the realities of each territory and its goals. This Playbook therefore is not a process guide: it rather provides practitioners with a conceptual frame and pathways for them to experiment and create their own PRI.

The Playbook also contains a toolbox and includes a guide on how it can be used. This toolbox aims to demonstrate, drawing from inspiring policy experiences across Europe and the world, that the policy directions and tools for the green and digital transition are worth developing and that there are possibilities to introduce PRI that are open to all levels of government in the EU.

By providing an accessible point of entry to a broad range of approaches and tools, **the Playbook aims to promote knowledge of good practices, facilitate learning through experimentation and support the long-term development of the right capacities both within public administrations and in the broader ecosystem.**

Particular attention is placed on **tools and governance mechanisms that mobilise multiple sources of funding and policies, and that can help connect regional and national initiatives to EU initiatives for the twin green and digital transition.** Over the course of the Pilot, the tools will be further improved, adapted and tested against the realities of European regions and Member States, turning the Playbook into a mature operational guidance document.

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Partnerships for
Regional Innovation

INTRODUCTION

CHAPTER 1
INTRODUCTION

The world is changing fundamentally and rapidly, creating instability and disruption but also opportunities. There is a pressing need to address climate change. Deep global transformations of basic human support systems are taking place. They affect food, housing, energy, transport, also enabled through the all-pervasive digitalisation. The EU joins the global response to these challenges with new policies and unprecedented financial support aiming to foster deep socio-economic transformations. The investments that European households, businesses and governments will be making in the coming years will determine our way of life for decades to come.

Building a more sustainable and resilient Europe is of utmost importance. The concept of sustainable development was described by the 1987 Brundtland Commission Report as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs." Whereas sustainability is often thought of as a long-term goal (i.e. a more sustainable world), sustainable development is about the many processes, approaches and pathways to achieve it[1]. The concept of 'sustainability' applies not only to the well-known 'environmental' goals, but it also means thinking about the future of the economy and society. Balanced progress across all dimensions of sustainable development – society, environment, culture and economy - is needed to ensure that our present actions do not lead to social rifts and do not compromise future economic opportunities. The new directionality of the European Green Deal[2] therefore sees future **economic prosperity as passing through environmental and social sustainability**. Resilience will have to be fostered so that Europe can make meaningful progress along this direction, coping with the many challenges as they emerge and navigating the transition in a sustainable, fair and democratic manner (European Commission, 2020).

[1] https://en.unesco.org/themes/education-sustainable-development/what-is-esd/sd

[2] https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal_en

Additional action is necessary to achieve Europe's ambitious environmental goals, including system-level innovation. Wide ranging analysis by the European Environment Agency (European Environment Agency, 2019b, p. 12) finds that although many EU policies are working, policies are on the whole not delivering change fast enough to meet Europe's ambitious goals. According to the European Environment Agency (2019b, p. 9):

"Achieving these goals will not be possible without a rapid and fundamental shift in the character and ambition of Europe's responses. Europe needs to find ways to transform the key societal systems that drive environment and climate pressures and health impacts — rethinking not just technologies and production processes but also consumption patterns and ways of living. This will require immediate and concerted action, engaging diverse policy areas and actors across society in enabling systemic change."

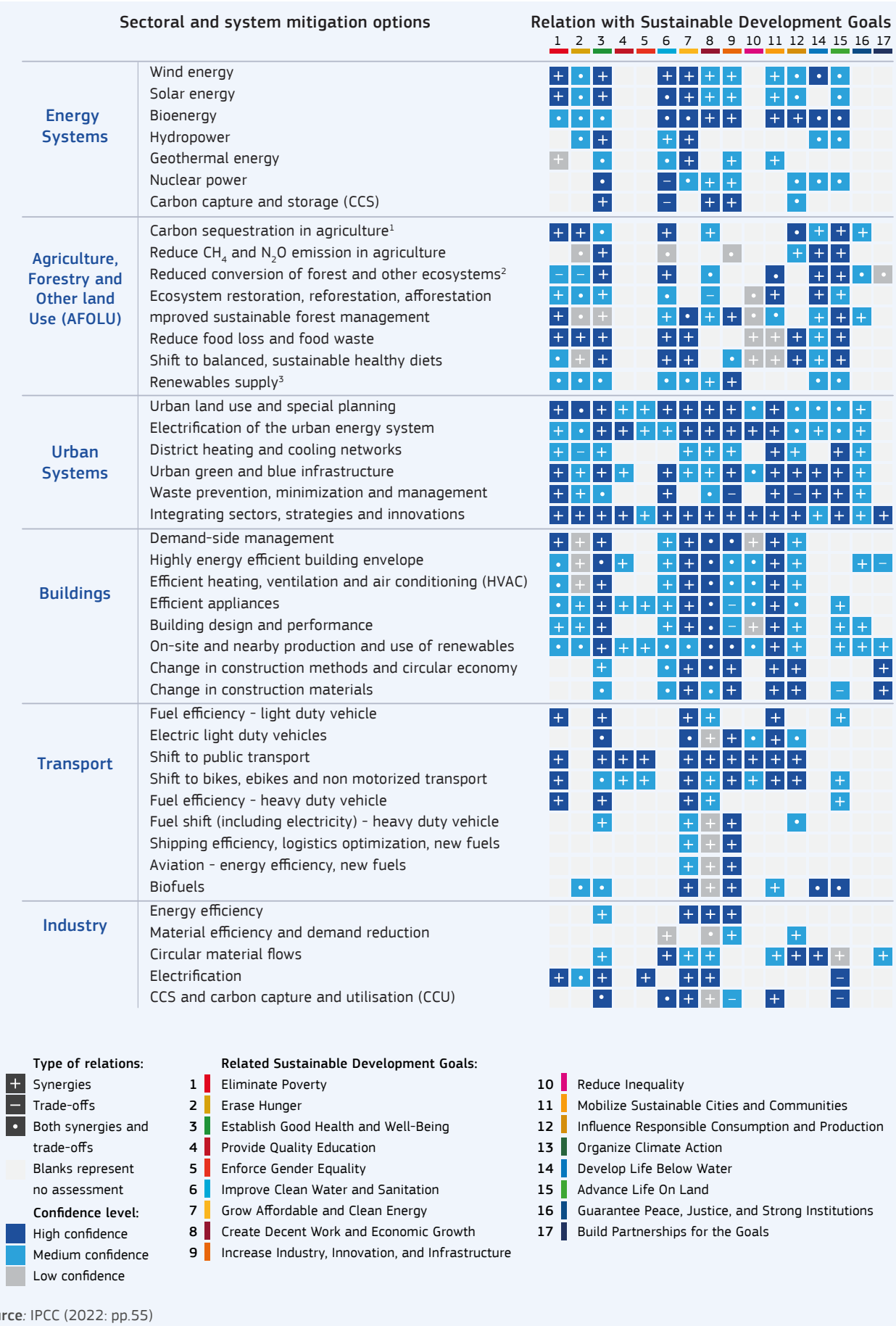
The benefits of delivering on the green transition cannot be overstated. First, the sustainability transition is likely to result in massive improvements in human health. Markandya *et al.* (2018) have estimated[3] the economic value of potential health benefits from improvements in air quality alone to be twice the size of the cost of implementing the Paris Agreement. Secondly, converging estimates from multiple sources anticipate the net employment effects of the green transition to be strongly positive (Fankhauser *et al.*, 2008; IEA, 2020; ILO, 2018; IRENA, 2020).

[3] A review of similar cost-benefit studies reported in OECD (2021: The Annual Climate Action Monitor) shows that the preponderance of estimates are of similar orders of magnitude, with overall health costs from other types of pollution being much higher still.

Box 1. Estimates on economic, social and environmental co-benefits.

A recent report by Intergovernmental Panel on Climate Change (IPCC, 2022) evaluates available evidence on the impacts of mitigation options. As shown in the figure below, it finds that most mitigation options have extensive co-benefits with many Sustainable Development Goals, but some options can also have trade-offs. The synergies and trade-offs vary dependent on context and scale. Some of its conclusions are:

- Policy packages tailored to national contexts and technological characteristics have been effective in supporting low-emission innovation and technology diffusion.
- Appropriately designed policies and governance have helped address distributional impacts and rebound effects.
- Innovation has provided opportunities to lower emissions and reduce emission growth and created social and environmental co-benefits.



Source: IPCC (2022: pp.55)

The green and digital transitions are advancing fast and delay means falling behind. According to the International Energy Agency (IEA, 2020), global investment in renewable energy is overtaking investment in fossil fuels and the strongly complementary electrification of transport, despite its low level, is already on an exponential growth trajectory. The energy transition simultaneously advances decentralisation of the energy system and regional and cross-border grid connections. Digitalisation itself brings about major opportunities. For example, energy production, distribution and consumption are becoming increasingly 'smarter' as a result of pervasive digitalisation, which stimulates the development of new business models and nurtures knowledge-intensive employment.

The European Green Deal raises **new multi-level governance challenges**. Viewed from a global perspective, the European Green Deal represents on the one hand, Europe's contribution to the Sustainable Development Goals – Europe's Moonshot mission of the 21st Century – and on the other hand, an attempt to position Europe in the global sustainable development effort – Europe's own "socio-economic transformation strategy".

Players such as regions, cities and local communities, will play an important role. Understanding the territorial perspective will be essential to engage local stakeholders and to implement the European Green Deal in a flexible manner for impact. It brings to the fore the importance of "place" and the particular role and contribution of local policy making. The recognition of the importance of the **territorial dimension of a sustainable Europe** highlights the particular relevance of "subsidiarity" in policy making with local and regional authorities being in many ways at the forefront of transformation, as was the case during the response to the pandemic.

At the same time, local and regional governments, have to deal with challenges that they cannot meet alone and have to operate in complex, multi-level governance contexts that lack the responsiveness demanded by the present times. They need access to relevant state-of-the-art expertise for aiding policy and practice, for fostering stakeholder engagement and mobilisation, for enhancing policy-sharing and policy-learning and for local institutional and governance capacity building. Furthermore, national policy makers in Research and Innovation (R&I), regulators and line ministries in environment, energy, transport, waste, digitalisation to name but a few, have unique bundles of experience and resources that can help bring local production and consumption systems closer to tipping points of transformation.

The deep transformations also risk amplifying social rifts. While solid majorities of citizens across the EU and beyond[4] demand more of their governments for climate action in particular, over the years a 'geography of discontent' (McCann 2019) has emerged in different countries and across Europe in which many citizens, and especially those in economically weaker regions, feel increasingly disenfranchised and disconnected with high-level governance. Finding ways to encourage these less prosperous communities to embrace the European Green Deal will be essential. There are two key reasons for this. On the one hand, many of Europe's economically weaker regions could be among the most exposed to climate change mitigation processes. Therefore, the social resistance to such processes and policies can be potentially greater in these economically weaker regions. On the other hand, EU cohesion also requires that all regions and all constituencies feel motivated to participate and innovate as part of the Green Deal. In order to counter the geography of discontent, this motivation has to be locally-driven, and critically, it must be inclusive. Regions, constituencies, and

[4] See https://www.undp.org/publications/peoples-climate-vote. According to the Special Eurobarometer 513 on climate change (2021), Europeans increasingly recognise the need for multi-level, multi-stakeholder action: More than six in ten Europeans believe that, within the EU, national governments are responsible for tackling climate change, ahead of business and industry and the EU. Nearly two-thirds of Europeans state that national governments (63%, +8 percentage points since 2019) are responsible for tackling climate change; Close to six in ten respondents think that business and industry (58%) and the European Union (57%) are responsible for tackling climate change; Over four in ten Europeans answer regional and local authorities (43%) or 'you personally' (41%).

communities of practice who typically feel marginalised in EU agendas both locally and nationally, must feel energised to take the lead in sustainable innovations tailored to their local context. It will be important to ensure that progress towards the Green Deal is made across a wide range of fronts, involves all groups, and is therefore genuinely inclusive and pan-European.

Box 2. Building on EU Cohesion policy and smart specialisation strategies.

In their 2020 JRC paper, McCann and Soete argued that the Green Deal challenges could be set ideally:

"in the context of place-based innovation supported by EU Cohesion Policy in economically less developed regions, and in particular, in the smart specialisation and its results-oriented logic. There are three reasons for this:

- Firstly, the S3 Smart Specialisation agenda of Cohesion Policy has already led to the building of innovation-led and entrepreneurial-led capabilities at local, city and regional scales which can serve as a platform on which movements towards the Green Deal can be built.
- Secondly, the financial means that Cohesion Policy can bring to these at a more detailed spatial and institutional level means that incentives can be better structured to make this bottom-up driven process meaningful across local players, stakeholders and places.
- Thirdly, Cohesion Policy has as a primary focus the goal of enhancing the prosperity and viability of economically weaker and less resilient regions, so many governance elements are already in place to drive forward this agenda.

Regarding the first reason why the Smart Specialisation agenda provides an ideal platform on which substantial EU-wide movements towards the Green Deal can be built, it is the combination of both innovation-led and entrepreneurial-led activities alongside enhanced governance capabilities at the local, city and regional scales which provide the ideal setting for driving forward the Green Deal.

The entrepreneurial-led and innovation-led core of Smart Specialisation ensures that it is the creative, scientific, imaginative, and technological prowess of the Europeans that will drive the Green Deal agenda. Econometric evidence confirms that new green technologies tend to build on existing capabilities (Santoalha and Boschma, 2019). At the local and regional scales 'dirty' technologies inhibit the shift towards green technologies but this can be overcome where local technological relatedness to green technologies is already evident (Santoalha and Boschma, 2019). Moreover, in shifting towards green technologies, the existing relatedness features of regional capabilities in green activities and technologies dominates any effect of political or policy support at the national level, although political and policy support for green technologies at the local level strengthens the local diversification processes into green technologies (Santoalha and Boschma, 2019). In other words, local policy design and delivery is essential for driving green technologies.

The driving of the Green Deal agenda via Smart Specialisation can be made consistent with market principles by re-orienting the broad macro-level incentives shaping the enterprise activities of European commerce, although this 'mission-oriented' (Mazzucato, 2018) type of approach will only be successful across a broad base if it is accompanied by widespread bottom-up engagement and mobilisation. There is no single ideal green growth model (World Bank, 2012), nor mission-oriented institutional design (Breznitz *et al.*, 2018) suitable for driving the agenda. Rather, the challenges faced by different contexts differ, and therefore actions need to be tailored to the local context. In particular, the mix of incentives and regulations should

be tailored to the local innovation potential, as well as the sequencing of activities (World Bank, 2012). In this regard Smart Specialisation in the context of the European Green Deal provides a unique combination of both top-down macro-level directionality and widespread bottom-up micro-level and enterprise-led engagement which ensures that the creative energies of Europe can be targeted and focused on medium and long-term Green Deal goals. Smart Specialisation is the only policy-schema in the EU policy portfolio which can combine top-down directionality with bottom-up enterprise engagement on the requisite scale and breadth to ensure EU-wide engagement."

Source: McCann and Soete (2020)

System-level innovation[5] is increasingly seen as a legitimate and achievable policy goal. Over the past two decades innovation scholars and practitioners have co-developed a new framing of innovation policy, which is now increasingly taking centre stage (e.g. EEA, 2019a; Mazzucato *et al.*, 2019; OECD and Eurostat, 2018; Schot and Steinmueller, 2018; Weber and Rohracher, 2012;)[6]. This new framing of innovation policy recognises that truly transformative social change is rarely just about the underlying science and technology: it invariably involves new socio-economic configurations meant to serve new socio-economic functions.

Policy for transformative innovation starts with the societal goals which cannot be dictated but have to be discovered with all relevant stakeholders, who then become agents and champions of change. A foundational premise for this new framing is that policy should be concerned with the goals of innovation, which should not be just about the economy, but include all dimensions of long-term societal wellbeing. To do so, we need to take a broader view of what needs to change beyond the narrow group of knowledge producing organisations that have traditionally monopolised attention. While acknowledging the central importance of firms and other knowledge-producing organisations, this new framing of system-level innovation is much broader. It encompasses the entirety of the production and consumption system, including households and citizens. Additionally to supporting the knowledge system, policy should also seek to transform the economy and society to make them more receptive to and demanding of beneficial innovation. Such transformative innovation policy increases the chance of purposeful economic and societal impact. Small, but growing numbers of policy practitioners are now working to operationalise a new framework of strategic thinking and acting in the face of transformative change (for a review see OECD, 2021a)[7]. Table 1 presents some examples of the combinations of technological, social, business model and infrastructural innovations that will be needed to bring about system-level innovation for sustainability, that will often be unique to each territory.

[5] The concept of system-level innovation is discussed in detail in the 'Concepts and Rationales' document accompanying this report.

[6] At the time of writing, Schot and Steinmueller (2018) is the most cited paper in the top innovation journal (Research Policy), with some of the foundational papers by Geels (2002; 2004) following closely behind. The new OECD/Eurostat Oslo Manual of Innovation (OECD and Eurostat, 2018) now recognises households and other users as meaningful statistical units. Policy-oriented reports by the European Commission (2020), the OECD (2015; 2021) and a recently launched OECD Project on Enabling Transitions through STI (https://www.oecd.org/sti/inno/stpolicy2025/), also reflect the growing recognition that the dominant framing of innovation is not up to the challenges of our time.

[7] There are multiple attempts to operationalise scholarly work on transformative innovation policy, which reflect both growing interest by experts and practitioners and the fact that the new framing of innovation is still emerging and is being created by experimenting and by doing. As argued by Haddad *et al.* (2022) no one approach can yet claim to offer complete guidance across all functions of policy making.

Table 1. Examples of sustainability innovations in the mobility, food and energy domains.

	Mobility	Food	Energy
Incremental technical innovation	Fuel-efficient petrol or diesel cars	Precision farming, food waste valorisation, integrated pest management	Insulation, energy-efficient appliances, efficient gas or coal-fired power plants
Radical technical innovation	Battery electric vehicles, electric bikes, alternative fuels, autonomus vehicles	Permaculture, no-tillage farming, plant-based meat and dairy products, genetic modification	Renewable electricity, heat pumps, passive houses, whole-house retrofitting, smart meters
Social or behavioural innovation	Car sharing, modal shift, teleconferencing, teleworking, internet retail	Alternative food networks, organic food, dietary change, urban farming, food councils	Decentralised energy production ('prosumers'), community energy, energy cafes
Business model innovation	Mobility services, car sharing, remanufacturing vehicles, bike sharing	Alternative food networks, organic foods	Energy service companies, back-up capacity, vehicle-to-grid electricity provision
Infrastructural innovation	Intermodal transport systems, compact cities, integrated transport and land use planning	Reform to distribution systems, storage provision and better fod waste management	District heating systems, smart grids, bio methane in reconfigured gas grid

Source: European Environment Agency (2019b)

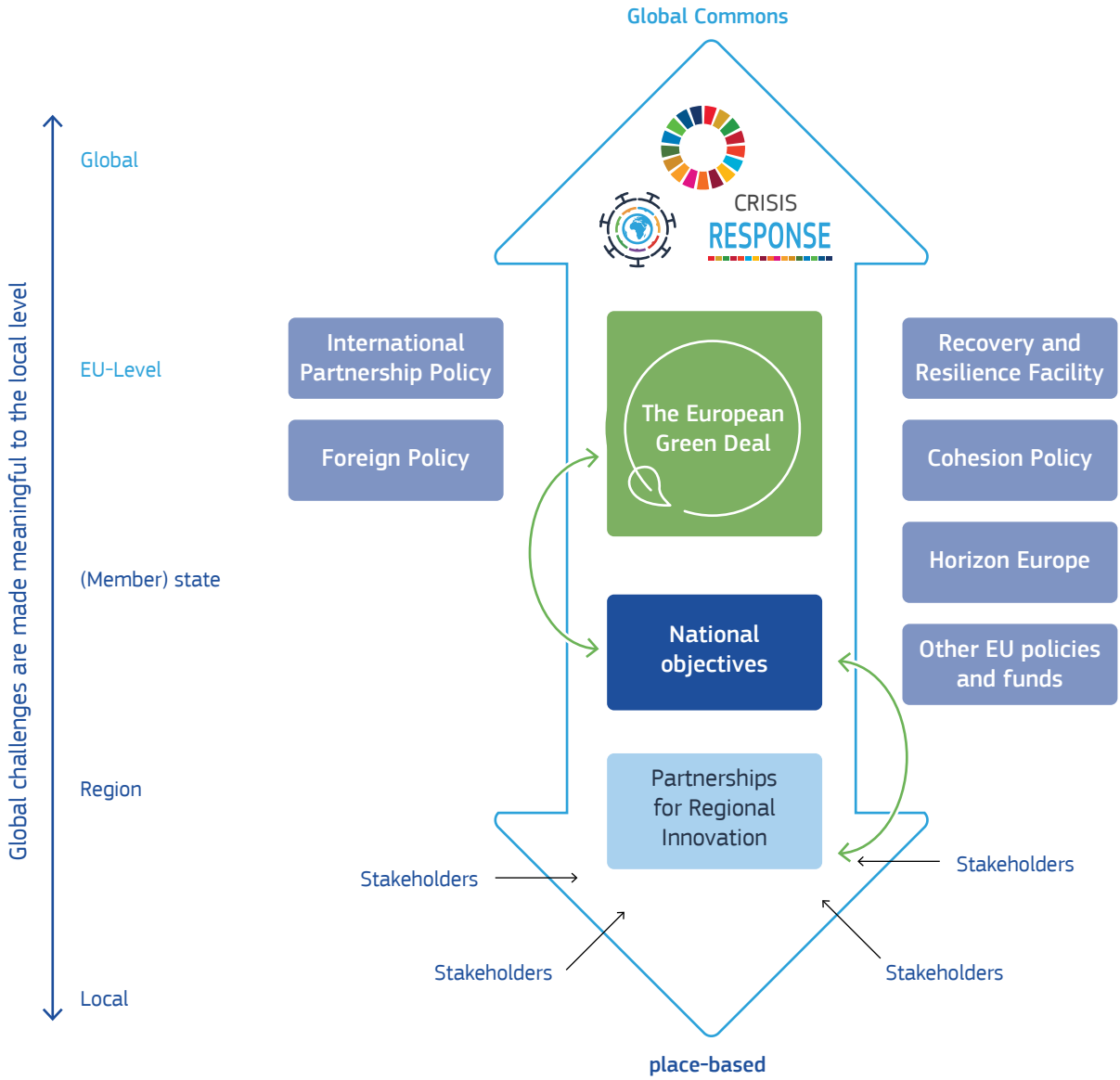
Discovering and making progress along the desired pathways implies working with growing stakeholder coalitions. The transition affects us all and needs to involve every part of society. Discussions need to involve technology users relevant to specific challenges (who may be patients, students, commuters or households), financiers, regulators, professional associations, trade unions, educators, consumers or workers, and especially vulnerable groups and others whose voices are often unheard. Smart specialisation has introduced forms of participatory governance that are a good basis to build and expand on. System-level innovation assigns new roles to governments, who in addition to channelling public resources for innovation, should also act as orchestrators, regulators, watchdogs, warners, mitigators, lead users, as well as promoters of transformative change (Borrás and Edler, 2020). Besides government, also other intermediaries, especially from civil society can play a key role.

The Partnerships for Regional Innovation (PRI) approach proposes a step change in the effectiveness of coordination, in order to accelerate and amplify impact. European regions and countries face sizeable challenges in their green and digital transitions, which often demand investments greater than any one region, member state or EU fund can shoulder. Unlike previous generations of innovation strategies whose visions were usually open-ended, we now have to achieve impact for the economy, society and environment *within defined timeframes*. To do so, we should be using both new and old solutions, investing not just in R&D and business innovation but also in education and skills and critical physical infrastructures. We should be drawing linkages with policy domains generating demand for innovation – such as energy,

health, transport, waste, security - that are now largely unexploited. We should also be re-tooling government, including with revised and fit-for-purpose policy instruments, such as new forms of public private partnerships, public procurement for transformation and regulatory experimentation and reform. The experience with S3 is a good basis to build on, but its limited success in coordinating across silos in practice (Guzzo and Gianelle, 2021) highlights the need for adopting a broader planning framework which introduces viable solutions.

PRI is firmly anchored in the EU policy framework. The aim is to support existing policies and inspire further policy action exploring an approach to establish a sound basis to enhance the coordination and directionality of regional, national and EU policies to implement Europe's green and digital transitions (see Box 3). To achieve this PRI adopts a multi-level perspective, paying attention to the needs of local, regional and national policy makers and opening pathways for their closer alignment and cooperation (Figure 1).

Figure 1. Partnerships for Regional Innovation in a Multi-Level Perspective.



Source: Adapted from Nakicenovic *et al.* (2021)

PRI can help address two types of fragmentation[8] that affect the EU innovation ecosystem:

- *Fragmentation of funding instruments and policies in the territories* (horizontal fragmentation): the achievement of the twin transition requires to mobilise multiple funds (RRP, HE, ESIF, as well as national and regional funds) beyond Cohesion policy, leverage investments beyond R&I funding and leveraging other policies (education, industrial, employment, energy, transport, etc.) that can amplify the impact of innovation expenditures. There are potentially many synergies between research and innovation (which were part of S3 initially), broader business support, skills, training opportunities (which became part of S3 more recently), infrastructures, different types of funding tools, regulation, subsidies for the energy transition, social policies etc. Yet these synergies need to be identified early on, which can be done if there is a broader and long-term framework in place.

- *Disconnection of regional/national initiatives from those of the EU* (vertical fragmentation): while a plethora of instruments exists to support coordination between innovation players and ecosystems, coordination at higher level of granularity is insufficient. Regional initiatives do not benefit sufficiently from synergies with initiatives in other regions, Member States and the EU. PRI will attempt to bring networks of regions together to co-create mechanisms that address fragmentation and link territories to sustainable European value chains, including synergies with I3, Interreg, Euroclusters, and EIT KICs.

[8] Addressing fragmentation closely relates to some of the rationales for transformative policies as introduced by Weber and Rohracher (2012), especially policy coordination and reflexivity failure, which directly relate to fragmented and possibly even counter-productive policies. Directionality failure and demand articulation failure are the other two types which PRI also stands to address (we owe this insight to Matthijs Janssen).

Box 3. The Partnerships for Regional Innovation in the EU policy framework.

- The PRI are fully aligned with the socio-economic transformation logic underpinning the **Green Deal**, and can effectively support its objectives in every territory. National, regional and local authorities are expected to further improve and develop their climate adaptation and digitalisation strategies and ensure their effectiveness based on the latest science. The PRI will be mobilised in this endeavour by proposing innovative solutions to territorial climate challenges based on inclusive, participative and evidence-informed process.

- The new **industrial strategy** identifies 14 different ecosystems, encompassing all players in a specific value chain. The PRI will attempt to bring networks of regions together to co-create mechanisms that address fragmentation and link territories to sustainable European value chains. This can lead to the construction of viable transition pathways in place-based industrial transitions. Strategic directions should be informed by economic strengths and reflected through the prism of social and cultural values of the territory.

- The new **Cohesion Policy** explicitly recognises in its updated regulations for the programming period 2021-2027 the need to strengthen economic, social and territorial cohesion in the European Union, by revised S3 strategies including, among others, actions to support industrial transitions. These form a good basis to develop the PRI, and ,in fact, there are already promising examples of new S3 strategies including key features of the partnerships and a strong sustainability dimension, while remaining completely compatible with the regulatory framework of S3. The PRI can in fact strengthen S3 implementation, without interfering in any way with the conditionality criteria.

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- The new Horizon Europe **EU missions** offer a concrete opportunity for multi-level governance where the new PRI can play a catalyst and coordination role at territorial level. Indeed, four of the five EU missions (Climate adaptation, Oceans and waters, Soil and food, and Climate-neutral cities) are place-based. This will open up new opportunities for regions and countries participating in the missions to strengthen place-based innovation clusters, up-scale local innovations, access innovation funding, international networking and interregional collaboration in line with the PRI.

- The PRI can support implementation of the **Recovery and Resilience Facility** at territorial level, inspiring a logic of economic transformation that links RRP funding with other available instruments and delivers real change. The marked green and digital directionality of the Recovery and Resilience Facility goes very much along the lines of the PRI-based focus on directions for development that lead to co-benefits for the economy, society and the environment. Indeed the RRF shares many common features with the PRI, but also important differences: i) the RRF is a temporary instrument while the PRI aim to become a long-term framework; ii) the RRF is performance-based while the PRI are impact-based; iii) the PRI have a stronger focus on multi-level governance and on synergies between different funding instruments, as well as broad stakeholder engagement and participatory governance.

Box 4. The Partnerships for Regional Innovation in the global policy framework.

- The European Union and all its Member States have co-created and committed to the Global Agenda 2030 and its **Sustainable Development Goals (SDGs)**. European Union has embedded the SDGs in all its policies and programmes. An increasing number of European regions and cities are also adopting the SDGs in their policies and strategies, including the ones focused on innovation. Localisation of SDGs and their meaningful embedding in Smart Specialisation Strategies is an important part of the PRI approach that allows to identify sustainability challenges and possible innovative solutions to address them.

- The urgency of the global cooperation around six key transformations has been strongly pointed out in Global Sustainable Development Report 2019[9] and is further strengthened in TWI 2050 report prepared by the World in 2050 initiative. The 2020 edition focuses on *Innovations for Sustainability. Pathways to and Efficient and Sufficient Post-Pandemic Futur*[10] . Both reports acknowledge the **transformative power of sustainable development** and the key role of **science, technology and innovation** to achieve it. The time to achieve SDGs and save our planed is scarce. The Decade of Action announced by UN Secretary General in 2019 is the call to use the last ten years of Agenda 2030 for global, local and people action, meaning not only strengthening global leadership and resources, but also embedding the necessary transitions at **national, regional and local levels** and mobilising individual actions.

- **Addis Ababa Action Agenda** (2015) states that science, technology and innovation can help achieve much faster progress in delivering the SDGs. For this purpose United Nations established **Technology Facilitation Mechanism** to support multi-stakeholder cooperation and partnerships to deliver SDGs. Global and international cooperation can help develop synergies and joint policy action to address knowledge and capacity gaps that many territories struggle with.

- The new **UN Science, Technology and Innovation Resolution** (2022) recognises an important role of STI for SDGs Roadmaps and the Global Partnership in Action for their development and implementation. Smart Specialisation has been recognised as one of global methodologies to

develop such roadmaps, which can be done by increasing focus on sustainability dimension of those place-based research and innovation strategies.

– **Paris Agreement** is the global pledge to fight the climate change. Its implementation requires social and economic transformation that is planned based on Nationally Determined Contributions and implemented in 5-year cycles. PRI can become an important contribution to delivering climate action at local and regional level through its focus in innovation for sustainability and transformative action.

[9] https://sustainabledevelopment.un.org/content/documents/24797GSDR_report_2019.pdf

[10] https://iiasa.ac.at/web/home/research/twi/Report2020.html

This Playbook has been conceived as an initial support document for a pilot exercise involving several EU regions and countries to facilitate co-creation, experimentation and practitioner learning.

The Playbook is structured in three main chapters: following the introductory **chapter 1, chapter 2** then describes the initial PRI concept, its rationale and key features, and outlines a prototype of its three core building blocks: the Strategic Policy Framework, the Open Discovery Process and the Policy and Action Mix. The building blocks are based on research, theory and the pioneering experiences of growing numbers of practitioners who are introducing transformative approaches as part of their innovation policies. **Chapter 3** proposes an initial toolbox for the development of PRI that is structured around visual fiches presenting key concepts, approaches, policy instruments or good practices.

The Playbook is accompanied by an analytical report explaining the concepts and rationales for the approach, drawing on the experience with smart specialisation strategies, literature insights, experimental applications and emerging good practices in the governance of transformative innovation policy.

Partnerships for Regional Innovation

WHY, WHAT, HOW

CHAPTER 2
PARTNERSHIPS FOR REGIONAL INNOVATION

2.1 Long-term societal wellbeing as the "guiding star" of PRI

Sustainable development is a priority for the EU internal and external policies[11] and a key principle of the Treaty on European Union. Sustainable development is commonly defined as *"development that meets the needs of the present without compromising the needs of future generations to meet their own needs"*[12] (Brundtland, 1987). Without urgent, systemic, and fair action, *long-term societal wellbeing* is threatened (Ashford and Renda, 2016).

This is because human activities have greatly accelerated, and largely caused, socio-ecological problems such as loss of biodiversity, climate change and related extreme weather events, depletion of natural resources, and pollution (European Environment Agency, 2021; Steffen *et al.*, 2015). Human drivers for these changes include population dynamics, an economic growth based on overconsumption of the natural resources available, urbanization, technological innovation (UNEP, 2019), unsustainable production and consumption, and trade and governance (IPBES, 2019). These phenomena present urgent challenges to long-term societal wellbeing (IPCC, 2022), and addressing, adapting, and reverting these problems is imperative to achieve sustainability and fulfil the SDGs.

Environmental challenges are in fact interconnected to economic activities and societal lifestyles, as well as planetary health is extremely linked to human health and a thriving and resilient nature is a fundamental backbone to prosperous economies and flourishing societies (Hebinck *et al.*, 2021; OECD, 2017). This duality is also recognised by many in society, who responded to a special Eurobarometer (2022) that tackling **climate change** can help improve their own **health and wellbeing** (87%), besides also creating new opportunities for innovation, investment and jobs (85%) (European Parliament and European Commission, 2022).

Innovation plays a dual role in the face of sustainability. On one hand, **technological innovation** has contributed to amplifying human impacts on the planet. On the other, **system-level innovation** - which comes about as the result of broad deliberation that leaves none behind - is our best shot to act on time to address our planetary crisis and enable a green and fair transition.

Despite widespread growing consensus on the need to transform our economies and societies in more sustainable ones, the **confusion** surrounding what sustainability really is complicates efforts to set a commonly agreed direction to take action.

[11] https://ec.europa.eu/info/strategy/international-strategies/sustainable-development-goals_en

[12] This version of the PRI Playbook embraces this definition, and it may be adapted and updated during or after the Pilot.

Sustainability bears a great deal of ambiguity and it can be interpreted differently by different groups of people with different aims (Bianchi *et al.*, 2022). This is partly because sustainability is not a fixed concept that determines one best way to produce and consume that is static in time, but it depends on contextual factors, such as location and timeframe, to name some (Jickling and Wals, 2012). Furthermore, **sustainability and sustainable development** are often used interchangeably, despite their conceptual difference. **Sustainability** is best described as a long-term goal, such as attaining a more sustainable world. It encompasses the economy, our society and the environment on which we depend. **Sustainable development**, like the term suggests, refers to the many processes and **pathways to achieve development**, or progress, in sustainable ways, for example through sustainable agriculture and forestry, sustainable production and consumption, appropriate government measures, research and innovation, education and training, etc.

In this Playbook, we espouse this view and refer to sustainability as our long-term direction, our "guiding star" goal, and sustainable development as a means to achieve it, specifically through the SDGs (Miedzinski *et al.*, 2021; Nakicenovic *et al.*, 2021; Hill, 2022). Furthermore, we consider a policy, an action, or ultimately a strategy as sustainable, if it makes a substantial contribution to at least one of the environmental, social or economic dimensions of sustainability and at the very least "does no harm" to other dimensions. This is also the essence of the concept of multiple value creation[13] and of actions that generate co-benefits. We take inspiration to do so from the approach employed by the EU taxonomy for sustainable activities to define when an economic activity shall qualify as environmentally sustainable (see Fiche 60, "*EU taxonomy for sustainable activities*").

[13] See the relevant section in the accompanying PRI Concepts and Rationales document.

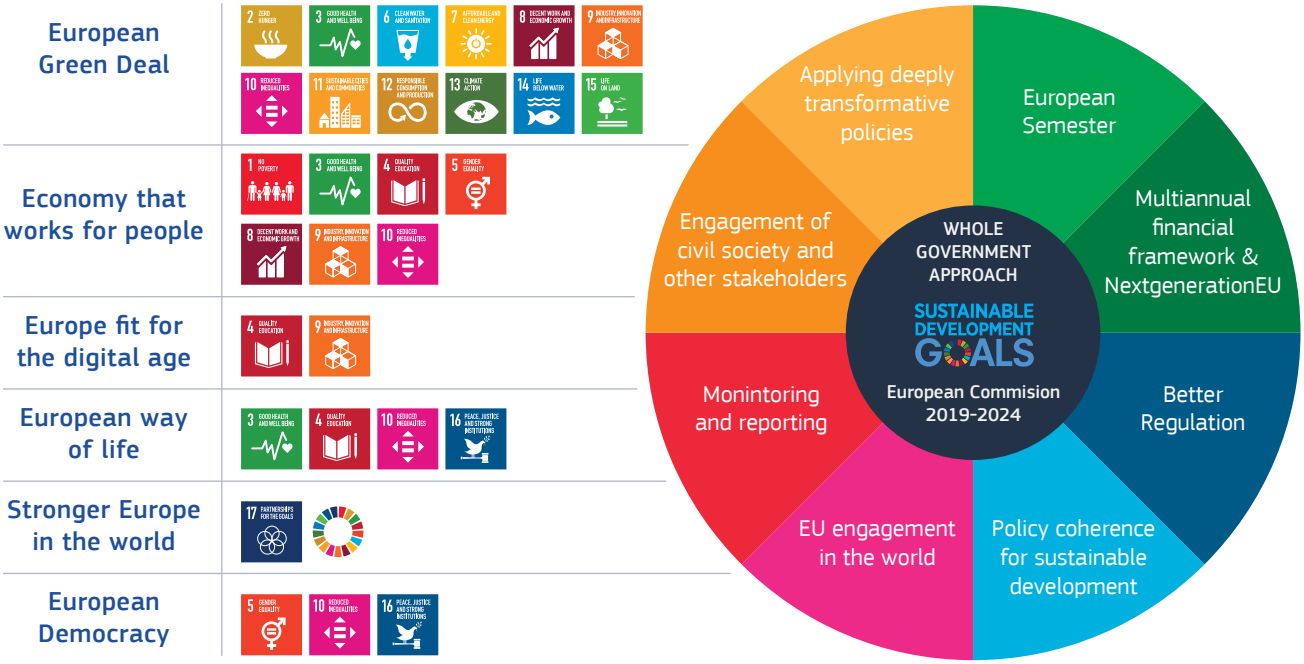
The SDGs represent the 17 global goals that need satisfying to achieve a sustainable world by 2030 and beyond, with human wellbeing and a healthy planet at its core (see Figure 2).

Figure 2. Sustainable Development Goals

Source: image downloaded from https://sdgs.un.org/goals

EU policies define and provide the tools and actions for Europe to get there, by enabling a just and fair transition. The EU has committed to Agenda 2030 and the **SDGs** embedding them at the heart of all proposals, policies and strategies, with an ambition to achieve tangible progress. The EU approach promotes a Whole-of-Government approach to the integration of SDGs into its policies, so that SDGs are systemically embedded in various sectors of our economy and can be reflected in various aspects of our society (see Figure 3). Innovation can play a key role in this respect, and the experience with S3 for SDGs offers fruitful ground for broadening up strategic perspectives (Miedzinski *et al.*, 2021; Nakicenovic *et al.*, 2021).

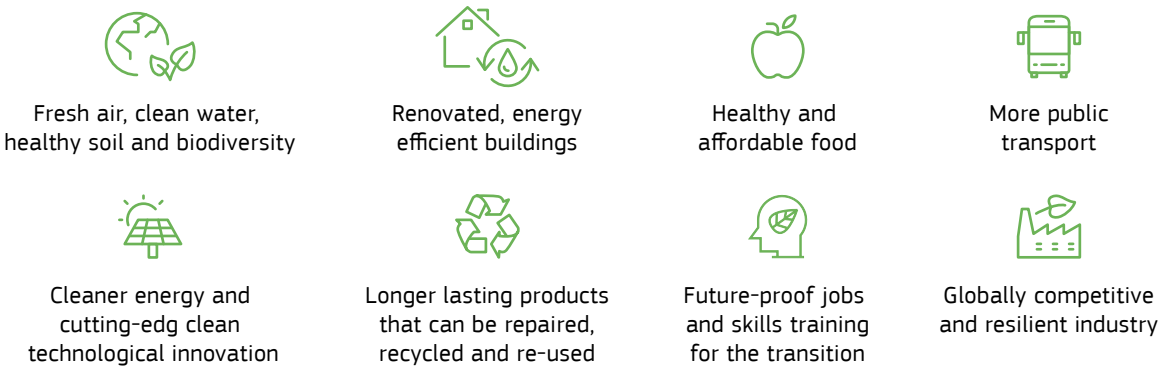
Figure 3. SDGs mapped on European Commission policy priorities through a Whole-of-Government approach.



Source: https://ec.europa.eu/info/strategy/international-strategies/sustainable-development-goals/eu-holistic-approach-sustainable-development_en

The **European Green Deal** (or Green Deal in short) is the main European answer to deliver on the SDGs ambition. The Green Deal represents a roadmap towards sustainable development, where SDGs help define a broad direction and monitor our progress. It sets the blueprint for systemic transformative change needed to successfully embark on the twin transition in a timely and just manner. The Green Deal is part of the EU policy programme to shape Europe's future, placing it at the global forefront in the delivery of a more sustainable economic model and inclusive society.

The Green Deal aims to improve the long-term societal wellbeing of Europeans by providing:



However, new measures alone are not sufficient to achieve **the European Green Deal's objectives**. The Commission will also work with the Member States to step up the EU's efforts to ensure that current legislation and policies relevant to the Green Deal are enforced and effectively implemented[14].

[14] See https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal_en

In fact, EU policies are deployed in territories, where action comes easier and tailored to each territory ecosystem. It is at local, regional and national level that challenges can be identified together with the main stakeholders involved. The place-based approach of challenges is a necessary aspect of change, which can make it socially acceptable and meaningful to our diverse communities (Nakicenovic *et al.*, 2021).

Partnerships for Regional Innovation (PRI) combines place-based challenges and the directionalities set by each territory to help them devise a pathway to address these challenges. PRI empower territories (local communities, cities, regions, cluster of regions, but also states) to identify local challenges and define a mix of policies and actions to tackle and turn them into opportunities. PRI embraces co-creation and the autonomy of territories under the principle of subsidiarity to define their sustainable development strategies. Its aim is to open up new pathways for territorial development and cooperation across silos that takes full advantage of the twin transition.

Therefore, the overall directionality of PRI rests on the European Green Deal. The Green Deal represents the European core response to address the SDGs and provides further tools, including direction, to PRI. Ultimately, PRI represents an approach that helps territories identify local challenges and set place-based directionalities for *long-term societal wellbeing.*

2.2 PRI in a nutshell

Partnerships for Regional Innovation (PRI) is a strategic framework with a strong systemic transformative ambition, linking the European Green Deal to place-based opportunities and challenges. Conceived in the EU policy context and building upon the positive experiences with Smart Specialisation Strategies (S3) (see Fiche 1), PRI seeks to promote transformative innovation with a sharp focus on sustainability that stems from the increasing urgency to deal with the defining challenges of our

time. This new innovation approach shows much potential to tackle the sustainability challenge, resulting in co-benefits for the economy, society and the environment.

The present version of the Playbook is only an early milestone, in a long process of PRI co-creation and development with policy-makers, experts and practitioners that begins with the Pilot conducted by JRC and the Committee of Regions (CoR).

In this respect, we identify the following **long-term goalposts for PRI development approach:**

- **Deliver** effective solutions to pressing societal challenges within defined timeframes;
- Use resources in ways that **generate co-benefits** for the economy, society and environment;
- **Draw linkages** across multiple stakeholders and policy domains, exploit synergies and address tensions;
- Revise and reform policy and regulatory instruments to **improve coordination and amplify impact.**

These goalposts can be achieved by identifying territorial challenges and opening up pathways to address them through innovation in coordination with other policies. For example, the translation of global challenges such as SDGs to territorial contexts and specific places can make them meaningful for local communities and allow building broader coalitions and alliances with like-minded partners. At the same time, the complexity of issues to be addressed requires a wider effort that can bring the expected results by working in concert with actions and policies in other territories and portfolios.

Some of the possible long-term ambitions that the PRI can enable policy makers to explore compared to other strategic frameworks for innovation are:

- *Overcoming paralysis by complexity* through an even greater emphasis on *open deliberation, agreement and co-creation.* Instead of seeking elusive (and perhaps impossible) consensus around collective strategic priorities, in PRI it is sufficient for **coalitions of the willing** to rally around goals that are important for them insofar as they can demonstrate that they contribute to long-term societal wellbeing.
- *Readiness to use a broader range of policy tools to deliver impact within defined timeframes,* recognising that the unique window of opportunity to transform for the better is closing fast. The need for time-critical solutions to e.g. address climate change, conserve specific employment levels or secure Europe's position in emerging value chains implies greater emphasis on innovation investments that are merely *risky* (e.g. the adaptation of proven technologies), as opposed to *uncertain*. Addressing time-critical challenges also implies coordination with policy domains outside R&I that subsidise the diffusion of key innovations and shape framework conditions.
- *Broad scope cutting across several policy areas:* PRI have a strong focus on Research and Innovation (R&I) policy, but also seek to make strategic use of and inspire

relevant e.g. industrial, employment, education, among others, and social policies, which have so far largely operated in silos.

- *Sharp focus on development directions that lead to co-benefits for the economy, society and the environment* and, crucially, give preference to pathways that deliver co-benefits in all three dimensions at the same time. Discovering and enabling viable pathways along these directions requires extensive stakeholder deliberation and mobilisation, informed by high-quality strategic intelligence that localises the challenges and opportunities of the transition.

- *New ways of working across government departments and levels* to deliver impact, ensure stronger coordination across policy silos and to stimulate synergies between stakeholders' efforts. Novel mechanisms seem necessary in light of the inability of current arrangements to facilitate the coordination that is now necessary in view of the profound transitions Europe is facing. Strengthened and extended participatory governance is necessary to engage citizens, identify and legitimise bold transformation goals and co-create transition pathways.

- *Introduction of a challenge-oriented approach to innovation policy to accelerate transformative outcomes,* such as local goal-oriented partnerships to coordinate actions under a coherent directional logic. Stronger directionality, or clarity about goals, stands to open up perspectives and gather actors (in unusual combinations) around shared objectives. A key feature of strongly directional partnerships would be their ability to explore policy mixes for system-level innovation that include interventions from outside the traditional confines of R&I policy (such as employment, social, fiscal policy and also line ministries in energy, health, transport, waste), promote innovation through regulation (such as 'regulatory sandboxes'), and demand-side policies, such as the creation of lead markets, the creation of innovation spaces during large physical investments, innovation for affordability (for more information see Fiches 51 and 52).

- *Firm roots in the EU policy framework,* supporting the implementation of the European Green Deal, the EU industrial policy strategy, Horizon Europe, Cohesion policy and the Recovery and Resilience Facility. PRI also address the fragmentation of EU initiatives and funds, ultimately uniting them under the umbrella of integrated partnerships linked to broadly-backed territorial goals. As the PRI approach matures, it can offer a viable path towards simplifying access to different EU frameworks and funds.

2.3 The three building blocks of PRI: an initial outline

A careful consideration of the challenges and opportunities presented earlier calls for a PRI approach with the following broad design specifications. **PRI should:**

- **Align multiple funds/policy domains for the twin transition;**

- **Be suitable for various levels of governance** (not just regions);

- **Deploy various support instruments** (not just projects);

- **Allow linking with European missions and partnerships** (e.g. through mission hubs).

A first approximation of a policy framing that could meet these specifications groups the various elements into **three 'building blocks'** of PRI as follows:

(I) **A Strategic Policy Framework** that lays the foundation for action in the following two 'building blocks' and allows broader and dynamic planning;

(II) **An Open Discovery Process (ODP)** that allows for engagement and path co-creation with variable sets of stakeholders also by working backwards from desired societal outcomes.

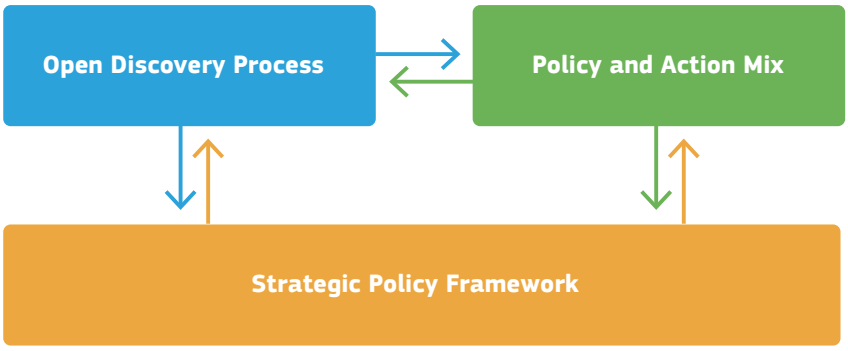
(III) **A Policy and Action Mix** that includes the possibility to mobilise additional instruments to publicly-funded projects, as necessary for the desired outcomes, including private sector co-investments. Societal goals become the focus of the related actions so that they result in complementarities. Importantly, this building block co-opts additional actions by stakeholders.

The strategic policy framework underpins the entire approach. It sets out only slowly changing "rules of the game" including governance and institutional foundations, yet installs mechanisms which allow the rules to be revised when necessary. The Open Discovery Process and the Policy and Action Mix are where policy design and implementation ("the game" for which the rules were earlier defined) actually happens (Figure 4 below)[15].

[15] See Aranguren *et al.* (2022) for an extensive discussion of the distinction between the overall architecture of S3 and the micro-processes that emerge to particularise and valorise priorities.

The discovery process and the actions are closely connected. One of the key outcomes of the ODP will be proposals to government for changes to the policy mix. The ODP is also where open agendas are developed that can potentially unite multiple funds and policy makers (from across levels and departmental portfolios), including the (additional) actions of stakeholders. Changes may continuously shape the ODP, such as experience from how policies play out in practice in the policy mix, and as the transition gains legitimacy and momentum, perhaps resulting in a more holistic and longer term frame for the strategic policy framework.

Figure 4. PRI Building Blocks

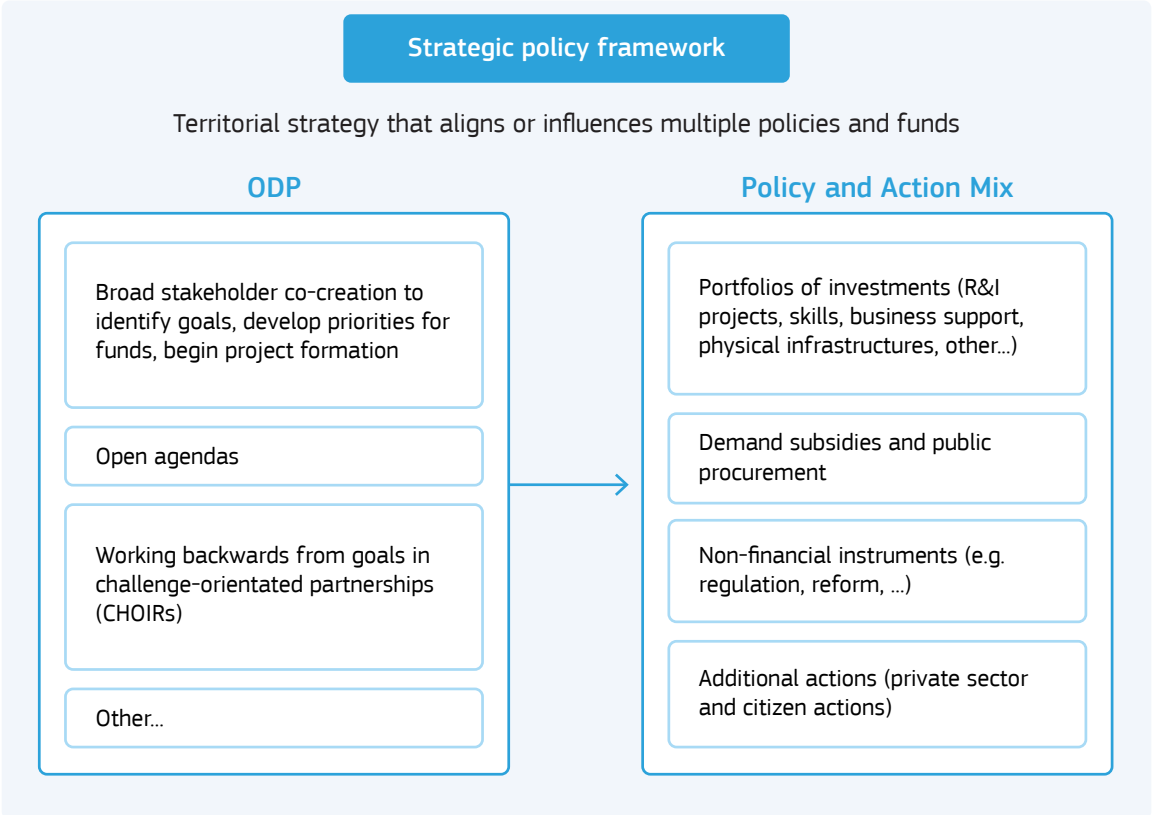


The reader of the Playbook will find —in the "Toolbox" section of the Playbook— a series of fiches. Each fiche is numbered for ease of reference, and numbers have a colour code which represent the building block they pertain to:

- **Orange** is for Strategic Policy Framework,
- **Blue** for Open Discovery Process, and
- **Green** for Policy and Action Mix.

At the present – exploratory and experimental – phase of PRI development it is wise to define the key building blocks only in outline, allowing room for co-creation and learning from experimentation during the course of the pilot. Figure 5 provides a rough sketch of selected components of each building block, as is apparent at this initial stage of PRI development, but as indicated in the figure, is very much incomplete and open to additions and redefinitions. The fiches contained in the following chapter describe many of the elements of these building blocks and approaches to introducing them to strategic policy making, but they cannot possibly be exhaustive – their great range and diversity serves to communicate the need for policy makers to consider a broad menu-for-choice. In practice of course policy makers will have to be eclectic, in choosing a small number of elements and tools appropriate for them and suitably adapting them for the job at hand.

Figure 5. Indicative components of each PRI building block.



The participatory discovery process with stakeholders that begun with S3 remains at the heart of PRI. A good implementation of S3 and fulfilment of the criteria for the enabling condition of good governance places a territory in an excellent starting point to pivot its development path in the direction of PRI. However, PRI also requires a new framing of sustainable development in keeping with the present times (as more fully explained in the accompanying PRI Concepts and Rationales document). Changing the *framing of policy* in line with the new societal directions is essential to strengthening horizontal and vertical coordination. In this respect it is important to recognise that the framing of S3 was a product of its time. Therefore, the key building blocks of PRI do not map directly to the steps of the S3[16] methodology, to allow the necessary room for lateral thinking on how to integrate the newly relevant planning domains, and attendant experimentation and learning.

[16] Of course future editions of the Playbook may include helpful aids that detail the additional actions necessary when compared to S3 practice, but at this stage this would be premature.

A key concern for PRI is coordination between the policy makers who already use S3 to plan Cohesion funding for R&I, and those handling other relevant funds and actions both at the EU level (e.g. RRF, Horizon and many others [see Fiche 11, *"Mapping funding opportunities"*]) and at the level of individual Member States.

For example, according to Eurostat figures national (and in some cases regional) research funds still command more than four fifths of public R&D funding among EU member states, yet are not part of S3 planning. Partnerships will also need to be made with policy makers in charge of complementary actions beyond R&I, such as regional, national and municipal or community-level planning (e.g. on sustainability, energy, water, waste, transport, urban planning, large physical infrastructures) that strives for co-benefits.

A crucial point to make is that there is no single path to a successful transition, and one size fits all approaches should be emphatically avoided. The approaches, tools and good practices described in the fiches of the toolbox should therefore be seen as 'menus for choice' that permit alternative configurations of PRI according to the level of political support and ambition (which is the prerogative of the territory), their administrative capacity (which over time, is also a choice) but also the cultural context (which is not a choice).

Allowing for varying ambition and capability should not be seen as an invitation to reduce PRI methodological development to the lowest possible common denominator: the pressing challenges Europe faces demand that we strive to do our absolute best. While allowing for varying ambition, it is extremely important, especially as part of the pilot, to experiment with the most ambitious configurations possible. This can serve to 'raise the bar' for everyone. At the same time, it is extremely important for PRI to open up capacity development pathways for those regions that can benefit the most from transformative innovation, progressively offering clear guidance for policy development as the outcome of co-creation and learning with the territories that participate in the pilot.

2.3.1 The Strategic Policy Framework: Setting the conditions for broader and dynamic planning

The importance of an appropriate strategic framework cannot be overstated. A broad framing that includes multiple policy domains and levels of governance can set the right tone from the very beginning. A broad framing can also allow longer-term perspectives, enabling realistic timescales to be set for ambitious goals to be achieved.

The strategic policy framework embraces multiple policy domains and draws on a variety of funding mechanisms to deliver co-benefits. Recent examples of this approach include Navarra's "S4 Strategy[17]", the coordination of Smart Specialisation and the localised SDG Agendas in regions such as Aragon or Basque Country and the Austrian Recovery and Resilience Plan, which cut across policy silos. A particularly interesting feature of some of these strategies is that they extend beyond the horizon of the EU Multiannual Financial Framework (MFF, currently

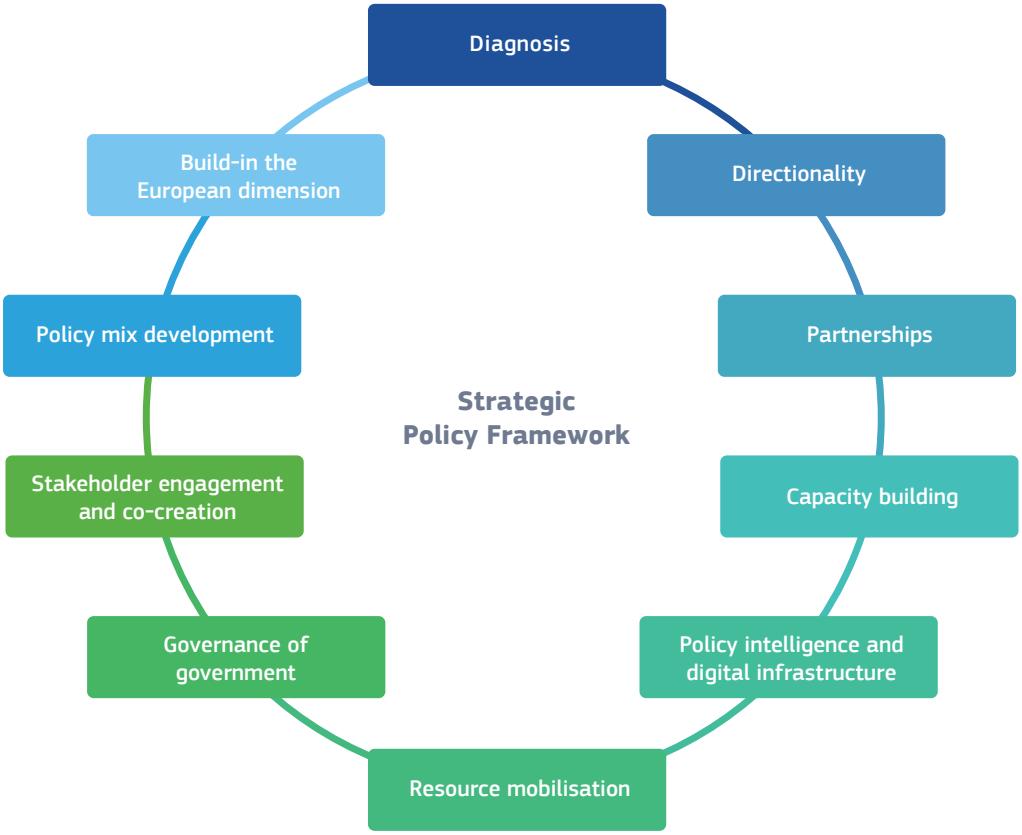
[17] https://s4navarra.es/

set for 2021-27), and seek to bring under their umbrella national and regional funds too. If the political will is present, and if planning cycles are mature, the introduction of a new strategy that incorporates many of the relevant action-spaces under a coherent directional logic would be an ideal first step (see Fiche 24 Guiding Principles for a WoG Approach implementation). This would also be an excellent opportunity to broaden the framing of key policy issues and to reap the benefits of joint planning on related challenges, such as environmental sustainability, economic competitiveness, social fairness and cohesion. **However, PRI does not necessarily require changes to existing strategies.**

Elements of PRI can be developed under the existing strategic and planning frameworks prevalent in all of the EU (e.g. S3, RRF, national development plans, National Energy and Climate Plans, Skills Agendas etc.). In addition, since the key feature of PRI - the discovery process – is already well-embedded in S3, existing arrangements provide an excellent basis for additional actions that strengthen horizontal and vertical coordination and amplify impact, which in PRI is understood as the generation of co-benefits. Adaptations can be made in operational planning that are compatible with prevalent strategic arrangements, while allowing for the additional elements as envisaged in PRI.

To develop an **appropriate strategic framework** it is important to consider the following **key elements**: (Figure 6):

Figure 6. Elements of a strategic framework



Diagnosis: A rigorous diagnosis of strengths, weaknesses, threats and opportunities for the territory in a multi-level setting is essential. Some questions to consider include: What are the major challenges ahead for the territory? What is the evidence on bottlenecks and opportunities for sustainable development? Are there possible synergies or negative trade-offs between our main goals? Where will innovation, new partnerships and stakeholder coalitions be needed? Is the territory heading in the right direction? What is the structure of the underlying production and consumption systems? What can be learnt from past experience / evaluations? What are the key leverage points? (see Fiches 6-9, 11, 13, 15, 16, 29, 62, 63 among others).

Directionality: Overall directionality is driven by the strategic framework policies that have been agreed at the EU level (such as the European Green Deal, Cohesion Policy, the EU missions, the Recovery and Resilience Facility, etc.) and adopted and adapted at national and subnational levels in the spirit of subsidiarity. It is the outcome of a broad, participatory process of deliberation, through the lens of local challenges and prevalent social values, which may vary considerably across territories and may change over time (see Fiche 44, "*Promoting multiple value creation and co-benefits*"). The reflection on directionality should lead to the definition of priorities (desired outcomes) that will focus future actions.

Partnerships: An initial division of roles across government, as well as clear mechanisms for it to evolve over time, will need to be agreed at the policy framing stage (see Fiches 22-24). As this will involve cross-government collaboration, it will be important to foresee ways to anticipate and handle tensions between different departments if and when they emerge. It is important to recognise that trust among public officials in different departments is the foundation of a whole-of-government (WoG) approach, and no amount of departmental restructuring can substitute for the lack of trust. A coherent WoG approach makes government a better and more effective partner for its key constituencies in business and civil society. For the actual change to happen, the external stakeholder mobilisation and engagement are crucial. A partnership is then understood as a coalition of relevant players that can contribute to or will be potentially affected by the chosen priorities and goals.

Capacity-building: PRI requires a step change in coordination and implies new roles for government. It is important to pay full attention to the organisational capacities and individual competences required and ensure that they are aligned with PRI from the outset (see Fiches 53-57). By providing an accessible point of entry to a broad range of approaches and tools, the Playbook aims to promote knowledge of good practices, allow learning through experimentation and support the development of the right capacities both within public administrations and in the regional innovation ecosystem. Building the right capacities is also a strategic choice, and there are dedicated EU funds (e.g. technical assistance in the ERDF) to support the development of capacity over time. However, it is important to recognise that not all public administrations will be able to develop the same capacity.

An effective approach for PRI will be to disaggregate institutional capacity into three key components, namely: (i) *institutional capacity for policy design*, (ii) *institutional capacity for policy co-creation with stakeholders (ODP*), and (iii) *institutional capacity for implementation* (operational, technical, and political) that includes also monitoring & evaluation capacity (see Fiches 16-23). These are qualitatively different capacities that are unevenly developed even within individual regions. The more developed regions tend to have a more balanced set of institutional capacities, while less

developed regions will most likely have more competence in implementation capacities compared to the other two capacities (Morgan and Radosevic, forthcoming).

Policy intelligence and digital infrastructure (evidence, monitoring, evaluation). Policy intelligence is necessary for the identification of relevant challenges and development trends. The increased complexity of the issues faced by the territories require using new indicators, methods and approaches[18]. Among these, foresight, scenario planning and analysis of alternative pathways can be particularly useful. The monitoring system should allow tracking of planned actions of all implicated parts of government and other stakeholders. Making information about plans readily available to the right people is by itself a powerful enabler of synergies, allowing innovation actions to be planned so they are complementary to the actions of other parts of government. E-government infrastructure will be invaluable for a whole series of applications, including for the ODP, for engaging with citizens, for rapid stakeholder consultations, for network building, and for information sharing and collaboration (see Fiches 30, 65, 66). Monitoring and evaluation (M+E), serves to provide evidence-based lessons to improve decision-making. In the PRI context, the M+E system should be seen as an integral part of policy design and implementation. It should be participative, involving stakeholders in an open discussion about the effects of policy choices, which can facilitate the acceptability of policies (see Fiches 31, 38). Territorial decision-makers, businesses, households should be engaged in the co-creation of policies and as a result be inspired, encouraged and steered to change their behaviour[19]. One of the key challenges of policymaking and neglected purposes of monitoring is to be able to adjust, adapt and correct instruments and initiative as they are being deployed. Given the heightened complexity, uncertainty and speed of change, policymaking needs to become more agile and reflexive 'in real time' (Morgan and Radosevic, forthcoming) and not just in designing new instruments but also in tweaking, reorienting and shutting down existing initiatives[20]. To achieve these ends, M+E needs to transition itself to a new framework requiring new tools and capabilities (see Box 5).

[18] For example, the JRC platform KnowSDGs offers a set of relevant tools supporting policy intelligence: https://knowsdgs.jrc.ec.europa.eu/ . An analytical methodology for the identification of innovation potential for SDGs was piloted in Matusiak and Fuster Martí (2021).

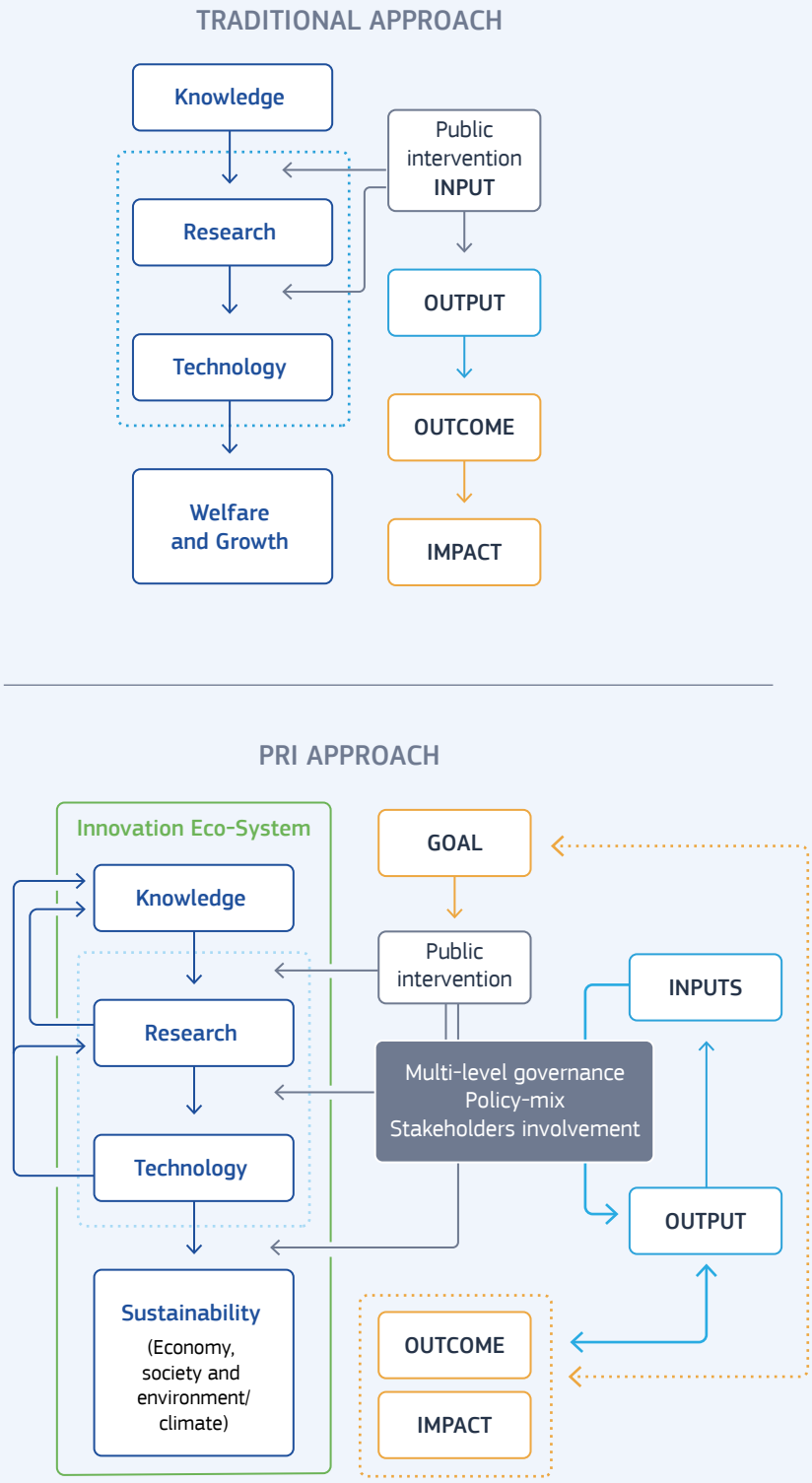
[19] These are the key features of so-called formative, participative, and integrated approaches to evaluation that are increasingly seen as relevant for transformative innovation policies (Molas-Gallart *et al.*, 2021).

[20] In this respect the concept of 'tentative governance' (Kuhlmann *et al.*, 2019) seems especially relevant.

Box 5. Monitoring and Evaluation: traditional versus PRI framework approaches.

PRI Monitoring and evaluation should follow a dynamic, interactive and flexible approach, rather than static and linear. It should follow a holistic and multi-level perspective, starting at the level of projects, moving to missions and then assessing changes in the whole territorial eco-system (For more details see Fiches 19, 20, 22 ["*Monitoring and evaluation in an impact-based policy", "What to monitor?"* and *"What and how to evaluate?"*]).

PRI Monitoring and evaluation also entails assessing the changes in the territorial eco-system concerning institutional capacity, and all stakeholders including citizens' behaviour. Therefore, it is also about the evaluation of the 'footprint' of policy along the value chain. For instance, policy evaluation should focus on the environmental sustainability of the new solutions along their life cycle, from production to end of life of a product. System-level innovation also entails changes in social behaviour and practices which will also have to be monitored and evaluated, challenging existing indicator frameworks.



Source: Own elaboration based on European Commission (2013), Shahab *et al.* (2019) and Molas-Gallart *et al.* (2021)

Resource mobilisation: Mobilising multiple funds has been rendered difficult in the past because each fund had its own rules and regulations and this was further constrained by project-level framing. PRI will be in a better position to mobilise multiple funds (a) because PRI can operate at a higher level of aggregation (e.g. groups or portfolios of projects and also other instruments that are not projects) and (b) because many of the funds have been simplified (e.g. a common provisions regulation has been established to govern eight EU funds whose delivery is shared with Member States and regions and together these funds account for a third of the EU budget). The design of the strategic framework should beware of being too closely associated to specific funds, and introduce mechanisms to include newly relevant funds over time according to the evolution of the goals and implementation pathways (see Box 6 and Fiches 45, 48-50, 60)[21].

[21] JRC and IIASA work on S3 for SDGs has identified a set of guiding questions for sustainability proofing of policy mix and SDG budgeting (Nakicenovic *et al*, 2021).

Box 6. Successful national experiences in Budgeting for the SDGs: an overview

Three countries already doing comprehensive SDG integration within their national budgets are Italy, Finland and Iceland. Instead of aligning all of the 17 SDGs to the budget, Finland and Iceland align government program objectives: in Finland this is, for example, a carbon neutral and resource-wise Finland. In Italy, the Presidency of the Council is in charge of coordinating the implementation of the SDGs (SDG Watch Europe, 2021), which are integrated into the public budget. The National Sustainable Development Strategy (NSDS) (approved in December 2017) defines broad guidelines for environmental, social and economic policies. It also draws upon an important role for institutions and civil society on the long road to implementing the 2030 Agenda in Italy, but dedicated commitment by line ministries and linkages with other plans are lacking. Budgeting in Italy has recently changed to become an integrated budget explicitly related to the SDGs (see below). Other interlinkages between strategies – such as the NSDS and the National Reform Programme – provide improved coordination (Mulholland and Berger, 2019) (extract from Nakicenovic *et al.*, 2021)[22]. In Iceland, there are over 180 goals relating to expenditures to which the SDGs could be linked. It appears that the linking of the SDGs to government objectives is helpful in gaining support in aligning the budget along the SDGs, as it would already have governmental support, especially if it helps the government reach said goals. Significant experiences in this domain are also found in Mexico and Norway.

More in detail:

- In Finland, during the preparation of the 2018 budget, the Ministry of Finance asked each ministry to include a short paragraph under each of the main titles in the budget proposal. In these paragraphs, ministries provided information on how sustainable development would be reflected in their sectoral policies during the 2018 financial year.
- In Norway, each ministry is responsible for one or more SDGs. As in Finland, each ministry writes a paragraph about their activities in relation to the goal(s) they are responsible for, both from the domestic and international points of view to demonstrate the link between their budget proposal and its contribution to achieving the SDGs. These draft paragraphs are sent to other ministries for review, before the Ministry of Finance compiles the texts and includes them in a chapter on SDG implementation, which is added to the main document of the budget proposal.
- In Sweden, ministries are encouraged to show the link between their area and the SDGs in budget documents in a descriptive way. In the document presenting the 2016 budget, the SDGs were mentioned around 100 times, and around 200 times in 2017 according to our interviews. The SDGs are handled differently by different ministries, some reference them more often than others.

– In 2016, the Mexican government, in collaboration with the UNDP, developed a methodology building on different public finance instruments, which allows the SDGs to be integrated into the planning, monitoring and evaluation phases of the budget. The methodology uses a results-based management approach, a participatory and team-based management approach to programme planning that focuses on performance and achieving results and impacts. All line ministries participated in identifying the comparability of their performance indicators with SDGs indicators (tier I and II). This enabled ministries to learn if the SDG indicators were already integrated into the performance evaluation system, and if any methodological adjustments were needed, or new indicators had to be added. In addition, the Mexican methodology breaks 102 of the 169 targets into "sub-targets", which helped refine the analysis. Different programs can contribute to a part of a target, but this also opens the possibility that programs may not cover all aspects of a target, thus leaving parts of a target unattended by any program or policy.

Source: Georghiou and Renda (forthcoming); Nakicenovic *et al.* (2021)

[22] https://op.europa.eu/en/publication-detail/-/publication/983a6915-42a3-11ec-89db-01aa75ed71a1/language-en

Governance of government: PRI call for a more holistic WoG approach to governance than previous place-based innovation policies and this involves both vertical and horizontal dimensions of governance (see Fiches 21-23, 47, 49, 60, 61). One of the greatest vertical governance imperatives is to strike a balance between *directionality and subsidiarity*: on the *directionality* front by offering a route map of the direction of travel, as the EU is currently doing with e.g. the European Green Deal and Cohesion Policy priorities; and, on the *subsidiarity* front, by offering a user-friendly menu of priority options from which national and subnational decision-makers select the priorities that are attuned to and resonate with their unique circumstances. Horizontal governance also needs to be substantially enhanced at each level of the multilevel polity because PRI calls for a more integrated policy repertoire. At national and subnational levels, governments have been experimenting with a series of new governance mechanisms to promote cross-government or WoG collaboration. These cross-cutting levels exhibit different degrees of horizontal integration, and research has established a rough rule of thumb, which suggests the more wide-ranging and intensive the mode of cross-cutting working, the greater its potential to disrupt existing systems and the greater the resources it will demand.

These enhanced links, horizontally and vertically between government agencies and with external stakeholders, implied in many cases a shift from governmental leadership to collaborative leadership, or from centralised to distributed leadership (e.g. the case of the Basque Country, documented by Aranguren et al, forthcoming). The process was catalysed by S3 implementation mechanisms and is likely to assume even more importance in PRI because the rules of the game – based on trust, transparency and inclusiveness – must retain the confidence of the regional stakeholders (Morgan and Radosevic, forthcoming).

Stakeholder engagement and co-creation. The strategic policy framework should foresee arrangements for stakeholder engagement and co-creation (more fully described in the ODP building block) which will build on and extend upon the S3 process (see Fiches 24-36). The vehicle for engagement and co-creation in S3 was the Entrepreneurial Discovery Process (EDP), which was largely confined - in practice - to the well-organised science and technology community. However, the vehicle for engagement and co-creation in PRI is the Open Discovery Process (ODP) which is more

challenging in the sense that it seeks to include a wider group of participants. PRI will be in a better position to address the challenge of including missing stakeholders by adopting a challenge-oriented approach, working backwards from goals to develop widely-backed agendas. This is more fully explained in the following section on the Open Discovery Process (ODP), which includes an early prototype of a configuration for its governance.

Policy mix development. A diverse and tailored policy mix will be needed to achieve the ambitious goals associated with PRI (see Fiches 37-39, 45-47). Although policy mix is one of the building blocks (and discussed more fully in the corresponding section of the Playbook) the necessary governance and administrative arrangements that can allow a diverse and tailored policy mix to happen need to be embedded in the strategic policy framework. For example, an agreement could be sought with relevant parts of government to open up their instruments to territorial needs. As explained in the section on the Policy and Action Mix, this needs to go beyond R&I projects. As a 'bird's eye view' of the system is missing, robust mechanisms for sharing information – both vertically and horizontally - within the multilevel polity and with local ecosystem stakeholders will be important (see Box 9 and Fiche 23).

Build-in the European dimension. The European dimension plays very important roles in the PRI process in three distinct ways. First, commonly agreed EU policies (like the EGD and Horizon Europe for example) set the strategic framework for place-based innovation partnerships at national and subnational levels, providing a coherent directionality logic to the PRI process. Second, as the ODP prototype below demonstrates, the European dimension provides funding instruments and regulatory mechanisms to ensure that the PRI is supported throughout the Union by common rules, regulations and resources and it has sought to forge greater synergies between EU funds. Third, the European Commission can facilitate the exchange of good practice between Member States and their regions by supporting cross-border networks of regional innovation stakeholders (e.g. through cross-border inter-regional networks) (see Fiches 27, 43) .

2.3.2 Open Discovery Process: Engagement and co-creation with stakeholders

The Open Discovery Process (ODP) is the central PRI mechanism for stakeholder engagement and co-creation. It is where new opportunities are co-discovered, where the agreement for their exploration begins and where joint plans for action are developed. The ODP builds on the positive experience of the Entrepreneurial Discovery Process (EDP) developed in the context of S3 to engage with stakeholders for strategic tasks, such as vision development, priority setting, project development, implementation and monitoring and evaluation (Box 7 below). In practice, this meant consulting and working together with stakeholders (e.g. in workshops) in policy tasks. As many practitioners acknowledge, the EDP represented a significant improvement in the quality of stakeholder engagement, despite the practical limitations in its implementation[23]. In fact, the EDP corresponded so well to the need to plan jointly with stakeholders, that arguably the main drawback of its implementation was that it was not more widely used.

[23] Many of the limitations were linked to the earlier policy framing of S3, a directionality focused on economic growth (and entrepreneurship), its close link to only part of Cohesion funding prevented it from initiating broader discussions about other types of investments and policy changes. Additionally, in practice the EDP was often not continuous, it did not include mechanisms that could trigger changes in the policy mix (it focused almost exclusively on publicly-funded R&I projects), it tended to be inwards looking missing opportunities for collaboration with other regions and with crucial players for transformative change (especially civil society, regulators, demand-shapers) (Prognos, 2021; Guzzo and Gianelle, 2021).

Box 7. The Entrepreneurial Discovery Process (EDP)

The term Entrepreneurial Discovery Process (or EDP) originally referred to the identification of areas for investment in research and innovation (i.e. priority areas), through an inclusive and evidence-based process grounded in stakeholders' engagement. An EDP was formally required by the European Commission, in order for regions to identify their S3 priority areas.

The stakeholders include the private, research and public sectors. Ideally non-governmental organisations (NGOs) and civil society should also be involved, yet this segment of society was in practice rarely included. Throughout the implementation of S3 an important shift emerged. The EDP evolved from being only an activity carried out during the S3 design phase, into a continuous one, which keeps going throughout S3 implementation.

Such continuous EDP implies that stakeholders are kept engaged in the refinement and review of priority areas, as well as in the identification of instruments that would implement them. The research and business sectors are expected to be involved, in particular, in various activities related to calls management (i.e. commenting on pre-calls, etc.) in order to develop appropriate instruments. Entrepreneurial Discovery exercises have generated positive learning curves making EU regions and member states readier to embrace more complex forms of stakeholder engagement. For more information on the process and the experience with it, see Marinelli and Perianez-Forte (2017) and Guzzo and Perianez Forte (2019).

The governance and steering of PRI can build on this solid base to further future transformations, inspired by the positive experience with the application of Shared Agendas during the EDP in Catalonia in particular (Fernandez and Romagosa, 2020) or with coalitions for societal challenges in Northern Netherlands. The ODP approach aims to consolidate the good practices that have emerged in the past few years, broadening the EDP to reach out to new segments of society. In turn, it seems essential to provide clear guidance and structure for the EDP, deploying capacity-building efforts for all stakeholders involved. Furthermore, it seems important to restructure the process around societal challenges and their possible solutions.

It is important to build on EDP experience and follow its successful philosophy. The ODP seeks to imbue the discovery process with a new sense of purpose to achieve sustainability objectives and to broaden engagement and co-creation considerably to include new sets of stakeholders. The deep transitions we are currently undergoing require careful planning (see Fiches 6, 9, 15, 30). However, the plan cannot be written in advance, and cannot be done by government alone. An open, inclusive and reflexive discovery process is necessary to address the two crucial problems of planning: "*its inability to control the inherent uncertainty of innovation and its inability to know or foresee the specific needs of economic agents*" (Erdos and Foray, forthcoming). An open and collective process, that understands the different roles and motivations of stakeholders (Box 8) has a greater chance of producing system-level innovations than individual innovators themselves, especially if it provides mechanisms for triggering regulatory change and for steering demand.

Box 8. Understanding the different roles and motivations of innovation stakeholders to participate in PRI

In a setting in which the public sector, the private sector, the civil society sector and the research community are all major constituencies, it is essential to identify and understand the key motivations and incentives which determine how and when they can all potentially play a positive role in achieving policy objectives (O'Connell 2021):

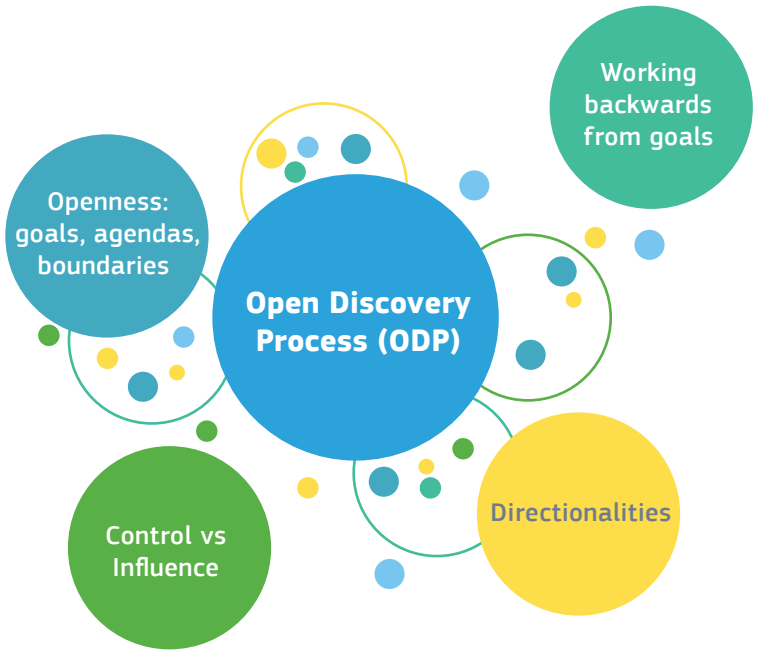
- *Public sector stakeholders* will tend to be most interested in, and to prioritise, issues around open government and processes of transparency and accountability in setting budgets and policy objectives. They will also emphasise the role of citizen engagement and participatory governance in determining priorities, shaping policies and setting budgets and monitoring progress towards intended outcomes.
- *Private sector stakeholders* will be most focussed on the business sector perspective, where it might contribute to and benefit from, influencing regional and local development plans and practice, along with the delivery mechanisms. This will involve identifying business needs-led funding regimes and shaping and managing key funding decisions, and also balancing different commercial and investment interests regarding land use planning and other types of public investments.
- *Civil society and third-sector* actors will tend to ensure that the voices and representations of all citizens, communities and communities of practice are heard, and especially for those groupings who are typically voiceless.
- *The research community* will tend to understand an individual's feelings and motivations for wishing to participate actively in policy and governance actions, developing and testing models for citizen engagement, and identifying from evidence and experimentation what works and what does not appear to work and why, and ensuring that different interests are balanced (O'Connell 2021).

Source: McCann (2022)

The key features of an ODP include: openness, directionalities focused on long-term societal wellbeing, working backwards from goals, and a distinction between control and influence (Figure 7). In a nutshell the ODP encompasses the mechanisms that allow the purposeful search, through broad interaction and collective deliberation, for solutions to economic and societal problems. In practical terms, these mechanisms include the ways the discovery process has been implemented in S3 (e.g. with meetings/workshops of stakeholders working on strategic tasks, including towards R&I projects) and also, *in addition*, the introduction of new challenge-oriented partnerships with variable sets of stakeholders, according to the goal. There are good reasons to believe that **challenge-oriented partnerships** can provide the right combination of bottom up knowledge and actions with top-down changes in regulation and shifts in the policy mix that permit transformative, system-level innovation to happen[24].

[24] By way of example, one practical way to arrive at a correct composition of stakeholders could operate at three levels: (i) Selection of key stakeholders during the phase of identification, localisation and prioritisation of sustainability challenges; (ii) Further identification of players and communities relevant to discuss the identified challenges (iii) Mobilisation of implementation partners.

Figure 7. Key features of an Open Discovery Process (ODP).



Openness, a key principle of Responsible Research and Innovation (see the accompanying PRI Concepts and Rationales document), is a central feature of the ODP. First of all, the goals of the process are truly open, in that they could be economic, societal, or environmental, and stakeholders would ideally discover integrated (or at least non-conflicting) ways to advance towards all three. Openness in the direction of the search can ensure that the ODP avoids 'closure' and lock-in. Second, the ODP is open about the framings of innovation, recognising that there cannot be a pre-existing framing that fits all goals. This means that e.g. the quadruple helix framing of collaboration may or may not be suitable and will have to be carefully considered according to the goal (e.g. universities may in fact have no real role to play for some goals whereas much more finely circumscribed user communities have a central role). Third, the ODP should introduce incentives for stakeholders to *open up (part of) their agendas relevant* to the goal, beginning with the relevant levels and departments of government (see Fiche 28). Promoting greater openness and transparency will be key to gaining a shared understanding of challenges and, as an added bonus, will facilitate coordination. Last but not least, the ODP is also open to stakeholders outside the territory, which should be easier to do as partnerships operate at a higher level of aggregation than projects (see Fiche 27). Their design can consider the many interregional and European mechanisms for fostering inter-territorial collaboration (including via new digital tools, see Fiche 32, "*Digital tools for the Open Discovery Process*").

Directionalities: When dealing with uncertain science and technology identifying the goals in advance can be difficult, so in practice the traditional ways of setting priorities for R&I funds will continue to be relevant. However the priorities of R&I funds need to be seen as just part of overall territorial priorities for transformation. These should be inspired by directionalities focused on long-term societal wellbeing for local communities, which have the additional advantage of allowing unlikely sets of stakeholders to work together, including those who do not perform systematic R&I activities. To have any chance of energising action from citizens and other users of innovation, directionalities will have to be at least shaped by them so they will have

to be implicated at all possible stages. The discovery of desirable directionalities is a difficult and therefore scarce activity. It is likely to result in unique value creation, especially since it would interact with the territory's unique resource endowments, socio-cultural and institutional context. The discovery of desirable directionalities for the territory is practically useful in identifying priorities for the public funds but also in translating opportunities and challenges into concrete goals to strive for. It is not an instantaneous event, but a long-term, continuous process that deploys various methods of engagement with stakeholders (see fiches 3, 29, 30, 31, 32, 34, 36, 37) and of probing the system for valuable knowledge (4, 8, 9, 15, 16, 17, 18).

Working backwards from goals: Challenge-oriented PRI also involve *working backwards from goals*, with variable sets of stakeholders, according to the goal. The goal could be about environmental sustainability (e.g. being carbon neutral / carbon negative), or about quality employment (e.g. no new disadvantaged groups, reduce disadvantage gaps), prosperity (e.g. competitive advantages, co-benefits / multiple-value creation). For challenge-oriented partnerships to emerge, it would be important to begin with the goals and adopt a user-centred perspective (the user may be an entrepreneur, or a student, patient, commuter, worker) (see Fiches 7, 11-13, 26, 30, 31, 33-36). The ODP could also consider alternative scenarios for arriving the goals. Considering alternative futures can make plans more resilient[25].

Control and influence: Policy-makers and other stakeholders responsible for orchestrating the discovery process should make a distinction between the parts of the system they *control*, and the parts of the system they can *influence*. Focusing much more on the latter question – *who/what can be influenced?* - should progressively broaden the frame of innovation to encompass up to now missing, yet crucial players for bringing about change within the wider socio-technical system, and in other levels of governance. It will be important to take a strategic approach in the formation and composition of the partnerships that allow them to grow over time. Partnerships are both an outcome and an input into a dynamic discovery process.

According to ESPON (2021) the European Green Deal will require models of territorial development that bring together stakeholders across governance levels. In this context generating local-national and national-local feedback loops of knowledge, resources and cooperation seems increasingly important (McCann, forthcoming). Finding suitable governance solutions to the need for intensified coordination across levels of governance, across policy areas and with broader sets of stakeholders is at the heart of the development of PRI. An early prototype of a possible ODP governance configuration (CHallenge-Oriented Innovation paRtnerships, CHOIRs), to be adapted, fine-tuned and co-developed over the course of the pilot, is described in Box 9 below.

[25] For example, in the STI for SDGs roadmaps guidebook, there is a dedicated activity to co-create and explore alternative transition pathways (United Nations Inter-Agency Task Team, S.T.A.I.F.S. and European Commission, J.R.C., 2021).

Box 9. Challenge-oriented innovation partnerships (CHOIRs): An early prototype.

A core objective of the ODP will be the establishment of CHallenge-Oriented Innovation paRtnerships (CHOIRs): These could be multi-stakeholder and, as far as the government is concerned, multi-portfolio, multi-level partnerships linked to concrete territorial challenges. Their modus operandi could be inspired by challenge-oriented (Fiche 7, "*Challenged-oriented innovation policy*") or mission-oriented innovation policies, although unlike some missions, partnerships would place a greater emphasis on *agreement, co-creation* and *co-ownership*. A desirable feature of these partnerships is that they could be additional to existing operational arrangements (e.g. with regards to S3 priorities and projects) yet unite under the umbrella of common goals, currently disparate policy actions and funds, enabling complementarities between them and improving the likelihood of more needs-tailored, more timely solutions.

Innovation partnerships would define challenges in terms of collectively determined and broadly understood goals. These partnerships would offer deliberation spaces, where each stakeholder contributes to the definition of the goal and makes contributions to its achievement. The combination of shared understanding of goals and autonomy about their implementation allow broad stakeholder coalitions to explore multiple pathways, maximising the chances that the envisaged goal will be met. As shown in Figure 8, **key elements in each innovation partnership would include**:

1. *Goal(s)*: Agreeing on common goals is a key first step, and arguably the hardest. Groups of consumers or users (concerned citizens or more finely defined groups of challenge-owners such as commuters, patients, students, households) can play a key role in goal definition, in identifying other potential stakeholders (companies and knowledge producers) and/or champions of locally suitable solutions (e.g. SMEs, citizen scientists, tinkerers or prosumers). To ensure alignment with European goals, territorial goals will have to be seen through the lens and ambitions of the twin green and digital transition (in practice goals that contribute to European goals could get preferential access to EU funds, even if the contribution is local). The European dimension is strengthened through partnership hubs (described below).

2. *Partners*: The partners would be partly a function of the goal and vice versa. The relevant parts of government, and particular configurations of public and private stakeholders, will vary according to the goal. Yet someone must make the first move in proposing a goal that can then be focused and refined through collective deliberation. The first move could be made either by some of the stakeholders themselves or by the local or regional government, assuming it has good knowledge of broadly shared challenges.

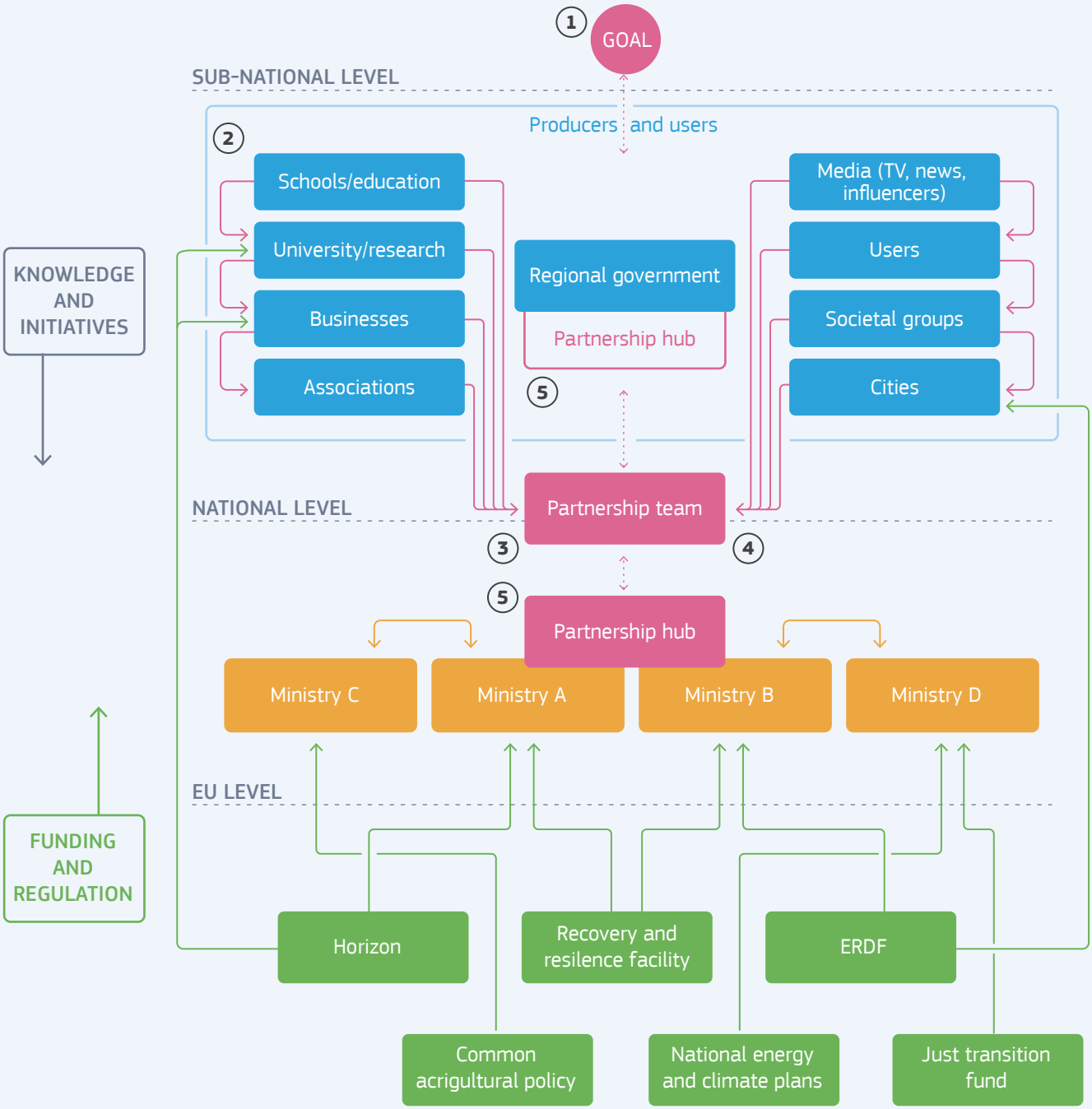
3. *Partnership teams*: This could be an executive body consisting of stakeholders who keep their regular jobs and devote only part of their time to the partnership teams (similar to the Top Teams in the Dutch Top Sector industrial policy). The teams would engage with representatives of variable sets of stakeholders, according to the goal, aspiring to work under a whole-of-society (rather than simply whole-of-government approach). The teams' tasks could include: co-define the goals, grow and strengthen the coalition, develop projects and seek funding, identify additional stakeholder actions beyond commitments in the context of publicly funded projects, develop open agendas, with commitments from all relevant stakeholders, and make evidence-based proposals to government(s) for changes in the policy mix.

4. *Open agendas*: Following several rounds of deliberation members of the partnership team co-develop an open, dynamically adjusted agenda for the territory describing their desired pathway for achieving the goal. In return for public support, stakeholders open up their individual agendas in relation to the goal, which can permit synergies in the policy mix and sequencing of actions in the collective agenda. In return for public support, stakeholders commit to additional actions

(beyond their commitments to publicly funded projects) including co-investment, co-production and changes in technology use and consumption patterns (e.g. support for community enterprises, urban mines, signing up to schemes that promote public transport, civil society organisations that promote re-use, recycling, repair, urban composting, tree planting etc.).

5. *Partnership hubs*: Hubs are meant to provide the needed interfaces with various parts of government that can help accomplish the goals. They could be adjacent to or embedded in government with a task to coordinate activity across government both horizontally and vertically . A key difference with partnership teams (described above) is that the former include all stakeholders, whereas hubs comprise only of public officials from various parts of government, a small core of which are fully dedicated to the hub activities. There could be at least one hub in each level of governance dealing with issues that closely match the competences of that level. Hubs of this kind would primarily perform information aggregation and sharing/relaying tasks although their exact role would likely vary considerably across member states with different administrative traditions. Their success would depend on the simultaneous adoption of appropriate rules for engaging with the information that the hubs provide. Inspiration for their governance can be found in inter-ministerial committees, taskforces and other kinds of intermediary structures (see Kivimaa et al, 2019 for a typology and examples) that can enable a whole of government approach. One direction for the development of these hubs could be focused on the use of appropriate digital tools to lower the transaction/coordination costs, aggregating information about different missions (including EU missions) and relaying them to those who need to know (e.g. partnership teams linked to specific goals).

Figure 8. CHallenge-Oriented Innovation paRtnerships (CHOIRs)



N.B:: this is just one possible configuration meant to illustrate a general idea that covers many possible cases, but it is not exhaustive, not an ideal-type, not accurate with respect to funds/flows, not fully applicable to all member states without adjustment etc.)

To properly tailor this early sketch of a prototype to the very different realities faced across Europe, it would be important to, as part of the pilot, define at least some of the following:

- Rules of engagement, what is desirable behaviour;
- Set up adjusted to cultural context (e.g. degrees of trust and pre-existing stakeholder frameworks);
- Legal position of the partnership, adapted to the institutional realities of each territory.

In principle a CHOIR may be initiated at any level of governance be it local, regional, national or by groups of decision-makers across national borders. It is the level of granularity of the goal that will in many respects determine their nature and scope. Indeed mission- or challenge-oriented innovation policy is gaining in popularity and there are now many examples at local, regional and national levels (see e.g. OECD, 2021a; Hill, 2022). Many of the features of the ODP can already be observed in real-world examples (Box 10). During the experimentation stage of the PRI Pilot, and especially in regions and countries with lower institutional capacity, a staged approach to CHOIRs development may make sense. For example, they can begin by focusing on smaller niche CHOIRS, developed around established discovery processes, extending them in the direction of ODP and facilitating place-based experimentation (including local sandboxes). Such niche CHOIRS may eventually scale up to become more ambitious at which point they could connect many regional and local initiatives, cut across more policy areas and assume more comprehensive vertical and horizontal coordination tasks.

Box 10. The Open Discovery Process – Some real-world examples.

Many practitioners around Europe and the world have introduced mission-oriented innovation policies that work backwards from agreed goals with broad swathes of stakeholders. For reviews of good practices and guidance in implementation see OECD (2021), Palavicino *et al.* (2021) and Hill (2022). The following selection of real-world examples demonstrate key features of the ODP at work but are not exhaustive and many more examples can be found in the aforementioned reports. Their experience can be a useful point of departure in the adaptation of the ODP to different kinds of European realities.

Key feature of ODP	Relevant example
Working backwards from goals with many parts of government a nd stakeholders to deliver solutions within defined timeframes	*Pilot-E in Norway*: Pilot-E is a cross-agency scheme aiming to develop climate emission free and energy saving solutions. It was jointly launched in 2016 by three Norwegian agencies: the Research Council of Norway, Innovation Norway and Enova. Pilot-E aims to result in very concrete results, i.e. the deployment of new full-scale solutions in energy and transportation, such as for instance various types of electric ships, but the calls for proposal include no indication of any preferred technological options (OECD, 2021a, p. 27)
Open agendas	*Shared Agendas in Catalonia*: In Catalonia a participatory model of governance coordinates the collective action of various stakeholders to address a common challenge (usually related to SDGs) in a given territory. Shared Agendas are collectively agreed plans for territorial transformation in which broad coalitions of affected stakeholders commit to specific actions. RRI is the main driver for generating new jobs and business opportunities and for advancing towards more sustainable and inclusive pathways. Experimentation is central to their development (Fernandez and Romagosa, 2020).

Additional actions beyond publicly funded projects	*Mission-oriented Topsector and Innovation Policy* in the Netherlands: An initiative of the Ministry of Economic Affairs and Climate Policy (EZK) with the involvement from several thematic ministries. Originally focused on the transformation of thematic sectors, but since 2019 geared towards developing and diffusing innovations contributing to societal mission goals. Each Topsector consists of a Topteam of high-level representatives from science, industry and policy. Additionally, the Topsectors have one or more 'Topconsortia for Knowledge and Innovation' (TKI). Together, the Topteam and TKI are responsible for creating and implementing the Knowledge and Innovation Agendas (KIAs) in which stakeholders active in the respective Topsector domains articulate their visions on the directions in which they want to develop. Other ministries have devoted some of their own budgets to activities or instruments coordinated (programmed, not executed) by the Topsectors. This concerns for instance EZK for energy innovation, the ministry of the Interior for (spurring) innovative solutions contributing to the goal of disconnecting houses from the natural gas grid and the ministry of Infrastructure and Water management for the development and especially uptake of innovations in the field of logistics. Apart from also programming a substantial amount of earmarked funding from the National Science Foundation (NWO), the Topsectors have mobilised many other – often domain-specific – funding streams and policy initiatives in order to execute the plans laid out in the KIAs. (Janssen, 2020).
Stakeholders make proposals to government for changes to the policy mix	*Mission-oriented Topsector and Innovation Policy in the Netherlands*: Although important decisions are mostly taken by the Topteam members, the TKI have a staff of multiple people (usually also active still in their main jobs), which leaves them the capacity to engage with stakeholders and coordinate the writing of the KIAs. Moreover, they also organize networking activities and other supporting initiatives to help stakeholders in their domain develop and apply innovations. Taking a rather systemic perspective on innovation, the Topsectors make proposals to government for changes in the policy mix, e.g. in supporting human capital development (e.g. by regularly updating Human Capital Agendas reflecting skill demands), export activities, and reconsideration of regulatory barriers. Importantly, the experimental way of engaging in 'modern' industrial policy involves relatively little dedicated funding. While financially the bulk of innovation support in the Netherlands is still allocated through fiscal schemes like the WBSO and the Innovatiebox (Patent Box), the Topsectors mostly operate by influencing the scope of other policy instruments (Janssen, 2020).

At the level of the EU, mission-oriented innovation policy has been recently introduced in the new Horizon Europe programme (European Commission, 2021), which also holds much potential for engaging citizens and other stakeholders that are essential but do not perform R&I themselves. While possible governance solutions (such as partnership hubs envisaged in the proposed CHOIR configuration) may allow for the cross-fertilisation of missions with federated goals, the principle of subsidiarity suggests that EU missions and CHOIR under PRI could also operate independently[26]. It is important to recognise that the supranational setting of Horizon missions is considerably different to the national and subnational context, as it is based on different assumptions, rationales, imply different scale of action and have a different basis for their legitimacy (Table 2). It is for example conceivable that PRIs could be established not just by local or regional governments, but by groups of regions, including ones that cross national borders, in which case they might be of a different nature and imply different approaches.

[26] Of course a PRI could be used to foster the implementation of EU missions too.

Table 2. Challenge-oriented innovation policy following the principle of subsidiarity

Key feature of ODP	Relevant example	Supranational
Assumption	Challenges specific to local circumstances	Challenges affecting all regions in similar ways
Rationales	Finding ways to tackle contextual problems Improving democratic decision-making Increasing variety Achieving multi-player coordination	Avoiding free-rider problem Avoiding duplication Sharing risks Benefitting from scale economies
Scale	Small-scale and contextual solutions	Large-scale solutions requiring big investments
Legitimacy	Contested problem requiring responsiveness to citizens and multistakeholder participation in formulating needs and solutions	Uncontested problem with clear problem definition, often associated with need for scientific advancement, technology innovation and technology diffusion

Source: Wanzenbock and Frenken (2020, p. 55)

The Long-Term Vision for the EU's Rural Areas, set out by the European Commission in 2021, includes a dedicated flagship action to increase stakeholder and citizen engagement in research and innovation activities as a way of addressing challenges and seizing opportunities for well-being in rural areas (European Commission, 2021). The interaction between different groups is supported by the annual European Start-up Village Forum. The Forum intends to promote knowledge exchange and cooperation activities and to work as an open space where institutions and stakeholders can meet, discuss and shape action for start-up-driven innovation in rural areas. The Forum represents another interesting setting where PRIs could be established, with a focus on start-up creation, innovation ecosystems and environmental and digital transitions in rural areas (Box 11).

Box 11. The European Start-up Village Forum

In 2021, the European Commission set out a **Long-term Vision for the EU's Rural Areas.** The vision identifies several areas of action towards **stronger, connected, resilient** and **prosperous** rural areas by 2040. The vision recognises the role of innovation to help tackle challenges and reap opportunities for wellbeing and growth in rural areas and includes a specific flagship action on research and innovation for rural communities. The **European Start-up Village Forum** is part of this flagship action.

The Start-up Village Forum was launched at a live broadcast virtual event on 16 November 2021.

The Forum will work to:

- Support the further **development of rural innovation ecosystems.**
- Identify and analyse **triggering factors for innovation and startup creation** in rural areas.
- **Raise awareness** among rural entrepreneurs of the opportunities they can benefit from.
- **Connect rural innovation groups** across the EU, with a focus on startups.

To pave the way for the future design and delivery of the Forum, the JRC will work on shaping a common understanding of the Startup Village concept. Work will include exploring how the Startup Village Forum can develop as a linking device to **work together with existing initiatives**, including: smart villages, the European Innovation Partnership on Agriculture Productivity and Sustainability (EIP-AGRI), thematic smart specialisation partnerships, the European Network for Rural Development (ENRD) and the European Innovation Council.

The objective is to ensure that the **existing knowledge and evidence** is circulated and used **for better policies** at all levels (EU, national, regional and local), as well as to **anticipate relevant emerging issues** which might need specific policy response.

Furthermore, the Forum aims to collect the commitment of public and especially private organisations to support Start-up Villages. To achieve this goal, a **call for pledges** has been launched. This call is open for pledges that can offer financial but also in-kind support, such as provision of co-working spaces, IT infrastructure or expertise, coaching, mentoring or training, aiming at creating startups and job opportunities.

The Forum will be supported by the JRC through science-based analysis and knowledge exchange, linked to the forthcoming setting up of the **Rural Observatory**, which will be managed by the JRC in coordination with DG REGIO and DG AGRI.

The main aim of the **Rural Observatory** is to improve data collection and analysis on rural areas to better understand the rural dimension of economic, social and demographic conditions and act upon them. The Observatory will be tasked with:

- Centralising and analysing data, ensuring a bridge between data sources through a rural data portal.
- Informing on relevant EU initiatives for rural areas.
- Analysing the achievements of the EU Rural Action Plan.

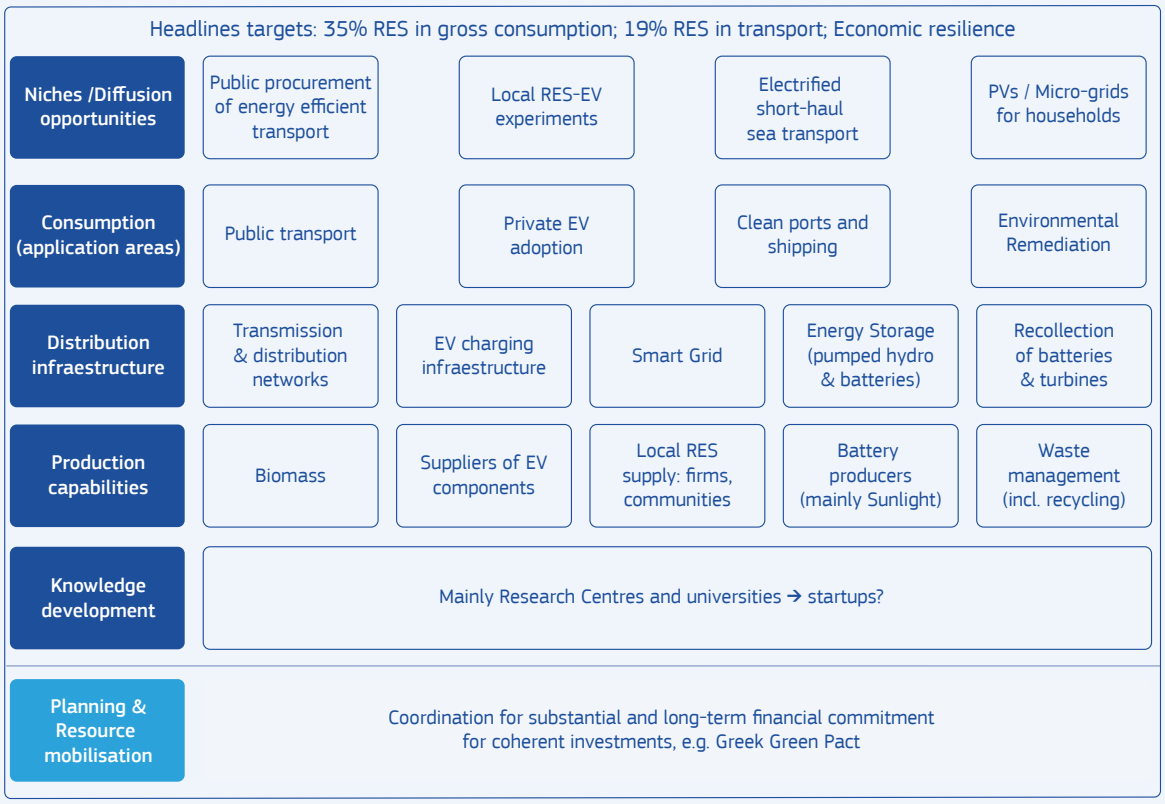
Source: European Commission (2021: pp. 24-25)

As a lot of the goals can be contested, evidence on the magnitude of different challenges, and of the opportunities, can be a useful point of departure for the ODP. Policy reviews of the domains affected by the transition can provide evidence, including evidence obtained through consultation with stakeholders, that is otherwise unavailable. For example POINT reviews (see Fiche 8 about the methodology) can reveal directions that enjoy broad stakeholder support and also inform the stakeholder composition of initial ODP workshops.

As POINT reviews frame the issues at the level of the socio-technical system, they can be a useful input for developing priorities and ambitions that combine economic considerations with socio-cultural values. These can then be further refined and validated in more intense deliberations under the ODP (e.g. leading to one or more CHOIRs). Box 12 presents some key findings and recommendation of the POINT Review of Greece.

Box 12. POINT Review of Greece

The POINT review of industrial transition of Greece was carried out by the JRC in partnership with the Greek Ministry of Development and Investments and in consultation with several dozens of stakeholders including regions, cities, the business and research community as well as communities of users. The review aimed to identify policy pathways that maximise *opportunities for industrial development and quality employment*, as Greece transitions towards renewable sources of energy and energy storage with transversal applications in mobility, agriculture, shipping and defence. Following the POINT methodology of the JRC, which places producers and consumers at the heart of the innovation system, the review engaged with stakeholders, collected extensive evidence, and assessed opportunities in many sectors at the interface of battery development, recycling, sustainable land and sea transport.



Source: Janssen *et al.* (2021a)

Among others, the review identified the following possible actions to catalyse a successful transition:

- Governance: In view of the coordination challenge for national, regional and municipal policies, the narrow window of opportunity and a groundswell of support by stakeholders, a suitable governance response may include a national mission ("a Greek Green Deal for Sustainable Industry and Quality Employment") coupled with regional or local "shared agendas" for transformation.
- Support for vocational skills with active participation in EU Centres of Vocational Excellence and innovation actions focussed on knowledge transfer, Public Private Partnerships and Public Procurement for Innovation, including forging stronger links between support for investment and the design of demand-side policies in energy and transport (such as energy and electric vehicle subsidies).
- Market creation measures such as new legislation and enforcement, land use regulation (and regulatory experimentation in 'sandboxes'), support to infrastructure (grid and charging points) and demand management (smart meters, city-level standards, recycling, etc.).

Orientation and planning	Human and financial resource mobilisation	Production of knowledge, goods and services	Consumption and use
• Extend joint ministerial committe and 'Green pact' for electric mobility; e.g., via the use of working groups also addressing skills, businesses, regions • Consider interregional learning via e.g., scalable demonstrator experiments • Enhance industry involvement, via roadmaps and consultation 'fora'	• Reverse brain drain via support for development paths targeting local challenges • Certify and accredit the offer of vocational training • Establish thematic vocational training centres (cf. CoVES) • Use EU funding schemes linked to the European Green Deal investment Plan (EGDIP) • Intensify PCP and PPI • Develop rating tools and a digital one stop shop for investments	• Target FDI at industialisation related to RES technologies and digitalisation • Forge links between energy and transport sectors/systems • Upgrade public investments that create demand and attract businesses and FDI • Enforce active environmental regulations • Create regulatory sandboxes • Support KTOs and incubators	• Enable prosumers and reform the local energy community law to avoid excesses • Support energy citizenship and links RES production to different application domains (e.G., private EV, electric boats) • Exploit niches with special demands, like EV on islands • Expand RES-based public transport (like buses), e.g., via municipality-owned development companies

Source: Janssen *et al.* (2021a)

2.3.3 Policy and Action Mix: Orchestrating actions under a coherent directional logic

Identification of a robust, but flexible Policy and Action Mix is the third PRI building block. The PRI have innovation policy at their core, but they are much more than a new approach for place-based R&I policies. PRI embraces *system-level* innovation, thus calling for a strategic use of industrial, employment, education and social policy instruments, as required by each challenge, which have so far operated in isolation. Coordinated policy actions in these fields are crucial for transformation that results in co-benefits for the economy and society.

PRI must mobilise a wide range of policy instruments within each relevant policy area (see Fiches 37-62), but the specific choice of tools, measures and investments cannot be determined ex-ante, it must be based on a sound diagnostic of development needs and then co-created with stakeholders through the Open Discovery Process described above. Box 13 presents a non-exhaustive list of additional policy areas beyond R&I that can be mobilised and aligned within the PRI.

In practice, the core focus could initially be mainly on R&I policy and on its interfaces with other policy areas. Over time, it will be important for the scope of policy portfolio to progressively expand to engage more fully with and influence other policy areas and their instruments, as required by each territorial challenge (e.g. PRI policies start from R&I policy, then engage with relevant policy areas in joint experiments, then get mainstreamed).

Box 13. PRI policy areas beyond innovation.

- **Energy policy,** including energy efficiency, renewable energies, energy infrastructures, climate adaptation measures, energy interconnections, etc.
- **Environmental policy and resource management**, including water and waste management and other resources, circular economy, pollution prevention and control and the protection and restoration of biodiversity and ecosystems, reforms to promote environmental policy and resource management, etc.
- **Transport policy**, including for example investment in sustainable transport, modal shift, and accessibility or demand-side measures.
- **Digitalisation**, which can include infrastructure in the telecom sector, cross¬border interconnectivity, accessibility, digital capacities and deployment of advanced technologies, digitalisation of businesses and SMEs, e-commerce and digitalisation of public administration.
- **Business environment**, with measures to support SMEs, reduce the regulatory burden, but also to support access to finance and growth financing, access to venture and grow capital, development of equity markets, promotion of alternative sources of finance, sustainable finance and financial literacy.
- **Employment and labour market policies**, such as employment legislation, undeclared work, active labour market policies, incentives to work and to increase labour market participation, non-discrimination and equal opportunities, active ageing.

- **Social policies to support transitions**, tackle poverty and social exclusion risks and inequality, including child benefits and family support, in-work benefits, active inclusion, minimum income schemes, access to social protection, income replacement, access to quality social services, etc.
- **Education and skills policies**, aimed to improve educational outcomes, improve and invest in the performance, capacity and labour market relevance of education, measures to foster green and digital education and teach digital competences, inclusiveness of the education system, upskilling/reskilling vulnerable people, addressing skills shortages and skills mismatches, continuous adult learning, etc.
- **Tax policies**, such us on progressivity/ or improving the inequality reducing impact of taxation, green/environmental taxes, eliminating environmentally harmful subsidies.
- **Public administration reforms**, to enhance the capacity and performance of regional and local administration, or improving the collaboration between different layers of government, as well as to enhance the administrative capacities at different levels in view of the twin green and digital transition.

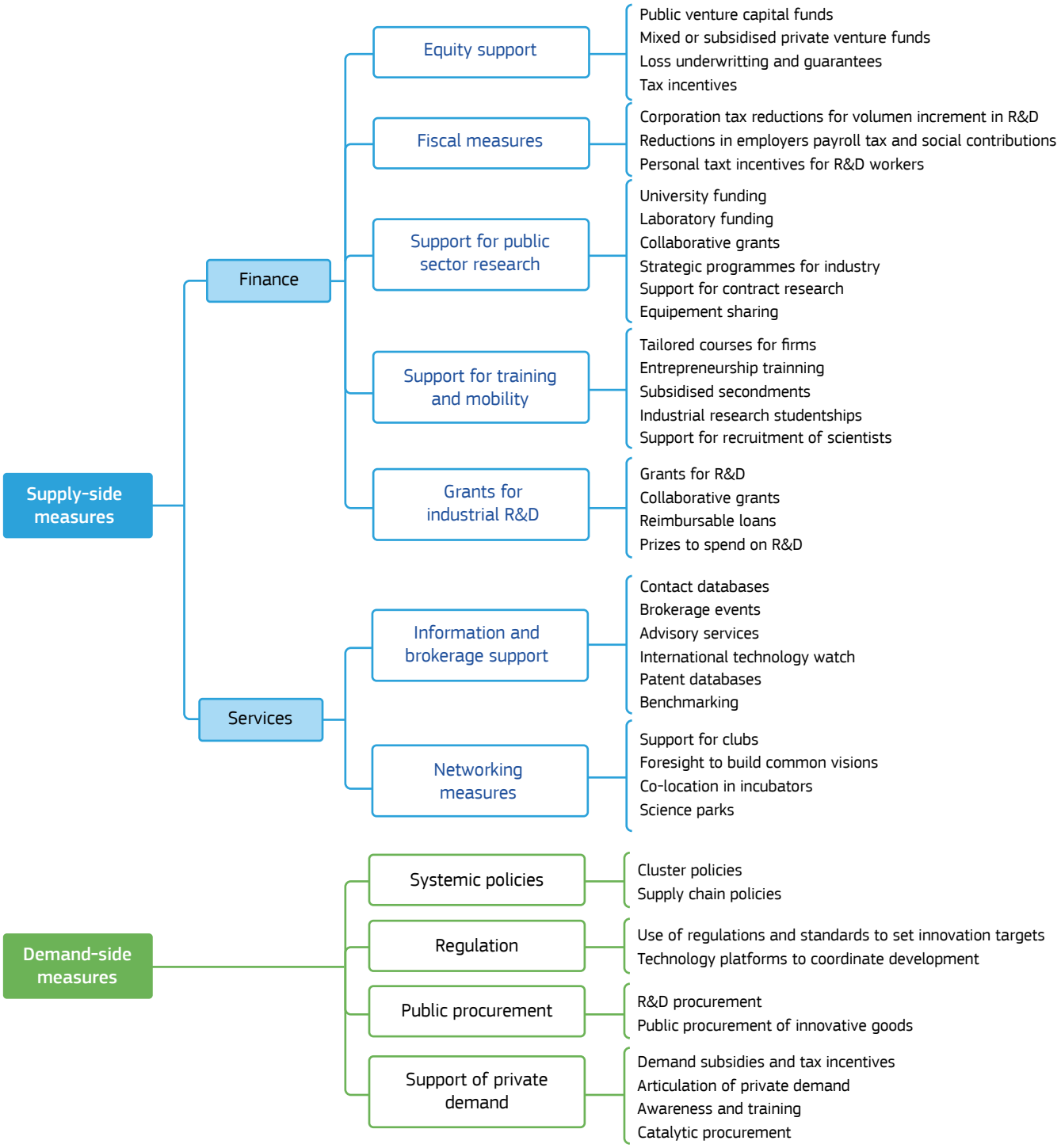
Throughout Europe there are plenty of inspirational examples of clear and well-directed strategies mobilising a wide range of policy instruments that are relevant to PRI. Member States' Recovery and Resilience Plans already embrace to some extent the logic of transformative innovation policy and strong directionality, and are a good basis for the further development of PRI. For example, the Italian RRP is expected to have a strong transformative impact, as reforms address bottlenecks to sustainable growth, while investments are targeted to fostering the green and digital transitions as well as addressing social and territorial divides. In Spain, the RRP supports the digital transition with investments in the digitalisation of the public administration, in digital skills and digital inclusion, in cyber security and in connectivity, and this is done through the mobilisation of both investments and reforms in a well-coordinated manner. Finland's RRP raised the level of climate ambition considerably, which influenced the composition of suggested actions and introduced several reforms addressing the green transition.

In the context of PRI, three particular features appear as key: (i) policy mix development as a response to opportunities and challenges identified during the Open Discovery Process (ii) readiness to identify and deploy the right tool for the job, considering where possible both supply- and demand-side instruments (iii) the alignment and coordination.

Figure 9. Key features of a Policy and Action Mix for PRI.

A mix of policies tailored to the territorial challenges: The systemic change fostered by PRI cannot be achieved solely through supply-side innovation policies aimed at remedying deficits in finance and/or capabilities of firms. Achieving the necessary directionality is also dependent upon market-shaping and market-creating policies on the demand side, for example through the use of procurement and regulation to drive innovation. Edler and Georghiou (2007) propose a taxonomy of supply-side and demand-side measures that can serve as inspiration to structure PRI-relevant measures as part of a broader strategic framework (Figure 10). The choice of policy instruments does not need to be based so much on a large variety of instruments, but rather on their capacity to fulfil the needs of the transition.

Figure 10. A taxonomy of supply- and demand side policy measures.



Source: Edler and Georghiou (2007)

On the *demand side*, PRI underlines the importance of regulation as a tool for innovation (such as experimentation in 'regulatory sandboxes' – Fiche 51 -, public procurement for innovation and the strategic use of more stringent regulatory standards for innovation). A concerted use of other demand-side policies (such as the creation of lead markets, the creation of innovation spaces during large physical investments, support for innovation for affordability - see fiche 52) is also a key feature of the PRI approach (see Georghiou and Renda, forthcoming).

On the *supply side*, tools that mobilise multiple sources of funding for the same goal are absolutely crucial, especially in the current juncture, where a multiplicity of often disconnected funding sources at EU level need to be brought together under a single umbrella. Box 14 outlines Portugal's recent positive experience with the coordination and mobilisation of different funding sources that can serve as inspiration for the development of PRI.

In addition to demand- and supply-side policy instruments, it would be important to consider *tools that destabilise existing unsustainable systems*, e.g. via structural reforms in legislation, stopping unsustainable subsidies and tax exemptions and expanding the network of policy actors to new niches (Kivimaa and Kern, 2016).

Box 14. Mobilising multiple funding sources towards a common goal: the case of Portugal

In **Portugal**, in addition to other financing instruments, in particular the Partnership Agreement 2021-2027, the Recovery and Resilience Plan (RRP) is aligned with the vision and objectives of the Portugal 2030 Strategy and contributes to promoting the implementation of its thematic agendas.

The exercise illustrated in the Table below reflects the overall coherence and complementarities between the RRP and the Partnership Agreement 2021-2027, the programming of which is taking place in parallel.

Portuguese RRP complementarities with MFF 2021-2927 and other European funding source.

	MFF 2021-2027					Other European Funds										
Comp#	PO1	PO2	PO3	PO4	EMFF	InvestEU	CEF	JTF	Horizon Europe	Digital Europe	SMP	Erasmus	Health	AMIF	LIFE	CAP
C01				X									X			
C02														X		
C03				X										X		
C04	X			X						X						
C05	X					X			X							
C06				X				X								X
C07	X		X			X	X					X				
C08		X													X	X
C09		X													X	X
C10		X			X	X			X	X					X	
C11		X				X		X								
C12		X							X							
C13		X				X										
C14		X				X										
C15		X	X			X										
C16	X					X				X	X					
C17											X					
C18																
C19	X									X						
C20				X												

Legend: Comp# = Number of the component in the Plan; MFF= EU's multiannual financial framework 2021-2027; PO1= Policy Objective 1 - A Smarter Europe; PO2 = Policy Objective 2 - A greener, low carbon Europe; PO3 = Policy Objective 3 -A more connected Europe =; PO4 = Policy Objective 4 - A more social Europe; EMFF = European Maritime and Fisheries Fund ; SMP = Single Market Programme; Health = EU4Health programme; AMIF = Asylum, Migration and Integration Fund, LIFE = Funding instrument for the environment and climate action; CAP Common agricultural policy funds

Source: Marques Santos (2021:20)

The mobilisation of resources from various financing instruments in a complementary approach enables their effects to be leveraged and, in the programming and implementation of the RRP, the mechanisms are laid down to ensure that there are no competing or overlapping interventions, mitigating the risk of double funding.

The preparation and programming of the RRP was therefore carried out taking into account the potential complement of other funding instruments. Within this framework, the funds entered in the Multiannual Financial Framework 2021-2027, with a particular focus on the Cohesion Policy Funds, in the framework of the Partnership Agreement 2021-27; the remaining Next Generation EU initiatives, including REACT-EU and the reinforcement of the European Solidarity Fund (EUSF); other centralised European funding instruments and programmes (e.g. Horizon Europe, Connecting Europe Facility, InvestEU and ERASMUS); as well as annual national budget years and structuring private investments.

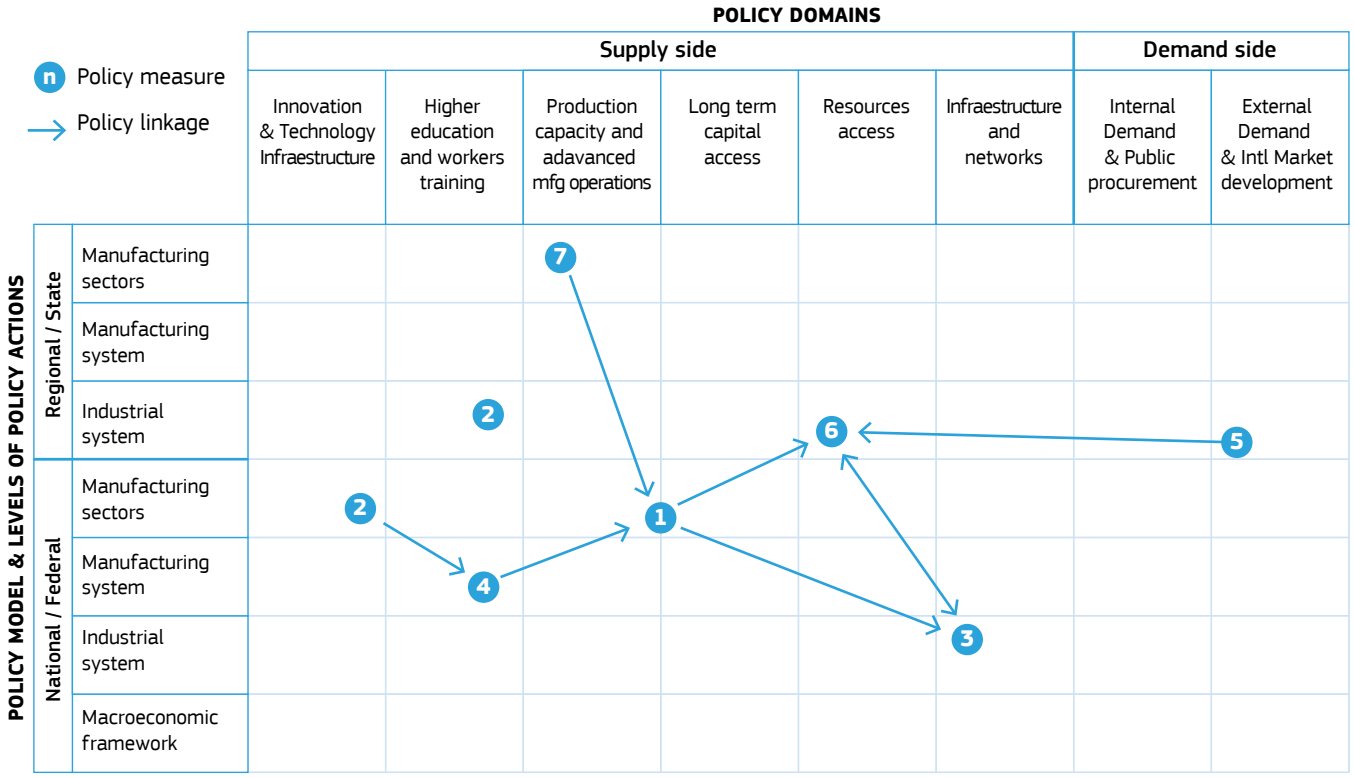
In a broader field of complementarity with the European Structural and Investment Funds, the REACT-EU initiative should be highlighted as a tool to strengthen cohesion policy for the period 2014-20 to accelerate the recovery from the crisis.

This initiative aims to support the survival of economic activity, in particular through measures to maintain and boost employment and support business, strengthen social responses and public investment for the environment and climate transition, laying the foundations for economic recovery in a long-term perspective, which will benefit from the concerted action of the various European instruments planned for the coming years, and above all Portugal 2030 and the Recovery and Resilience Plan.

Properly coordinating policy packages beyond policy silos must be an essential feature of the partnerships at a more advanced stage. Andreoni and Chang (2019) propose a policy package matrix (see Figure 11) designed for industrial policies that can be a useful template for strategic policy coordination. The matrix is structured around two main axes. The horizontal axis lists a number of key 'policy domains' within an industrial policy package that are divided into two subsets: supply-side and demand-side policy domains. The vertical axis covers different policy governance models and the level of policy intervention, distinguishing between national and regional levels.

A structure of this type can support an adequate mapping and clustering of the different policy instruments, facilitating their discussion with stakeholders and the decision-making process. It can also help in identifying relevant linkages between the different policy instruments implemented and enforced by different institutions across different policy domains.

Figure 11. Policy package matrix.



Source: Andreoni and Chang (2019)

The alignment and coordination of policy packages striving to also influence policies beyond across policy silos and levels of governance. PRI will require goal or 'mission' specific policy mixes, i.e. tailored instruments for each priority. To this end, policy mixes could be used or a portfolio of instruments that cut across several so far isolated or poorly connected policy domains (R&D, industrial policy, environmental policy, social policy) (Morgan and Radosevic, forthcoming).

Partnerships for Regional Innovation

AN INITIAL TOOLBOX

CHAPTER 3
AN INITIAL TOOLBOX TO DEVELOP PARTNERSHIPS FOR REGIONAL INNOVATION

In this Chapter, you can find a repository of tools, approaches and concepts underpinning each of the three building blocks presented in the previous chapters. Each tool is described in a short fiche (or tool profile), communicating the main idea, explaining why it could be useful, and providing links to fuller descriptions elsewhere. The fiches you will encounter describe **tools or approaches** that can assist you in putting into practice partnerships for innovation in your territory. From goal-setting to assessing impacts of policies, these fiches try to cover the three building blocks.

You can also find these fiches describing **concepts** that can underpin innovation policies fit for addressing societal grand challenges and transition to a greener and digitally connected Europe. These conceptual fiches are critical to make sure that stakeholders, and policy makers, embrace the necessary mindset.

The main aim of this chapter is to provide an accessible point of entry to a broad range of approaches and tools to support the development of the right capacities, both within public administrations and in the innovation ecosystem.

The Chapter includes (i) an orientation guide, (ii) a list of fiches, and (iii) the fiches themselves. The orientation guide aims at giving you some information on how to read fiches, how to select the ones that may be more relevant to your territory, and help navigate this toolbox. The list provides you with an overview of all the tools, or fiches, in the box. Finally, the fiches themselves are a one-page document in continuous evolution. By engaging with them in the Pilot, you can help make these tools more relevant and useful for you and others who will want to set up partnerships for innovation.

Orientation guide

The *fiches* are primarily dedicated to **sustainability innovators in the public sector** like yourself. However, as you will soon find out, to put in practice such tools you need to engage with a broad range of stakeholders, such as citizens, research or higher education institutions or businesses. Therefore, you will need to include them actively when thinking of applying a fiche, to create inclusive and robust partnerships for regional innovation.

All fiches are important to develop the three building blocks described in Chapter 2. However, you can select those that are more relevant to your territory, to meet your goals, or depending on where your territory stands in the development of innovation policies. Different regions have different needs, capacities and responsibilities.

For this reason, we created **an orientation system to label** different fiches according to several criteria:

- Sustainability innovators in the public sectors can operate at different geographical, and administrative, ***Levels***.
- It follows that according to the levels they operate in, they have different ***Responsibilities***.
- Then, you may pursue different ***Goals*** in relation to developing and implementing partnerships for innovation.
- Finally, every fiche is associated with different ***Competences*** that you can learn by putting them in practice in partnership with your stakeholders.

The table below shows the available options for the four categories above. You should note that this does not aim to be an exhaustive list rather a quick guide to easily orient you in choosing fiches.

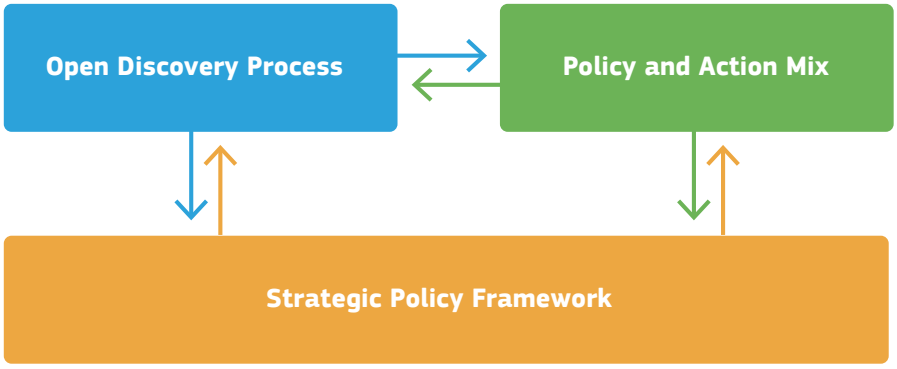
Table 3. Entire list of options used to label the fiches.

Levels of government	Type of Responsibility	Goals	Competences
• Local • Regional • National • European	• Managing funds • Acquiring resources • Monitoring and control • Evaluation of project/ operations • Promoter (to overcome resistance to change) • Developing innovation strategies • Collecting and evaluating ideas • Regulation and legislation • Transfers of authority • Developing human resources • Tax policy • Industrial policy	• Goals setting • Strategy design • Policy objectives • Stakeholder mapping • Stakeholder engagement • Creating partnerships • Problem framing • Legitimisation • Implementation • Monitoring • Evaluation • Intervening • Coordinating across levels / portfolios • Developing public administration • Accumulating service provision capabilities • Internationalising • Steering demand	• Values for sustainability • Think systemically • Spot opportunities for sustainability • Be futures literate • Be creative • Frame policy problems • Shape change • Work with others • Think critically • Manage transformations • Mobilise resources sustainably • Be financial and economic literate • Plan and manage sustainably • Advise the political level based on evidence

Additionally, you can grasp the **Purpose** and **Use** of a fiche at a glance by reading the one-line statements under the Title of each fiche.

Each fiche is numbered for ease of references, and numbers have a **colour** code which represent the building block they pertain to:

- **Orange** is for Strategic Framework,
- **Blue** for Open Discovery Process, and
- **Green** for Policy and Action mix.



Some fiches may be relevant to build, or reinforce, more than one building block, but only the most representative was selected. The following Table 4 presents the full list of fiches according to the building block. Different regions are at different stages of the green and digital transition and thus the fiches most relevant to each depend on whether action is needed in starting up processes, accelerating innovations or stabilising the new system.

Table 4. List of Fiches

Strategic Framework
Setting the conditions for broader and dynamic planning

1. Smart specialisation strategies (S3)
2. S3 for SDGs: A methodological approach
3. S3 for SDGs: A reflection framework
4. STI potential to address sustainability challenges
5. European start-up village forum
6. Sustainable development as a transition
7. Challenge-oriented innovation
8. POINT Reviews
9. Priority Compass
10. R&I viewer (R&I TEDv)
11. Mapping funding opportunities
12. Strategic intervention logic

13. Identifying regions and skills in transition
14. Industrial transition pathways
15. Identifying local challenges
16. Monitoring the SDGs at local and regional level
17. JRC tools for sustainable urban development
18. Foresight

Monitoring funds, human resources, and outputs
19. Monitoring an evaluation in an impact based policy
20. What to monitor?
21. Example of monitoring system of Catalonia
22. What and how to evaluate?
23. Measuring and monitoring resilience

Governance coordination
24. Guiding principles for a Whole-of-Government approach implementation
25. Steps towards a Whole-of-Government approach
26. Multi-level coordination mechanisms

Open Discovery Process
Engagement and co-creation with stakeholders

27. Participatory governance and EDP
28. Open Discovery Process (ODP)
29. Working backwards to create multiple value: the case of NutriAlth3D
30. International dimension of ODP
31. Science-based ODP building on the Seville process
32. Digital tools for the ODP
33. Challenge-led system mapping
34. Small-scale experimentation for transitions
35. National and regional science for policy ecosystems for innovation
36. Co-creation for policy
37. Engaging citizens in innovation and innovation policy
38. Contribution of civil society organisations
39. Citizen science
40. Network intelligence: The EIT

Policy and Action Mix
Orchestrating actions under a coherent directional logic

41. Policy mix for the green transition: The Ruhr Area
42. Policy mix for the digital transition
43. Broad-based business innovation
44. Promoting multiple-value creation and co-benefits
45. Innovation councils
46. Joint calls
47. Supporting firm growth
48. Financial instruments and private finance blending
49. Sustainable financing instruments and green bonds
50. Green public procurement
51. Regulatory sandboxes
52. Innovation policies for affordability

53. Public-private partnerships for skills development
54. Promoting public sector innovation
55. Empowering civil servants to create sustainable prosperity
56. Competences for the twin transitions
57. Futures literacy
58. Supporting organisational capacity and competence development with SELFIE tools
59. Open science and education
60. EU taxonomy for sustainable activities
61. Energy consumption taxation
62. Waste management in a circular economy– innovation and regulation
63. Assessment of eco-innovative strategies to reduce waste management impacts
64. Best Available Techniques (BAT) and Emerging Techniques (ET) for industrial emissions
65. European digital innovation hubs
66. AI in the public sector
67. GovTech
68. Technological infrastructures for energy transition

LEVELS OF GOVERNMENT
Local, Regional

LEVELS OF RESPONSIBILITY
Developing innovation strategies

GOALS
Policy objectives; Stakeholder engagement; Implementation

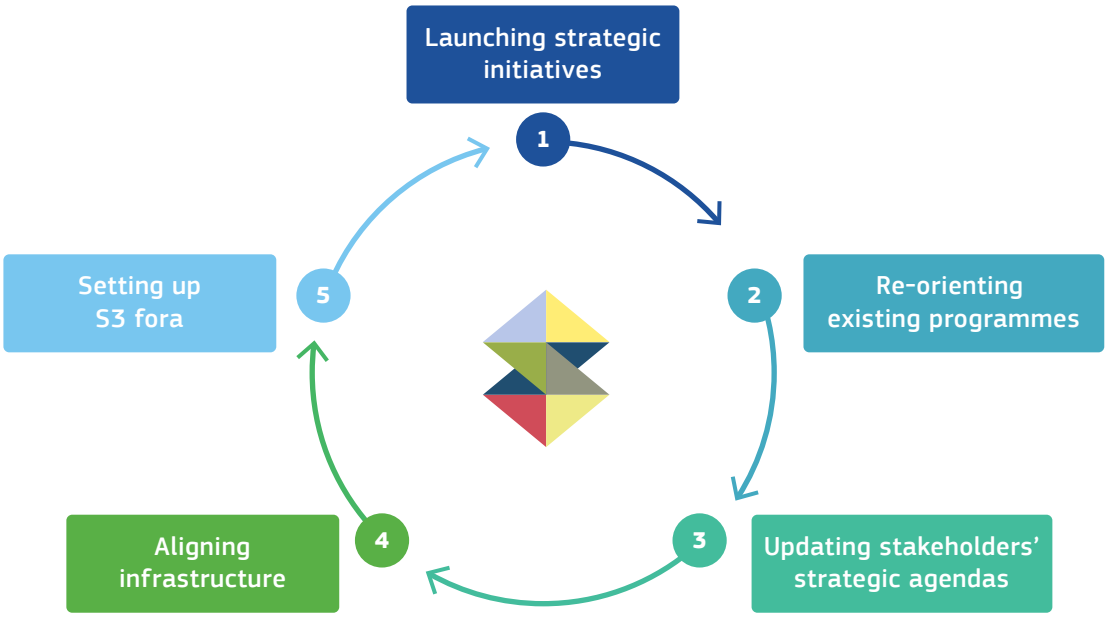
COMPETENCES
Frame policy problems; Work with others; Be financial and economic literate

1 Smart specialisation strategies (S3)

Purpose: To provide an outline of the S3 concept and its perspective

Use: To develop smart specialisation strategies

Smart Specialisation Strategies (S3) are regional innovation strategies established for a more effective use of Cohesion Funds in the 2014-2020 programming period. They became an ex-ante conditionality whereby the design of a smart specialisation strategy (S3) was a prerequisite to access the European Structural and Investment Funds devoted to research, technological development and innovation, and maintained for the 2021-2027 period as a so-called enabling condition. They aim at focusing R&I efforts on a limited number of priorities based on an assessment of opportunities of the regions and full involvement of local stakeholders (mainly business, research organisations and the public sector) via an entrepreneurial discovery process. The S3 experience reshaped the innovation policy process as illustrated below.



S3 has promoted a methodical approach to regional economic development. Furthermore, S3 has enhanced participatory governance in the identification of priorities and the overall design, as well as in the implementation of the strategy, leading to a more open, market-oriented and inclusive decision-making process. S3 has led to a cultural change in many regions, territories and Member States.

Find out more:
https://s3platform.jrc.ec.europa.eu/home
https://ec.europa.eu/regional_policy/en/funding/erdf/
https://publications.jrc.ec.europa.eu/repository/handle/JRC124389
https://www.interregeurope.eu/fileadmin/user_upload/plp_uploads/policy_briefs/Smart_Specialisation_Strategy__S3__-_Policy_Brief.pdf

2 S3 for SDGs: A methodological approach

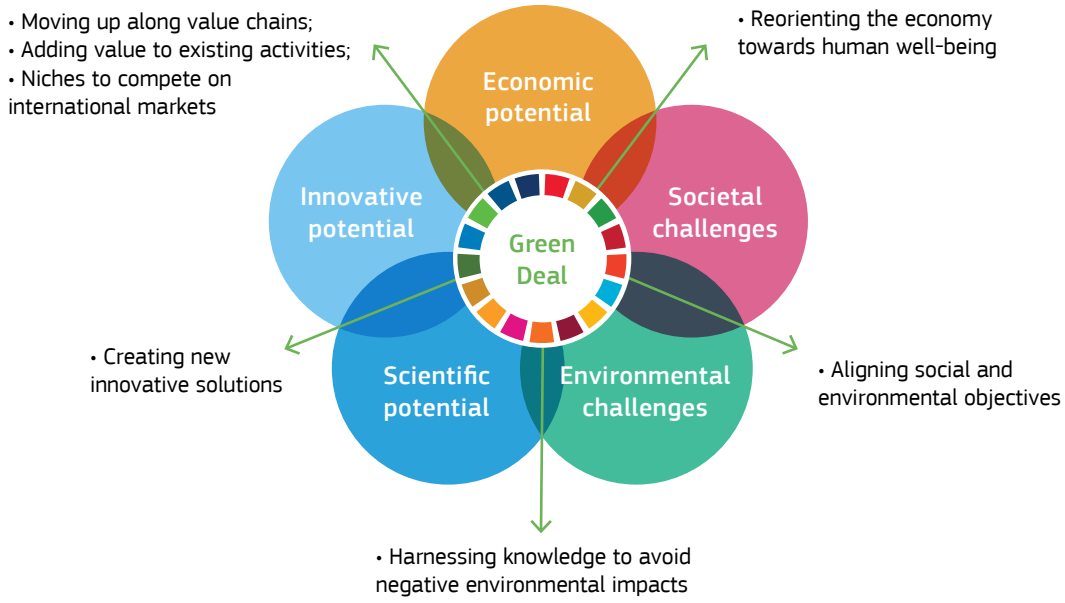
Purpose: To the strengthen sustainability dimension and integrate SDGs in S3

Use: To embed sustainability and the SDGs in Smart Specialisation

Smart Specialisation for Sustainable Development Goals (S3 for SDGs) is a methodological approach that aspires to integrate Sustainable Development Goals (SDGs) and resulting sustainability challenges in the whole policy cycle of Smart Specialisation Strategies – from their design to implementation, monitoring and evaluation. It integrates insights from the cooperation of the JRC with the United Nation's Inter-Agency Task Team on Science, Technology and Innovation for SDGs Roadmaps, as well as practical applications and inspirations in Europe and beyond (see links below), profound reviews of theoretical foundations, analyses of policy coherence and directionality and practical stress-testing of applicable policy proposals and solutions.

The basic idea of S3 for SDGs is that science, technology and innovation can and should be mobilised not only for economic growth, but also to address societal and environmental challenges. This new purpose of innovation is reflected in the new metrics, diagnostic approaches, rethinking stakeholder engagement and participation, policy mix, governance, financing and budgeting for SDGs and sustainability. S3 for SDGs allows to localise global challenges, making them meaningful for different territorial contexts and local communities. This is the basis for mobilisation of new stakeholder coalitions and innovative solutions for a sustainable transition.

New dimensions of Smart specialisation for SDGs call for broader and more systematic considerations of synergies, trade-offs and relevant stakeholders.



Source: Nakicenovic, *et al.*

Find out more:
National, regional, urban and international partnerships inspirations / Theoretical and conceptual framework / Policy coherence and environmental focus / Diagnostic methodology / Integration in the UN STI for SDGs Framework

LEVELS OF GOVERNMENT
Regional, National

LEVELS OF RESPONSIBILITY
Developing innovation strategies

GOALS
Strategy design. Problem framing; Implementation

COMPETENCES
Values for sustainability; Spot opportunities for sustainability; Frame policy problems; Plan and manage sustainably

3 S3 for SDGs: A reflection framework

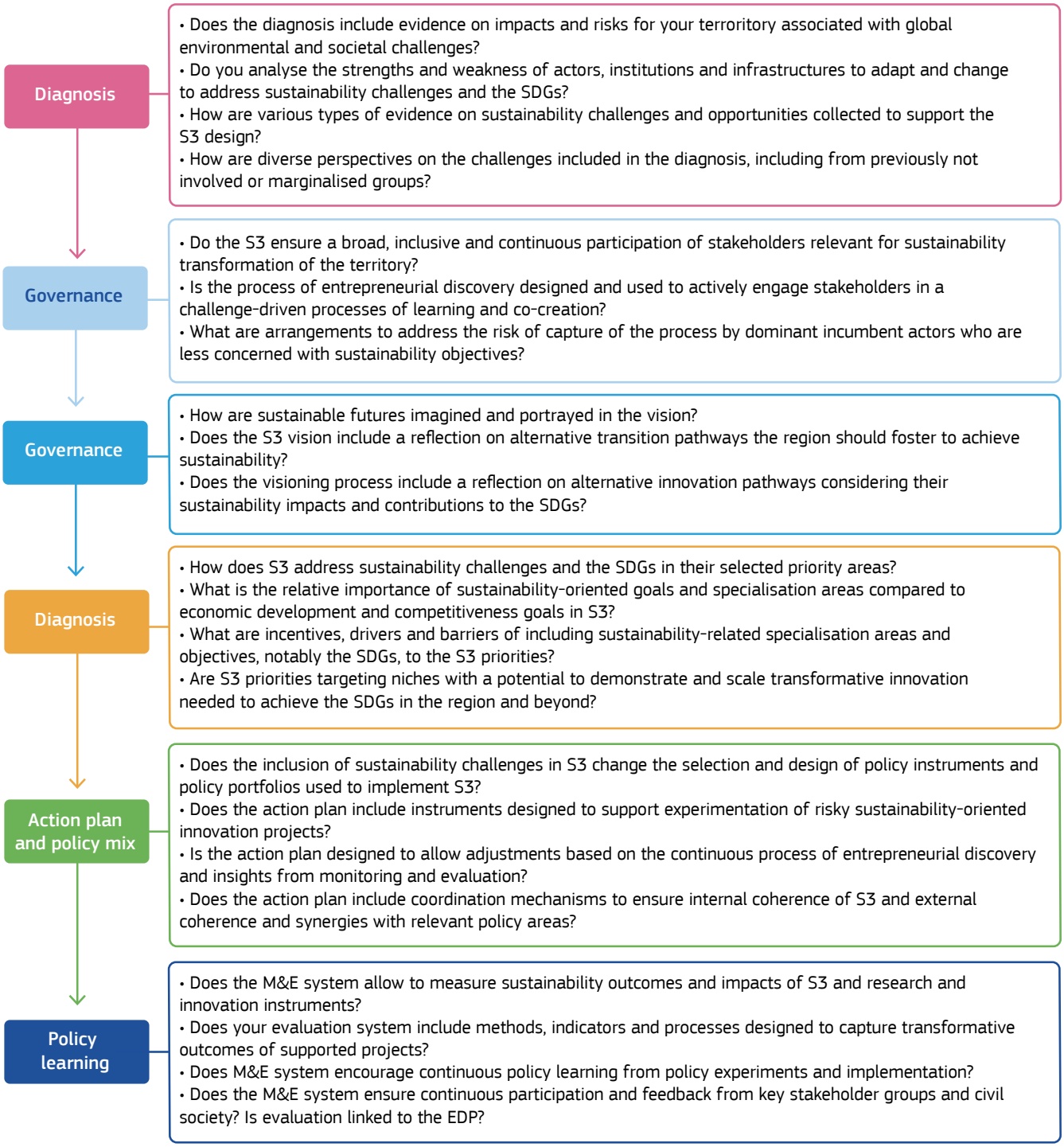
Purpose: To the strengthen sustainability dimension and integrate SDGs in S3

Use: To reflect on existing and new S3 and innovation policies

A reflection framework is designed as a tool to assist policymakers and practitioners in Europe and beyond in reflecting on how to localise and integrate sustainability challenges and goals in Smart Specialisation Strategies at regional and national levels. The framework discusses the main implications and challenges of integrating sustainability challenges and the SDGs for each step of S3. To guide the reflection process, the framework puts forward questions for each step of the process.

The framework is based on a substantial literature review (see links), the results of which were tested and co-created during a series of interviews with regional and national authorities responsible for Smart Specialisation. The JRC team organised co-creation sessions with 11 regions and countries from the EU and beyond, during which we consulted more than 30 policy makers and practitioners working on Smart Specialisation. The experiences of the regions and countries invited to participate in the exercise reflect the diverse socio-economic and policy contexts that S3 practitioners work in.

Selected questions in the reflection framework.



Find out more:

How can Smart Specialisation strategies address sustainability challenges to contribute to the Sustainable Development Goals? Reflection framework and lessons learned from practitioners in the EU and beyond to strengthen sustainability dimension in Smart Specialisation strategies (upcoming JRC report)

Theoretical and conceptual framework

S3, SDGs and Environmental Commons

4 STI potential to address sustainability challenges

Purpose: To develop new analytical approaches for S3 for SDGs

Use: To identify science, technology and innovation (STI) potential to address sustainability challenges

Science, technology and innovation (STI) can accelerate progress to address sustainability challenges underpinning the SDGs and the Green Deal. To do so, policy action needs a sound evidence base. This JRC-developed approach proposes the following analytical steps to identify STI potential and networks for sustainability challenges:

- ***Identifying synergies with other policies***: first, it identifies synergies with other existing policies and national strategic framework, based on which priority SDGs (sustainability challenges) have been selected in the national- or regional-level policies.
- ***Evidence check***: analysis of the statistical indicators of SDG achievement at target level (new priorities might emerge).
- ***Stakeholder validation of challenges***: the results of the priority and statistical analyses are validated in discussion with the relevant Smart Specialisation team, high-level policy makers and EDP working groups for priority domains.
- ***Identification of existing science, technology and innovation potential to respond to identified challenges***: the analysis is based on text mining of STI outputs (publications, patents, innovation projects) based on a set of SDG-controlled vocabulary and machine learning.
- ***Identification of collaboration networks to deliver change***: the national and international collaboration networks are mapped to identify the key change-makers already working on the identified challenges, who can be mobilised to deliver new projects and solutions.
- ***Update and revision of ''classic'' S3 priorities***: the full results are matched with the S3 priorities, indicating the direct and indirect connections, synergies and trade-offs. The results of this process feed into the experimental (continued) EDP phase.

Illustrative example of analysis of STI potential for SDG 3: Good health and wellbeing.

Goal 3: Good Health and Well-being

HIGHER priority challenge

Analysis of Serbian SDG-related assessment and policy documents

3rd **MEDIUM Indicated Goal**

Statstical assessment of the gap in the SDG indicators with EU countries

3rd **LARGER gap with leading EU countries**

Rank share of Goal 3 in the STI analysis

This table represents the rank of Goal 3-related STI activities, in relation to the rest of goals. For publications and H2020 projects, the share vs. EU27 provides a notion of relative specialisation.

Publications (out of 16 goals)		Horizon 2020 (out of 14 goals)		Innovation found (out of 11 goals)	Patents (out of 1o goals)
1st	1st	7th	5th	5th	2nd
5.4%	5.2%	2.9%	4.6%	5.8%	8.2%
Serbia	EU27	Serbia	EU27	Serbia	Serbia

Scientific impact of Goal 3-related publications

% of publications in TOP10% journals	Normalised citation impact (vs. Serbian pubs.)
9.0%	1.8
Serbian average = 10.2%	Serbia = 1

Active organisations in Goal 3-related STI activities

This table represents the number of organisations engaged in Goal 3-related STI activities, providing a notion of critical mass and international linkages.

N. of organisations in publications		N. of organisations in Horizon 2020		N. of organisations in Innovation Funds	N. of organisations in patents
167	2380	6	96	9	4
National	International	National	International	National	National

Relation with other goals and with smart specialization

Most related goals

10% Similarity

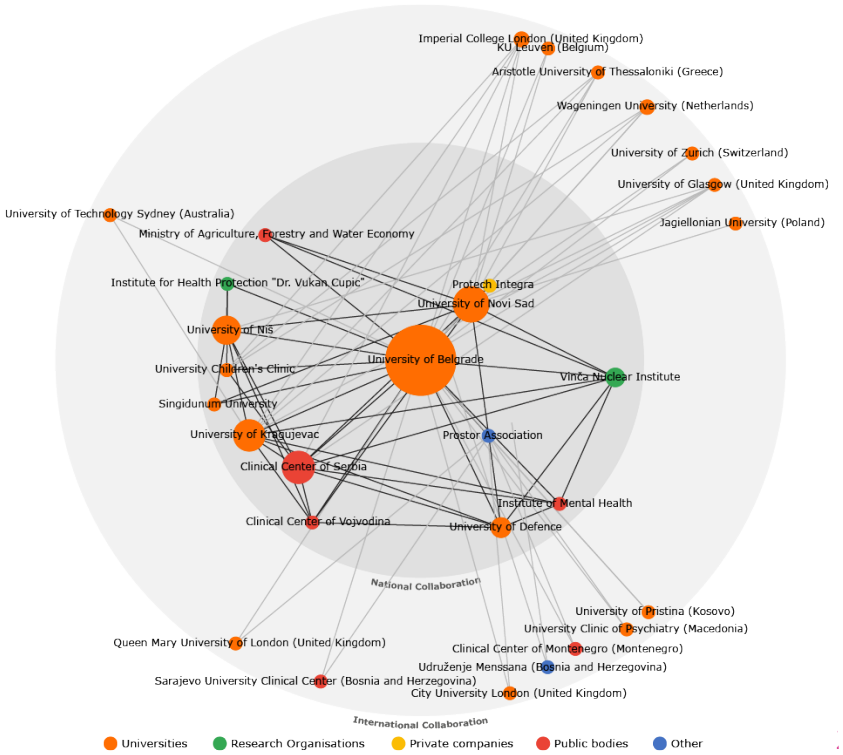
6% Similarity

Most related S3 priority domains

- Information and communication technologies
- Food for Future
- Key Enabling Technologies (Biotechnology)

Source: Fuster Martí *et al.* (2021)

SDG- orientated STI collaboration networks.
The following schema presents the collaboration network of the top 15 national and top 15 international actors engaged in Goal 3, classified by typology of organisation.



Source: Fuster Martí *et al.* (2021)

Find out more:
Pilot methodology
Pilot diagnostic report and additional indicators

LEVELS OF GOVERNMENT
Regional; National; European

LEVELS OF RESPONSIBILITY
Promoter; Developing innovation strategies

GOALS
Strategy design; Stakeholder engagement

COMPETENCES
Think systemically; Values for sustainability; Work with others; Be creative

5 European start-up village forum

Purpose: To promote entrepreneurship in rural areas

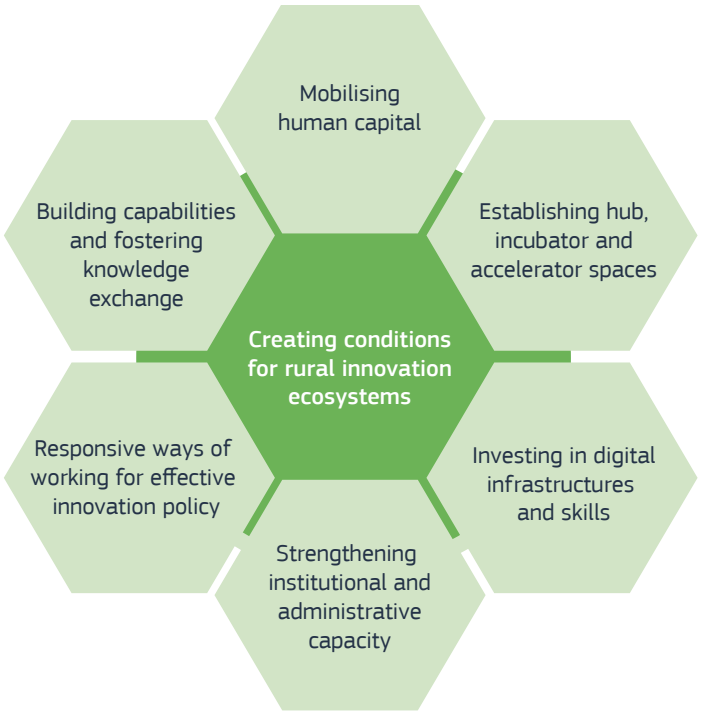
Use: To identify local problems and create sustainable multiple value

On 30 June 2021, the European Commission set out a **long-term vision for the EU's rural areas.** The vision identifies several areas of action towards **stronger, connected, resilient** and **prosperous** rural areas by 2040. The vision recognises the role of innovation to help tackle challenges and reap opportunities for wellbeing and growth in rural areas and includes a specific flagship action on research and innovation for rural communities. The **European Start-up Village Forum** is part of this flagship action.

The Forum complements knowledge exchange and cooperation activities, and work as an open space where institutions and stakeholders can meet, discuss and shape actions and tools for innovation in rural areas. By bringing science-based and community-based knowledge and experiences together with high-level political traction, the Forum explores the different **dimensions of rural innovation ecosystems** and discusses insights on the challenges and potentials for **start-up creation and development in rural areas.**

- Do you have similar initiatives in your region?
- Do you support idea generation among different types of stakeholders?

Think about how such an initiative could help identify local social problems and deliver multiple value in co-creation with stakeholders involved. Explore more below.



Find out more:
Long term vision for the EU's rural area: https://ec.europa.eu/info/strategy/priorities-2019-2024/new-push-european-democracy/long-term-vision-rural-areas_en
The European Start up village Forum: https://eustartupvillageforum.eu/

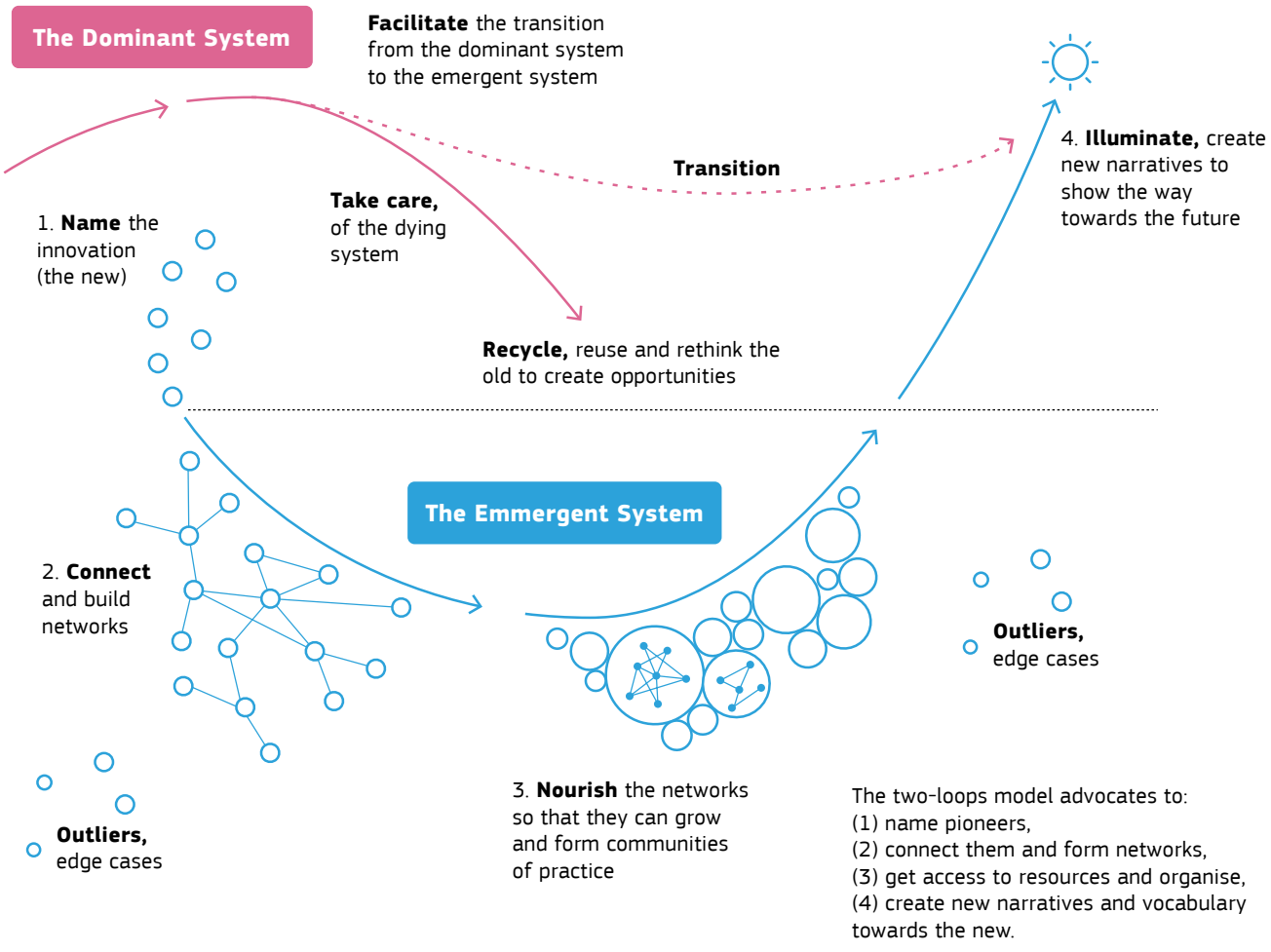
6 Sustainable development as a transition

Purpose: To embrace socio-technical systems change

Use: To think of transitions as complex multi-level processes

Dominant socio-technical systems are characterised by individuals, norms, institutions, infrastructures and technologies, which are intertwined and reinforce each other. This leads to lock-ins, path dependency and resistance to change in current systems. Technological green fixes can hide the urgent need for transitioning from current business models to socio-technical systems in line to achieve the SDGs. To this aim, transformations (or transitions) that are more ambitious are needed. For example, new socio-technical systems should enable citizens to engage and contribute to the SDGs beyond their buying choices.

A socio-technical system transition involves social, behavioural and technological change in an interrelated way, so that the end result is change in all elements of the old production and consumption configurations. Can you think about socio-technical systems that require



Source: adapted from Berkana Institute

urgent transitioning for sustainability? [hint: energy, mobility, food, water, healthcare and communication (Schot and Steinmuller, 2018)].

The two loops model highlights transitions as a non-linear process, without predefined steps for change. It describes two systems: the dominant system, with its growth and subsequent decline; and an emerging system formed by alternative niches arising in the landscape. Given the coexistence of the two systems, when designing and implementing policies we need to ensure a fair transition from the old system, but also support the emergence and viability of alternatives that can contribute to the SDGs. Holistic approaches are needed far beyond research and innovation policies. This will involve supporting the stabilization of new business models and value networks, together with new social practices. Giving support and legitimacy to these alternatives, so that they grow and consolidate, is key. In most cases, the adoption of alternatives will require adapting regulatory frameworks and institutional practices and creating new markets.

Find out more:
https://www.systemsinnovation.io/post/two-loop-model

LEVELS OF GOVERNMENT
All

LEVELS OF RESPONSIBILITY
Developing innovation strategies

GOALS
Goals setting

COMPETENCES
Think systemically; Spot opportunities for sustainability; Values for sustainability; Manage transformations

7 Challenge-oriented innovation

Purpose: To enable challenge-driven innovation

Use: To design transformative policies that create multiple value

Challenge-oriented (or mission-driven) innovation policy starts with well-defined societal goals and designs its research and innovation as well as regulatory measures around such goals to address them in a timely manner. Such policies consider the whole innovation cycle from research to demonstration and market deployment, mix supply-push and demand-pull instruments, ranging across various policy fields, sectors and stakeholders. Such a transversal approach is needed to achieve the SDGs.

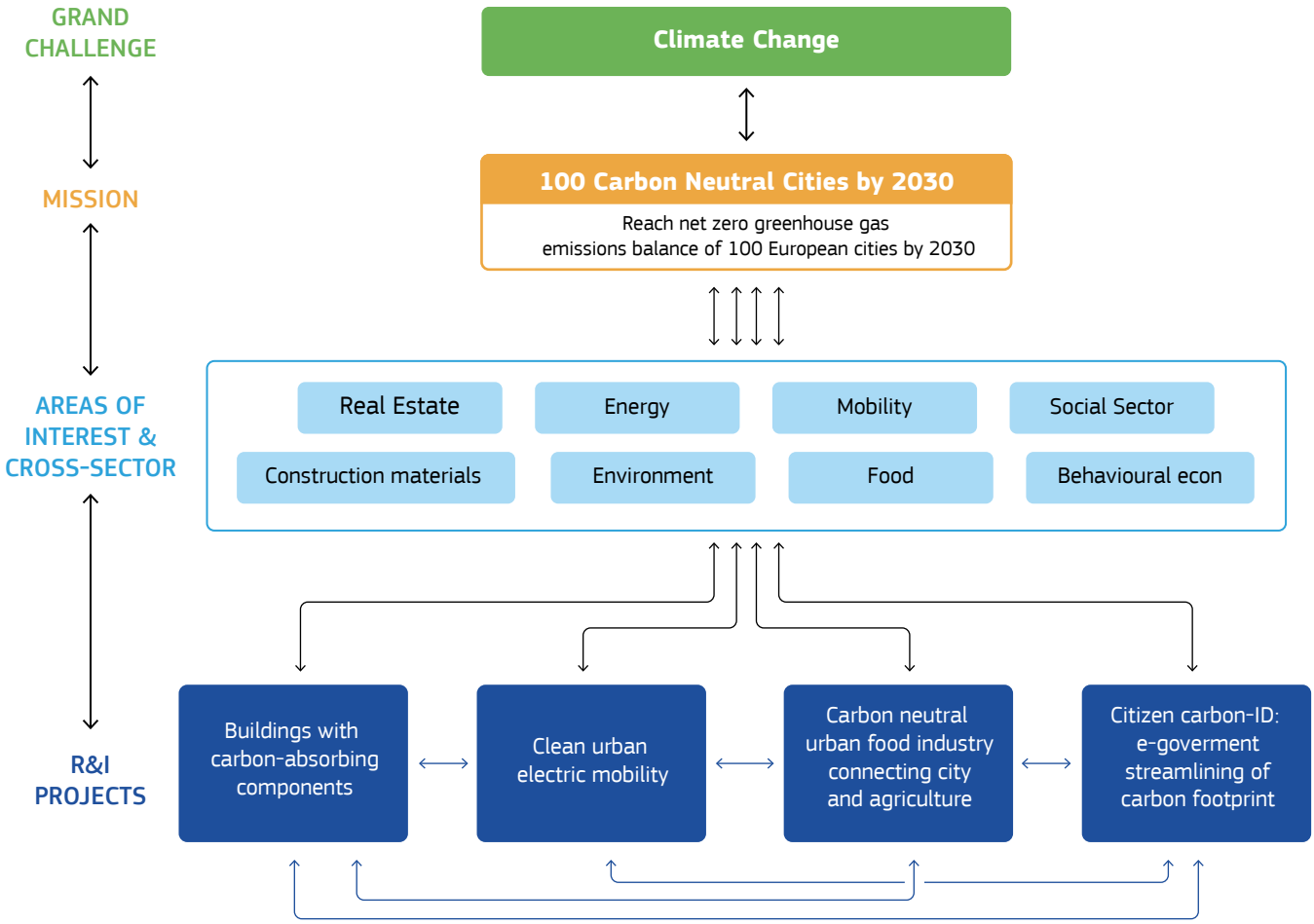
In contrast to traditional innovation policy, it aims at building policy coordination and joint ownership with stakeholders, and guiding directionality to tilt players in the market towards societal grand challenges.

You can apply the ROAR framework to advance such transformative policies, where the state behaves as 'market co-creating' and 'market-shaping'. With ROAR, you can promote strategic thinking about the desired direction or *Routes*, the structure and capacity of public sector *Organisations*, the way in which policy is *Assessed*, and the incentive structure for both private and public sectors, or *Risks and Rewards.*

Roar framework.

Routes – direction	Organisations	Assessment and evaluation	Risks and rewards
Focusing on a challenge determines the direction of policy, i.e. its goal, rather than one best way to get there. Challenge-oriented policies should be: • Broad to engage the public; • Enable concrete missions to create societal value; • Attract cross-sectoral investments; • Involve industry; • Allow bottom-up initiatives and experimentation; • Achieve measurable success.	To succeed implementing challenged-oriented policies, public organisations should develop and nurture skills and structures to learn and create dynamic public-private partnership through: • Capabilities for leadership and engagement; • Experimentation capabilities; • Evaluation capabilities able to integrate approaches such as user research, social experiments and system level reflection; • Transversal skills, across disciplines and sectors.	Promoting functional finance as a government spending approach, where fiscal policy focuses on achieving desired missions, while budget deficit plays a minor role. Cost benefit analysis and net present value prevent proactive market creating and shaping. Instead, dynamic efficiency involves using resources to achieve changes over time to achieve goals. Defining concretes target and objectives is critical.	Treating investments as a portfolio, to balance wins and losses, thus reaping (financial) benefits to fund investments in other areas/policies/initiatives and/or learning from failures.

Source: Elaborated by authors based on Mazzucato *et al.*, 2020



Source: Mazzucato 2018

Find out more:

Mission-Oriented Innovation Network (MOIN) 2021 Casebook: https://www.ucl.ac.uk/bartlett/public-purpose/publications/2022/jan/moin-casebook-2021

Mission-oriented Innovation Policy Observatory: https://www.uu.nl/en/research/copernicus-institute-of-sustainable-development/mission-oriented-innovation-policy-observatory

OECD Mission-Oriented Innovation Policies online toolkit: https://stip.oecd.org/moip/

LEVELS OF GOVERNMENT
All

LEVELS OF RESPONSIBILITY
Developing innovation strategies

GOALS
Strategy design; Legitimisation

COMPETENCES
Think systemically; Be futures literate; Advise the political based on evidence; plan and manage sustainably

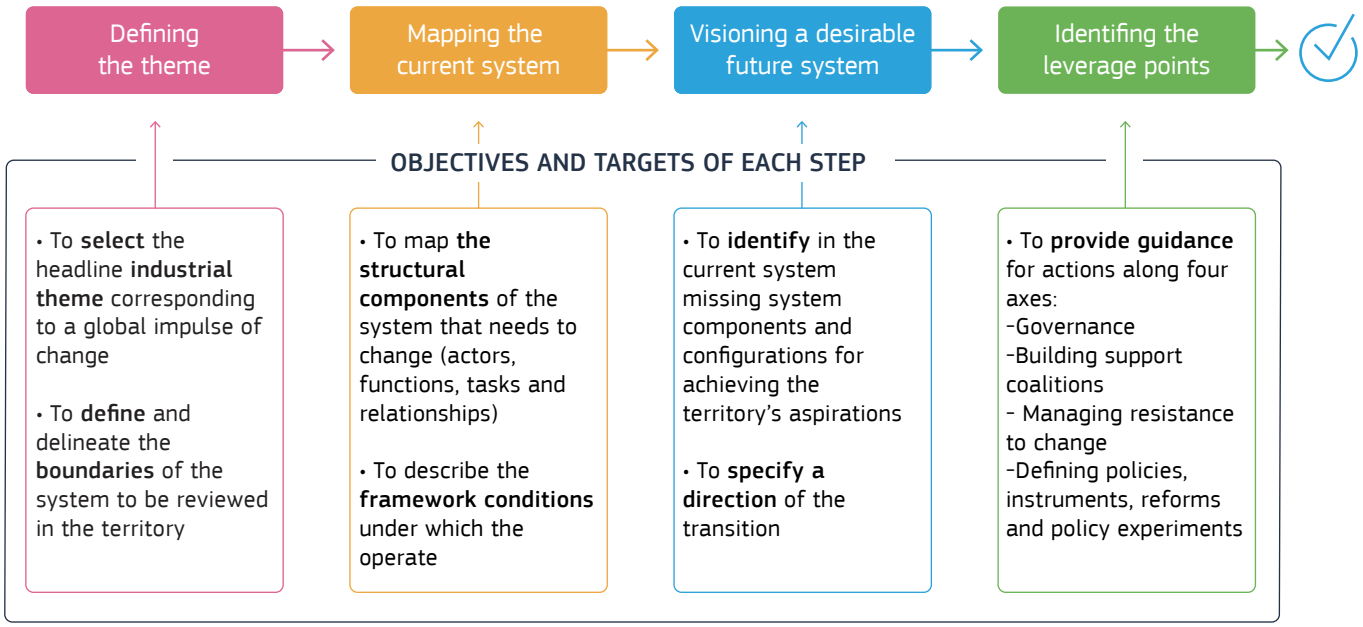
8 POINT reviews

Purpose: To inform policy development across domains

Use: To collect evidence about the affected systems

A POINT (Projecting Opportunities for INdustrial Transitions) review is an independent study of a domain of policy action. It is a tool to support transformative, system-level, innovation. A first objective of a review is to collect missing evidence necessary for understanding the extended industrial system, including workers, consumers, users and the natural environment. A second objective is to identify opportunities for industrial development and offer concrete policy pathways. The overall aim is to contribute to the development of a credible, coherent and ambitious direction for the transition of the territory.

You can follow the POINT methodology by the JRC to conduct reviews (Pontikakis et al., 2020). The reviews follow the state-of-the-art in innovation policy and adopt a framing of innovation that include groups such as workers, users and households that may otherwise be missed. The broad framing enables you to identify relevant policy portfolios and gain thinking time to complementary actions and reforms under a coherent directional logic. It is operationally viable hence its focus on four essential functions to any industrial system: *orientation; resource mobilisation; production; consumption*. A review draws on extensive research, wide stakeholder consultations and international experiences. Below you can check the four main steps of a POINT review. A SWOT analysis of key functions can be supported by quantitative evidence and can be also combined with complexity analysis to showcase the most technologically promising paths.



Find out more:
POINT Reviews: an overview (Marques Santos *et al.*, 2021)
POINT Review of Industrial Transition of Bulgaria (Stefanov *et al.*, 2021)
POINT Review of Industrial Transition of Greece (Janssen *et al.*, 2021a)

LEVELS OF GOVERNMENT
Regional; National

LEVELS OF RESPONSIBILITY
Developing innovation strategies; Collecting and evaluating ideas

GOALS
Policy objectives; Legitimisation; Goals setting

COMPETENCES
Think critically; Advise the political level based on evidence; Spot opportunities for sustainability; Be financial and economic literate

9 Priority compass

Purpose: To have data-driven identification of regional level opportunities and capabilities

Use: (As one of the tools) To inform innovation policy design

Many institutions use Complexity analyses for country level macroeconomic analyses. However, we need to look at regional systems of innovation to better inform industrial policy. As most of innovation and industrial policy happens at the regional level, relevant policy instruments require understanding which regions are better prepared in terms of technological capabilities. This framework is designed to help policymakers identify knowledge-based investment priorities and the potential feasibility of the several options they have. It uses machine learning algorithms (developed within the economic complexity paradigm) to highlight which technologies and production lines may be feasibly developed by a region or a country, based on their current capabilities. It is a quantitative tool, whose aim is to provide orientation for policymakers from the early phases of the strategy design and throughout its implementation.

Traditionally you (we) may have used patent analysis that relies on patent counting to infer the activity of a regional innovation system. Now, you have access to Complexity analysis to grasp the technological fields your region is active in to infer its capabilities. With such analysis, you can describe the potential of the innovation system not just in terms of simple indicators, but also as a multidimensional analysis of the possibilities of the region in different directions. You will be able to inform each region of their comparative advantage in different dimensions.

Focus on three dimensions of capabilities:

Sectors
Vertical technological capabilities at the sectorial level, identified by crossing patent and export data to highlight technologies leading to a comparative advantage in a specific export market.

Green sustainability
Technological capabilities specifics to the green effort of the commission, identified through the Y classification of the EPO (but see the side bar).

Key Enabling Technologies
Transversal technological capabilities spanning different sectors, identified through expert opinion.

Identification of Green Technologies

The identification of industrial priorities and their connection to technological fields requires constant monitoring, as the institutional goals and the technological landscape evolve. To advance on this task, we are working on an automatic matching of patents with BREFs (Best Available Techniques reference documents) allowing connecting green priorities to technological fields at a very high level of disaggregation automatically and as fast as priorities updates.

Priority compass in action: the case of Andalusia

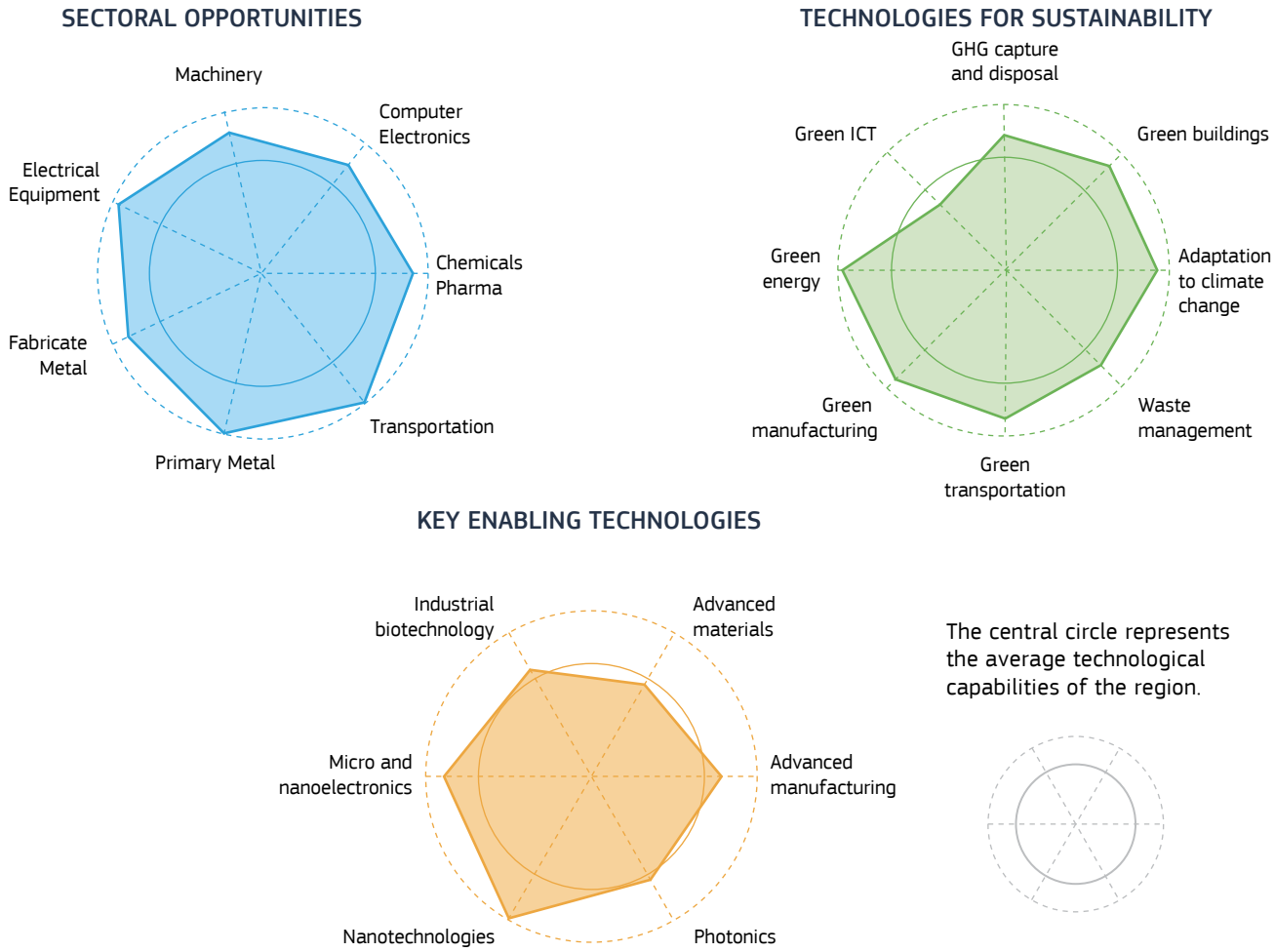
The priority compass uses Complexity analysis to help policy-makers select knowledge-based investment priorities at the regional level. The radar plot highlights areas where the region holds greater technological capabilities.

The blue radar focuses on advanced manufacturing sectors, while the green and red radars focus on green and horizontal technologies, respectively. For each radar plot, the central circle represents the average technological capabilities of the region, which means the radar is underlying the relative technological capabilities, rather than the absolute ones.

The radars can be used to evaluate the relative strengths and weaknesses of the region. This is aimed to inform policy makers, but it does not provide directly industrial strategies: it is up to the policymaker, for instance, to decide whether to focus investment in technologies where the region is strong or weak.

We observe that in general Andalusian comparative advantage in advanced products is lagging behind, but they have an advantage in Primary Metal and Transportation. Andalusia holds relative strength in all green technologies except for Green ICT, while – for key enabling technologies – it is relatively well positioned in Nanotechnologies.

Compasses for Andalusia region, Spain.



Find out more:

[Economic Complexity Analytics: Country Factsheets]

[Economic complexity to address current challenges in innovation systems: A novel empirical strategy linked to the territorial dimension]

LEVELS OF GOVERNMENT
Regional

LEVELS OF RESPONSIBILITY
Managing funds

GOALS
Strategy design; Monitoring; Legitimisation

COMPETENCES
Spot opportunities for sustainability; Be financial and economy literate; Advise the political level based on evidence;

10 R&I viewer (R&I TEDv)

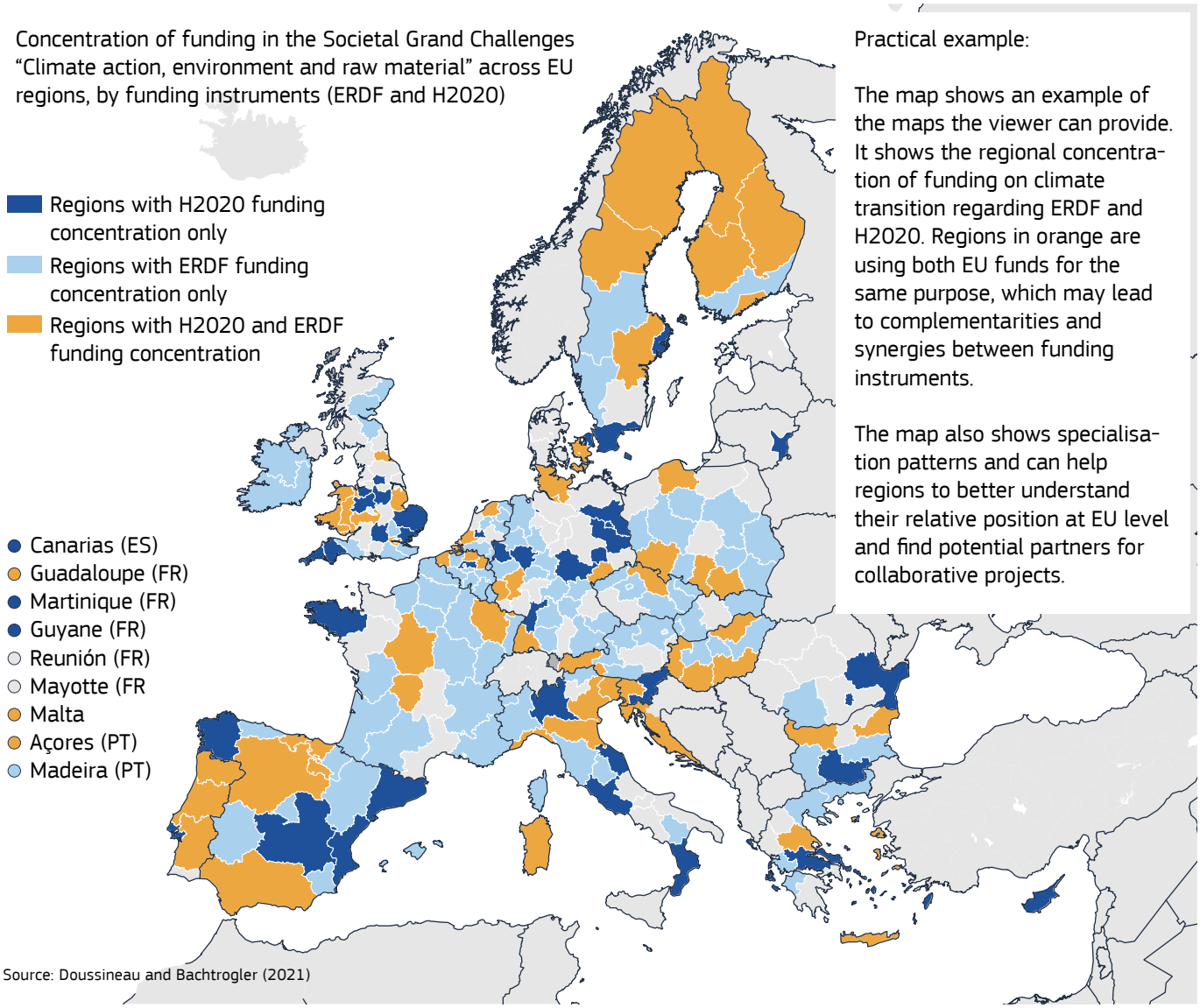
Purpose: To support in the diagnosis phase of the policy cycle

Use: To get an overview of where EU funds are used and the potential complementarities

You can use the **R&I Territorial Economic Data Viewer** (R&I TEDv) to support the diagnosis of the R&I policy. The R&I TEDv aims to:

- Simultaneously visualise territorial information on these funding sources both as a stand-alone statistical information and through a number of derived combined indicators.
- Easily zoom / compare sub-categories of spending reflecting the different taxonomies adopted in the monitoring / implementation of these funds.
- Perform bilateral regional benchmarking at the NUTS level of interest as well as through a set of pre-defined territorial category areas / grouping commonly used across Europe.
- Export statistical information (maps, histograms, etc.) as well as underlying data in a report-friendly format suitable for both static and dynamic documents.

Concentration of funding in the Societal Grand Challenges "Climate action, environment and raw material" across EU regions, by funding instruments (ERDF and H2020).



Practical example:

The map shows an example of the maps the viewer can provide. It shows the regional concentration of funding on climate transition regarding ERDF and H2020. Regions in orange are using both EU funds for the same purpose, which may lead to complementarities and synergies between funding instruments.

The map also shows specialisation patterns and can help regions to better understand their relative position at EU level and find potential partners for collaborative projects.

Find out more:
R&I https://s3platform.jrc.ec.europa.eu/synergies-tool

LEVELS OF GOVERNMENT
Regional; National; European

LEVELS OF RESPONSIBILITY
Managing funds

GOALS
Strategy design; Implementation

COMPETENCES
Spot opportunities for sustainability; Be financial and economy literate; Plan and manage sustainably

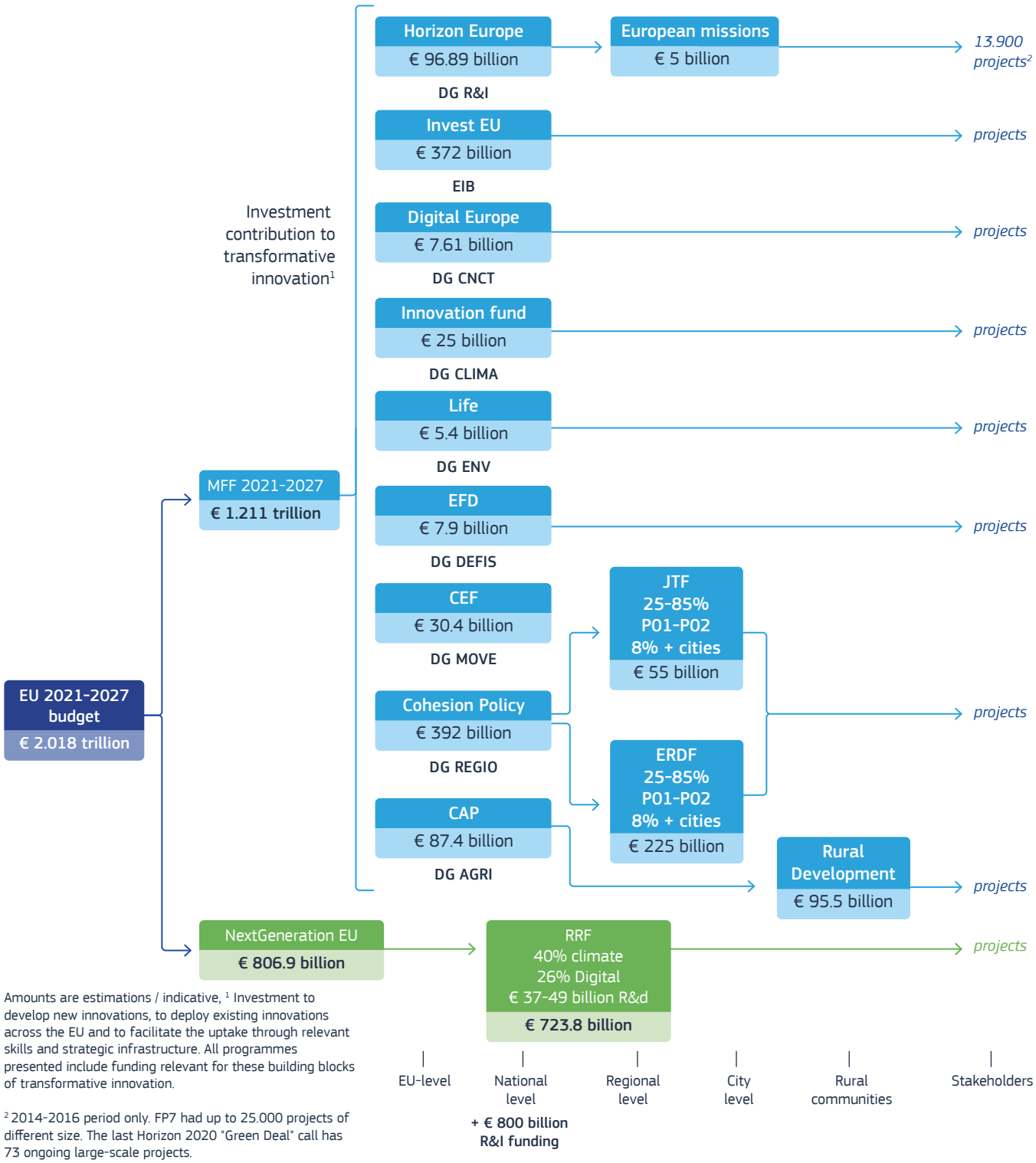
11 Mapping funding opportunities

Purpose: To map the main EU sources of R&I funding to support the transitions

Use: To get an overview of EU funds for the twin transitions

Research and innovation activities are central elements for the achievement of the twin transitions, as they are essential for the development of more sustainable products and solutions. However, access to finance is considered an important barrier to research and innovation activities. Public support, under the form of subsidies, grants or loans, can act as an instrument to overcome such obstacle and enhance the emergence of low-carbon technologies. The programming period 2021-2027 includes several EU financing instruments to support, in particular, green and digital innovative activities, and improve the regional innovation eco-system (e.g. supporting up-skilling and re-skilling labour force qualifications for the twin transitions). The figure below aims to give you an overview of the main sources of funding (grants and loans) financed by the EU budget, to support the green and digital transitions and the level of the accessibility: national, regional, final beneficiary.

Find out more:
Horizon Europe
InvestEU
Recovery and Resilience Facility (RRF)
Cohesion Policy



Amounts are estimations / indicative, [1] Investment to develop new innovations, to deploy existing innovations across the EU and to facilitate the uptake through relevant skills and strategic infrastructure. All programmes presented include funding relevant for these building blocks of transformative innovation.

[2] 2014-2016 period only. FP7 had up to 25.000 projects of different size. The last Horizon 2020 "Green Deal" call has 73 ongoing large-scale projects.

12 Strategic intervention logic

Purpose: To align strategic aims to stakeholder capabilities, resource allocation and expected results

Use: To ensure that each decision is taken on evidence-based information

A strategic intervention-logic approach is a six-step cascade process to identify solutions to territorial challenges by involving all stakeholders when making decisions over strategy adoption. This approach relies on the following: (1) all stakeholders share their data, ideas, expertise and expectations; (2) a documented assessment of the ecosystem can lead to a better selection of the next generation of activities and investments; (3) the proof of the available capabilities is used to demonstrate that stakeholders are able to deliver what they promised, (4) the expected results are taken into consideration to adopt a distribution grid for allocating financial and human resources (reverse action plan); (5) a clear description of what is expected from policy makers and stakeholders at each step reinforces the governance value chain, and (6) a permanent feedback system regarding the achievements and changes in the ecosystem is put in place to ensure constant monitoring and continuous improvement . With such approach, stakeholders are able to define their role in strategy implementation and hence, effectively deliver what they promised to achieve.

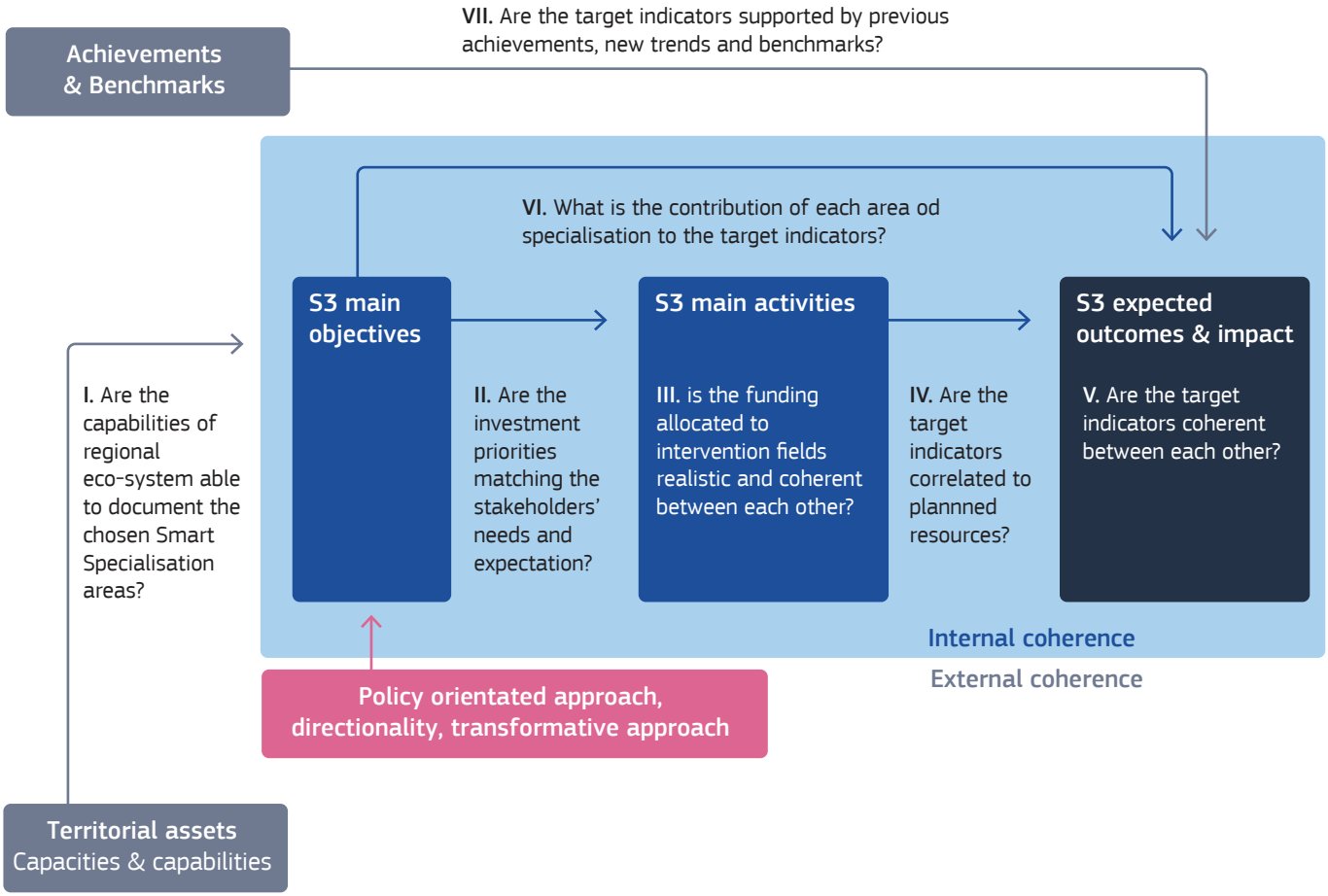
The concept of Smart Specialisation is rooted in the utilisation of the assets and resources that a territory can mobilise to address socio-economic challenges. The assessment of territorial capacities and capabilities is a precondition for any strategy design. An analysis of the territorial research and innovation capacities, existing infrastructures and equipment, and human capital is crucial to establishing the framework conditions. This assessment of the place-based assets aims to ensure that regional stakeholders involved in the S3 Entrepreneurial Discovery Process (EDP) and regional intermediary bodies will implement or fully benefit from the Strategy.

Any public policy intervention is designed through various actions such as assigning a budget, deciding on priorities, funding sources, and support measures. In public policy evaluation theory, the coherence of a public intervention involves looking at how well or not different actions work together. It may highlight components where synergies improve the overall performance or, conversely, point out tensions between objectives and associated activities, which are potentially incoherent or inefficient.

One can then further differentiate between the internal and external coherence of the logic of intervention. Assessing "internal" coherence requires considering how the various components of the same intervention operate together to achieve its objectives. Coherence is also necessary for other "external" components such as previous achievements or international benchmarking, or between interventions within the same policy area. The following questions should be addressed to appreciate the strengths of the intervention logic:

1. Are the chosen Smart Specialisation areas related to the existing capabilities of the regional eco-system (external coherence)?
2. Do the investment priorities match stakeholders' needs and expectations (relevance)?
3. Is the funding allocated to intervention fields realistic and coherent between each other (internal coherence)?
4. Are the target indicators coherent with the planned resources (internal coherence)?
5. Are the target indicators coherent between each other (internal coherence)?
6. What is the contribution of each area of specialisation to the target indicators (impact)?
7. Are the target indicators supported by previous achievements, new trends, and benchmarking (external coherence)?

As shown in the figure below, all decisions taken to design the Strategy and its implementation modalities should be well documented and coherent with other choices.



Source: Doussineau *et al.* (2021)

The operational capacity of smart specialisation requires human resources, management accountability skills and implementation budget. The administration should be able to respond to questions such as "Are the necessary human resources available?", "Are the implementation costs suitably taken into consideration?", "Who will be accountable for the management and implementation of the different parts of the strategy?" The department responsible for implementing the strategy must have the capabilities and skills needed. The regional administration must identify who will lead the implementation process and correctly quantify the implementation costs. The operationalisation of smart specialisation strategies must be performed across departments, avoiding the JIMA ("Just In My Administration" silo syndrome). The governance matrix must include an overview of the management activities, budget and accountability activities, implementation bodies and the accountability of the key stakeholders. The administration must realistically forecast the implementation costs.

Find out more:
An intervention-logic approach for the design and implementation of S 3 strategies: from place-based assets to expected impacts
https://www.onlines3.eu/phase-5-policy-mix/5-1-ris3-intervention-logic/

LEVELS OF GOVERNMENT
Local, Regional

LEVELS OF RESPONSIBILITY
Developing human resources

GOALS
Stakeholder mapping, Monitoring, Accumulating service provision capabilities

COMPETENCES
Spot opportunities for sustainability, Advise the political level based on evidence

13 Identifying regions and skills in transition

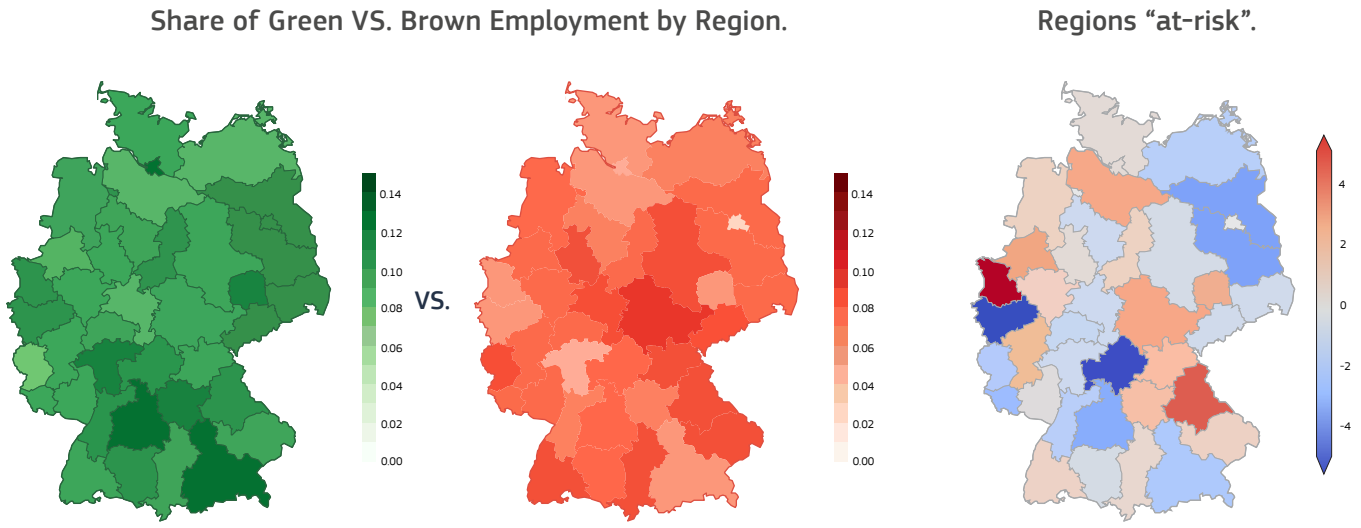
Purpose: To identify regions with higher shares of employment in declining sectors

Use: To design future-oriented policies for workers in declining sectors

The green transition will have an impact on employment. Some jobs in polluting industries will disappear, while the demand for new "green" jobs will increase. This will likely have profound effects on the geographical distribution of jobs since "green" jobs will not necessarily be created in the same regions where "brown" jobs are lost.

Ensuring a "fair" green transition also means supporting those negatively affected by it. This requires the development of education and training strategies that support re-skilling and up-skilling of workers (e.g. Apprenticeship 2.0). For this, it is essential to identify the skill profiles that are, and will be, in low and high demand as a consequence of the green transition. On the one hand, the demographic composition of employment across sectors and occupations needs to be considered: many workers in sectors and occupations negatively affected by the green transition are older than 50, have low educational levels and are reluctant to move. All these aspects reduce the expected gains from their re-skilling/up-skilling and hence limit the set of active labour market policies that can be used to support their re-employment. On the other hand, "green" jobs are not equally distributed among regions.

A granular analysis at both the geographical and labour market dimensions is essential as the ability of at-risk workers to move to in-demand occupations



Regions "at-risk" from the green transition in Germany (adapted from Egli & Zaussinger, 2021)

depends crucially on the transferability of their skill sets. The JRC is developing a framework that qualifies occupations as more or less "green" based on the prevalence of "green" tasks. In turn, this occupational classification allows measuring the share of "green employment", as well as "brown employment" at the regional level (panel 1 and 2).

This analysis can inform you on the size of the occupation-transition risk and opportunity in specific regions. This reflects the difficulty/ease of switching to green or neutral jobs, and it is based on the "distance" between the skills of workers currently employed in brown occupations and those that would be needed in (new) green and neutral jobs. Even regions that are high in green occupations and low in brown ones might be considered "at risk" if the "conversion" of brown jobs into greener jobs is problematic from a skill perspective. This would happen if the skills currently demanded by (the few) existing brown jobs would not be useful for/applicable to greener jobs. In this case, workers employed in brown jobs would have to significantly upskill.

Find out more:

Labour Markets and the Green Transition: a practitioner's guide to the task-based approach

Green Deal Going Local: Delivering climate-neutrality, leaving no one behind

LEVELS OF GOVERNMENT
Regional; National

LEVELS OF RESPONSIBILITY
Promoter; Industrial policy

GOALS
Legitimisation; Problem framing; Monitoring

COMPETENCES
Think systemically; Manage transformations; Values for sustainability Plan and manage sustainably

14 Industrial transition pathways

Purpose: To implement and coordinate industrial transition pathways

Use: To help public and private groups to build territorial transition pathways

Transitions in territories should go hand in hand with transitions at EU level. The European Industrial Strategy is developing, for accelerating the digital and green transition, the co-creation of **transition pathways for 14 European industrial ecosystems**. Transformative innovation processes at territorial level need to be aligned with transitions planned at systems level in Europe. Connecting well territories and their transition strategies to the EU system-level transition pathways is crucial for a coordinated approach in transforming EU's industrial ecosystems towards sustainability.

Additionally, territories can integrate the place-based perspective in the transition of European industrial ecosystems and help involve a diversity of players across Europe in the transition of EU systems. This way, territories can be a bridge between European value chains and local decision-makers in their territory. Clusters can be a good bridge for such connections. The figure below indicates initiatives and financing opportunities for better coordination between territories and European value chains in implementing the twin transition.

Building blocks for increasing coordination between places and EU industrial ecosystems

Initiatives for coordinating territorial and European systems transformation		Examples of additional initiatives for financing coordination	
Euroclusters or Join Clusters Initiatives	• Support the implementation of the industrial strategy • 1 Eurocluster for each industrial ecosystem and 16 horizontal Euroclusters.	Interregional Innovation Investments (13)	Funds mature joint innovation projects and supports S3 stakeholders in specific value chains.
Industrial Alliances	Facilitate stronger cooperation between a wide range of public and private partners in a given value chain (incl. civil society).	Important Project of Common European Interest (IPCEI)	State-aided larg-scale projects which address major market failures of significant benefits to the Union and its citizens, bringing together knowledge expertise, financial resources and economic actors from across the union.
Interregional S3 Partnerships	Connect EU regions around thematic areas of smart specialisation.	Interreg Europe	Cooperation instrument for public actors. Could be used for mapping multilevel gaps and for defining new policy instruments for involving territories in the transition process.
European Partnerships	Bring together EC and private and public partners around selected R&I initiatives	European Innovation Ecosystems (EIE)	Funds cooperation among national, regional and local actors and supports connecting innovation ecosystems and upscaling companies.

Find out more:
Transition Pathway for Tourism

LEVELS OF GOVERNMENT
Local, Regional

LEVELS OF RESPONSIBILITY
Promoter; Developing innovation strategies

GOALS
Goals setting; strategy design

COMPETENCES
Frame policy problems; Work with others; Shape change; Manage transformations

15 Identifying local challenges

Purpose: To identify and solve local problems collaboratively

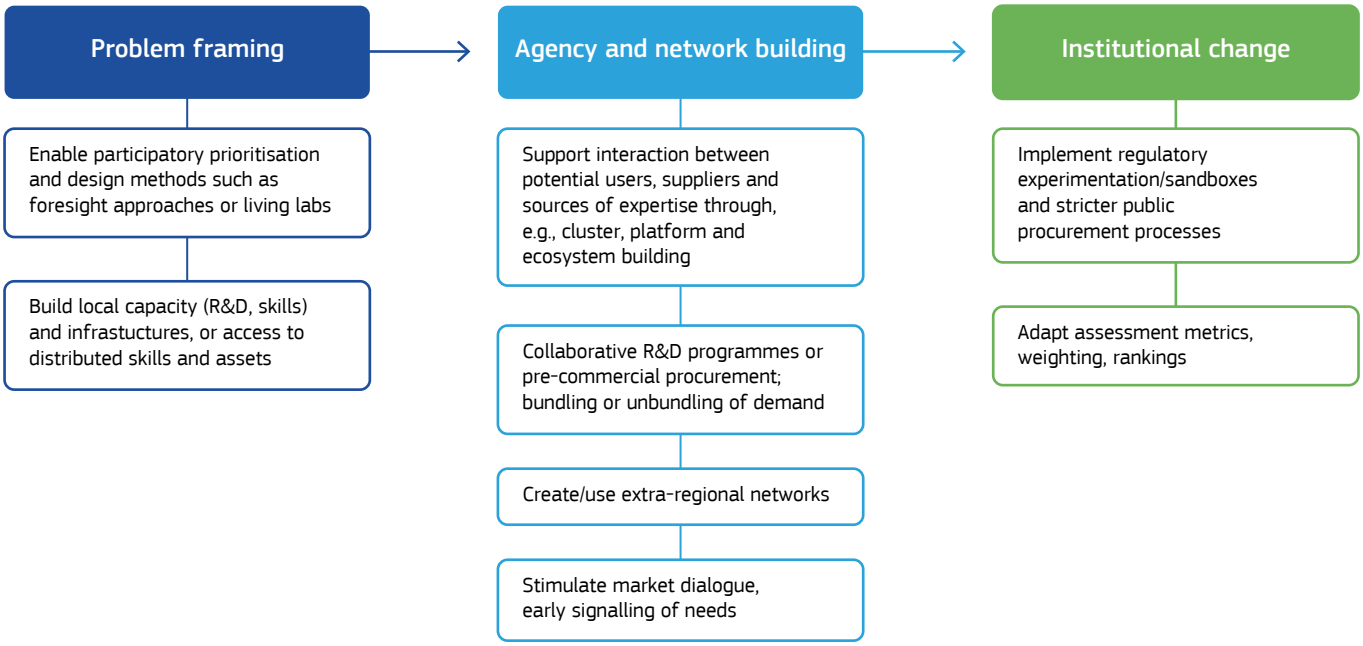
Use: To break policy framing into smaller steps

Try and think about local problems as being more than market failures. Instead, they represent **opportunities** where through innovation, you and your stakeholder network can build a more sustainable territory, while creating multiple value for the local community and its economic development.

Innovation policies need to be designed around a close understanding of the local context and those mostly affected by them. It is key to engage local decision-makers, networks and institutional entrepreneurs as they have knowledge of the problem, shared values, and the willingness to co-create locally-tailored solutions. This will generate access to resources, legitimacy, and solutions to local problems.

This way market creation is enabled through shared visions of local problems shaped by local stakeholders (problem framing), their interactions and sense of ownership towards building solutions (agency and network building), and the active involvement of institutions (institutional change). You can take a look at the steps below.

Areas of public intervention to enable market creation to tackle local problems.



Source: Kieron Flanagan *et al.*, 2022

Find out more:
Towards a problem-oriented regional industrial policy: possibilities for public intervention in framing, valuation and market formation

LEVELS OF GOVERNMENT
Regional; National

LEVELS OF RESPONSIBILITY
Monitoring and control

GOALS
Monitoring

COMPETENCES
Advise the political level based on evidence; Frame policy problems; Spot opportunities for sustainability

16 Monitoring the SDGs at local and regional level

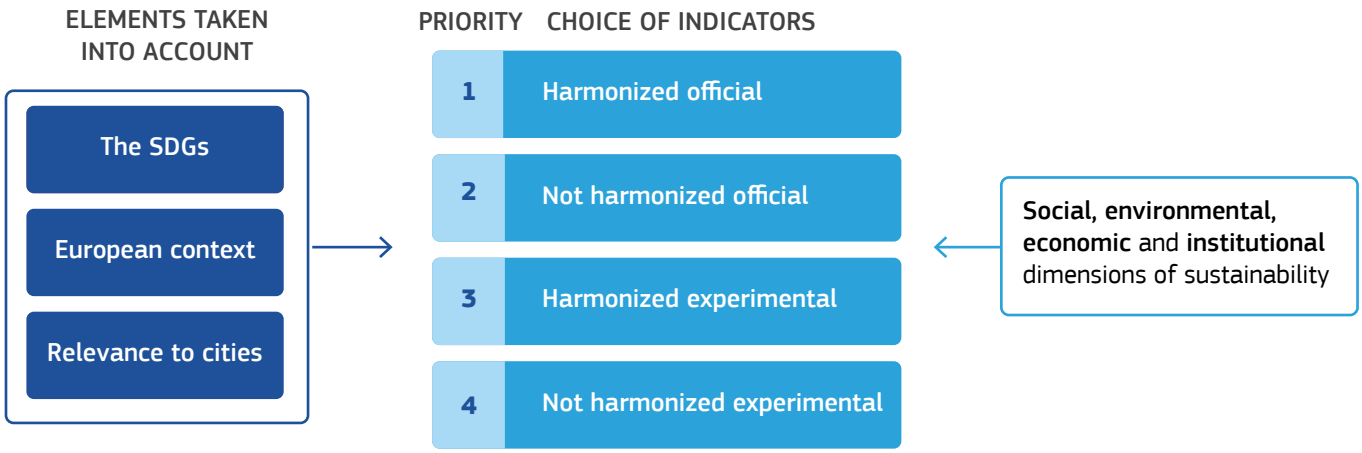
Purpose: To monitor sustainability in an integrated and holistic way

Use: To track place-based progress on SDGs to inform policy

The 2030 Agenda for Sustainable Development and the SDGs offer local and regional governments a powerful framework to design and monitor holistic and transformative action to achieve sustainability. In recent years, cities and regions like yours have started to use the SDG Voluntary Local Reviews (VLRs) to review the implementation and achievement of the 2030 Agenda at local scale, based on the blueprint of the Voluntary National Reviews. To monitor progress, VLRs help refine and sustain the transformative and inclusive actions of local change-makers towards the achievement of SDGs.

Local and regional reviews can be tailored to your region needs, adapting targets and key indicators to specific context and challenges. This enables you to monitor progress on specific challenges, and to benchmark with peers. New methods include examples of both official and experimental indicators to develop effective SDG local monitoring systems specifically targeted to European cities and regions. With these tools, governments and stakeholders can go beyond silos between sectors and design or adapt strategies based on review of reliable and timely data and information.

Rationale for the selection of the SDG indicators for Local and Regional Governments (Siragusa *et al.* 2020).



Find out more:
European Handbook for SDG Voluntary Local Reviews – 2020 edition
Localising the Sustainable Development Goals - EU Science Hub (europa.eu)

LEVELS OF GOVERNMENT
Local

LEVELS OF RESPONSIBILITY
Developing innovation strategies

GOALS
Strategy design; implementation

COMPETENCES
Frame policy problems; Values for sustainability; Think systemically; Mobilise resources sustainably

17 JRC tools for sustainable urban development

Purpose: To provide tools for strategies for sustainable development

Use: To design and implement a strategy for sustainable development

Cities, alongside regions, can play a pivotal role in achieving the SDGs. The 'urban dimension' of EU policies has grown over recent years During the 2014-2020 programming period, cohesion policy has made sustainable urban development (SUD) strategies compulsory, and their relevance has been even strengthened in 2021-27. Strategies in urban areas should apply an **integrated and place-based approach**, with emphasis on multi-sectoral policy, multi-level and multi-stakeholder governance, and promoting multi-territorial and community-led processes (Fioretti et al, 2020).

The Urban Agenda for the EU (2016) explicitly mentions the need for sound and strategic urban planning linked with smart specialisation strategies. SUD strategies can cover a variety of activities that could help implementing innovation policies at local level, directly including R&I in their portfolio or investing in complementary policy areas such as education, training, infrastructures and entrepreneurship (Larrea *et al.* 2019).

JRC provides **methodological support** to cities, managing authorities and other stakeholders involved in the design and implementation of SUD strategies. There are six building blocks that operationalise the EU integrated approach to sustainable urban development: *strategic dimension, territorial focus, governance, cross-sectoral integration, funding and finance, and monitoring*. To build synergies between innovation policy and cohesion policy, these six building blocks are meant to be used in the scope of the Cities mission when preparing and executing integrated climate neutrality plans to support climate neutrality in an integrated and sustainable way (RTD, 2021, Info Kit for Cities – Cities mission).

JRC tools for sustainable urban development available on the Urban Data Platform plus.

STRAT-Board

Interactive tool developed by the Joint Research Centre (JRC) and DG REGIO under the umbrella of the Knowledge Centre for Territorial Policies.

It aims to provide a continuously updated state of play on how European Structural and Investment Funds (ESIF) support the integrated approach to urban and territorial development.

Handbook of Sustainable Urban Development Strategies

The Handbook of Sustainable Urban Development Strategies provides methodological support to cities, managing authorities and other stakeholders involved in the design and implementation of urban strategies under Cohesion Policy by creating room for exchange of experience and policy learning.

Self-Assessment Tool for Sustainable Urban Development strategies

The Self-Assessment Tool for Sustainable Urban Development strategies (SAT4SUD) is intended to be used by Local Authorities and Managing Authorities of EU Cohesion Policy.

It aims to support them when verifying to what extent the strategy builds on an integrated and participatory approach.

Find out more:

https://urban.jrc.ec.europa.eu/urbanstrategies/
https://urban.jrc.ec.europa.eu/urbanstrategies/strategic-dimensions#challenge3-synergies-with-other-policy-frameworks
https://urban.jrc.ec.europa.eu/sat4sud/
https://urban.jrc.ec.europa.eu/strat-board/#/where

LEVELS OF GOVERNMENT
Regional; European

LEVELS OF RESPONSIBILITY
Developing innovation strategies; Industrial policy

GOALS
Problem framing; Stakeholder mapping; Strategy design

COMPETENCES
Be futures literate; Values for sustainability; Think systemically

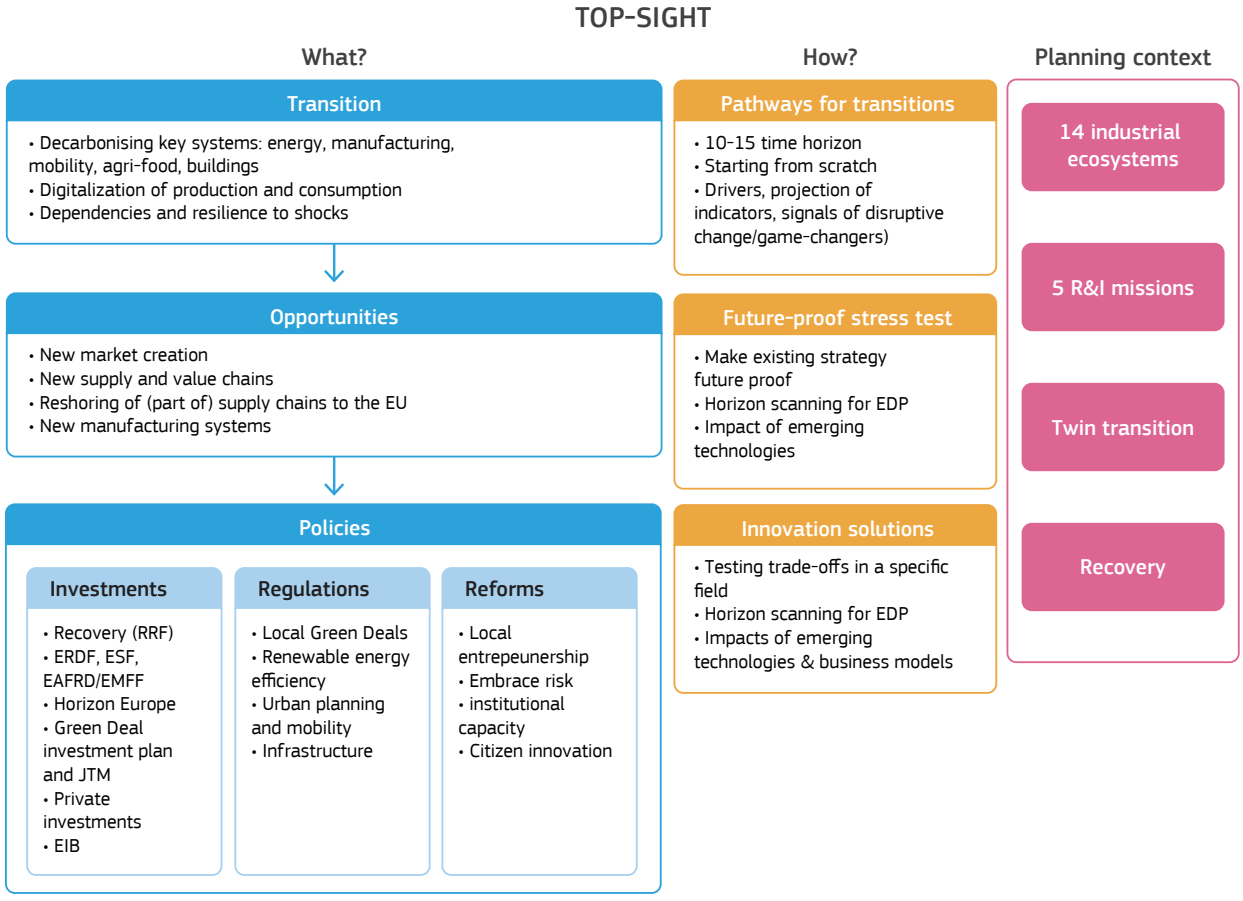
18 Foresight

Purpose: To use anticipation in policy design

Use: To orient regions towards opportunities emerging from the twin transitions

The twin transition requires paradigm shifts towards new value chains and systems. The recovery from the Covid-19 crisis aims at the same time to bring the EU closer to this transition, and to increase resilience of European territories for the unexpected. The needs for paradigm shifts, increased resilience and strategic autonomy requires EU territories to draw on collective anticipatory intelligence. The nature of the changes required also calls for different approaches to anticipation, and on combining both quantitative and qualitative knowledge and methods.

The PRI TOP-sight tool considers *Transitions* (green, digital, strategic autonomy), *Opportunities* (markets, value chains, industrial systems, reshoring of activities, etc.) and public *Policies* (national, regional, urban, local) to reap benefits for local jobs and value creation through PRI. It identifies opportunities for innovations emerging from the twin transition, primarily within the 14 industrial ecosystems. This tool allows you to draw opportunities from analysis of specific transitions, and translate them into policies regarding investments and strategies, regulations, and reforms.



Find out more:
Foresight tools: https://knowledge4policy.ec.europa.eu/foresight_en / Future technologies: https://ec.europa.eu/info/publications/future-technology-prosperity_en / National STI trends: https://stip.oecd.org/stip/

LEVELS OF GOVERNMENT
Local; Regional; National

LEVELS OF RESPONSIBILITY
Monitoring and control; Evaluation of projects/ operations

GOALS
Policy objectives; Monitoring; Evaluation;

COMPETENCES
Plan and manage sustainably; Think critically; Think systemically; Be financial and economic literate

19 Monitoring and evaluation in an impact-based policy

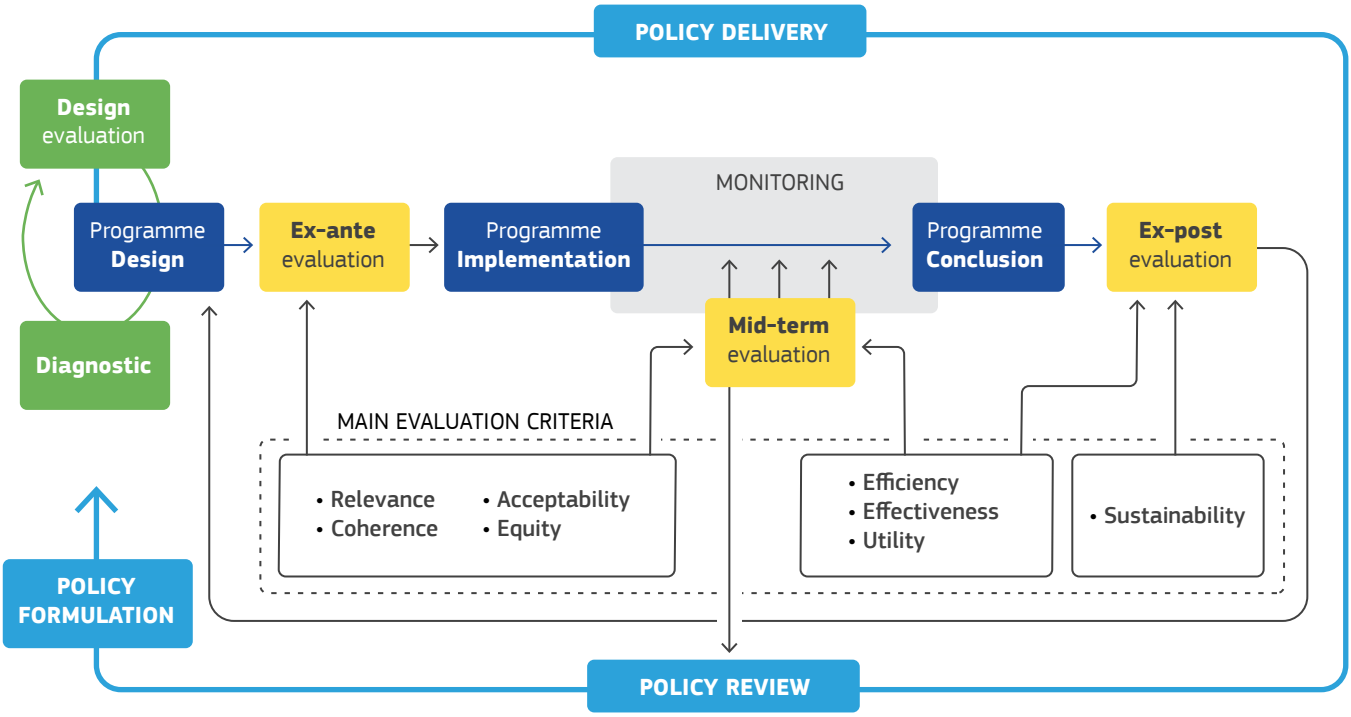
Purpose: To understand the role of monitoring and evaluation in policy design

Use: To put in place an evaluation and impact assessment procedure

Monitoring and evaluation are key concepts in the different phases of the policy cycle. With an impact-based policy, evaluation should support programme design or policy formulation, instead of appearing only before implementing the programme. Designing a monitoring and evaluation system should also be part of the policy design.

Policy or programme design can be supported not only through the lessons learned from the past (e.g. previous ex-post evaluation), but also from several assessment tools used to forecast the best mechanism(s) and pathways to achieve the targeted goal(s) and to reduce risk and uncertainty. The singularity and higher complexity of the PRI features, also point to the need of designing and implementing a different monitoring and evaluation system (see figure below). It implies moving from a traditional approach to other methods that are more inclusive and participative. It also involves adding other evaluation criteria (e.g. equity and acceptability) in addition to the traditional ones (relevance, coherence, efficiency, effectiveness, utility, and sustainability).

Monitoring and evaluation system in PRI policy cycle.



• **Relevance** (justification of the strategy or priorities chosen • based on socio-economic-sustainable needs wich can evolve and revised in mid-term analysis • objective-needs relationships)

• **Coherence** (compatibility of the intervention with other intervention(s) in a country/region)

• **Acceptability** (support of policy design and implementation by society, decision-makers and decision-takers)

• **Equity** (intragenerational and intergenerational effects)

• **Efficiency** (optimal use of resources • input-ouput relationship • output maximum and minimum input)

• **Effectiveness** (success of resources used to achieve objectives and goals • objectives-outcomes relationship)

• **Utility** (effect-needs relationship)

- - - - - - - - - - -

• **Sustainability** (durability and continuity of the effects)

Source: Own elaboration based on European Commission (2013) and Shahab *et al.* (2019).

Find out more:

EVALSED :The resource for the evaluation of Socio-Economic Development - Evaluation guide

Transformative Innovation Consortium Platform

20 What to monitor?

Purpose: To critically tailor monitoring for PRI

Use: To put in place a monitoring system

Under a traditional approach, monitoring refers to a periodic process of analysing the outputs. In the context of PRI it must go beyond and focus on examining its outcomes and impacts. Nevertheless, in both cases, it should be carried out during the execution phase of a programme/policy intervention, with the aim of correcting any deviation from desired objectives/goals. **PRI monitoring should differ in terms of scope, dimensions, and focus of analysis** on the basis of its singular characteristics, as described in the figure below. For instance, instead of monitoring achievements, measured by indicators associated with subsidized beneficiaries, it should focus on the monitoring of outcomes and net impacts. Furthermore, it should also screen the spillovers at the territorial level to assess not only the desired effects but also the non-desired effects. Such concepts are also associated with policy footprint, i.e. the quantification of the environmental footprint of the policy choice along the value chain, from the development and production of new products/technologies to their end-of-life after their use.

Traditional *versus* PRI monitoring methodological approaches.

	TRADITIONAL APPROACH	PRI APPROACH
SCOPE	• Performance-based analysis	• Impact-based analysis
DIMENSIONS	• Socio-economic dimensions	• Stakeholders involvement • Policy-mix (synergies and complementarities) • Socio-economic and environmental dimensions
FOCUS	• **Achievements at beneficiary-level** **Static** in given period (e.g. R&I investments, number of subsidized firms, number of employment created by subsidized firms, firms in R&D cooperation between firms or university-firm)	• Multiple-level perspective • **Direct impacts and spillovers at territory-level** (desired and non-desired effects) • **Dynamic** over time to ensure the continuity of the effects

Source: Own elaboration.

Find out more:
EVALSED :The resource for the evaluation of Socio-Economic Development - Evaluation guide
The Annual Climate Action Monitor (OECD)

LEVELS OF GOVERNMENT
Local, Regional

LEVELS OF RESPONSIBILITY
Monitoring and control; Evaluation of projects/ operations

GOALS
Policy objectives; Monitoring; Evaluation

COMPETENCES
Plan and manage sustainably; Work with others; Think critically; Think systemically

21 Example of the monitoring system of Catalonia

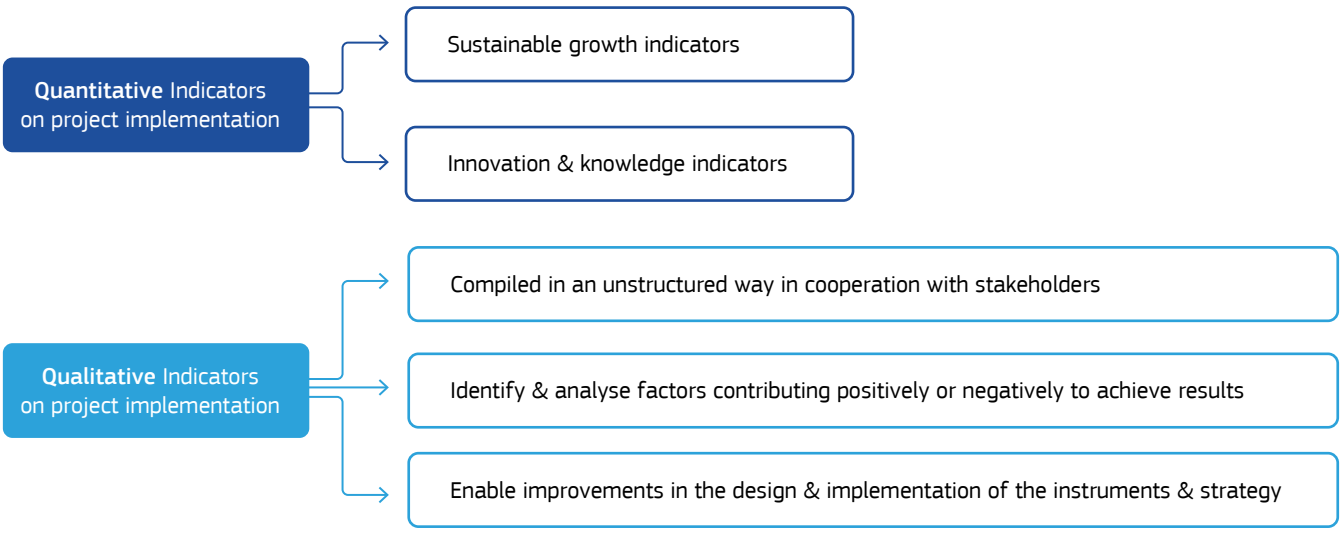
Purpose: To design dynamic and participatory monitoring systems

Use: To monitor PRI features

Monitoring systems in a PRI dimension require to be dynamic and participatory, thus focusing more on strategic learning than on achieving pre-established objectives. This comprises key elements including governance, articulation of the contribution by key stakeholders, strengthening synergies, maximising collective impacts, and putting in place a common system of indicators and monitoring leading to a dynamic overview for proper decision-making. The monitoring system has to be planned immediately at the kick-off of the strategy.

However, you should bear in mind that a dynamic and participatory monitoring system has to be flexible so that the questions that it is trying to answer can evolve over time. This will lead to more effectiveness. The monitoring system has to take into account the complexity of the real situation in all its dimensions and interrelations, dovetailed with the development and exploration of tools and indicators to capture such complexity.

You can see in the figure below some sources of indicators that you may want to consider when developing a monitoring system fit for the needs in your region. These are the indicators used in the Catalonia monitoring system. Could you take inspiration from these practical indicators?



Find out more:
https://www.interregeurope.eu/policylearning/good-practices/item/1567/ris3cat-catalonian-ris3-monitoring-system/
http://catalunya2020.gencat.cat/web/.content/00_catalunya2020/Documents/angles/fitxers/interreg-ris3cat-en.pdf

LEVELS OF GOVERNMENT
Local, Regional

LEVELS OF RESPONSIBILITY
Monitoring and control; Evaluation of projects/ operations

GOALS
Policy objectives; Monitoring; Evaluation

COMPETENCES
Plan and manage sustainably; Think critically; Think systemically; Be financial and economic literate

22 What and how to evaluate?

Purpose: To have an evaluation system fit for PRI

Use: To put in place a continuous evaluation system

Evaluation refers to the process of determining the success or failure of a policy/programme. In a traditional approach, there are three main different types of evaluation: i) *ex-ante analysis* conducted before programme implementation; ii) *mid-term analysis* carried out once during the period of implementation; iii) *ex-post analysis* aiming to account for the achievement of expected impacts (see Fiche 19). The evaluation framework of PRI should follow a traditional approach but include a more continuous process. It should go hand in hand with the evaluation of investment projects to be implemented in the territory and the monitoring process. As an impact-based policy, the starting point lies in defining the expected impact(s) and then designing the programme/policy intervention and identifying the inputs to achieve it (or them). Inputs include not only funding opportunities but also multi-level governance, policy-mix, and stakeholder involvement. The assessment of outcomes should also go beyond the direct effect at the beneficiary-level and include spillovers effect in the territory and along the value chain (multi-level perspective).

In your PRI, you can use a mix of techniques and methods for evaluation, and combine qualitative and quantitative approaches. Qualitative methods refer to surveys, interviews, reviews, focus groups and case studies. Quantitative methods include counterfactual analysis, multi-criteria analysis, and cost-benefit analysis, among others. Since PRI is about trade-offs, co-benefits, and stakeholders involvement, you should prioritize multi-criteria analysis (MCA) as one preferred method (but not exclusively), in combination with the results of other methodologies, for instance, Cost-benefit Analysis (CBA).

Multi-criteria analysis and Cost-benefit analysis: When to use it?

	DEFINITION	WHEN TO USE IT?
Multi-Criteria Analysis (MCA)	• Tool used to compare several interventions in relation to several criteria • It may involve weighting, reflecting the relative importance attributed to each of the criteria	• *Ex-ante* evaluation for comparing policy options or projects proposals for clarification purpose • *Ex-post* evaluation to compare the relative success of the different components of the intervention
Cost-benefit Analysis (CBA)	• Tool for judging the advantages of the intervention from the point of view of all the groups concerned, and on the basis of a monetary value attributed to all the positive and negative consequences of the intervention • It estimates a fictive price or the willingness of beneficiaries to pay to obtain positive impacts or avoid negative ones. It can also be estimated by the loss of earnings in the absence of the intervention	• Usually for ex-ante evaluation • When it is not possible to use market price to estimate a gain or a loss of an intervention • To reveal missing information of the effect of the intervention • It allows (even if challenging) to express environmental impacts in monetary terms • Should be used with multi-criteria analysis

Source: Own elaboration based on European Commission (2013), Gamper and Turcanu (2007), Hanley and Barbier (2009).

Find out more:

EVALSED :The resource for the evaluation of Socio-Economic Development - Evaluation guide

Better regulation tool box (European Commission)

Transformative Innovation Consortium Platform

LEVELS OF GOVERNMENT
Regional; National

LEVELS OF RESPONSIBILITY
Monitoring and control; Collecting and evaluating ideas

GOALS
Monitoring; goals setting; Strategy design

COMPETENCES
Spot opportunities for sustainability; Think systemically; Frame policy problems

23 Measuring and monitoring resilience

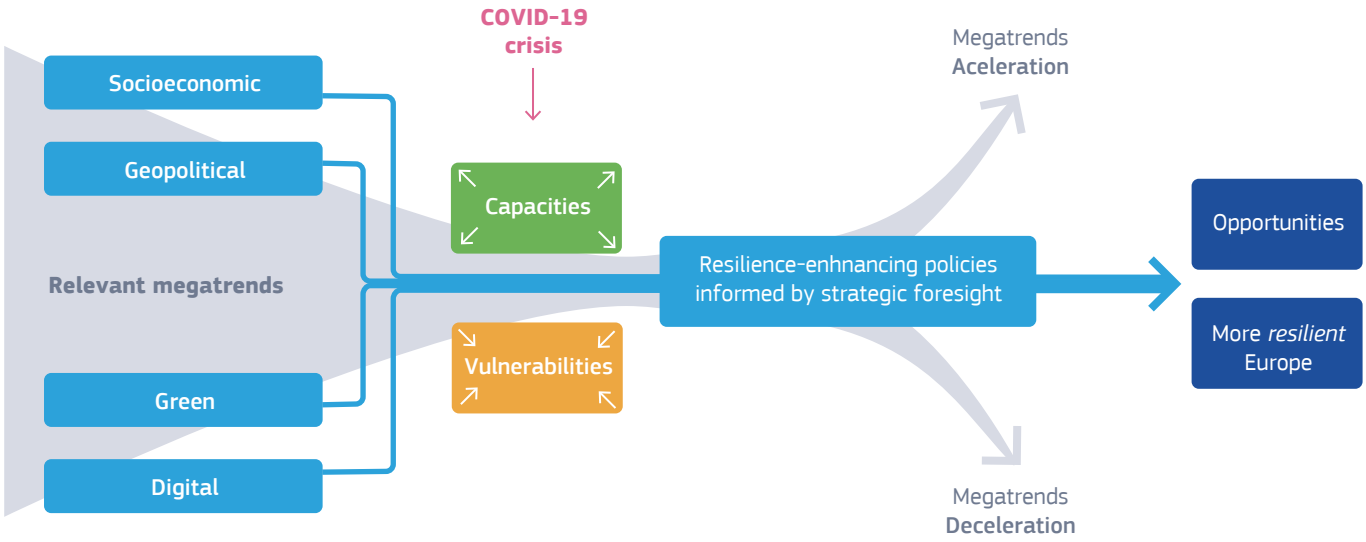
Purpose: To react and take advantage of transitions

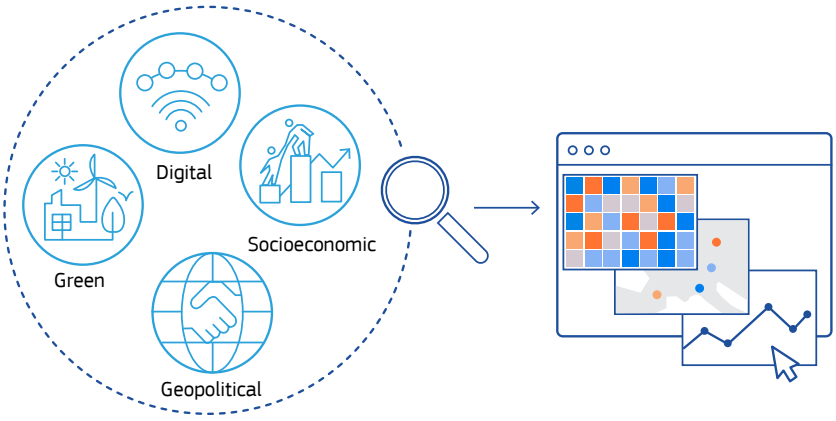
Use: To identify and monitor capacities and vulnerabilities

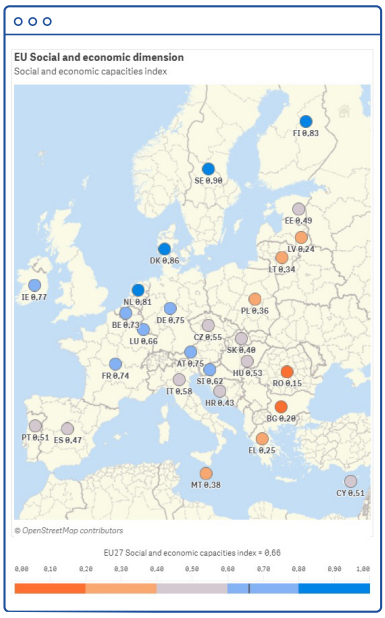
The resilience dashboards aim to provide a holistic assessment of resilience in the EU and its Member States. In relation to ongoing societal transformations and challenges ahead, the dashboards assess **resilience as the ability to make progress towards policy objectives amidst challenges**. Through a broad set of indicators, the resilience dashboards depict the relative strengths and weaknesses of countries and help to identify areas for further analysis and potential policy actions. The indicators span in four dimensions: **social and economic, green, digital, and geopolitical.**

The dashboards include a selection of indicators that show (1) *capacities* - enablers and/or opportunities to navigate the transitions and face future shocks; and (2) *vulnerabilities* - obstacles or aspects that can worsen the negative impact of the challenges related to the green, digital, and fair transitions.

Partnerships for Regional Innovation can play a key role in enhancing the resilience of regions. Assessing and monitoring resilience at regional level can help local government shed light on policy areas that could deserve their attention. The JRC offers help for the regions to design and develop such assessment and monitoring tools for their respective circumstance, in terms of data selection, preparation and benchmarking.



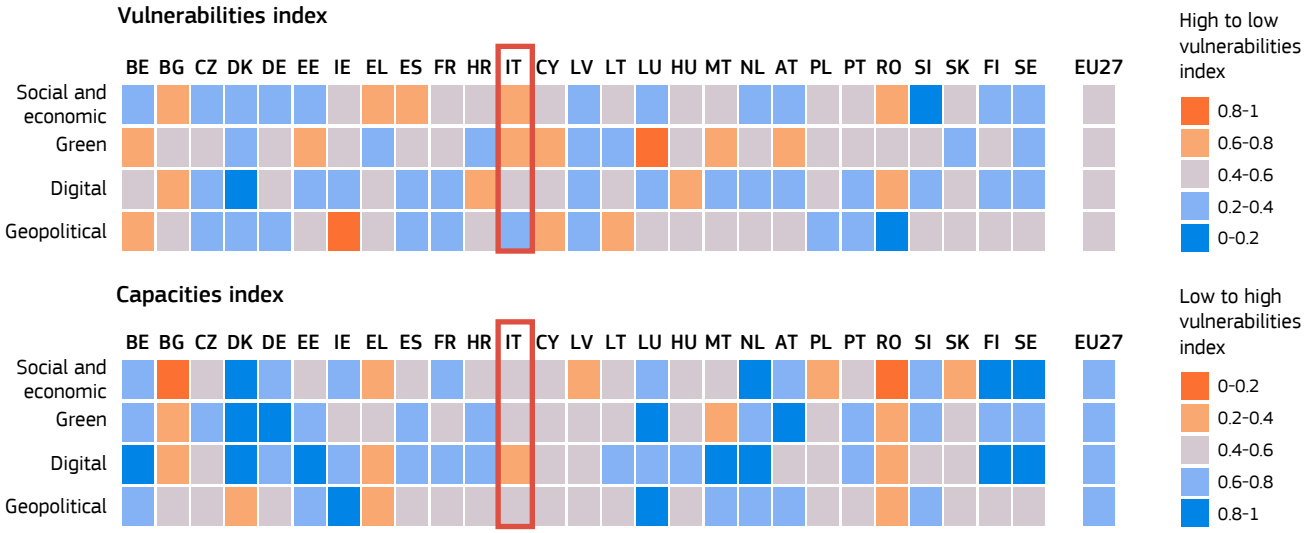




Resilience dashboard in action: the case of Italy

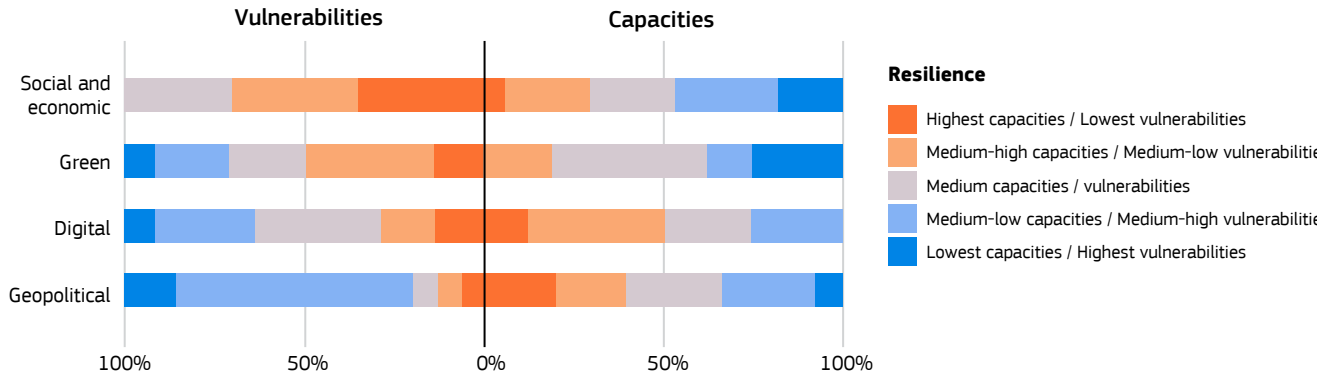
Based on the **Resilience Dashboards**, Italy displays **medium-high vulnerabilities in the social and economic and the green dimensions** relative to other Member States. In the digital dimension its vulnerabilities fall into the medium range, while in the geopolitical dimension it has medium-low vulnerabilities relative to other countries. On the capacity side, it has medium capacities in all dimensions but **medium-low capacities in the digital one**. The weaknesses in the social and economic dimension are also reflected by the large share of indicators in the high vulnerability range, such as the employment in energy-intensive sectors or in manufacturing with high automation risk, and the regional dispersion in household incomes. In the green dimension vulnerabilities relate to the sustainable use of resources, soil and biodiversity. Italy exhibits significant vulnerabilities in relation to the ongoing transitions in its **labour market** and industrial structure. Resilience indicators in the **social area** are also weak.

Synthetic resilience indices across dimensions.



Note: The synthetic indices aggregate the relative situation of countries across all considered indicators. A higher vulnerabilities index indicates higher vulnerabilities (from blue to dark orange), while a higher capacities index indicates higher capacities (from dark orange to blue), compared with other countries.

Italy's capacities and vulnerabilities across the four dimensions of the resilience dashboards.



Note: The figure shows the share of indicators that fall within each of the five colours, by vulnerabilities and capacities within each dimension. Each dimension includes approximately 30 indicators. Dark blue indicates the top 12.5% of the underlying distribution (highest values in case of capacities, lowest values in case of vulnerabilities). The range 12.5%-37.5% is light blue, 37.5%-62.5% is grey, 62.5%-87.5% is light orange and the bottom 12.5% is dark orange.

Find out more:
https://ec.europa.eu/info/strategy/strategic-planning/strategic-foresight/2020-strategic-foresight-report_en
https://ec.europa.eu/info/strategy/strategic-planning/strategic-foresight/2020-strategic-foresight-report/resilience-dashboards_en
https://joint-research-centre.ec.europa.eu/resilience_en

LEVELS OF GOVERNMENT
Local, Regional

LEVELS OF RESPONSIBILITY
Developing innovation strategies

GOALS
Developing public administration;Coordinating across levels / portfolios; Transfers of authority

COMPETENCES
Work with others; Spot opportunities; Frame policy problems

24 Guiding principles for a Whole-of-Government approach implementation

Purpose: To define guiding principles for a WoG

Use: To improve collaboration and coordination among government levels

Implementing a Whole-of-Government (WoG) approach can be a complex exercise that requires a careful balancing act between existing features of the governance system and new features aimed at **improving collaboration, coordination and effectiveness across government departments and agencies**. Based on general experience with WoG, the following principles could guide the implementation:

1. Perform a thorough assessment of existing obstacles to cooperation and identify possible solutions that may require a staged approach	Difficulties of subordinate administrative units to cooperate can arise from various reasons, including deep roots in organisational design and cultures, leadership patterns or cultural legacies. Identifying solutions to improve collaboration may require new administrative arrangements that can sometimes be too complex to apply in a single stage and may require a staged approach, where new changes build on the improvements achieved in previous stages.
2. Understand the causes of 'silo mentalities' and the factors explaining their persistence	A WoG approach is generally seen as positive, but "silo mentalities" may also exist for a good reason. They may derive from well-defined vertical and horizontal organizational boundaries, division of labour and specialization patterns within modern organizations, and should not always be seen as a symptom of obsolete thinking. Understanding their causes and reasons of persistence will help assessing what should stay and what should be changed.
3. Allocate adequate time and resources, address unintended risks and consequences	Implementing a WoG approach can be a long-term project that takes time, new skills, changes in organizational culture, and the building of mutual trust relations. Unintended risks or consequences may also appear, that need to be addressed early in the process.
4. Balance accountability and risk management	Implementing a WoG joint action, common standards, and shared values may sometimes imply less clear accountability and risk management at the level of individuals vs. the agency as a whole. The challenge is to balance better vertical and horizontal accountability within the organization with individual responsiveness and responsibilities. Fundamental changes in accountability systems, dominant cultures, cost estimations and structural arrangements are necessary for government departments to work horizontally rather than engage in competition and rivalry.
5. Acknowledge the politically sensitive nature of WoG actions and promote incentives for all parties	WoG initiatives are not neutral administrative techniques. Accountability, legitimacy, power relations, and trust in government organizations are fundamentally political issues. Identifying appropriate incentives for all parties involved may help the collaboration and success of joint actions.
6. WoG needs a bottom-up and cooperative approach rather than high-level politics	High-level politics and changes in central government organizations are not necessarily the most important reform tool for promoting WoG initiatives. WoG is largely about lower-level politics and getting people on the ground in municipalities, regions, local government organizations, civil society organizations, and market-based organizations to work together. WoG needs cooperative effort and cannot easily be imposed from the top-down (Pollitt 2003).

Source: Based on Christensen and Lægreid (2007)

Find out more:

Pollitt, C. (2003), The Essential Public Manager. Maidenhead, UK. Open University.

LEVELS OF GOVERNMENT
Local, Regional

LEVELS OF RESPONSIBILITY
Developing innovation strategies

GOALS
Developing public administration; Coordinating across levels / portfolios; Transfers of authority

COMPETENCES
Work with others; Spot opportunities; Frame policy problems

25 Steps towards a Whole-of-Government approach

Purpose: To identify steps towards a WoG

Use: To set the ground for better coordination and collaboration leading to synergies

A whole of government (WoG) approach is a comprehensive way to assemble resources and expertise from multiple agencies and groups within and outside the government to address problems with interrelated social, economic and political causes, to create comparative advantage and maximize the use of resources. The approach requires a good understanding of the continuous dynamics between team members to solve problems, coordinate responses and ensure the necessary resources. Some specific implementation steps have been described in the literature, drawing on case studies, e. g. the Marshall Plan, the humanitarian response to Kosovo and the US President's Emergency Plan for AIDS Relief.

General purpose	Specific steps
1. Establish an adaptable ecosystem approach with a clearly defined leader.	• Use technology to facilitate communication and interaction. • Identify a single acknowledged leader to provide strategic direction, resolve disputes, evaluate progress towards top-level goals and initiate course changes as needed. • Adjust the identification of the ecosystem leader to circumstances: it may require continuity when an agency or an individual initiates the ecosystem, or consensus, when the WoG approach is mandated by a higher authority not closely involved in execution and the lines of leadership may be less clear. • Recognise the leader's authority to add or remove players, as the shared mission evolves .
2. Clearly define the problem	• Ensure consensus on problem definition and strategy to follow, shared understanding of root causes to ensure tight coordination. The leader has an essential role in securing buy-in on the nature and definition of the problem. • Ensure diversity in ecosystem members to offer different comparative advantages, expertise, priorities, robustness of the WoG.
3. Identify and mobilize the right stakeholders	• Select the right players and tools: only the stakeholders that possess necessary tools to achieve the mission (offices, bureaus, and individuals). • Avoid wasteful duplication or a diffusion of authority and responsibilities that leads to inaction. • Keep a lean ecosystem (not too many actors, only those with the right tools) • Help stakeholders understand how other entities operate (strengths, legal structures, etc.) to minimize conflicts. • Create an advisory committee representing a greater number of entities than the smaller, action-oriented core team, to ensure buy-in from relevant entities on the periphery without reducing efficiency.

4. Ensure consistent, predictable funding to minimize competition for resources	• Provide consistent and predictable funding for a WoG approach. • Create a "one-stop-shop" to disperse funding across the government, to promote collaboration between ecosystem partners and minimize duplication of effort.
5. Coordination with domestic and international partners	• Involve multiple donors and ensure cross-donor coordination (public, multilateral and private sector organizations). • Ensure engagement with domestic partners for long-term sustainability. • Manage additional challenges in coordination and duplication of efforts that may result from new donor nations and philanthropic entities.

Source: based on Worzala *et al* (2017)

Find out more:

George C. Marshall Foundation, "Analyzing the Marshall Plan: Chapter 3— Monograph Collection," by Barry Machado, Available at: Analyzing the Marshall Plan: Chapter 3 - Monograph Collection - Library (marshallfoundation.org). Accessed 1 February 2022.

LEVELS OF GOVERNMENT
Local, Regional

LEVELS OF RESPONSIBILITY
Developing innovation strategies

GOALS
Coordinating across levels / portfolios; Creating partnerships; Transfers of authority

COMPETENCES
Work with others; Frame policy problems; Spot opportunities

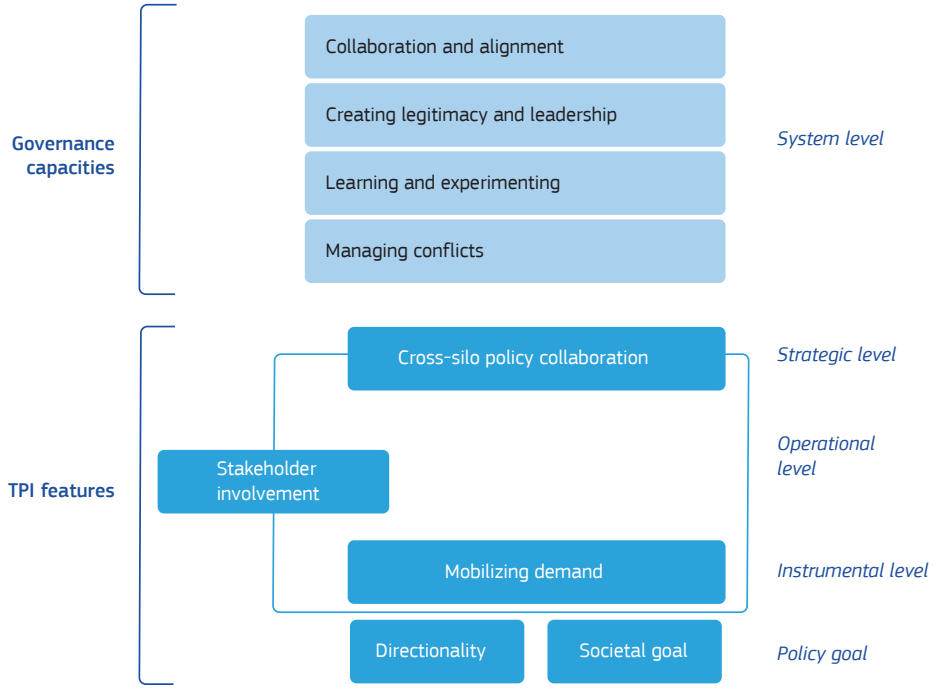
26 Multi-level coordination mechanisms

Purpose: To indicate necessary elements for a well-functioning multi-level set-up

Use: To plan a rigorously coordinated process from the start

Coordination is key considering the number of pitfalls that could exist when a State prioritises a strong goal. The government at all levels has a role in facilitating the **transformative policy initiative (TPI)**. The underlying mechanism is to involve different ministries depending on the theme with one of them as a lead, but the diffusion part will eventually be undertaken by the other ministries. All the players involved will be helping each other in a coordinated approach. In addition, in certain new and more inclusive governance arrangements, the government could refrain from being the leader but would act as an enabler to achieve more open, transparent and diverse policy networks and policy processes across stakeholders.

Directionality, societal goals and a cross-cutting policy field embedded in the societal agenda with several specific-policy domains (environment, energy, health, agriculture) should be identified. In parallel, coordination arrangements between national, regional and local governments together with subnational capacity building are necessary. Striving for horizontal and vertical alignment across domains as well as multi-level and temporal policy alignment can be important for a successful transition.



Find out more:

Governance of Innovation Systems, Vol. 1: Synthesis Report - OECD

The Future of Regional Development and Public Investment in Wales, United Kingdom (gov.wales)

LEVELS OF GOVERNMENT
Local, Regional

LEVELS OF RESPONSIBILITY
Developing innovation strategies

GOALS
Stakeholder engagement

COMPETENCES
Work with others; Spot opportunities; Frame policy problems

27 Participatory governance and EDP

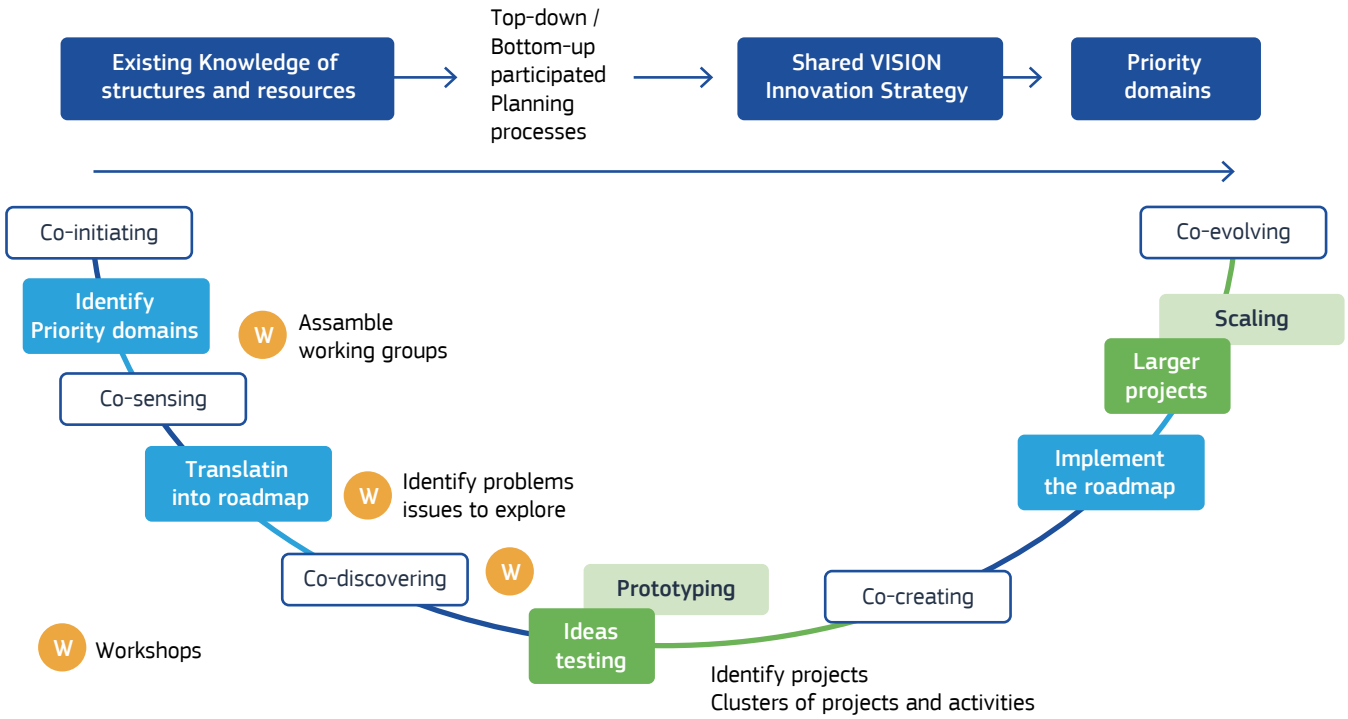
Purpose: To co-create public value with stakeholders

Use: To engage stakeholders in policy-making

Participatory governance is embodied in processes that **empower citizens to participate in public decision-making**. Participatory governance broadly refers to the democratic mechanisms that are intended to involve citizens in public policy-making processes. There is evidence that participatory governance practices are contributing to **stronger government transparency, accountability and responsiveness, and improved public policies and services**. Participatory governance is being promoted in different contexts to increase the engagement of citizens in public policy-making process and in broader processes of public value co-creation.

The development of smart specialisation strategies rely on identification of priority areas and the exploration of the potential for economic transformation within these areas. Strategic priority areas are selected through a participatory process within a top-down approach steered by national and/or regional authorities – entrepreneurial discovery process (EDP, see Fiche 1, "*Smart specialisations strategies*"). Because of S3, regions are focused on local needs, policy design is becoming more evidenced-based and broader consultation is contributing to have regional stakeholders more involved in regional innovation policymaking.

S3 as Strategic Planning Process and S3 as a balanced planning and participatory incremental process:



Find out more:
Smart Specialisation Platform (europa.eu)

LEVELS OF GOVERNMENT
Local; Regional; National

LEVELS OF RESPONSIBILITY
Developing innovation strategies; Collecting and evaluating ideas

GOALS
Stakeholder engagement; Creating partnerships

COMPETENCES
Work with others; Spot opportunities for sustainability; Think systemically; Frame policy problems

28 Open Discovery Process (ODP)

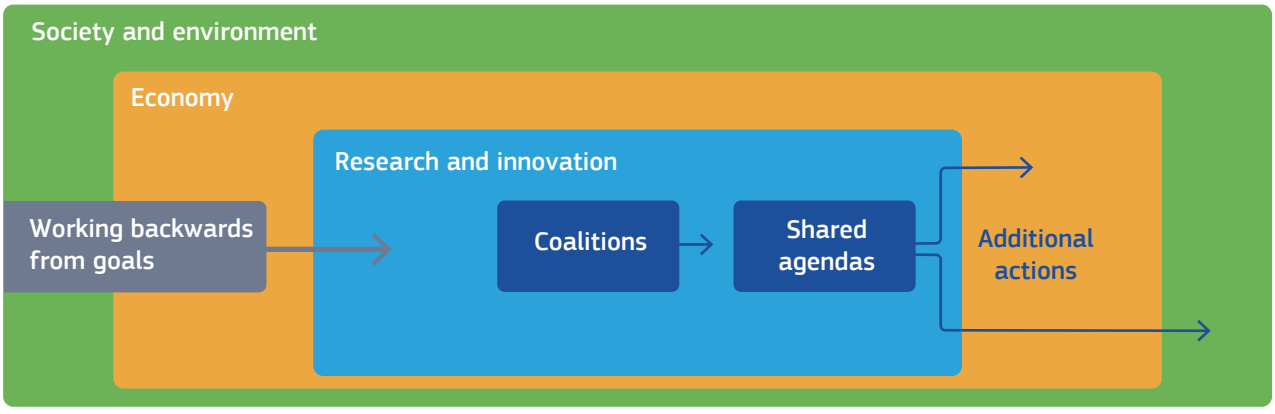
Purpose: To build partnerships, action plans and projects

Use: To engage and work with stakeholders on local problems

Open discovery process (ODP) builds and extends on success of entrepreneurial discovery process (fiche 27) to mobilise stakeholders and develop action plans or projects. Seeking more impact, ODP concept aligns research and innovation actions (and policy) with economy (industrial policy) as well as society and environment (sustainability policy). **The core of ODP is working backwards from mutually agreed goals with coalitions of stakeholders in a multi-level perspective** (Fiche 29, "*Working backwards to create multiple value: the case of NutriAlth3D*"). Public support encourages stakeholders to open up their agendas, which will allow for synergies/sequencing and building shared agendas. **Continuous, growing and reflexive coalitions result in multiple actions beyond publicly funded projects**. Working in multiple policy domains, ODP aims to synergise multiple funding streams other policies and stakeholder actions.

- Can you think of how the ODP would benefit your strategy design?
- Think about a problem in your region: do you know who are the main stakeholders involved and those affected?
- Think about how you could implement an ODP: share vision, look for training opportunities, look for examples.

Open discovery process relies on working backwards from goals with coalitions of stakeholders in a multi-level perspective.



Find out more:

Open discovery process (4.2.2) / Articulating shared agendas for sustainability and social change: A contribution from the territory to the EU debate on transitions to sustainability" (2020) / http://catalunya2020.gencat.cat/web/.content/00_catalunya2020/Documents/angles/fitxers/shared-agendas.pdf / Designing missions. Mission-oriented innovation in Sweden – A practice guide by Vinnova (2022) / https://www.vinnova.se/contentassets/1c94a5c2f72c41cb9e651827f29edc14/designing-missions-corr-final-10-3-22-mid-res.pdf

LEVELS OF GOVERNMENT
Regional

LEVELS OF RESPONSIBILITY
Developing the innovation strategy; Collecting and evaluating ideas

GOALS
Stakeholder engagement; Creating partnerships

COMPETENCES
Spot opportunities for sustainability; Mobilise resources; Work with others; Think systemically

29 Working backwards to create multiple value: the case of NutriAlth3D

Purpose: To make innovation to solve local problems collaboratively

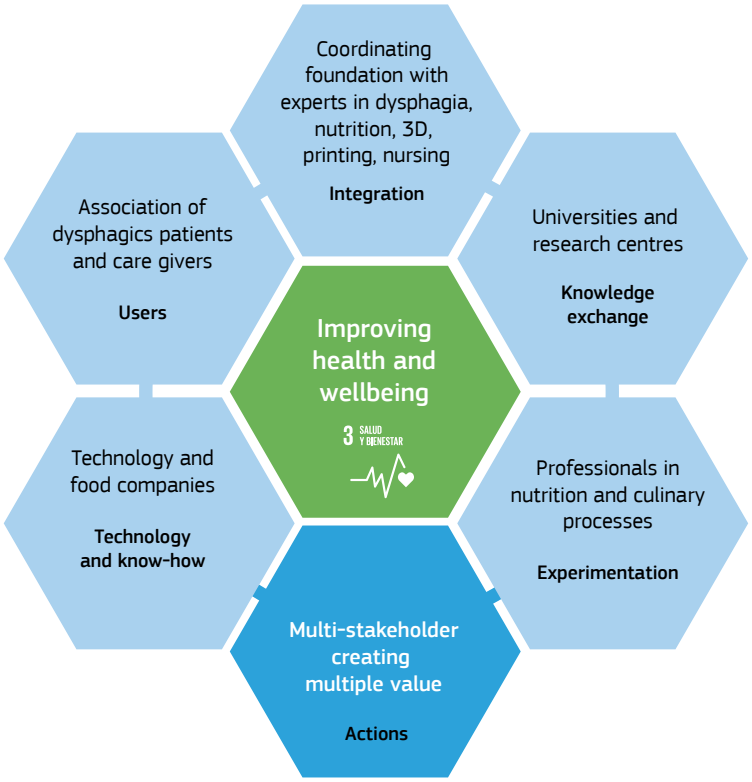
Use: To identify a problem and its solutions in partnership with stakeholders

Over a population of 46.8 million people[27], in Spain two million people[28] are affected by the inability to swallow food or drinks (oropharyngeal dysphagia). People suffering from this swallowing disorder eat mashed food, which causes them to lose interest in eating and can lead them to dehydration and malnutrition. This affects also their health and social life and that of their families, as they may feel uncomfortable eating in public. Yet, early detection and multidisciplinary intervention can help them achieve a healthier life.

For this, **stakeholders from various sectors and fields joined forces to tackle this problem and find a multidisciplinary solution** to create social and economic value (see Fiche 7, "*Challenge-oriented innovation policy*").

With this goal in mind, stakeholders adapted existing technology to deliver 3D printing food that is easier to swallow, while maintaining quality and taste.

Multi-stakeholder collaboration to achieve common goal and create multiple value.



[27] Data from 2018, https://data.worldbank.org/indicator/SP.POP.TOTL?locations=ES

[28] https://www.clc.cat/pdf/publicacions/documents/ca/atencio-disfagia-orofaringia.pdf

Find out more:
NutriAlth3D

LEVELS OF GOVERNMENT
Regional, national

LEVELS OF RESPONSIBILITY
Developing the innovation strategy; Collecting and evaluating ideas

GOALS
Stakeholder engagement; Creating partnerships; Internationalising

COMPETENCES
Spot opportunities for sustainability; Mobiliseresources sustainably; Work with others

30 International dimension of the Open Discovery Process

Purpose: To add a stronger international dimension to discovery process

Use: To link local strengths with the global opportunities for policy and projects

While entrepreneurial discovery process (EDP) emphasises on the local/regional or national assets, the international the national and especially international opportunities can be often overlooked or not fully exploited in practice. Open discovery process (ODP) aims to further develop mechanisms of openness to link local strengths with global opportunities. The international dimension is embedded into the discovery process to some extent, as countries/economies do not act in isolation and participating stakeholders do bring their experience and plans for further international actions. However, such attention to international dimension does not fully cover the discovery phase, as it is more focused on the implementation afterwards.

Then, how can sustainability innovators, like yourself, include international stakeholders into the thinking process of ODP and facilitate their participation so that all stakeholders benefit? To start, you can look at the international landscape when you conduct stakeholder mapping. Then, the international stakeholders in the personal or organisational capacity should be joining the ODP and "**doing the thinking together**", based on identified mutual interests. On the programme level, clearly formulated linkages to global value chains, European Innovation Partnerships, Horizon Europe missions, etc. can represent the international dimension. Take a look at the figure below to get some inspirations.

Components for stronger international dimension of ODP.

Find out more:
Cross-border Smart specialisation strategy of Galicia- Northern Portugal (RIS3T) https://ris3galicia.es/wp-content/uploads/RIS3T_INGLES.pdf

LEVELS OF GOVERNMENT
All

LEVELS OF RESPONSIBILITY
Regulation and legislation; Industrial policy

GOALS
Strategy design; Goals setting; Implementation

COMPETENCES
Frame policy problems; Think critically; Work with others; advise the political level based on evidence

31 Science-based ODP building on the *Sevilla* process

Purpose: To support policy implementation

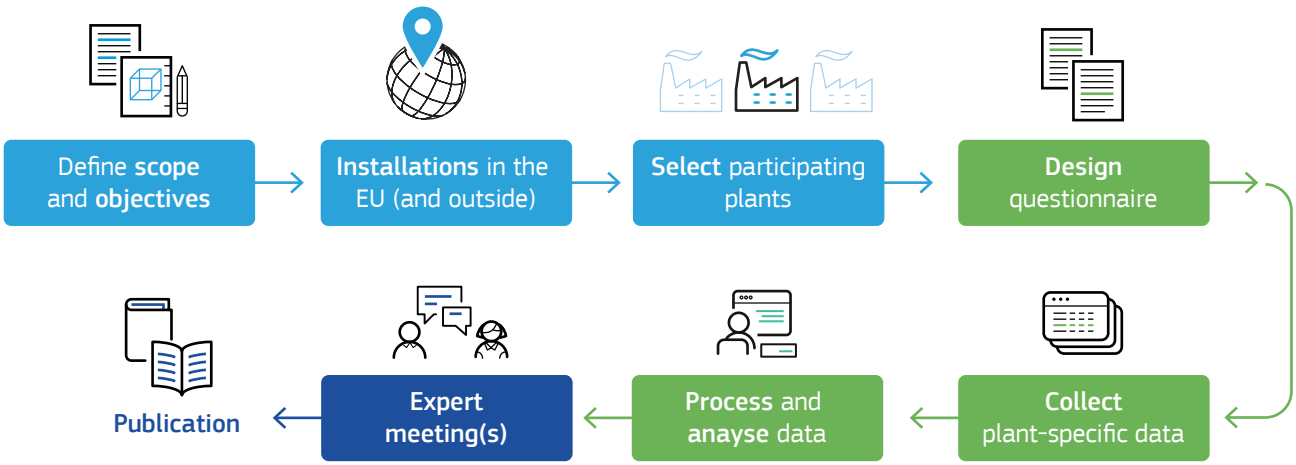
Use: To form science-based stakeholder consensus

The Sevilla process is a participatory, transparent, consensus-based approach to develop and establish (as well as regularly review and update) **environmental norms, performance criteria and standards** in EU policies/legislation, on the basis of sound scientific/techno-economic data, information, and evidence. It was developed and has been operated for more than 20 years by the JRC, to define environmental norms to industrial emissions, based on the **best available techniques (BAT)** approach. The process has been applied also to other EU environmental legislation contexts.

The *Sevilla process* includes the use of tools and methodologies for data gathering, interactive data analysis, stakeholder feedback and transparency, which allow all parties to take an active role during data collection, processing and verification.

You can make use of the *Sevilla process* to support policy implementation in any sector where transparency, inclusiveness and evidence-based consensus are necessary. The open discovery process (Fiche 28, "*Open Discovery Process*") is an example of process driven by stakeholders, where the principles and tools of the *Sevilla process* could be applied to enhance its science-based approach and stakeholder consensus.

Phases of the Sevilla process, applied to large scale agro-industrial installations.



Find out more:
Video on the Sevilla process: https://audiovisual.ec.europa.eu/en/video/I-210182
https://eippcb.jrc.ec.europa.eu/
https://ec.europa.eu/environment/industry/stationary/index.htm

LEVELS OF GOVERNMENT
National

LEVELS OF RESPONSIBILITY
Acquiring resources; Developing innovation strategies

GOALS
Strategy design; Stakeholder mapping

COMPETENCES
Mobilise resources sustainably; Be futures literate; Be creative

32 Digital tools for the ODP

Purpose: To enhance stakeholder consultation and joint planning

Use: To facilitate robust participatory governance

Government's use of digital tools is highly likely to grow as technologies mature and administrations become more familiar with these working methods. The *European Interoperability Framework* (EIF) was launched by the European Commission as a new cooperative interoperability policy for Europe to assist the public sector in the digital transformation. The EIF provides concrete recommendations on how to **improve governance of the interoperability activities** in a public administration. It also seeks to establish cross-organisational relationships, streamline processes supporting end-to-end digital services, and ensure that both existing and new legislation do not compromise interoperability efforts. The European Commission also offers *Joinup* which is a one-stop shop for e-Government tools.

The best approach to formulate the future policy is to co-create it together with stakeholders. Discussions with stakeholders can also be held remotely and allow everything that could be done physically such as split participants in groups, use of whiteboards and diffusion of the event on social media. Stakeholder mapping, used for stakeholder analysis to group people on the basis of their interest and influence, helps to reduce silos and accelerate a successful completion of a project. Tracking key engagement indicators with digital tools assist in recording every stakeholder interaction through ready-made software.

Digital tools tend to lower the costs of coordination, allow more frequent engagement and lead to the involvement of players outside the territory. These tools not only allow for existing forms of participatory governance to be better delivered but they also **enable new forms of participatory governance**. This could include citizen assemblies or tasks for participatory governance and thus, enhance transparency and accountability, and allow genuine policy co-creation.

Steps by goverments to promote the use of digital tools and enhance participartory governance

Encourage local software support businesses	Increase transparency and auditability of administrative processes	Construct tailored, more flexible and sustainable solutions
Ensure data sovereignty, privacy and security	Encourage sharing and pooling of resources among municipalities and agencies	Free IT policy and planning from commercial strategies
Internalise staff and develop in-house skills to drive transformation	Cross-out the use of a non-free and open source program	Save money, by avoiding propietary licence fee

Find out more:

https://joinup.ec.europa.eu/collection/elise-european-location-interoperability-solutions-e-government/elise-location-interoperability-workshop-pack

https://www.govtech.com/

https://unhabitat.org/digitalcitiestoolkit/

LEVELS OF GOVERNMENT
Local; Regional; National

LEVELS OF RESPONSIBILITY
Developing innovation strategies

GOALS
Stakeholder mapping; Strategy design

COMPETENCES
Think systemically; Frame policy problems; Think critically

33 Challenge-led system mapping

Purpose: To design and implement innovative participatory processes in a practitioner-oriented narrative

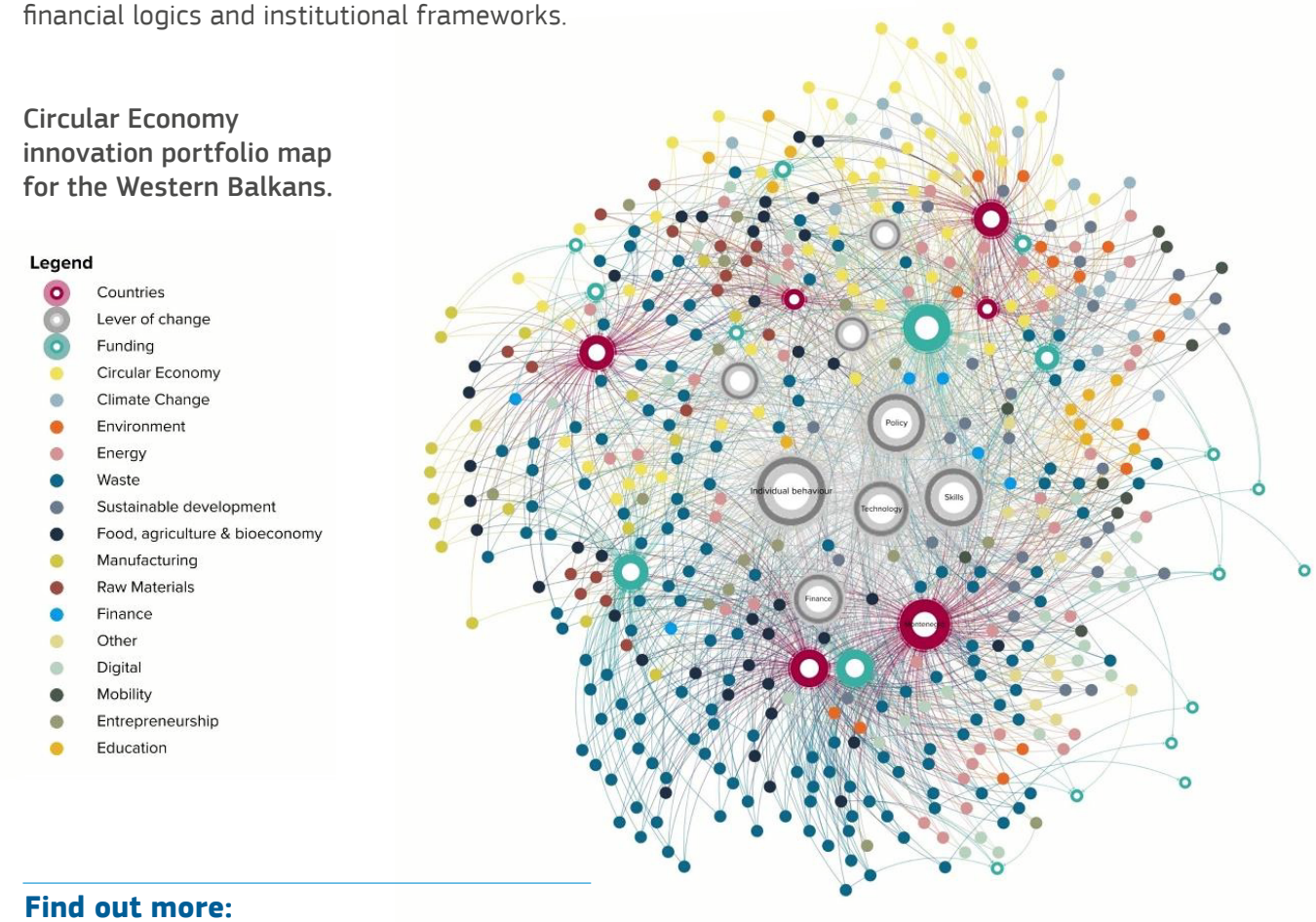
Use: To design and implement system mapping processes

Challenge-led system mapping is a flexible participatory approach aimed to improve the collective understanding of system components and transformative system change. It allows for the **exploration of governance structures, thematic priorities and innovation capacity at multiple territorial levels**. Furthermore, mapping processes focused on innovation portfolios enables different stakeholders to explore strategic opportunities, prototyped actions, projects and interventions throughout multiple nested and articulated portfolios responding to different financial logics and institutional frameworks.

The system mapping process contribute to a collectively created notion of the socio-technical system facing specific multi-level, cross-regional and place-based topics. This can act as a basis for co-designing processes for a portfolio of Policy and Action Mix.

This methodology is designed to be flexible, for a diverse audience, allowing learning-by-doing. You can explore the Handbook developed by Climate KIC. It will provide you with visual tools and a step-by-step guide, ranging from simple concepts to examples for application.

Circular Economy innovation portfolio map for the Western Balkans.



Find out more:

Handbook Challenge-led system mapping: A knowledge management approach. EIT Climate-KIC

Webinar Network Analysis as a tool for science, policy and practice interface

Example: EIT Cross-KIC project on Circular Economy in the Western Balkans

LEVELS OF GOVERNMENT
National

LEVELS OF RESPONSIBILITY
Developing innovation strategies; Promoter

GOALS
Steering demand; Intervening

COMPETENCES
Think systemically; Be creative; Work with others

34 Small-scale experimentation for transitions

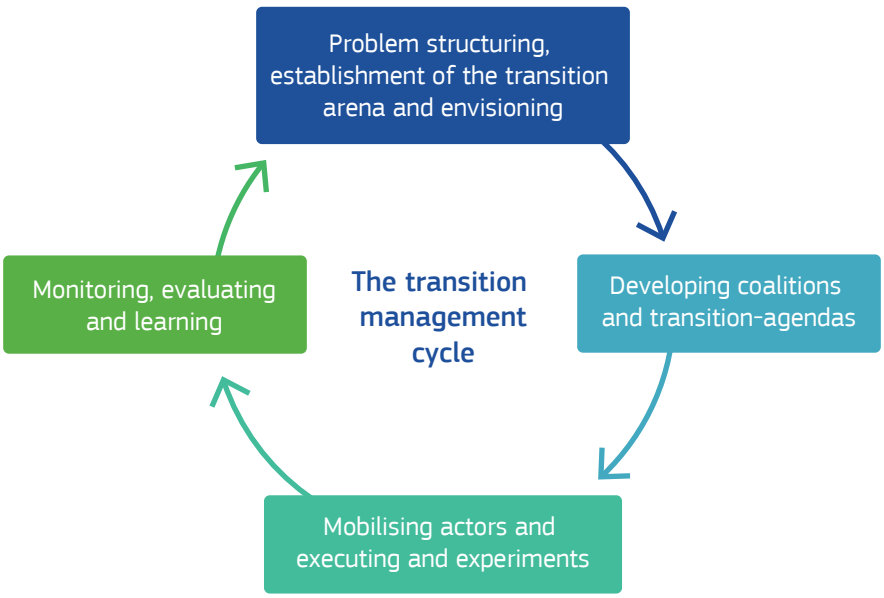
Purpose: To nurture and experiment with co-evolution of technology, user practices, and regulation

Use: To create protected niches to address a societal challenge

Creating **modular protected spaces, or niches, for experimentation can facilitate sustainable transitions** as they are guided by broad societal needs. Such spaces recognise that technological and social change are interrelated. They thus allow to **experiment the co-evolution and alignment of new technology together with user interactions, new social practices, financial and regulatory structures, and sustainability goals**. Some examples include experimentation to address water management, mobility in urban areas, and access to food.

You should use niche for transition experiment together with other concepts and tools, such as directionality complex systems analysis, transition pathways, shared agendas, monitoring and evaluation, WoG approach and stakeholder engagement.

To create transition experiment niches, you can focus on identifying and framing local problems for your region and **create shared visions** by being flexible yet ambitious. If short term goals are not met, the plan(s) should change rather than goals. You can promote shared agendas and work with stakeholders to create networks and coalitions to act upon shared strategies. Failure is part of the process and is needed to learn. You should also make sure to monitor and evaluate progress towards a shared vision.



Distinctive characteristics of transition experiments.

	Classical Innovation Experiment	Transition Experiment
Starting point	Possible solution (to make innovation ready for market)	Societal challenge (to solve persistent societal problem)
Nature of problem	A priori defined and well-structured	Uncertain and complex
Objective	Identifying satisfactory solution (innovation)	Contributing to societal change (transition)
Perspective	Short and medium term	Medium and long term
Method	Testing and demonstration	Exploring, searching and learning
Learning	1st order, single domain and individual	2nd order (reflexive), multiple domains (broad) and collective (social learning)
Actors	Specialised staff (researchers, engineers,professionals, etc.)	Multi-actor alliance (across society)
Experiment context	(Partly) controlled context	Real-life societal context
Management context	Classical project management (focused on projects goals)	Transition management (focused on societal 'transition' goals)

A **transition experiment** is an innovation project with a societal challenge as a starting point for learning aimed at contributing to a transition.

Source: Rotmans and Loorbach (2006); Loorbach (2007)

Transition niche can become established once the problem is addressed in a fair and responsible manner, and design and demands have stabilised. Governments can favour niche creation for example through subsidies. Yet it is a broader community made of engineers, scientists, policy-makers, citizens, users and other interested groups that should engage in a bottom-up approach. Should you need any benefits of transition experiments, take a look at left Panel above.

Find out more:
Deepening, Broadening and Scaling up - A Framework for Steering Transition Experiments

LEVELS OF GOVERNMENT
All

LEVELS OF RESPONSIBILITY
Promoter

GOALS
Stakeholder engagement; Creating partnerships

COMPETENCES
Work with others; Think critically; Advise the political level based on evidence; Mobilise resources sustainably

35 National and regional science for policy ecosystems for innovation

Purpose: To connect scientific institutions with policy-makers

Use: To obtain evidence-informed innovation policymaking at various levels of governance

Innovation strategies require **entire ecosystems of support**, involving a wide range of enterprises, government measures and services, citizens, social partners, finance, and research and technology organisations. By mobilising a diverse set of stakeholders, you can ensure that sector-specific challenges and needs can be anticipated and addressed collaboratively while benefits of innovation can be widely shared. One of the critical relationships for innovation within such ecosystems connects scientific institutions with policymakers: **Scientists can help policymakers make sense of cutting-edge innovations, as well as develop and identify policy options with the greatest transformative potential**. Policy-makers can help direct research into fields of direct relevance for innovation and innovation policies. Scientific expertise on the varied impacts of different intervention also helps connect different governmental services, promoting a Whole-of-Government approach to innovation.

Yet, you can face challenges along the way. Obstacles range from a simple mismatch of timeframes and diverging incentives to deep-seated cultural differences. However, you can refer to a set of practical tools developed by the JRC to overcome these obstacles, strengthening capacity for science-policy engagement both of individual researchers and policymakers, as well as of scientific institutions and policymaking bodies at various levels of governance.

Participatory events involving key stakeholders from the science-policy interface: Participatory science for policy ecosystems workshops and innovation camps (several are in the pipeline) have been successfully used for SWOT analyses, co-creation of capacity building projects in support of using evidence in policymaking, mutual learning and networking between sectors and across Member States, regions and cities.

Building competences for science-policy engagement with training: training modules and materials have been developed for both scientists and policymakers to allow individuals to develop the knowledge, attitude, and skills to better engage with partners and processes in the other sector.

Pairing and placement schemes: a pairing scheme will be put in place allowing regional and local policymakers to spend time with scientists working on issues that are relevant to the policy challenges they face.

Three tools for harnessing the power of science for policy ecosystems for innovation.

Find out more:
Science meets Regions
Science for Policy Ecosystems
Competences for scientists and policymakers

LEVELS OF GOVERNMENT
All

LEVELS OF RESPONSIBILITY
Developing innovation strategies; Collecting and evaluating ideas

GOALS
Stakeholder engagement; Strategy design

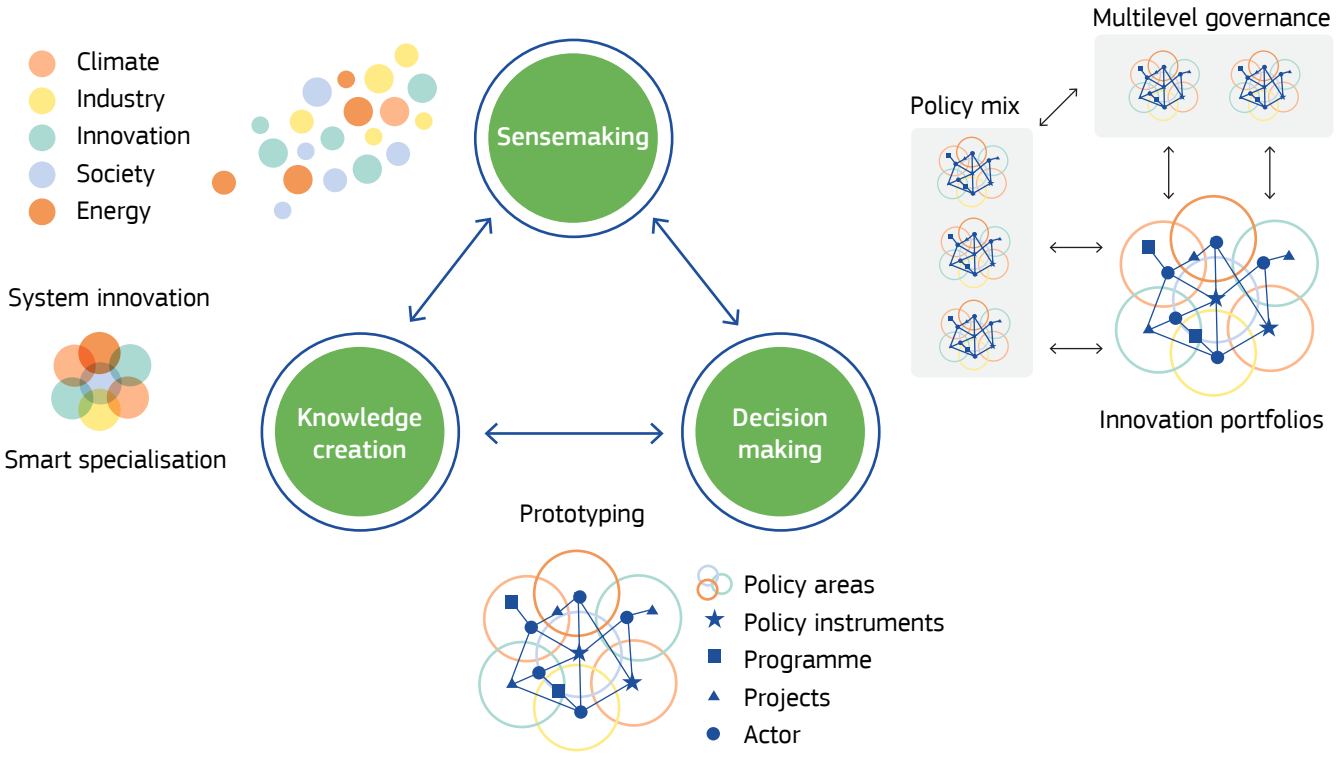
COMPETENCES
Think systemically; Work with others; Manage transformations; Be creative

36 Co-creation for policy

Purpose: To provide a narrative to design and implement innovative participatory processes

Use: To organise policy co-creation processes and events in a purposeful and structured way

The Co-creation for policy handbook provides practical steps and recommendations for identifying synergies among stakeholders across territories, sectors and levels. It shows how to **ensure optimal knowledge management and efficient communication** to optimise resources use, policy convergence and the achievement of positive results when designing or implementing policy. By combining **community engagement and knowledge management services**, the handbook highlights how participatory processes can be embedded in the policymaking cycle to improve the societal value of generating collaborative innovation, goodwill and co-created evidence for informing policymaking.



Find out more:

Co-creation for policy. Participatory methodologies to structure multi-stakeholder policymaking processes Forthcoming. Matti *et al.*

Transitions Policy Lab webinar on Co-creation for Policy

LEVELS OF GOVERNMENT
Local; Regional

LEVELS OF RESPONSIBILITY
Acquiring resources

GOALS
Stakeholder engagement;
Goals setting

COMPETENCES
Work with others;
Manage transformations;
Be creative

37 Engaging citizens in innovation and innovation policy

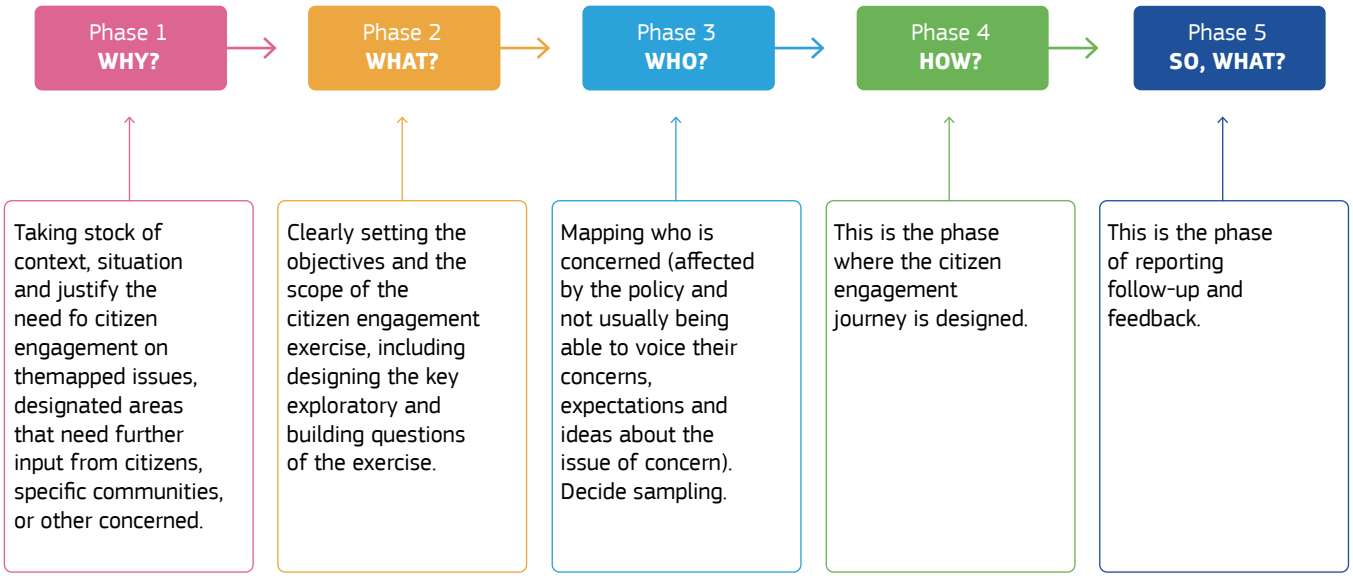
Purpose: To empower citizens

Use: To proactively influence innovation policy

By taking participatory and deliberative approaches with citizens, policymakers can ensure that **innovation processes are enriched by wider knowledge and input**. This maximises the chances of the innovations being widely fit-for and taken-up in society and minimises the risks of generating public opposition. Well-designed and targeted processes can deliver timely and useful insights to help innovators grasp, leverage or mitigate social, ethical and other non-economic aspects of innovation. **Engaging citizens more systematically can help innovators explore opinions, preferences and interests and elicit knowledge and values**. It can also help pre-emptively understand and respond to possible public concerns, as well as avoid being affected by controversies generated by less responsible innovation and emerging technologies with uncertain impacts. It makes the active role of citizens visible in innovation ecosystems – **empowering them to influence future pathways for innovation, and improving overall public trust in the innovation system and innovation policy**.

In practical terms, you can plan or upscale a citizen participation process over five basic phases, as depicted below. Such processes can be set up independently, or in conjunction with stakeholder-oriented formats. The Commission's Competence Centre on Participatory and Deliberative Democracy is equipped to provide the expertise, tools and methods needed to support such processes. It is collaborating actively with an extended community of practitioners across EU countries, and can offer guidance and support to other interested institutions.

The five phases of planning a participatory process.



Find out more:
Competence Centre on Participatory and Deliberative Democracy
Community of Practice at the Competence Centre on Participatory and Deliberative Democracy

LEVELS OF GOVERNMENT
Local; Regional

LEVELS OF RESPONSIBILITY
Promoter; Collecting and evaluating ideas

GOALS
Goals setting; Strategy design; Stakeholder engagement

COMPETENCES
Work with others; Shape change; Values for sustainability; Be creative

38 Contribution of civil society organisations

Purpose: To involve civil society organisations in policy-making

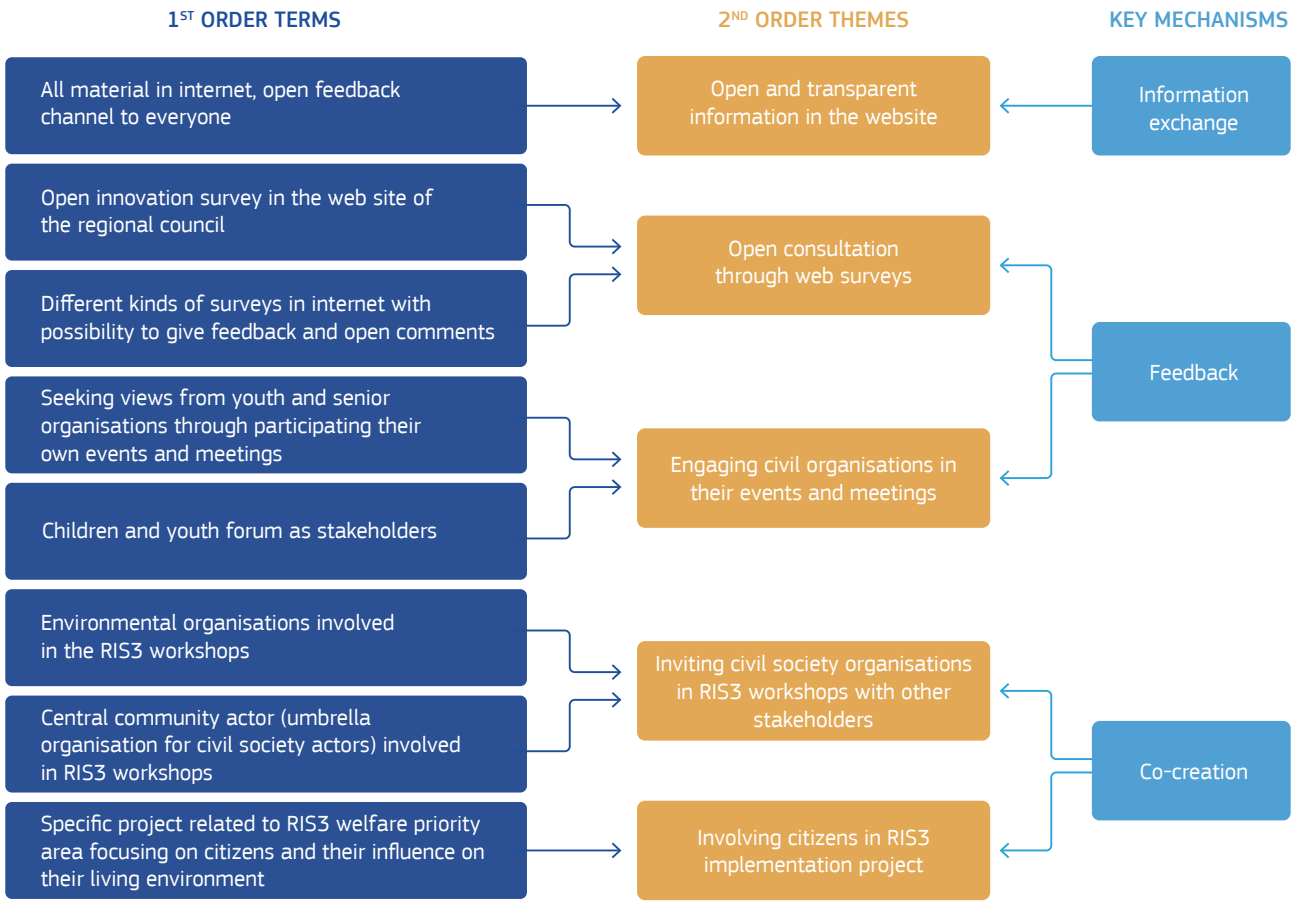
Use: To engage with a broader range of stakeholders

Following the post-Covid-19 era, there is currently a great desire for **Civil Society Organisations (CSOs)** to emerge and contribute, however, this is not at all straightforward. Common impediments surrounding CSOs are awareness, motivation and skills issues. Also, their initiatives tend to be highly heterogeneous and location-specific. However their inclusion in a PRI could contribute to valuable input and increase the diversity of knowledge, values, ideas and perspectives. They could push for a **more place-specific endeavour by bringing attention to local problems and needs, lead to creative ideas and could play a major role as co-creator of innovation**. They could turn a PRI into a more democratic process, possibly motivated by an alternative vision and a more progressive understanding of regional development.

However, there can be an automatic mismatch between the need for and ability of, CSOs to act on behalf of citizens' and community desires to bring about change. The need for CSOs to fill the policy space tends to be greater where local government has less discretion and fewer resources to act, than in a scenario where local government has significant resources and policy discretion, which would probably be the occasion where CSOs are mostly needed.

Their participation in innovation policy could be in policy design aiming to enhance the accountability and transparency of policy-making and improving government decision-making. In the figure below, you can see the different mechanisms to facilitate the participation of CSOs in regional planning.

38 Contribution of civil society organisations



Find out more:
https://www.sciencedirect.com/science/article/pii/S0264837721005871
https://opendocs.ids.ac.uk/opendocs/handle/20.500.12413/14509

LEVELS OF GOVERNMENT
Local; Regional

LEVELS OF RESPONSIBILITY
Collecting and evaluating ideas

GOALS
Stakeholder engagement

COMPETENCES
Work with others; Mobilise resources sustainably; Values for sustainability; Shape change

39 Citizen science

Purpose: To innovate in evidence-based policy-making

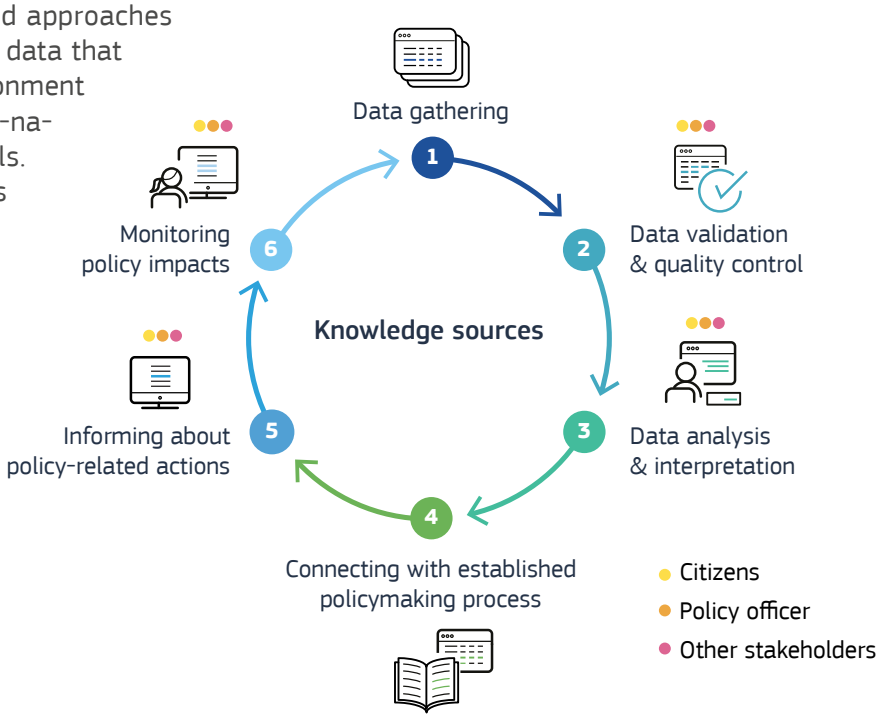
Use: To foster social innovation in local contexts

Citizen Science (also known as public participation in scientific research) evolved from a long tradition in fields, such as biodiversity and meteorology, into almost all scientific fields. Simultaneously, regional and global communities became well organised and interconnected, and we arrived at a situation in which Citizen Science is not only prominent in research and civil society, but also well recognised in policy (e.g. related to Open Science and Better Regulation).

On the one hand, citizen scientists can contribute with valuable knowledge to scientific research, and thereby help innovate evidence-based policy-making. The benefits have been recognised long ago in terms of bird monitoring, weather monitoring and other environmental fields. Today, structured approaches exist that enable citizens to contribute data that they observe in their immediate environment to official monitoring processes at sub-national, national and international levels. Such engagements enable citizens to provide valuable contributions to science and policy, while they also help raise awareness and educate about environmental topics. The monitoring of the Sustainable Development Goals (SDGs) can be well supported.

On the other hand, knowledge creation and sharing between citizens, scientists and public administrations can also help develop a shared understanding of matters of concern, and it can empower all participants to co-design solutions that fit each other's needs. For example, people living in the same neighbourhood might collect data about certain environmental stresses (such as noise or odour), patterns and sources of these stresses could be identified, possible solutions discussed with all that are involved, and then implemented with the relevant public authorities.

Integrating citizen science with evidence based policy making, a cycle of six steps:



Find out more:
https://publications.jrc.ec.europa.eu/repository/handle/JRC123500 / https://publications.jrc.ec.europa.eu/repository/handle/JRC122219 / SWD(2020) 149 final. COMMISSION STAFF WORKING DOCUMENT. Best Practices in Citizen Science for Environmental Monitoring / https://www.nature.com/articles/s41893-019-0390-3

LEVELS OF GOVERNMENT
All

LEVELS OF RESPONSIBILITY
Developing human resources; Collecting and evaluating ideas

GOALS
Stakeholder engagement; Internationalising

COMPETENCES
Work with others; Mobilise resources sustainably; Shape change; Be creative

40 Network intelligence: the EIT

Purpose: To build strategic network to create multiple value

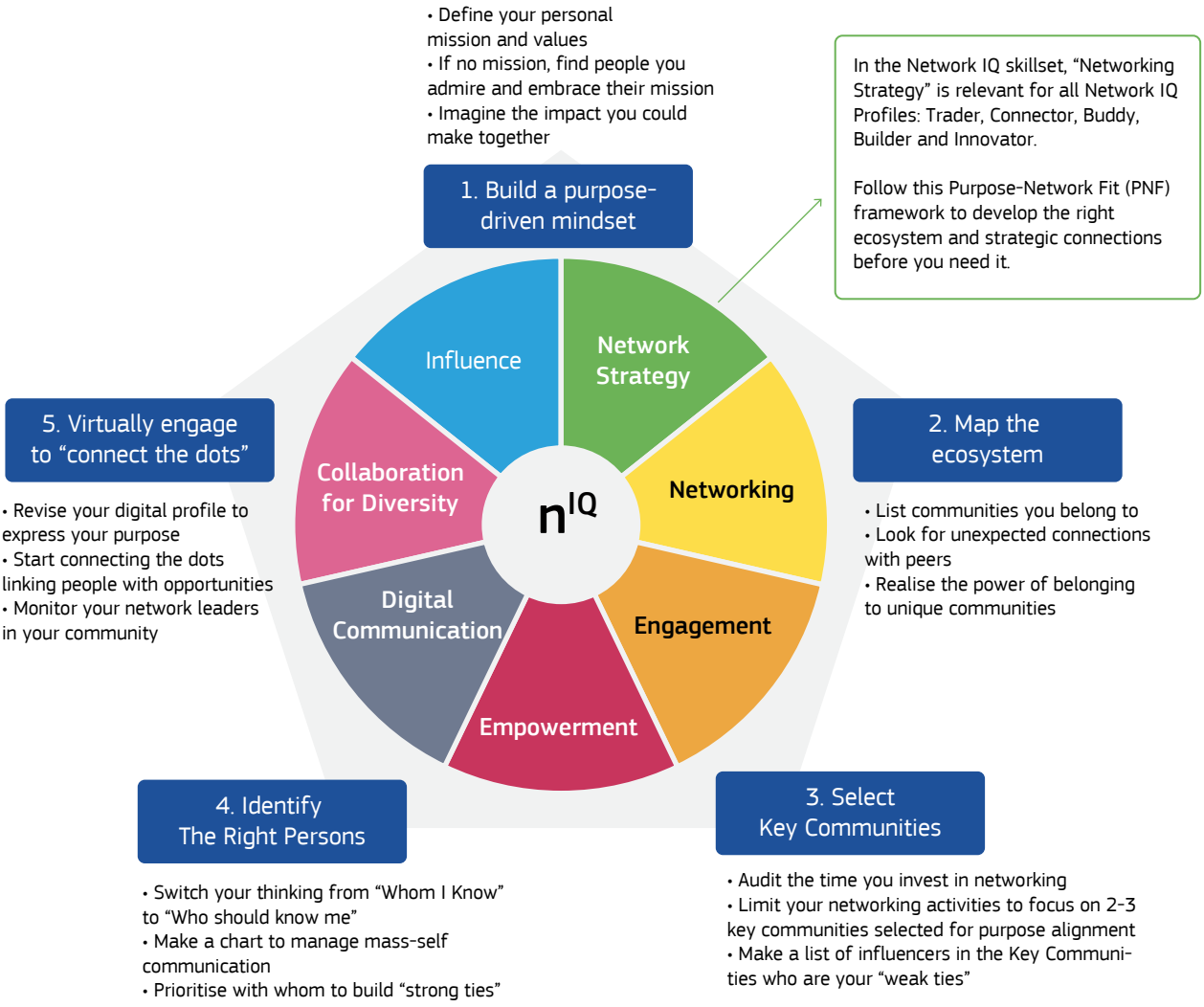
Use: To optimise the operations of value creation networks

The European Institute of Innovation & Technology (EIT) is the largest innovation ecosystem in Europe with almost to 3000 partners from research, education and innovation. This ecosystem spreads across 200 physical "co-location" centres connected through a virtual or hybrid teamwork, a multi-level governance, and an entrepreneurial culture. Over the last decade, the EIT has demonstrated that this "KIC model" works: over 100.000 participants received entrepreneurship trainings; the EIT start-ups, scale-ups and tech transfer projects mobilised 3.9 billion EUR; and EIT is a seedbed for nine unicorns.

The value-creation networks, such as the EIT KICs, require a certain level of a strategic networking capacity which can be defined as Network Intelligence. **Network Intelligence is a capacity to turn people in your networks into collaborators who can help you and your team increase performance, innovate, and grow with a purpose in mind**. It is based on seven core competencies including: Network Strategy, e-Networking, Engagement, Empowerment, Digital Communication, Collaboration for Diversity, and Influence. Empirical evidence shoes that Network Intelligence enabled EIT Health Spain to optimise teamwork in a complex, network-based organization. It also improved the capacity of EIT HEI EntreUnity consortium partners to connect universities from less developed regions to the EIT community.

You can use the Purpose-Network-Fit framework to mobilise your innovation community around a shared purpose, and capture or monetise opportunities abundant in your value creation networks.

Purpose - Network - Fit. Start with Network Strategy.



Source: Commons @Daria Tataj 2022

Find out more:
https://www.entrepreneurship.manchester.ac.uk/develop/programmes/niq/
https://eit-hei.eu

LEVELS OF GOVERNMENT
All

LEVELS OF RESPONSIBILITY
Promoter; Industrial policy; Tax policy; Developing innovation strategies

GOALS
Goals setting; policy objectives; problem framing

COMPETENCES
Think systemically; Mobilise resources sustainably; Be futures literate; Values for sustainability

41 Policy mix for the green transition: the Ruhr Area

Purpose: To learn about policy approaches and instruments for a just green transition

Use: To put in place a Policy and Action Mix for the green transition

Phasing down coal production has contributed to economic decline, high unemployment and emigration rates and environmental degradation in German mining regions. To address these interrelated issues, a series of policy measures has been implemented since the 1960s. Their goals include (i) economic diversification and reorientation; (ii) workforce support; (iii) social well-being and quality of life; and (iv) environmental remediation and protection (see the table below).

Economic diversification and reorientation	Workforce support	Social well-being and quality of life	Environment remediation and protection
Support to attract new businesses and financially support existing local enterprises beyond coal	Integrating labour market policies into regional development policies	Urban development	Decommissioning and environmental remediation
Expansion of educational and research activities contributing to the formation of tertiary activities and attraction students and scholars	Financing or co-financing job procurement and employment measures	Cultural and leisure activities by developing and modernizing physical infrastructure	Water management
Focus on green energy, digitalization and automation technologies, while supporting existing regional potentials and clusters	Extension of qualification and career counselling infrastructure		

In addition, nationwide "baseline policies" included measures such as the German social security system, with unemployment protection and pension system; the labour system, with for example a codetermination mechanism and trade unions; and the system for regional fiscal equalization. Despite not directly related to coal phasing down, they played a major role together with a structural approach to policy to promote systematic transformations in coal regions.

- Could you envision such a systemic approach to policy transition in your region?

In the Table below, you can consult some key takeaways from this real life case study, and think about how they can be a source of inspiration to your region.

Lesson learnt from Germany just transition policies applicable to other cases.

Anticipatory approach	Local context	Integrated policies	Large-scale regional industrial policy	Integrated net
• Providing a framework to manage social consequences, instead of trying to prevent structural change; • Developing individual and organisational capabilities to anticipate change; • Must be in line with COP26 agreement.	• Considering existing economic activities that can be strengthened; • Promoting potential activities tailored to regional skills, physical infrastructure, and geographical features; • Away from mere focus of business attraction; encouraging local participation; providing local governments more financial and administrative autonomy.	• Holistic approach towards social and cultural dimensions of local communities on top of focus on private investments and infrastructures; • Combining existing programs and funding in a broader package to assist local businesses, workers, and communities; • Fostering synergies and partnerships.	• Cluster approach to develop local networks of businesses and research institutions; • Preventing minor interventions to conserve the role of traditional industries.	• Role of baseline policies together with transition policies; • Resilient institutions ble to address the impacts associated with the transition; • Increasing their capacity to invest in local infrastructure and social programs; • Avoiding regional competition to ensure equivalent living conditions among regions.

LEVELS OF GOVERNMENT
All

LEVELS OF RESPONSIBILITY
Promoter; Industrial policy; Tax policy; Developing innovation strategies

GOALS
Goals setting; policy objectives; problem framing

COMPETENCES
Think systemically; Mobilise resources sustainably; Be futures literate

42 Policy mix for the digital transition

Purpose: To enable uptake of benefits from digital technologies

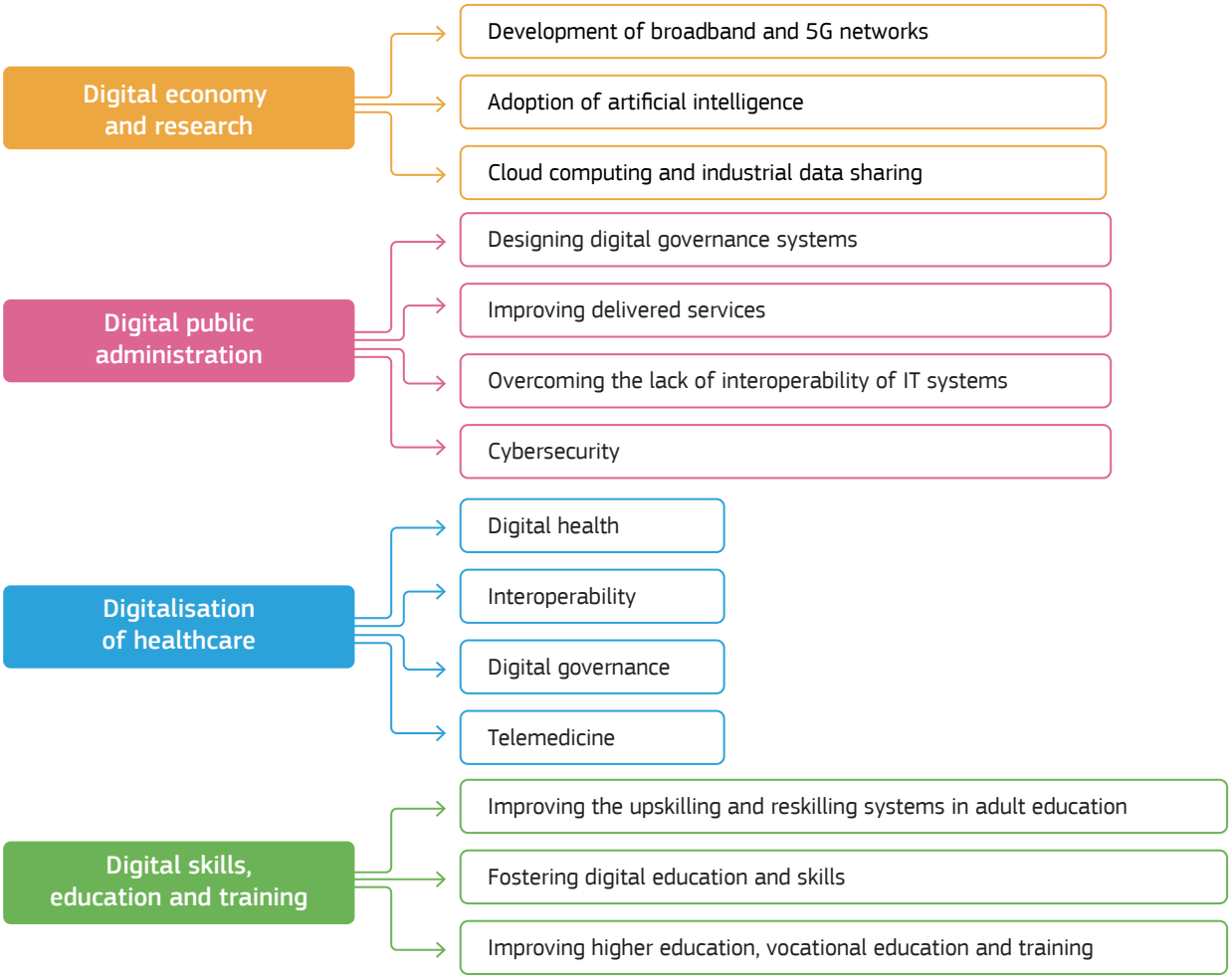
Use: To put in place a Policy and Action Mix for the digital transition

The digital and green transitions (or transformations) are at the core of the agenda for future sustainable growth adopted by the European Commission. The digital transition stands to mainstream the use of digital technologies by public and private sectors for the benefits of the society. The digital transition is based on three pillars: **technology that works for the people; a fair and competitive digital economy; an open, democratic and sustainable society**.

- Can you think how the digital transition has changed the way you interact with your stakeholders?
- What benefits and challenges you face, or will face, at work as a consequence of more digital public administration?

Digital solutions that put people first will open up new opportunities for businesses, encourage the development of trustworthy technology, foster an open and democratic society, enable a vibrant and sustainable economy, help fight climate change and achieve the green transition.

Example of policy mix.



Find out more:
https://ec.europa.eu/info/strategy/priorities-2019-2024/europe-fit-digital-age/shaping-europe-digital-future_en
https://www.europarl.europa.eu/news/en/headlines/society/20210414ST002010/digital-transformation-importance-benefits-and-eu-policy

LEVELS OF GOVERNMENT
Local; Regional; National

LEVELS OF RESPONSIBILITY
Promoter; Developing innovation strategies

GOALS
Policy objectives; Stakeholder engagement

COMPETENCES
Spot opportunities for sustainability; Be futures literate; Shape change; Think systemically

43 Broad-based business innovation capabilities

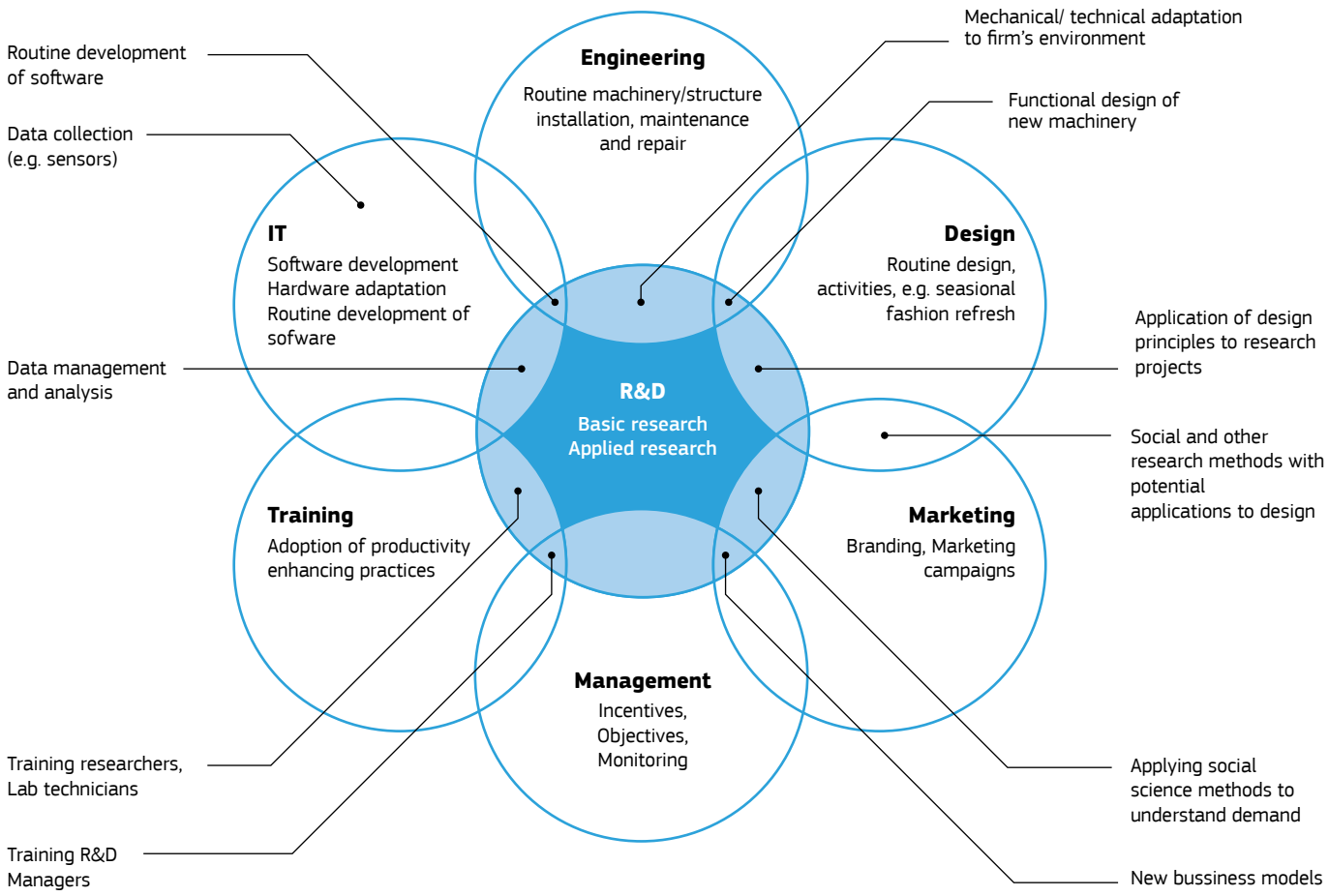
Purpose: To design a policy mix to support diverse business innovation capabilities, including in SMEs

Use: To enlarge the pool of innovating firms, strengthen overall business innovation performance

Broad-based innovation capabilities include R&D and also non-R&D innovation activities (see figure below), which are important for services firms and for SMEs.

Non-R&D innovation is complementary to and can be a stepping stone to more, more systematic and more valuable business R&D and innovation activities.

R&D and non-R&D innovation activities.



Source: Adapted and expanded from a similar diagram on design innovation by Gallindo-Rueda and Millot (2015, p. 51)

If most firms in the territory are not yet reporting systematic innovation activities, the kinds of support needed to enlarge the pool of innovators should go well beyond collaborative projects with universities, that tend to exclude SMEs that do not yet engage in systematic innovation activities. The table below helps you visualise how you can support capacity building through policies targeted at the different innovation needs of your innovation ecosystem.

Capacity building / development stage Policy tasks	A. From no innovation to innovation that is at least **new-to-the-firm**	B. From primarily new-to-the-firm to innovation that is at least **new-to-the-market**	C. From new-to-the-firm and new-to-the-market to innovation that is at least **new-to-the-world**
1. Increase the pool of innovators	Innovation training Innovation vouchers/microfinance Knowledge-intensive employment subsidies	Loan guarantees Public procurement Knowledge-intensive employment subsidies	R&D subsidies R&D tax incentives
2. Increase the intensity of innovative effort	Favourable capital depreciation allowances	R&D subsidies R&D tax incentives	R&D subsidies R&D tax incentives
3. Diversify by extending the range of innovation modes and fostering collaboration	Promote collaboration between firms, establish inter-firm networks of learning	Promote collaboration betweenfirms, service providers and vocational education providers	Promote collaboration in dense networks of firms, universities, public research institutes and others

Find out more:
Innovation Capabilities and Directions of Development by Martin Bell.

LEVELS OF GOVERNMENT
Local; Regional; National

LEVELS OF RESPONSIBILITY
Collecting and evaluating ideas

GOALS
Goals setting; Strategy design

COMPETENCES
Think systemically; Values for sustainability; Work with others

44 Promoting multiple value creation and co-benefits

Purpose: To engage different groups in innovation for multiple value creation

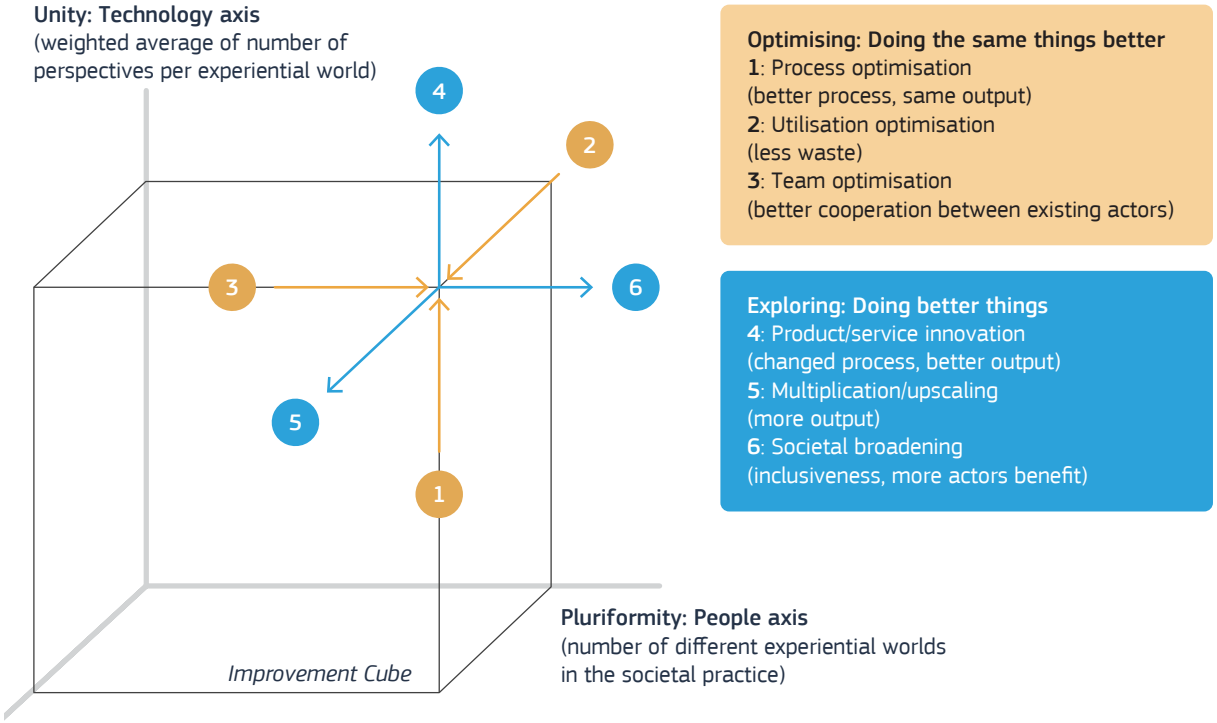
Use: To explain practical processes of creating multiple value creation and co-benefits

Collaborative working is key in the recovery process of the pandemic and in the generation of resilient value chains. This approach offers new innovation opportunities which would not be achieved through change-makers working in isolation. This also provides stimulus to explore new commercial openings. An innovation framework of value orientations and player-based improvement perspectives leads to societal innovation which serves multiple needs and functions in a novel manner. It targets society in a broad sense more than a particular sector. Transition policy mixes include elements of creative destruction, involving policies for the creation of the new and for destabilising the old.

Societal innovation involves different stakeholder groups bringing in different perspectives with the aim of creating value and avoiding negative costs to society. It works as a multi-player innovation challenge leading to co-benefits. Turning our current production-consumption systems into sustainable systems while maintaining their societal benefits requires the involvement of consumers, governments, companies, knowledge institutes and intermediaries. Respecting differences by considering them as flexible components of a process is key in intentional multi-player networks. Innovators need to acknowledge that they require each other in fulfilling their own needs.

Take for example the **Innovation Cube** as a guide with its six value orientations. Ask yourself whether your goal is to improve current practices (incremental innovation) or if you want to explore new avenues (radical innovation). This collective system building can lead to faster diffusion and adoption of the new practices.

The innovation cube.



Source: Dienmaat *et al.* (2020)

Find out more:

https://www.s3vanguardinitiative.eu/
https://www.mdpi.com/2071-1050/12/3/1270
https://www.sciencedirect.com/science/article/pii/S0959652619343677

LEVELS OF GOVERNMENT
National

LEVELS OF RESPONSIBILITY
Developing innovation strategies; Promoter

GOALS
Stakeholder engagement; Strategy design; Internationalising

COMPETENCES
Think systemically; Be creative; Work with others

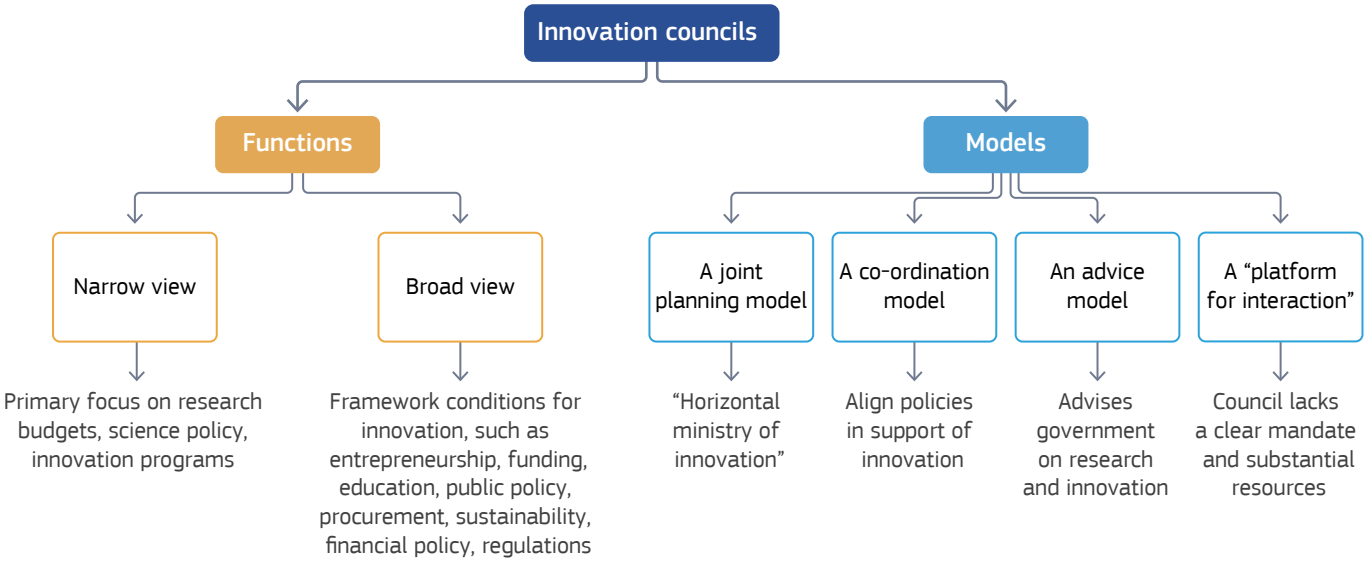
45 Innovation councils

Purpose: To ensure innovation policy coordination and stakeholder engagement

Use: To collectively make long-term choices

Clear goals and strong coordination among public and private stakeholder groups are required to direct innovation capacities towards meeting societal challenges and play a central role in transitioning to a more sustainable economy and society. Innovation (or research and innovation) councils are widespread institutions with **plurality in their composition and a certain degree of independence and detachment from the electoral cycle**. Innovation councils can provide *advice, coordinate, allocate funding, monitor, evaluate* and *do foresight*. Therefore, an innovation council needs political endorsement and support to have a meaningful role; resources to keep the momentum (secretariat), prepare and have the strategic intelligence (data, studies) to provide evidence-based guidance; have a sense of urgency, a common purpose and ambition. Such councils can help align different levels of government for long-term commitments and ensure reflexivity and the resilience of collective efforts towards long-term societal wellbeing.

Functions and models of innovation councils.



Source: based on Schwaag (2021) and Schwaag *et al.* (2015)

Find out more:

National Research and Innovation Councils as an Instrument of Innovation Governance - Characteristics and challenges (vinnova.se)

How is research policy across the OECD organised? : Insights from a new policy database | OECD Science, Technology and Industry Policy Papers | OECD iLibrary (oecd-ilibrary.org)

LEVELS OF GOVERNMENT
Regional; National; European

LEVELS OF RESPONSIBILITY
Acquiring resources; Collecting and evaluating ideas

GOALS
Stakeholder engagement; Strategy design; Internationalising

COMPETENCES
Work with others; Spot opportunities for sustainability; Be creative

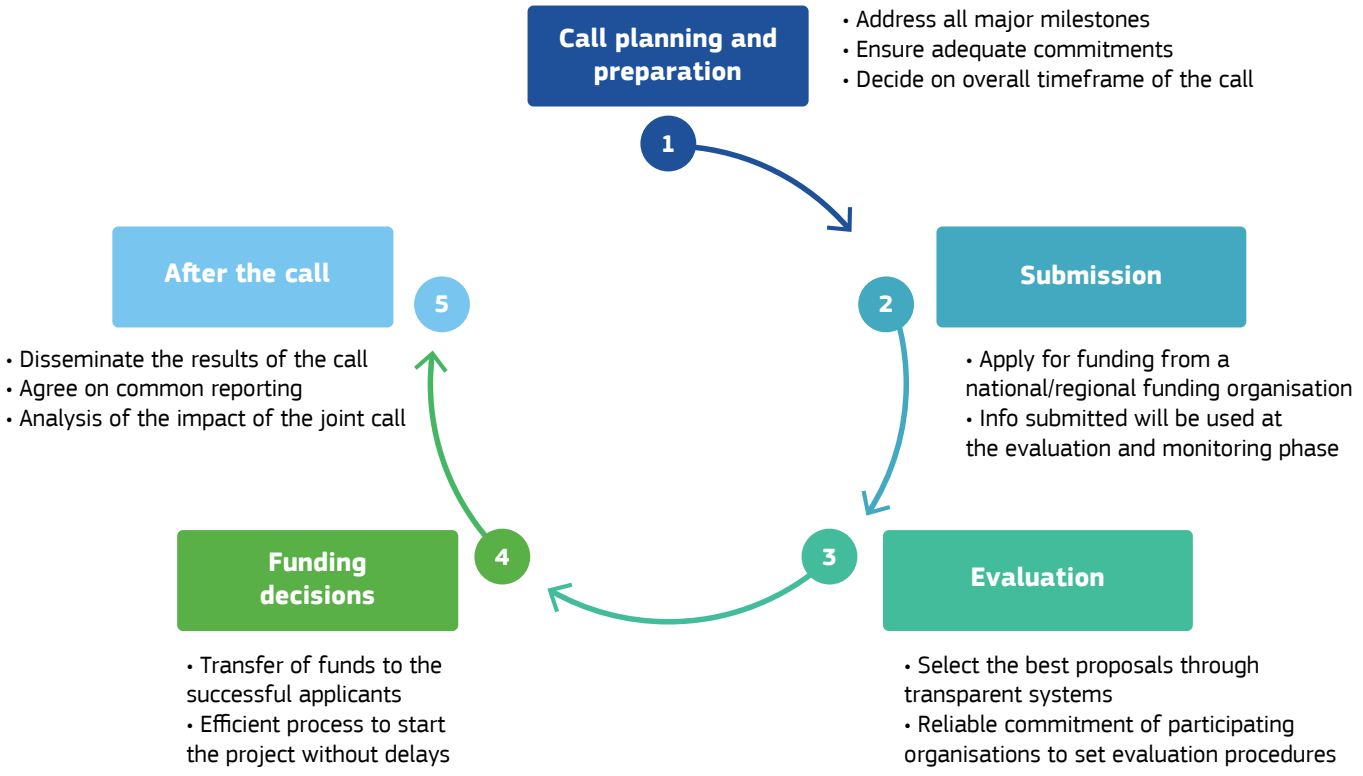
46 Joint calls

Purpose: To help align various calls for proposals and ensure complementarities by design

Use: To set up transnational partnerships

Joint calls generated by private-public partnerships display active networks leading to **opportunities to create new forms of sustainable cooperation and funding arrangements**. These help mobilise multiple R&I stakeholders at Member State and regional levels. Usually industry-led partnerships behind joint calls carry particular characteristics. They feature a governance structure based on critical mass from the private sector and tend to have strong links with national and regional levels. They generally develop their research agenda within the EU's relevant policies leading to closer ties with regional and national initiatives. Then, they involve key stakeholders, part of international value chains, that could be of strategic importance to respective Member States and regions. In this manner, they, would be able to have access to a broad scientific community in relation to advanced technologies.

You can follow these key steps below to implement transnational calls for proposals, developed by the ERA-LEARN platform.



Find out more:
https://s3platform.jrc.ec.europa.eu/en/web/guest/w/joint-undertakings-analysis-of-collaboration-mechanisms-with-esi-funds-in-a-s3-context
https://publications.jrc.ec.europa.eu/repository/handle/JRC91595

LEVELS OF GOVERNMENT
Local; Regional; National

LEVELS OF RESPONSIBILITY
Acquiring resources; Collecting and evaluating ideas

GOALS
Intervening; Creating partnerships

COMPETENCES
Mobilise resources sustainably; Plan and manage sustainably; Work with others

47 Supporting firm growth

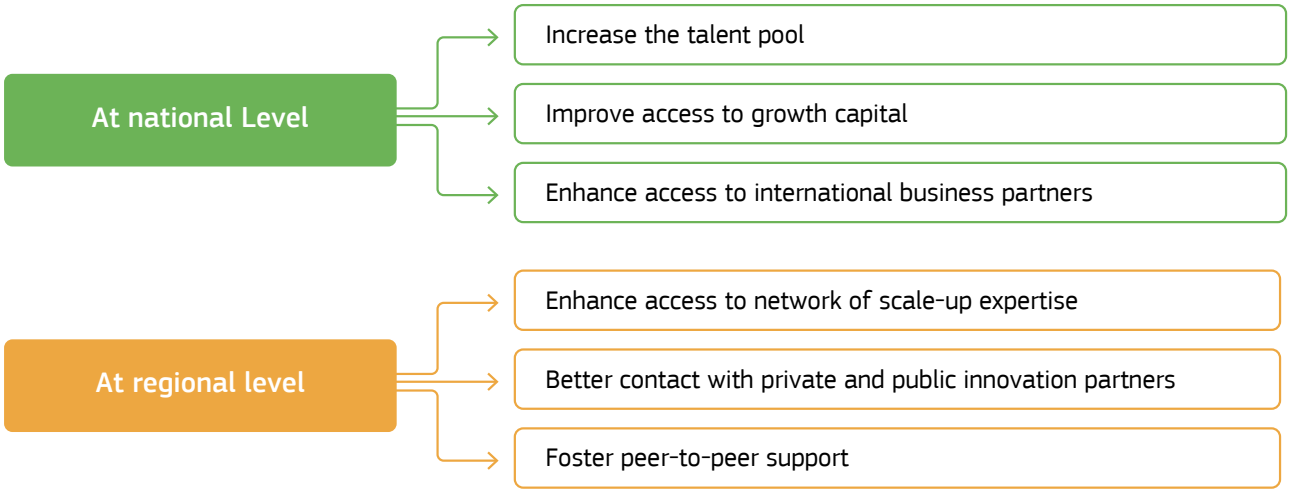
Purpose: To prepare and accelerate growth through competence building

Use: To support the scale-up phase of firms

Effective policy-making needs to target the heterogeneity of the SME's entrepreneurs. There are subsistence entrepreneurs and transformational entrepreneurs, where the latter aim to enlarge their businesses leading to job opportunities and income for others through innovative business ideas. Subsistence entrepreneurs may not be economic creators like transformational entrepreneurs, however, they provide the bulk of goods and services purchased for daily consumption. Considering this diversity in the entrepreneurial dimension, policy support should be targeted accordingly.

Furthermore, human capital is a key driver of firm growth and in fact those firms which generally are successful, tend to invest thoroughly in training. Firms planning to grow make different financing choices than firms with no growth ambitions. In other words, growing firms usually face a larger debt-to-asset ratio when compared to others.

Bank lending may not be of easy access to young and fast-growing firms, as this type of firms is generally characterised with limited collateral and uncertainty in revenues particularly in the short term. To a certain extent, equity financing could be a better option in this case. Equity-based support instruments mostly provide indirect support, i.e. public funding used to leverage private investment where investment decisions are taken by the private sector.



Find out more:
https://www.oecd.org/publications/understanding-firm-growth-fc60b04c-en.htm
https://ec.europa.eu/growth/index_en

48 Financial instruments and private finance blending

Purpose: To consider different funding sources

Use: To formulate a doable financing mix

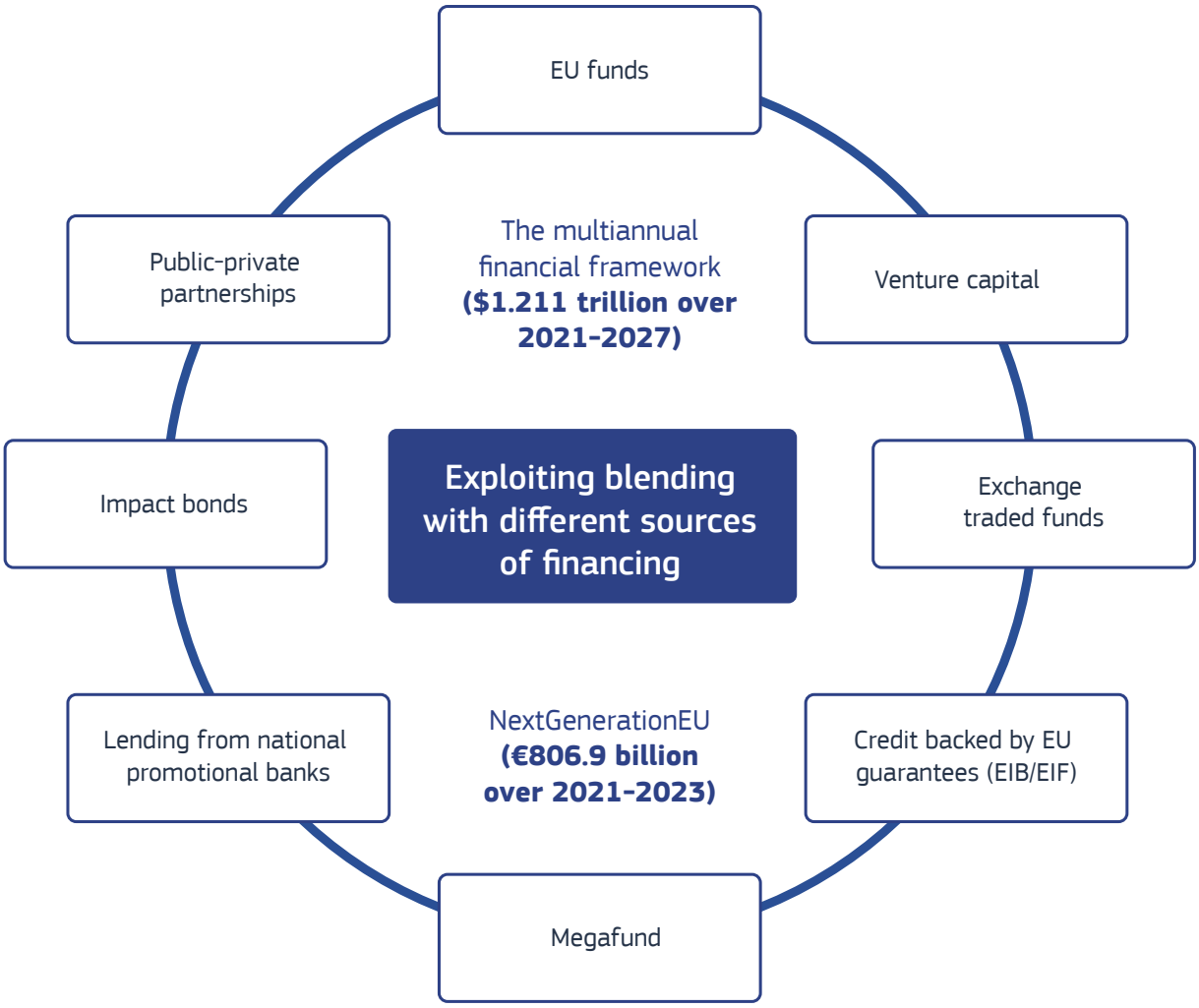
Multiple means of funding are an opportunity for regions and Member States to support the twin transition. There is a need to overcome the regulatory, organisational and attitudinal barriers in setting up synergies with different streams of financing at the territorial level. In addition, it is important to have concerted efforts by going beyond ESIFs and obtain more leveraged type of financing. Different components of financing have to be combined together in order to reach the financial resources needed for a project and thus making the process more viable.

Sometimes projects which have potentially large benefits for society are not implemented due to lack of private incentives to attract the required financing. **Financial engineering can help solve this market failure by modifying the risk-reward trade-off of such investments**.

- When the risk is diversifiable, financial engineering tools build on this characteristic by allowing to invest in many projects to decrease risk at the level of the portfolio of projects, such as setting up a Megafund for a mission of curing a medical condition. However, if the risk is diversifiable but it has only a social impact, such as implementation of minority empowerment programs, then Exchange Traded Funds might be a better option as this instrument provides exposure to a large number of socially responsible companies in order to diversify away the risk associated to factors specific to the individual firms.
- On the other hand, when the risk is non-diversifiable, such as when there is a single project or when the outcomes of several projects depend on each other, financial engineering solutions aim at reallocating risks between the different stakeholders. For example, in the case of a mission establishing a circular economy in a set of regional sectors (materials, construction, food, wood amongst others), many companies will be willing to invest but the business models will be doable when other complementary models are already in place such as development of alternative materials, management and recycling of wastes, and promoting a repair sector to name a few. Thus, in this scenario financial engineering needs to be complemented by a well-designed Private-Public Partnership. In addition, when the risk is non-diversifiable but the project has only a social impact, such as implementing green infrastructures to reduce storm-water run-off, social and environmental Impact Bonds could be best suited to provide financial insurance in case of failure by transferring the risk from the public to the private sector and thus, making the scheme more acceptable to the taxpayer.

In the figure below, you can have a look at different funding options which would be worth considering.

Moving forward on the path of setting up synergies with EU funds.



Find out more:
https://smart-cities-marketplace.ec.europa.eu/
https://ec.europa.eu/info/strategy/eu-budget/long-term-eu-budget/2021-2027/whats-new_en
https://www.eib.org/en/products/loans/microfinance/index.htm

LEVELS OF GOVERNMENT
National

LEVELS OF RESPONSIBILITY
Managing funds

GOALS
Intervening; Legitimisation

COMPETENCES
Think systemically; Plan and manage sustainably; Values for sustainability; Work with others

49 Sustainable financing instruments and green bonds

Purpose: To ensure public finance supports the green transition

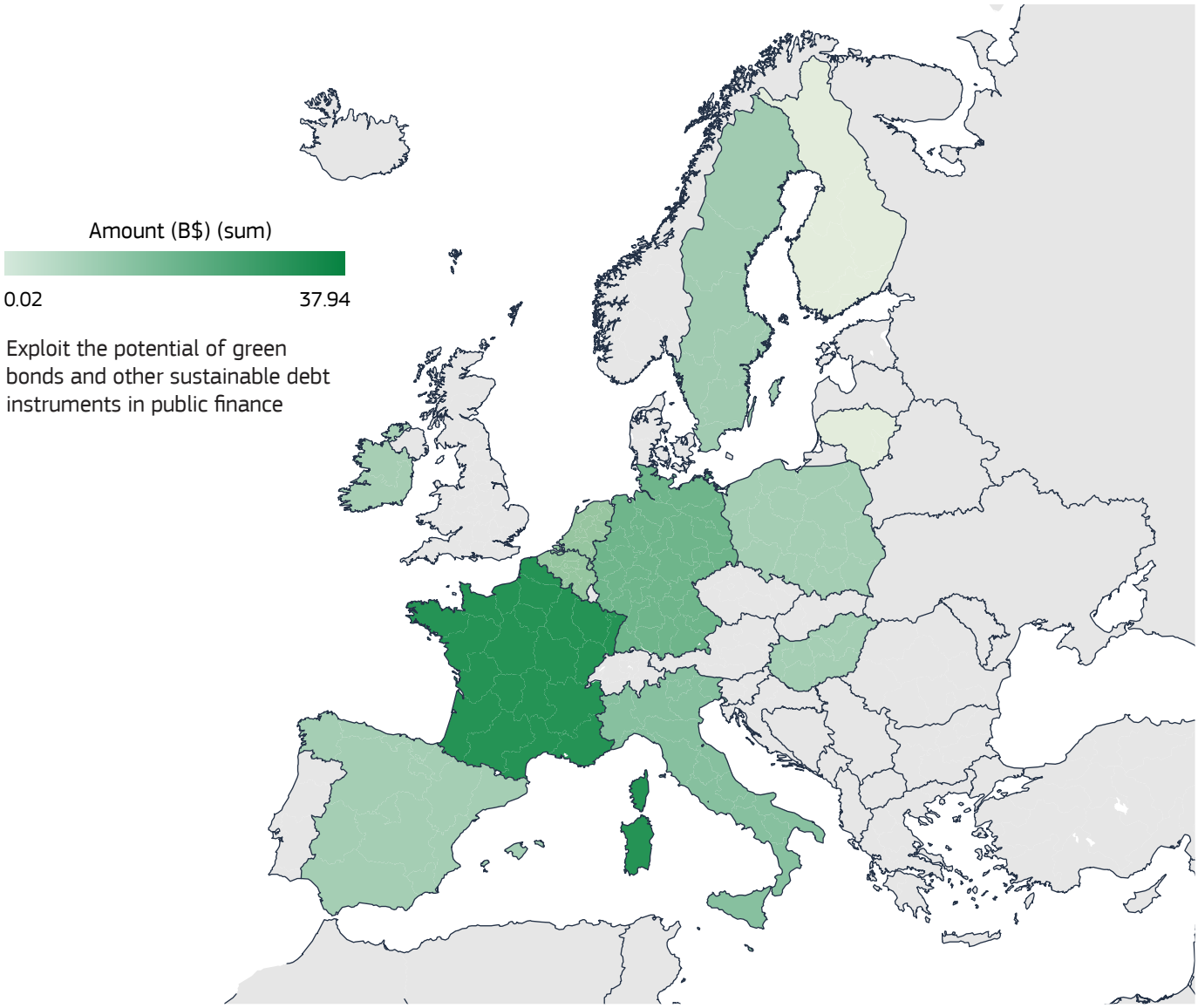
Use: To use sustainable financing instruments to steer the impacts of public finance

What are the challenges that your region faces to access green bonds? Sustainable debt instruments play an increasingly important role in scaling up financing of investment for the low carbon transition and the other environmental and social goals set at the EU and global level. As a type of fixed-income security issued to finance projects with positive environmental or climate effects, **green bonds** have emerged as the most successful and promising instrument of green finance so far.

Europe is home to the largest market for sustainable debt, and the EU is expected to consolidate its leadership both as a market player and as a regulator. The green bond issuance to finance up to 30% of the EUR 750 billion allocated for NGEU, and the proposal for a European green bond standard are expected to accelerate market growth by stimulating further private and public issuances, and to help respond to the rapidly expanding base of sustainability-concerned investors. There is evidence that governmental issuers can benefit from lower funding costs by issuing green bonds, while investors are not exposed to high downside risk during periods of financial market stress.

Think about your territory. What is the percentage of financing instruments that is green/sustainable?

The use of green bonds in public finance.



Find out more:

Green bonds as a tool against climate change | European Commission JRC Publication Repository
The pricing of green bonds: Are financial institutions special? | European Commission JRC Publication Repository
Sustainable investing in times of crisis: evidence from bond holdings and the COVID-19 pandemic. | EU Science Hub (europa.eu)

LEVELS OF GOVERNMENT
All

LEVELS OF RESPONSIBILITY
Acquiring resources; Promoter

GOALS
Steering demand

COMPETENCES
Mobilise resources sustainably; Work with others; Plan and manage sustainably; Think critically

50 Green public procurement

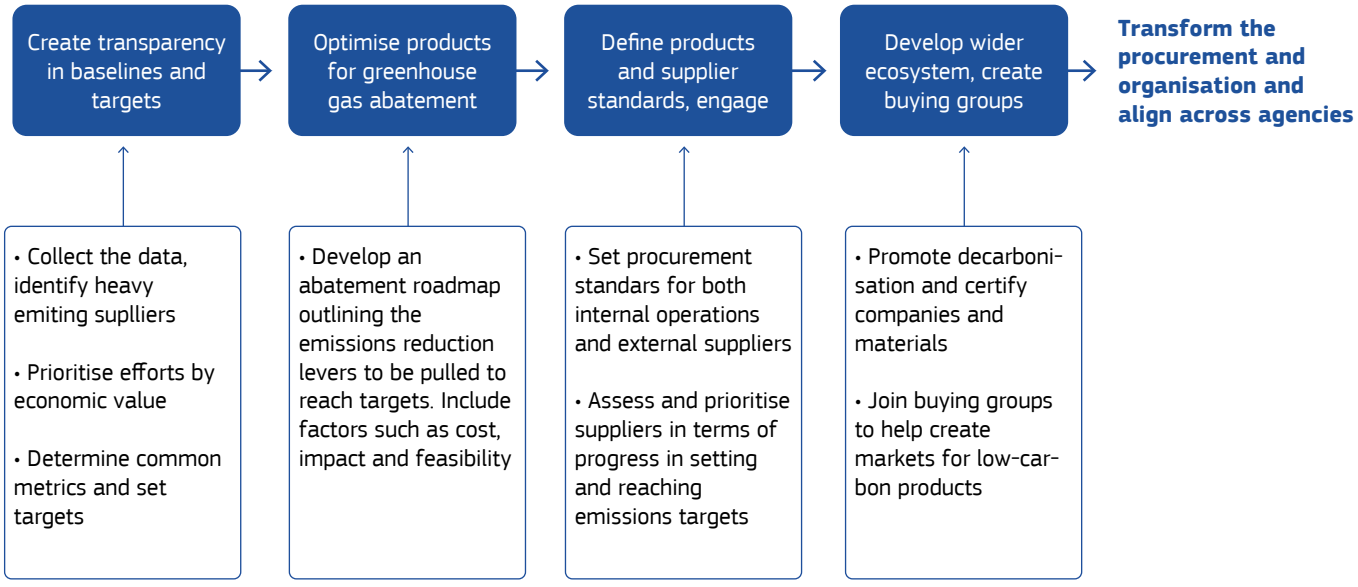
Purpose: To use the purchasing power of government to achieve sustainability goals

Use: To work across government in reconsidering public procurement procedures that create multiple value

Governments, by using their purchasing power to choose goods, services and works with a reduced environmental impact, can make an important contribution towards local, regional, national and international sustainability goals. Countries increasingly recognise that **Green public procurement (GPP) can be a major driver for innovation, providing industry with incentives for developing environment-friendly works, products and services**. However there are obstacles to successfully implementing GPP, including in particular: the perception that green products and services may be more expensive than conventional ones; public officials' lack of technical knowledge on integrating environmental standards in the procurement process; the absence of monitoring mechanisms to evaluate if GPP achieves its goals.

- Have you already made use of GPP?
- What are the real or potential obstacles you face when/if implementing GPP?

Below, you can find a series of common obstacles and how you can overcome them.



Find out more:

WEF_Green_Public_Procurement_2022.pdf (weforum.org)
Buying green handbook - Green Public Procurement - Environment - European Commission (europa.eu)

LEVELS OF GOVERNMENT
Regional; National

LEVELS OF RESPONSIBILITY
Promoter; Monitoring and control; Regulation and legislation

GOALS
Steering demand; Monitoring

COMPETENCES
Mobilise resources sustainably; Be creative; Plan and manage sustainably; Think critically

51 Regulatory sandboxes

Purpose: To allow real-world experimentation with the regulations most propitious to innovation

Use: To quickly identify and remove legal and regulatory obstacles to innovation, create new markets

Regulatory sandboxes are real-world testing environments where conditional exemptions from regulations currently in force allow rapid experimentation, learning and innovation. Lessons from real-world experimentation may then provide the basis for informed adjustments of laws and rules. Sandbox experiments are typically not about the demonstration of one innovation in particular, but rather involve bringing together various stakeholders in the development and testing of interrelated innovations. Regulatory sandboxes require the introduction of a compatible legal framework and a regulatory authority (e.g. an independent energy regulator, or a telecommunications, transport, food safety or data protection oversight body) to approve exemptions from prevalent rules for a limited time and for well-defined purposes, providing safeguards and oversight to minimise risks.

Potential Benefits of Regulatory Sandboxes.

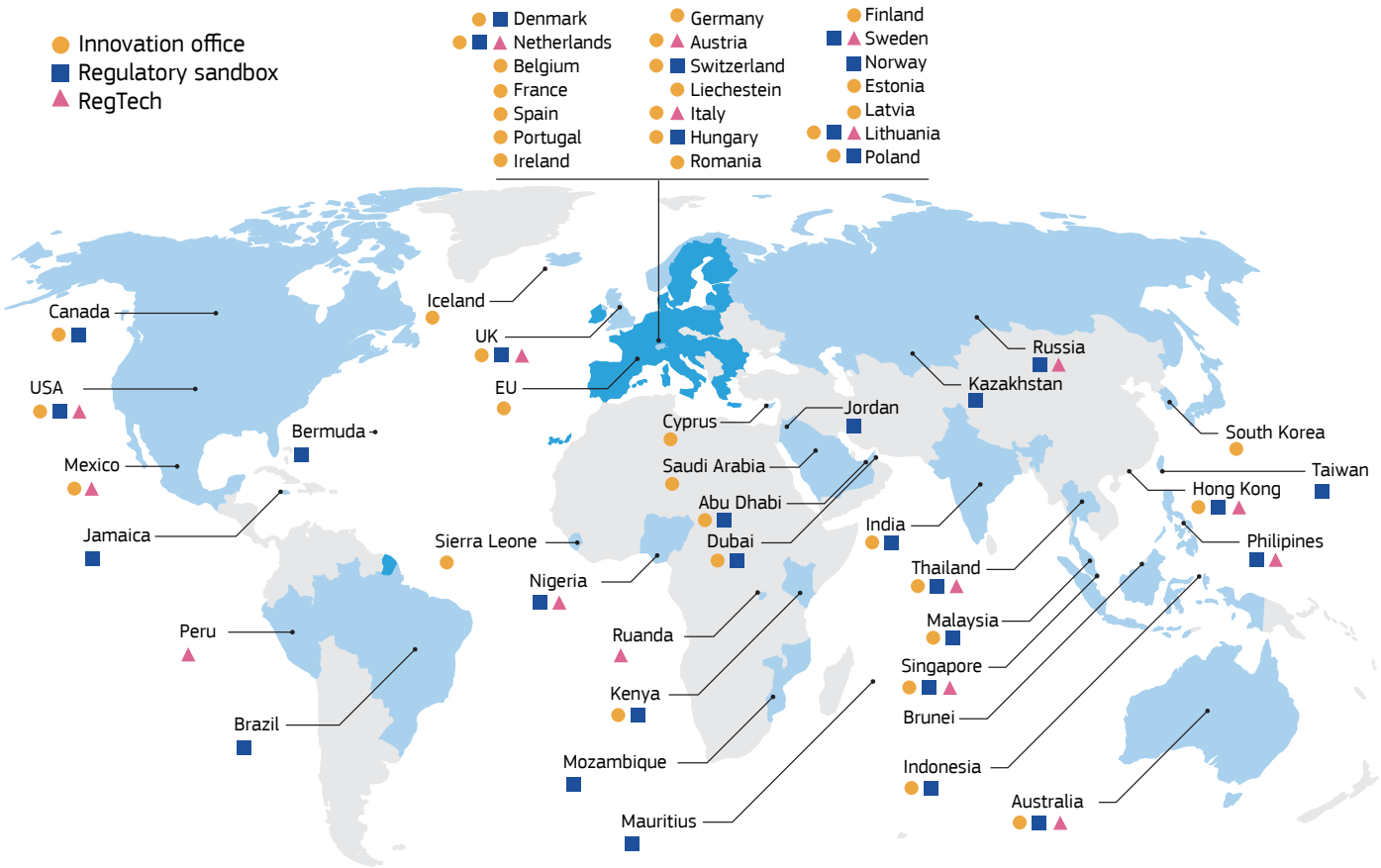
Public authorities	Innovators	Consumers
• Inform policy making through learning and experimentation • Signal commitment to innovation and learning • Promote communication and engagement • Update regulations that may prohibit beneficial innovation	• Reduce time-to-market by streamlining authorisation • Reduce regulatory uncertainty, e.g. risk that innovations may be prohibited • Gather feedback on regulatory requirements and risks • Improve access to capital	• Accelerate the introduction of improved and potentially safer products • Enlarge the pool of consumers who can access improved products and services

Source: Adapted from UNSGSA (2019, p. 30)

Regulatory sandboxes in action around the world

Initially tested in the field of finance by the UK Financial Conduct Authority, regulatory sandboxes have gradually spread throughout the globe, and in sectors as diverse as energy, finance, telecoms and transportation. A report by the UNSGSA (2019) provided a map of existing sandboxes around the world, and at the same drew attention to the difficulty of designing experiments properly.

Regulatory sandboxes and RegTech tools around the world.

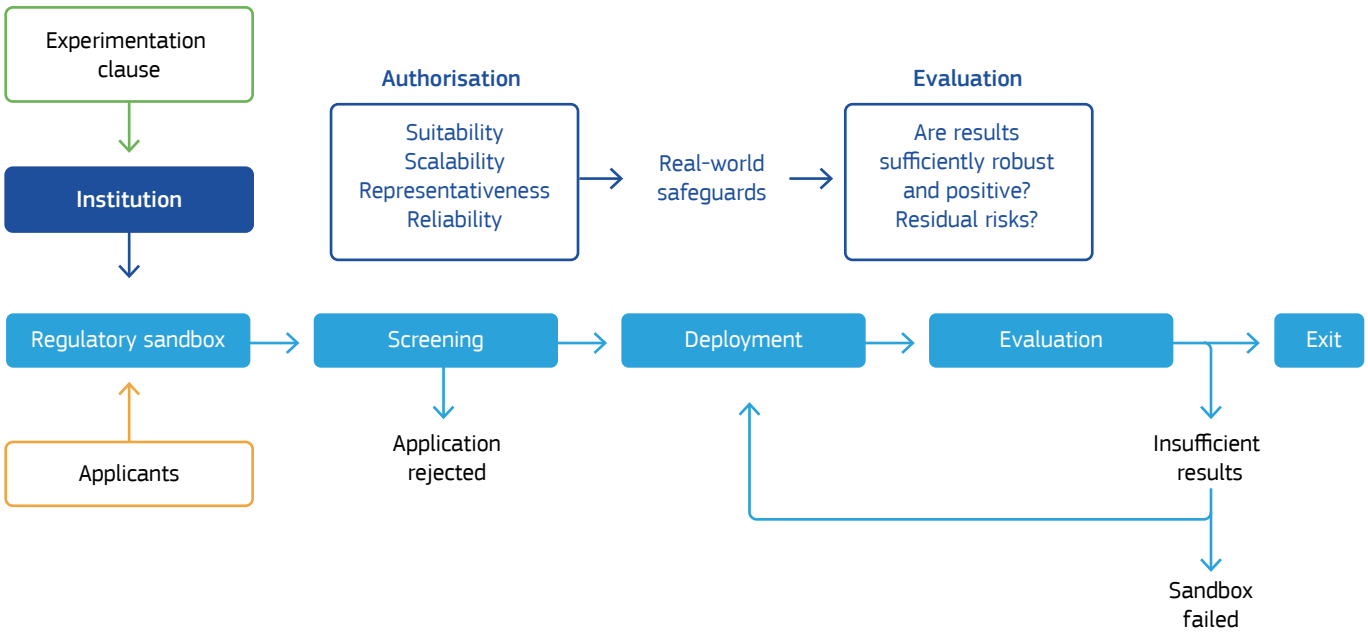


Source: UNSGSA FinTech Working Group and CCAF (2019)

Guidance for sandbox design and implementation

The figure below shows a possible step-by-step guidance to designing and executing a regulatory sandbox. First, regulatory sandboxes require that an experimentation clause is included in legislation, allowing public institutions to design and implement experimental policymaking in a controlled environment. A given institution then opens up the possibility for businesses aiming at a change in legislation to apply to enter a regulatory sandbox environment. This is typically the case when legislation contains very prescriptive requirements, which the applicant does not fully meet due to the adoption of an innovative business model. Applications have to be assessed based on the potential benefit of allowing the innovative solution, the scalability of potential positive results, the representativeness of the sample of consumers/users chosen, and the reliability of the experimental design. Once the application is authorised, the deployment phase begins, possibly requiring several iterations before results are considered to be robust enough to allow for admission of the innovative solution to the market.

Designing and implementing a Regulatory Sandbox.



Source: Andrea Renda

Find out more:
https://voxeu.org/article/sandboxes-and-role-policy-experimentation
https://blogs.worldbank.org/psd/four-years-and-counting-what-weve-learned-regulatory-sandboxes

52 Innovation policies for affordability

Purpose: To make innovations more affordable to promote greater access, impact and capability

Use: To develop policy mixes that lower cost and accelerate the diffusion of sustainability solutions

Many innovations for sustainability such as heat pumps, EVs, green hydrogen, stationary battery storage, are still prohibitively expensive, preventing their widespread diffusion. Although prices tend to drop over time as these solutions are manufactured to scale, the radical price reductions necessary for the widespread adoption implicit in Europe's ambitious goals will require much additional innovation to develop more affordable solutions. Historical experience suggests that public policy can play a key role in accelerating their development.

Why are innovation policies for affordability necessary?

High-technology markets characterised by large-scale R&D and monopolistic competition can take a long time to cater to majority adopters. Early adopters are prepared to pay a high price premium which is necessary to offset the high costs of R&D. For this reason solutions tend to cater to the needs of early adopters first. However, early adopters typically account for a very small share of the potential market. More widespread diffusion usually requires the development of technological prototypes that are adapted to the means and needs of the majority of potential adopters. It often takes new entrants to identify majority adopter needs and adapt technological solutions accordingly (see some real-word examples in the box below). Real-world examples point to what may well be a more general tendency for the initial persistence of solutions offering continuously improved technology capability for a constant high price. Mass adoption however may rather depend on the development of progressively lower priced solution prototypes that offer a mostly fixed bundle of technological capability that is sufficient for the majority of use cases. The trigger for these solutions to emerge does not usually come from an incumbent, can sometimes be traced outside the market, and can include publicly-supported and non-profit initiatives.

How innovations by new entrants, publicly-supported and non-profit initiatives helped make key technologies more affordable.

Many of the technologies entering widespread use in recent years were already in limited use many decades ago but had to wait for suitably adjusted technological prototypes before they could become affordable. For instance, it took the introduction of personal computers to bring graphical user interfaces and networks out of the niches in which they emerged in the 1960s and into widespread use by the turn of the century. Because mass-market prototypes require an intimate understanding of use cases, some of the innovations that opened the path to mass adoption were not initially driven by market considerations. Some were pioneered by non-profit organisations (e.g. MIT's "one laptop per child" initiative demonstrated untapped demand for low-cost laptops that triggered the development of much more affordable portable computers known as 'netbooks') whereas others have their roots in user innovation and draw on prosumer knowledge (such as the Raspberry-Pi inexpensive computer board initially designed to educate students

on hardware-level programming but now used extensively in low cost computing applications). Solar photovoltaic is another telling example, with its initial application in small niches (such as the US space programme) going as far back as the 1960s. Driven by demand for clients with niche uses the thrust of technological development in the early years aimed at increasing photovoltaic panel efficiency rather than reducing price. It took generous government subsidies aimed at promoting mass adoption to bring about the massive cost reductions that permitted accelerating take up, especially over the past decade. Yet another example of a prototype that stands to accelerate diffusion is the affordable electric powertrain and battery kit designed by French startup Transition One (https://transition-one.fr/) to retrofit mass produced conventional cars for a fraction of the cost of a new electric vehicle.

What is the role of public policy?

In this context public policy has a role to support a greater pool of firms to *innovate with the ultimate aim of providing affordable solutions for the majority of users.* Some possibilities include:

- **Collective provision of sustainable solutions** makes sense where there are clear benefits from procuring and delivering solutions at scale: examples include sustainable mass transport, ride-sharing, promotion of pay-per-use sustainable vehicle business models, municipal heating, some forms of energy storage, etc. Whereas governments often support such services, the support does not normally have an innovation objective. However collective provision can open up otherwise unavailable **innovation spaces**, availing precious early opportunities for local companies to gauge demand, experiment with prototypes and understand complex behavioural and regulatory interactions. However, introducing innovation spaces in public subsidies, public investments and public procurement requires building provisions for innovation into the design of their technical specifications, earmarking a budget for experimentation. The collective provision of sustainable solutions can also raise awareness about not only the environmental benefits of some of the solutions but in many cases their other superior performance characteristics (e.g. reduced noise pollution, ride comfort, and increased safety for electric vehicles, reduction in overall waste due to home composting and recycling etc.) that in turn promote private adoption of sustainable solutions.

- **Public support for innovation that develops more affordable sustainable product and service prototypes** can be a crucial role of public policy in cases where additional innovation is necessary before mass-market prototypes emerge or are suitably adapted to local circumstances. This can take the form of public research for more affordable solutions, specific support for new entrants (startups or FDI), regulatory sandboxes, horizontal business innovation support subsidies or small sum innovation vouchers for so-called **frugal innovation**, which are also made available to small companies, repair workshops, citizen scientists and prosumers. Combining the objective of affordability with **adaptation to local needs** (e.g. last-mile sustainable logistics), may also provide a pathway for the development of unique technological niches (e.g. place-based sustainable housing and transport, renewable energy and storage solutions or solutions linked to other production uses such as suitably adapted agrivoltaics, desalination plants, environmental remediation technologies).

- **Public support for mass manufacturing / service provision** may make sense in cases where mass-market prototypes already exist and the bottleneck is in unit-cost reductions. Public policy can support those investments that allow mass manufacturing (e.g. gigafactories for batteries) or service provision (e.g. digital solutions that improve access, adaptation to the needs of social groups that face digital barriers). These investments can be risky and require a fertile business ecosystem.
- **Systemic interventions** such as the provision of complementary industrial services, competition-enhancing measures (e.g. in the energy market) or support to investments (e.g. combined investments in renewables and energy storage) that reduce the prices of crucial factor inputs (e.g. the provision of relevant skills, access to scarce raw materials) could be another path.

Find out more:
https://www.oecd.org/sti/inno/knowledge-and-innovation-for-inclusive-development.htm
https://www.rndtoday.co.uk/themes/frugal-innovation/

LEVELS OF GOVERNMENT
All

LEVELS OF RESPONSIBILITY
Transfer of authority; Developing innovation strategies

GOALS
Creating partnerships; Accumulating service provision capabilities; Steering demand

COMPETENCES
Think systemically; Mobilise resources sustainably; Shape change

53 Public-private partnerships for skills development

Purpose: To develop the skills that individuals need in a greener and digital society

Use: To connect public and private stakeholders for effective implementation of skills-related policies

To ensure that young people and adults are employable, systems of vocational education and training (VET) around the world build various forms of collaboration between the public and private sectors. Public–private partnerships (PPPs) that focus on skills development are one form of collaboration found in any VET system. Player cooperation and public and private investments are important factors to make lifelong learning a reality for all.

PPPs in the field of skills can be useful instruments of skills policies and programmes, to attain positive outcomes for learners. These PPPs are a space where public and private stakeholders come together with their respective competence, innovation capacity, human and material resources to enable what none of them could achieve alone (see box below).

PPPs for skills development feature 3 dimensions, namely function, scope and membership. In terms of function, we find:

- PPPs that focus on knowledge, for example skills intelligence and data analysis, context and demand analysis, and foresight;
- PPPs that focus on resources, for example learning equipment, laboratories, dormitories;
- PPPs that focus on VET provision are the most frequent, for example: various forms of work-based learning programmes, joint curriculum and programme design and delivery, joint management of training centres, innovation of learning environments, transition from school to work, up-skilling and re-skilling.

In terms of scope, the PPP types range from 'fully integrated in the VET system' to 'ad hoc pilot initiative' depending on the extent of diffusion of the practice within the VET system.

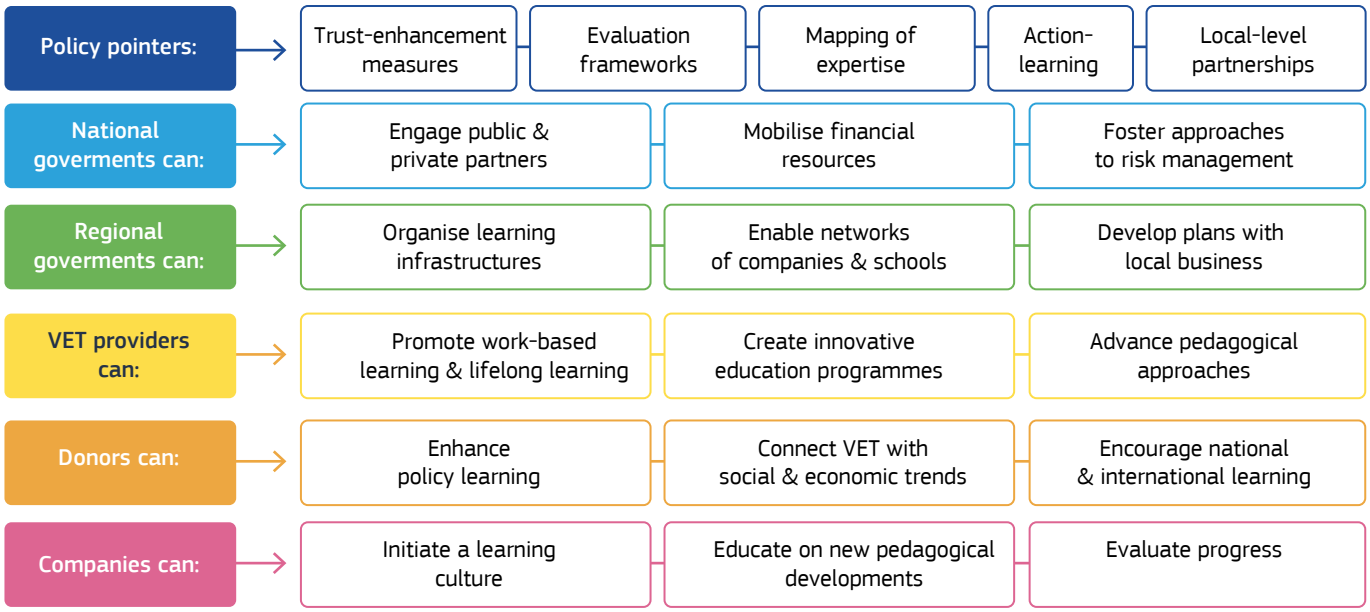
Finally, in terms of membership the PPP types depend on the openness to new partners joining, which can vary from 'open' or 'semi-open' to 'closed' PPPs.

You can find evidence from 23 case studies in a report by the European Training Foundation. It analyses the purpose of the partnerships, their scope and membership, governance, financing and risk management arrangements, as well as the motivation, role and capacities of the partners. This ETF report shows that PPPs for skills development do not exist in a vacuum but build on conditions and are influenced by contextual factors. The following graph summarises what public institutions, companies, schools and training centres as well as donors can do to sustain PPPs that serve skills development purposes.

What are public-private partnerships for skills development?

PPPs for skills development are mechanisms for coordinating action and sharing responsibility between public and private stakeholders in VET. They jointly formulate, design, finance, manage and/or sustain engagements that produce good quality skills and employability for the learners. Stakeholders in PPPs may include public institutions or semi-public organisations, such as schools, agencies and state enterprises, and individual businesses, associations, chambers of commerce and civil society organisations. PPPs on skills development may unfold at the school/company level, within or across sectors, at the national or sub-national scale.

Public-private partnerships for skills development.



Source: European Training Foundation

Find out more:

https://www.etf.europa.eu/en/publications-and-resources/publications/public-private-partnerships-skills-development-governance

Public–private partnerships for skills development: A governance perspective – Volume II. Case studies | ETF (europa.eu)

How public-private partnerships support skills development in South Eastern Europe and Turkey | Open Space (europa.eu)

Public Private Partnerships in skills development and value for Youth Guarantee implementation | Open Space (europa.eu)

LEVELS OF GOVERNMENT
Local; Regional; National

LEVELS OF RESPONSIBILITY
Acquiring resources; Developing innovation strategies

GOALS
Policy objectives; Problem framing; Accumulating service provision capabilities

COMPETENCES
Spot opportunities for sustainability; Shape change; Work with others; Manage transformations

54 Promoting public sector innovation

Purpose: To promote innovation for societal goals

Use: To develop faster, more efficient solution to public policy challenges

In both business and the public sector, innovation can be key to fostering prosperity, to reducing costs and improving services. Public sector innovation is defined by the European Commission as the process of generating new ideas, and implementing them to create value for society. Each public innovation addresses a public policy challenge, and a successful public innovation is one that achieves the desired public outcome. Fostering innovation in public organisations requires changes that encourage organisations and the people that work for them to come up with new ideas, try new approaches and work in new ways.

There are two main categories of public sector innovation: *innovation in and innovation through* the public sector. While the first mostly describes the modernisation of public services to render them more citizen- and business-friendly, the latter focuses on large-scale high-cost and high-risk innovations where the business sector was initially reluctant to invest, such as space technology or nanotechnology, transport (e.g. high-speed trains), or digital infrastructure (e.g. the internet).

People are at the heart of both types of public sector innovation. Be supportive of your colleagues and employees – that is, make sure they have the competences, motivation and opportunity to come up with new approaches (see Fiche 55, "*Empowering civil servants to create sustainable prosperity*").

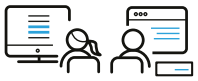
Four action areas to promote public sector innovation:

Action 1
People matter

Governments must invest in the capabilities of civil servants as the catalysts of innovation. This includes building the culture, incentives and norms to facilitate new ways of working

Action 2
Knowledge is power

Governments must facilitate free flow of information, data and knowledge across the public sector and use it to respond creatively to new challenges and opportunities



Action 3
Working together solves problems

Governments must advance new organisational structures and leverage partnerships to enhance approaches and tools, share risk and harness available information and resources for innovation

Action 4
Rules and processes to support, not hinder

Governments must ensure that internal rules and processes are balanced in their capacity to mitigate risks while protecting resources and enabling innovation

Find out more:
OPSI Publications - Observatory of Public Sector Innovation Observatory of Public Sector Innovation (oecd-opsi.org) / Governance, public sector innovation and social change | EU Science Hub (europa.eu)

LEVELS OF GOVERNMENT
Local; Regional; National

LEVELS OF RESPONSIBILITY
Developing human resources

GOALS
Developing public administration; Accumulating service provision capabilities

COMPETENCES
Spot opportunities for sustainability; Be creative; Mobilise resources sustainably

55 Empowering civil servants to create sustainable prosperity

Purpose: To pursue transformative ideas in the public sector

Use: To develop and nurture employees with an entrepreneurial mindset

"Experimenting with new ideas is not part of my job. Public organisations should not waste public money on trial-and-error". In an increasingly volatile, uncertain, complex and ambiguous world, can public administrations focus only on routine value creation, i.e. delivering what has worked so far to address well-defined problems?

Given the unprecedented pace of innovation, worsening environmental conditions, and changing citizen needs, public administrations need to future-proof their strategy by supporting purposeful innovative ideas that create value for society and contribute to the SDGs. To this aim, civil servants need to be equipped with the entrepreneurial competences to address complex challenges and ill-defined problems creatively, to cope with uncertainty ambiguity and risk, to mobilise resources so that they can transform such ideas into public value.

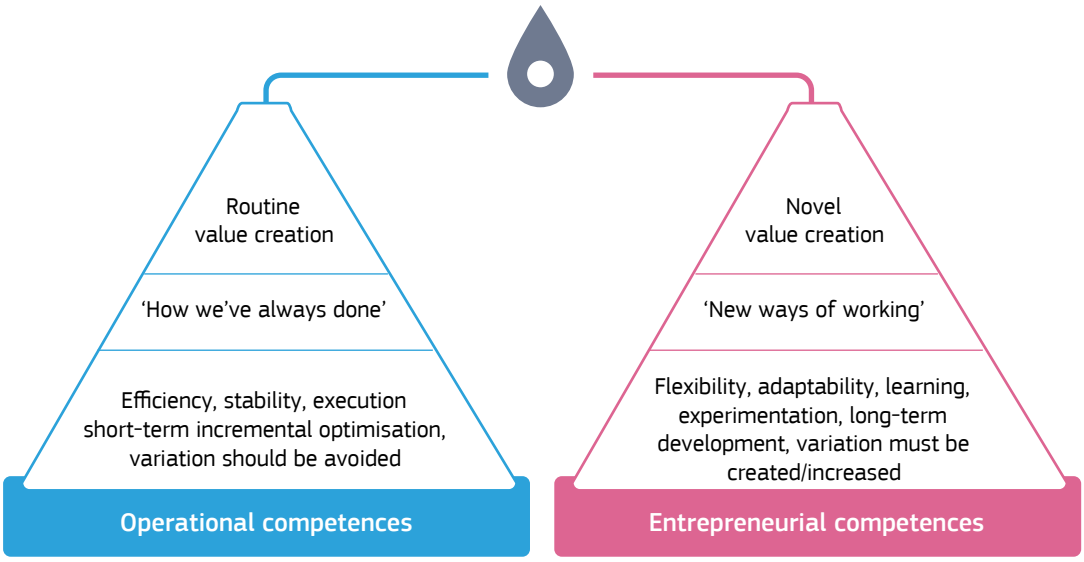
This can be hard to achieve, given that current organisational structures and cultures may tend to allocate resources and rewards to deliver routine work. In this light, public sector employees could think that experimenting with new ideas is not part of their job or organisation. Furthermore, resistance to change and fear of failure can also act as obstacles.

Public sector employees can become more entrepreneurial by performing a balancing act: being flexible and exploring new ways of working and interacting with different stakeholders, while also delivering on their daily tasks, where execution and efficiency are prioritised.

Entrepreneurial employees care about their job, try hard to envision experiment, and collaborate to create new kinds of value for others and they are an important asset for your organisation to address "glocal" sustainability challenges.

Employees with an entrepreneurial drive surely work in your organisation already. They just need to be given slack resources, time and autonomy as well as trust to pursue their ideas. You may have a key role in providing leadership and institutional support. By enabling your team to become more entrepreneurial you are likely to help your organisation remain relevant and keep delivering value to its intended beneficiaries despite disruptions, setbacks and uncontrollable externalities. What is more, you will also see how the motivation of the staff working in your organisation will increase, as pursuing the creation of value someone cares about enhances their sense of purpose and engagement with their job.

Balancing operational competence and entrepreneurial competences.



Find out more:
The entrepreneurial Employee in the public and private sector. What, why, how.

LEVELS OF GOVERNMENT
All

LEVELS OF RESPONSIBILITY
Developing human resources

GOALS
Developing public administration

COMPETENCES
Think systemically; Be futures literate; Manage transformations; think critically

56 Competences for the twin transitions

Purpose: To inspire change in your education and training systems

Use: To equip citizens with a wide set of skills that will help them play a creative role in the twin transition

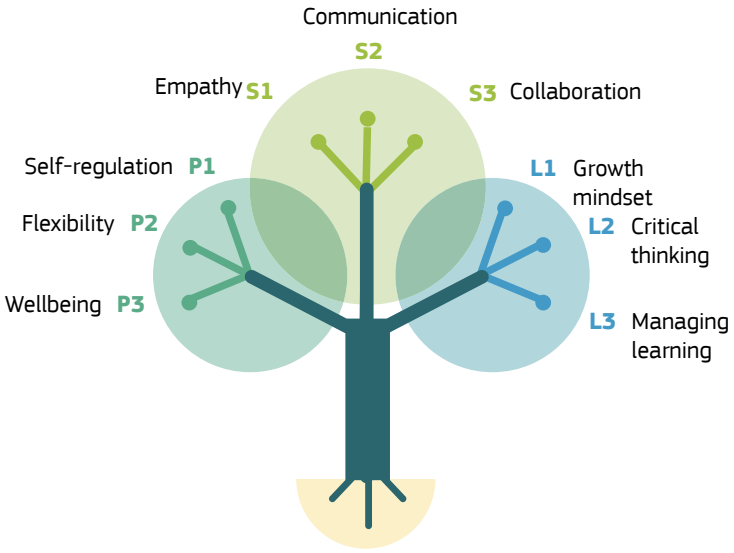
Technological innovations, climate change, demographic trends, migration flows, together with sudden shocks such as financial crisis, pandemic outbreaks or shifts in global order are changing societies and economies thus affecting Europeans' way of living and participating in society, including in the labour market. They also affect your job as policy maker, faced with challenges of unprecedented complexity.

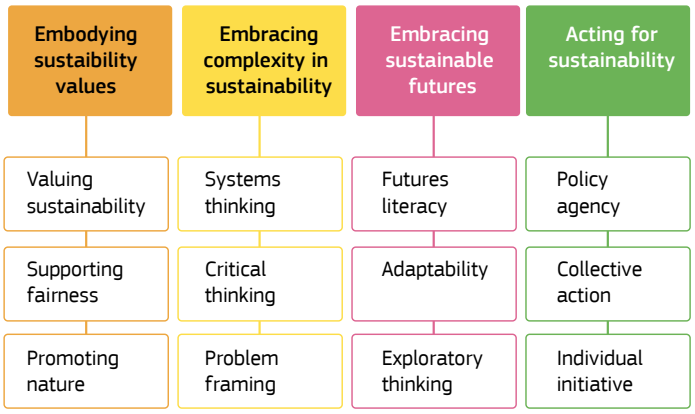
One of such challenges is ensuring people have the knowledge, skills and attitudes that allow them to fulfil their aspirations while contributing to shared global responsibilities (e.g., the SDGs). How can you equip people with the future-fit competences that empower them to thrive in a fast-changing world when the future is so uncertain? How can you teach them what they need to shape the digital and green transitions to achieve collective prosperity, when those who are in education today may end up working in sectors that do not exist today, developing knowledge in disciplines that are emerging, interacting with technologies that are yet to come?

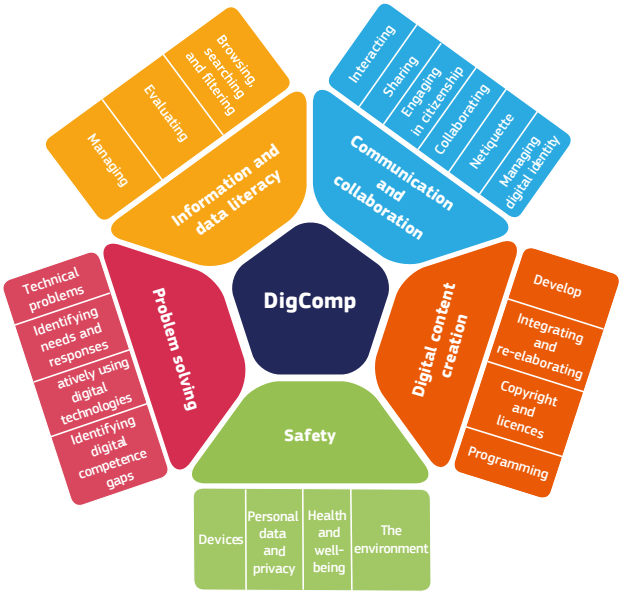
First and foremost, it is essential that you decouple learning from education provision. Learning happens at school in as much as in non-formal training or through informal learning experiences. By taking a lifelong and life-wide approach to learning, you ensure that you focus your effort not only on providing people with basic skills (literacy, numeracy and basic digital skills) and civic competences, but also competences that will help them face complexity and change in today's society.

Such competences include personal and social competences, at the core of individual resilience and well-being; the capacity to learn to learn, essential to shape the course of transformation and adaptation (LifeComp); the capacity to turn ideas into action, fundamental to generate new value for oneself and society (EntreComp); sustainability competences, which are key to ensure that human action and value creation remains within planetary boundaries (GreenComp); digital competences, which build the confident, critical and creative use of ICT to achieve goals related to work, employability, learning, leisure, inclusion and participation in society (DigComp);.

The European Commission has developed a series of reference documents and support tools to help you innovate in lifelong learning by embedding the competences society needs to make the twin transitions a process of transformation that is just and inclusive.







Find out more:

[LifeComp: The European framework for the personal, social and learning to learn key competence]
[EntreComp: The entrepreneurship competence framework]
[GreenComp: the European sustainability competence framework]
[DigComp: European Digital Competence Framework]

57 Futures literacy

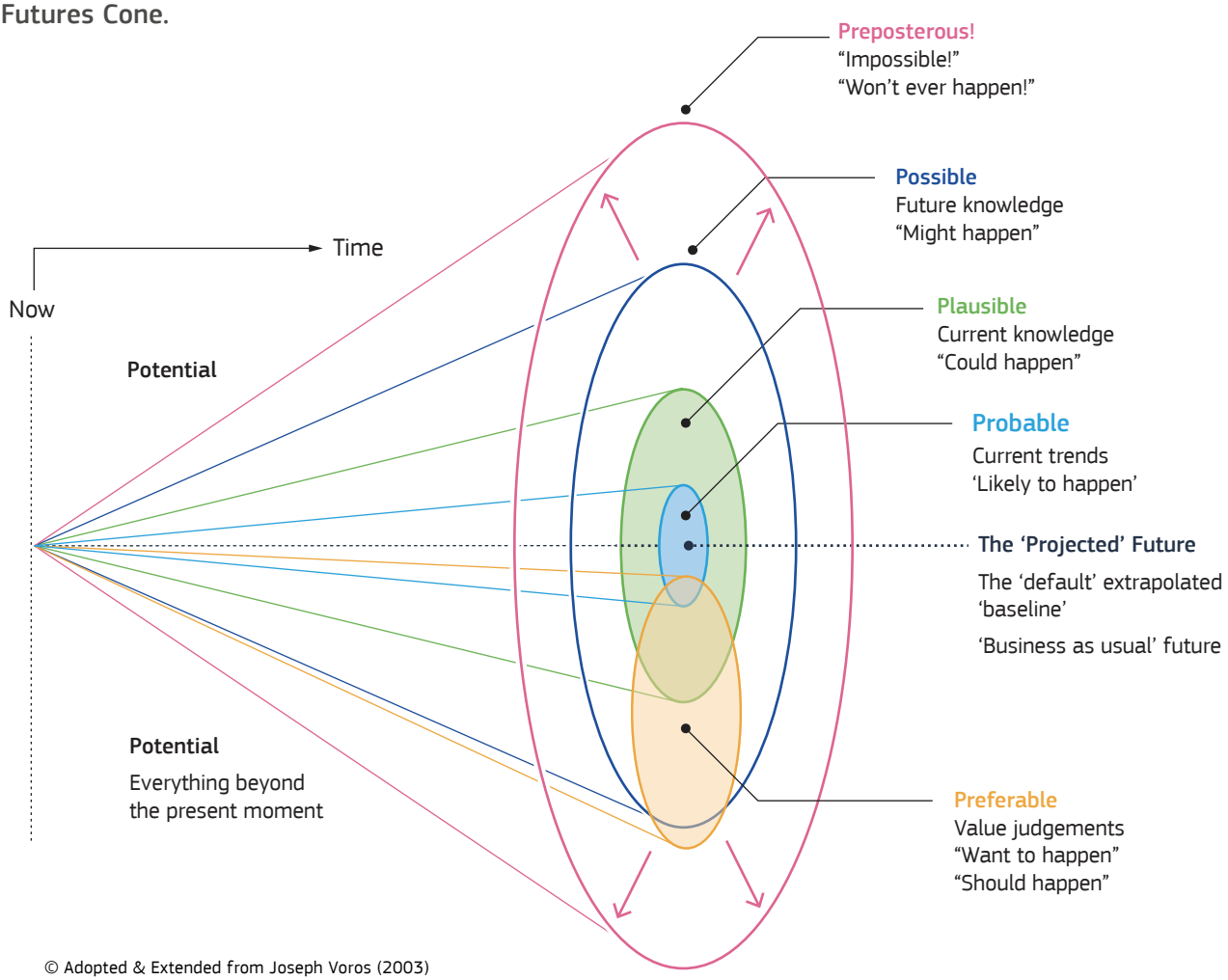
Purpose: To understand possibilities ahead to make more informed decisions in the present

Use: To stretch your thinking and imagine possible futures

When thinking about the future we tend to extrapolate the present into the future as a business-as-usual future. But next to this business-as usual future there are multiple more futures that can unfold. Probable futures, that can arise due to current trends, or even possible futures, that might happen due to new developments we might not even be aware of now.

By stretching our thinking, and being able to imagine all of these different futures, the discussion about the preferable future is much richer, and also prepares us to be more flexible and open to alternatives.

The Futures Cone.



© Adopted & Extended from Joseph Voros (2003)

Find out more:

The Futures Cone, use and history – Joseph Voros
Competence Centre on Foresight, Joint Research Centre, European Commission

LEVELS OF GOVERNMENT
All

LEVELS OF RESPONSIBILITY
Acquiring resources; Developing human resources

GOALS
Developing public administration

COMPETENCES
Think systemically; Be futures literate; Manage transformations; Think critically

58 Supporting organisational capacity and competence development with SELFIE tools

Purpose: To provide tools of collective and individual self-reflection

Use: To conduct self-reflection on digitalisation

The SELFIE tool developed by the JRC engages school leaders, teachers, students and in-company trainers (SELFIE WBL) in an anonymous, collective reflection on how digital technologies are used for teaching and learning. The results of the reflection are captured in a report, which is used as a basis for discussion among the school community and action planning. The SELFIE process aims at promoting a culture of participation and collective responsibility for the introduction of change in schools. (see top figure).

SELFIEforTEACHERS helps teachers self-reflect on their digital competence and supports their further development (see bottom figure). The tool is a continuous learning process, allowing teachers to understand what digital competence entails. By completing a self-reflection, teachers can identify their needs and plan their professional learning based on the tool feedback. Through their dashboard, teachers can keep a history of their self-reflections and compare their progress over time and group and global averages. SELFIE and SELFIEforTEACHERS can benefit schools, teachers but also education and training systems by providing aggregated data which can inform digital education planning and teacher training.

The self-reflection tools can be considered as an instrument-based approach to innovation and policy-making as they emphasise the emergence of new practices around these tools and have the potential to gather around their use a community of stakeholders at different levels of governance (school community, educators, companies, school leaders, teacher training centres, regional and national authorities).

Collective reflection process with SELFIE and SELFIE WBL.

Monitoring progress based on SELFIEforTEACHERS self-reflection results.

Find out more:
European Framework for Digitally Competent Educational Organizations (DigCompOrg) / European Digital Competence Framework for Educators (DigCompEdu) / SELFIE and SELFIE for Work Based Learning (SELFIE WBL) / SELFIEforTEACHERS

LEVELS OF GOVERNMENT
All

LEVELS OF RESPONSIBILITY
Acquiring resources; Promoter

GOALS
Stakeholder engagement; Policy objectives; Problem framing

COMPETENCES
Shape change; Frame policy problems; Mobilise resources sustainably

59 Open science and open education

Purpose: To foster inclusion and innovation

Use: To enable new practices and policy design to promote transformation at the system level

Europe is lagging behind in translating research and innovation (R&I) results into the economy. Efforts need to be channelled towards strengthening industrial innovation, technology transfer and fostering the diffusion of innovation through knowledge transfer and public-private cooperation (EC ERA Communication 2020). A way to do it is through **Open Science** and **Open Education**, to increase stakeholder engagement and investment in human capital. The European Research Area has enhanced access to open, free of charge, re-usable scientific information through the Open Science initiative, and the recently launched European Open Science Cloud (EOSC) creating a cloud area for research data in Europe allowing for better science through open and collaborative knowledge sharing.

As skills needs are rapidly evolving, and the green and digital transition requires future-proof education, the higher education sector has to adapt. Diversity, inclusiveness and gender equality in the higher education sector have become more important than ever (EC Communication 2022). Universities have a unique position at the crossroads of education, research, innovation, serving society and economy, through knowledge transfer and sharing. In this sense, open educational practices play an essential role, creating a route for communication between what is produced 'inside the university' to the world 'out there' – and this includes businesses, local authorities and citizens.

Re- and up-skilling the workforce through an ecosystem of practices, such as opening up access to university knowledge via open courses, open educational resources, open learning pathways, micro-credentials and open research and data, is a way forward to transformative change. This ecosystem of practices contributes to professional development and upskilling the workforce in local economies. It also opens up a dual way for communication between the universities and the community around them. Regional innovation depends upon a multi-stakeholder approach, in which smart specialisation strategies (S3) for universities play a crucial role in the triangle research, education and innovation.

OpenEdu framework.

Find out more:
Practical Guidelines on Open Education for Academics; OpenEdu Framework (European Commission, JRC) Open Science Cloud; Open Research Europe, Self-reflection tool on digital competence for academics --Check-In (JRC) / Blockchain in Education (European Commission, JRC) , European Blockchain Service Infrastructure (diploma case)

60 EU taxonomy for sustainable activities

Purpose: To define sustainable activities based on evidence-based criteria

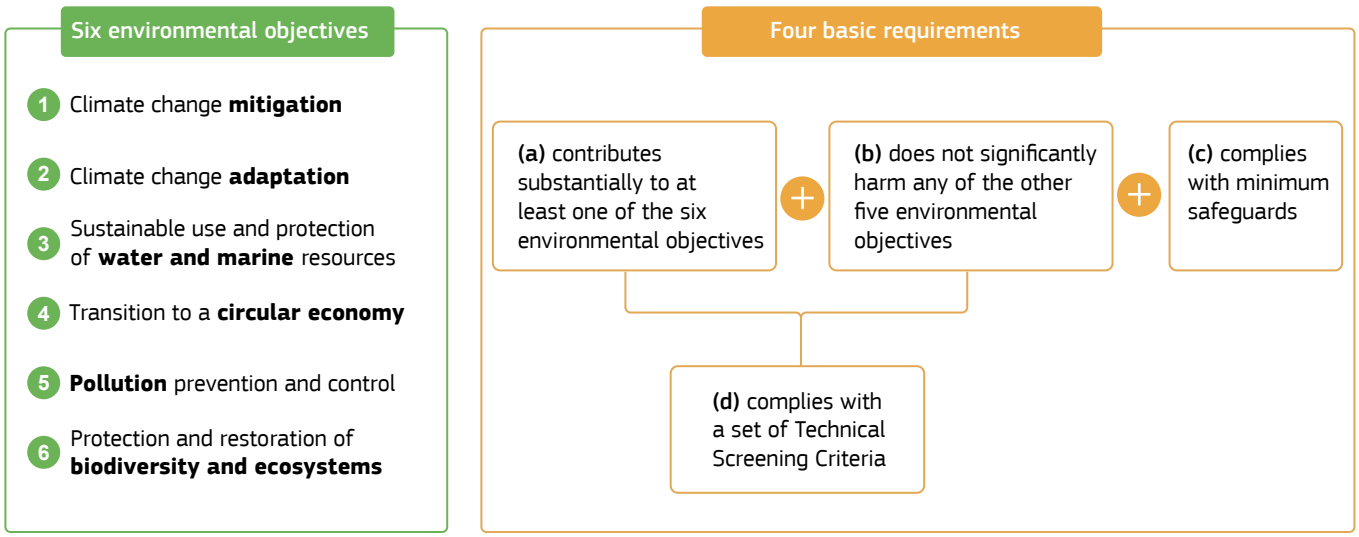
Use: To establish the degree to which an investment is environmentally sustainable and steer behaviour

The EU taxonomy is a classification system establishing a list of environmentally sustainable economic activities. With this, the EU taxonomy aims to provide companies, investors and policymakers with a common language and a clear definition of what is 'sustainable'.

A relevant element of the EU Taxonomy is its underlying concept of sustainability. The Taxonomy Regulation defines six environmental objectives and lays down that, to be qualified as environmentally sustainable, an activity shall fulfil four conditions (see Figure below). The rationale behind this approach is that an environmentally sustainable activity shall not only substantially contribute to one of the defined objectives: it shall also do no significant harm to the other ones.

This framework is being further developed through specific Delegated Acts, which contain the Technical screening criteria for each environmental objective and for each economic activity. As reference, the Climate Delegated Acts cover approximately 90 economic activities that are responsible for nearly 80% of the direct Greenhouse Gas emissions in Europe.

Six Environmental Objectives.



Find out more:
EU taxonomy for sustainable activities
Platform on Sustainable Finance
Taxonomy Delegated Acts

61 Energy consumption taxation

Purpose: To measure the burden of taxation on energy consumption in the EU

Use: To understand how fiscal policy can steer investment and consumption behaviour.

The taxation of energy consumption is a central topic in the current policy debate. On the one hand, energy taxation is a key lever for the achievement of the ambitious EU 2030 climate targets. Raising minimum rates for energy products underpins one of the major legislative initiatives of the European Green Deal, such as the Revision of the Energy Taxation Directive. On the other hand, the current energy crisis is causing dramatic increases in the price of energy products across the EU, raising calls for reducing their taxes to support households and firms.

However, measuring and monitoring the burden of taxation over energy consumption is a challenging task. Differences in consumption patterns across Member States - such as the use of heating in countries exposed to different climates – imply that even similar tax systems might affect consumers differently across the EU. Furthermore, energy consumption is subject to multiple and interacting rates of tax, such as VAT and specific excises, which are expressed in different units (i.e. percentage vs unit of currency).

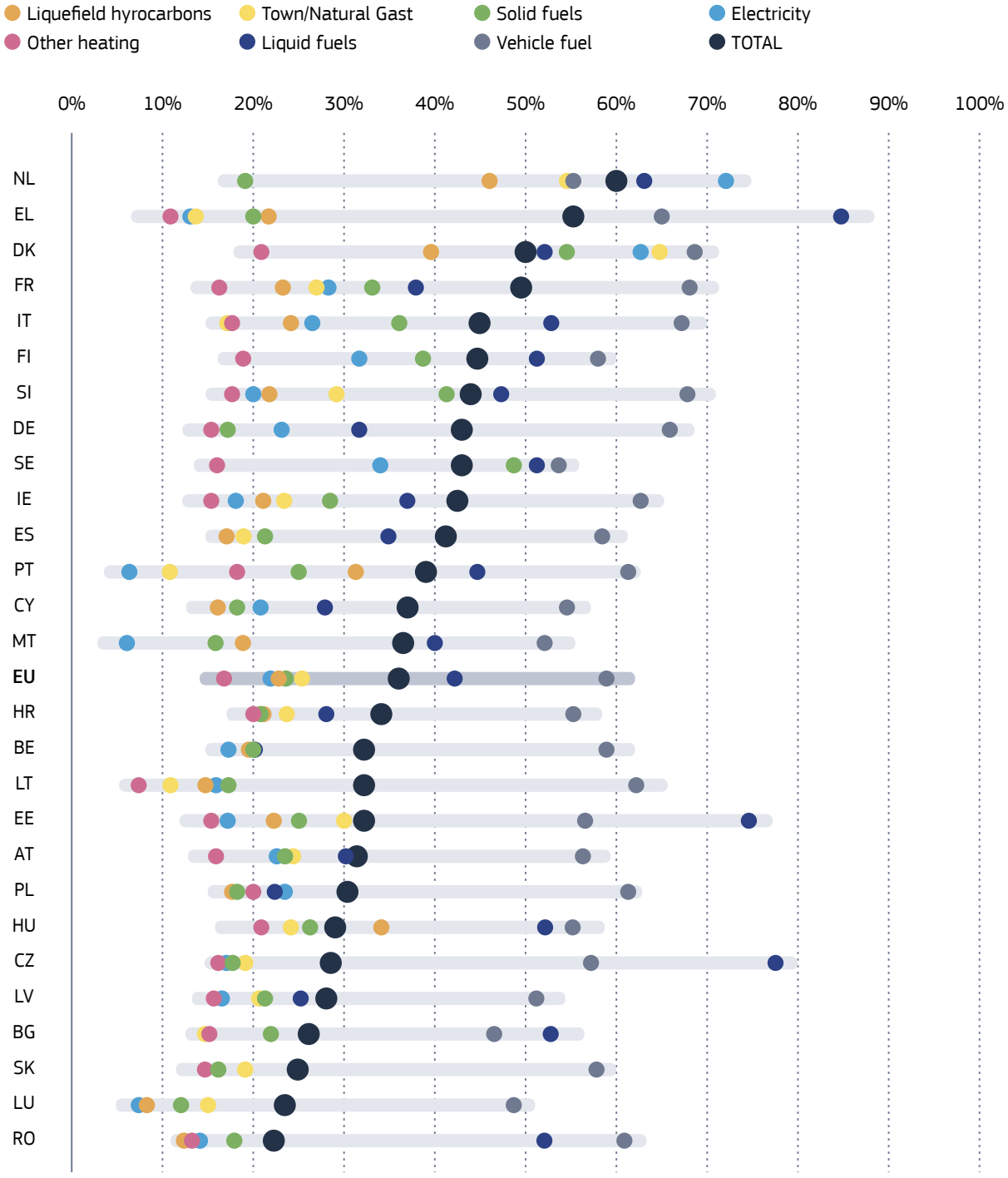
The indicator of implicit energy consumption taxation (see the graph below for 2019) represents the total burden of taxation over the price of each energy product (in percentage terms). It allows measuring the tax burden over energy consumption in each Member State.

In the EU, the implicit tax rate of the energy bundle ranges between 60% and 20%. While rates vary significantly across countries, vehicle fuel (e.g. petrol and diesel) and liquid fuels (e.g. heating oil) generally feature the highest rates of taxation. At the other extreme, 'other heating products' (e.g. district heating) are usually the least taxed. Moreover, solid fuels (e.g. coal, biomass) are in various cases taxed in the low range despite their important environmental and health impact, while less polluting energy sources, like gas, are more heavily taxed. In some Member States, the average tax burden is mostly driven by one or two products, which feature a relative large share in the household energy mix.

Using implicit tax rates policy makers can assess the energy products for which there is comparatively more room for tax increases, also in consideration of practices in other Member States. Moreover, they can combine them with their knowledge of the consumption mix of different types of households in order to prevent undesired distributional outcomes.

61 Energy consumption taxation

Implicit tax rates over energy consumption in the EU, in 2019.



Find out more:

We employ the recently developed EUROMOD Indirect Tax Tool (ITTv4) to calculate the tax liabilities paid by households over the main types of energy products in each Member State based on the tax policy in place in 2019. Differences in implicit tax rates over energy consumption across countries reflect differences in their tax systems as well as in their consumption patterns

LEVELS OF GOVERNMENT
All

LEVELS OF RESPONSIBILITY
Regulation and legislation; Evaluation of operations

GOALS
Implementation; Strategy design

COMPETENCES
Mobilise resources sustainably; Plan and manage sustainably; Think systemically

62 Waste management in a circular economy– innovation and regulation

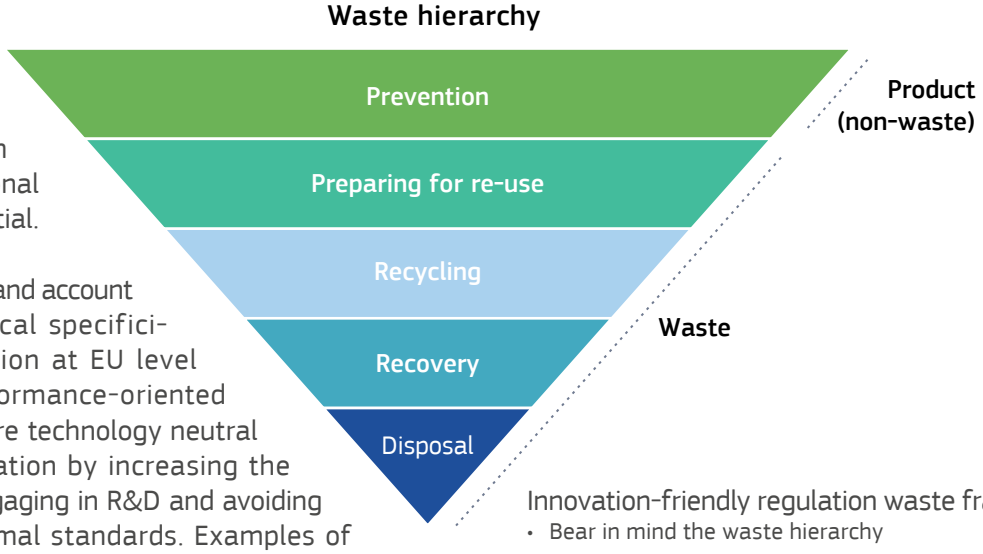
Purpose: To promote the implementation of initiatives to reuse and recycle waste

Use: To manage waste according to the EU waste hierarchy in ways that create multiple value

Waste management services provide collection, transportation, processing, recycling, and disposal of materials that have been discarded. The foundation of EU waste management is the "waste hierarchy", launched in the Waste Framework Directive. It establishes an order of preference for managing and disposing waste. Waste prevention is the desired option in a circular economy, but waste generation is still growing because of increasing material use. Sound waste management helps protect human health, reduces environmental impacts, and alleviates import dependency of primary resources from other states. Management options are strongly constrained by local conditions like for example urban density, geography, or climate, and hence mostly organised at municipal level. Technologies may vary in their performance, therefore technical guidance and measures that form part of EU and national legislation are essential.

To increase flexibility and account for regional and local specificities, waste legislation at EU level often involves performance-oriented requirements that are technology neutral and promote innovation by increasing the attractiveness of engaging in R&D and avoiding lock-in into suboptimal standards. Examples of such legislation include preparing for re-using and recycling targets for certain waste streams (e.g. paper, metal, plastic waste, or end-of-life vehicles), the ban of pollution-causing practices without prescribing fixed alternatives (e.g. the phasing out of landfilling biodegradable waste), or minimum quality standards to ensure that recycled waste can be placed on the internal market as a standardised product. Ex-ante impact assessments that compare policy options as well as stakeholder inputs ensure that tangible social, economic and environmental benefits are generated by new EU legislation. The regulatory EU framework on waste aims to foster new opportunities for private companies, national authorities and citizens throughout the EU to turn waste into a valuable resource.

Five elements to consider for innovative regulation on circular waste management.



Innovation-friendly regulation waste frameworks:

- Bear in mind the waste hierarchy
- Consider different implementation paths
- Minimise prescriptive actions
- Contemplate the local context
- Build on stakehold er inputs

Find out more:

EU Waste legislation: https://ec.europa.eu/environment/topics/waste-and-recycling/waste-law_en
The EU's circular action plan: https://ec.europa.eu/environment/strategy/circular-economy-action-plan_en

LEVELS OF GOVERNMENT
Local; Regional

LEVELS OF RESPONSIBILITY
Collecting and evaluating ideas; Evaluation of projects/operations

GOALS
Strategy design; Evaluation

COMPETENCES
Plan and manage sustainably; Mobilise resources sustainably; Think systemically

63 Assessment of eco-innovative strategies to reduce waste management impacts

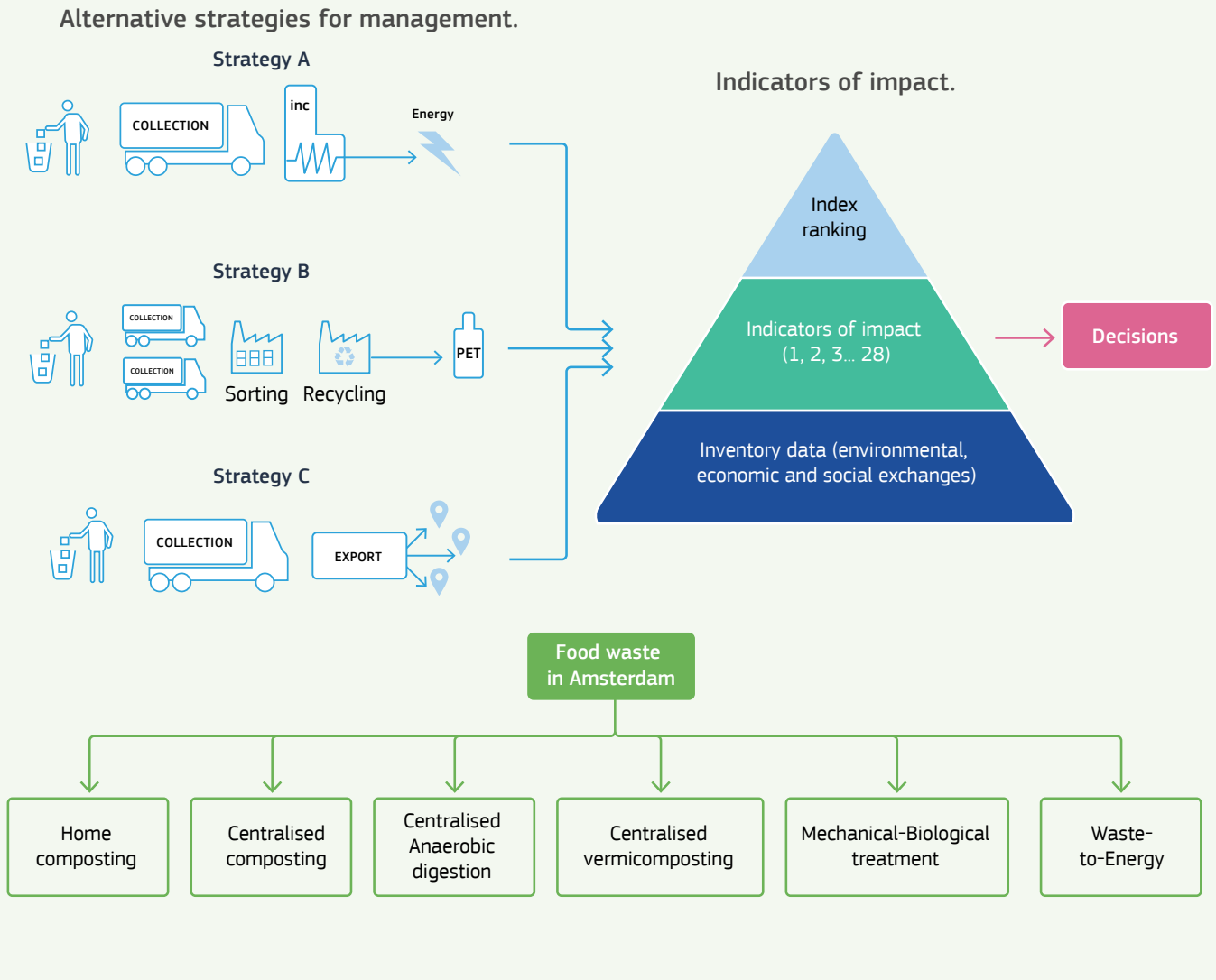
Purpose: To inform decision-makers on the impacts of alternative strategies

Use: To maximise benefits of waste management at local level

While a variety of solutions and technology for waste management exist, optimal eco-innovative management strategies of waste strongly depend upon regional factors such as recycling capacity installed, demand/markets for secondary resources, density and other characteristics or constraints of the region. In this context, sustainability assessment tools can be applied to inform decision-makers on the environmental, economic, and social impacts of eco-innovative waste management strategies.

These tools are mainly quantitative, based on life cycle thinking and allow modelling local innovative strategies providing a quantification of the environmental, economic, and social impacts across sustainability dimensions (e.g. climate change, smog, total employment in the waste sector, capital and operational costs). The indicators of interest for the region under study should be decided by consulting local stakeholders (authorities, citizens, industry, operators, NGOs, etc.) and experts. Additional techniques may then be used to aggregate the different indicators of impact in order to obtain a more easy-to-communicate ranking of the strategies studied or even a single-score final indicator.

For example, the H2020 REPAiR project developed an operational framework to quantify the impacts of regional/municipal waste management strategies, and identify and rank the best ones using MCDA (Taelman *et al.*, 2020). This was applied to various cities in the EU, to feed local circular economy strategies. The framework included life cycle (and material flow) analyses of waste management systems. There are also more specific and quick calculators, e.g. the tool developed by the JRC to estimate the impacts of pre-selected food waste prevention strategies.



Find out more:

http://h2020repair.eu/case-studies/amsterdam-nl/
http://h2020repair.eu/gdse-software-package/gdse-description/
https://eplca.jrc.ec.europa.eu/FoodSystem.html
http://www.easetech.dk/
https://www.tudelft.nl/bk/onderzoek/onderzoeksthemas/circular-built-environment/projects/cinderela

LEVELS OF GOVERNMENT
All

LEVELS OF RESPONSIBILITY
Regulation and legislation; Evaluation of projects/operations

GOALS
Implementation

COMPETENCES
Mobilise resources sustainably; Plan and manage sustainably; Manage transformations

64 Best Available Techniques (BAT) and Emerging Techniques (ET) for industrial emissions

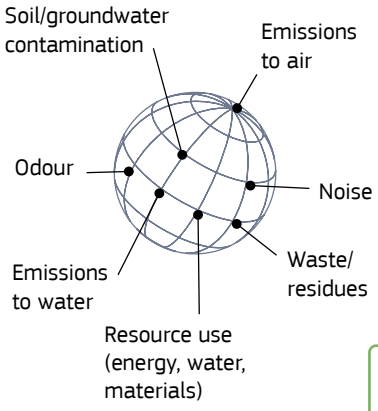
Purpose: To innovate sustainably

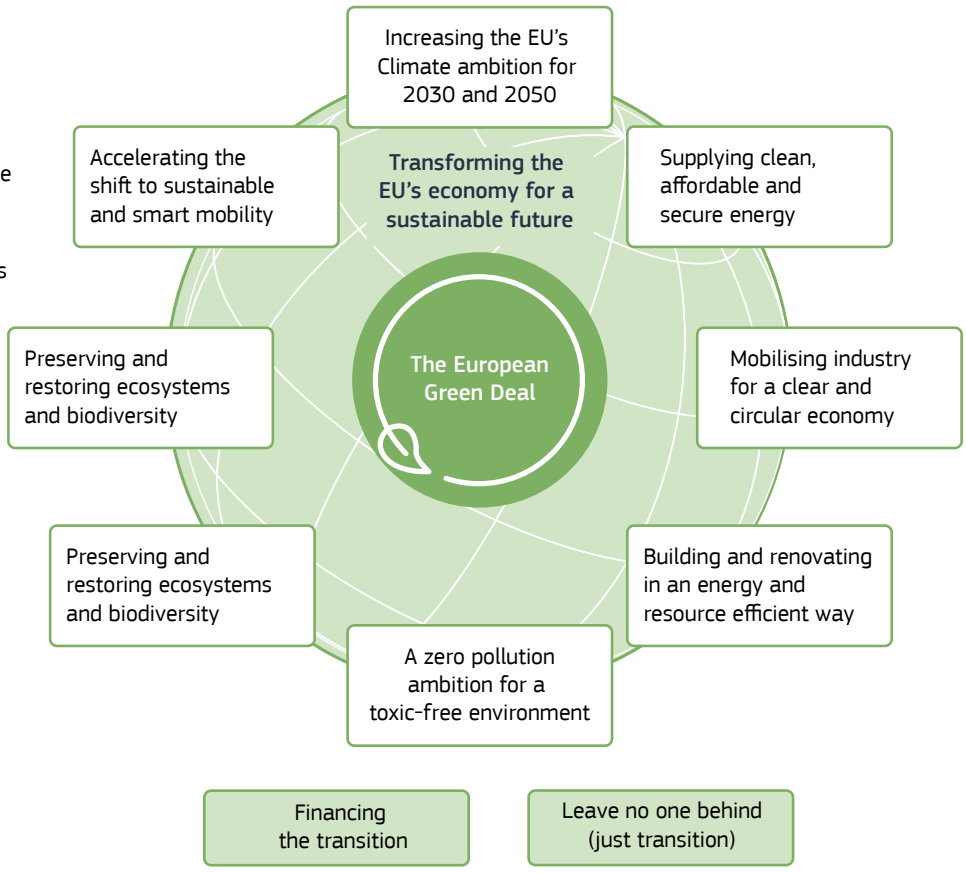
Use: To implement Best Available Techniques and emerging techniques in industrial activities

Best Available Techniques (BAT) indicate the techniques which are: i) the most effective in achieving a high general level of protection of the environment as a whole, ii) developed on a scale which allows implementation in the relevant industrial sector, under economically and technically viable conditions. They refer to both the technology used and the way the installation is designed, built, maintained, operated and decommissioned. **Emerging techniques (ET)** refer to the techniques that, if commercially developed, could provide either a higher general level or the same level of environmental protection and higher cost savings than existing BATs.

The application of the BAT concept has assisted to reduce significantly, at EU level, the industrial emissions to air and water and to promote circularity in industrial processes. Application of emerging techniques promotes innovation and helps achieve further reduction in emissions. Both approaches will help define priorities on investment decisions and will contribute to the development of strategic technology investment pathways.

Environmental impact of industrial activities / role of BAT and ET in the EU Green Deal.





Find out more:
https://eippcb.jrc.ec.europa.eu/ / https://ec.europa.eu/environment/industry/stationary/index.htm

LEVELS OF GOVERNMENT
Regional; National

LEVELS OF RESPONSIBILITY
Acquiring resources

GOALS
Goals setting; Implementation; Stakeholder engagement

COMPETENCES
Work with others; Manage transformations; Mobilise resources sustainably

65 European digital innovation hubs

Purpose: To accelerate place-based digital transformation of businesses and society

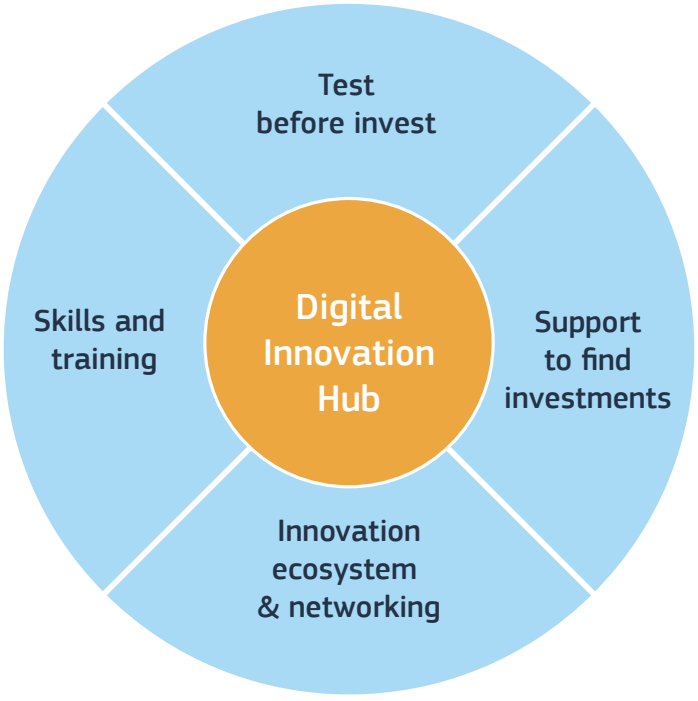
Use: To accelerate SME digitalisation through collaboration

The recent global crisis incited by the COVID-19 pandemic has further highlighted the critical role of digitalisation and the benefits it can bring to the European economy and society. SMEs, the cornerstone of the EU economy, need to embark upon the digitalisation challenge and use it to introduce new innovative production processes, new business models and upgraded innovative products. Are you aware of the Digital Innovation Hubs (DIH)? They play a key role for the digital transition. A DIH is a networked support facility (formed by research and technology organisations, universities, clusters, industry associations, chambers of commerce, incubator/accelerators, regional development agencies, and governments) that helps companies become more competitive by improving their business/production processes as well as products by means of digital technology. DIHs are partnerships (formalised or not) with a non-profit mission that **act as one-stop-shops,** serving companies **within their local region and beyond** to digitalise their business.

Think of DIHs as powerful policy tools, which can support regional or national policy-makers in implementing their innovation strategies and facilitating the recovery of their economies.

Starting this year and funded by EU and national funds a network of **200 European Digital Innovation Hubs (EDIHs)** will be gradually deployed until 2027. **EDIHs** will help companies of any size, sector and digitalisation level to get access to advanced digital technologies and face the objectives of the European Green Deal and the recovery of economy. They will present a more specific profile as they will have both local and European functions and will play a central role to stimulate the broad uptake of **Artificial Intelligence, High Performance Computing (HPC) and Cybersecurity** as well as other digital technologies by industry (in particular SMEs and midcaps) and/or public sector organisations.

Main functions of European Digital Innovation Hubs:



Find out more:

Catalogue of DIHs/Candidate EDIHs https://s3platform.jrc.ec.europa.eu/web/guest/digital-innovation-hubs-tool
Practical Handbook for policy makers on how to reinforce DIHs https://s3platform.jrc.ec.europa.eu/w/digital-innovation-hubs-as-policy-instruments-to-boost-digitalisation-of-smes

LEVELS OF GOVERNMENT
All

LEVELS OF RESPONSIBILITY
Acquiring resources;
Promoter

GOALS
Strategy design;
Implementation

COMPETENCES
Manage transformations;
Think critically;
Shape change

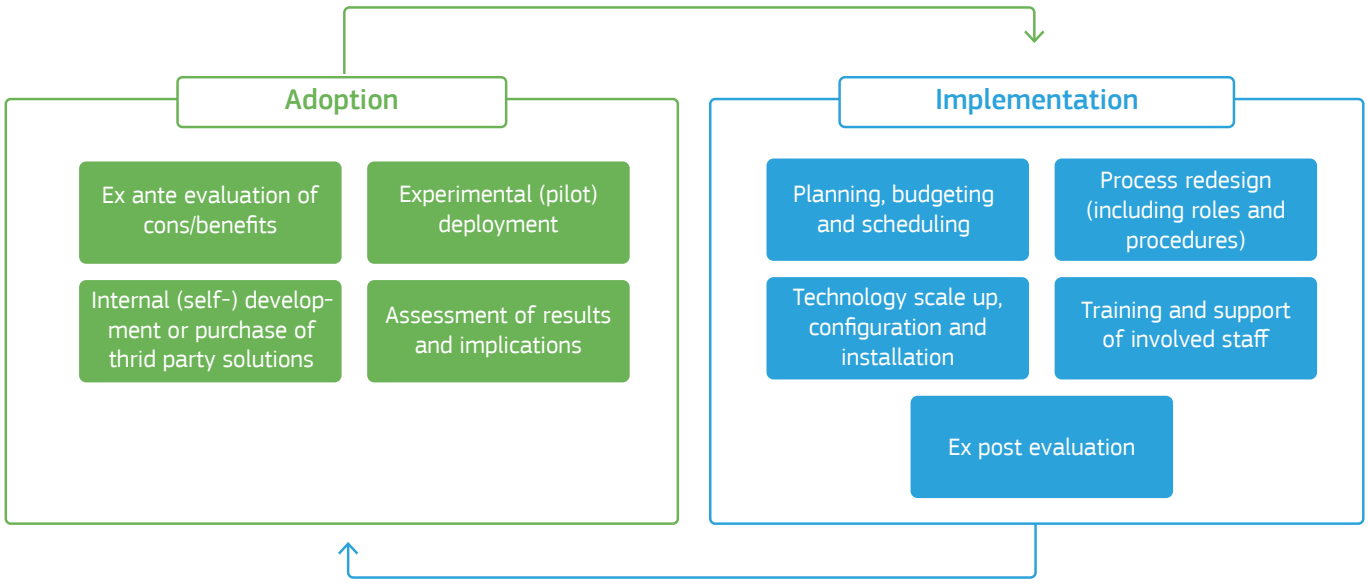
66 AI in the Public Sector

Purpose: To create better public services using Artificial Intelligence

Use: To make the public sector more efficient

Artificial Intelligence (AI) is part of our daily lives. Think about the navigation services in our smart phones, the parking assistants in our cars, or the personalised suggestions on movie and music streaming platforms – in one way or another, they are all using AI. As you may know, also the public sector is increasingly making use of AI to improve public services. At the beginning of 2022, the JRC had identified over 600 cases of using AI in the public sector in the EU (publication forthcoming). The cases of AI in the public sector range from rather simple chat bots to algorithms that support the review of applications for public funding. As a so-called general-purpose technology, the possibilities to use AI to improve public services are far reaching. Currently, AI is predominantly an enabler to increase the overall efficiency of the public sector through process and task automation, but also analysis and processing of large amounts of data. However, using AI in the public sector does come with its own set of challenges, for example, related to the trustworthiness and explainability of AI, or challenges in building and using those systems.

Appropriation of AI in the public sector:



Find out more:
https://publications.jrc.ec.europa.eu/repository/handle/JRC126665
https://publications.jrc.ec.europa.eu/repository/handle/JRC120399

LEVELS OF GOVERNMENT
Local; Regional; National

LEVELS OF RESPONSIBILITY
Acquiring resources; Promoter

GOALS
Strategy design; Implementation

COMPETENCES
Manage transformations; Mobilise resources sustainably; Think critically

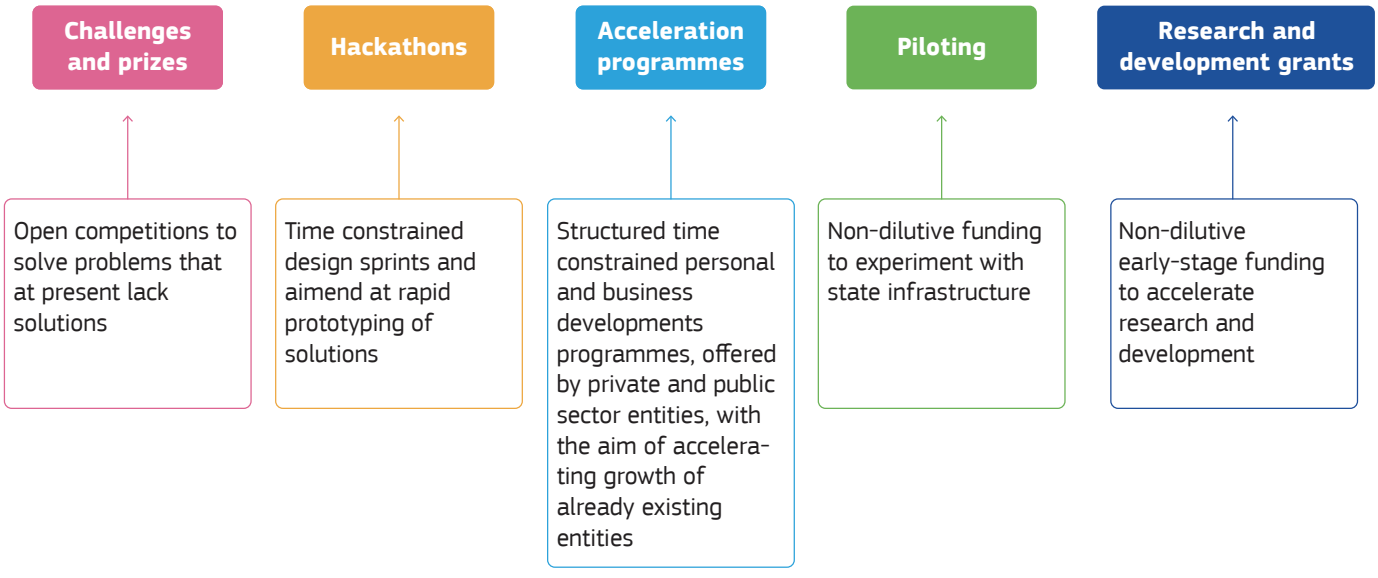
67 GovTech

Purpose: To bring digital innovation to the public sector by working with start-ups and SMEs

Use: To innovate in the public sector

Governments in the EU, at the local, regional, and central level, as well as the EU's institutions, are facing a myriad of complex interrelated challenges. Demographic change, technological change, climate change and acute crises, such as the economic and financial crisis starting in 2008 and the most recent COVID-19 pandemic. These circumstances require governments to act and adapt even quicker than during non-crises times. How can digital technologies help? They can help governments become more efficient, more effective, and increase the value they provide to the public. However, buying off-the-shelf digital solutions from established vendors is not always sufficient to address the specific challenges governments are facing. Therefore, many governments are starting to look into GovTech. The term "GovTech" refers to governments working with start-ups and SMEs to develop and buy innovative digital solutions. Governments in the EU engage with GovTech because, in addition to creating innovative digital solutions to societal problems, this field promises to bring a new working culture to the public sector and foster innovation made in Europe. However, there are challenges to government working with start-ups and SMEs, related for example to the structure of the market, complex procurement rules, and different working cultures between governments and GovTech companies. For example, to address those challenges, governments across Europe have started setting up dedicated GovTech programmes.

Activities of public GovTech programmes:



Find out more:
https://publications.jrc.ec.europa.eu/repository/handle/JRC128247
https://publications.jrc.ec.europa.eu/repository/handle/JRC128093

LEVELS OF GOVERNMENT
Regional; National

LEVELS OF RESPONSIBILITY
Evaluation of project/ operations; Collecting and evaluating ideas

GOALS
Strategy design; Creating partnerships

COMPETENCES
Mobilise resources sustainably; Plan and manage sustainably; Think critically

68 Technological infrastructures for energy transition

Purpose: To co-develop technological infrastructures in support of energy transition

Use: To initiate a process that identifies and co-creates suitable technological infrastructures

Strategic research infrastructure investments on energy efficiency and renewables are powerful tools to reduce energy dependency, however their large investment requirements, their complex setting and mostly their maintenance costs, make these assets a challenging resource whose localisation can be controversial. However when territories cooperate and involve public and private groups as well as users, these projects entail systemic transformative potential. Key infrastructures are vital prerequisites for innovation activities, as they facilitate the organisation and diffusion of innovations. The complexity for policy makers is to avoid "supply-side" competition, which can result in duplication of services, equipment and infrastructures. Hence the importance of finding complementarities between infrastructures. Public-Private cooperation offers an integral mode of conceiving these facilities by providing the organizational frame for enhancing complementarities, generating knowledge conducing to 'producing' innovations and bringing new products or processes to society. Collaboration could take place, among others, in the following phases of the infrastructure development.

Building blocks for Technological Infrastructures on Energy transition and diffusion of sustainability solutions

Co design	A sound Open Discovery Process, allowing stakeholders engagement for identification of needs and challenges, definition of capacities, life cycle awareness, business model design.
Green Public Procurement	All along the different phases of the facility development. GPP can be a driver for innovation, engaging multiple actors, providing industry with incentives for developing new solutions, environmental friendly works products and services.
Funding	Multilevel and territorial cooperation allow synergies between private and private funds, always in compliance with State Aid regulations.
Open data Open science	When researchers share knowledge and data as early as possible in the research process with all relevant actors it helps diffuse the latest knowledge.
Open innovation	User-centric environments charaterised by early and continuous involvement of users and by user-driven rapid prototyping cycles. Establishing sustainable partnerships.
Monitoring and Evaluation	New measurements of performance, based on cooperation intensity and contribution to territorial wellbeing, connectiviness and fairness. Stakeholders and impact evaluation.
New governance and public accountacy	Public private governance allowing for multilevel cooperation. Transparency and public accountability.

An example of energy infrastructure: Iberian Energy Storage Research Center – CIIAE

To be located in Extremadura (Spain), with a budget of €53m, CIIAE is an example of funding synergy between Recovery and Resilience Plans and ERDF, with the support of regional and national research centers, aiming at the full cycle of capacity building and implementation of technologies for the production, storage and distribution of green energy, covering the challenges related to energy manageability. Technology diffusion is foreseen through collaboration between the public and private sector at national and international (Spain & Portugal) level. CIIAE covers competing energy storage solutions in the electricity sector, hydrogen, power-to-x, and thermal energy storage.

Find out more:
www.ciiae.org

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LIST OF ACRONYMS

List of acronyms

3D	Three-dimensional
AI	Artificial Intelligence
BAT	Best Available Techniques
CBA	Cost-benefit Analysis
CDI	Challenge-Driven Innovation
CHOIRs	CHallenge-Oriented Innovation paRtnerships
CoR	Committee of the Regions
CoRIS	Challenge-oriented Regional Innovation System
CoVE	Centre of Vocational Excellence
CPR	Common Provisions Regulation
CSOs	Civil Society Organisations
DIH	Digital Innovation Hub
EC	European Commission
EDIHs	European Digital and Innovation Hubs
EDP	Entrepreneurial Discovery Process
EEA	European Environment Agency
EGD	European Green Deal
EGDIB	European Green Deal Investment Plan
EIB	European Investment Bank
EIE	European Innovation Ecosystems
EIF	European Investment Fund
EIT	European Institute of Innovation and Technology
EOSC	European Open Science Cloud
EPEs	Experimental Policy Engagements
EPO	European Patent Office
ERA-LEARN	European Research Area for Research and Innovation
ERASMUS	European Community Action Scheme for the Mobility of University Students (EU's Programme for education, training, youth and Sport)
ERDF	European Regional Development Fund
ESIFs	European Structural and Investment Funds
ET	Emerging Techniques
EUSF	EU Solidarity Fund
EV	Electric Vehicle
FDI	Foreign Direct Investment
FP7	Seventh Framework Programme
GDP	Gross Domestic Product
GHG	Greenhouse Gas
GPP	Green Public Procurement
H2020	Horizon 2020
HE	Horizon Europe
HPC	High Performance Computing
I3	Interregional Innovation Investments
ICT	Information and Communications Technology
ILO	International Labour Organisation
IPBES	Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services

IPCC	Intergovernmental Panel on Climate Change
IEA	International Energy Agency
IPCEI	Important Project of Common European Interest
IRENA	International Renewable Energy Agency
IT	Information Technology
JRC	Joint Research Centre
KICs	Knowledge and Innovation Communities
KTO	Knowledge Transfer Office
M+E (M&E)	Monitoring and Evaluation
MCA	Multi-criteria Analysis
MCDA	Multi-criteria Decision Analysis
MFF	Multiannual Financial Framework
MLP	Multilevel Perspective
MS	Member State
NGEU	Next Generation EU
NGOs	Non-governmental Organisations
NPM	New Public Management
NSDS	National Sustainable Development Strategy
NSF	National Science Foundation
NUTS	Nomenclature of Territorial Units for Statistics
O&M	Operation and Maintenance
ODP	Open Discovery Process
OECD	Organisation for Economic Cooperation and Development
P4R	Partners for Review
PCP	Pre-commercial Procurement
PO	Policy Objective
POINT	Projecting Opportunities for INdustrial Transitions
PP	Public Procurement
PPI	Public Procurement of Innovation
PPP	Public–private Partnerships
PRI	Partnerships for Regional Innovation
R&D	Research and Development
R&I	Research and Innovation
REACT-EU	Recovery Assistance for Cohesion and the Territories of Europe
REPAiR	REsource Management in Peri-urban Areas
RES	Renewable Energy Systems
RIS3	National/Regional Research and Innovation Strategies for Smart Specialisation
RRF	Recovery and Resilience Facility
RRI	Responsible Research and Innovation
RRP	Recovery and Resilience Plan
RTD	Research and Innovation
RTOs	Research and Technology Organisations
S3	Smart Specialisation Strategies
SDGs	Sustainable Development Goals
SME	Small and Medium-sized Enterprise
SNM	Strategic Niche Management
STI	Science, Technology and Innovation
STS	Socio-Technical System

SUD	Sustainable Urban Development
SWOT	Strengths, Weaknesses, Opportunities and Threats
TEDv	R&I Territorial Economic Data Viewer
TIP	Transformative Innovation Policy
TPI	Transformative Policy Initiative
ToC	Theory of Change
TRLs	Technology Readiness Levels
TT	Transition Task
TWI	The World in 2050
UN	United Nations
UNEP	United Nations Environment Programme
UNSGSA	UN Secretary-General's Special Advocate for Inclusive Finance
VET	Vocational Education and Training
WoG	Whole-of-Government approach
WTO	World Trade Organisation

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