Bachelor Thesis

- Rethinking digital governance -

How collaborative innovation strategies advance the development of digital innovations in public organisations

A case study about Tech4Germany

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Abstract

Digital innovations bear the potential to increase the efficiency and transparency of governments and create more accessible and user-centric public services. However, public organisations are facing several challenges in the development of digital innovations and the unique democratic requirements imply that digital services cannot simply be procured from private contractors. Hence, a new strategy called collaborative innovation appears to be a possible solution, but few institutional designs have been found to sustain collaborative innovation in the present governance system. Therefore, this thesis investigates the unexplored phenomenon of innovation fellowship programmes by conducting a diagnostic case study about Tech4Germany. To analyse the mechanisms in the light of the existing scholarship, the following research question guides the thesis: *How does the fellowship programme Tech4Germany contribute to the development of digital innovations in German public sector organisations?* In-depth interviews with participants of Tech4Germany revealed that fellowship programmes are a suitable institutional design for collaborative innovation as they create an attractive setting for tech experts and enable a constructive collaboration between public employees and citizens. Furthermore, fellowship programmes provide public employees a unique room to experience agile and user-centric approaches to digital innovation projects whereby mutual learning is stimulated and the implementation resistance is reduced.

Keywords: collaborative innovation, fellowship programmes, public innovation, digital transformation

Table of Content

List of tables

List of figures

List of abbreviations

AI	Artificial Intelligence
HR	Human Resources
IT	Information Technology
NPG	New Public Governance
NPM	New Public Management
MVP	Minimum Viable Product
TPA	Traditional Public Administration
UI	User Interface
UX	User Experience

1. Introduction

The interest in public innovation has intensified among public administration scholars. The public sector is facing new challenges such as ageing society, skilled labour shortage and various 'wicked' problems, hence a growing number of scholars agree that innovation is central to the public organisation's capacity to deal with those challenges (DeVries, Bekkers, & Tummers, 2016; Hartley, Sørensen, & Torfing, 2013; Lindsay et al., 2017). Particularly, the emergence of advanced technologies like robotic process automation, artificial intelligence (AI), or machine learning offer the potential to increase the efficiency, transparency, and effectiveness of governments (Gil-Garcia, Dawes, & Pardo, 2018). Furthermore, digital innovations can potentially be a response to rising citizen expectations towards faster, more accessible, and user-centric public service delivery (Mergel, 2019). However, public organisations are encountering several challenges in the development of digital innovations. It has been well-rehearsed in the pertinent literature that traditional organisational characteristics of public organisations such as hierarchy, silo structures, and red tape are severe barriers to public innovation (Bommert, 2010; Damanpour, 1991; DeVries, Tummers, & Bekkers, 2018; Rainey, 2014). Moreover, the political environment and multitude of stakeholders tend to increase the complexity of public services and public organisations have a comparatively small innovation budget as well as long-term financial planning horizons (Borins, 2001; Cinar, Trott, & Simms, 2019). Of particular relevance for digital innovations is the lack of personnel with the required technical skills and a deficient usage of modern working methods like design thinking and agile project management (Coglianese, 2020; Mergel, 2016).

At the same time, it has been shown that public employees are not intrinsically less innovative and there are also distinctive drivers of innovation in the public sector, such as the political and normative pressure for improvement (Hartley et al., 2013; Sørensen & Torfing, 2011). Moreover, it is acknowledged that the unique rules and procedures in the public sector usually serve a democratic purpose, for instance, equal opportunities (Neumann, Matt, Hitz-Gamper, Schmidthuber, & Stürmer, 2019). Therefore, digital innovations are only justifiable when they create public value and it is emphasised that practices and solutions from the private sector cannot simply be transferred to the public sector (Heartley, 2005). Additionally, scholars point to the risk of an overreliance on external information technology (IT) providers as private contractors "may not be sufficiently sensitive to the particular demands on government for explainability, due process, or avoidance of bias" (Coglianese, 2020, p. 49). Given this tension between potential benefits and risks, it is a key question in the research of public innovation how to develop digital innovations *within* public sector organisations.

In recent years, a new strategy to spur public innovation has been developed which is termed *collaborative innovation* and can be defined as "multi-actor collaboration that […] may foster innovation by bringing together public and private actors with relevant innovation assets, facilitating knowledge sharing and transformative learning, and building joint ownership to new innovative visions

and practices" (Sørensen & Torfing, 2012, p. 1). This new research field combines theoretical knowledge about collaborative governance (Ansell & Gash, 2008) with findings and theories of innovation (Borins, 2001; Chesbrough, 2003; Greenhalgh, Robert, Macfarlane, Bate, & Kyriakidou, 2004; Moore & Hartley, 2008). As such, collaboration is not new to the public administration literature but is closely related to the concepts of co-production (Verschuere, Brandsen, & Pestoff, 2012) and co-creation (Voorberg, Bekkers, & Tummers, 2015). However, co-production has primarily been used to encourage user participation in public service delivery (Fledderus, Brandsen, & Honingh, 2014) and has only recently been extended to the question of public sector innovation. Here, the work of Sørensen and Torfing (2011) and Torfing (2016) are frequently referred to as the key theoretical foundation (DeVries et al., 2018).

The emergence of *collaborative innovation* can be embedded in the wider paradigm shift towards the New Public Governance (NPG) model (Osborne, 2006). Hence, it can be distinguished from *hierarchical innovation strategies* which have been predominant in the Traditional Public Administration (TPA) paradigm and *competitive innovation strategies* that emerged in the New Public Management (NPM) era (Hartley et al., 2013; Heartley, 2005; Torfing, 2019). As hierarchical and competitive strategies inhere some limitations, collaborative innovation has been suggested as one possible approach for public organisations to mitigate the emerging challenges (Hartley et al., 2013; Torfing, 2019). A growing number of studies found empirical evidence for a positive impact of multi-actor collaboration (McGann, Wells, & Blomkamp, 2021; Neumann et al., 2019). At the same time, recent literature is concerned with the challenges and limitations of collaborative innovation (Agger & Sørensen, 2018; Torfing, Sørensen, & Røiseland, 2019; Wegrich, 2019).

However, the question of how collaborative innovation can be supported and sustained in the present governance system has not yet been resolved since there is no history or tradition of systematically opening up public bureaucracies to citizens and third sector organisations (Bommert, 2010; Hartley et al., 2013; Torfing, 2019). Mostly, collaborative innovation appears either in form of one-time projects (see for instance Neumann et al., 2019 and Lindsay et al., 2017) or in institutionalised and permanent innovation labs (Gascó, 2017; McGann, Blomkamp, & Lewis, 2018; Whicher & Crick, 2019). The former induces the problem that learning effects about the collaborative process itself cannot be sustained and the scope is relatively limited (Torfing, 2016). The latter faces the challenge that innovations are again developed in a separate setting outside the public organisation and often constricted to the development of ideas, thus facing challenges in reaching the implementation stage (McGann et al., 2021). A very new phenomenon that has not been covered by the peer-reviewed literature so-far are *innovation fellowship programmes*. Hereby, citizens with relevant skills and expertise spend a short-term stay in the federal government to collaboratively create innovative solutions for specific problems together with the government employees. Mergel (2016, p. 520) mentioned these

innovation fellowship programmes as "innovative HR policies" in the context of agile innovation management in public organisations, yet there is a crucial research gap since this new practice has neither been systematically analysed nor connected with the existing scientific knowledge about collaborative innovation. As a growing number of scholars emphasize the untapped potential of collaborative innovation (Hartley et al., 2013) and fellowship programmes might be a suitable approach to overcome the outlined barriers, it is of high scientific importance to analyse the mechanisms, potentials, and limitations of this new practice. This thesis aims to fill that gap by conducting a diagnostic case study about Tech4Germany, a fellowship programme that brings citizens with relevant technical skills into the German national ministries for three months to develop digital innovations for prevailing problems. To systematically investigate the new phenomenon of innovation fellowship programmes, the following research question will be answered in the course of this research:

How does the fellowship programme Tech4Germany contribute to the development of digital innovations in German public sector organisations?

From the main research question, three sub-questions are derived to guide the analysis of this case study in alignment with the existing knowledge about collaborative innovation. Each sub-question investigates one phase of the innovation cycle. Thereby, it is aimed to develop an in-depth understanding of the fellowship programme by analysing whether the theoretical mechanisms of collaborative innovation are observable. It is asked:

(1) In what ways does the fellowship programme Tech4Germany enable the collaboration of empowered actors to contribute to the generation of innovative ideas?

(2) To what extent does the fellowship programme Tech4Germany stimulate mutual and transformative learning to contribute to the development of digital innovations?

(3) To what extent does the fellowship programme Tech4Germany stimulate the creation of joint ownership of the innovation among the involved actors to facilitate the implementation of digital innovations?

By answering the proposed research questions, the study adds to the existing scholarship in several ways. Firstly, since fellowship programmes are emerging as a third space between one-time projects and innovation labs, this theory-guided case study provides highly relevant scientific insights to the question of how collaborative innovation can be initiated and sustained in public organisations. Secondly, by connecting the theorised mechanisms of collaborative innovation with empirical observations of a so-far unexplored form of collaboration, the study adds to the existing knowledge about the causal relationship between collaboration and innovation. Lastly, the study provides empirical findings about digital innovations which have only recently begun to receive attention from public administration researchers (DeVries et al., 2016).

Therefore, the study is also of high social relevance. The digital transformation is one of the most pervasive transformations of the public sector (Dunleavy, Margetts, Bastow, & Tinkler, 2006). Governments increasingly use new forms of data analysis and emerging technologies that no longer solely automate existing processes but instead induce entirely new forms of governing societies and running public organisations (Gil-Garcia et al., 2018; Peeters & Schuilenburg, 2020). This development comes with a severe tension between the potential benefits of digital innovations and various identified risks (Wirtz, Weyerer, & Geyer, 2019). One concern is that public employees rely on technology without having insights and control about how the algorithms produce their results (Peeters & Schuilenburg, 2020). Thus, it is called for new ways to deal with digital innovations and to strengthen the understanding of new technologies among the employees (Wirtz et al., 2019). Since collaboration in form of fellowship programmes may be one approach to increase the in-house capacity of public organisations to develop, implement and oversee new technologies in line with democratic principles (Coglianese, 2020), this thesis entails socially important findings and provides relevant practical implications for policy and governance regarding new digital innovation strategies.

To answer the proposed research questions, the thesis is structured into five major sections. The next chapter provides the theoretical foundation for the case study. Here, the concept and mechanisms of collaborative innovation are granularly elaborated to develop the analytical framework that will guide this study. Subsequently, the methodology will be outlined, including a description of the investigated case. In the fourth chapter, the case Tech4Germany will be analysed by applying the analytical framework to the empirical evidence. Hereafter, a critical discussion of the results and the limitations of the research is presented to answer the three proposed sub-questions. Finally, the thesis concludes with an answer to the overall research question and practical implications as well as suggestions for future research.

2. Theoretical foundation

This chapter provides the theoretical foundation for the research. It starts with conceptualising digital public sector innovation, followed by an elaboration of the concept of collaborative innovation. Subsequently, the evolution of innovation strategies in the public sector is outlined. The fourth section explains the theoretical mechanisms of collaborative innovation, complemented by a description of the key limitations and challenges of collaborative innovation. The chapter concludes with connecting collaborative innovation and digital innovations and a summary of the developed analytical framework.

2.1. Digital public sector innovation: a definition

Digital innovation is a social construct that has different meanings in different contexts. Since there is not one commonly used definition in the public administration literature, this section clarifies how digital innovation is conceptualised in the study. On the most general level, innovation can be

understood as “an idea, practice, or object that is perceived as new by an individual or other unit of adoption” (Rogers, 2003, p. 12). Based on a systematic literature review of studies about public sector innovation, DeVries et al. (2016, p. 152) define three facets as necessary and sufficient conditions for public sector innovation: the perceived novelty, the first adoption of an idea by a given organisation, and a discontinuity with the past. Together, these dimensions differentiate innovation from reform, change, or new ideas (Sørensen & Torfing, 2011, p. 849).

As this definition still includes a wide range of different innovation forms, DeVries et al. (2016) distinguish four types of public sector innovation: administrative or technological process innovation, product or service innovation, governance innovation, and conceptual innovation. This study investigates digital innovation, thus the focus lies on technological process innovation that is defined as the “creation or use of new technologies, introduced in an organization to render services to users and citizens” (DeVries et al., 2016, p. 153). Simultaneously, literature from the private sector refers to digital innovation as “innovating products, processes, or business models using digital technology platforms as a mean or end within and across organizations” (Ciriello, Richter, & Schwabe, 2018, p. 565). Taken together the outlined dimensions, this study defines digital public sector innovation as *the first adoption of a technology that is perceived as new by the given public organisation and produces a significant change in the specific context.*

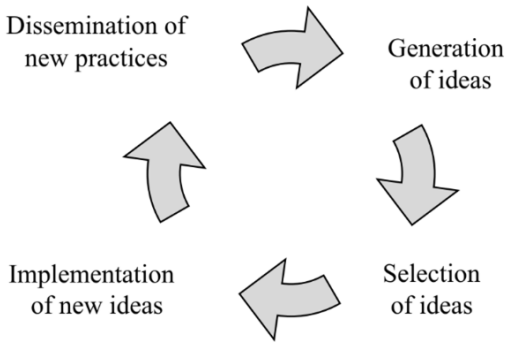
Importantly, the presented definition does not include anything about whether the innovation produces good or bad consequences (Heartley, 2005). Even though the term has a positive connotation and the goal in most cases is to create an improvement, the risk of failure is usually very high and the perception of whether an innovation is an improvement or debasement is a subjective valuation (McIvor, 2020; Torfing, 2019). Therefore, critical innovation theories point to a “pro-innovation bias” (Godin & Vinck, 2017, p. 8) as several scholars and practitioners tend to assume that innovation is always the solution and always leads to improvement. Since the study does not aim to evaluate whether the collaboratively developed digital innovations are an improvement, this debate will not be further elaborated. However, the critical view will be considered in the discussion of the results.

2.2. The concept of collaborative innovation as a new strategy for the public sector

The concept of *collaborative innovation* presents the key theoretical foundation for this study. At its core, the strategy is characterised by the feature that “the private and third sector and citizens are integrated into the innovation cycle (idea generation, selection, implementation and diffusion) from the earliest stage onwards” (Bommert, 2010, p. 16). This definition emphasises that collaborative innovation does not refer to the output but to the process that (potentially) leads to innovation. Thereby, innovations are developed in a complex, nonlinear, and iterative process (Eggers & Singh, 2009). Hence, to reveal the mechanisms of collaborative innovation, four analytical phases of the so-called innovation cycle can be depicted (Figure 1). The first stage, the *generation of ideas*, typically starts with the

identification and analysis of the problem, followed by the clarification of the goal. Then, a set of possible solutions and creative ideas is developed. Subsequently, the *selection of ideas* evolves around the decision of which ideas should be further pursued by designing, testing, and redesigning prototypes. The *implementation of new ideas* refers to the conversion of ideas into concrete products, procedures, practices, or services (Eggers & Singh, 2009).[1]

Figure 1. The cycle of innovation



Source: Sørensen and Torfing (2011, p. 851)

Secondly, the collaborative element remains to be clarified. Torfing (2016, p. 64) defines *collaboration* as "a temporal process through which a plurality of actors work together in an organized way to transform problems and opportunities into joint solutions that rest on provisional agreements that are formed despite the persistence of various forms of dissent." In the context of public innovation, those actors can on the one hand include politicians, public managers and government employees, and on the other hand private companies, civil society organisations, and citizens (Lopes & Farias, 2020). In sum, collaborative innovation in the public sector can be conceptualised as *a temporal process in which nonstate actors are integrated into the innovation cycle from the first stage onwards whereby the involved groups - public and external actors - engage in collaborative activities to jointly develop and implement public innovation.*

2.3. The evolution of innovation strategies in the public sector

In order to illustrate how the strategy of collaborative innovation may help to spur innovation in the public sector, it is contrasted with hierarchical and competitive innovation strategies in the following. Hereby, it is acknowledged that the outlined strategies are not mutually exclusive but co-exist and might develop hybrid forms of innovation approaches (Wegrich, 2019).

Hierarchical strategies tend to favour in-house innovation initiated in a top-down approach by public managers or leaders (Hartley et al., 2013). Beyond the already mentioned organisational barriers, this approach seldomly produces innovative ideas that break with the past because public leaders have few incentives for change, carry the whole responsibility for possible failure and solely rely on their

[1] Due to the limited scope of this study, the dissemination phase will not be analysed.

own ideas which limits the scope of developed solutions and tends to create group-thinking and blind spots (Cinar et al., 2019; Eggers & Singh, 2009; Wegrich, 2019). Competitive strategies are strongly characterised by the adoption of modern business practices in the public sector during the NPM era and aim to counteract the deficiencies of TPA strategies with the "creation of quasi markets and the adoption of new forms of strategic leadership and performance management" (Hartley et al., 2013, p. 824). Even though the new management practices can enhance public innovation in some dimensions, new barriers like a tendency towards standardisation, control and a reluctance to share knowledge can be induced by the strong focus on competition and performance (Torfing, 2019). Therefore, collaborative innovation has been suggested as one possible approach for public organisations to mitigate the challenges and limitations of hierarchical and competitive strategies by including empowered actors with diverse knowledge, skills and perceptions in a collaborative process (Hartley et al., 2013; Torfing, 2019).

Importantly, this new strategy "requires a reformulation of the traditional roles of public and private actors" which resembles a wider trend in the shift towards NPG (Hartley et al., 2013, p. 827). Whereas citizens have been mainly perceived as passive clients in the TPA model and as customers in line with the market orientation of the NPM era, they are required to take on an active role as co-creators in the collaborative innovation strategy (Hartley et al., 2013). At the same time, the role of public managers shifts from providing standardised public services as professional bureaucrats (TPA) or running public organisations like a business in the role of managers (NPM) to taking the role of mediators in the NPG model (Heartley, 2005; Sicilia, Guarini, Sancio, Andreani, & Ruffini, 2016). In the context of collaborative innovation, this includes encouraging and empowering different actors and constructively managing interdependencies (Sørensen & Torfing, 2015). Concluding, the roles and key characteristics of the outlined innovation strategies are summarised in Table 1.

Table 1. The evolution of innovation strategies

	Hierarchical innovation	*Competitive innovation*	*Collaborative innovation*
Related Paradigm	Traditional Public Administration	New Public Management	New Public Governance
Organisational values	Hierarchy, control, bureaucracy	Market orientation, focus on performance, contracting in/out	Multi-actor networks, inter-organisational relationships
Innovation	In-house innovation by public managers (top-down)	Innovation through competition between actors	Innovation through collaboration of diverse actors
Role of public managers	Providers	Managers	Mediators
Role of population	Clients	Customers	Co-creators

Source: Adapted from Heartley (2005) and Sicilia et al. (2016)

2.4. From collaboration to innovation: the underlying mechanisms

Based on the previously outlined conceptualisation, Torfing (2016) theorised the causal relationship between collaboration and public innovation by connecting interdisciplinary theoretical building blocks with empirical findings. Hereby, it must be noted that it is not a fully developed theory of collaborative innovation. Nonetheless, it provides a solid and suitable foundation for this study as it allows scrutinising fellowship programmes as a new form of collaboration in the light of the existing scholarship. The key proposition is that collaborative innovation between actors with diverse experiences, skills, and knowledge positively influences all phases of the innovation cycle through three underlying mechanisms: empowered actors, mutual and transformative learning, and joint ownership (Torfing, 2016). The following sections outline each of these causal relationships to develop the analytical framework for this theory-guided case study.

2.4.1. Collaboration of empowered actors

The first theoretical mechanism proposes that collaboration has a positive effect on the first phase of the innovation cycle, the idea generation, when *empowered actors* - that are affected and relevant actors - engage in collaborative problem-solving by exchanging different experiences and challenging prevailing opinions (Torfing, 2016). The *"affected actors"* are social or political actors who are directly impacted by the benefits or inconveniences induced by the innovation and can therefore provide a comprehensive understanding of the problem and first-hand experiences with the circumstances (Torfing, 2016, p. 131). *"Relevant actors"* are actors with knowledge, skills and ideas that are essential for developing and implementing an innovation (Torfing, 2016, p. 132). Depending on the problem to be solved, the form of expertise can differ. In the context of digital innovations, there is a strong demand for technical skills, agile project management, design thinking, interdisciplinary problem-solving and building (software) prototypes (Mergel, 2016). To empower these actors to collaborate, the theory suggests including a third group in the collaboration, the *"boundary spanners",* who are capable of translating and connecting the diverse knowledge of affected and relevant actors in order to leverage potential synergies (Torfing, 2016, p. 133). Importantly, collaboration does not occur inadvertently. It must be initiated, facilitated, and organised in a way that enables the actors to produce the desired outcome (Agger & Sørensen, 2018; Ansell & Gash, 2008). Hence, empowerment requires *clear ground-rules* including the definition of roles, responsibilities, and procedures to prevent conflicts and provide room for creative thinking and constructive discussions (Sørensen & Torfing, 2017). Also, it is essential that all involved actors develop a *shared understanding of the goal* to prevent misunderstandings (Neumann et al., 2019). Concluding, the first theoretical argument proposes that collaborative innovation allows public organisations to include affected and relevant actors into the innovation cycle. That in turn is positively related to the likelihood of innovation as the empowered collaboration between both is expected to create a group that is most capable of developing an innovative solution that meets the requirements of the specific context (Bommert, 2010; McGann et al., 2021).

2.4.2. Mutual and transformative learning

The second causal relationship proposes that collaboration stimulates learning processes through which the actors acquire new skills and expand or revise their knowledge, and these learning processes can spur the development of innovations (Torfing, 2016; Voorberg, Bekkers, Timeus, Tonurist, & Tummers, 2017). The first dimension of the mechanism is grounded in the assumption that the collaborative innovation strategy encourages learning when empowered actors with diverse knowledge and opinions engage in iterative rounds of the outlined innovation cycle and "participate in a joint and cross-disciplinary assessment of the content, feasibility, and potential gains and risks of competing ideas" (Torfing, 2016, p. 65). The second dimension of the mechanism is based on constructivist learning theories which theorise that learning from and with diverse actors has a positive effect on the development of innovations (Sørensen & Torfing, 2011; Voorberg et al., 2017). To elaborate on this relationship, it can be distinguished between mutual and transformative learning.

Mutual learning refers to a continuous dialogue and mutual exchange of experiences and ideas that stimulate collective, creative, and experimental problem-solving (Lindsay et al., 2017; Torfing, 2016). Hereby, it is assumed that one individual usually does not have all the needed knowledge and abilities to solve a complex problem (Ansell & Torfing, 2015). Thus, every actor has some relevant expertise and through the circulation of that knowledge, collaboration contributes to overcoming information asymmetries between public agencies and public service users (McGann et al., 2021). Further, learning theories emphasize that collaboration broadens the repertoire of solutions through the communicative search for new ways of doing things and can spur innovation through inspiration and imitation (McGann et al., 2021; Torfing, 2016). Hence, this type of learning has an instrumental focus that facilitates the acquisition of practical skills and knowledge to produce the desired innovation (Lindsay et al., 2017; Torfing, 2016).

Transformative learning goes one step further as the actors not only get to know new approaches but also new ways of thinking and reframing the problem (Voorberg et al., 2017). Whereas individually acquired knowledge and skills are often continuous with former assumptions, mindsets, and habits, collective learning of social actors can disrupt bounded forms of thinking through critical and collective reflection (Neumann et al., 2019; Torfing, 2016). Furthermore, exchanges of actors who are different in terms of their cognition and culture are likely to prevent group-thinking and blind spots that are often a problem in closed circles (Wegrich, 2019). Since innovation requires by definition a disruption of old ways of doing things, transformative learning is expected to positively influence public innovation as it enables creative ways of understanding a complex problem and exploring new opportunities that break with the past (Agger & Sørensen, 2018; Torfing, 2016). Concluding, it is theorised that multi-actor collaboration stimulates mutual as well as transformative learning and therefore increases the likelihood of public innovation.

2.4.3. Joint ownership of innovations

The third proposition states that collaborative innovation has a positive effect on innovation because it can create a "joint ownership" of new ideas that reduces the *implementation resistance* (Sørensen & Torfing, 2011, p. 852). Joint ownership is understood as the shift of the *decision-making authority* from the public agency to the collective of the involved actors (Ansell & Gash, 2008). Moreover, it implies a form of commitment since ownership creates a *shared responsibility* for the project (Ansell & Gash, 2008; Neumann et al., 2019). The theoretical mechanism is based on sociological planning theories stating that not sufficiently taking the stakeholder dynamics into account can lead to implementation failures because the involved actors develop a severe resistance when they do not have ownership of the plans and new developments (Cinar et al., 2019; Sørensen & Torfing, 2011). Given the uncertain and destructive character of innovation, this risk is particularly high for innovations as the implementation phase bears potential conflicts, power struggles, and failures (Wegrich, 2019). Hence, enabling an active exchange between the affected public stakeholders and the actors responsible for developing an innovation can provide the government employees with the opportunity to actively control and shape the outcome which increases the chances of a successful implementation (McGann et al., 2021). In sum, the theory proposes that through the creation of joint ownership of the innovation among the involved actors, collaboration enhances the implementation stage of the innovation cycle and is therefore positively related to the likelihood of public innovation.

2.5. Limitations and challenges of collaborative innovation

The core value of collaborative innovation is the interactive engagement of actors with highly diverse skills, knowledge, and perceptions. At the same time, this characteristic creates severe challenges as collaboration in such a constellation faces the risk of losing the capacity to constructively work together. Hence, the existing knowledge in this aspect is presented in the following to critically investigate innovation fellowship programmes.

According to Wegrich (2019), the collaborative innovation strategy inherits two key *limitations*. First, a divergent understanding during a collaborative process is likely to persist when the commitment towards the goal of the innovation project is superficial or weak. As a consequence, the diverse actors may have different interpretations of the objectives which might lead to *misunderstandings and conflicts*. In strong contrast, the second limitation is that collaboration might lead to too much alignment of the involved actors, ultimately inducing the risk "that one particular world view and approach to doing things becomes dominant" (Wegrich, 2019, p. 17). In this case, the previously outlined mechanisms would not work properly, and the benefits of collaboration disappear. Furthermore, several studies reveal the potential problem that the process can be manipulated by influential interests (Ansell & Gash, 2008), and collaboration tends to have high transaction costs in terms of time and resources (Hartley et al., 2013).

Lastly, the notion of collaborative governance itself is not undisputed. McIvor (2020) points to some dangers and unintended consequences of the normative and political stakes in collaborative governance. He outlines how collaboration policies can serve as an ideological justification of government actions and that the outcome of collaboration in terms of its success is likely to be perceived quite differently by public managers and politicians than by civic groups or citizens. Moreover, "interest group pluralism can too easily slide into corporatist models of governance" and in that case rather serve business value than public value (McIvor, 2020, p. 512). In conclusion, these limitations illustrate that collaborative innovation is not a suitable strategy for all contexts and social actors will not necessarily collaborate constructively.

2.6. Connecting the collaborative innovation strategy with digital innovations

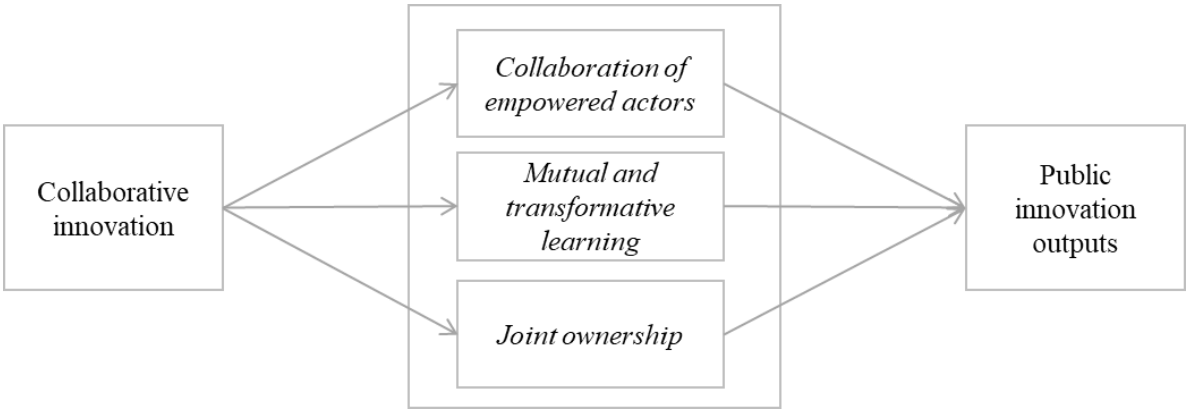
The outlined theoretical foundation of collaborative innovation is applicable to many different types of public sector innovation. Thus, the specific arrangement "should be determined by the problem or challenge at hand" (Torfing, 2019, p. 4). The challenge investigated in this study is the lacking capacity of public organisations to develop and implement *digital* innovations. Therefore, the question remains why this strategy may be suitable for the unique setting of digital public sector innovations. The first reason is that governments need personnel with technological skills to create and develop digital solutions (Coglianese, 2020; Wirtz et al., 2019). Particularly, because the NPM era incentivised outsourcing of digital public service delivery, technical skills like coding and user-centric web design are mostly not available among civil servants (Dunleavy et al., 2006; Wirtz et al., 2019). Therefore, the inclusion of empowered actors, in this case empowered by technical skills, is a prerequisite to creating digital innovations.

Secondly, the development of digital innovations requires very different working methods than what is traditionally established in public organisations. Especially, design thinking and agile project management are crucial in software development and digital innovation projects (Mergel, 2016). Simultaneously, private actors are presumably not conversant with the unique organisational structure, processes, and requirements of a public organisation (Coglianese, 2020). Thus, the process of mutual and transformative learning is expected to have a positive influence on digital innovations as the diverse actors might help each other to acquire the necessary skills for the successful development of digital innovations in the specific setting of public organisations. Lastly, resistance towards transformative change is expected to be particularly strong in the case of new technologies because the affected government employees might not fully understand their functionality and possible consequences (Wirtz et al., 2019). Therefore, creating joint ownership by including them in the innovation process has the potential advantage, compared to outsourcing it to external IT-providers, that the public employees may be offered an opportunity to understand the new technologies and their potential risks and benefits.

2.7. Analytical Framework

Concluding, the theorised mechanisms of collaborative innovation serve as the analytical framework for this study as summarised in Figure 2. Thus, it allows connecting the existing knowledge about collaborative innovation with the so-far unexplored phenomenon of innovation fellowship programmes. In all, it is expected that the three outlined mechanisms potentially explain how the investigated fellowship programme contributes to the development of digital innovations in public organisations.

Figure 2. Analytical framework: Mechanisms of collaborative innovation



Source: own representation, based on Torfing (2016)

3. Methodology

This section clarifies and justifies the chosen methods for answering the beforementioned research question. It starts with elaborating on the research design of this study, followed by a justification of the case selection and a description of the case. Hereafter, the unit of analysis and units of observation are specified. Lastly, the data collection method and data analysis are described.

3.1. Research design

In line with the main research question that aims to uncover the underlying mechanisms of how Tech4Germany contributes to the development of digital innovations, this study is designed as an explanatory single-case study (Swanson & Holton, 2005; Yin, 2003). This research design arises directly from the proposed question because the thesis investigates one unique case, Tech4Germany, and "[t]he case study method is most likely to be appropriate for 'how' and 'why' questions" (Yin, 2003, p. 22). Moreover, since the objective of this study is not to analyse one specific variable but to develop a comprehensive understanding of the causal mechanisms, a case study is "uniquely predisposed to taking into account a broad and diverse set of explanatory factors" (Blatter & Haverland, 2012, p. 5). Further, this case study follows a diagnostic approach. Generally, this type of applied research is "concerned with using the knowledge acquired through research to contribute directly to the understanding or

resolution of a contemporary issue" (Ritchie, 2003, p. 24). As outlined in the introduction, fellowship programmes are a so-far unexplored form of collaborative innovation. At the same time, the theory and scholarship about collaborative innovation are well established. Therefore, a diagnostic case study is the most suitable research design because it allows the researcher to develop an in-depth understanding of a unique phenomenon by connecting the empirical observations with the theoretical concepts and existing knowledge (Blatter & Haverland, 2012; Swanson & Holton, 2005). Hence, the study will be theoretically-guided by the analytical framework that was deductively derived from the theory of collaborative innovation in chapter 2 (see Figure 2).

Given the uniqueness of the case and the outlined diagnostic case study design, this study does not attempt to generalise its findings to a wider population. However, the generated knowledge may be transferable to other cases, namely other fellowship programmes (Lewis & Ritchie, 2003). In regard to the internal validity, multiple sources (contracts, project reports, and semi-structured interviews) are collected and triangulated to ensure that the findings conform with reality (Lewis & Ritchie, 2003; van Thiel, 2007). Furthermore, triangulation mitigates the subjectivity in the research process and therefore strengthens the overall reliability (van Thiel, 2007).

3.2. Case selection

As outlined above, the case is not assumed to be statistically representative of a wider population but was chosen for "intrinsic" reasons (Swanson & Holton, 2005, p. 330). The selection of this particular case is justified by three arguments. First, the case is very "information-rich" (Patton, 1990, p. 169) and scientifically relevant because it applies the strategy of collaborative innovation in an unexplored form. The analysis of this case is therefore predestined to fill the identified research gap. Secondly, Tech4Germany is the only fellowship programme of its kind in terms of the organisation in project groups that actively work together for a short term of three months and its explicit focus on digital innovations. Even though there are comparable fellowship programmes in other countries, for instance, the Presidential Fellowship Programme in the USA (Obama White House Archives, n.d.) and the No.10 Innovation Fellowship Programme in Great Britain (HM Government, n.d.), they take place over a longer period and are not organised in unchanging groups of citizens and public employees. The project characteristic of Tech4Germany therefore provides an especially bounded and clear setting to investigate the collaborative process (Swanson & Holton, 2005). Additionally, the accessibility of Tech4Germany is very high as relevant documents and names of former participants are provided online (van Thiel, 2007). Lastly, Germany offers a striking setting because it ranks comparatively low, on place 21 in the European Union, in terms of the provision of digital public services (European Commission, 2020). Hence, it is particularly interesting to analyse how German public employees experience the collaboration with tech experts from the civil society and the potential clash of cultures.

3.3. Case description

The fellowship programme Tech4Germany started as an initiative of a young German citizen in 2018 with the goal to "expedite the digitalisation of Germany and thereby learn from and with each other" (Tech4Germany, 2021b, p. 1). The core idea of the fellowship programme is to bring talented citizens in the fields of software engineering, product management and User Experience (UX) or User Interface (UI) design into the national ministries or agencies where they work together with public employees to solve a concrete problem or improve public services by using new technologies (Tech4Germany, n.d.). Each year, about 30 citizens collaboratively work on digital innovation projects with the government employees for twelve weeks. The project teams consist of four citizens, the so-called *Fellows*, and two to four public employees, the so-called *Digitallotsen* (Tech4Germany, n.d.). Hereby, the Fellows get a small monetary contribution in form of a scholarship by Tech4Germany to cover their living costs (DigitalService4Germany, 2021c). The projects explicitly focus on user-centric and agile approaches to develop a technological prototype (Tech4Germany, 2021b). Examples are a chatbot for the German Ministry of Family Affairs that navigates families through a large amount of available information and an online tool for pensioners to file their tax returns (Tech4Germany, n.d.).

From the very beginning, the initiative operated under the patronage of the head of the federal chancellery which underpins its high political relevance. After the successful pilot year, the initiator founded the non-profit start-up 4Germany GmbH together with two other young citizens which received pilot government funding in 2019 (DigitalService4Germany, n.d.). Hereafter, Tech4Germany presented the developed innovations of the second cohort to the German chancellor and federal cabinet, and was called the technology taskforce for the German government (Presse- und Informationsamt der Bundesregierung, 2020). In September 2020, the non-profit start-up was bought by the German government and turned into the DigitalService4Germany GmbH. It is now fully funded and owned by the state (DigitalService4Germany, 2021a) and can therefore be categorised as a "[g]overnment enterprise" (Rainey, 2014, p. 75). Next to the fellowship programme Tech4Germany and a second fellowship called Work4Germany, the DigitalService4Germany GmbH currently builds a digital service team that operates as a permanent in-house coding force (DigitalService4Germany, n.d.; see Mergel (2019) for a scientific analysis of digital service teams).

3.4. Unit of analysis and units of observation

Derived from the main research question, the unit of analysis is Tech4Germany. The research objective to develop a comprehensive understanding implies that the case is not divided into smaller sub-units or specific variables (Yin, 2003). Instead, the unit of analysis can be specified to be the whole process that was undergone during the collaborative innovation projects (Yin, 2003). The "[s]ampling within a case should be guided by the research questions and by the theory that underlies the initial conceptualization of the case" (Swanson & Holton, 2005, p. 336). In accordance with the analytical framework (Figure 2),

information about the collaboration and the experiences of the involved actors needs to be gathered. Therefore, actors who have actively participated in the collaborative innovation process are the units of observation. This translates into conducting interviews with the participating Fellows and Digitallotsen. Given the highly individual character of collaboration, for instance the experience of learning, it is indisputable to directly talk to former participants of the fellowship programme to fully understand its mechanisms and dynamics. Further, it is essential to talk to both groups since the perception might differ significantly among the actors (Torfing, 2019). As both groups are very limited in their number, the selection of the interviewees was "purposive" based on three criteria (Ritchie, Lewis, & Elam, 2003, p. 78): the respondents participated in different projects in 2019 or 2020, took on different roles (Engineering, Design or Product Fellow or Digitallotse), and are diversified in terms of their gender. These criteria allow to gain insights from diverse perspectives and increase the internal validity of the study (a list of the interviewees is provided in Appendix E).

3.5. Data collection method and data analysis

The study draws on two sources of evidence. First, a mix of materials was collected whereby the website of Tech4Germany (Tech4Germany, n.d.) was the main source. Precisely, the documents include project reports, contracts, information brochures, and guidelines (a list of documents is provided in Appendix A). Further, secondary data such as personal experience reports of Fellows and press statements were investigated to enrich the perspective and mitigate the potential subjectivism of information published by Tech4Germany itself (Finnegan, 2006). Additionally, podcasts with the founders of Tech4Germany were consulted which provide relevant information as they reflect the position and experiences of the third involved group in the collaborative process, namely the core team of Tech4Germany (the podcast transcripts are provided in Appendix E). The analysis of these documents sets the foundation for the conducted interviews and serves as supplementary information for the analysis.

The second and main source of evidence are in-depth interviews with former participants of Tech4Germany. In total, six interviews were conducted, three with former Fellows and three with Digitallotsen. The method of semi-structured interviews was chosen which "involves the implementation of a number of predetermined questions and special topics" while the interviewer has the freedom to ask follow-up questions and go beyond the prepared standardised questions (Berg, 2009, p. 107). This is the most suitable method because it allows to structure the interviews in accordance with the theoretical framework and it simultaneously provides the flexibility to dive deeper into a topic that occurs to be particularly relevant for the investigated case (van Thiel, 2007). Following the outlined research design, the interview guideline was deductively derived from the analytical framework. Thereby, each theoretical dimension (empowered actors, mutual and transformative learning, and joint ownership) was operationalised into concrete questions (presented in Appendix D), whereby the abstract concepts were translated into everyday language to ensure the interviewees can understand what is asked

(Kvale, 2007). While using the same dimensions in all interviews, the specific questions have been slightly adopted for the Fellows and Digitallotsen to take the different functions and perspectives into account. The interviews took on average 35 minutes and were conducted via a video meeting on Zoom with one exception via phone.

The interviews were recorded, transcribed and anonymised to prepare the data for the qualitative content analysis which is understood as the "nonnumerical examination and interpretation of observations, for the purpose of discovering underlying meanings and patterns of relationships" (Babbie, 2013, p. 390). As the diagnostic research design implies, the coding scheme was developed based on the deductive category assignment method whereby the analysis is systematic, theory-driven and rule-bound (Mayring, 2015). Hence, the analytical framework was operationalised into specific codes in order to apply the theoretical frame to the interview transcripts. After a first familiarisation with the data, the software "ATLAS.ti" was used to apply the theoretical codes to the empirical data. In a third step, it was scrutinised whether the deductively derived codes capture all data or further inductively developed codes are needed (Mayring, 2015; Swanson & Holton, 2005). To increase the reliability of the qualitative data analysis and interpretations, the coding scheme is provided in Appendix B.

4. Analysis

In this chapter, the findings that were derived from the content analysis are presented in the light of the analytical framework whereby each section provides the results of one code group. In accordance with the theoretical foundation, the chapter starts with presenting the data regarding the collaboration of empowered actors, followed by mutual and transformative learning, and joint ownership of the digital innovations. Lastly, the identified limitations and challenges are presented.

4.1. Collaboration of empowered actors

Upon exploring in what ways Tech4Geramany enables the collaboration of empowered actors, the first key finding is that Tech4Germany is responsible for the *initiation of the collaboration* (Fellow 2). One of the co-founders describes Tech4Germany in a podcast as "an independent intermediary who lowers the obstacles for both sides so that [the collaboration] is attractive" (Lang, 2020, l.73f.). Particularly, they address professions such as designers who usually do not find job advertisements in German public organisations and provide a setting that is attractive for young tech talents who otherwise would have not considered working for a public organisation (Fellow 1; Fellow 3). Simultaneously, Tech4Germany creates a unique room for public employees who are willing to approach their digital innovation project with new methods but do not have the available resources, knowledge, or opportunity to do so (Anton & Hupperth, 2020b; Digitallotse 3). To ensure the feasibility of the digital innovation project, Tech4Germany selects the participants through an application process. The Fellows are chosen based on their technical skills, methodological expertise, and motivation (DigitalService4Germany, 2021c).

The Digitallotsen apply with a concrete project (Digitallotse 3) which is assessed by an external jury (including representatives of the administration, science, civil society and Tech4Germany alumni) based on three criteria: impact, open-endedness, and feasibility (Tech4Germany, 2021a). However, it appeared in one case that a Digitallotse was not involved in the application process but appointed to join the fellowship because another department led the application process and nobody else from his/her department wanted to participate (Digitallotse 2).

To analyse whether the projects of Tech4Germany meet the concept of collaborative innovation, it was investigated whether the selected participants qualify as the in chapter 2.4.1 outlined roles of empowered actors. Hereby, it was identified in the document study that the Digitallotsen suit the theoretical concept of affected actors and the Fellows the role of relevant actors (see for instance Rodríguez (2021); project reports, Appendix A). In the interviews, these roles were clearly confirmed. The Digitallotsen described that they were directly *affected* by the problem to be solved in their working life as they work in the responsible department and therefore had detailed knowledge of the problem and its context. This coincides with the perception of all interviewed Fellows who experienced that the Digitallotsen had "many direct points of contact" (Fellow 1, l.64) with the problem and their expertise was "very detailed" (Fellow 3, l.60). During the project, Digitallotse 2 perceived his/her *role* to be a "mediator […] between the Fellows and the department or the house [ministry] in general" (ll.38ff.). Hereby, the main responsibilities spanned providing support in regard to special requirements like data protection and accessibility (Fellow 2), connecting the Fellows with other important stakeholders (Digitallotse 1), putting their political opinion into context (Digitallotse 3), and providing direct access to the end-users of the developed innovation (Fellow 1). Therefore, all Fellows stated that "it would have not been possible to realise [the project] without the Digitallotsen" (Fellow 3, ll.208f.).

All interviewees reported that the Fellows had relevant and necessary *skills* to develop the digital innovation which confirms their characterisation as relevant actors. Particularly, it was emphasised that the teams were interdisciplinary, and their expertise complemented one another well (Digitallotse 1; Digitallotse 2). Besides others, these skills include UX-/UI-design, coding, design thinking, agile software development and user-centric problem-solving (Fellow 1; Fellow 2; Fellow 3). What stands out is that the methodological expertise is generally more emphasised than purely technical skills. Hence, the Fellows mainly took on the *role* of project and product managers who structured the projects as an iterative innovation cycle and enabled the collaborative development of the prototype with the outlined working methods (Fellow 2; Fellow 3). Particularly, identifying the actual problem from a user-perspective and investigating the problem with an unprepossessed view was stated to be a key value (Digitallotse 1; Digitallotse 2). Thus, all Digitallotsen described that they could not have achieved the same results without the Fellows.

Secondly, it is a key premise that the projects can indeed be characterised as *collaboration* between the Digitallotsen and Fellows. Overall, all interviewees reported an active and intense collaboration throughout all project phases. Hereby, the Fellows did a large part of the analytical work like conducting and synthesising user interviews whereby the Digitallotsen helped the Fellows to understand the problem and were available the whole time to answer questions or provide additional information. One day a week, the Fellows and Digitallotsen collaboratively worked on the digital innovation in form of workshops which included open discussions, ideation sessions, brainstorming, prioritising of ideas and testing prototypes (Digitallotse 1; Digitallotse 2; Fellow 1). Especially because the Digitallotsen participated in the innovation activities without hierarchical structures (Fellow 2) and as full members of the team (Digitallotse 2; Digitallotse 3; Fellow 3), these workshop activities accord with the theoretical understanding of collaboration. Hereby, Digitallotse 3 emphasised the "co-creative momentum" (l.102) which strongly differentiated the fellowship from the relationship to an external IT-provider. Therefore, the findings suggest that the collaboration of diverse actors with interdisciplinary skills contributed to the *generation of innovative ideas* (Digitallotse 3; Fellow 1; Fellow 2).

Having found that the projects are indeed a form of collaborative innovation, the question remains how Tech4Germany enables the relevant and affected actors to collaborate. Beyond the initiation of the collaboration, the data indicates that Tech4Germany meets the theoretical description of a *boundary spanner.* One of the co-founders described her role in a podcast as "enabler and problem-solver *[Probleme-aus-dem-Weg-Räumer]*" (Lang, 2021, l.86). Precisely, Tech4Germany facilitated the start of the collaboration by providing each group with relevant information and setting the *ground-rules,* for instance, the meeting and time schedule (Digitallotse 1; Fellow 1) and the legal foundation (DigitalService4Germany, 2021b). Since all participants apply for a specific role (Engineering, Design or Product Fellow or Digitallotse), Tech4Germany also implicitly prescribed the responsibilities (Fellow 2). Moreover, the core team organised an onboarding week and workshops whereby the Fellows learned about the processes and vocabulary of public organisations and the Digitallotsen about the working methods and vocabulary of the digital economy (Anton & Hupperth, 2020a; Fellow 2; Tech4Germany, 2021b). This coincides with the outlined theoretical role of a boundary spanner to translate and link the diverse knowledge of the actors (Torfing, 2016). Both groups, Fellows and Digitallotsen, perceived those measures to be helpful for the collaboration as they also allowed to get to know each other in a safe setting (Digitallotse 2; Fellow 1).

Regarding a *shared goal*, Tech4Germany did not prescribe a concrete objective for each project but only guiding principles like a strong focus on user-centricity and the aim to finish the project with a prototype (Fellow 2). Hereby, the Fellows and Digitallotsen had a divergent understanding of the objectives in the beginning but developed a shared goal over time (Digitallotse 2; Fellow 3). However, in line with the design thinking and agile approach, it was not a fixed goal but reframed constantly

(Fellow 2). During the course of the project, Tech4Germany was not actively involved in the collaboration (Digitallotse 1; Fellow 1), but "they provided the frame and [the participants] could fill this frame completely free and independently" (Fellow 2, ll.157f.). Tech4Germany regularly asked whether everything was going well (Fellow 1), provided additional feedback and help when the project teams had problems (Fellow 3) and moderated between the Fellows and Digitallotsen in cases of conflict which was perceived as very helpful (Digitallotse 2). The key findings are summarised in Table 2. Additionally, the code frequencies and paraphrased key messages per interviewee which serve as the basis for the tables are presented in Appendix C.

Table 2. Collaboration of empowered actors: Key findings

Key finding	Number of responding interviewees who confirmed key finding*	
	Fellows	*Digitallotsen*
Digitallotsen are directly affected by problem/innovation	3/3	3/3
Digitallotsen take on the role of mediators	3/3	3/3
Fellows have relevant skills for the innovation project	3/3	3/3
Fellows take on the role of project/product managers	3/3	3/3
Tech4Germany takes on the role of a boundary spanner	3/3	3/3
Tech4Germany initiates collaboration	3/3	2/3
Active collaboration takes place in form of weekly workshops	3/3	3/3
A shared goal is developed throughout the project	3/3	3/3
Tech4Germany sets ground-rules	3/3	3/3
Collaboration contributes to generation of innovative ideas	3/3	2/2

* In the illustration x/y, y indicates the number of interviewees who gave a relevant response to the attribute and x indicates the number of interviewees who confirmed the key finding. A finding counts as confirmed if any indication that the attribute applies was made.

4.2. Mutual and transformative learning

The analytical framework ascribes an important role to mutual and transformative learning for the development of innovations through collaboration. In the case of Tech4Germany, this importance is

reflected in the official contracts, stating that the DigitalService4Germany GmbH "runs the programme Tech4Germany […] for the development of digital competencies *[Digitalkompetenzen]* of the public employees" (DigitalService4Germany, 2021b, p. 1) and "provides the talents *[Fellows]* a platform for open-ended thinking in regard to digitalisation processes through an open-ended knowledge transfer in an 'experimental' space" (DigitalService4Germany, 2021c, p. 1). In the interviews, it was investigated whether these official statements conform with reality.

For the dimension of *mutual learning*, all interviewed Digitallotsen reported they learned new methods, particularly agile project management skills and design thinking techniques. Additionally, some got to know new workshop formats and tools for digital collaboration (Digitallotse 1). The learning experience is underpinned as the Digitallotsen continued using the acquired methods and tools after the project (Digitallotse 1; Digitallotse 2). However, all interviewees did not acquire new technical skills, either because they already had advanced IT-skills (Digitallotse 1), they were not interested in technical issues (Digitallotse 2), or the time was not sufficient to develop advanced technical skills (Digitallotse 3). From the perspective of the Fellows, the willingness to learn differed among the participating Digitallotsen. Whereas most were eager to learn new working methods and it was observable that they acquired new techniques, some were sceptical because they either assumed to already know these working methods (Fellow 2) or they did not acknowledge the value of the new approaches (Fellow 1).

Concerning the *transformative learning*, the findings are mixed. On the one hand, the attitude towards digital innovations in general did not change (Digitallotse 1; Digitallotse 3). To a large extent, this can be explained by the fact that the participating public employees already had a positive attitude towards digital innovations before the collaboration (Fellow 1). On the other hand, two Digitallotsen described that their thinking on how to approach a digitalisation project changed significantly. Especially, Digitallotse 2 reported that s/he thought little about whether a product or service even makes sense for the citizens beforehand, and then learned how to approach problems from a user-centric perspective from the Fellows. Hereby, it was emphasized as a key value of Tech4Germany that new working methods are not taught in a training but can be experienced in a real digital innovation project (Digitallotse 3; Fellow 2; Fellow 3). The importance of this real-life experience is underpinned by the statement of Digitallotse 2 that the degree of transformative learning appeared to be "related to […] the degree how strongly one was involved in the process" (ll.109f.). Additionally, the Digitallotsen "disregarded existing rules to imagine how it could look like in an ideal world" (Digitallotse 2, ll.315f.) and the used methods in the workshops aimed to "break with the gridlocked administrative thinking" (Digitallotse 2, l.94), which again indicates the experience of transformative learning. At the same time, it was mentioned that it was rather a first encounter and "it takes more to really learn the mindset of design thinking" (Fellow 2, ll.226f.).

On the side of the Fellows, all interviewees described that they experienced *mutual learning* during the project. Particularly, because the public administration was perceived as a "Blackbox" (Fellow 2, l.206) before the project, they acquired new knowledge about the requirements, decision-making and administrative processes in public organisations. Furthermore, some learned new skills from the other participating Fellows and during the workshops organised by Tech4Germany (Fellow 2; Fellow 3). However, there were few findings that suggest *transformative learning*. Only Fellow 2 experienced a mindset shift away from career and monetary success towards purposeful work to such an extent that s/he started working for the public sector after the Tech4Germany project. In sum, it was reported to be highly important that the collaborative learning allowed for a "more realistic" (Fellow 2, l.354) *development of suitable digital innovations* because without the expertise of the Digitallotsen, the Fellows would have not been able to understand the specific context of the public organisation (Fellow 3). To conclude, the key findings are summarised in Table 3.

Table 3. Mutual and transformative learning: Key findings

Key finding	Number of responding interviewees who confirmed key finding*	
	Fellows	*Digitallotsen*
Digitallotsen experience mutual learning	3/3	3/3
Fellows experience mutual learning	3/3	n.a.
Digitallotsen experience transformative learning	2/3	2/3
Fellows do *not* experience transformative learning	2/3	n.a.
Collaboration contributes to the development of a suitable innovation	3/3	3/3

* In the illustration x/y, y indicates the number of interviewees who gave a relevant response to the attribute and x indicates the number of interviewees who confirmed the key finding. A finding counts as confirmed if any indication that the attribute applies was made.

4.3. Joint ownership of digital innovations

Concerning the third theoretical dimension, the data clearly indicates that joint ownership of the digital innovation was created among the actively involved participants. Firstly, a *shared responsibility* is observable since all interviewees felt strongly responsible for the success of the digital innovation project. Fellow 1 explained that the implementation of the developed prototype "was only possible because [the] project partners were very committed" (l.221). Also, the Fellows and Digitallotsen equally contributed to the success of the project (Fellow 3). The positive impact of the collaboration is confirmed

by the statement of Digitallotse 3 that s/he would have not cared about the project's success that much if it was a normal relationship with an external IT-provider. Secondly, it can be derived that all important decisions were made together in the team and in many cases even consensual (Digitallotse 1; Fellow 2). Thus, the *decision-making authority* moved from the public agency to the collective of the involved actors.

In line with the theoretical mechanism, this joint ownership led to a reduced *implementation resistance* among the actively involved Digitallotsen as they all personally advocated the implementation of the developed digital innovation and took action to make the implementation possible after the project ended (Digitallotse 1; Digitallotse 3). The importance of the collaboration is underpinned by the finding that the implementation resistance of the public employees who were not involved partly remained. For instance, some rejected the changes that would have come along with the digital innovation as they "got the feeling to do everything wrong and now the young people come and want to tell [them] how public administration works" (Digitallotse 2, ll.100ff.). In contrast, those who regularly noticed the progress and observed the applied methods became more open-minded and did not oppose digital innovations and modern approaches anymore (Digitallotse 2).

Another important aspect is that the collaboration with Tech4Germany in some projects directly helped to get the necessary support for a digital innovation the Digitallotsen have unsuccessfully tried to implement for many years because the Fellows were able to present a concrete prototype to the important actors and illustrate the benefits more precisely (Fellow 1). Further, it was essential that the projects with Tech4Germany were often supported and promoted by high political decision-makers who were involved through presentations of the progress and results, for instance the state secretary or federal minister (Digitallotse 3; Fellow 1). Concluding, the key findings are summarised in Table 4.

Table 4. Joint ownership: Key findings

Key finding	Number of responding interviewees who confirmed key finding*	
	Fellows	*Digitallotsen*
Fellows and Digitallotsen share responsibility	3/3	3/3
Decisions are made collectively	2/2	1/1
Degree of implementation resistance is reduced by the collaboration	3/3	3/3

* In the illustration x/y, y indicates the number of interviewees who gave a relevant response to the attribute and x indicates the number of interviewees who confirmed the key finding. A finding counts as confirmed if any indication that the attribute applies was made.

4.4. Limitations and challenges of collaboration in form of fellowship programmes

As the past three sections outlined in what ways the three theoretical mechanisms of collaborative innovation are observable, this section presents the key challenges and limitations of collaborative innovation in form of fellowship programmes to allow for a critical assessment of the concept of Tech4Germany.

Firstly, several *conflicts and misunderstandings* were reported. At the beginning of the collaborative innovation process, it was perceived as a challenge that the public employees and digital experts used different vocabulary and talked about processes neither of them knew of the other (Fellow 1). Additionally, there was disagreement about the chosen communication tools (Digitallotse 2). Moreover, a conflict occurred because the Fellows decided the aspired solution does not make sense for the specific context which was met with disappointment by some Digitallotsen (Fellow 2). In one case, a Digitallotse "even rejected to take part in workshops" (Fellow 1, l.184) because s/he feared ridicule and did not see the value of those methods. However, all interviewees stated that these were minor conflicts that could either be solved or did not strongly impair the overall project.

Beyond that, some circumstances caused *limitations.* Many of the tools used by the Fellows were not compatible with the IT-equipment of the public employees or not allowed due to security regulations (Digitallotse 2; Fellow 1; Fellow 2). Furthermore, time was described to be a key limitation factor because the Digitallotsen participated in the Tech4Germany project on top of their daily work, resulting in a very limited time frame and a reduced learning opportunity (Digitallotse 3; Fellow 1; Fellow 2). In addition to that, three months is a very short time frame for a digital innovation so the end product usually was a good prototype but not a functioning minimum viable product (MVP) and not all prototypes were implemented afterwards (Digitallotse 1; Fellow 2). Moreover, the findings show that even if all three outlined mechanisms are observable, there are still *barriers to the implementation* that cannot be changed by Tech4Germany, for instance, limitations due to data protection and accessibility requirements, technical issues in the larger IT-system of the public organisation, and procedural regulations (Digitallotse 1; Fellow 2). Moreover, the Digitallotsen usually do not have the full authority to decide about the implementation (Digitallotse 1). Lastly, the contact *restrictions due to the Covid-19 pandemic* strongly impaired the digital innovation projects in 2020 as collaboration is more fruitful in presence than in digital formats (Digitallotse 1; Fellow 1; Fellow 2).

In sum, two key points regarding the *scope and impact of Tech4Germany* can be derived from the findings. On the one hand, the concept is limited in its scope as the above-outlined mechanisms mainly apply to the comparatively small number of active participants. In this aspect, the difficulty to communicate these new approaches to the entire ministry and to really "live" the mindset was described (Digitallotse 2, l.153). Thus, it will take a relatively long time until Tech4Germany has an impact beyond the directly involved actors. Nonetheless, all interviewees strongly emphasized that the fellowship

programme is a valuable concept that should be continued. Hereby, the identified key value is that Tech4Germany opens-up the public organisations and provides a setting where the public employees can experience an interdisciplinary, cross-sectional, and agile way of working (Fellow 2). Therefore, Tech4Germany is described by the participants as a very important first step initiating a process of change and thus paving the way for further digital innovations projects that are approached from an agile and user-centric perspective (Digitallotse 2; Fellow 2; Fellow 3). Hence, the impact of Tech4Germany was summarised with the words: "Constant dripping wears away the stone" (Digitallotse 2, l.358).

Table 5. Limitations and challenges: Key findings

Key finding	Number of responding interviewees who confirmed key finding*	
	Fellows	*Digitallotsen*
Conflicts or misunderstandings occur	3/3	1/3
Limited time capacities of the Digitallotsen and/or insufficient IT-equipment impair the collaboration	3/3	2/2
External barriers impede implementation	2/2	2/2
Covid-19 pandemic impaired collaboration	2/2	1/1
Tech4Germany has a positive impact on the development of digital innovations but the scope is limited	3/3	3/3

* In the illustration x/y, y indicates the number of interviewees who gave a relevant response to the attribute and x indicates the number of interviewees who confirmed the key finding. A finding counts as confirmed if any indication that the attribute applies was made.

5. Discussion

5.1. Results

The presented findings serve to answer the sub-questions of this study. Regarding the ways the fellowship programme enables the collaboration of empowered actors, it became clear that Tech4Germany meets the role of a boundary spanner by bringing together the Digitallotsen in their position as affected actors and Fellows whose technical and methodological skills make them relevant actors. Therefore, Tech4Germany provides a space where both groups can collaboratively work together on a concrete digital innovation by defining the basic structure, rules and responsibilities. Beyond that, the workshops and onboarding week facilitate the collaboration by linking and translating the diverse knowledge and vocabulary. What must be noted is that the active collaboration between the affected and relevant actors only takes place one day a week, whereas the rest of the time the interaction can rather

be described as mutual support. Furthermore, Tech4Germany does not operate as a boundary spanner throughout the whole collaboration but is available upon request, for instance in cases of conflict.

The findings for the second sub-question are mixed, indicating that mutual and transformative learning was experienced in some cases but highly depends on the individual motivation, previous knowledge, and extent to which the actor was actively involved. Hereby, it stands out that the Digitallotsen did not learn new technical skills which must be noted as a limitation as this study investigates the development of *digital* innovations. On the other hand, the public employees clearly acquired new methodological competencies and changed the way they approach digital innovation projects towards user-centric and agile thinking. Since it is widely acknowledged that these approaches are crucial for digital innovation projects (Mergel, 2016), it is concluded that the actors overall learned relevant skills for the development of digital innovations in the specific context of public organisations.

Concerning the third sub-question, it was found that the actively involved actors evidently created joint ownership as they shared the responsibility and decision-making authority. Therefore, the collaborative innovation contributes to a low level of implementation resistance among the involved public employees. Similar to transformative learning, this effect seems to depend on the degree of involvement and gets weaker the fewer contact points a public employee had with the Tech4Germany project. At the same time, the sheer presence of Tech4Germany helped to reduce the implementation resistance of decision-makers by illustrating potential benefits and increasing the political attention.

All in all, the results show that the theoretical mechanisms of collaborative innovation apply to a very large extent and the theory provides relevant propositions to explain how a fellowship programme can contribute to the development of digital innovations in public organisation. At the same time, it appears that even if all mechanisms apply, the collaboratively developed prototypes were not necessarily transformed into digital innovations. Thus, particularly the third theoretical mechanism concerned with the implementation of innovations should be extended by focusing on antecedents that affect the implementation beyond joint ownership among the involved actors. In the findings, the institutional setting and support of decision-makers were indicated to have a relevant impact. Therefore, it should be further theoretically investigated how the complex political environment of public organiations might effect the implementation of collaboratively developed innovations.

5.2. Limitations of the research

With regard to the limitations of the thesis, this single-case study does not allow generalising the findings to other fellowship programme but only provides transferable indications and starting points for further studies. Additionally, the small sample size implies that it was not possible to empirically validate the extent to which the theoretical mechanisms apply in this case. Since not all participants have been interviewed, some perspectives might be missing, and no conclusion can be drawn about the overall

impact of Tech4Germany. Particularly, it stands out that all interviewees generally had a positive attitude towards the fellowship. Thus, the selection process might have induced a bias as not all persons replied to the interview request and it may be that advocates of Tech4Germany were more willing to share their experience than sceptics. Moreover, since all participants are publicly named on the website of Tech4Germany, they might have an intrinsic motivation to present the programme in a positive light.

Beyond that, the exceptional circumstances during the Covid-19 pandemic infer that the experiences of the respondents who participated in 2020 might differ in comparison to other years and contain elements that are not representative for the fellowship programme. However, it was found that the key findings coincide between the participants of 2019 and 2020 which mitigates this limitation. Lastly, all interviews have been conducted in German so the translated quotations may have different connotations and thus can lose some of their meaning.

6. Conclusion

While it is known that collaborative innovation strategies adhere some advantages compared to hierarchical and competitive innovation strategies, few settings in which collaborative innovation can be supported and sustained in the present governance system have been found. Therefore, this study aimed to analyse a so-far unexplored form of collaborative innovation by answering the research question of how the fellowship programme Tech4Germany contributes to the development of digital innovations in German public organisations. The key finding of this study is that the scientific phenomenon of fellowship programmes qualifies as a form of collaborative innovation and the theoretical mechanisms are observable to a large extent. Therefore, fellowship programmes can be described as a third space between one-time collaboration projects and innovation labs. In theoretical terms, a fellowship programme thus contributes to the development of digital innovations by providing a new institutional design for collaborative innovation.

Precisely, Tech4Germany enables the collaboration by lowering the transaction costs for the public organisations, creating a setting that attracts digital innovation experts, and providing the basic structure and rules. Further, the fellowship programme provides a unique room in which public employees can experience new ways of working and mutual and transformative learning is stimulated. However, the findings are mixed, indicating that the experience of learning depends on individual characteristics and the degree of involvement in the collaboration. Moreover, the fellowship programme creates joint ownership of the developed prototype, leading to support for the implementation of the digital innovation among the involved public employees. These mechanisms strongly differentiate the collaboration with citizens from contracting-out the development of digital innovations to external IT-providers. In sum, the fellowship programme contributes to the development of digital innovations by initiating the first step towards opening-up public organisations for interdisciplinary and cross-sectional

expertise and allowing the public organisations to experiment with agile and user-centric approaches in a secure setting.

Having systematically analysed the fellowship programme in the light of the existing scholarship of collaborative innovation, this study fills the identified research gap. Therefore, it sets the initial groundwork for future research on the scientific phenomenon of innovation fellowship programmes and provides promising starting points for further studies. First, quantitative studies are needed to measure the impact of fellowship programmes. Here, an interrupted time series design based on a questionnaire answered by all participants in the beginning and at the end of each project appears to be a valuable research design. Given the bounded setting of Tech4Germany, the case also provides opportunities for different data collection methods, for instance focus groups or observations of behaviour. This would allow to further investigate the before outlined theoretical implications. Further, a study that evaluates the long-term impact and the degree of improvement through the developed digital innovations is recommended. Beyond that, case studies of different fellowship programmes and especially cross-country comparative studies would increase the validity of these findings and would allow to analyse which institutional design of fellowship programmes provides the best setting for collaborative innovation.

In addition to the implications for research, this study provides recommendations for practitioners in politics, public administration, and governance. Generally, fellowship programmes appear to be a valuable alternative or supplement to innovation labs and one-time collaboration projects as they not only create digital innovation prototypes but may also increase the in-house capacity of public organisations to develop and oversee digital services and products. Hence, it is recommended to establish more fellowship programmes, for instance on the federal state level. This seems to be realistic as the number of applications by far exceeds the number of projects that Tech4Germany can implement (Anton & Hupperth, 2020a). Concerning the organisation of Tech4Germany, the findings clearly suggest that the Digitallotsen should be granted more time to actively collaborate with the Fellows and thus need to be freed from some of their daily responsibilities. This would increase the positive effect of mutual and transformative learning and therefore also the long-term impact on the development of digital innovations. Lastly, it should be aimed to include more public employees in the collaboration who are sceptical about digital innovations and modern working methods. Even though this might increase the transaction costs of the collaborative projects, it is essential to establish a cultural change and ultimately reach the goal of Tech4Germany to “expedite the digitalisation of Germany and thereby learn from and with each other” (Tech4Germany, 2021b, p. 1).

References

Agger, A., & Sørensen, E. (2018). Managing collaborative innovation in public bureaucracies. *Planning Theory*, *17*(1), 53–73.

Ansell, C., & Torfing, J. (2015). How does collaborative governance scale? *Policy & Politics*, *43*(3), 315–329.

Ansell, C., & Gash, A. (2008). Collaborative Governance in Theory and Practice. *Journal of Public Administration Research and Theory*, *18*(4), 543–571.

Anton, S., & Hupperth, A. (2020a, March 16). Episode 11: tech4germany – wie macht man den staat fit für die digitalisierung, sonja anton & anna hupperth? (Teil 2). *Podcast: Talking Legal Tech, Hosted by Felipe Molina*. Retrieved April 29, 2021, from: https://open.spotify.com/episode/69SzsRr5rZnPf88toyXJiX

Anton, S., & Hupperth, A. (2020b, March 16). Episode 9: Tech4Germany – Wie digitalisiert man die öffentliche Verwaltung? (Teil 1). *Recode.Law Podcast, Hosted by Henrik Volkman*. Retrieved April 29, 2021, from: https://open.spotify.com/episode/5Xs8gMeDUbMuiOLdtDGQQZ

Babbie, E. R. (2013). *The practice of social research* (13th edt.). Wadsworth: Cengage Learning.

Berg, B. (2009). *Qualitative Reserach Methods for the Social Sciences*. Boston: Allyn & Bacon.

Blatter, J., & Haverland, M. (2012). *Designing case studies: Explanatory approaches in small-N research*. New York: Palgrave Macmillan.

Bommert, B. (2010). Collaborative Innovation in the Public Sector. *International Public Management Review*, *11*(1), 15–33.

Borins, S. (2001). Encouraging innovation in the public sector. *Journal of Intellectual Capital*, *2*(3), 310–319.

Chesbrough, H. W. (2003). *Open innovation: The new imperative for creating and profiting from technology*. Boston: Harvard Business School Press.

Cinar, E., Trott, P., & Simms, C. (2019). A systematic review of barriers to public sector innovation process. *Public Management Review*, *21*(2), 264–290.

Ciriello, R. F., Richter, A., & Schwabe, G. (2018). Digital Innovation. *Business & Information Systems Engineering*, *60*(4), 563–569.

Coglianese, C. (2020). Algorithmic regulation: Machine learning as a governance tool. In M. Schuilenburg & R. Peeters (Eds.), *The algorithmic society. Technology, power, and knowledge* (pp. 35–52). Andover: Routledge.

Damanpour, F. (1991). Organizational Innovation: A Meta-Analysis of Effects of Determinants and Moderators. *The Academy of Mangagement Journal*, *34*(3), 555–590.

DeVries, H., Bekkers, V., & Tummers, L. G. (2016). Innovation in the public sector: A systematic review and future research agenda. *Public Administration*, *94*(1), 146–166.

DeVries, H., Tummers, L. G., & Bekkers, V. (2018). The Diffusion and Adoption of Public Sector Innovations: A Meta-Synthesis of the Literature. *Perspectives on Public Management and Governance, 1*(3), 159–176.

Digitallotse 1. (2021, May 10). Interview 1.

Digitallotse 2. (2021, May 12). Interview 4.

Digitallotse 3. (2021, May 21). Interview 6.

DigitalService4Germany (n.d.). Company Website. Retrieved April 20, 2021, from: https://digitalservice4germany.com/

DigitalService4Germany (2021a). Corporate Governance Bericht 2020: nach Ziffer 6.1 des Public Corporate Governance Kodex des Bundes. Retrieved April 20, 2021, from: https://digitalservice4germany.com/assets/corporategovernance-bericht-2020.pdf

DigitalService4Germany (2021b). Kooperationsvertrag Tech4Germany. Retrieved April 20, 2021, from: https://tech.4germany.org/wp-content/uploads/2021/02/Kooperationsvertrag_Tech4Germany-2021.docx.pdf

DigitalService4Germany (2021c). Stipendiumsrichtlinie Tech4Germany. Retrieved April 20, 2021, from: https://tech.4germany.org/wp-content/uploads/2021/02/Stipendiumsrichtlinien_Tech4Germany_2021.docx.pdf

Dunleavy, P., Margetts, H., Bastow, S., & Tinkler, J. (2006). New Public Management Is Dead - Long Live Digital-Era Governance. *Journal of Public Administration Research and Theory*, *16*(3), 467–494.

Eggers, W. D., & Singh, S. K. (2009). *The public innovator's playbook: Nurturing bold ideas in government*. Washington, DC: Harvard Kennedy School of Government.

European Commission (2020). Digital Economy and Society Index (DESI) 2020: Digital public services. Retrieved May 3, 2021, from: https://ec-europa-eu.ezproxy2.utwente.nl/digital-single-market/en/digital-public-services

Fellow 1. (2021, May 10). Interview 2.

Fellow 2. (2021, May 11). Interview 3.

Fellow 3. (2021, May 17). Interview 5.

Finnegan, R. (2006). Using Documents. In R. Sapsford & V. Jupp (Eds.), *Data collection and analysis* (2nd edt., pp. 138–150). London: SAGE.

Fledderus, J., Brandsen, T., & Honingh, M. (2014). Restoring Trust Through the Co-Production of Public Services: A theoretical elaboration. *Public Management Review*, *16*(3), 424–443.

Gascó, M. (2017). Living labs: Implementing open innovation in the public sector. *Government Information Quarterly*, *34*(1), 90–98.

Gil-Garcia, J. R., Dawes, S. S., & Pardo, T. A. (2018). Digital government and public management research: finding the crossroads. *Public Management Review*, *20*(5), 633–646.

Godin, B., & Vinck, D. (Eds.) (2017). *Critical studies of innovation: Alternative approaches to the pro-innovation bias*. Cheltenham: Edward Elgar.

Greenhalgh, T., Robert, G., Macfarlane, F., Bate, P., & Kyriakidou, O. (2004). Diffusion of innovations in service organizations: Systematic review and recommendations. *The Milbank Quarterly*, *82*(4), 581–629.

Hartley, J., Sørensen, E., & Torfing, J. (2013). Collaborative Innovation: A Viable Alternative to Market Competition and Organizational Entrepreneurship. *Public Administration Review*, *73*(6), 821–830.

Heartley, J. (2005). Innovation in Governance and Public Services: Past and Present. *Public Money and Management*, *25*(1), 27–34.

HM Government (n.d.). No.10 Innovation Fellowships. Retrieved May 3, 2021, from: https://no10innovationfellows.campaign.gov.uk/

Kvale, S. (2007). *Doing interviews*. London: SAGE.

Lang, C. (2020, July 2). Frauen digitalisieren Deutschland. *Podcast: Plan W – Süddeutsche Zeitung, Hosted by Susanne Klingner*. Retrieved April 29, 2021, from: https://open.spotify.com/episode/5N2Wm8Tyfn9CZT7Z3jN8Ii

Lang, C. (2021, April 5). Episode #7 – Christina Lang. *Motivation. Du & Ich – Ein Podcast Mit Philip Bremer*. Retrieved April 29, 2021, from: https://open.spotify.com/episode/7i3XDBuZsJI2Rpqmsodmjn?si=AHbqLIKLQzqvY9WQZGvfbQ

Lewis, J., & Ritchie, J. (2003). Generalising form Qualitative Research. In J. Ritchie & J. Lewis (Eds.), *Qualitative research practice: A guide for social science students and researchers* (pp. 263–286). London: SAGE.

Lindsay, C., Findlay, P., McQuarrie, J., Bennie, M., Corcoran, E. D., & van der Meer, R. (2017). Collaborative Innovation, New Technologies, and Work Redesign. *Public Administration Review*, *78*(2), 251–260.

Lopes, A. V., & Farias, J. S. (2020). How can governance support collaborative innovation in the public sector? A systematic review of the literature. *International Review of Administrative Sciences*, 1-17.

Mayring, P. (2015). *Qualitative Inhaltsanalyse: Grundlagen und Techniken* (12th edt.). Basel: Beltz Verlag.

McGann, M., Blomkamp, E., & Lewis, J. (2018). The rise of public sector innovation labs: experiments in design thinking for policy. *Policy Science*, *51*, 249–267.

McGann, M., Wells, T., & Blomkamp, E. (2021). Innovation labs and co-production in public problem solving. *Public Management Review*, *23*(2), 297–316.

McIvor, D. W. (2020). Toward a Critical Theory of Collaborative Governance. *Administrative Theory & Praxis*, *42*(4), 501–516.

Mergel, I. (2016). Agile innovation management in government: A research agenda. *Government Information Quarterly*, *33*(3), 516–523.

Mergel, I. (2019). Digital service teams in government. *Government Information Quarterly*, *36*(4), 1–16.

Moore, M., & Hartley, J. (2008). Innovations in governance. *Public Management Review*, *10*(1), 3–20.

Neumann, O., Matt, C., Hitz-Gamper, B. S., Schmidthuber, L., & Stürmer, M. (2019). Joining forces for public value creation? Exploring collaborative innovation in smart city initiatives. *Government Information Quarterly*, *36*(4), 1–14.

Obama White House Archives (n.d.). Presidential Innovation Fellows. Retrieved May 3, 2021, from: https://obamawhitehouse.archives.gov/innovationfellows

Osborne, S. P. (2006). The New Public Governance? *Public Management Review*, *8*(3), 377–387.

Patton, M. Q. (1990). *Qualitative evaluation and research methods*. Newbury Park: SAGE.

Peeters, R., & Schuilenburg, M. (2020). The algorithmic society: An introduction. In M. Schuilenburg & R. Peeters (Eds.), *The algorithmic society. Technology, power, and knowledge* (pp. 1–16). Andover: Routledge.

Presse- und Informationsamt der Bundesregierung (2020, October 15). Tech4Germany. Technologie-Taskforce für die Bundesministerien. Retrieved May 3, 2021, from: https://www.bundesregierung.de/breg-de/suche/tech4germany-1797948

Rainey, H. G. (2014). *Understanding and managing public organizations* (5th edt.). San Francisco: Jossey-Bass.

Ritchie, J. (2003). The Applications of Qualitative Methods to Social Research. In J. Ritchie & J. Lewis (Eds.), *Qualitative research practice: A guide for social science students and researchers* (pp. 24–46). London: SAGE.

Ritchie, J., Lewis, J., & Elam, G. (2003). Designing and Selecting Samples. In J. Ritchie & J. Lewis (Eds.), *Qualitative research practice: A guide for social science students and researchers* (pp. 77–108). London: SAGE.

Rodríguez, J. E. (2021, February 12). Mit Tech4Germany Dienstleistungen gestalten, die besser für alle funktionieren. *Medium*. Retrieved April 29, 2021, from: https://jerdesign.medium.com/mit-tech4germany-dienstleistungen-gestalten-die-besser-f%C3%BCr-alle-funktionieren-26a456a211d6

Rogers, E. M. (2003). *Diffusion of innovations* (5th edt.). New York: Free Press.

Sicilia, M., Guarini, E., Sancio, A., Andreani, M., & Ruffini, R. (2016). Public services management and co-production in multi-level governance settings. *International Review of Administrative Sciences*, *82*(1), 8–27.

Sørensen, E., & Torfing, J. (2011). Enhancing Collaborative Innovation in the Public Sector. *Administration & Society*, *43*(8), 842–868.

Sørensen, E., & Torfing, J. (2012). Introduction: Collaborative innovation in the public sector. *Innovation Journal*, *17*(1), 1–14.

Sørensen, E., & Torfing, J. (2015). Enhancing Public Innovation through Collaboration, Leadership and New Public Governance. In A. Nicholls, J. Gundelfinger, & M. Gabriel (Eds.), *New Frontiers in Social Innovation Research* (pp. 145–169). Basingstoke: Palgrave Macmillan.

Sørensen, E., & Torfing, J. (2017). Metagoverning Collaborative Innovation in Governance Networks. *The American Review of Public Administration*, *47*(7), 826–839.

Swanson, R. A., & Holton, E. F. (2005). *Research in organizations: Foundations and methods of inquiry*. San Francisco: Berrett-Koehler.

Tech4Germany (n.d.). Company Website. Retrieved April 20, 2021, from: https://tech.4germany.org/

Tech4Germany (2021a). Checkliste: Eignen wir uns mit unserem Projekt für das Fellowship? Retrieved April 20, 2021, from: https://tech.4germany.org/wp-content/uploads/2020/12/Checkliste-Eignet-sich-mein-Projekt-fu%CC%88r-das-Tech4Germany-Fellowship_-2-2.pdf

Tech4Germany (2021b). Tech4Germany Kurzinfo: Für digitale Vorreiter:innen in der Bundesverwaltung. Retrieved April 20, 2021, from: https://tech.4germany.org/wp-content/uploads/2021/02/Tech4Germany-Kurzinfo.pdf

Torfing, J. (2016). *Collaborative innovation in the public sector*. Washington, DC: Georgetown University Press.

Torfing, J. (2019). Collaborative innovation in the public sector: the argument. *Public Management Review*, *21*(1), 1–11.

Torfing, J., Sørensen, E., & Røiseland, A. (2019). Transforming the Public Sector Into an Arena for Co-Creation: Barriers, Drivers, Benefits, and Ways Forward. *Administration & Society*, *51*(5), 795–825.

Van Thiel, S. (2007). *Research Methods in Public Administration and Public Management: An Introduction*. New York: Routledge.

Verschuere, B., Brandsen, T., & Pestoff, V. (2012). Co-production: The State of the Art in Research and the Future Agenda. *Voluntas*, *23*(4), 1083–1101.

Voorberg, W. H., Bekkers, M., & Tummers, L. G. (2015). A Systematic Review of Co-Creation and Co-Production: Embarking on the social innovation journey. *Public Management Review*, *17*(9), 1333–1357.

Voorberg, W., Bekkers, V., Timeus, K., Tonurist, P., & Tummers, L. (2017). Changing public service delivery: learning in co-creation. *Policy and Society*, *36*(2), 178–194.

Wegrich, K. (2019). The blind spots of collaborative innovation. *Public Management Review*, *21*(1), 12–20.

Whicher, A., & Crick, T. (2019). Co-design, evaluation and the Northern Ireland Innovation Lab. *Public Money and Management*, *39*(4), 290–299.

Wirtz, B. W., Weyerer, J. C., & Geyer, C. (2019). Artificial Intelligence and the Public Sector - Applications and Challenges. *International Journal of Public Administration*, *42*(7), 596–615.

Yin, R. K. (2003). *Case study research: Design and methods* (3rd. edt.). Thousand Oaks: SAGE.

Appendix

A. List of studied documents

In this appendix, all documents that were consulted as a preparation for the interviews are presented. All documents have been accessed between the 19.04.2021 and 03.05.2021.

Project reports Tech4Germany

Editor	Document Title	Web link
Tech4Germany	Fallstudie: Antidiskriminierung	https://tech.4germany.org/wp-content/uploads/2020/10/Fallstudie_Antidiskriminierung_final-1.pdf
Tech4Germany	Projektdokumentation: Antidiskriminierung	https://tech.4germany.org/wp-content/uploads/2020/10/Projektdokumentation_Antidiskriminierung.pdf
Tech4Germany	Fallstudie: Steuerlotse	https://tech.4germany.org/wp-content/uploads/2020/10/Fallstudie_Steuerlotse.pdf
Tech4Germany	Projektdokumentation: Steuerlotse	https://tech.4germany.org/wp-content/uploads/2020/10/Steuerlotse-Doku-Final-212020.pdf
Tech4Germany	Fallstudie: Projekt Chatbot	https://tech.4germany.org/wp-content/uploads/2020/10/20200930_Fallstudie_V2.pdf
Tech4Germany	Projektdokumentation: Chatbot	https://tech.4germany.org/wp-content/uploads/2020/11/BMFSFJ_Dokumentation_V1.pdf
Tech4Germany	Fallstudie: Rechtsinformationsportal	https://tech.4germany.org/wp-content/uploads/2020/10/Tech4Germany_Fallstudie_Rechtsinformationsportal.pdf
Tech4Germany	Fallstudie: Forschungsdatenzentrum	https://tech.4germany.org/wp-content/uploads/2020/10/Fallstudie_FDZ.pdf
Tech4Germany	Fallstudie: Pflanzenschutzmittel	https://tech.4germany.org/wp-content/uploads/2020/10/PSM_Fallstudie.pdf
Tech4Germany	Projektdokumentation: Pflanzenschutzmittel	https://tech.4germany.org/wp-content/uploads/2020/10/PSM_Projektdokumentation_final.pdf
Tech4Germany	Fallstudie: Open Data Portal	https://tech.4germany.org/wp-content/uploads/2020/10/Fallstudie_OpenDataPortal.pdf
Tech4Germany	Projektdokumentation: Open Data Portal	https://tech.4germany.org/wp-content/uploads/2020/10/Projektdokumentation_OpenDataPortal.pdf
Tech4Germany	Fallstudie: Online-Videoberatung	https://tech.4germany.org/wp-content/uploads/2020/10/Fallstudie-Videoberatung.pdf
Tech4Germany	Projektdokumentation: Weiterbildungsportal	https://tech.4germany.org/wp-content/uploads/2020/02/BMAS_Weiterbildung-Projektdokumentation_T4GWebseite.pdf
Tech4Germany	Fallstudie eRechnung: Redesign des eRechnungs-Portals des Bundes	https://medium.com/tech4germany/fallstudie-erechnung-redesign-des-erechnungs-portals-des-bundes-67dd3e089b67
Tech4Germany	Fallstudie Bundespersona: Online-Identifikation für staatliche Leistungen	https://medium.com/tech4germany/fallstudie-bundespersona-online-identifikation-f%C3%BCr-staatliche-leistungen-5ec51d2e7768
Tech4Germany	Fallstudie BuFI: Infoplattform zu Bildung und Forschung	https://medium.com/tech4germany/fallstudie-bufi-infoplattform-zu-bildung-und-forschung-d7e10af51e22

Tech4Germany	Fallstudie Rotationsportal: Planungstool zur Unterstützung der Rotation	https://medium.com/tech4germany/fallstudie-rotationsportal-planungstool-zur-unterst%C3%BCtzung-der-rotation-15d852f494b8
Tech4Germany	Fallstudie E-Learning: E-Learning zur E-Akte Bund	https://medium.com/tech4germany/fallstudie-e-learning-e-learning-zur-e-akte-bund-dad91e49d1dc

Contracts and Guidelines

Editor	Document Title	Web link
DigitalService4 Germany GmbH	Corporate Governance Bericht	https://digitalservice4germany.com/assets/corporategovernance-bericht-2020.pdf
DigitalService4 Germany GmbH	Kooperationsvertrag Tech4Germany	https://tech.4germany.org/wp-content/uploads/2021/03/210309_Transparenz_Richtlinien-4G.pdf
DigitalService4 Germany GmbH	Stipendiumsrichtlinie	https://tech.4germany.org/wp-content/uploads/2021/02/Stipendiumsrichtlinien_Tech4Germany_2021.docx.pdf
DigitalService4 Germany GmbH	Transparenz-Richtlinien	https://tech.4germany.org/wp-content/uploads/2021/03/210309_Transparenz_Richtlinien-4G.pdf
Tech4Germany	Checkliste	https://tech.4germany.org/wp-content/uploads/2020/12/Checkliste-Eignet-sich-mein-Projekt-fu%CC%88r-das-Tech4Germany-Fellowship_-2-2.pdf
Tech4Germany	Kurzinfo	https://tech.4germany.org/wp-content/uploads/2021/02/Tech4Germany-Kurzinfo.pdf

Personal Experience Reports

Author	Date	Title	Medium	Web link
Anton, S.	16.01.2019	Tech4Germany: In 70 Tagen durch die öffentliche Verwaltung	Medium	https://medium.com/tech4germany/tech4germany-10-wochen-9-fellows-2-projekte-erfahrungsbericht-ea1c4406c37a
Detje, S.	21.01.2020	Die digitale Transformation in deutschen Behörden ist kein technologisches Problem…	Medium	https://medium.com/tech4germany/t4gfellow-die-digitale-transformation-in-deutschen-beh%C3%B6rden-ist-kein-technologisches-problem-3b9c1deba3e4
Erhardt, S.	09.04.2020	Tech4Germany - a personal experience report	LinkedIn	https://www.linkedin.com/pulse/tech4germany-personal-experience-report-sebastian-erhardt/
Rodríguez, J. E.	12.02.2021	Mit Tech4Germany Dienstleistungen gestalten, die besser für alle funktionieren	Medium	https://jerdesign.medium.com/mit-tech4germany-dienstleistungen-gestalten-die-besser-f%C3%BCr-alle-funktionieren-26a456a211d6

Press Statements and Newspaper Articles

Author / Editor	Date	Title	Medium	Web link
Bundes-ministerium für Finanzen	16.20.2020	Steuerlotse für Rentnerinnen und Rentner - Kooperationsprojekt mit der Initiative Tech4Germany zur Entwicklung eines Prototypen für eine einfache, zukunftsfähige und digitale Steuererklärung für Rentnerinnen und Rentner	Website BMF	https://www.bundesfinanzministerium.de/Content/DE/Standardartikel/Themen/Schlaglichter/Rentenbesteuerung/2020-10-16-steuerlotse.html
ITZ Bund	02.07.2020	TZBund ist wieder Projektpartner im Tech4Germany Fellowship 2020 - Prototypischer Chatbot soll Kommunikation und Interaktionen fördern	Website ITZ Bund	https://www.itzbund.de/SharedDocs/Pressemitteilungen/DE/2020/2020-07-02_T4G_Fellowship_2020.html
ITZ Bund	20.10.2020	Abschlussveranstaltung zum Tech4Germany Fellowship-Programm 2020 - Innerhalb von zwölf Wochen konnte eine prototypische Chatbotlösung entwickelt werden	Website ITZ Bund	https://www.itzbund.de/SharedDocs/Pressemitteilungen/DE/2020/2020-10-20_T4G_Fellowship_Abschluss.html
Tech4Germany	27.07.2021	Pressemitteilung Start Tech4Germany Fellowship - Die Technologie-Taskforce für die Bundesregierung geht in die dritte Runde	Website Tech4Germany	https://docs.google.com/document/d/1G21BPwlMzFqgkemmlKshxVMe-ipBSTipvV8l0px05O0/edit
Rusch, L. & Punz, M.	16.09.2020	Entwickeln für den Staat	Der Tages-spiegel	https://www.tagesspiegel.de/wirtschaft/digitalservice4germany-entwickeln-fuer-den-staat/26192730.html

Podcasts

The relevant parts of the podcasts were transcribed and are provided in the separate data file of Appendix E.

Podcast & Host	Date	Episode	Web link
Motivation. Du & Ich – ein Podcast mit Philip Bremer	05.04.2021	Episode #7 – Christina Lang	https://open.spotify.com/episode/7i3XDBuZsJI2Rpqmsodmjn?si=AHbqLIKLQzqvY9WQZGvfbQ
Podcast: Plan W – Süddeutsche Zeitung; Susanne Klingner	02.07.2020	Frauen digitalisieren Deutschland	https://open.spotify.com/episode/5N2Wm8Tyfn9CZT7Z3jN8Ii
Podcast: Talking Legal Tech; Felipe Molina	16.03.2020	Episode 11: tech4Germany – wie macht man den staat fit für die digitalisierung, sonja anton & anna hupperth? (Teil 2)	https://open.spotify.com/episode/69SzsRr5rZnPf88toyXJiX
recode.law Podcast; Henrik Volkman	16.03.2020	Episode 9: Tech4Germany – Wie digitalisiert man die öffentliche Verwaltung? (Teil 1)	https://open.spotify.com/episode/5Xs8gMeDUbMuiOLdtDGQQZ

B. Coding scheme

Code-Group	Code	Explanation	Source	Example
Empowered actors	01 Affected actors: Affectedness / Knowledge of problem	Actors who are impacted by the innovation and have relevant knowledge of the problem and context	Chapter 2.4.1	„die hat davon direkt viele Berührungspunkte gehabt“ (Fellow 1, l.64)
	02 Affected actors: Role	Role and responsibilities of affected actors in the collaborative project	Chapter 2.4.1	“Ich würde sagen meine Rolle war die eines Vermittlers” (Digitallotse 2, l.38)
	03 Relevant actors: Skills	Actors who have essential skills and knowledge to develop the digital innovation	Chapter 2.4.1	„beeindruckend fand ich, dass das Team sehr passgenau zusammengestellt war“ (Digitallotse 2, ll.57-58)
	04 Relevant actors: Role	Role and responsibilities of relevant actors in the collaborative project	Chapter 2.4.1	„geht man methodisch ran und gibt der ganzen Teamarbeit so ein bisschen einen Rahmen“ (Fellow 2, ll.46f.)
	05 Boundary spanners	Actor who is capable of translating and linking the diverse knowledge	Chapter 2.4.1	„das sind erstmal die Enabler ganz am Anfang“ (Fellow 2, l.152)
	06 Initiation of collaboration	Measures to initiate collaboration or motivate relevant and affected actors	Chapter 2.4.1	„die Mission dahinter ist das, was mich dazu motiviert hat“ (Fellow 2, l.34)
	07 Form of collaboration	Intensity and form of collaborative activities	Chapter 2.2	„da haben wir wirklich aktiv zusammen-gearbeitet“ (Fellow 1, ll.93-94)
	08 Shared goal	Shared understanding of the goal of the collaboration	Chapter 2.4.1	„Es gab kein ganz klares Ziel, aber es gab schon Eckpunkte, die definiert wurden“ (Fellow 1, l.156)
	09 Ground-rules	Definition of roles, responsibilities, and procedures	Chapter 2.4.1	„es gab schon konkrete Regeln, ähm zum Beispiel auch was den zeitlichen Aufwand betrifft“ (Fellow 1, ll. 144-145)
	10 Generation of innovative ideas	Innovativeness of the generated ideas during the collaboration	Chapter 2.2	„das wäre auf jeden Fall weniger innovativ gewesen, wenn sie es ohne uns gemacht hätten“ (Fellow 3, ll.237-238)
Mutual & transfor-mative learning	11 Mutual learning: Digitallotsen	Mutual acquisition of new skills, methods, or knowledge by the Digitallotsen	Chapter 2.4.2	„wollten von uns auch sehen, welche Tools wir benutzen und wie man die benutzen kann“ (Fellow 3, l.177)
	12 Mutual learning: Fellows	Mutual acquisition of new skills, methods, or knowledge by the Fellows	Chapter 2.4.2	„Ich habe sehr viel über die Verwaltungsarbeit gelernt“ (Fellow 1, l.165)

	13	Transformative learning: Digitallotsen	New ways of thinking, changed perceptions of digital innovations or new approaches to solve a problem by the Digitallotsen	Chapter 2.4.2	"so weit, dass wir auch bestehende Regeln ähm einfach mal ausgeblendet haben, um weiterzuspinnen, wie könnte das aussehen in einer idealen Welt" (Digitallotse 2, ll.315-316)
	14	Transformative learning: Fellows	New ways of thinking, changed perceptions of digital innovation in public organisations or new approaches to solve a problem by the Fellows	Chapter 2.4.2	"hat's mir vom Mindset glaube ich schon nochmal geholfen, mich da auch ein Stück weit mehr in Richtung Sinn und weiter weg noch von diesem ganzen anderen, irgendwie Karriere und Monetäres" (Fellow 2, ll.171-173)
	15	Development and selection of suitable innovations	Degree of suitability of the selected idea and developed prototype	Chapter 2.2	„wenn wir es ohne die gemacht hätten, dann wäre es wahrscheinlich ein bisschen an dem Problem vorbei gegangen" (Fellow 3, ll.238-239)
Joint ownership	16	Shared responsibility	Shared responsibility for the innovation project among the involved actors	Chapter 2.4.3	„wir waren auch alle verantwortlich ja für den Erfolg" (Fellow 1, l.36)
	17	Decision-making	Shift of the decision-making authority from the public agency to the collective of the involved actors	Chapter 2.4.3	„wir haben die meisten Entscheidungen gemeinsam getroffen" (Fellow1, l.258)
	18	Degree of implementation resistance	Perception of public employees towards the implementation of digital innovations or new working methods	Chapter 2.4.3	„da konnte man dann schon merken, dass die offener wurden. Dass die nicht mehr nur geblockt haben" (Digitallotse 2, ll.113-114)
Challenges, Limitations & Potentials	19	Conflicts & misunderstandings	Conflicts, misunderstandings and manipulations that occurred during the collaboration	Chapter 2.5	„eine Person war demgegenüber gar nicht aufgeschlossen, hat sogar ähm in Workshops die Mitarbeit verweigert" (Fellow 1, ll.183-184)
	20	Limitations of collaboration	Limitations during the collaboration project	Inductive	„die klassische IT-Ausstattung, also es ist natürlich schwierig zusammenzuarbeiten mit jemandem virtuell, der sich erstmal darum bemühen muss ne Webcam zu kriegen" (Fellow 1, ll.407-409)

	21	Barriers to implementation	Organisational or structural barriers to the implementation of the collaboratively developed digital innovations	Inductive	„Das ist nicht jetzt mal eben gemacht, sondern da gibt es wahnsinnig viele Regeln und Vorschriften“ (Digitallotse 1, ll.198-199)
	22	Restrictions due to pandemic	Restrictions of the collaboration due to the contact restrictions during the Covid-19 pandemic	Inductive	„Corona hat die Zusammenarbeit mit den Projektpartner:innen beeinträchtigt“ (Fellow 1, l.283)
	23	Scope / effect of Tech4Germany	Overall scope and effect of Tech4Germany on the development of digital innovations in public organisations	Chapter 2	„Das verändert schon was. Das macht ja was mit Menschen.“ (Digitallotse 2, ll.360-361)

C. Code frequencies and key messages

In this appendix, first an overview of the code frequencies per code group is provided. Subsequently, a table for each code with the code frequency and the paraphrased key message of each interviewee is presented. Additionally, it is indicated whether this key message was classified as being concordant with the theoretical proposition or, for inductive codes, the identified key finding. These tables served as the foundation for the analysis in chapter 4.

Overview

Code Group 01 – Empowered Actors

		Code Frequency per group		
Code		*Digitallotsen*	*Fellows*	**Total**
01	Affected actors: Affectedness	10	12	**22**
02	Affected actors: Role	7	8	**15**
03	Relevant actors: Skills	9	19	**28**
04	Relevant actors: Role	9	6	**15**
05	Boundary spanner	11	15	**26**
06	Initiation of collaboration	9	10	**19**
07	Form of collaboration	16	21	**37**
08	Shared goal	8	10	**18**
09	Ground-rules	6	7	**13**
10	Generation of innovative ideas	2	5	**7**

Code Group 02 – Mutual and Transformative Learning

		Code Frequency per group		
Code		*Digitallotsen*	*Fellows*	**Total**
11	Mutual learning: Digitallotsen	19	6	**25**
12	Mutual learning Fellows	n.a.	11	**11**
13	Transformative learning: Digitallotsen	20	14	**34**
14	Transformative learning: Fellows	n.a.	6	**6**
15	Development of suitable innovation	13	9	**22**

Code Group 03 – Joint Ownership

		Code Frequency per group		
Code		*Digitallotsen*	*Fellows*	**Total**
16	Shared responsibility	9	8	**17**
17	Decision-making	1	5	**6**
18	Degree of implemenation resistance	22	16	**38**

Code Group 04 – Challenges, Limitations & Potential

		Code Frequency per group		
Code		*Digitallotsen*	*Fellows*	**Total**
19	Conflicts & misunderstandings	7	11	**18**
20	Limitations of collaboration	9	13	**22**
21	Barrierrs to implementation	6	3	**9**
22	Restrictions due to pandemic	5	3	**8**
23	Scope / Impact of Tech4Germany	18	9	**27**

Frequencies and key messages per interviewee

Code Group 01 – Empowered Actors

Code 01 – Affected Actors: Affectedness / Knowledge of the problem

Interviewee	Frequency	Concordance with theoretical proposition	Key Message
Digitallotse 1	3	Yes	S/he was directly affected as s/he works in the department responsible for the product and s/he had a detailed knowledge of the problem and context.
Digitallotse 2	3	Yes	S/he was the responsible person for the developed prototype in the department and had a detailed knowledge of the context and requirements.
Digitallotse 3	4	Yes	S/he was directly affected as s/he works in the department responsible for that product and had a detailed knowledge of the product and the requirements.
Fellow 1	7	Yes	The Digitallotsen had many direct points of contact with the problem, were responsible for the innovation and had a lot of expertise. Additional decision-makers (e.g. the minister and department managers) were involved through presentations of the progress.
Fellow 2	3	Yes	There were two groups of Digitallotsen involved: One was responsible for the technical implementation of such a digital innovation and was not affected by the problem to be solved; the other was directly affected by the problem and had a detailed knowledge of the end-users and context.
Fellow 3	2	Yes	The Digitallotsen were responsible for that project in the ministry, had a lot of expertise and a detailed knowledge of the problem.
Total	**22**		

Code 02 – Affected Actors: Role

Interviewee	Frequency	Concordance with theoretical proposition	Key Message
Digitallotse 1	2	Yes	His/her role was mainly to provide all necessary information for the project, connect the Fellows with other relevant stakeholders, and provide feedback and support regarding the prototype.
Digitallotse 2	3	Yes	His/her role was to be a mediator between the Fellows and the department and ministry.
Digitallotse 3	2	Yes	His/her role was to support the Fellows by connecting the technical aspects with the content requirements and particularly putting the information of the interviewed stakeholders into the political context.
Fellow 1	1	Yes	The role of the Digitallotsen was to contribute their expertise and provide access to the end-users of the innovation.
Fellow 2	4	Yes	The role of the Digitallotsen was to contribute their knowledge about the procedures and special requirements (e.g. accessibility) in public organisations and set the frame for possible solutions.
Fellow 3	3	Yes	The role of the Digitallotsen was to ensure the Fellows fully understand the problem and to actively participate in the development of the prototype so they can continue the innovation project afterwards.
Total	**15**		

Code 03 – Relevant actors: skills

Interviewee	Frequency	Concordance with theoretical proposition	Key Message
Digitallotse 1	4	Partly	The Fellow team was very interdisciplinary, their skills comprehended one another well, and particularly the methodological competencies were strong. However, those were not skills the public employees of that (IT) department did not have themselves.
Digitallotse 2	1	Yes	The Fellow team was very interdisciplinary, and their skills comprehended one another well (including user-centric problem-solving, technical and design skills).
Digitallotse 3	4	Yes	The methodological and technical skills of the Fellows were relevant and necessary, particularly their coding and user-research expertise. These skills would have otherwise had to be procured from an external IT-provider.
Fellow 1	6	Yes	The skills of the Fellows comprehended one another well and spanned product management, software engineering, UX-/UI-design and conducting interviews and user tests.
Fellow 2	7	Yes	His/her methodological skills (e.g. design thinking, scrum, technological understanding and teaching experience) were suitable for the role as Product Fellow and included skills that were not available among the public employees.
Fellow 3	6	Yes	His/her skills were very suitable and relevant for the innovation project, particularly design thinking, user-centric problem-solving, product management and software development.
Total	**28**		

Code 04 – Relevant actors: Role

Interviewee	Frequency	Concordance with theoretical proposition	Key Message
Digitallotse 1	4	Yes	The role of the Fellows was to identify the problem with an unprepossessed view, prepare the collaborative workshops, and develop a prototype independently from former conceptions.
Digitallotse 2	4	Yes	The role of the Fellows was to identify the problem with an unprepossessed view, develop a shared vision with all stakeholders, identify solutions from a user-centric perspective, and lastly develop the prototype with their technical and design skills.
Digitallotse 3	1	Yes	The role of the Fellows was to understand the requirement of all stakeholders and co-creatively develop the prototype.
Fellow 1	1	Yes	His/her role included to prepare the collaborative workshops, and present, explain and promote the digital innovation to the relevant stakeholders in the public organisation.
Fellow 2	2	Yes	His/her role included to communicate with relevant stakeholders, develop the methodological structure of the project (e.g. design sprints) and explain technical buzzwords (e.g. artificial intelligence).
Fellow 3	3	Yes	His/her role included to set the organisational and methodological frame of the project and use the technical and design skills to build a user-centric prototype.
Total	**15**		

Code 05 – Boundary Spanner

Interviewee	Frequency	Concordance with theoretical proposition	Key Message
Digitallotse 1	4	Partly	The core team of Tech4Germany was not actively involved in the collaboration but mainly in the preparation and feedback phase. Further, they set the basic structure and time schedule of the project.
Digitallotse 2	5	Yes	The core team of Tech4Germany moderated between the Fellows and Digitallotsen as a conflict occurred and facilitated the collaboration through the onboarding process and workshops.
Digitallotse 3	2	Partly	The core team of Tech4Germany set the time schedule and basic frame for the collaboration and facilitated the collaboration by organising trainings. However, they were not actively involved in the collaboration (since it was not necessary).
Fellow 1	6	Yes	The core team of Tech4Germany explained both groups the vocabulary, working methods and basic procedures of each other and provided support in cases of conflict or problems. However, they did not have a permanent role as mediators during the collaboration.
Fellow 2	5	Yes	The core team of Tech4Germany is the enabler in the beginning and acts as a sparring partner throughout the project by providing the frame for the project and facilitating the collaboration through the onboarding process and workshops.
Fellow 3	4	Yes	The core team of Tech4Germany supported the participants by providing feedback and facilitating the collaboration through the onboarding process and coachings.
Total	**26**		

Code 06 – Initiation of Collaboration

Interviewee	Frequency	Concordance with theoretical proposition	Key Message
Digitallotse 1	1	Yes	S/he participated because Tech4Germany provides an opportunity to receive external input for the innovation and to expand his/her skills.
Digitallotse 2	4	No	S/he did not participate in the application process but was appointed to participate in the programme because no one else from that department wanted to participate. The application was filed by a different department which then requested the support of the department of Digitallotse 2.
Digitallotse 3	4	Yes	S/he initiated the application as the co-founders promoted the programme in the ministry. S/he participated because Tech4Germany offers the opportunity to approach an innovation project with modern working methods and develop a concrete prototype what would have otherwise not be possible.
Fellow 1	4	Yes	Tech4Germany provides a room for professions that do not typically work for public organisations (e.g. designer) and creates an attractive work setting.
Fellow 2	4	Yes	S/he was motivated by the mission of Tech4Germany, and the programme provides a unique opportunity to work with many talented people while doing meaningful work.
Fellow 3	2	Yes	S/he was motivated by the opportunity to contribute to the digitalisation of public services and the attractive work setting.
Total	**19**		

Code 07 – Form of Collaboration

Interviewee	Frequency	Concordance with theoretical proposition	Key Message
Digitallotse 1	5	Yes	The collaboration consisted of weekly workshops whereby the Fellows did the most part of the preparatory work, but s/he felt to be strongly involved in all phases of the innovation cycle.
Digitallotse 2	5	Yes	The collaboration consisted of weekly workshops in a co-working space and, additionally, the Digitallotsen had daily contact with the Fellows to exchange information.
Digitallotse 3	6	Yes	There was an active collaboration throughout all project phases, and s/he felt to be a full member of the team.
Fellow 1	7	Yes	There was an active collaboration throughout all project phases in form of weekly workshops while the Digitallotsen were available the whole time to provide additional help or information.
Fellow 2	7	Yes	The collaboration consisted of weekly workshops whereby the Digitallotsen participated in various working sessions (brainstorming, ideation sessions, etc.) as full members of the team.
Fellow 3	7	Yes	The collaboration consisted of weekly workshops that were prepared by the Fellows while the Digitallotsen actively participated in all workshop sessions (e.g. creating a user journey).
Total	**37**		

Code 08 – Shared goal

Interviewee	Frequency	Concordance with theoretical proposition	Key Message
Digitallotse 1	4	Partly	The project had deliberately not a fixed goal, but the participants developed a shared understanding of the objectives over time.
Digitallotse 2	3	Partly	There was a divergent understanding of the goal in the beginning, so s/he perceived it as a great success that the team was able to develop a goal shared by all stakeholders throughout the project.
Digitallotse 3	1	Partly	There was deliberately not a fixed goal in the beginning, but a shared goal was developed through the user-research.
Fellow 1	2	Partly	The project did not have a clear goal but only guiding principles and while the understanding of the objectives was divergent in the beginning, the participants developed a shared understanding over time.
Fellow 2	3	Partly	Due to the agile approach, the project did not have a fixed goal, but the objective was collaboratively updated during the project.
Fellow 3	5	Partly	Due to the design thinking approach, the project did not have a fixed goal, but the participants developed a shared understanding of the objectives over time.
Total	**18**		

Code 09 – Ground-rules

Interviewee	Frequency	Concordance with theoretical proposition	Key Message
Digitallotse 1	3	Yes	Tech4Germany set the basic rules in regard to the time and meeting schedule, formal requirements, and responsibilities.
Digitallotse 2	2	Yes	Tech4Germany set the basic rules in regard to the time and meeting schedule, but the collaboration with the Fellows was in general very freely organised.
Digitallotse 3	1	Yes	Tech4Germany set the basic rules in regard to the time and meeting schedule and structured the collaboration.
Fellow 1	2	Yes	Tech4Germany set the basic rules in regard to the time and meeting schedule and responsibilities.
Fellow 2	4	Yes	Tech4Germany defined the responsibilities and set the basic frame of the project. There were no fixed rules regarding the collaboration prescribed by Tech4Germany, but they were developed within the project team.
Fellow 3	1	Yes	Tech4Germany set the basic structure and time schedule but the end-result was not prescribed in form of a fixed contract.
Total	**13**		

Code 10 – Generation of innovative ideas

Interviewee	Frequency	Concordance with theoretical proposition	Key Message
Digitallotse 1	0	-	-
Digitallotse 2	1	Yes	The clash of cultures led to more innovative ideas.
Digitallotse 3	1	Yes	If people with diverse backgrounds work together, the developed product is more innovative.
Fellow 1	1	Yes	The developed prototype is an innovation for the ministry.
Fellow 2	2	Yes	The interdisciplinarity allowed to develop an innovative solution.
Fellow 3	2	Yes	Without the collaboration with the Fellows, the solution would have been less innovative.
Total	**7**		

Code Group 02 – Mutual and Transformative Learning

Code 11 – Mutual Learning: Digitallotsen

Interviewee	Frequency	Concordance with theoretical proposition	Key Message
Digitallotse 1	10	Yes	S/he did not learn new technical skills (because she already has advanced IT-skills) but s/he acquired new methodological competencies, workshop formats and digital tools that s/he continued to use afterwards.
Digitallotse 2	6	Yes	S/he did not learn new technical skills (because s/he is not interested in IT) but methodological competencies, particularly user-centric problem-solving and design thinking.
Digitallotse 3	3	Partly	Generally, s/he already knew the methods (user-design etc.) before the project, but s/he expanded the skills as it was the first time s/he applied them in a real project. S/he did not learn new technical skills (because the time was not sufficient).
Fellow 1	3	Partly	The willingness to learn differed among the Digitallotsen: two were eager to learn, one rejected to participate in workshops and use new methods.
Fellow 2	2	Partly	The willingness to learn differed among the Digitallotsen: one group did not learn something as they felt they already know everything, a second group leaned many new but rather basic skills, a third group with former knowledge acquired very concrete new methodological skills.
Fellow 3	1	Yes	The Digitallotsen were eager to learn new methods and tools from the Fellows.
Total	**25**		

Code 12 – Mutual Learning: Fellows

Interviewee	Frequency	Concordance with theoretical proposition	Key Message
Digitallotse 1	n.a.	n.a.	n.a.
Digitallotse 2	n.a.	n.a.	n.a.
Digitallotse 3	n.a.	n.a.	n.a.
Fellow 1	2	Yes	S/he learned a lot about the procedures in public organisations.
Fellow 2	8	Yes	S/he learned a lot about the procedures in public organisations and how the state works. Additionally, s/he learned new skills from the other Fellows.
Fellow 3	1	Yes	S/he learned a lot about the procedures in public organisations. Additionally, s/he learned new skills in the workshops of Tech4Germany, particularly project management and communication.
Total	**11**		

Code 13 – Transformative Learning: Digitallotsen

Interviewee	Frequency	Concordance with theoretical proposition	Key Message
Digitallotse 1	6	Yes	S/he learned how to approach an innovation project as an agile and open-ended project. S/he did not experience a mindset shift since s/he was already open-minded towards digital innovations.
Digitallotse 2	11	Yes	S/he learned to approach an innovation project from a user-centric perspective and the workshops contributed to break with the gridlocked administrative thinking.
Digitallotse 3	3	No	S/he did not experience a mindset shift since s/he was already open-minded towards digital innovations and knew modern innovation approaches before the project.
Fellow 1	1	No	There was no mindset shift as the Digitallotsen were already open-minded towards digital innovations and modern working methods before the project.
Fellow 2	12	Partly	A mindset shift was observable as the Digitallotsen got to know new ways of approaching an innovation project, but it takes more than three months to fully adapt a design thinking mindset.
Fellow 3	1	Partly	A mindset shift was observable as the Digitallotsen got to know new ways of approaching an innovation project, but it takes more than three months to fully adapt a design thinking mindset.
Total	**34**		

Code 14 – Transformative Learning: Fellows

Interviewee	Frequency	Concordance with theoretical proposition	Key Message
Digitallotse 1	n.a.	n.a.	n.a.
Digitallotse 2	n.a.	n.a.	n.a.
Digitallotse 3	n.a.	n.a.	n.a.
Fellow 1	2	No	His/her perception of innovations in public organisations did not change but s/he was positively surprised about the strong motivation for change of the public employees.
Fellow 2	2	Yes	S/he experienced a mindset shift away from career and monetary success towards work that has a purpose so s/he now works for the public sector.
Fellow 3	2	No	His/her perception of innovations in public organisations did not change but s/he was positively surprised about the strong motivation for change of the public employees.
Total	**6**		

Code 15 – Development of suitable innovation

Interviewee	Frequency	Concordance with theoretical proposition	Key Message
Digitallotse 1	6	Yes	From a user-perspective, the developed solution was suitable and (potentially) leads to an improvement for the users and public employees.
Digitallotse 2	3	Yes	Without the collaboration, it would have not been possible to develop the innovation. The developed prototype (potentially) leads to an improvement for the users and public employees.
Digitallotse 3	4	Yes	Without the collaboration, it would have not been possible to develop the innovation.
Fellow 1	1	Yes	The collaboration of actors with expertise in regard to the content on the one hand, and technological and methodological skills on the other hand, was essential to develop a suitable innovation.
Fellow 2	4	Yes	The collaboration was essential to develop a suitable innovation as it allowed for a more realistic solution that meets the specific requirements of the public organisation.
Fellow 3	4	Yes	The collaboration of actors with expertise in regard to the content on the one hand, and technological and methodological skills on the other hand, was essential to develop a suitable innovation.
Total	**22**		

Code Group 03 – Joint Ownership

Code 16 – Shared responsibility

Interviewee	Frequency	Concordance with theoretical proposition	Key Message
Digitallotse 1	3	Yes	S/he and the other Digitallotsen were committed to the success of the project and took action to implement the prototype afterwards.
Digitallotse 2	3	Yes	S/he felt strongly responsible for the project.
Digitallotse 3	3	Yes	S/he felt a lot more responsible for the project than if it was a relationship with an external IT-provider.
Fellow 1	4	Yes	Everybody was responsible for the success of the project and the implementation of the prototype was only possible because the Digitallotsen were strongly dedicated.
Fellow 2	2	Yes	The whole team was responsible for the success of the project.
Fellow 3	2	Yes	The Fellows and Digitallotsen were equally responsible for the success of the project.
Total	**17**		

Code 17 – Decision-making

Interviewee	Frequency	Concordance with theoretical proposition	Key Message
Digitallotse 1	1	Yes	Decisions were mostly made consensual.
Digitallotse 2	0	-	-
Digitallotse 3	0	-	-
Fellow 1	2	Yes	Important decisions were made together with all team members (Fellows and Digitallotsen).
Fellow 2	3	Yes	Decisions were made together in the team (Fellows and Digitallotsen) and mostly consensual.
Fellow 3	0	-	-
Total	**6**		

Code 18 – Degree of implementation resistance

Interviewee	Frequency	Concordance with theoretical proposition	Key Message
Digitallotse 1	3	Yes	S/he personally advocated the implementation of the developed prototype.
Digitallotse 2	14	Yes	S/he personally advocated the implementation of the developed prototype. Concerning the broader stakeholders, the implementation resistance depended on the degree of involvement (the less direct contact points with the project, the higher the implementation resistance).
Digitallotse 3	5	Yes	S/he personally advocated the implementation of the developed prototype. The developed prototype contributed to persuade important decision-makers. Some stakeholders who were not actively involved partly remained sceptic.
Fellow 1	7	Yes	The Digitallotsen advocated the implementation. Further, the collaboration with Tech4Germany directly led to a reduced implementation resistance of the broader stakeholders because the Fellows were able to present a concrete prototype to the relevant decision-makers.
Fellow 2	4	Yes	The Digitallotsen and other involved actors mostly advocated the implementation of the developed prototype.
Fellow 3	5	Yes	The Digitallotsen and other involved actors mostly advocated the implementation of the developed prototype.
Total	**38**		

Code Group 04 – Limitations, challenges and potentials

Code 19 – Conflicts and misunderstandings

Interviewee	Frequency	Concordance with theoretical proposition	Key Message
Digitallotse 1	1	No	There were no conflicts or misunderstandings during the project.
Digitallotse 2	5	Yes	There was a conflict between the Fellows and the Digitallotsen due to divergent opinions about what can be changed. Further, there was disagreement about the communication tools.
Digitallotse 3	1	No	There were no major conflicts or misunderstandings during the project.
Fellow 1	4	Yes	One Digitallotse rejected to participate in the workshops and the divergent vocabulary was a challenge in the beginning. However, both did not fundamentally impair the innovation project.
Fellow 2	5	Yes	There were small conflicts due to the clash of cultures. Further, a conflict occurred because the Fellows decided the aspired solution does not make sense for the specific context which was met with disappointment by some Digitallotsen.
Fellow 3	2	Partly	There were no conflicts with the Digitallotsen but small disagreements with other stakeholders of the ministry about the implementation of the prototype.
Total	**18**		

Code 20 – Limitations of collaboration [inductive code]

Interviewee	Frequency	Concordance with key finding	Key Message
Digitallotse 1	0	-	-
Digitallotse 2	3	Yes	Due to the limited time, the end-product was more a concept than a concrete MVP.
Digitallotse 3	6	Yes	His/her timely capacities were very limited as s/he did the project on top of the daily responsibilities
Fellow 1	3	Yes	The Digitallotsen were very limited in their time as they did the project on top of their daily responsibilities and not all digital tools could be used due to security requirements.
Fellow 2	8	Yes	The Digitallotsen were very limited in their time as they did the project on top of their daily responsibilities and the IT-equipment of the public employees was not sufficient to work together remotely.
Fellow 3	2	Yes	The Digitallotsen were very limited in their time and the end-product was only a prototype but not a fully functioning MVP.
Total	**22**		

Code 21 – Barriers to implementation [inductive code]

Interviewee	Frequency	Concordance with key finding	Key Message
Digitallotse 1	5	Yes	The unique requirements and rules of public organisations cannot be changed by Tech4Germany and remain barriers to the implementation.
Digitallotse 2	1	Yes	The complexity of the IT-system of the public organisation makes the implementation difficult.
Digitallotse 3	0	-	-
Fellow 1	0	-	-
Fellow 2	1	Yes	The unique requirements and rules of public organisations make the implementation difficult.
Fellow 3	2	Yes	Even though the decision-makers generally advocated the developed prototype, no final decision about the implementation was made and the implementation was deferred.
Total	**9**		

Code 22 – Restriction due to pandemic [inductive code]

Interviewee	Frequency	Concordance with key finding	Key Message
Digitallotse 1	5	Yes	The collaboration would have been more fruitful if they took place in real life.
Digitallotse 2	n.a.	n.a.	n.a.
Digitallotse 3	n.a.	n.a.	n.a.
Fellow 1	1	Yes	The collaboration would have been more fruitful if they took place in real life.
Fellow 2	2	Yes	The collaboration would have been more fruitful if they took place in real life.
Fellow 3	n.a.	n.a.	n.a.
Total	**8**		

Code 23 – Impact / Scope of Tech4Germany

Interviewee	Frequency	Concordance with theoretical proposition	Key Message
Digitallotse 1	1	Yes	Tech4Germany is a very important programme to initiate a change of the working methods towards agile innovation projects.
Digitallotse 2	12	Yes	Tech4Germany is a valuable concept that should be continued as it initiates change. However, it was difficult to communicate the new methods to the whole ministry so it will take a long time until real changes are visible.
Digitallotse 3	5	Yes	Tech4Germany is a valuable concept that allows to experiment with new approaches and methods and the co-creative element creates an incentive to participate in innovation projects. Thus, it creates a multiplicator effect.
Fellow 1	4	Yes	It has a stronger impact when young digital experts who have a background in a different branch work on a digital innovation project, than if it would have been implemented internally in the ministry. Further, due to the presentation of the project results, public employees beyond the Digitallotsen became aware of modern working methods.
Fellow 2	2	Yes	The key value of Tech4Germany is that the new approaches and methods are not taught in a training but can be experienced in a real project which is the first important step to initiate change.
Fellow 3	3	Yes	The developed digital innovations themselves will not have a significant impact, but Tech4Germany creates an awareness for digital innovations and modern working methods, also beyond the Digitallotsen (e.g. through the final presentation).
Total	**27**		

D. Interview guideline

(1) English translation

Category	Sub-Category	Question(s)
Introduction	/	- Am I allowed to record the interview as discussed in advance and use it anonymously as a source for my bachelor thesis? - Please introduce yourself and your position in 2-3 sentences and name the project of Tech4Germany in which you were involved.
Empowered Actors	Affected Actors	- What **motivated** you to take part in Tech4Germany? - How would you describe your **personal role** in the project? o Affected by problem / innovation o Knowledge of the problem / context o Involvement of significantly affected stakeholders
	Relevant Actors	- To what extent did the Fellows have **relevant skills** *(especially technical or methodological knowledge)* to develop an innovative solution to the problem? o Could you have implemented the project with a comparable result without the Fellows?
	Collaboration	- To what extent did you and the other Digitallotsen **work collaboratively** with the Fellows on the innovative solution? o In which phases of the innovation cycle *(idea development, idea selection, prototyping)* did you actively work together? o How did the collaboration look like?
	Boundary Spanners	- What **role** did the **Tech4Germany** core team play in the course of the project? o How did Tech4Germany facilitate the collaboration?
	Empowerment: Ground-rules / Shared goals	- To what extent were **rules** specified by Tech4Germany? o Clear distribution of tasks and roles - Was there a clear **goal** at the beginning of the project? o Shared understanding of the goal
Mutual and Transformative Learning	Mutual Learning	- Did you **learn new (technical) knowledge or methods** as a result of working with the Fellows? o Re-application of what has been learned after the project o What learning formats did Tech4Grmany offer *(workshops, onboarding, etc.)* and to what extent did these offers support you in the learning process?

	Transformative Learning	- To what extent has your **attitude** towards digital innovations changed as a result of working with the Fellows *(mindset shift)*? o Critical questioning of existing processes and conventions in the ministry o Changes in the approach to digitalisation projects *(agile methods, cross-sectional work)*
Joint Ownership	Shared Responsibility	- Did you feel **responsible** for the success of the project? o Did you feel that you could actively shape the outcome of the project? o How were decisions made in the team? o To what extent did the fellows take responsibility for the project?
	Reduced Implementation Resistance	- To what extent did you **personally advocate** implementation of the developed prototype? - Was the developed innovation prototype **implemented** after the project? o If not, why not? o To what extent have you developed a better understanding of the prototype than if the project had been implemented externally by a private IT company? o To what extent has any existing scepticism on the ministry's side about digital innovations been reduced by the project?
Outcome	Stages of the innovation cycle	- To what extent were **more innovative ideas** developed due to the collaboration of diverse actors than if you had only worked on the innovation project internally in the ministry? - To what extent is this **innovation suitable** for the context of the ministry and leads to an improvement for the ministry / the end-users?
Limitations & Challenges	Conflicts & Misunderstanding	- Were there any **aspects that impaired the collaboration** with the Fellows? o Conflicts or misunderstandings o Manipulations o No open discussions and expressions of opinion
End	Effect	- How would you describe the **overall effect of Tech4Germany** on the development of digital innovations in public organisations?

(2) German original: Digitallotsen

Category	Sub-Category	Question(s)
Introduction	/	- Darf ich das Interview wie vorab besprochen aufzeichnen und in anonymisierter Form im Rahmen meiner Bachelorarbeit verwenden? - Bitte stellen Sie sich und Ihre Position in 2-3 Sätzen vor und nennen Sie das Projekt von Tech4Germany, an dem Sie beteiligt waren.
Empowered Actors	Affected Actors	- Was hat Sie dazu **motiviert**, bei Tech4Germany teilzunehmen? - Wie würden Sie ihre **persönliche Rolle** in dem Projekt beschreiben? o Betroffenheit von Problem / Innovation o Kenntnis von Problem / Kontext o Einbindung wesentlich betroffener Stakeholder
	Relevant Actors	- Inwieweit hatten die **Fellows relevante Fähigkeiten** *(insbesondere technische oder methodische Kenntnisse)*, um eine innovative Lösung für das Problem zu entwickeln? o Hätten Sie das Projekt auch ohne die Fellows mit einem vergleichbaren Ergebnis umsetzen können?
	Collaboration	- Inwieweit haben Sie und die anderen Digitallosten mit den Fellows **gemeinsam** an der innovativen Lösung gearbeitet? o In welchen Phasen des Innovationszyklus (Ideenentwicklung, Ideenauswahl, Prototyping) haben Sie aktiv zusammengearbeitet? o Wie hat die Zusammenarbeit genau ausgesehen?
	Boundary Spanners	- Welche **Rolle** spielte das Core Team von **Tech4Germany** im Projektverlauf? o Wie hat Tech4Germany die Zusammenarbeit erleichtert?
	Empowerment: Ground-rules / Shared goals	- Inwieweit wurden **Regeln** von Tech4Germany vorgegeben? o Klare Aufgaben- und Rollenverteilung - Gab es zu Beginn ein **klares Ziel**? o Einheitliches Verständnis von dem Ziel
Mutual and Transformative Learning	Mutual Learning	- Haben Sie aufgrund der Zusammenarbeit mit den Fellows **neues (technisches) Wissen oder Methoden gelernt?** o Erneute Anwendung des Gelernten nach Projekt o Was für Lernformate gab es von Tech4Grmany *(Workshops, Onboarding etc.)* und inwieweit haben diese Angebote Sie beim Lernen unterstützt?

	Transformative Learning	- Inwieweit hat sich Ihre **Einstellung gegenüber digitalen Innovationen** durch die Zusammenarbeit mit den Fellows verändert *(mindset shift)*? o Kritische Hinterfragung bestehender Prozesse und Konventionen im Ministerium o Veränderung der Herangehensweise an Digitalisierungsprojekte (agile Methoden, bereichsübergreifendes Arbeiten)?
Joint Ownership	Shared Responsibility	- Haben Sie sich für den Erfolg des Projektes **verantwortlich gefühlt**? o Hatten Sie das Gefühl, das Ergebnis des Projekts aktiv mitgestalten zu können? o Wie wurden Entscheidungen in Team getroffen? o Inwieweit haben die Fellows Verantwortung für das Projekt übernommen?
	Reduced Implementation Resistance	- Inwieweit haben Sie **persönlich eine Implementation** des entwickelten Prototypen **befürwortet**? - Wurde das Projekt **umgesetz**t / weiterverfolgt? o Wenn nein, warum nicht? o Inwieweit haben Sie ein besseres Verständnis für den Prototypen entwickelt, als wenn das Projekt extern von einem privaten IT – Unternehmen umgesetzt worden wäre? o Inwieweit wurde eine ggf. vorhandene Skepsis auf Ministeriumsseite gegenüber digitalen Innovationen durch das Projekt verringert?
Outcome	Stages of the innovation cycle	- Inwieweit wurden aufgrund des Zusammentreffens von verschiedenen Sichtweisen *(clash of cultures)* **innovativere Ideen entwickelt**, als wenn Sie nur intern im Ministerium nach Lösungen gesucht hätten? - Inwieweit ist diese Innovation für den Kontext des Ministeriums **geeignet**, um zu einer Verbesserung für das Ministerium / die Nutzer beizutragen?
Limitations & Challenges	Conflicts & Misunderstanding	- Gab es Aspekte, die die **Zusammenarbeit** mit den Fellows **beeinträchtigt** haben? o Konflikte oder Missverständnisse o Manipulationen o Keine offene Diskussionen und Meinungsäußerungen
End	Effect	- Wie bewerten Sie den **gesamtheitlichen Einfluss von Tech4Germany** auf die Entwicklung von digitalen Innovationen in der öffentlichen Verwaltung?

(3) German original: Fellows

Category	Sub-Category	Question(s)
Introduction	/	- Darf ich das Interview wie vorab besprochen aufzeichnen und in anonymisierter Form im Rahmen meiner Bachelorarbeit verwenden? - Bitte stellen Sie sich und Ihren beruflichen Hintergrund in 2-3 Sätzen vor und nennen Sie das Projekt von Tech4Germany, an dem Sie beteiligt waren.
Empowered Actors	Relevant Actors	- Was hat Sie dazu **motiviert**, bei Tech4Germany teilzunehmen? - Wie würden Sie ihre **persönliche Rolle** in dem Projekt beschreiben? - Inwieweit waren Ihr technisches **Wissen und Skills geeignet und notwendig**, um das Problem zu lösen *(bspw. Design Thinking, Programmieren, UX / UI-Design)*?
	Affected Actors	- Inwieweit waren die **Digitallotsen** in ihrem Arbeitsalltag von dem zu lösenden Problem **betroffen** und hatten somit eine detaillierte **Kenntnis** von dem Problem und Kontext? o Einbindung wesentlich betroffener Stakeholder - Inwieweit hätten Sie das Projekt auch ohne die Zusammenarbeit mit den Digitallotsen umsetzen können?
	Collaboration	- Inwieweit haben Sie und die anderen Fellows mit den Digitallotsen **gemeinsam** an der innovativen Lösung gearbeitet? o In welchen Phasen des Innovationszyklus *(Ideenentwicklung, Ideenauswahl, Prototyping)* waren die Digitallotsen aktiv beteiligt? o Wie hat die Zusammenarbeit genau ausgesehen?
	Boundary Spanners	- Welche **Rolle** spielte das Core Team von **Tech4Germany** im Projektverlauf? o Wie hat Tech4Germany die Zusammenarbeit erleichtert?
	Empowerment: Ground-rules / Shared Goal	- Inwieweit wurden **Regeln** von Tech4Germany vorgegeben? o klare Aufgaben- und Rollenverteilung - Gab es zu Beginn ein **klares Ziel**? o Einheitliches Verständnis von dem Ziel
Mutual and Transformative Learning	Mutual Learning	- Haben Sie aufgrund der Zusammenarbeit mit den Digitallotsen **etwas Neues gelernt** *(bspw. über die Prozesse und Anforderungen in öffentlichen Organisationen)*? o Was für Lernformate gab es von Tech4Grmany *(Workshops, Onboarding etc.)* und inwieweit haben diese Angebote Sie beim Lernen unterstützt?

		- Inwieweit haben sich die **Digitallotsen offen dafür gezeigt**, neue Methoden und technisches Wissen zu lernen?
	Transformative Learning	- Hat sich Ihr **Bild von der öffentlichen Verwaltung** (insbesondere im Kontext der digitalen Transformation) durch das Projekt und die Zusammenarbeit mit den Digitallotsen **verändert**? o Kritische Hinterfragung eigener Sichtweisen - Wie hat sich (Ihrer Einschätzung nach) die **Einstellung der Digitallotsen** gegenüber digitalen Innovationen aufgrund des Projektes verändert? o Inwieweit hat ein Mindset-Shift in Bezug auf die Herangehensweise an digitale Innovationen stattgefunden *(bspw. Agilität / bereichs-übergreifendes Arbeiten)*?
Joint Ownership	Shared Responsibility	- Inwieweit haben Sie sich für den Erfolg des Projektes **verantwortlich gefühlt**? o Wie wurden Entscheidungen in Team getroffen? - Inwieweit haben die **Digitallotsen Verantwortung** für das Projekt übernommen und das Ergebnis aktiv mitgestaltet?
	Reduced Implementation Resistance	- Inwieweit hat sich (Ihrer Einschätzung nach) die **Wahrscheinlichkeit einer erfolgreichen Implementation** der entwickelten Innovation durch die aktive Einbindung der Digitallotsen erhöht? o Inwieweit wurde eine ggf. vorhandene Skepsis auf Ministeriumsseite gegenüber digitalen Innovationen durch die aktive Zusammenarbeit verringert?
Outcome	Stages of the innovation cycle	- Inwieweit wurden aufgrund des Zusammentreffens von verschiedenen Sichtweisen *(clash of cultures)* **innovativere Ideen entwickelt**, als wenn Sie nur mit den Fellows nach Lösungen gesucht hätten? - Inwieweit ist diese Innovation für den Kontext des Ministeriums **geeignet**, um zu einer Verbesserung für das Ministerium / die Nutzer beizutragen?
Limitations & Challenges	Conflicts & Misunderstanding	- Gab es Aspekte, die die Zusammenarbeit mit den Digitallotsen **beeinträchtigt** haben? o Konflikte oder Missverständnisse o Manipulationen o Keine offene Diskussionen und Meinungsäußerungen o Widerstände auf Seiten des Ministeriums
End	Effect	- Wie bewerten Sie den **gesamtheitlichen Einfluss** von Tech4Germany auf die Entwicklung von digitalen Innovationen in der öffentlichen Verwaltung?

E. Interview transcripts

In this appendix, the interview transcripts are presented. Additionally, the transcripts of the podcasts listed in Appendix A are provided. To clearly arrange the quotations, each transcript has a self-contained page numbering.

The transcripts are in German as all interviews were conducted in German.

To ensure the anonymity of the respondents, all personal and project-specific information was anonymised as the small number of team members might allow to draw conclusions about the identity of the respondents.

Overview of Interviewees

Name	Date of Interview	Project	Year of Participation	Role
Digitallotse 1	10.05.2021	Project 1	2020	Digitallotse (Agency)
Fellow 1	10.05.2021	Project 2	2020	Design Fellow
Fellow 2	11.05.2021	Project 3	2020	Product Fellow
Digitallotse 2	12.05.2021	Project 4	2019	Digitallotse (Ministry)
Fellow 3	17.05.2021	Project 5	2019	Engineering Fellow
Digitallotse 3	21.05.2021	Project 6	2019	Digitallotse (Ministry)

This appendix is provided in the separate Data Appendix file.

Declaration of Academic Integrity

I hereby confirm that the present bachelor thesis

Rethinking digital governance - How collaborative innovation strategies advance the development of digital innovations in public organisations: A case study about Tech4Germany.

is the result of my own independent scholarly work, and that in all cases material from the work of others (in books, articles, essays, dissertations, and on the internet) is acknowledged, and quotations and paraphrases are clearly indicated. No material other than that listed has been used.

The work has not been submitted to any other examining authority, either in whole or in part, and has not yet been published.

Hamburg, 28.06.2021

Laura John