Participatory and Responsible Policy-Design for Smart Cities, Transport and Energy

Guidebook

M. Angelidou, C. Politis

RRI2SCALE
RESPONSIBLE RESEARCH & INNOVATION ECOSYSTEMS AT REGIONAL SCALE

Q-PLAN
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Participatory and Responsible Policy-Design for Smart Cities, Transport and Energy

Guidebook

EXECUTIVE SUMMARY

Local and regional policy-makers often find themselves confronted with a dilemma: they are called on to develop policies that spearhead economic growth in their territory while at the same time promote inclusiveness and improve their citizens' quality of life. Finding the sweet spot between the two is a real challenge (the so-called "**Regional dilemma**"). And it becomes even harder when policy design concerns technology sectors, e.g., policies that accommodate and promote smart cities* initiatives. Such technology sectors are fast-changing, and new sectoral developments (e.g., the adoption of new technologies) do not always have predictable consequences for society, the economy and the environment (the so-called "**Collingridge dilemma**").

This document serves as a guidebook to support policy-makers involving citizens in designing policies related to technology sectors. It proposes a **five-phase methodology**. The first phase (i.e., the preparation phase) includes a review of the current R&I landscape, identifying regional dilemmas and exploiting potential collaborations with other regions. The second phase investigates emerging trends in the particular technology sector and develops techno-moral scenarios for the region's future. In the third phase, the scenarios are communicated to the wider public to validate their content. Also, key stakeholders and citizens experiment with the scenarios using a simulation tool called the Scenario Exploration System. In the fourth phase of policy design, co-creating an agenda with specific goals and initiatives makes for a commonly agreed course of action toward actively addressing the regional dilemmas identified. Finally, during the fifth phase, ongoing monitoring of the process allows on-spot improvements and a solid evaluation of the impact on society, the economy and the environment.

This document is addressed to **policy-makers and policy advisors at all levels**, mainly at the local and regional levels. It is also addressed to other project consortia interested in the RRI2SCALE approach. It can be used as a guide to implement the five-phase methodology or to adopt particular incorporated tools, such as the Delphi method, the Scenario Exploration System, and the monitoring and evaluation framework. **Real-life examples from the RRI2SCALE project** are provided throughout, as well as hints & tips and suggestions for sources the reader can consult for further information.

We envisage that this guidebook will inspire other regions and project consortia that wish to adopt the RRI2SCALE approach. Further information can be provided upon request by the document lead author, Q-PLAN International Advisors P.C. The Guidebook is also available on Zenodo.

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* The terms 'intelligent' and 'smart' cities are used interchangeably in this document, as both refer to the broader socio-technical construct of technology-enabled urban development and innovation.

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ABBREVIATIONS

AI -   Artificial Intelligence

CoR -   European Committee of the Region

EC -   European Commission

ERRIN -   European Regions Research and Innovation Network

EU -   European Union

GDP -   Gross Domestic Product

GDPR -   General Data Protection Regulation

IoT -   Internet of Things

JRC -   Joint Research Centre

MoC -   Memorandum of Collaboration

NGOs -   Non-Governmental Organisation

PWDs -   People with Disabilities

R&I -   Research and Innovation

RRI -   Responsible Research and Innovation

SES -   Scenario Exploration System

1. INTRODUCTION

Local and regional policy-makers often find themselves confronted with a dilemma: they are called on to develop policies that spearhead economic growth in their territory while at the same time promote inclusiveness and improve their citizens' quality of life. Recent developments in the global techno-social landscape have led to the realisation that finding the sweet spot between the two requires more "social", open and **collaborative governance models**. Through involving businesses, academia and society in the policy-design process, a substantial contribution can be made to mobilising tacit knowledge, upscaling institutional capacity for regional and urban innovation and transformation, and securing ownership and sustainability of the policies and measures introduced.

As is well known, involving citizens in decision-making is neither easy nor straightforward. And it becomes even more complicated when it concerns **policies related to technology sectors** (e.g., policies that accommodate and prepare for the digital transformation of the local or regional economy). In such cases, relying solely on citizens' current needs and preferences can be misleading. The fast-changing nature of digital technologies requires adopting a forward-looking perspective. Thus, involving the public in a future-forecasting exercise may be considered.

This document serves as a guidebook to the above. In particular, it aims to support policy-makers to effectively involve citizens in designing policies related to technology sectors, such as smart cities, energy and transport. It proposes a five-phase methodology for preparing, running, and evaluating such a process. The proposed methodology is compatible with the principles of **Responsible Research and Innovation** (RRI)[*], and thus, it can also serve as a first step (or good practice) for institutionalising an inclusive approach to policy-making in the governance processes of a regional or local authority.

Section 2 provides an overview of the proposed methodology. **Sections 3-7** elaborate on each of the five phases, namely (i) Preparation, (ii) Looking ahead, (iii) Engagement and Awareness, (iv) Policy design, and (v) Monitoring and Evaluation. **Section 8** provides the main conclusions. Also, we have uploaded on Zenodo various materials, such as questionnaires and templates, to support future endeavours.

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* The European Commission (EC) understands RRI as "an inclusive approach to research and innovation, to ensure that societal actors work together during the whole research and innovation process. It aims to better align both the process and the outcomes of research and innovation with the values, needs and expectations of European society". Source: Moghadam-Saman, S., et al. (2020). The Regional Dilemma: report on how EU regions integrate RRI in territorial R&I landscape. RRI2SCALE project. Available at https://cordis.europa.eu/project/id/872526/results

2. OVERALL APPROACH

First, policy-makers need to select a technology sector, such as smart cities, energy or transport, where their targeted intervention is directed. Normally, this should be a sector (i) either of particular interest for the region; (ii) or where new policies (or strategic plans) are currently being discussed; (iii) or where another national or supranational development (e.g., European Commission policy) calls for regional/ local action.

After selecting a focus sector, the methodology to be followed comprises five key phases:

1. Preparation Phase: Prepare the Ground and Set Up a Team

This phase includes setting up a skilled team of people to run the process. Their work starts by investigating the current landscape of policies, strategies, stakeholder views, and dilemmas to be addressed.

2. Looking Ahead Phase: Develop Scenarios for the Future

This phase includes identifying emerging trends in the focus sector and developing plausible future scenarios that depict the region's future in a comprehensible narrative.

3. Engagement and Awareness Phase: Validate and Simulate Scenarios

This phase concerns the involvement of citizens in scenario validation to gather feedback and make adjustments to the scenarios. Then, key stakeholders and citizens experiment with the scenarios using a simulation tool called Scenario Exploration System.

4. Policy Design Phase: Build Agenda and a Roadmap for Policy Changes

This phase addresses the co-creation of an agenda with specific goals and initiatives and proposes a commonly agreed course of action toward actively addressing the regional dilemmas identified. Also, a roadmap is produced to embed RRI into regional/ local policy-making.

5. Monitoring and Evaluation Phase: Measure Performance and Impact

This phase runs horizontally and includes the ongoing monitoring of the four previous phases. Also, it includes the evaluation and the assessment of the impact on society, the economy and the environment.

IMPORTANT INFO
This document is addressed to **policy-makers and advisors at all levels** in Europe, principally at the local and regional ones. Such policy-makers can belong to any department of their organisation and be either civil servants or elected. They may be directors (or have another similar position) in their department or simply willing to act as change agents in their organisations. The guidebook can be used to implement the five-phase methodology or parts of it. Thus, it can also be used by stakeholders other than policy-makers, such as NGOs, citizen associations, or businesses that want to engage with a broad set of actors.

Preparation Phase
Prepare the Ground
and Set Up a Team

Looking Ahead Phase
Develop Scenarios
for the Future

**Engagement and
Awareness Phase**
Validate and Simulate
Scenarios

Policy Design Phase
Build Agenda
and a Roadmap for
Policy Changes

**Monitoring and
Evaluation Phase**
Measure Performance
and Impact

Figure 1
Overview of
the proposed
methodology

3. PREPARATION PHASE: PREPARE THE GROUND AND SET UP A TEAM

Successful implementation starts with setting up a motivated and competent team. The team may consist of people working for the regional or local authority and be supported by external experts (advisors). Once set up, the team needs to acquire some necessary background knowledge. In particular, the team needs to:

1. review the current landscape, including territorial innovation policies, political landscape and regional citizens' current views, attitudes and needs (section 3.1.);

2. identify regional dilemmas and consider examples of policies and initiatives to address them (section 3.2.);

3. collaborate with other regional or local authorities to develop synergies or exchange good practices (section 3.3.).

3.1. Review the current landscape

As a first step, reviewing and understanding the region's current situation and landscape is essential since any proposed policies should be compatible. For instance, the team may review the following:

• the economic landscape of the region, including key macroeconomic indicators, flourishing and innovative sectors, and regional competitive advantages;

• the political landscape in the region, including the governance structure (e.g., governor, councils and committees), the responsibilities and roles of the regional and local authorities, and key political parties;

• regional or urban innovation policies and strategies (such as the Smart Specialisation Strategy and its key pillars), innovation networks and funding schemes;

• any strategic plans and policies related to the sector of interest, such as energy and climate plans and their key provisions, regulatory authorities, national strategies and laws;

• the level and form of civil participation in the region. Examples include voting, volunteering, and participating in group activities.

Extensive desk research is required to gather the above information. Also, in-depth interviews or focus groups with the region's citizens and key stakeholders may need to be undertaken to complement desk research findings with hard-to-grasp and often fast-changing insights. Face-to-face interviews are recommended if the information is more sensitive and the stakeholders are reluctant to share it. On the other hand, focus groups are highly recommended when the team wants to uncover dynamics, cleavages and convergences of opinions between citizens and stakeholders.

Afterwards, a more in-depth look into citizens' and other regional stakeholders' current views, attitudes and needs is recommended. For instance, the team may perform an online survey to investigate the following:

- citizens' aspirations over future trajectories of the region (e.g., should it be a hub of innovative small and medium-sized businesses or a highly-digitalised public sector region?);

- citizens' priorities for future public investment (e.g., should the region provide grants for research and innovation activities, developing skills or creating new public spaces?);

- citizens' moral views and preferences on trade-offs between promoting innovation and improving citizens' well-being (as well as promoting gender equality and safeguarding personal data and privacy);

- citizens' trust in local institutions (e.g., regional government, civil society organisations, research institutes and large corporations) and their attitudes towards public participation (e.g., past experiences, willingness to participate, and preferred methods).

A key strength of using an online survey is that the team can gather large-scale information that is anonymous, quantifiable, and easy to process. Also, it can discover how preferences, priorities and aspirations differ among societal groups (e.g., do women share the same opinion as men?; do private sector stakeholders have the same priorities as academic stakeholders?).

RESOURCES
Examples of the above research can be found in the following documents:

- Moghadam-Saman, S., et al. (2020). The Regional Dilemma: report on how EU regions integrate RRI in territorial R&I landscape. RRI2SCALE project. Available at https://cordis.europa.eu/project/id/872526/results

- Panori, A., et al. (2020). Large scale regional citizen surveys report. RRI2SCALE project. Available at https://cordis.europa.eu/project/id/872526/results

A questionnaire that local or regional authorities can use to understand their citizens' views, attitudes and needs is available on Zenodo (Tool 1 - Views Questionnaire).

3.2. Identify regional dilemmas and good practices

The team should devise a list of current dilemmas in the region by combining the above knowledge and also -potentially- after consulting local stakeholders. The dilemmas can be broad or apply specifically to the selected sector of interest. The later phases (i.e., looking ahead, engagement and policy design) will shed further light on the dilemmas and propose changes to policies or strategic plans that could contribute to addressing them.

DEFINITION
Dilemmas are "situations in which a difficult choice has to be made between two or more alternatives" (Ribeiro et al., 2018). A typical dilemma is the trade-offs between ecology and economy (Paredes-Frigolett et al., 2015).[1]

THE RRI2SCALE EXAMPLE
In RRI2SCALE, after research in local newspapers and news websites, and consultation with stakeholders, we identified key policy dilemmas in Vestland, Overijssel, Kriti and Galicia. A description of one of Kriti's dilemmas is provided below.

The dilemma in brief: To what extent should regional innovation policy promote mass, revenue-generating tourism at the expense of sustainable, place-based development and culture? Where is the 'sweet spot' between costs and benefits?

- **One side of the coin:** Tourism is critical to the local economy's growth. Tourism and trade each contribute 35% to the local economy. Also, cultural tourism constitutes one of the four pillars of the region's RIS3 strategy.

- **The flip side:** Mass tourism and over-tourism risk degrading the historical heritage, the urban fabric, and the traditional bonds that bring together local communities over a shared identity. Moreover, they create significant sustainability risks related to public health concerns, lack of adequate public and open spaces, overuse of public infrastructure and traffic pollution.

Subsequent to this, the team can consider cases of other regions facing similar dilemmas. How did they grasp what society wanted, how did they involve a wide range of stakeholders, how did they consider all possible impacts, and how did they manage to be open and transparent? Reviewing the difficulties and challenges those regions faced, the solutions adopted, the results achieved, and the lessons learned can help the team to avoid similar mistakes and adopt best practices.

3.3. Collaborate with other regional or local authorities

In addition to the above, the team can explore and exploit collaborations with other regions. The team could approach regions experienced in public participation and/ or regions facing similar dilemmas. Collaboration allows policy-makers to address problems they would not be able to solve independently and benefit from synergies (e.g., by entering into shared services or procurement agreements with other regional or local authorities to provide critical services). The team could use their network of regions or contact existing networks, coalitions and associations of regions to find appropriate collaborators.

THE RRI2SCALE EXAMPLE

In RRI2SCALE, we organised a series of cross-regional dialogues to promote the development of cross-regional partnerships, exchange knowledge and experience, and enhance openness, transparency and engagement. Also, the four regions participating in the project, namely Vestland (Norway), Overijssel (the Netherlands), Kriti (Greece) and Galicia (Spain), signed a Memorandum of Collaboration to sustain long-term collaboration. They agreed to consider collaboration through various means, including but not limited to (i) joint events, seminars and workshops; (ii) joint awareness-raising campaigns; (iii) joint implementation of programmes and/ or projects; (iv) exchange of information and past experiences; (v) participation of experts in meetings; (vi) staff visits on a short-term basis for enhanced knowledge exchanges; and (vii) shared services or procurement agreements.

Finally, in RRI2SCALE, we undertook a series of knowledge exchanges with regional authorities and agencies from sister projects (i.e., projects that received funding under the same European Commission call). In a spirit of mutual support, these synergies helped the four RRI2SCALE regions identify similar dilemmas that other regions were facing and potential solutions for regional policy-making that integrates the RRI principles. Mutual support came about through exchanging relevant material (e.g., policy briefs), organising virtual discussions in webinars, and holding roundtables in physical events (e.g., in the RRI2SCALE Final Conference).

4. LOOKING AHEAD PHASE: DEVELOP SCENARIOS FOR THE FUTURE

As a next step, the team needs to investigate future developments that may affect the region within the next five to ten years. Such developments are generally of three types: (i) social, technological, economic and environmental megatrends; (ii) sectoral developments (pertinent to the selected sector of interest); and (iii) changes in people's views (including moral views, perceptions, needs and preferences). The current section elaborates on ways to anticipate each of these developments.

4.1. Identification of megatrends

DEFINITION
Megatrends are macro-level (even global) phenomena that define the future by having a far-reaching impact on businesses, economies, industries, societies and individuals.[2,3] They have existed for many years and promise to last for a long time ahead.[4]

We suggest reviewing key megatrends in the social, technological, economic and environmental domains. Examples of megatrends include population rise and ageing, urbanisation and migration, technological innovation and digital transition, potential recessions and power shifts, resource scarcity and climate change. Understanding these megatrends is a crucial first step to foreseeing the future of a region.

Reviewing relevant and most recent research and policy reports, scientific journal articles, and other scientific publications produced by international public and private institutions can provide an overview of the most-cited megatrends. The focus should be placed on how these megatrends can impact the life and work of people in the region. For example, the text should not focus on the various upgrades of Artificial Intelligence (AI) technology but rather on the impact of AI technological products on employment (e.g., robotisation) and education (e.g., need for soft skills).

HINTS AND TIPS
⚠ Forecasting and planning for the future are considered to be the basis for rational decision-making.[5] Yet, the future is uncertain and most often unpredictable.[6,7] Thus, forecasting studies should not be perceived as predictors of the future but rather as *"tools to broadly describe the space within which actual futures are likely to develop"*,[8] helping all concerned parties to manage the uncertainty. [9]

⚠ An important point is to investigate not only what takes place globally but also at the continent or national level, where possible. This is because megatrends may often vary significantly among countries. For instance, the population in North Europe is expected to grow by 4% by 2030, while the population in Southern Europe is expected to decrease by 3%. [10]

THE RRI2SCALE EXAMPLE
In RRI2SCALE, we performed a similar review and identified twelve key megatrends. A description of the technological megatrend "**Changing the Education Paradigm**" is provided below.

"The digital transformation of our society brings in new ways of working and requires the possession of new knowledge and skills by workers.[11] In particular, the skills gap is already evident, with 40% of European employers facing difficulties finding employees with the proper skills to "*grow and innovate*" (2018).[12] Within this framework, education is progressively transitioning from merely obtaining a degree to developing skills and specifically soft skills.[13,14] * The World Economic Forum classified: (i) analytical thinking and innovation; (ii) active learning and learning strategies; and (iii) creativity, originality and initiative-taking as three of the most in-demand soft skills of 2022.[15] In this respect, the importance of

non-formal and informal learning (i.e., gained at work, through social activities, volunteering etc.), as well as lifelong learning, is increasing.[16] **

The influx of younger generations and the digitalisation of society induce changes not only in educational needs but also in the modes of delivery.[17] An abundance of knowledge is becoming easily accessible to everyone on the internet, and online educational courses are gaining ground.[18]

4.2. Identification of sectoral developments

For identifying developments in the selected sector of interest, several forecasting methods have been employed since the early 1960s. Although performing a literature review similar to the above could suffice, the information required is often too specific to find in published sources. Thus, we suggest performing the Delphi method, which facilitates the development of reliable group opinions by providing experts from various fields with a forum for discussion within a structured setting.[20]

DEFINITION

The **Delphi method** is a multi-round expert survey in which "*in the second and later rounds of the survey, the results of the previous round are given as feedback*".[21] More specifically, the Delphi method initiates an ordinary opinion survey to solicit experts' opinions on a subject. What differentiates Delphi is that afterwards, the facilitator collects, consolidates, and returns these opinions to the experts individually. Then, during the second (and any later) round, the experts can revise their viewpoints under the influence of their colleagues' opinions.

A critical success factor for the Delphi method is the quality of the questionnaire. Building a valuable questionnaire begins with a literature review to understand the state of play in the sector and then to decide on the most crucial information required for policy design. Such information can be phrased as projections of possible developments in one-sentence statements. After this, experts indicate their degree of agreement with each statement in the questionnaire. An ordinal 5-point Likert-type response scale, ranging from "Firmly disagree" to "Firmly agree", can be used.

Moreover, the outcome of a Delphi method largely depends on the group of participants involved.[22] A narrow set of criteria for selecting experts may "*lead to unrepresentative views or miss important sources of knowledge*".[23] Thus, the experts selected need to at least: (i) be aware of the current state of play in the sector of interest;[24] and (ii) have heterogeneous backgrounds (in terms of the type of stakeholder, nationality, etc.), as "*more diverse viewpoints reduce certain polarisation of preferences and responses*".[25]

HINTS AND TIPS

⚠ The questionnaire statements need to meet certain quality criteria, such as (i) to be concise and avoid complexity which may lead to confusion; (ii) to focus on a single issue to avoid ambiguity; and (iii) to exclude positive or negative item wordings to avoid any influence on respondents.[26,27]

⚠ Participants can also be invited to provide comments (share arguments) for or against a statement. In doing so, the Delphi method can provide additional insights into the investigated topic and resolve the problem of lack of justification.[28]

⚠ Compliance with the EU's General Data Protection Regulation (GDPR) or other relevant national laws may require participants' consent to handle their data and provide them with a privacy policy and a data subject request form.

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* Soft skills are character traits and interpersonal skills that characterize relationships with other people and complement hard skills in the workplace. Source: Kenton, W. (2020). Soft Skills. Investopedia. Retrieved from https://www.investopedia.com/terms/s/soft-skills.asp

* * Informal education is the type of knowledge that one gains through several life experiences. Non-formal education is one that is framed according to the requirement of a particular job. Source: Globale, E. (2020). Types Of Education: Formal, Informal and Non-Formal. Medium. Retrieved from https://medium.com/@ecoleglobale101/types-of-education-formal-informal-and-non-formal-aee0495004a9

After the first round of the Delphi survey has been completed, results need to be analysed to check for consensus among participants. Following the paradigm of Dajani et al. (1979), the level of agreement between participants can be categorised based on the decision rule below:

- **Majority agreement** occurs when more than 70% of the respondents have stated that they either (i) agree/ firmly agree; or (ii) disagree/ firmly disagree. Such statements are perceived as highly probable to realise.

- **Majority disagreement** occurs when there is a preference over an opinion, but less than 70% of the experts support it.[37] Such statements are perceived as less probable to realise.

- **Bipolarity** occurs when respondents are equally divided over an issue (i.e., providing two conflicting forecasts). A convenient way to check for bipolarity, as proposed by Von Briel (2018), is to analyse the histogram of each statement. If the histogram has more than one peak, then bipolarity is present.[38]

In the second round, as is common in Delphi surveys, statements on topics where majority agreement has already been achieved can be omitted to minimise survey fatigue (McMillan et al., 2016). The iterative process theoretically ends once views have been stabilised, meaning that participants' responses no longer alter significantly between successive rounds of feedback.[39] Most current studies are limited to two rounds.[40]

THE RRI2SCALE EXAMPLE

We performed a Delphi survey for the RRI2SCALE in November 2020. First, we investigated drivers of change, emerging trends and potential impacts in the smart cities, transport and energy domains. Then, we formulated 38 questionnaire statements and identified 954 experts as potential survey participants.

The following three statements are examples of potential future developments in the smart cities sector.

- **Driver.** The need to address growing urban challenges (e.g., rising house prices, traffic congestion, poor air quality, and urban flooding) will be one of the key drivers for European cities to pursue smart city projects.

- **Trends.** Local policy-makers in Europe will adopt an entrepreneurial mindset when designing smart city programmes and services (e.g., they will specify the services' value proposition, use smart procurement models and attribute importance to sustainability beyond funding).

- **Impact.** Smart city initiatives to be undertaken in Europe will be designed in ways that consider the needs of vulnerable groups (such as the elderly and people with disabilities), improving the prospect of significantly contributing to social inclusion. However, these initiatives will be adopted unequally across European countries.

The questionnaire was administered using the Welphi decision support system. There are several online platforms (including open-source software) that can be used to this end. Alternatively, a simple survey questionnaire could be shared with participants, though this comes without the convenience of being able to automatically analyse the responses.

During the first Delphi round, 120 experts provided their feedback (i.e., a 13.5% response rate). This feedback was collected, consolidated, and returned to the participants individually during the second round of the Delphi. At that time, participants could revise their responses based on other participants' views. A total of 88 valid replies were received, corresponding to a 73% response rate. The study outcomes indicate that majority agreement occurred in 18 out of 38 statements (16 statements in the first round and 2 statements in the second round); majority disagreement in 17 statements; and bipolarity in 3 statements.

RESOURCES

Examples of performing the Delphi method are available in the following document:

- Angelidou, M., et al. (2020). Report on the identification of emerging territorial trends, drivers & potential impacts. RRI2SCALE project. Available at https://cordis.europa.eu/project/id/872526/results

• von Briel, F. (2018). The future of omnichannel retail: A four-stage Delphi study. Technological Forecasting and Social Change, 132, 217-229. Available at https://www.sciencedirect.com/science/article/abs/pii/S0040162518302026

The questionnaire that can be used for a Delphi study on smart cities, transport and energy, developed in the context of RRI2SCALE, is available on Zenodo (Tool 2 - Delphi Questionnaire).

4.3. Development of techno-moral scenarios

On top of megatrends and sectoral developments that may affect the region over the following years, the team also needs to consider changes in people's views, including morals, perceptions, needs and preferences. We would suggest constructing techno-moral scenarios. Techno-moral scenarios help explore and clarify underlying beliefs, values and concerns regarding new technologies. Also, they can be used in the "awareness and engagement" phase as a tool to stimulate imagination, reflection, debate, and public engagement.[41]

> **DEFINITION**
> **Future scenarios** are *"carefully constructed snapshots of the future and the possible ways a sector might develop"*.[42] Organisations usually create them to define key future uncertainties and discuss the impacts and responses they need to give for each one of them.[43] **Techno-moral scenarios**, in particular, highlight 'soft' impacts (Swierstra et al. 2009; Boenink et al. 2010), appraising how technologies may change ideas, values and ideals.[44]

Constructing the scenarios begins by setting out their structure. A popular way to do it is by selecting two of the most important drivers identified previously to use them as the axis of a matrix.[45] For each driver, two contrasting aspects are chosen to label the axis poles. According to Ringland (2002), three common areas of uncertainty are the following[46]: (i) globalisation versus localisation; (ii) community values versus individual values; and (iii) quick adaption of new technology versus lagging adaption.

For instance, "social values" can be one axis, whereby one pole is labelled "individually dominated" and the other pole "community dominated". Similarly, "technology" may be the other axis, whereby the poles are labelled "quick adaption" and "lagging adaption". The result is four quadrants that provide the key structure for four different scenarios (*see Figure 2*). The first scenario would depict a region where the community feeling is dominant and the adaption to technology lags. The other scenarios are similarly designed.
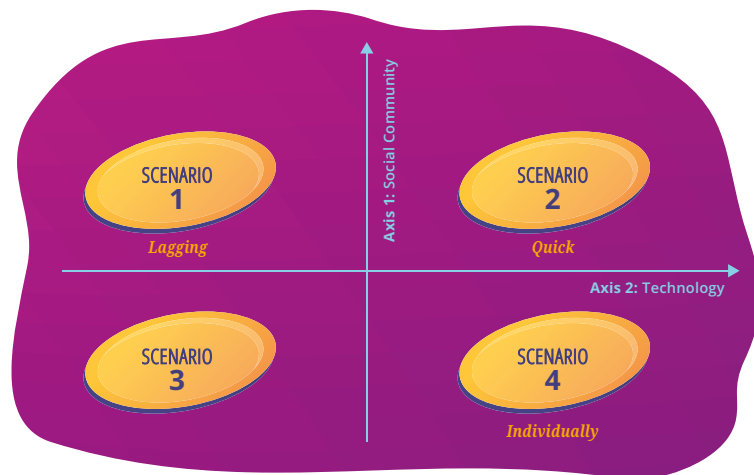
Figure 2
Matrix to support the identification of scenario structure

The next step is writing the scenario text by considering and synthesising all previously gathered information from the "preparation" and the "looking ahead" phases.

The scenarios can be constructed as a narrative of about one page long, while the time horizon can be set to the next 5 or 10 or 20 years. Among general trends, it is important to explore the emotions and controversies that technologies and other developments may bring. The writer's imagination is used whenever relevant literature or the Delphi findings do not suffice.

THE RRI2SCALE EXAMPLE

In the RRI2SCALE, we used the findings from the Delphi survey and the investigation of the local landscape to create two techno-moral scenarios for each sector of interest (i.e., smart cities, transport and energy). The driver "regional innovation policy" was one axis, whereby one pole was labelled "flexible and adaptive design and implementation" and the other pole "rigid and intervening, top-down". And the driver "citizen participation in regional decision-making" was the other axis, whereby the poles were labelled "High" and "Low".

A summary of one of the RRI2SCALE scenarios is provided below. In particular, the scenario of "flexible and adaptive design and implementation of the regional innovation policy" and "high citizen participation" is presented.

"We are in the year 2031. The government has digitised most of its services. Local and regional administrations operate on the principles of smart governance. Thanks to large volumes of secure and anonymous data, they make the right decisions and respond quickly to the needs of citizens. For example, the region systematically monitors air quality and identifies the most polluted areas. In collaboration with the citizens of the areas, it selects targeted measures and interventions to improve its quality.

Governmental and Non-Governmental Organisations (NGOs) provide digital skills training and support in using digitised public services. They provide special programs for the elderly and immigrants. Citizens participate in open councils where they design and select innovative ideas that could be implemented in their region. When their ideas are good, the regional or local authorities implement them. Recently, for example, citizens made a detailed record of the bodies and organisations involved in the local circular economy. The regional authority used the recording and maps to improve its strategy since 2023.

Also, NGOs support social inclusion and social innovation. They emphasise the needs of the elderly and people with disabilities (PWDs). Much of their work with the various communities is done digitally. Most citizens are happy with their lives."

RESOURCES

More examples of future scenarios can be found here:

• Dijkstra, A., et al. (2021). Techno-moral scenarios for territorial R&I futures in the domains of intelligent cities, energy and transport. RRI2SCALE project. Available at https://cordis.europa.eu/project/id/872526/results

• OECD. (2020). Back to the Future of Education: Four OECD Scenarios for Schooling, Educational Research and Innovation. OECD Publishing. Paris. Available at https://espas.secure.europarl.europa.eu/orbis/sites/default/files/generated/document/en/178ef527-en.pdf

A template to help local or regional authorities to structure and write their scenarios is provided on Zenodo (Tool 3 - Scenario Building & Validation).
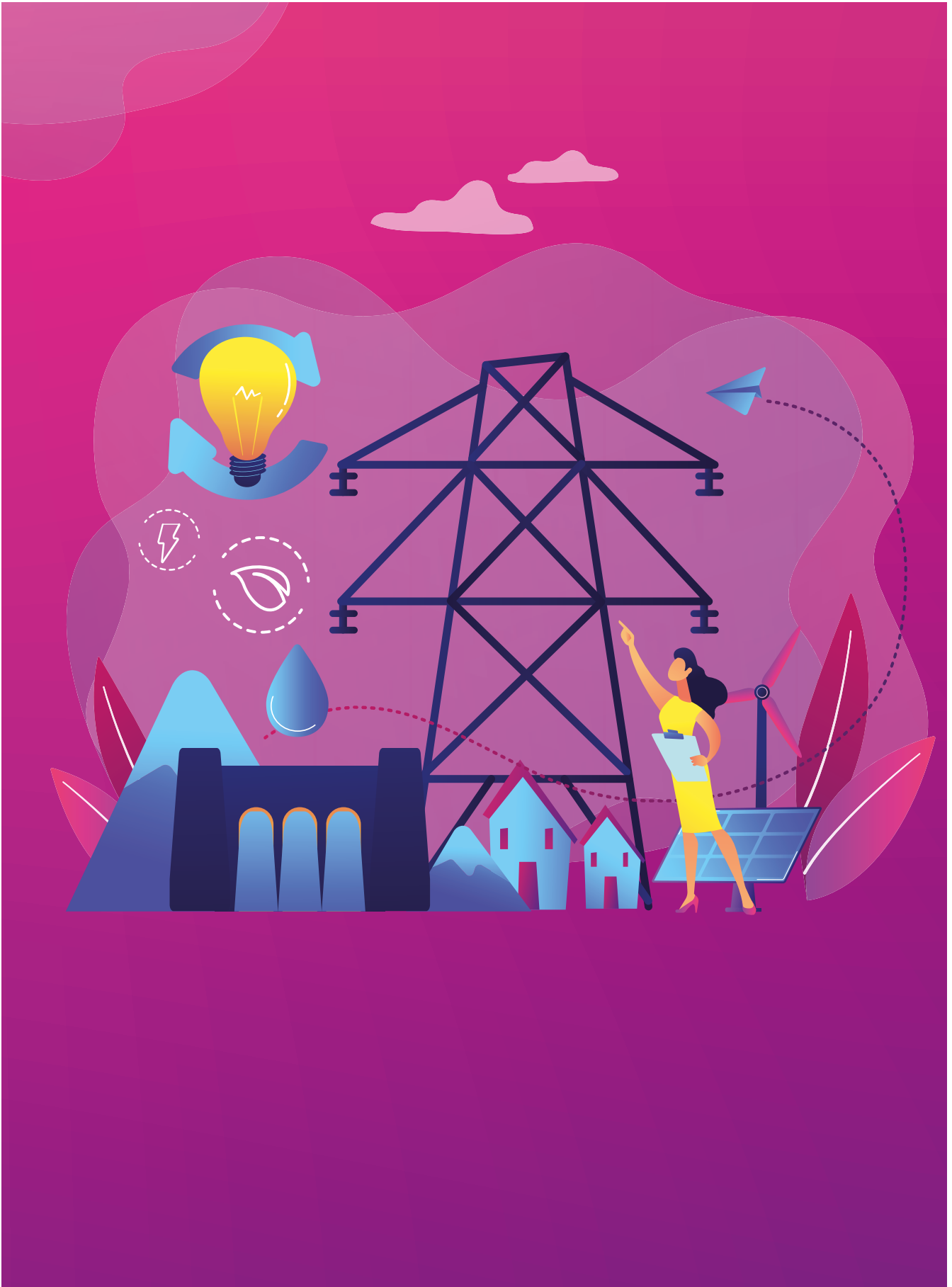
5. ENGAGEMENT AND AWARENESS PHASE: VALIDATE AND SIMULATE SCENARIOS

The purpose of the "Engagement and Awareness Phase" is to stimulate the interest of local citizens, involve them in the whole process and prepare them (equip them) for fertile participation in the "Policy Design Phase". In particular, local citizens are first called upon to validate the developed scenarios contributing to more realistic and insightful content. Then they are invited to participate in a simulation session, enabling them to understand particular circumstances and trends in the region and develop a long-term perspective. For the simulation session, the team needs to prepare and set up the Scenario Exploration System (SES).

5.1. Validation of the techno-moral scenarios

Organisations typically want to validate their speculation on the future before committing to policy action. In other words, they want to ensure the scenarios' logical consistency and capacity to serve as strategic insight and foresight tools.[47] One way to validate scenarios is to consider citizen perspectives, beliefs, and aspirations. In parallel, techno-moral scenarios can serve as a handy tool to raise awareness, engage the public, and feed the public discourse. To this end, we suggest organising a scenario validation process where local citizens can understand, discuss and potentially oppose the scenarios.[48] A scenario validation process can take place physically, in a workshop, or digitally using an online platform.

Scenarios are usually evaluated upon such criteria as plausibility, the difference from one another, completeness, and internal consistency.

HINTS AND TIPS

⚠ An option to communicate the scenarios to citizens is to convert them from text to videos. Consider selecting photos and background music that can be freely reproduced.

⚠ One way to measure plausibility is to ask citizens: "How likely is this scenario to become a reality in your region within the next ten years?". If only a minority finds it impossible, then the criterion is satisfied.

⚠ One way to measure the difference from one another is to ask citizens: "Which of the two scenarios would you prefer to become a reality in your region within the next ten years?". If the majority votes for one or the other scenario and only a minority states "No clear preference between the two scenarios", then the criterion is satisfied.

⚠ Assessing a scenario in terms of completeness and internal consistency is slightly more challenging because a straightforward question (e.g., "What is missing from the two scenarios to be complete?") wouldn't work well. An alternative would be to pose a general question (e.g., "In what way would your life be affected if this scenario becomes a reality?") and allow people to leave comments. Then, from the comments received, you can elicit information on (i) any missing components from the scenario or (ii) any indications of flaws in the scenarios' internal consistency.

THE RRI2SCALE EXAMPLE

In RRRI2SCALE, we designed and implemented a validation process to assess whether the techno-moral scenarios developed meet the high-quality scenario criteria.

First, videos presenting the scenarios were created (see examples here and here), uploaded on the RRI2SCALE website and promoted through social media. Citizens from the four regions (i.e., Kriti, Galicia, Overijssel and Vestland) were asked to comment and discuss various aspects of the scenarios. They were also encouraged to participate in a short survey, assigning scores to the scenarios' desirability and probability. According to Facebook statistics, our campaign reached more than 31,000 people, while we collected 386 comments and 279 valid survey replies.

After that, all the comments and replies received were analysed to identify recurring themes and assess whether the scenarios are plausible, different from one another, complete, and internally consistent, allowing us to make improvements.

R E S O U R C E S
Examples of scenario-building and validation processes can be found in the following documents:
- Angelidou, M., et al. (2021). Validation Report on Techno-Moral Scenarios. RRI2SCALE project. Available at https://cordis.europa.eu/project/id/872526/results
- Kallis, G., Hatzilakou, D., Mexa, A., Coccossis, H., Svoronou, E., & Areos, P. (2006). Deliberative Visioning: A critical view. Observations from a Scenario Workshop for water management in a Greek island. Available at https://tinyurl.com/3ptf4esj

5.2. Scenarios simulation

After validating the scenarios, we suggest inviting key stakeholders and citizens to dedicated sessions to experiment with the scenarios using a simulation tool. Such a learning process can help them understand better what the future may bring and, thus, be in a better position to participate in the following policy design phase. A useful tool to operate such sessions is the Scenario Exploration System (SES), which was adjusted by RRI2SCALE.

D E F I N I T I O N
Stakeholder Exploration System is a role-playing board game that allows participants to experience and act through plausible alternative futures. The participants assume different stakeholder roles (e.g., policy-makers, academia, and business) and explore a universe different from theirs (e.g., a universe described by a future scenario). The aim is not to play a game and win but to promote a constructive conversation amongst key actors and long-term thinking in a spirit of collaboration.

SES was initially developed by the European Commission's Joint Research Centre (JRC) EU Policy Lab to facilitate the practical use of scenarios in forecasting studies. RRI2SCALE adjusted the tool materials to accommodate a multi-stakeholder dialogue at the regional/ local level based on previously developed techno-moral scenarios. Further instructions on how to set up and operate the SES and all the materials that need to be developed beforehand, such as the board and cards, are provided on Zenodo (Tool 4 - SES Instructions & Materials).
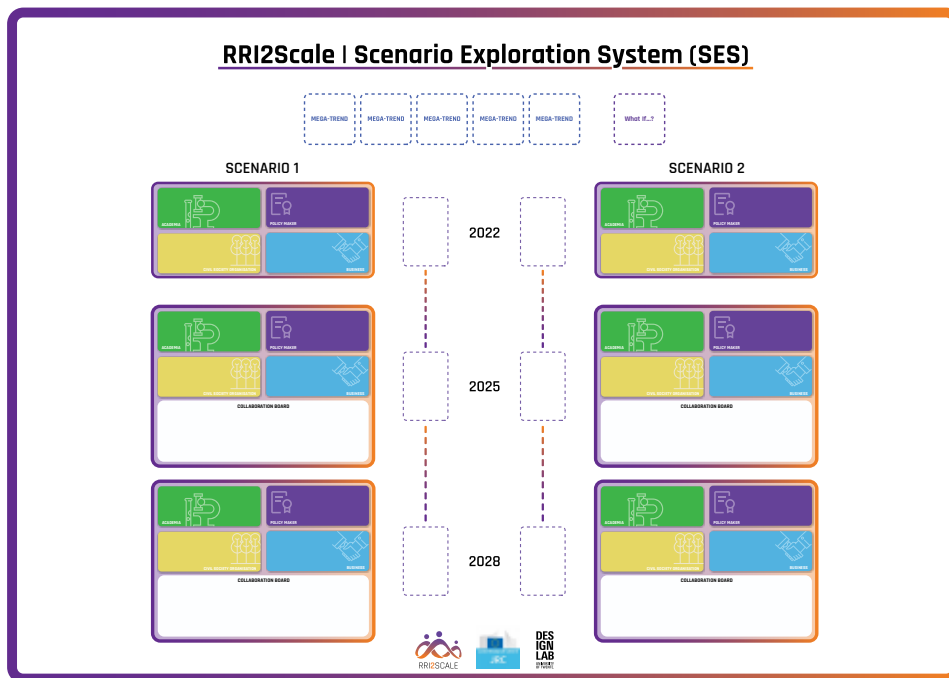

Figure 3:
An example of
the SES board

A critical factor for a successful SES session is inviting the right participants. We suggest inviting stakeholders who:

• have a stake in the innovation policy-making, domain of interest and/ or RRI within their regions;

• are regional stakeholders and could be both internal champions (within the regional or local authorities) or external stakeholders representing the quadruple helix;

• as a team, they are balanced in terms of age, career, gender and background; and

• can also participate in the agenda co-creation workshop. This is important because the knowledge and insights gained through the SES are critical to the policy design phase.

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HINTS AND TIPS

⚠ At least one week before the session, consider sharing with the participants a supporting document with guidelines to familiarise them with information such as the purpose of the meeting, the SES, the other participants and how the outcomes could be used.

⚠ Experienced moderators are important for a smooth and fruitful session. We suggest organising several rehearsals to ensure that the team and the moderator are familiar with the SES.

⚠ The success of the SES and its outcomes depend on good communication. Although digital sessions are safer in a pandemic and logistically easier to organise, physical sessions are much more effective and enjoyable. Also, digital sessions are significantly longer by default.

⚠ Note-keeping during the session is important for the policy design phase. Expressed concerns about the region's future, other needs and preferences can serve as input to the agenda creation. Also, the moderator can elicit further information by directly asking relevant questions, such as "considering the various alternative scenarios, what would be a realistic target for the region on the X topic?".

</div>

RESOURCES

Additional instructions on how to set up and operate the SES are provided in the following materials:

• DesignLab. Instruction Video. Scenario Exploration System: Responsible Futuring. University of Twente. Available at: https://zenodo.org/record/7459822

• DesignLab. Quick Guide. Scenario Exploration System: Responsible Futuring. University of Twente. Available at: https://zenodo.org/record/7459834

• van den Berg, M., et al. (2022). On the process and outcomes of the regional multi-stakeholder dialogues. RRI2SCALE project. Available at https://cordis.europa.eu/project/id/872526/results

6. POLICY DESIGN PHASE: BUILD AGENDA AND A ROADMAP FOR POLICY CHANGES

The purpose of this phase is to use the knowledge generated in the previous phases and involve citizens in a participatory process to consider potential policy changes. We suggest organising two workshops, whose outcomes are: (i) an agenda to promote actions that address the regional dilemmas in the sector of interest; and (ii) a roadmap with steps for institutionalising an inclusive approach to policy-making in the governance processes of the regional/ local authority.

DEFINITION
- An **agenda** is a planning tool to define specific goals and initiatives. It includes a clear diagnosis of the region's internal condition, a shared understanding of the goals, identification of the most critical opportunity areas, and knowledge of the capabilities, assets, and partnerships needed for success.[49]
- A **roadmap** is a strategic plan that defines the desired outcomes and includes the major steps needed to reach them.[50]

Before the first workshop, the team can synthesise (i) the background knowledge based on the current situation and regional dilemmas from the "preparation phase"; (ii) the foreground knowledge gained through the forecasting studies of the "looking-ahead phase"; and (iii) the insights on citizens' aspiration, preferences, fears and social roles from the "engagement and awareness phase". Based on the above, the team can develop a solid proposal for changes in the current regional/ local policies or a new policy that could contribute to addressing the regional dilemmas and is aligned with the principles of RRI. Also, it is recommended that the team invites the same stakeholders and citizens who participated in the SES session since the knowledge and insights gained through the simulation tool enable them to participate in the workshop more actively.

During the workshop, the team can briefly describe the current status and policy landscape in the sector of interest. Then, it may present its suggestions for policy changes and explain why and how such changes take into account the estimated future developments in the sector and incorporate the views and preferences of citizens. Later, citizens can provide feedback, and a fertile dialogue may follow, discussing, among others, the shortcomings of the proposed changes and ideas to overcome those obstacles.

After the end of the first workshop, the team sets up the new regional/ local agenda pointing out the modifications needed in the existing or upcoming policies. Ideally, the team could disseminate the document to local citizens to receive feedback from a wider audience. Press releases, newsletters and a website or social media post can be helpful in this respect. Finally, the team forwards the agenda to higher-level policy-makers for it to be considered for adoption.

However, irrespective of whether the agenda is adopted, the five-phase methodology proposed in this document can serve as a first step (or a good practice) for institutionalising an inclusive approach to policy-making in the governance processes of the regional or local authority. Thus, we suggest organising a second workshop with policy-makers and other stakeholders to discuss whether and how to sustain this practice for future-proof and participatory policy design. Also, this workshop could provide an opportunity for discussing governance changes to embed additional RRI dimensions, such as gender equality, open access, science literacy and ethics. After the workshop, the team can prioritise the main steps and synthesise them into a roadmap for governance change. Finally, the team shares the roadmap with all the governance stakeholders, including those who might not have been present in the workshop but have an important role in or impact the governance framework.

R E S O U R C E S

Further inspiration for changes in regional governance can be derived from the following documents:

- Moghadam Saman, S., et al. (2022). Agendas and Roadmaps of the RRI2SCALE Regions' co - creation process. RRI2SCALE project. Available at https://cordis.europa.eu/project/id/872526/results
- Willi, Y., Putz, M. and Muller, M. (2018). Towards a versatile and multidimensional framework to analyse regional governance. *Environment and Planning C: Politics and Space* 36(5): 775–795.

7. MONITORING AND EVALUATION PHASE: MEASURE PERFORMANCE AND IMPACT

Monitoring the above phases and collecting data for assessment and evaluation offer many benefits. It can help the team:

- identify the strong and weak parts of their approach, infer any success and prohibiting factors and ultimately improve their way of working;

- understand the specificities of the region better, including regional strengths and weaknesses and thus, improve the team's ongoing planning for the next phases in the process;

- collect evidence on the societal, scientific, economic and environmental impact of the whole process, then present it to policy-makers and other stakeholders and, finally, gain their commitment to exploiting the results and supporting similar future initiatives; and

- provide themselves (i.e., the team members) with a sense of success or failure.

We suggest setting up a monitoring and evaluation framework following four steps:

- **First**, the team needs to decide on a list of objectives and sub-objectives for the whole process. For instance, the objectives can be to (i) address regional dilemmas in the sector of interest; and (ii) embed RRI dimensions in the regional governance framework. A few sub-objectives could be to (i) involve the public in policy design; (ii) prepare the region for upcoming developments in the sector of interest; and (iii) promote gender equality in the decision-making bodies.

- **Second**, the team needs to decide on the means to collect the required data and develop any relevant material. For instance, the team could ask the participants in the simulation session and the agenda workshop to fill in feedback questionnaires. Also, it could interview a few citizens. In any case, the team needs to develop the relevant questionnaires or interview forms, while abiding by all General Data Protection Regulation (GDPR) provisions or other national laws. The team needs also to consider the questionnaire's size, avoiding potential survey fatigue.

- **Third**, the team need to develop a list of indicators. The indicators need to, either directly or indirectly, measure progress towards the objectives and sub-objectives set. They can be (i) process indicators, which measure the quantity and quality of any actions taken and processes implemented; (ii) outcome indicators, which measure the tangible outcomes or perceived outcomes achieved; and (iii) perception indicators, which measure changes in the perception and values of the engaged citizens.

- **Fourth**, the team needs to collect the data and evaluate them. The first task includes calculating sums, mean or weighted averages, and trends. Then, based on previous experiences or expectations, the team needs to provide an evaluation of the data and come up with meaningful conclusions.

HINTS AND TIPS

⚠ Persuading workshop participants to fill in a feedback questionnaire is sometimes challenging. We suggest clearly explaining to them the purpose and the importance of collecting such data. Also, we recommend asking for feedback during or immediately after the event and not later.

⚠ Evaluation of results can be made easier and more effective if target values are assigned to indicators. Target setting is an important tool for clarifying direction and assessing organisational progress. However, setting targets is not

a trivial process. They should be SMART, meaning: (i) Specific (i.e., specific about what is to be accomplished); (ii) Measurable (i.e., to ensure that there are measurement methods available); (iii) Achievable (concerning the baseline situation identified previously); (iv) Relevant (i.e., relevant to the direction the process wants to go in), and (v) Time-bound (because targets without a timeframe may be forgotten or pushed to the side).[51]

RESOURCES

Examples of relevant monitoring and evaluation frameworks can be found in the following document:

• Angelidou, M., et al. (2022). RRI2SCALE Indicators Database. RRI2SCALE project. Available at https://cordis.europa.eu/project/id/872526/results

A template to assist local and regional authorities in setting up their monitoring and evaluation framework is provided on Zenodo (Tool 5 - Monitoring and Evaluation).

THE RRI2SCALE EXAMPLE

In the RRI2SCALE, we compiled a list of more than 100 indicators and collected the necessary data in three ways: (i) we asked for participants' feedback after each participatory process (receiving more than 50 replies); (ii) we asked regional authorities to fill in a report every four months; and (iii) we regularly collected data from the Eurostat website. The key conclusions that we came up with in brief were:

• The group of people in the discussions was sufficiently diverse to allow a meaningful conversation (76% of the citizens in the RRI2SCALE participatory activities agreed with this statement);

• The SES took place in a gender-equal environment (100%) and complied with research integrity standards (e.g., clarity in the research goals, respect for all participants and transparency in data-collection methods) (88%);

• Participants had or were provided with sufficient background knowledge on the topics discussed to participate in the SES actively (82%) and gained a better understanding of potential developments, e.g., technological, demographic and economic developments (65%);

• Participants better understood the social role of various stakeholders (91%). However, only half of them improved their understanding of current dilemmas in their region (53%). Also, only a few of them said that, in the future, they would search more actively for information about controversial technologies (29%);

• Finally, in terms of perception change, they now think that analysing potential ethical issues must be an integral part of the strategic planning of the regional authority (100%) and consider new technologies as worth-investigating solutions to regional problems and challenges (64%).

8. CONCLUSIONS

More "social", open and collaborative governance models are feasible and necessary to address regional dilemmas. Local and regional policy-makers can use this document as a guidebook to involve citizens in policy design related to fast-changing technology sectors. In brief, the guidebook proposes a five-phase methodology. The first phase (i.e., the preparation phase) includes reviewing the current R&I landscape, identifying regional dilemmas and exploiting potential collaborations with other regions. The second phase investigates emerging trends in the particular technology sector and develops techno-moral scenarios for the region's future. Afterwards, in the third phase, the scenarios are communicated to the wider public to validate their content. Also, key stakeholders and citizens experiment with the scenarios using a simulation tool called Scenario Exploration System. In the policy-design phase, co-creating an agenda with specific goals and initiatives entails a commonly agreed course of action toward actively addressing the identified regional dilemmas. And finally, ongoing monitoring of the process allows on-spot improvements and a solid evaluation of the incurred impact on society, the economy and the environment.

We envisage that this guidebook will inspire other regions and project consortia that wish to adopt the RRI2SCALE approach. Further information can be provided upon request by the document lead author, Q-PLAN International Advisors P.C.

IMPORTANT INFO

The guidebook is also available on Zenodo. There, we have uploaded various tools and materials to support future endeavours. In particular, one may find: (i) a questionnaire that local or regional authorities can use to understand their citizens' views, attitudes and needs (Tool 1 - Views Questionnaire); (ii) a questionnaire that local or regional authorities can use to run a Delphi study on smart cities, transport and energy (Tool 2 - Delphi Questionnaire); (iii) a template that local or regional authorities can use to structure and write their techno-moral scenarios (Tool 3 - Scenario Building & Validation); (iv) instructions on how to set up and operate the SES and all the materials that need to develop beforehand, such as the board and cards. (Tool 4 - SES Instructions & Materials); and (v) a template to assist local and regional authorities in setting up their monitoring and evaluation framework (Tool 5 - Monitoring and Evaluation).

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