8. The design and management of public-private eHealth partnerships

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INTRODUCTION

The public sector faces an urgent need to develop new, innovative services to be able to continue delivering quality services (Sørensen and Torfing, 2011). Resource constraints, pandemics, and climate change are examples of some of the complex problems that call for innovation of public services. However, public actors cannot meet the demand to innovate on their own. Several authors from various fields propose collaboration as a mechanism for creating innovation. Arguments for innovation through collaboration can be found in the increasing complexity of industries and societies (Ketchen, Ireland, and Snow, 2007; Hartley, Sørensen, and Torfing, 2013; Crosby, 't Hart, and Torfing, 2017; Diamond and Vangen, 2017), the added value in developing something together rather than having to do it all individually (Huxham and Vangen, 2005; Leydesdorff and Cooke, 2006; Bryson, Ackerman, and Eden, 2016), the easy access to relevant knowledge and other, external sources (Chesbrough and Appleyard, 2007; Dell'Era and Verganti, 2009; Walsh, Lee, and Nagaokab, 2016), and the general fact that innovating internally is both extremely expensive and very risky (Bianchi et al., 2016; Appleyard and Chesbrough, 2017).

These incentives encourage both public and private organizations to develop innovations in collaboration with other organizations. The basic assumption is that collaboration between autonomous organizations has both a stimulating and a protective effect on innovation processes. Collaborative innovation is *stimulating* because it gives organizations access to knowledge and resources, along with all the underlying experiences, perspectives, and insights that were not previously part of the (in-house) innovation process (Davis and Eisenhardt, 2011). Collaborative innovation is *protective* because it shares the costs and

risks of failure (Bruce et al., 1995; Baldwin and von Hippel, 2011; Corsaro, Cantù, and Tunisini, 2012), it shares the burden of solving complex problems (Crosby, 't Hart, and Torfing, 2017), and it creates space for experimentation that would not be tolerated in other circumstances (e.g., highly competitive conditions) (Leydesdorff, 2000; Raven et al., 2011; Markard, Raven, and Truffer, 2012; Hermans et al., 2013).

While a growing number of empirical and theoretical studies focus on innovation in public services through partnerships between public and private organizations (Brogaard, 2021; Hammond et al., 2021; Alonso and Andrews, 2022), little is known about which conditions contribute to the digital transformation of healthcare through public-private innovation. Healthcare is a core human service, where digital transformation has consequences for professionals and citizens alike. Hence, this chapter addresses the following research question: 'Under which conditions do different types of eHealth partnerships lead to innovative service delivery?' The chapter describes four clusters of conditions that may have a stimulating effect on collaborative innovation, namely, (1) the features of the partnership, (2) the features of the involved individuals and organizations, (3) the use of ICT in the collaboration, and (4) the involvement of users in the collaboration. The chapter focuses on innovation in public service delivery (specifically eHealth service delivery) and looks specifically at the conditions that affect the process of collaborative innovation (i.e., no specific attention to *ex ante* or *ex post* conditions).

DIGITAL TRANSFORMATION IN THE HEALTHCARE SECTOR

In recent years, digital transformation has become an important source for innovating services in both the public and private sectors. Digital transformation stimulates organizational efficiency and performance, but also solves complex societal issues and increases citizens' quality of life (Mergel, Edelmann, and Haug, 2019; Vial, 2019). Although digital transformation comes with some dangers, especially in terms of privacy, surveillance, security, and misuse of data (Vial, 2019), it can also have a tremendous effect on citizen's well-being and society's capability to tackle wicked problems.

The healthcare sector is a perfect example of how digital transformation can lead to innovative technologies and practices, which have a direct effect on citizen's well-being. For example, AI-based technologies that use pattern recognition software and big data to identify anomalies are already being employed to detect cancers, which has revolutionized precision oncology (Dlamini et al., 2020). Furthermore, electronic health records, which facilitate the exchange of important health data, enhance the interoperability between databases, on which a lot of digital health services ultimately depend (Kane,

2015; Lehne et al., 2019). Other health technologies are aimed at increasing the well-being of a specific audience. For instance, social robotics are being used for elderly people who suffer from loneliness (Loveys et al., 2019), but also to learn social skills for children with autism (Pennisi et al., 2016). Moreover, digital health technologies assist people in their daily activities, for instance, through telehealth and mobile health apps, devices and wearables (Steinhubl, Muse, and Topol, 2015). For this reason, eHealth is perceived as one of the key priorities of the European Union (European Commission, 2018).

However, the healthcare sector is also very complex and interconnected, in that multiple stakeholders are involved in creating, regulating, financing, and providing health services (e.g., government institutions, non-profit organizations, for-profit organizations, interest groups, and patient organizations). For this reason, digital transformation in the healthcare sector is difficult to achieve without involving a network of public and private actors. Public-private collaborations have valuable properties, which makes them well suited to pursue technological innovation. By collaborating with each other, partners learn from each other, create new ideas, share resources, and can rely on each other to implement new technologies (Sørensen and Torfing, 2011; Torfing, 2019). A recent literature review by Brogaard (2021, p. 145) confirms the importance of collaborative innovation for the healthcare sector, as the large majority of the 170 studies on public-private innovation partnerships covered by the review were conducted in healthcare-related policy fields (i.e., healthcare, eldercare, and social services).

THEORETICAL FRAMEWORK

Figure 8.1 shows our conceptual model. The research in this chapter attempts to identify four clusters of conditions in an extensive set of cases (see 'Research Design'). Before we introduce the clusters, it is important to emphasize that the innovation process itself can be divided into several phases, which are also discussed in this chapter. Different authors use different classifications of these phases, and scholars agree that these phases often overlap and are not easily delineated from each other (Meijer, 2014). However, dividing the innovation process into several phases can be useful for analytical purposes. This chapter bases the innovation process on Damanpour and Schneider's (2008) distinction between the idea generation phase and the idea adoption phase. However, we agree with other authors who include two other phases to the innovation process, one preceding the actual innovation process (i.e., the problem definition), and one connecting the idea generation phase with the idea adoption phase (i.e., the testing phase) (Rogers, 2003; Meijer, 2014). Hence, the innovation process in this chapter is composed of four phases: (1) problem definition, (2) ideation, (3) testing of ideas, and (4) adoption and implementation.

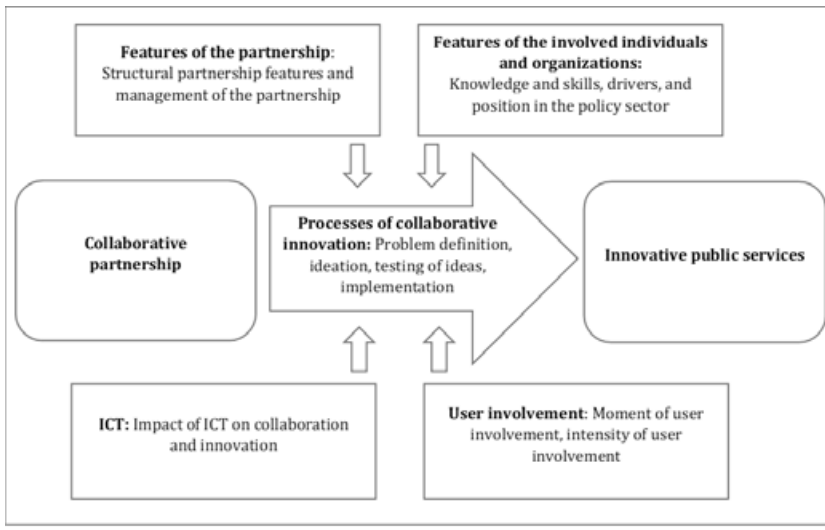

Figure 8.1 Conceptual model

The four clusters of conditions are developed in great detail in Chapter 4, to which we refer for a more extensive elaboration on the theoretical background of these conditions. For this chapter, we consider specific conditions from these four clusters. The first cluster of conditions includes conditions at the partnership level, namely, the *structural features* of the partnership and the used *management*. We look specifically at the size of the partnership, the governance structure of the partnership, and the contract management and network management in the partnership. For the second cluster of conditions, we consider conditions on the level of the involved *individuals and organizations*, which include conditions such as the knowledge and skills of the involved actors, their drivers to engage in the partnerships, and their position in the policy sector. The third cluster of conditions relates to the use of *information and communication technology (ICT)*. We look at two ways in which ICT can influence the collaborative innovation process, that is, through their direct impact on the collaborative dynamics in the partnership and through their impact via the broader national and regional ICT networks. The fourth cluster includes conditions related to *user involvement*, and we focus specifically on the moment of user involvement (i.e., at what stage of the innovation process) and the intensity of user involvement (e.g., informing users or co-creating with users).

RESEARCH DESIGN

An international research team from the European Horizon 2020 TROPICO[2] project collected data from a total of 19 eHealth cases in the period September 2019–February 2020: five cases in Belgium, four in the Netherlands and Spain, and three in Denmark and Estonia. We used purposeful sampling to select cases that represent public-private eHealth partnerships in Europe. Hence, the countries were selected because they represent the two major European healthcare systems (i.e., Etatist Social Health Insurance System and National Health Services, Böhm et al., 2013). In National Health Service systems, the government controls the regulation, finance, and provisioning of healthcare. In Etatist Social Health Insurance systems, regulation is conducted by the government, finance by societal actors (e.g., para-fiscal funds), and the provisioning of services by private actors (non-profit and for-profit actors). Furthermore, as each of these healthcare systems is regulated by the government, the administrative traditions of (continental) Europe were also considered in the selection of the countries (Napoleonic, Nordic, Eastern European, and Continental European, Pollitt and Bouckaert, 2017). The typology makes use of five criteria to distinguish different administrative traditions, that is, the state structure, the executive government, the minister/mandarin relations, the administrative culture, and the diversity of policy advice. Table 8.1 shows the selected cases per country.[3]

The cases were selected based on several criteria. First, all partnerships were collaborations between public actors and private actors. As these public-private collaborations can be coordinated by the public actors or the private actors, two 'types' of collaborations were selected: government-coordinated partnerships and societally coordinated partnerships. These project coordinators hold a special position in the collaboration (Klijn and Koppenjan, 2015), which is the reason why this aspect was considered during the selection of the cases. Second, all partnerships involved a third type of actor, namely, service users. These service users could be citizens and patients, but also health professionals such as GPs, nurses, specialists, etc. Third, two types of eHealth technologies were selected, which represented the most common eHealth innovations: (1) technologies that aimed to innovate the information flows between stakeholders (e.g., digital patient platforms, digital health records, integrated digital processes, etc.), and (2) technologies that aimed to innovate the end product itself (e.g., apps, smart devices, telehealth, mobile health, trackers, etc.) and distinction was made between two types of eHealth projects, namely, projects related to (1) administrative simplification and digitization of data sharing and (2) telehealth, mobile health, and smart devices. All of these innovations were

Table 8.1 Selected cases

Cases		Collaborative eHealth innovations
Belgium Mixed Napoleonic – Etatist Social Health Ins.	B1	National portal website which provides information for all the citizens, created through a collaboration between government agencies, ministerial cabinets, hospital networks, regional governments, private health suppliers, insurance organizations, and user organizations
	B2	Patient information sharing tool for GPs and home care organizations, created through a collaboration between private nursing organizations and federation, ministerial cabinets, national government agencies, hospital networks, individual GPs, and several private health organizations
	B3	A way of creating, validating, and disseminating official evidence-based guidelines for healthcare providers, created through a collaboration between universities, private health organizations, national and regional government agencies, red cross organizations, knowledge organizations, ICT suppliers, and individual health professionals
	B4	Several technologies in a nursing home (wearables, smart cameras, etc.), created through a collaboration between a public nursing home (local government), private construction companies and contractors, consultant companies, nurses, and patients
	B5	Platform which brings people with health/social care demands together with volunteers, created through municipalities, communal network, private hospitals, private ICT companies, consultant companies, citizens, and health professionals
The Netherlands Continental adm. retime Etatist Social Health Ins.	N1	ICT platform which facilitates the exchange of health information between partners and patients, created through the collaboration between a municipality, public hospital, and several private health organizations
	N2	Digital platform designed to foster neighbourhood collaborations between clients and consultants, created through the collaboration between a municipality, private healthcare provider, neighbourhood teams, citizens
	N3	Tracking technologies in a nursing home, created through the collaboration between a semi-private association, software developer, and patient organization
	N4	'Smart diaper' for elderly people, created through the collaboration between a semi-private association, ICT company, consultant company

Cases		Collaborative eHealth innovations
Spain Napoleonic – National Health Service	S1	Electronic prescription system, patient appointment system, robot for automatic storage and dispensing, created through the collaboration between several public hospitals, private ICT companies, several patient organizations, university
	S2	Home health ICT tools for chronic patients, created through the collaboration between a public hospital/health service, regional government, ICT companies, consultancy companies, several other private companies, universities, health professionals and patients
	S3	Web application for computerized cognitive behaviour therapy (CCBT), created through the collaboration between public hospitals and healthcare services, public research institute, private technology centre, several health professionals (e.g., psychiatrist, psychologists, physicians, etc.)
	S4	AI used to diagnose uncooperative patients, created through the collaboration between public hospitals, ICT and telecom companies, physicians
Estonia Eastern European – Etatist Social Health Ins.	E1	Centralized patient registration system, created through a collaboration between the ministry, government agencies and public authorities, ICT companies, public and private healthcare providers, physician associations, hospital associations, individual physicians
	E2	Integration of application processes for rehabilitation, disabilities, aids, created through a collaboration between ministries, public health insurance authority, government agencies, physician association, interest groups
	E3	Voice command app to guide healthcare providers, created through a collaboration between a ministry, public health insurance authority, colleges, network of healthcare providers, ICT companies, several healthcare organizations
Denmark Nordic – National Health Service	D1	E-learning programme regarding dysphagia, created through a collaboration between a regional government, municipalities, public hospitals, ICT company, representatives of health professionals
	D2	Smartphone app for patient reported outcomes, created through a collaboration between a public hospital, ICT company, health professionals
	D3	Smartphone app that helps convey the results of bone scans to patients with osteoporosis, created through a collaboration between a public hospital, university, ICT and health service companies, patient associations, health professionals

implemented, or at least tested, in the last five years before the data collection started.

For the 19 cases, data were collected through interviews and surveys. In total, data from 132 interviews and 124 surveys were collected. Data were collected from project coordinators, public partners, private partners, and users. One research team per country was responsible for collecting the data from the respective cases. To ensure a systematic data analysis, each research team used a standardized questionnaire to collect and report the interview data. Moreover, to retain the necessary contextual information, each country team wrote a detailed summary of each of the cases. These summaries helped to interpret the standardized interview data during the data analysis. To ensure a standardized data analysis, one research team was in charge of the data analysis, but the other researchers provided assistance in case some of the data were unclear or more detailed contextual data were missing. The data analysis was conducted through the use of a data matrix in Excel and NVivo in which all the qualitative data, particularly from the interviews and case study summaries, were coded for each of the conditions mentioned in the theoretical framework. Through this data matrix, a comparison between the cases became possible. Examples from the cases were extracted from the data matrix to provide evidence for the insights that were obtained from the analysis. These examples are used in the next section of the chapter.

RESULTS OF THE COMPARATIVE CASE STUDY

In the following sections, we highlight the results of the comparative case study. We discuss the case evidence that we found for the conditions in our four clusters, that is, the features of the partnership, the features of the involved individuals and organizations, the use of ICT, and the involvement of users in the collaboration. However, we first elaborate on the phases of the collaborative innovation process, to clarify how this process unfolded in the cases. In general, all cases exhibited four, often consecutive, phases: (1) Problem definition, (2) Ideation, (3) Testing of ideas, and (4) Implementation of ideas. Note that aspects of these phases can also occur in other phases. For instance, ideation is still important in the implementation phase of the innovation process, while reflecting on the adoption context (which relates to the implementation phase) is also important during the ideation phase.

Key Features of the Collaborative Innovation Process

Problem definition

Innovation processes often start with a phase of problem awareness and problem definition (Rogers, 2003), which, in collaborative innovation pro-

cesses, are crucial as multiple stakeholders join the innovation process. During this phase, a clear focus on the problem should be established, which is more challenging when stakeholders from multiple backgrounds are brought together. We see this also in our comparative case study. Our cases show that a shared understanding between all the partners is important and that their perceptions regarding the problem need to be aligned. Different strategies were used by the partnerships to align the problem perceptions of the different partners. For instance, in case E1, all of the partners already recognized the scope of the problem, which made the problem definition easier. Conversely, in case S4, the partners signed a contract that explicitly described the objectives of the project, and, hence, aligned the perceptions of all of the partners regarding the problem. In case B2, the problem was raised by the service users, who had created a pilot project in which they tried to address the problem themselves. The users influenced the problem awareness and the problem definition of the project to a large extent.

Ideation

Idea exploration and generation are essential dynamics in every innovation process. In innovation partnerships, these dynamics emerge from the interaction between partners (Sørensen and Torfing, 2011, p. 842). For instance, in case D3, the partners established workshops in order to jointly develop new ideas and address the problem. This eventually led to the creation of a prototype application, from which further technological development could commence. In case S4, new ideas were developed through synergistic interaction between healthcare specialists and ICT experts. Consensus building remained the core of these ideation processes, as the partners refrained from conflicting issues and rather focused on the similarities between each other's ideas. However, the interactions between the partners during the ideation phase can also create tensions. For instance, in case D2, several partners introduced different, sometimes contradictory ideas, which caused tensions between the partners during the conceptual phases of the project. The project coordinator needed to carefully explore and align these different ideas in order to resolve these tensions and extract synergies from these interactions. Similarly, in case N2, the project coordinator made sure that the different ideas were well aligned, and that the partners saw the collaborative synergies that arose out of their interactions.

Testing of ideas

Testing new ideas in a real-life environment is an important step to identifying technological, organizational, and institutional obstacles to the implementation of innovations (Meijer, 2014, p. 202). Testing allows us to collect feedback on the innovation, and rethink, refine, and change the innovation. For instance,

in case E3, the initial application was not properly matched to the working routines of the users, which became clear during the testing phase. The testing phase in case D2 uncovered some of the technological barriers to the application, as the algorithm that was being tested did not differentiate on the proper criteria, and often resulted in wrong predictions. Furthermore, in case B5, the innovators discovered during the testing phase that the use of Internet-of-Things (IoT) technologies compromised the privacy of the users, and in case E1, the testing phase promoted intensive interactions between the partners. However, testing highly advanced technologies should also be supported by proper dialogue with the users. We see in case S4, for instance, that the users were instructed on how to use the innovation and how to provide feedback on their user experience. Furthermore, in case N2, the partners established a roundtable with the involved users in order to guide and inform them properly. Note that the testing phase of the innovation process can also lead to further ideation and does not always result immediately in the implementation of the tested ideas.

Implementation of ideas

Once the innovation is ready for the adoption context, it can be implemented. However, some new barriers may arise in this stage of the innovation process, such as a lack of financial resources, implementation capabilities, or commitment from the partners (Damanpour and Schneider, 2008; Ansell and Torfing, 2014; Meijer, 2014). For instance, in case N3, the partners were highly committed to implementing the innovation, as they strongly believed in the value and benefits of the technologies for the users. In case E1, the partners had invested significant financial resources into the innovation, which allowed them to implement the innovation without any hurdles. In case B1, the partners were encouraged to commit themselves to the implementation of the innovation, as otherwise, they would fall behind their competitors in the market, who were also involved in the partnerships. Furthermore, the support of the users and other stakeholders for the implementation of the innovation proved to be crucial in several cases. For instance, in case N2, an implementation plan was introduced to provide coaching and training to the users of the innovation. In some cases, external assistance in the form of experts or consultants was brought into the project in order to properly implement the innovation. For example, in case N4, the partnerships recruited a change management consultant in order to prepare the users for the new technologies.

Conditions of Collaborative Innovation in eHealth Partnerships

Features of the partnership

Size and governance structure

Partnerships bring together actors with different knowledge, experiences, and perspectives. The synergy between these actors is a crucial advantage of collaborative innovation (Sørensen and Torfing, 2017). Yet too much diversity can also cause tensions and fragmentation. Especially in large networks, actively searching for a good balance between diversity among the partners to stimulate creative processes, on the one hand, and aligning perspectives to generate synergy, on the other, is crucial to strengthen the innovation process (Nissen, Evald, and Clarke, 2014). As Provan and Kenis (2007) argue, larger partnerships benefit from more formal and centralized types of governance structures (e.g., network-administrative organization or lead organization-governed partnerships).

Overall, we see both smaller (e.g., less than ten partners) and larger (e.g., more than ten partners) partnerships in our dataset, which largely depended on the specific task they needed to perform. In general, larger partnerships engaged in innovation processes which affected a lot of stakeholders in the healthcare sector. An example of such a partnership is case B3, which was a partnership with over 20 involved actors. The partnership aimed to counteract fragmentation in the landscape of evidence-based health professions. As a result, several other health professions were also included in the network with the intention of covering the whole field of evidence-based health practice. The large number of stakeholders and their diversity brought many different opinions and interests during the successive collaborations. Since the goal of the collaboration was to avoid fragmentation, the opinions and interests of each stakeholder had to be considered, resulting in a very complex collaboration and innovation process.

The government acted here as an important broker to align the different opinions and interests, by establishing a steering committee that centralized the decision-making authority in the network in order to better coordinate the partnership. This steering committee could push through decisions to encourage more efficient decision-making. However, tensions also arose between the core partners and the steering committee as a result of the establishment of the governance structure. Indeed, not all core partners were structurally involved in the steering committee, which led to a lack of trust by some of the core partners in the decisions of the steering committee.

However, in the majority of cases, a governance structure was not only used to manage or control the partnership but also to promote interaction among stakeholders. In case N1, a ‘director’s table’ was created as part of the gov-

ernance structure to discuss the progress of the project in the involved partner organizations. This strengthened the alignment and trust between the organizations involved. Furthermore, the involvement of key executives ensured rapid and legitimate decision-making, as they were supported by the organizations involved. In case E1, a strategic-oriented steering committee was established to supervise the actions of the project team. Stakeholders from the broader health field, such as patient representatives and health insurance funds, could be involved in the innovation process through this steering committee.

We can conclude that the size and governance structure determine and facilitate the involvement of crucial actors in the process of decision-making in the collaboration. Moreover, the governance structure specifies the different responsibilities and roles of the partners and creates supported routines for decision-making and communication between the different actors in the partnership. However, there are also some pitfalls. A lack of communication between different parts of the governance structure can result in difficult or even parallel decision-making processes and a lack of confidence in the decisions that are made.

Contract management

Formal contracts are a primary way to ensure that goals and roles are clear and aligned between partners. In our analysis, contracts were used for several reasons: to clarify interdependencies and partners' roles, to bring additional knowledge into the partnership, and to avoid conflict by clarifying accountability relationships.

Almost all projects in our cross-case analysis used written contracts. In case B2, the coordinator of the partnership emphasized the importance of the contract between the partners, calling it one of the most important incentives for collaboration. A contract was signed between several regional, but autonomous organizations and the coordinating organization (which was specifically created to connect the regional organizations and coordinate their activities). The contract was important in several ways. First, the contractual ties between the partners ensured their commitment to the project. Second, the contract also ensured the autonomy of the actors in the project, as the contract prescribed that each regional organization could decide to stop collaborating and continue working on the innovation on its own. Third, the contract also guaranteed an influx of important financial resources for the partnership to develop the innovation.

A second reason for using a contract is to bring additional knowledge that originates from an external party into the partnership. In case B4, a tender process was initiated to find a private partner to build a new residential care centre. The tender process made the expectations of the public organization clear for potential candidates. In addition, after contract closure, additional

contracts were drafted that clarified the relationships between certain partners. For example, some partners contracted with each other to ensure the desired mutual accountability and prevent future disputes. In addition, the procurement contract provided a clear accountability relationship between the contractors. However, the innovation process also remained quite exploratory, partly due to the presence of a 'proof of concept' (PoC) in which different stakeholders could test the technological innovations and advise the project partners on these innovations. Thus, a clear delineation of objectives and responsibilities by using a contract does not need to preclude an exploratory innovation process, even when it legally enforces the demands of the contracting authority.

Our case studies show that contract management can effectively structure the interdependencies in a partnership. It can also clarify the roles of actors and establish accountability relationships. In addition to providing a way to coordinate the partnership, a contract can also encourage interactions. A contract can also reduce the risk of participating in the partnership. Furthermore, a contract also provides clarity on responsibilities and goals without rigidifying the innovation process. In addition, a contract can give actors autonomy and room to manoeuvre within the collaboration. Furthermore, a contract does not always hinder collaborations to explore new possibilities (e.g., through a PoC as was the case in case B4). However, the coordinators of the collaboration also need to maintain a constant balance between contract rigidity (clear goals and incentives) and contractual freedom (room to experiment and change things after the contract has been concluded), for which they might use additional process rules (see next section).

Network management

A second way to effectively manage a collaboration is to use network management strategies. In a collaboration, interactions between partners must create added value that individual partners cannot achieve as effectively or efficiently on their own. The strategies used to promote and manage interactions between actors in a collaboration are called network management strategies (Klijn, Steijn, and Edelenbos, 2010, p. 1065). Klijn, Steijn, and Edelenbos (2010) distinguish four strategies of network management. Connecting strategies focus on linking actors and resources together. Exploring strategies are aimed at fostering collaboration by searching for interdependencies, goals, and perceptions of actors. Arranging strategies focus on establishing (temporary) structures that enable interaction, consultation, and deliberation. Finally, process rules support the management of the collaboration by, for instance, implementing rules regarding the participation of new actors or the termination of the collaboration.

These network management strategies were observed in the studied cases. Some cases exhibited larger levels of these network management strategies than other cases, and not all network management strategies were used to the same degree in each case. For instance, in case D2, the coordinator was commended for facilitating the participation of actors, which can be seen as an example of a connecting strategy. By creating incentives to collaborate, the coordinator was able to activate partners and propel collaborative interactions. The result was an innovation that took the concerns and needs of all the stakeholders into consideration. Case N1 shows an example of the use of an arranging strategy. The partnership needed to meet the conditions of the funding partners (e.g., deadlines) in order to acquire their funding. To make sure that the project met the imposed deadlines, the coordinator implemented several structures, such as weekly team meetings and monthly meetings with core partners. The structured process proved to be essential to enable thorough planning of the activities of the project partners.

Second, network management also refers to the importance of resolving conflicts between cooperating partners. In this regard, contracts can also be a means of resolving conflicts. For example, in several cases, issues related to intellectual property were not resolved at an early stage, which increased the risk of intense conflicts between the partners. In cases S2 and B5, for instance, conflicts arose because potential intellectual property issues had not been raised early on. In case S2, the public partner did not want to be dependent on the private partner to further develop the application in the future. Through mediation between the public and private partners, the partners eventually agreed to a formal contract in which the intellectual property rights were settled and in which the public partner was given limited rights to further develop the application for its own use. Also, in case B5, a conflict arose between the partners because of the ambiguity of intellectual property rights. Indeed, the private partner wanted to commercialize the innovation, while the local government, where the innovation was developed and tested, and who also contributed to the ideas for the innovation, also wanted some recognition for the work they put into the project. The conflict led to a deadlock, which was only resolved by signing a contract that stipulated the intellectual property rights of both partners. Open communication between the partners regarding intellectual property rights was crucial in arriving at this contract. The case shows that conflict resolution is important to protect the innovation process from a failing collaboration. However, both the public and private partner also recognized that the discussion regarding intellectual property rights should have occurred much earlier in the project.

Note that both contract management and network management can be present in the same partnership. Indeed, whereas contract management is particularly focused on the input and output features of the collaborative

innovation process (e.g., engaging innovation-oriented contractors, stimulating innovation through contract incentives and output specifications, etc.), network management is focused on the process features (e.g., exploring ideas and perspectives, connecting partners, etc.). We refer to Chapter 9 for an elaboration on the combined effect of these management practices on innovation.

Features of the Involved Individuals and Organizations

Expertise and skills of the actors

The first feature of the involved individuals and organizations in the studied partnerships concerned the expertise and skills of these actors. Four types of expertise were identified in the cases: (1) ICT expertise, (2) legal expertise, (3) medical expertise, and (4) technical expertise. ICT knowledge, which was indicated as one of the most important types of expertise and was identified in all 19 cases, was particularly related to private partners. These private partners created new ICT tools on demand from the other partners or had already created similar technologies which could be adapted to the needs of the partnership. We find an example in case D1, where the private partner involved was an authority on e-learning and also had a background in the public sector. Thanks to the private partner's experience with public actors, he spoke the same technical language as the other partners, which contributed to smooth communication with users and public representatives. Furthermore, the partner knew the hospital procedures. Legal expertise was necessary to draft contracts between the partners but was also useful in many steps of the innovation process. An example of the former is tender contracts between a public procurer and a private contractor, or contracts that formulated the arrangements on intellectual property. An example of the latter is legal knowledge on data protection, as many cases processed personal health information of patients or citizens. This type of expertise was found in seven of the cases. Medical expertise was found in nine of the cases and concerned the knowledge about medical problems (e.g., diseases) and treatments, but also about healthcare in general. This type of expertise was found a lot in the coordinators and public partners, as these actors often had a medical background. Medical knowledge was, more so than ICT knowledge, considered the backbone of the innovation process in most of cases. Technical expertise refers to knowledge about specific issues that were connected to the innovation process. For instance, in case B4, technological innovation was introduced in a new nursing home. The implementation of the technological innovation had to be aligned with the construction of the new building, for which architectural knowledge was needed.

Furthermore, important skills were introduced by the partners in the partnerships. First, network management was an important skill, which was often attributed to the project coordinator, but could also be present in other

partners. As indicated before, network management refers to the improvement of interactions between actors, in order to explore differences between the actors, connect the actors, resolve conflicts, and ensure proper engagement and commitment of the involved actors. A lot of cases proved to have high levels of these network management skills. Second, project management skills were important to structure and manage the innovation process, for instance, by establishing and controlling deadlines, planning, and ensuring that all administrative requirements are met. These skills were crucial in five of the cases in which project management was often provided by the coordinator. However, in some cases, the coordinator recruited an external actor in the innovation process in order to facilitate the project management, so the coordinator could be more involved in the innovation process itself. Third, user engagement was important in all of the cases, and the skill to properly interact with users was therefore considered to be crucial in many of the cases. The partners interacted with the users by providing them with key information about the project, listening to suggestions of the users, and involving them in the conceptual and testing phases of the projects. Some partnerships even involved user engagement specialists in the partnership in order to facilitate a smooth and constructive user-partnership interaction.

Position of the actors in the policy sector

A second feature on the level of the individuals and organizations relates to their positions in the policy sector. These positions enabled some of the partners to access resources, which would otherwise have been excluded from the partnership. We already mentioned the skills and knowledge of the partners, which could be acquired through the partnerships, and which reflects their position in the policy field (e.g., ICT expertise from an ICT partner). However, some of the involved actors had a more subtle influence on the partnership through their position in the policy sector. For instance, access to relevant service users was often obtained through the involvement of specific actors (e.g., hospitals, patient organizations, etc.). This proved to be particularly important for some of the private IT partners who wanted to test the prototypes of the services they had produced, and who could not access the right service users on their own. Similarly, political support was frequently enabled by including representatives of responsible ministers or elected politicians. Moreover, in order to prevent interoperability issues between created technologies and (national) ICT infrastructures, in multiple cases the actors responsible for this infrastructure were also involved in the partnership. Even when these actors were involved at the periphery of the partnership, they often had extensive influence over the innovation process, as they were responsible for much of the data exchange infrastructure that was vital for many of the innovations.

Drivers of the actors

These different positions of the actors in the policy sector also revealed different drivers to participate in the collaborations. The first driver was related to the wish to innovate, either to reduce the costs of service delivery or to improve the quality of the services. However, not all actors were motivated by the pursuit of innovation by themselves. Some partners were involved in the innovation process in order to solve an urgent problem that directly or indirectly affected them. For instance, a lot of the hospitals were involved in the innovation project in order to find a solution for medical problems or treatments, and service users were sometimes involved because they were unable to efficiently use existing services.

A second driver came from the opportunity to develop previously created services further. Many of the private ICT partners possessed this driver, as the innovation project presented an easy way of testing their prototypes on a large scale and generalizing them to a wider audience. However, in some cases, users were already engaged in pilot projects before the innovation project was initiated. For these users, the innovation project presented a chance to attract more expertise and capacities to upscale and implement their ideas.

A third motive to participate in the innovation projects was related to the economic value of these partnerships. Private actors such as ICT companies, consultants, etc. profited directly from the innovation projects, but could also expand their market shares by tapping into new user groups. For instance, in case B5, a small start-up that was operating in a niche market was involved. The main reason for the company's involvement was not to sell or innovate their products, but to move into new markets by rigorously testing their products on a broader target group. Other types of economic incentives were also identified in the cases. For instance, a lot of the private partners were involved in the projects because the projects presented opportunities for learning and accruing new knowledge, which was of economic value for these actors. The phases of user involvement in each of the projects were particularly interesting for these actors as they enabled access to knowledge regarding user experiences, which could be used to optimize their own products and services.

Use of ICT in the collaboration

As all projects revolved around eHealth innovation, the use of ICT played a major role in almost all of the innovation projects. However, the use of ICT was not always directly related to the technological environment in which the eHealth solution was built, but also to the fact that the partners needed to work together to achieve a solution. For instance, ICT was often important in the collaboration process itself and was frequently used in the partners' interactions with the users. Through mock-ups and testing tools, the partners were able to easily involve the users in the innovation process. Through these

ICT tools, the users could test the innovations, but could also provide feedback on the innovations. For instance, a controlled testing environment was set up in cases D1, B4, and N3, which allowed the users to work with the new solutions and provide feedback on their experiences. In case B5, mock-ups of a website that allowed user feedback were used to test the final prototype of the innovation. Furthermore, a lot of communication technologies such as online interaction platforms (e.g., Skype, MS Teams, etc.) and cloud databases (e.g., Sharepoint, Dropbox, etc.) were used to connect disparate partners together and coordinate their work. However, the analytical capabilities of some technologies were also important to support decision-making. For instance, in case B5, the private partner used a software tool to visualize and analyze the desired process flow of the solution. In case D3, the coordinator was granted access to the back end of the solution, in order to thoroughly test the solution. This also allowed the coordinator to directly add new content to the solution without always needing the developers, which increased the efficiency of the innovation process.

The pre-existing ICT infrastructure played a second major role in the studied projects, especially in the projects which were aimed at innovating the digital information flows between stakeholders (e.g., national health platforms). ICT infrastructure such as eHealth networks enabled a lot of the initiatives of the partnerships. For instance, cases B1 and B2 were highly dependent on the Belgian eHealth platform for their success, as did case E2, which depended on the Estonian X-road. These eHealth networks facilitated the access and exchange of crucial citizen and patient information, which was the backbone of many of these innovations. For instance, the use of the Belgian eHealth platform made it possible for case B2 to connect to other eHealth databases, but at the same time, its own databases became connected to other health actors, which significantly enlarged the impact of its innovation. Hence, the innovation became part of the ecosystem of eHealth services. However, the existing ICT infrastructure might also pose new challenges for the innovating partnership, particularly in terms of interoperability. For instance, the project in case S3 was significantly delayed because of the incompatibility of the innovation with the existing ICT infrastructure. Moreover, the technical characteristics of the ICT infrastructure might influence the design of the innovation. In cases E1 and E2, the innovation needed to use the data formats of the X-road, which reduced the creative freedom of the developers and meant that the innovation needed to be designed with the X-road in mind. We see something similar in case B1, in which the original idea was to build a personal health record, which centralizes all the available, digitalized patient information. However, due to the already existing network of hospital hubs (i.e., networks established around the major hospitals), the idea of a central health record was abandoned, and a health portal was created instead.

The involvement of users in the collaboration

Timing of user involvement

The first dimension that was important in the case studies is the timing of user involvement. If users are involved early on in the innovation process, there are more opportunities to integrate their input into the final innovation, which we saw in most of the partnerships which created highly innovative services. In addition, users' views provide information that is best included already when generating innovative ideas. In this way, ideas are generated that are directly grafted onto users' concerns. For instance, in case B2, a pilot project was initiated before the start of the actual project by a group of users (general practitioners), and these users were later also included in the project itself. The involvement of the users and the experiences from the pilot project both accrued knowledge that was useful for idea generation. In case D1, users were involved early on in the problem definition phase. A survey of users was conducted to further identify the main problems surrounding the treatment of dysphagia. After the survey, seminars were organized to invite private partners to come up with ideas. By involving users at the problem definition stage, stakeholders were also highly motivated to implement the innovation.

Intensity of user involvement

A second aspect of successful user engagement is related to the intensity with which the users are engaged, which refers to the extent to which the input of users is considered in decision-making processes. Intensive involvement of the users was particularly important in partnerships which were dependent on the users to make decisions on the content and development of the innovation. This could be both in conceptual phases of the innovation process and in testing and implementation phases. In order to develop user-centred innovations, it is not enough to merely inform users. User input must actually be included in decision-making or users must be given real decision-making power. In case B5, for example, the whole concept of the innovation changed when users were involved in the innovation process. Initially, the idea was to develop an IoT solution. However, by involving the users, it quickly became clear that the users were not entirely comfortable with this. Despite the promise to the subsidizing government, an IoT solution was abandoned in favour of less intrusive telephone technology. The innovation was ultimately well received by users.

Another example is that of case N2, where user involvement was tightly organized. The project team employed a strict protocol with instructions on how to give feedback to the ICT partner. Some respondents pointed to the lack of openness in this process of user involvement. By setting too strict conditions for user involvement, users were not always able to openly express

their preferences and opinions to the ICT partner. In case N4, the project team anticipated such problems and built the inclusion of user feedback into the innovation process. The project team ensured that enough time was left to incorporate user feedback into the application and for trial and error to optimize the innovation. This was necessary because users were not involved in the design process and several shortcomings in the design (related to the comfort of the application for patients and the effectiveness of the device) were raised by users after the design process.

CONCLUSION

The comparative case study in this chapter shows that the collaborative innovation process in eHealth partnerships is subject to a large variety of conditions related to the design and management of the partnership. From this research, we learn that including the right number of relevant actors in the partnership in combination with introducing a governance structure that allows effective management of the partnership is crucial for successful collaborative innovation processes. We also illustrated the impact of direct management activities on the collaborative relationships in our cases. Contract management provides a design framework in which the objectives of the partners are aligned, responsibilities are secured and enforced, interactions amongst the partners are encouraged, and risks between the partners are reduced. Network management directly influences the interactions between the partners, encourages learning, allows innovative ideas to emerge, and remedies tensions and conflicts. Furthermore, successful partnerships include the relevant resources (mostly in the form of expertise and skills of the involved partners, and the use of ICT) and influence, by engaging partners from a multitude of different backgrounds and positions in the healthcare sector and involving service users in different phases of the innovation process.

A synthesis of the results points towards two interrelated spectra over which the conditions push and pull the collaborative innovation process. The first spectrum corresponds to the degree of collaborative stability. The higher the partnership scores on this spectrum, the more likely that the collaboration can be maintained and that the partners will jointly develop a certain outcome. Conditions such as the presence or absence of an adequate balance between size and governance structure, contract management and particular network management strategies (e.g., arranging strategies and process rules), ICT to enhance the collaboration, and influential stakeholders enable the partnership to move alongside this spectrum. A second spectrum relates to the degree of innovative impetus. The higher the partnership scores on this spectrum, the more it is motivated by the prospect of developing a creative and innovative solution. Conditions such as particular network management strategies (e.g.,

exploring and connecting), the involvement of a broad range of stakeholders that unite a lot of expertise and skills, and the involvement of users through which new knowledge can be accrued, push the collaborative innovation process higher up this spectrum.

Although the premise should be to elevate the partnership alongside both spectra, literature and practice show that this is quite challenging as encouraging collaborative stability might interfere with achieving innovative impetus and vice versa. For instance, focusing managerial attention on contract management might indeed make the partnership more stable, but it might also extinguish creative experimentation and trial-and-error behaviour because the contract conditions limit flexibility in the development process. On the other hand, stimulating innovative impetus by involving a multitude of different actors, including a lot of service users, and letting them freely engage and interact with each other might lead to interpersonal conflicts and a disintegration of joint objectives. The goal should therefore be to achieve a 'desirable' balance between collaborative stability and innovative impetus. Our comparative case study does not provide answers to what this desirable balance is, and more detailed research is needed into the combined effects of particular conditions to provide these answers. We start this endeavour in Chapter 9, in which we consider the combined effect of contract management and network management on the innovativeness of eHealth services. Nevertheless, future research should investigate how the other conditions can be optimally configured in order to enhance the collaborative innovation process.

NOTES

1. This part of the chapter is based on the results of the comparative case study, reported by Callens et al. (2020).
2. The TROPICO project received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 726840. This article reflects only the author's view and the Research Executive Agency of the European Commission is not responsible for any use that may be made of the information that the article contains. For more information: https://cordis.europa.eu/project/id/726840.
3. More detailed case information can be found in the TROPICO case study repository: https://tropico-project.eu/case-studies/

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