Chapter 7

Supporting public sector innovation through a living lab approach: the use of new technologies in administrations

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Abstract

Implementing data technologies such as big data, artificial intelligence and blockchain in the public sector is no easy task. It requires the collaboration of multiple actors, displaying various viewpoints and often divergent interests and unequal knowledge vis-à-vis technologies. Considering the implementation of new digital technologies as a public sector innovation, this chapter proposes a participatory methodology to support such process. The proposed methodology relies on a living lab approach supported by scenario thinking. A living lab is an innovation space in which stakeholders are engaged in a long-term bottom-up collaboration. It aims at fostering open innovation through knowledge exchange, co-creation techniques and participatory methods, bridging the gap between stakeholders that do not usually meet. In parallel, scenario thinking provides room for debate and convergence of multiple viewpoints of the future of an issue, by challenging the business-as-usual thinking. As the future is uncertain, it helps in considering a broader range of possible and plausible futures and to think creatively about them. Therefore, scenarios are a heuristic tool for one to think differently about the future(s), considering the future as an open yet not empty space. This chapter relies on data from a living lab process centred around the development of a governance model regarding the integration of big data, artificial intelligence and blockchain in Belgian federal public policies. This process was mostly based on scenario workshops that brought together civil servants and major stakeholders, such as technology providers, business federations, workers federations, sectoral federations, academics and NGOs. This chapter concludes with some recommendations for further use of participatory innovation in the public sector.

Keywords: living lab, scenario thinking, participatory methods, public sector innovation, new technologies

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7.1 Introduction

Implementing data technologies such as big data (BD), artificial intelligence (AI) and blockchain (BCT) in the public sector is no easy task. It requires the collaboration of multiple actors, displaying various viewpoints and often divergent interests and unequal knowledge vis-à-vis technologies.

Considering the implementation of data technologies as a public sector innovation (PSI), the theoretical starting point of this chapter is the growing evidence showing that PSI is better supported by collaborative and participative processes.

Building on the experience of the DIGI4FED research project, the aim of this chapter is to introduce the living lab approach as a participatory and deliberative methodology to support PSI while reflectively assessing the conduct of its implementation. A living lab can be seen as an innovation space in which stakeholders are engaged in a long-term bottom-up collaboration. It aims at fostering open innovation through knowledge exchange, co-creation techniques and participatory methods, bridging the gap between stakeholders that do not usually meet.

This chapter is divided into several sections. The next section (Section 7.2) offers a literature review of public sector innovation, in link with new digital technologies. Section 7.3 introduces the living lab approach to fostering public sector innovation and its use in developing public sector innovation. The following sections (Section 7.4-7.6) present the methodology to implement living labs, based on our DIGI4FED experience, including the use of scenario thinking to support such process. The final section (Section 7.7) assesses the proposed approach and provides theoretical and practical recommendations for further implementation.

7.2 Public sector innovation and new technologies

Since the early 2010s, there has been a renewed interest in public sector innovation. The OECD has, for example, published several reports and organised multiple workshops on the topic (OECD, 2011, 2014, 2015), defining an 'innovation agenda' for the public sector and calling for the 'innovation imperative'. Innovation has therefore become an instrument to make the public sector more open, more collaborative, more participative, and more productive. From 2017 onwards, the OECD Observatory for Public Sector Innovation (OPSI) has annually published a report of public sector innovation trends with the United Arab Emirates (UAE) Mohammed Bin Rashid Centre for Government Innovation. Similarly, the European Commission has funded several studies on the topic, considering innovation as a means to make the public sector more effective, more efficient and more responsive (Bason *et al.*, 2013; Hollanders *et al.*, 2013).

As any policy instrument, innovation is a construct and reflects the choices of those that develop and mobilise it (Lascoumes and Le Galès, 2007). Therefore, public sector innovation (PSI) is a fluid concept that is dependent on the values, interests and objectives of the actors involved in the innovation process.

The literature on PSI often refers to the writings of Schumpeter (1942). He sees innovation as a process of creative destruction in which new combinations of existing resources are formed. In his view, innovation is intrinsically linked to the notion of entrepreneurship. Another commonly cited definition is from Rogers (2003), for whom innovation is an idea, practice or object perceived as new by an individual or other entity adopting it. In this sense, it is the perception of the new nature of the idea that matters, as opposed to its objective novelty. Innovation is always contextualised. This is also reflected in the vision of Koch and Hauknes (2005) who propose to consider PSI as a tool for analysing social activities and interactions rather than as a marker of an objective reality. Finally, Bekkers *et al.* (2011a: 6) point out that:

> The need for public innovation can be defined as the search for new ideas and concepts, technologies, techniques and methods, forms, systems, and procedures to create meaningful interactions between the government and society in order to deal with a number of societal challenges.

Innovation is also based on a rather positive normative *a priori* and the added value is often left unquestioned (Fuglsang and Pedersen, 2011; Koch and Hauknes, 2005; Pollitt, 2011; Sveiby *et al.*, 2012). Therefore, taking a reflective stance on PSI, we can highlight four distinguishable features of PSI compared to other policy instruments:

1. PSI includes the notion of novelty; it produces a new idea, practice, or object (Bekkers *et al.*, 2011b; De Vries *et al.*, 2016; Hartley, 2005; Moore and Hartley, 2008). Some authors therefore distinguish between an objective innovation, in the sense that it is the very first time it appears, and a subjective innovation, appearing for the first time in a given context (Brown and Osborne, 2012).
2. PSI must be implemented in a specific context within which it is new. More than just ideas or inventions, innovations are new ideas and practices that are contextualised (De Vries *et al.*, 2016).
3. PSI involves a discontinuity with the past (and is therefore different from continuous improvement). If innovation is seen as an organisational change that can lead to significant changes in the organisation's environment, it also leads to a paradigmatic shift, in contrast to a classical organisational development. This shift changes the nature of the product, service or process concerned by positioning it as a disruption from previous practices (Brown and Osborne, 2012). However, it is possible to distinguish between incremental and radical innovations (Bekkers *et al.*, 2011b; Fuglsang and Pedersen, 2011).
4. PSI is both a product and a process. Thus, innovation is both the product of a process but also a process of transformation as such (Alter, 1993; Brown and Osborne, 2012). As a process, Schuurman *et al.* (2016) distinguish between internal and open innovation. While internal innovation processes only include members of an organisation, open innovation processes involve actors external to an organisation and their knowledge.

Novelty, context, discontinuity, and the productive and processual nature of innovation are therefore distinctive features of public sector innovation. Considering BD, AI and BCT as defined in Chapter 2 and these characteristics, implementing these technologies can clearly be seen as public sector innovation.

Moreover, the issue is also touched upon by the OECD Observatory for Public Sector Innovation that published a working paper in 2019 specifically oriented towards AI in the public sector (Berryhill *et al.*, 2019). It aimed at improving government officials' understanding of AI and its considerations within the public sector.

In the current context, public sector organisations are constantly engaged in innovation processes. In that regard, Hartley *et al.* (2013: 825) state the following:

> There is growing evidence that collaboration can spur public innovation [...] Theories of collaborative innovation in the public sector derive both from theories of network governance, which emphasise the role of collaborative networks in finding innovative solutions to complex problems [...], and from theories of learning that conceptualise step change as occurring through interorganisational interaction and collaborative processes [...]. Theories of collaborative innovation also echo insights from management theories about private sector innovation, where it focuses on 'social innovation' [...], 'co-creation' [...], and 'open innovation' [...].

7.3 Spurring public sector innovation through living labs

As mentioned in the previous section, open innovation, social innovation, and co-creation are pointed out as key principles of public sector open innovation processes. Involving actors external to the public sector becomes therefore a key element of such processes.

However, Schuurman *et al.* (2016: 7) specifically point out the 'lack of adequate management models'. Additionally, Gascó (2017: 90) states that the way 'open innovation can become a true and effective tool for governments is still an underexplored topic' as the literature is especially looking at ways to implement a successful private sector practice. in the public sector.

According to Gascó (2017), the role of agents and intermediaries is crucial to foster innovation. In the private sector, innovation networks of actors aiming at common goals have become the norm. However, such practices are difficult to directly implement in the public sector as actors are not competing for market shares: for example, the goals of policymakers, citizens, enterprises and NGOs are not necessarily aligned. This difficulty of alignment reinforces the need for intermediaries in the public sector. Examples of intermediaries supporting innovation networks can be specific actors (innovation consultants, civic innovators), permanent installations (FabLab, incubators), living labs and ad hoc events (workshops, conferences, networking events, hackathon) (Bakici *et al.*, 2013; Brandsen *et al.*, 2018; Gascó, 2017; Yuan and Gasco-Hernandez, 2021).

Specifically, in this chapter, we focus on one of these intermediaries: living labs. As noted by Bergvall-Kareborn and Stahlbrost (2009: 357), 'living lab has become an umbrella concept for a diverse set of innovation milieus'. We conceptualise the living lab as an 'innovation space' in which stakeholders are engaged in a long-term bottom-up collaboration. Such innovation space can take the form of one or several workshops, of an open space, or of any space that allows for dialogue between stakeholders (Alavi *et al.*, 2020). Living labs can be defined as:

> [...] constituting a setting for collaborative innovation by offering a collaborative platform for research, development, and experimentation with product and service innovations in real-life contexts, based on specific methodologies and tools, and implemented through concrete innovation projects and community-building activities (Schaffers and Turkama, 2012: 25).

Dell'Era and Landoni (2014: 139) provide a shorter definition, as 'a design research methodology aimed at co-creating innovation through the involvement of aware users in a real-life setting'. Considering these definitions, living labs are relevant intermediaries to foster innovation regarding new digital technologies. They allow collaborative innovation in the public sector, bringing stakeholders that usually do not meet in such a setting. This chapter focuses on various stakeholders involved in tax fraud policy and in social security infringement policy.

In methodological terms, living labs aim at fostering open innovation through knowledge exchange, co-creation techniques and participatory methods, bridging the gap between stakeholders that do not usually meet. They thus act as an intermediary for innovation, connecting actors and supporting the knowledge exchange. In that regard, the process matters often as much as the end-result (Gascó, 2017).

Nevertheless, such an approach cannot be decreed. Co-creation in open innovation requires an open mind-set towards sharing and collaboration, which can be supported by techniques such as 'context-mapping', which involves users intensively in creating an understanding of the contexts of service use (Sleeswijk Visser *et al.*, 2005), and 'generative' techniques, which can reveal tacit knowledge and expose latent needs (Dell'Era and Landoni, 2014). Such techniques include among others, scenarios thinking.

The real-life context of the innovation process contributes to a better understanding of the tacit and domain-based knowledge needed to assess needs and build feasible, appropriable solutions. The participatory techniques must respect some principles to ensure the sensitisation of participants, but they are to be adapted by the research team to the specific context and issues at stake.

In terms of living lab, several examples and processes are cited in the literature. Ruijer and Meijer (2019) describe, for instance, a living lab approach for open government data, based on several workshops and experiments with civil servants, students and researchers. Similarly, Bergvall-Kareborn and Stahlbrost (2009) offer insights on a living lab whose goal is to develop innovative

IT services and products with real users and their needs. Contrary to the previous example, this living lab is a continuous endeavour rather than a punctual project, and it has evolved with time to building a large community of users that test services and products.

A third example is provided by Dekker *et al.* (2021) who researched quite a different form of living lab, aimed at innovating alternatives in housing for asylum seekers to the classical large-scale facility housing. In a specific housing complex, a reduced number of asylum seekers lived together with locals and had access to learning activities. The living lab context was therefore the housing complex in which residents were innovating through living their life in the facilities. A final example is the concept of urban living labs, bringing together citizens, local authorities, businesses, and research organisations to co-produce innovative urban services. It is mostly based on meetings and workshops in different urban locations, sometimes using the city as a living environment (Nesti, 2017).

Nevertheless, none of these works provide a detailed approach to setting up a living lab. Hence, building upon these insights, we propose methodological steps to set up a living lab in the next section. We insist that what we provide here are guidelines rather than a recipe book, and recommend that the reader keep a critical eye on the creation and implementation of his/her own living lab, to keep it aligned with its objectives.

7.4 Implementing a living lab approach around new technologies in the public sector

7.4.1 The general methodological approach

Seeing the living lab as an innovation space that is user-centric in real-life settings, multiple methodological questions must be answered: Who to involve? When? What for? And how? The answers to these questions come from multiple sources including literature reviews and interviews, as shown below.

Our approach to living labs is designed in three phases: exploring, co-creating, and testing and evaluating (Zwetkoff *et al.*, 2018).

1. The first phase is about exploring problems and opportunities to be addressed regarding the issue at stake (in our case, integrating BD, AI and BCT in Belgian federal public organisations), as well as identifying emerging ideas and breakthrough scenarios.
2. The second phase is to support co-creating a product or a service, through deliberative processes including several diversified stakeholders. In the DIGI4FED project, we took the development of an open governance model for the use of new digital technologies in the fight against fraud as the policy innovation objective in the co-creation phase
3. The third phase (testing) allows stakeholders to test the product or the service. In a real-life context, in terms of performance and potential adoption, to identify incentives, possible risks and the discretionary space of professionals and users which can be specified (Brandsen *et al.*, 2018). Again, in the DIGI4FED project, the aim is to test key dimensions related to an open governance model developed thanks to the co-creation phase as well as to other research

outputs. In this project, testing involves the selection of adapted evaluation criteria to test the proposed governance model with the help of the Delphi survey method. Such criteria include the consistency, the feasibility, as well as the overall efficacy and suitability of the model for instance. These were selected after an assessment of the common criteria used in public policy evaluation, planning, and design science research literature.

To set up a living lab, several elements must be taken into account: users, an application environment, Information and Communication Technologies (ICT), methods, and partners bringing expertise (Ruijer and Meijer, 2019). These five elements are described in the following sections, grouping though users and partners within a single 'Participants' category, combined with ICT technologies.

7.4.2 The application environment

The application environment includes all organisations and stakeholders that could be impacted by the innovation. In the DIGI4FED project, it was centred on the Belgian federal administration. This includes all public organisations at the federal level. Such focus does not, however, exclude other politico-administrative levels (that is, for Belgium, European, regional, community, provincial and municipal levels), although the main focus is not on them.

In addition, if the topic at stake is more specific, it could be interesting to specify and/or restrain the organisations and stakeholders to be considered as relevant. For example, the DIGI4FED project mainly considered two policy domains: the fight against tax fraud, and the fight against social security infringements. These two policy domains were chosen as their stakeholders have shown sustained interest in the use of data for public policy. These two policy domains display quite distinctive configurations in terms of stakeholders.

On the one hand, tax policy concerns both direct and indirect taxation at the federal level. Direct taxation notably includes personal and corporate income tax, while indirect taxation comprises, among others, value-added tax and import and excise duties. Tax policy is a rather centralised policy domain, organised around the Belgian federal tax administration, that is in charge of both policy design and is a part of policy implementation. Other actors, such as the financial intelligence processing unit, several services of the police forces, the national bank and the financial services and markets authority, can provide information regarding potential infractions to the central administration. In that regard, the living lab will focus on topics that relate to the fight against tax fraud and tax evasion; the former is always illegal while the latter can be legal or illegal (based on several specific conditions). The participants (see below) were identified and chosen within this realm.

On the other hand, social security policy aims at providing several social services to citizens such as benefits (e.g. unemployment, retirement, children, maternity leave) and healthcare reimbursement. This policy domain is rather fragmented. The social security central administration is in charge of part of the policy design, while most of the implementation, including the fight against social

security infringements, is led by a multitude of public bodies, each with their own specific area, such as employment, healthcare insurance, social security for contractual workers, social security for self-employed workers and control of social legislation. There are other areas, but these five areas are also those in which there is a specific work to combat what is broadly defined as social security infringements. In addition to these several administrative actors, there are a series of other institutions involved, as the federal IT support service and the federal platform for social security data exchange, as well as private entities such as social partners, social secretariats, and mutual health funds.

Finally, other more horizontal political and administrative actors are also present in these two policy domains, such as the federal government, the federal parliament, the data privacy authority, and the Court of Audit.

7.4.3 Participants and ICT technologies

Participants and ICT technologies are the key interacting elements of an innovation process within a living lab.

The definition of the participants is one of the crucial elements in implementing a living lab. In our research, we worked with a closed collaborative network, rather than with an open one. This means participants will be pre-selected based on specific criteria in order to generate more focused inputs from them as users. The closed approach allows to choose the size of the group and the profile of participants, but is slightly more complex to implement than an open approach, especially in identifying, contacting and attracting potential participants (Dell'Era and Landoni, 2014).

In the DIGI4FED project, participants were members of an organisation that is (more or less closely) linked to one of the two topics that were specifically researched in the application environment (either tax policy or social security policy). In that regard, they all had an interest in participating as well as a particular expertise to bring to the debate. Similarly, the ICT technologies that are considered are, as stated before, BD, AI and BCT. Their development will have an impact on any identified participant to the living lab.

7.4.4 Methods

Living labs methodologies use user-centred co-creation methods, that are mostly participatory and qualitative. These methods also aim at engaging stakeholders in a real-life setting.

In DIGI4FED, the living lab approach we designed combined several qualitative and participatory methods, used in the three previously mentioned phases (exploration, co-creation and testing). The phases of exploration and co-creation strongly rely on scenarios thinking to position participants in real-life settings. In the exploration phase, the main methods used were literature review and semi-structured interviews, while the co-creation phase relied on four scenario workshops. The testing phase was supported by a Delphi survey. The whole process can be summarised as shown in Figure 7.1.

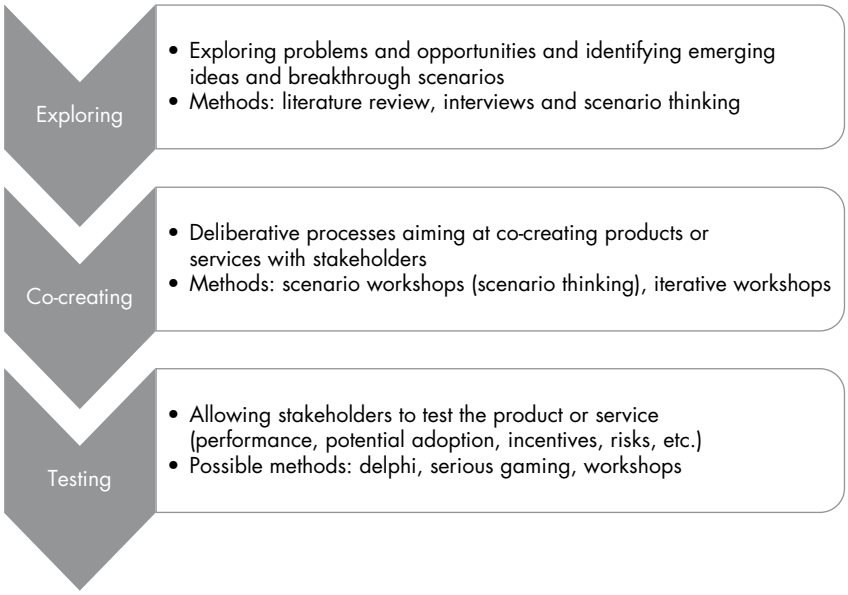

Figure 7.1. The living lab process.

In a nutshell, our testing phase was supported by a Delphi survey submitted to all the key stakeholders that were involved in the previous research steps of the DIGI4FED project (including the living lab workshops). The Delphi method is a social research technique that relies on a multi-round survey process to obtain positions on a topic of interest from a panel of experts (Brady, 2015; Landeta, 2006; Linstone and Turoff, 1975). By eliciting such positions, the goal is to determine the level of consensus or dissensus among experts regarding a topic of interest. In view of testing our model, we took inspiration from various approaches (such as design science research and public policy evaluation) to develop a list of ten evaluation criteria. To assess the general validity of the model, we used some wide-ranging criteria, such as the model's overall simplicity, consistency, and suitability. Some more refined criteria were also used to assess specific aspects of the model, such as the efficacy and consistency of specific design solutions in day-to-day practice.

To exemplify how participatory innovation can support public sector innovation, we will focus on the exploration and co-creation phases of the living lab process. The following section describes scenario thinking while the subsequent sections provide insights on the exploration and co-creation phases.

7.4.5 Scenario thinking as a support for the exploration and co-creation phases

As mentioned in the previous section, the exploration and co-creation phases rely on scenarios thinking. As Cairns and Wright (2018: 1-2) point out:

> Scenario thinking offers a way for individuals and groups to face up to the threats and opportunities of the future and to their potential impact upon the organisation or community. As a decision-maker in this sort of situation, you may not fully understand the complexities and ambiguities that the future may hold.

Scenario thinking provides room for debate and convergence of multiple viewpoints of the future of an issue, by challenging the business-as-usual thinking (Cairns and Wright, 2018). As the future is uncertain, it helps to consider a broader range of possible and plausible futures and to think creatively about them (Bishop *et al.*, 2007). Specifically, scenarios are a heuristic tool for one to think differently about the future(s), considering the future as an open but not empty space (Adam and Groves, 2007). They often take the form of narratives or future images that are consistent and plausibly possible (Spaniol and Rowland, 2019).

Such scenarios (and, more broadly, foresight methods) can fulfil multiple objectives: they can support decision-making, directly or conceptually, by building anticipatory knowledge about futures (Fobé and Brans, 2012). They can also provide information to decision-makers and help translate it within a particular policy (Havas *et al.*, 2010) while they also help to position some issues higher on the political agenda (Van der Steen and Van Twist, 2012). In addition, such a scenario approach allows a broad participation of stakeholders in the formulation of a public policy, potentially facilitating policy implementation (Havas *et al.*, 2010; Van der Steen and Van Twist, 2012). It thus helps build a network of stakeholders (Koschatzky, 2005), fosters organisational learning (Bootz, 2010), and facilitates the identification of barriers and obstacles to a particular vision (European Commission, 2009).

As Cairns and Wright (2018: 50-51) point out:

> Scenario stories in isolation serve no purpose per se. While some approaches to scenarios work place an emphasis on the scenario stories themselves as narratives of some 'real world' futures, we see them as providing primarily a better understanding of, and a broader range of perspectives on the present.

In sum, both the scenario process and its outcome are key features of the living lab approach we designed, in that they allow the focus to be on the experience of participants in (future) real-life settings.

7.5 Exploring big data, artificial intelligence and blockchain futures in public organisations

The exploration phase is the starting point of a living lab process; it aims at engaging stakeholders in the living lab and to providing insights to feed into the co-creation phase. In DIGI4FED, this phase was also used to build a set of four future scenarios.

7.5.1 Engaging with stakeholders

First, stakeholder engagement is vital for any living lab processes and must start as early as possible. Early engagement favours the opening of new research avenues and of emerging and creative ideas while it also incentivises these stakeholders to take part in later activities organised in the co-creation phase. More than a research activity per se, engaging with stakeholders is a mind-set, geared towards collaboration with multiple potential stakeholders.

In this regard, early engagement with stakeholders supports the development of scenarios by taking on board insights from various public and private stakeholders. They can be combined to try 'to think out of the box' for the mid-term and longer-term future. In DIGI4FED, we mostly relied on the follow-up committee meetings to discuss and test specific ideas and on semi-structured interviews to engage with users and stakeholders. This approach placed them early in the process and helped us to better define and refine the extent and the range of our research process.

This 'engagement' mind-set also oriented the scenario-building process of this exploration phase (see below).

7.5.2 Building a first set of scenarios

Several steps can be taken to build a set of future scenarios: clarifying the role of scenarios in the living lab process, eliciting information in order to build scenarios, and the building of the scenarios per se.

7.5.3 Clarifying the role of scenarios

Building scenarios is no easy task. As previously said, it is not possible to predict the future and scenarios must be aimed at broadening the range of thinking among stakeholders and living lab participants, thereby fostering innovation.

In that regard, scenarios are clearly built towards a specific goal, that is supporting the process of identifying conditions, problems, and opportunities to be addressed in building the open governance model, through the living lab process. In other words, scenarios must be built as cognitive tools that spur debate and exchanges within the living lab process. As said before, scenarios are not an end but a means to reach this objective of opening the debate.

In the DIGI4FED context, the choice has been made to develop scenarios in the exploration phase, rather than in the co-creation phase, for practical reasons. As we needed to bring 'time-poor, senior stakeholders' in the living lab process to ensure its relevance, designing scenarios *ex ante* favours the organisation of short and intense workshops (Cairns and Wright, 2018).

7.5.4 Eliciting information to build scenarios

There are many methods and techniques to build scenarios (Bishop *et al.*, 2007). For example, their starting point can be an individual judgement, dominant trends, particular logics, uncertainties, specific end-states, potential future events or system models. Depending on these different starting points, both the process and the products of scenario development can vary, for instance going from a trend-based (or baseline) single scenario to multiple scenarios or to alternative end-states. In this regard, techniques like visualisation, probability trees, backcasting, cross-impact analysis and modelling are often cited.

In DIGI4FED, we built scenarios on the intuitive logic tradition, also called the matrix approach, that leads to the definition of four scenarios based on the combination of two very impactful and two very uncertain external macro factors (Bishop *et al.*, 2007; Bradfield *et al.*, 2005; Cairns and Wright, 2018).

In order to identify these external macro factors, we relied on several methods: literature review, interviews, and brainstorming within the DIGI4FED research group. We also relied on research notes written by other members of the DIGI4FED team on the subject matter.

First, the literature review, which included both academic and grey literature,[1] had two objectives: it aimed at identifying, broadly, the driving forces of change regarding technology, public (digital) management and public policy, and at detecting possible use cases to feed into scenario narratives. The literature review also helped to prepare the semi-structured interviews (see below). It led to identifying particular driving forces such as skills and competences, organisational culture, politico-administrative support, socio-technical infrastructures (both software and hardware) and the legislation concerning, for instance, privacy rights and collaboration framework. It also highlighted the necessity to consider multiple levels of change (individual, organisational, policy and international), and it finally helped in identifying relevant use cases from other countries and contexts.

The (grey) literature review also supported the mapping of the key actors within the two policy domains, to build a rigorous multidisciplinary view regarding each policy, notably in terms of political and administrative policymaking, knowledge production and use, as well as legal issues and organisational, cultural and institutional matters. Such contextual knowledge is essential to be able to genuinely engage with stakeholders when meeting them.

[1] Grey literature includes in this case government/public institutions communication documents, such as political orientation notes and parliamentary debates, as well as documentation written by major technology providers, such as SAS, IBM and Microsoft.

Second, semi-structured interviews were conducted among stakeholders. These interviews aimed, among other project-related objectives, at identifying drivers of change regarding technology, public (digital) management and public policy, and at eliciting future visions leading up to 2030. Insight was gained on other topics, such as data management processes, trust-based issues, ethical and legal dimensions (e.g. privacy and control), transparency and public opinion.

Four categories of actors were surveyed: public stakeholders directly involved in the use of data, public stakeholders that are impacted by or have an impact on the use of data in the public sector, private stakeholders and academics. Stakeholders were identified, based on the mapping, in the two policy domains (i.e. the fight against tax fraud and the fight against social security infringement).

In the first category, public stakeholders directly involved in the use of data are the central administration and agencies that collect and/or use data in policy implementation either to fight tax fraud or social security infringements.

The second category is of public organisations that are impacted by such use of data. They can either control the use of data (such as data privacy authorities), support their exchange (such as the crossroad bank for social security which coordinates and controls a decentralised system of data exchange between social security public actors) or be compelled to transfer personal data when specific conditions are met. The latter case notably concerns the financial intelligence processing unit that collects financial data from various sources and can inform the tax inspection service within the central administration.

Private stakeholders, the third category, are actors that are affected in one way or another by the policies that are implemented by actors from the first categories. In a political system like Belgium in which social concertation is central, social partners, representing workers and employers, must be taken into account. Other transversal actors (in terms of policy domain) are technology providers (either big companies or small tech start-ups) and non-governmental organisations active in domains like human rights (including privacy). In addition, each policy domain has its own private stakeholders. For example, in terms of tax policy, stakeholders included social secretariats, business federations in highly monitored sectors (such as construction, food and drinks, and cleaning), information providers (such as banks, accountants and lawyers) and, obviously, potential fraudsters.

Finally, the fourth category is made up of academics who were chosen specifically to elicit their views of the future of BD, AI and BCT, both as technologies and in their projected use in the public sector by 2030.

Among these interviews, future expectations and views about the future of new technologies in government by 2030 were specifically used in identifying the driving forces.

By the end of the exploration phase, almost all the key stakeholders had been involved in talks or interviews, easing their subsequent invitation to the living lab workshops in the co-creation phase.

7.5.5 Building scenarios

As previously mentioned, the process of building scenarios relied on the matrix approach proposed by Cairns and Wright (2018), although slighted adapted to our purpose, as described below.

Theoretically, this approach ...

> ... is focused on development of multiple scenarios that explore the 'limits of possibility' for the future, rather than on the development of singular, 'normative' scenarios of some ideal future to be aspired to.

It is composed of 8 stages: (1) setting the agenda, (2) determining the driving forces, (3) clustering the driving forces, (4) defining the cluster outcomes, (5) determining the key scenarios factors, (6) framing the scenarios, (7) scoping the scenarios and (8) developing the scenarios (Cairns and Wright, 2018). Such a structured process helped to document and provide methodological transparency regarding the way the scenarios were developed. However, researchers must implement such an approach with flexibility, creativity and an open mind to new ideas which could be added at any stage of the process.

In DIGI4FED, we conducted the scenario-building process in the exploration phase within the research team without involving many external actors, as many of these were evolving in a time-limited context. Some phases were therefore reduced or merged with others. It is also important to note that due to the Covid-19 rules, all meetings were conducted online, sometimes using specific facilitation tools such as Mural.

As a matter of fact, setting the agenda (phase 1) was fairly easy: the focal issue was to build scenarios about the future integration of BD, AI and BCT within federal public administrations by 2030. The choice of 2030 was a pragmatic choice, guided by two elements: on the one hand, the time horizon needed to be far enough in advance in order to provide room for multiple visions of the future without being locked into technical and legal considerations; on the other, 2030 is also very close, and allows participants to easily project themselves to less than ten years from now.

The second phase was focused on determining the driving forces. The collected data described in the previous section were systematically analysed in order to identify the insights to be transformed into possible driving forces. Their identification relied on a PESTEL approach, to highlight the political, economic, social, technological, environmental, and legal dimensions. Driving forces can be defined as 'underlying and impacting factors that set the pattern of events and determine outcomes in the business environment and timescale being considered – the forces that make things happen' (Van der Heijden *et al.*, 2006: 202). These driving forces must thus be formulated so as to highlight an uncertain impact without providing information on the orientation of such an impact.

A first proposition of possible driving forces was discussed among the research team, adding new driving forces and reformulating existing ones. This process led to the identification of 74 driving forces. To ensure traceability, all driving forces were systematically referenced in a table, linking them with the source they come from. Examples of such driving forces were:

- Degree of use of new technologies within public administration and degree of international cooperation in policy domains (political driving forces).
- Degree of data availability to develop particular AI and BCT applications, and degree of transparency regarding data, processes and objectives (technological driving forces).
- Extent of R&D funding related to AI and BCT and degree of involvement of the private sector in technology development in public administration (economic driving forces).

All the driving forces were classified according to one of the PESTEL dimensions, in an online interactive manner, that led to such a scheme. The interest of the scheme is not to provide all the driving forces to the reader but rather to illustrate the research process using online facilitation and visualisation tools. Table 7.1 presents the PESTEL dimensions and their associated driving forces.

The driving forces were then clustered (phase 3), based on a preliminary proposition that was discussed within the research group. Such clustering process was based on a chronology analysis, considering which driving forces would lead to an impact that would lead to a change in other driving forces.

In total 8 clusters were defined:

1. political support in using of AI and BCT in public administration;
2. availability of skilled IT profiles for public organisations;
3. trust in public sector using new ICT technologies;
4. technological progress in AI and BCT applications for public sector;
5. Belgian federalisation process;
6. environmental regulation regarding new digital technologies;
7. development, compliance and enforcement of a regulatory framework;
8. solidarity within society.

Similar to the identification process, the Figure 7.2 and 7.3 provide some examples which illustrate the results of the clustering process. The full clustering process results are available as Electronic Supplementary Material.

To provide the reader with an example, we consider the cluster 4 regarding the availability of skilled ICT profiles for public organisation. The establishment of the cluster was inductive, based on a chronology analysis (ordering driving forces based on their influence on subsequent driving forces). We started this process looking at the driving force 2 as we thought it could be a key element of any process. We identified that driving forces 3, 8 and 19 preceded and led to the degree of political financial support towards new technology. Concretely, we hypothesised that a high degree of budgetary constraints, a high degree of risk aversion towards new technologies among politicians, and a low degree of political will to implement new technologies could lead to a low

Table 7.1. Driving forces classification.

PESTEL dimensions	Driving forces
Political driving forces	1. Degree of international cooperation about AI / BCT development; 2. Degree of political support towards new technologies (money); 3. Extent of the Belgian federalisation process; 4. Degree of collaboration between federal / federated entities; 5. Extent of proactive attitude in policy orientations; 6. Degree of use of new technologies (BD, AI, BCT) within PA; 7. Degree of international cooperation in policy domains; 8. Degree of political will to implement new technologies (discourse); 9. Extent of procedures regarding personal judgement in data processes; 10. Extent of transparency in policy orientations; 11. Degree of political support to open data policies; 12. Changing policy orientations in the two policy-domains; 13. Extent of access to public services by citizens / enterprises; 14. Extent of surveillance in policy orientations; 15. Outcome of a national data strategy; 16. Extent of involvement of the state in society; 17. Extent of horizontality between public organisations; 18. Outcome of a particular technology event (scandal / breakthrough); 19. Extent of risk aversion regarding new technologies among politicians; 20. Changing general policy in terms of public management; 21. Extent of international policy diffusion; 22. Degree of populism in politics; 23. Outcome of a particular non-technological event (e.g. terrorism); 24. Extent of harmonisation at the EU level of the internal market; 25. Extent of digital literacy in policy orientations
Environmental driving forces	1. Extent of the interest in environmental consequences of new technologies; 2. Degree of resilience vis-à-vis environmental / health crises; 3. Importance of environmental consequences of new technologies; 4. Extent of new EU energy regulation
Socio-cultural driving forces	1. Degree of public sector legitimacy (trust in public sector) among citizen / stakeholders; 2. Degree of interest in digitalisation among stakeholders; 3. Degree of technological literacy / interest in society; 4. Degree of citizen / stakeholders trust in new technologies; 5. Degree of acceptance of freedom restrictions; 6. Extent of importance of leisure time; 7. Extent of importance of work in life; 8. Outcome of digital divide; 9. Degree of data-led applications acceptance in society; 10. Degree of solidarity within society; 11. Degree of legitimacy of public management ideas in society; 12. Distribution of IT / data science skills between public and private sectors; 13. Extent of privacy consciousness

Table 7.1. Continued.

Technological driving forces	1. Degree of security of technologies vis-à-vis hacking and leaks; 2. Degree of data availability to develop particular AI and BCT applications; 3. Degree of transparency regarding data, processes and objectives; 4. Extent of algorithm transparency; 5. Degree of data sharing between public organisations; 6. Degree of sovereignty on software; 7. Degree of digital sovereignty at federal level; 8. Degree of interoperability of data; 9. Degree of data quality; 10. Extent of human decision-making in processes; 11. Extent of access for citizens / businesses to fraud analytics report; 12. Degree of diversity in teams developing technologies; 13. Degree of sovereignty on data; 14. Degree of sovereignty on hardware; 15. Degree of interoperability of technologies; 16. Extent of process explainability; 17. Extent of biases in algorithms; 18. Degree of development of EBSI; 19. Degree of AI technology development; 20. Degree of development of analytics as a service
Economic driving forces	1. Extent of R&D funding related to AI & BCT; 2. Degree of involvement of the private sector in technology development in PA; 3. Degree of budgetary constraints for public organisations; 4. Importance of competition in tech markets (monopoly, oligopoly, etc.); 5. Extent of international competition (with China & USA); 6. Degree of private sector involvement in public sector; 7. Degree of start-ups involvement / inclusion in public sector; 8. Number of tech profiles graduating per year; 9. Extent of brain drain in IT; 10. Distribution of wealth among society
Legal driving forces	1. Degree of regulation towards private actors providing new technologies; 2. Extent of legal development regarding data sharing among public and private organisations; 3. Degree of legal enforcement of current rules (e.g. GDPR, ECHR, administrative law principles); 4. Extent of policy-specific regulation regarding new technologies (e.g. fiscal policy, social policy); 5. Degree of change in public procurement rules; 6. Degree of integration between digital practices and legislation; 7. Degree of horizontal regulation regarding new technologies within public sector; 8. Degree of compliance with legislation within society; 9. Outcome of standards development; 10. Extent of new self-sovereign identity regulation; 11. Extent of ethical clause regulation for public procurement; 12. Extent of innovation process regulation for public regulation

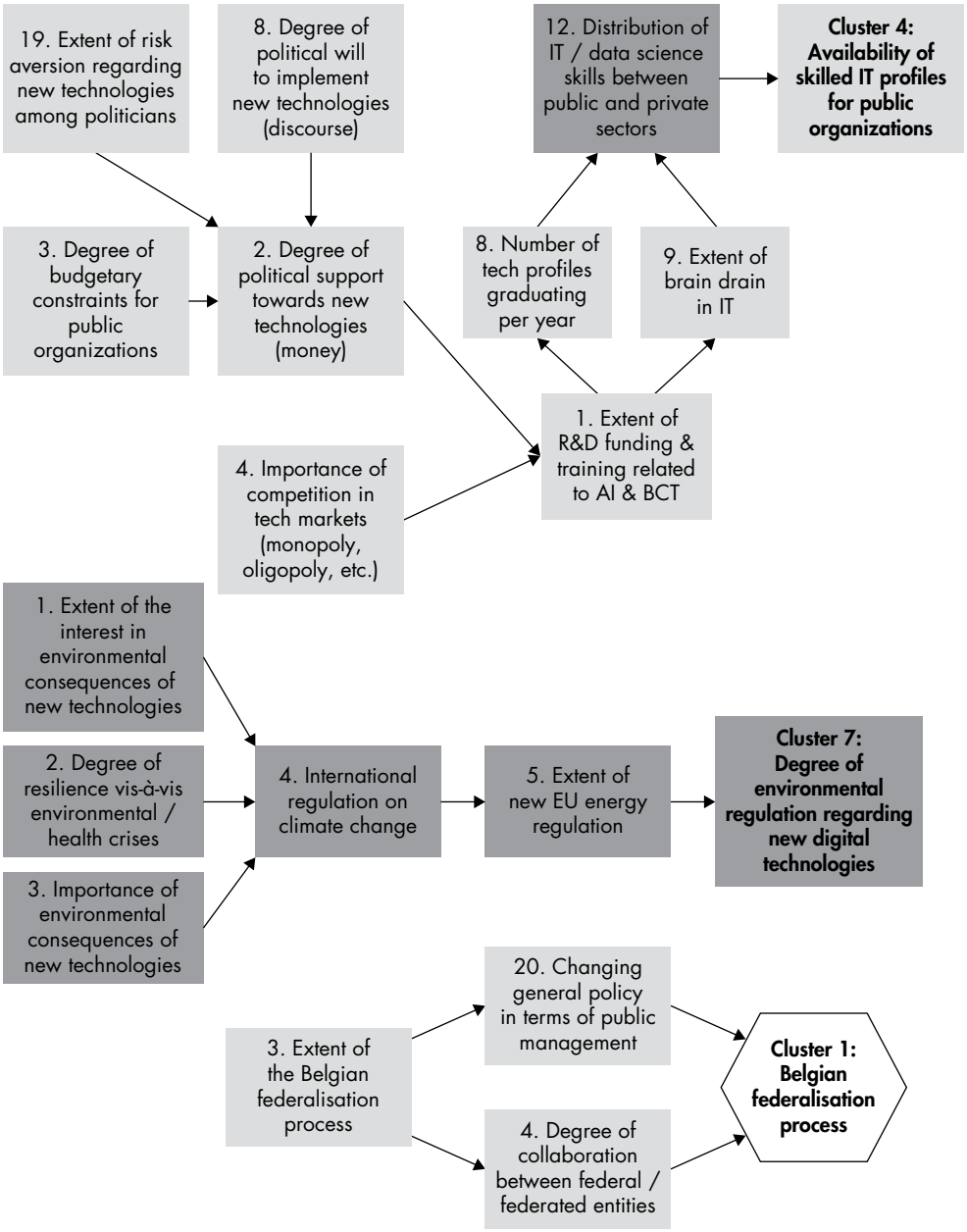

Figure 7.2. Results of the clustering process (examples of clusters 1, 4, and 7).

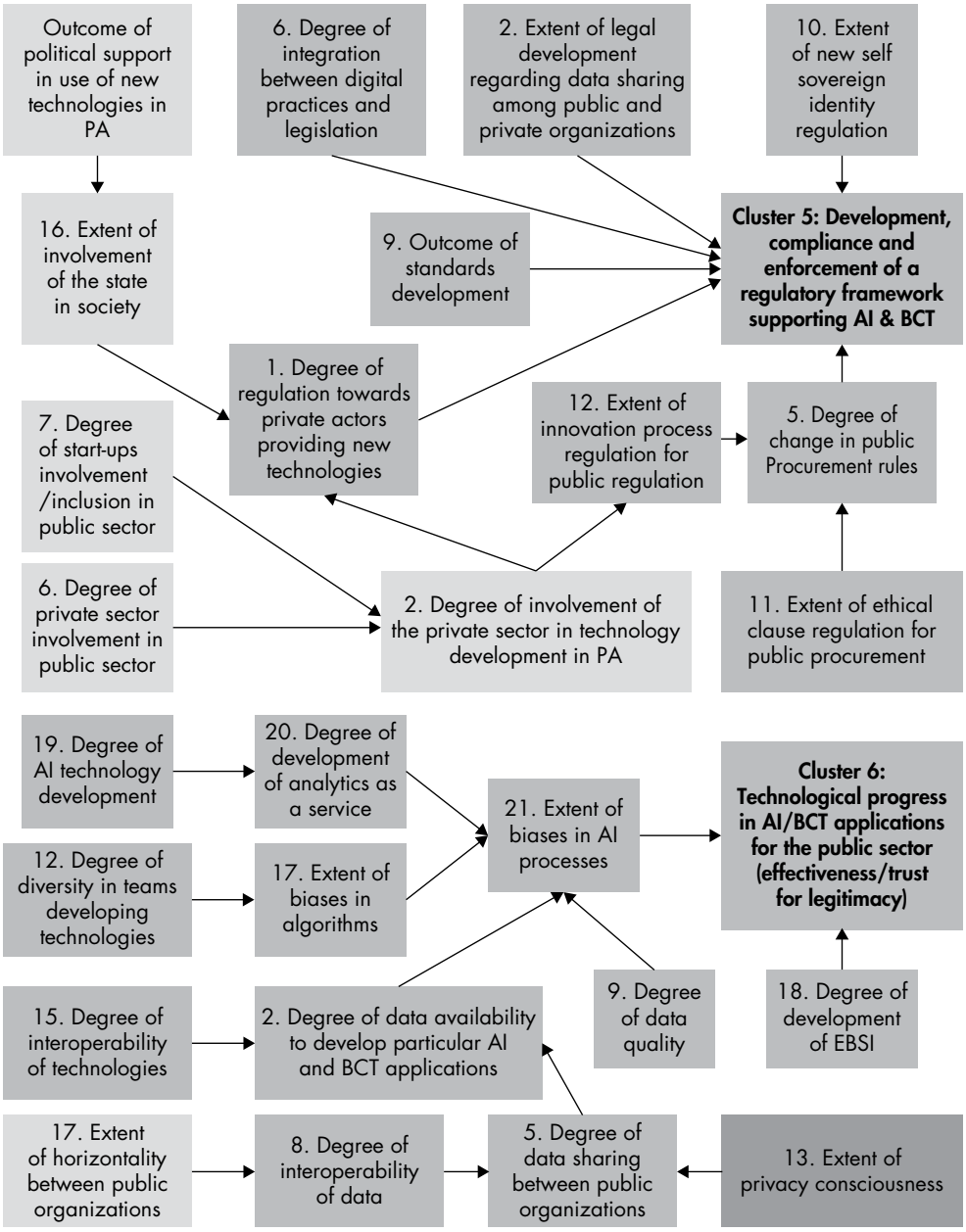

Figure 7.3. Results of the clustering process (examples of clusters 5 and 6).

degree of political financial support towards new technologies. The latter, and the importance of competition on tech markets (driving force 4) influence the extent of R&D funding and training related to AI and BCT.

In this regard, it is important to underline that establishing clusters was a collective endeavour during which researchers discussed the relevance of each relation between driving forces. Another team of researchers with a different background could have reached another clustering outcome. In scenario thinking, this is not an issue as long as the process is consistent and leads to distinctive scenarios.

In our process, while we discussed the possible clustering outcomes, we did not systematically assign two extreme outcomes to each of them (as phase 4 required). This decision was mostly guided by two considerations. First, the discussion did not lead us to identify one single axe of impact for each of these factors, which were highly multidimensional. Second, and more pragmatically, such an identification, although possible, was highly time-consuming. This is, however, not to say that this phase is not important, as it could be for other processes, but it was of lesser interest in our approach.

In a subsequent brainstorming session (phase 5), these clusters were then discussed in regard to the importance of their uncertainty and of their impact on the subject matter (i.e. the integration of BD, AI and BCT in federal public organisations). Concretely, an uncertainty-impact matrix was drawn, with two axes: one going from low to high degree of impact and another from low to high degree of uncertainty (Figure 7.4). The impact axis concerns the importance of the impact of the cluster on the subject matter, and disregards the direction of this impact. The uncertainty axis focuses on the uncertainty about the nature of the impact that was previously discussed. Each cluster was thus discussed along these lines to identify the most impactful and most uncertain clusters (placed in the upper right quadrant): political support in using AI and BCT in public organisations, and trust in public sector using new technologies. These were therefore chosen as the scenario macro-factors.

To exemplify this process, we consider the position of cluster 2 (political support in the use of new technologies in public administration). During the brainstorming session, we considered that this cluster has a high impact on the development of new digital technologies in government. Indeed, government and political actors are the main decision-makers regarding this topic. Concretely, by 2030, elected politicians could decide to support – or not – the development of such technologies. They could support them in providing financial support and in offering specific conditions for private companies to invest in them. Conversely, they could limit their development by adopting a conservative or prudent approach to new technologies or by supporting low-technologies principles. Similarly, we considered that the nature of the impact of such a cluster was uncertain by 2030 as no clear action had been taken at the time by political actors regarding this topic.

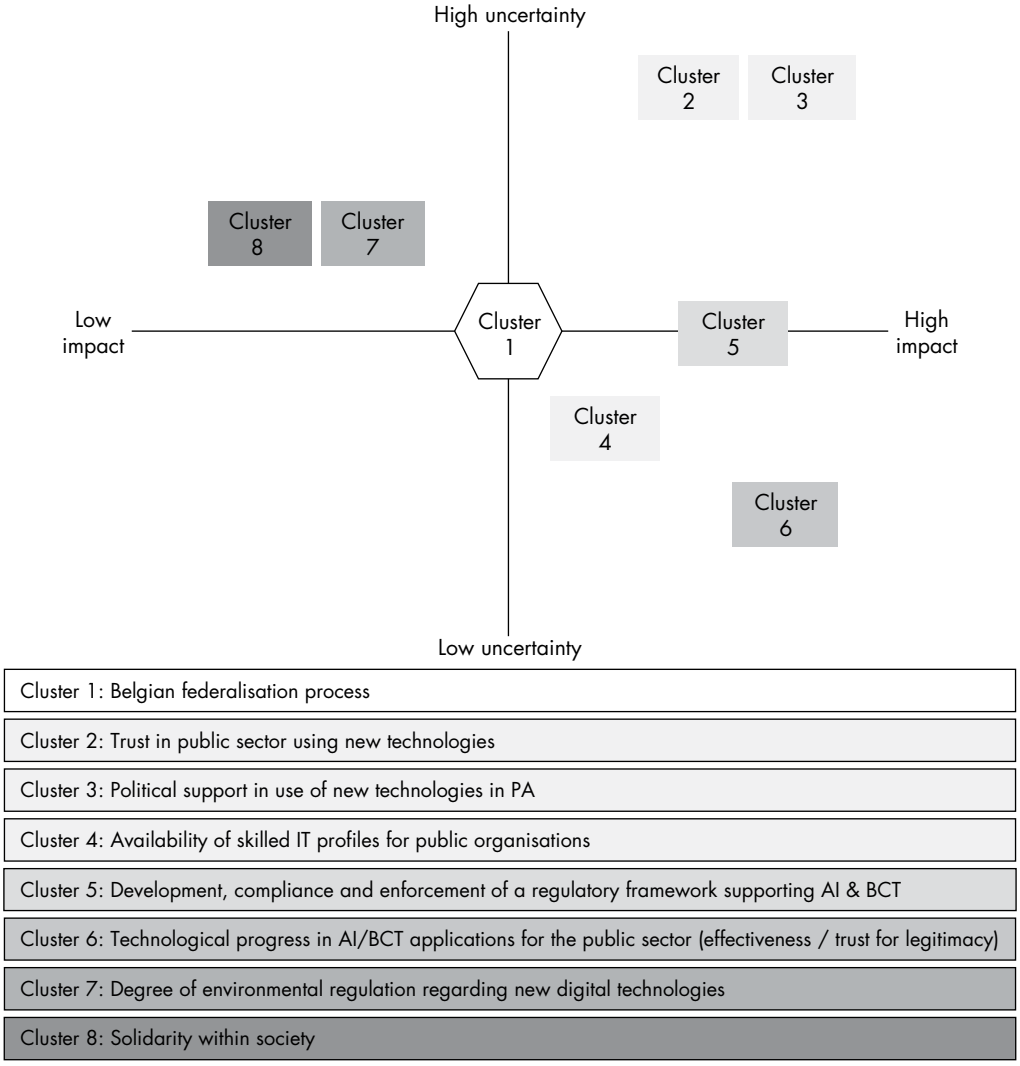

Figure 7.4. Uncertainty-impact matrix.

The stages 6 and 7 (framing and scoping the scenarios) were combined and conducted by a limited number of members of the research team, identifying the extreme outcomes for both macro-factors and building a set of descriptors for each scenario. The issues that were considered as descriptors in each scenario were identified from the previously collected data and from the multiple driving forces. Each scenario was also named and given a particular orientation. A tentative version was discussed and amended on multiple occasions, among the research team, in research seminars and in the follow-up committee of the project. It led to a final set of four scenarios (Figure 7.5).

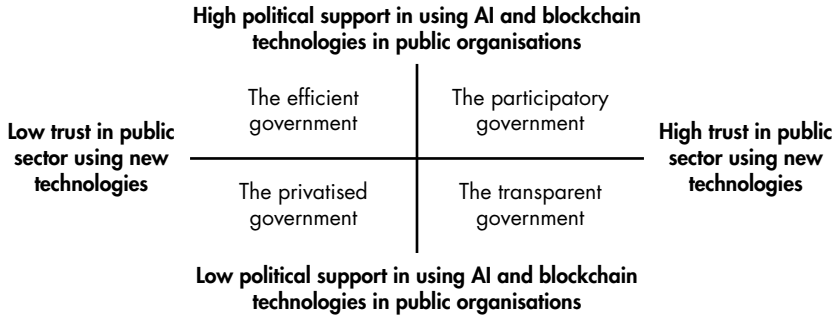

Figure 7.5. The four scenarios.

For each of these scenarios, a set of descriptors was agreed on. Table 7.2 illustrates some of the descriptors.

Table 7.2. Scenario descriptors.

	The efficient government	**The participatory government**	**The privatised government**	**The transparent government**
Political support in using AI and BCT in public organisations	High through major R&D funding towards private actors to develop these technologies	High with several public initiatives towards these technologies	Low, with the use of AI / BCT being low on the agenda	Low, with focus on open data and controllable technologies and rule-based algorithms
Trust in public sector using new technologies	Low among parts of the population	High through participatory deliberation	Low, as outsourcing has decreased technological expertise in the public sector	High, due to clear political orientations in using technologies in policy (security and transparency)
Public private relationships regarding technologies	Strong partnership with private actors as technology providers	Co-creation and participation with high public expertise	High presence of private actors in policy implementation	Public regulation vis-à-vis private actors to support open data and open source applications
Impact on policy	High efficiency and budget increases but opacity of algorithms and privacy issues	High legitimacy but time-consuming and costly processes	Outsourcing of implementation, with high financial returns but less control and socio-economic disparities	Continuity of current processes with a crossroad bank for policy

The first scenario was coined as the efficient government. It is characterised by a high political support for the use of AI and BCT in public organisations – which translates into generous funding allocated to private actors for the development of these technologies – as well as a strong partnership between private technology providers and the public sector. However, there is low trust in the public sector when using these technologies among citizens. Overall, the policy output of this scenario is characterised by a high efficiency due to budget increases in favour of these new technologies, but at a high cost for transparency and the privacy of data.

The second scenario was defined as the participatory government. This scenario is again characterised by a high political support for the use AI and BCT in public organisations – which translates into several public initiatives in favour of these technologies – as well as high levels of trust in the public sector using these technologies. The partnership between private and public actors is based on co-creation and participation with high public expertise. In this configuration, the policy impact is characterised by a high legitimacy of the technological choices and outcomes but these result from time-consuming and costly processes.

The third scenario was defined as the privatised government. It is characterised by a low political support for the use of AI and BCT in public organisations as well as low levels of trust in the public sector using new technologies because of its limited technical expertise. Private actors are highly involved in policy implementation due to a widespread use of outsourcing. Overall, the policy output of this scenario is characterised by low control over implementation (due to outsourcing), high financial returns, and important socio-economic disparities.

The fourth scenario was coined as the transparent government. This scenario is characterised by a low political support for the use of AI and BCT in public organisations and a strong regulation of private technology providers. This translates into a technological focus on open data, controllable technologies, and rule-based algorithms. This scenario is also associated with high levels of trust, due to a clear political commitment in favour of security and transparency regarding the use of technologies in policy. Overall, the policy output of this scenario is characterised by a continuation of current processes with a crossroad bank for policy.

Finally, based on the chosen descriptors for each of those scenarios, four narratives were developed, in the form of a very short story illustrating the lives of two characters per scenarios (8 in total). These narratives were storylines that included some specific key events and explained the context in 2030 and some of its implications to policies against tax fraud and social security infringements. They are internally consistent to enhance the capacity of participants to be immersed in them. They are also externally consistent, as each of them represents a specific and differentiated future that could happen. These scenarios are thus possibilities; they are neither determining the future, nor the way participants should see it (although one can see them as performative). The following script describes the narrative that was developed for the first scenario (the efficient government):

Sophie is heading the R&D AI grant programme for the federal government. In the aftermath of the COVID crisis and building on the TECH4GOV coalition, a major public private partnership has been set up to develop data technologies. The federal government has massively funded tech providers and start-ups to build AI applications for policy. A couple of weeks ago, Sophie's programme was put forward in the media, as the newly developed fraud detection application has strongly increased federal tax revenues. The fight against tax fraud has never been higher on the agenda, and the massive use of public and private databases for policy has led to major efficiency gains and budget increase.

However, such efficiency gains are not seen in a good light by everyone as they could come at the expense of transparency and privacy rights. Jan is highly critical of these policy orientations. His family, as many others, believes they were wrongfully declined social benefits through what they considered as opaque and discriminatory algorithms. That's why he recently signed the petition against the project of the government to implement data processing technologies from a major tech provider, as he fears a lack of transparency and is not confident his right to privacy will be respected.

A similar process was used for the second, third, and fourth scenarios. These four scenario narratives were translated into short, animated motion design videos whose goal was to support the first set of workshops.[2]

7.6 Co-creating through scenario workshops

As the second phase, the co-creation phase is mainly built around scenarios workshops. To make these workshops a reality, several aspects needed to be taken into account: designing the workshops protocol (1), selecting and inviting participants (2), choosing a location (3) and finally facilitating these workshops (4). These four sections mainly rely on our DIGI4FED experience.

7.6.1 Designing the workshop protocol

The co-creation phase mainly relied on two successive sets of workshops. These were supported by the four scenarios narratives built in the exploration phase (first set of workshops) as well as the results of an analysis of the first set of workshops (second set of workshops).

Designing the two scenario workshops

First, two workshops were designed in which scenarios served as the basis of discussions, to engage participants with a plurality of possible futures and to broaden their perspectives to include a wider set than currently existing ones (Cairns and Wright, 2018). We organised two workshops to distinguish between actors from the social fraud domain and those from the tax fraud domain. The

[2] The video can be accessed on the Cité research department website of Liege University: https://www.cite.uliege.be/cms/c_7331132/fr/des-scenarios-pour-penser-le-futur-des-nouvelles-technologies-dans-les-organisations-publiques.

objective of this first set of workshops was to elicit future expectations (including opportunities and risks) of participants regarding a model of governance aiming at integrating BD, AI and BCT in federal public organisations.

These two *scenario* workshops were designed to fit into a 4-hour period, in a physical setting (see below for the location). The protocol was designed to maximise speech time for participants, combining a plenary approach to subgroup discussions. As Belgian federal public organisations work in both Dutch and French, no constraints were imposed regarding the choice of a language of expression during the workshops. This choice was made to favour free speech from participants in a setting and a language in which they felt the most comfortable. Conceptualisations, complex thoughts, and impressions can be difficult to express and convey with nuance in a language that is less familiar. As such, we followed the advice of Rice and Ezzy (1999), who recommend allowing participants to express their thoughts in their own language.

The production of some visual support material was also arranged to facilitate the presentation of the workshop agenda and objectives to participants. PowerPoint presentations were devised in both French and Dutch versions to ensure participants' best possible comprehension. The animation video presenting the four scenarios was recorded in English with subtitles.

These first two workshops were audio-recorded; the recordings were transcribed and thematically analysed to highlight several issues around which to build the design of the third workshop. The idea was to identify the key issues, or *challenges*, that could possibly hinder the integration of BD, AI and BCT in federal public organisations.

Designing the solution-oriented workshop

The second set of workshops was based on these problems to be solved. In other words, the third workshop was designed to provide participants with feedback on the analysis of the scenario workshops. The analysis results (i.e. the identified challenges) served as a groundwork to elicit solutions to these challenges.

Contrary to the first two workshops, we organised a single workshop combining both policy domains. This change in design was decided following the first two workshops after seeing the enthusiasm of the actors to share their insights and experiences with colleagues they had never met before. Furthermore, the subsequent thematic analysis of the two scenario workshops revealed that the main issues voiced by participants regarding the integration of AI, BD, and BCT in the fight against tax fraud and social security infringements tended to converge across policy sectors. Similar macro-categories of themes were highlighted across workshops, such as 'Articulating the IT architecture with the legislation'; 'Data integration and coordination'; 'Balancing transparency, control and accountability'; or 'Resources (data expertise, funding, etc.)' of administrations. In that regard, grouping the stakeholders of two policy domains that are intertwined in some ways (both technically and in terms of content) made sense for the third workshop.

This third, solution-oriented, workshop was also designed to be held in a physical setting and for a duration of 4 hours. Again, we chose to allow participants to express themselves in their own respective languages (either Dutch or French). As for the first two workshops, we devised some visual support material to present the workshop agenda and objectives to participants. An additional presentation was prepared to share the main results of the scenario workshops (the ten challenges) to participants. The third workshop was also audio recorded with the consent of participants. These recordings were then transcribed to facilitate the implementation of a thematic analysis.

7.6.2 Selecting and inviting participants

The previously mentioned stakeholders mapping and interviews were key phases in the identification, selection, and invitation of participants. The different choices were made to generate heterogeneity within each policy domain group, fostering the expression of a plurality of points of view. The selection of participants was made based on several criteria: the institutional affiliation of the participant to one of the identified stakeholders, his/her expertise with some aspects of the policy domain, his/her interest in the topic and his/her level of seniority. For this latter aspect, we mostly targeted participants who were not in a senior management position. This choice was guided by our need to get specific insights from operational civil servants while reducing any dominance effect within the group.

Once selected, participants were invited by e-mails in their mother tongue, as they could speak either Dutch or French. Upon confirmation of their participation, they also received a second e-mail providing them with more information on the agenda of the workshops. When a participant declined to participate, he/she was asked to refer another member of his/her organisation when possible.

The first two workshops respectively gathered ten participants around the fight against social fraud and nine participants discussing tax fraud. Participants were civil servants from the policy domain or from a peripheral institution or service providers to public organisations.

The third workshop gathered 16 participants, most of whom had already participated in the two previous workshop instalments. Participants were evenly distributed between those involved in the fight against social fraud and those involved in the fight against social security infringements.

7.6.3 Choosing a location

A living lab is, often, a physical space, in which actors can meet and discuss, also informally (although lately, more and more living labs have taken place in a virtual way, also due to the COVID-19 pandemic). Also, it is important to choose a place in which participants feel free to express their opinions and share their experience. A rather neutral setting, especially with

politically sensitive topics, is thus an element to consider. Pragmatically, choosing a central location for participants is also recommended, as well as considering logistical elements (drinks and food, seating, availability, geographical location).

In the context of the DIGI4FED project (which was mostly conducted during 2020 and 2021 in a pandemic context), we had delayed the organisation of the living lab to make sure it could take place in a physical setting, while strongly ensuring and enforcing all Covid-safe rules and recommendations. The workshops took place in the building of one of the federal public organisations, using two rooms with seats separated by Plexiglas and people were wearing masks.

The chosen location was also very close to public transport, in a central neighbourhood in Brussels, facilitating access for participants mostly working in the city.

7.6.4 Facilitating workshops

Facilitating the two scenario workshops

For the first set of workshops, a team of five people was set up to facilitate the debates and support the process; it was composed of two facilitators, two note-takers and one logistical focal point in charge of welcoming and guiding participants in the building, as well as organising the post-meeting meal.

The role of the two facilitators was to mediate the debates between the different actors, taking care that everyone received a relatively similar speech time and that no voice went unheard. The role of the facilitator is also to make links between previous assertions of one or several participants and to rephrase arguments so as to be sure that they are clearly understood by every participant around the table.

The role of the note-takers was to write down the main topics that were discussed and to summarise them for further use (see below).

A first short plenary moment was organised to welcome participants, to introduce the research and the day and to present them with the four scenarios via the 7-minute video clip. In that regard, many participants underlined that the video clip was dense, as we had foreseen. Participants were then divided into two subgroups. In each group, they watched the video clip a second time with a specific request: they were asked to identify the three most desirable and the three least desirable dimensions in any scenario, keeping in mind their own position and experience of the topic. This was aimed at focussing the debates on the content of the scenarios rather than on discussion of the way they were set up, thus keeping the use of scenarios as a tool to stimulate the debate. Therefore, it was very important in the facilitation process to keep the discussion focused on why, and due to which aspects, people were discarding one scenario or another.

From then, each subgroup started a discussion on the topics and issues participants wanted to raise. It appeared that each group had similar issues to highlight (policy efficiency, data privacy, type and maturity of technologies, operationalisation and issues related to the policy itself). However, participants reacted differently to the video clip. In one group, they referred a lot to scenarios, while they did not in the other, although they still referred to issues that were discussed in the video clip. We consider this can be related to the facilitation process that made more emphasis on scenarios in one group than in the other.

These subgroup discussions lasted for more than an hour before participants were asked to join back to the plenary session. During this plenary session, the two note-takers presented the main insights from each group and there was a larger debate about them. This part really helped participants to form a group to further discuss some of the issues that had been raised. It also highlighted some new issues, such as strategic and budgetary dimensions of integrating new digital technologies in public organisations.

The first two workshops were closed with a lunch, during which the research team and the participants informally discussed additional issues, notably in regard to specific institutions.

Facilitating the solution-oriented workshop

The third workshop was supervised by a team of 6 people in charge of facilitating the debates and contributing to the workshop process. The team consisted of three facilitators, one note taker, and two logistical assistants. As in the previous workshops, the three facilitators were entrusted with mediating the debates between stakeholders and making sure that every participant had the opportunity to intervene. Facilitators were also expected to present the workshop objectives and the material that would serve as the groundwork for discussions among stakeholders (i.e. the challenges that were identified via the analysis of the scenario workshops). The note-taker was to write down, summarise, and organise the main topics of discussion, thus helping facilitators in the process and producing material for future use.

The solution-oriented workshop activities were divided into three main successive steps. The first phase started with a brief general introduction presenting the DIGI4FED project, the workshop participants, and the day's agenda and objectives. Then, the facilitators invited participants to react to a 15-minute-long presentation on the key challenges that were highlighted by the analysis of the two previous scenario workshops. Participants were invited to formulate specific solutions to the challenges they deemed the most accessible and the easiest to solve. The discussions among participants regarding the details, the usefulness, and the relevance of the proposed solutions were moderated by facilitators. During this process, the most complex challenges were also identified by the facilitators and the note-taker. These challenges, for which no clear solution was reached, were left for further discussion later during the ulterior steps of the workshop. This first phase lasted approximatively one hour.

During the second phase, the facilitators invited participants to briefly discuss the challenges to which no obvious solutions were found during the previous phase. To that end, participants were split into three subgroups, each assisted by a facilitator. When arranging the subgroups, the facilitators made sure to get a proper equilibrium regarding subgroup participants' profiles (generalist or technical expertise) and sector affiliation (social security or taxation and public or private organisations). During the 30 minute long debates, the facilitators' role was to assist the discussions and ensure that every subgroup participant had the opportunity to express his or her views. These discussions were not audio recorded.

In a third phase, a one hour long plenary discussion was held to share the solutions reached by each subgroup. Participants were also invited to put solutions and challenges onto a timeline in order to elicit priorities for the development of a governance model as envisioned by the DIGI4FED project.

After a concluding note from one of the facilitators, the workshop ended for lunch during which participants interacted with the team of researchers.

7.7 Conclusions and recommendations for participatory innovation within the public sector

The implementation of the exploration and co-creation phases of the living lab process allowed us to reflect on some of the added value and the shortcomings associated with this approach. Hence, we conclude this chapter with some reflections about the value of participatory methods in public sector innovation and, in particular, with regard to the integration of new digital technologies in public administrations. We also formulate some practical and methodological recommendations for future projects and for researchers who would be interested in implementing participatory innovation methods within the public sector.

7.7.1 Using participatory methods in the public sector

Participatory methods and collaborative innovation are gaining increasing legitimacy in the public sector. Specifically, this chapter showed how participatory approaches and more precisely living labs can contribute to supporting the development of new digital technologies in the public sector. Reflecting on the insights provided here, we would like to highlight three key aspects showing how this approach to new digital technology in the public sector offers an added value compared to the more centralised approaches to technology institutionalisation.

First, the exploration phase of the living lab process allowed for the identification of multiple philosophical or ideological points of view regarding new digital technologies, going further than the literature review and document analysis to elicit stakeholders' views on the topic. The systematic analysis of these points of view offered a pluralistic landscape of positions, underlining questions regarding the role of the state, its governance of new technologies and the public-private interactions, its digital sovereignty or the (sometimes relative) importance of data protection.

Such a landscape of positions is rarely made available in a systematic fashion. This proved to be of great value in the process of scenario-building since this landscape of positions provided multiple contrasting visions regarding the future of the new digital technologies in the public sector.

Second, building on scenarios through scenario workshops, the co-creation phase served as a catalyst for debates among stakeholders. This allowed participants to build their knowledge and to use anticipatory knowledge about the futures of new digital technologies in the process. Concretely, the co-creation phase facilitated the identification of ten key challenges to the integration of new digital technologies in public organisations. These ten challenges were clustered into three main categories of challenges: (1) citizens' acceptability of data exploitation; (2) the articulation of data use with regulations; (3) the resources and data expertise within administrations. For instance, the challenges pertaining to the first category include citizens' acceptance of the new anti-fraud tools and the difficulty of preserving citizens' trust. Challenges pertaining to the second category include the interpretation and implementation issues associated with the GDPR, while the third category includes challenges such as the lack of internal expertise and the dependence on external (private) ICT contractors. The co-creation phase also contributed to the collective identification of eleven potential solutions (and their implementation timeline) to address the aforementioned challenges. Among these solutions we can, for example, mention the pooling of resources, expertise and capabilities of administrations; the privileging of EU (or national) ICT contractors; and the rethinking of regulations by actively integrating ICT tools and data use in their development.

Third, the analysis of the whole living lab process and of the interactions between stakeholders also helps to identify the key elements to support the decision-making process. These elements notably include the identification of institutions that are key to leading the digital transformation, the production of groundwork on which policy formulation can take place, the positioning of the issue on the agenda of stakeholders, including public ones, and the establishment of a network of stakeholders interested in new digital technologies in the public sector.

7.7.2 Recommendations for future research

Based on our observations, we propose some theoretical and practical recommendations for future research projects that integrate participatory innovation methods.

Our first observation is that scenario-building is a rather long and time-consuming process. More specifically, the first phase of the living lab process required us to mobilise a vast array of methods and techniques to support the construction of the scenarios. Indeed, we implemented an extensive literature review, a qualitative analysis of semi-structured interview data, and resorted to a matrix approach for scenario-building. Furthermore, this phase requires constant interaction with field actors to elicit and confirm their views regarding the issues at stake. As such, each of the steps leading to scenario-building required a close coordination among the six researchers involved in previous project-related data collection processes (literature review and interviews). Although the obtained scenarios proved fruitful and insightful in driving the co-creation phase workshops, we surmise that this process could have been greatly simplified. For instance, it would have been

possible to considerably reduce the time spent at identifying the key drivers of change by engaging in another set of workshop(s) based on the insights provided by the literature review. This would have considerably shortened the qualitative data collection process as well as its analysis. However, in our case this solution proved impractical due to the COVID-19 restrictions at the time.

A second element is that the living lab process can necessitate a certain amount of flexibility and creativity from part of the involved researchers. For instance, staff changes within the stakeholder organisations led to unforeseen changes among the workshop participants. The team of researchers had to quickly react by finding new participants presenting an adequate profile. Similarly, our choice to combine the two originally planned solution-oriented workshops into one unique workshop was a pragmatic response in view of the results obtained via an analysis of the two previous workshop instalments. Although this choice was carefully debated to make sure that it would not jeopardise the overall project, we still had to opt for this solution in a timely manner. This is why our recommendation for future ventures would be to develop a comprehensive roadmap – or a decision tree – that would probably help researchers to choose between alternate courses of action when addressing contingencies during the multiple steps of the process. This would also be particularly useful in case of change of staff in the research team. However, some issues could not be planned ahead, and flexibility and open-mindedness should be key characteristics of the individual(s) leading the living lab process.

The third aspect to consider is the careful articulation of the various steps that are planned within each phase of the living lab process. From our experience, it appears that some little inconveniences could have been prevented during the co-creation phase. More precisely, the short timeframe that was envisioned between the two sets of workshops left little time for conducting the qualitative analysis that was expected to serve as the groundwork of the solution-oriented workshop. Thus, future participatory innovation projects which consider using a similar articulation of scenario and solution-oriented workshops should make sure to organise workshops in an adequate timeframe. Leaving too much time between workshops poses the risk of losing participants' interest in the process. Alternatively, leaving a shorter timeframe between both sets of workshops contributes to keeping participants invested. However, this shorter timeframe could prove challenging for researchers since they would have to perform a comprehensive analysis of the first set of workshops in a rather short period of time. It is thus necessary to find an equilibrium between the time researchers need to perform their analyses and the time necessary to keep participants invested in the participatory process.

A fourth observation is that designing and organising workshops is a collective endeavour that should preferably be undertaken by a team of researchers. The living lab process is highly demanding in terms of human resources, notably due to the logistics that are involved. For instance, workshop facilitation demands the active participation of three to four researchers. In addition to the facilitators, several other people may be involved for logistical aspects: welcoming and guiding participants; ensuring the adequate recording of debates; providing food and drinks and so on. In short, implementing such participatory processes remains difficult for researchers who are not involved in a collective research program.

Last but not least, the process described in this chapter did not consider the testing phase of a living lab approach. We however recommend envisaging this option. Such a testing phase could be envisioned through several participatory techniques. Two possible options are serious gaming and the Delphi method. First, serious gaming is used across all disciplines (from the humanities and social sciences to computer science). Serious games are distinguishable from classic games, in that their main purpose is not to entertain, although there is still an entertaining, experiential, and emotional sphere in a serious game (Laamarti *et al*., 2014). They are a learning tool aiming at emphasising consequences of actions in reality. This helps participants to project themselves into a second-degree universe in which they can make decisions individually or collectively (Parotte *et al.*, in press). Second, the Delphi method is a structured communication tool that allows for dialogue among a panel of actors (similar to those who participated to the workshops). It facilitates the search for consensus, the documentation of points of dissensus and the co-construction of a shared evaluation of a complex situation while controlling for possible power struggle between participants (Brady, 2015; Landeta, 2006; Turoff, 1970). While the serious game requires face-to-face interactions, Delphi surveys can be organised online which is a positive alternative during, for example, a pandemic.

Supplementary material

Supplementary material can be found online at https://doi.org/10.3920/978-90-8686-930-5_7

Figure S1. Results of the clustering process.

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