Co-Production Phases in the Development and Implementation of Digital Public Services

Co-production phases and roles in the development and implementation of digital public services

Abstract

Public bureaucracies can be digitally transformed by using co-production approaches to design and develop digital public services with input from their stakeholders. Drawing on interviews with international digital transformation experts, this article explores what co-production looks like—conceptually and empirically. We are making a theoretical contribution to the existing co-production literature by identifying the roles different stakeholders play in each co-production phase and the work practices and approaches used to incorporate the stakeholders' viewpoints. We show that service users' input is not included continuously but selectively in the co-production phases of digital public services. While digital public services are co-designed initially with the input of potential service users in the form of their user needs, the subsequent phases include different stakeholders up until the use phase, where service users are simultaneously using and evaluating the service. The results from this empirical study on the co-production of digital public services expand the existing co-production models—the co-production eco-system of stakeholders must be enlarged by the range of actors that need to be involved and the diverse roles they play in addressing citizen needs in a prospective, concurrent, and retrospective manner.

Keywords: Co-production, public sector, digital public services, digital transformation, co-production phases, co-production roles

Introduction

The digital transformation of the public sector provides the opportunity to review existing analog public services and integrate their service users' needs and experiences into the new creation or redesign of public services. In these transformative processes, public servants, therefore, co-produce new digital public services with their service users and other stakeholders to create usable services and make the interactions between them more efficient. We use the concept of co-production here in contrast to analog service contexts in which co-production is a collaboration process based on direct interaction between the actors at the point of use of a service (Maijala et al. 2024; Sicilia et al. 2019). Here, we expand this traditional notion of co-production to include the full range of phases of co-production beyond the use phase and expand the concept by introducing an additional phase – the co-assessment phase in which service users also provide continuous feedback to help improve the service once it is live and in use.

We define co-production narrowly as ways to create public services with public servants and service users (such as citizens or other stakeholders) to develop tailored, innovative solutions that will improve the service's acceptance and use (Brandsen and Honingh 2016; Brudney and England 1983). It requires as Brandsen and Honingh (2016:433) pointed out, "a direct and active contribution from these citizens to the activities of the organization." Service users are oftentimes involved in the actual delivery phase of public services by taking on some of the actions necessary for service delivery. In these cases, without their involvement, the service could otherwise not be delivered. So far, there is ample evidence of how service users are involved in the delivery of analog public services (see, for example, Loeffler 2020; Nabatchi, Sancino, and Sicilia 2017). There is some early evidence that focuses on how technology was used as a tool to collect input from potential service users as sources of information—how technology can be used to selectively collect or crowdsource information from service users to design analog co-production processes.

What has not been addressed in the literature is how the logic of co-production and its known phases can be applied to the creation of new digital public services and the transformation of existing analog public services into digital public services – and not just the use of technology to support the value-in-use phase.

Digital public service design has embraced co-production to incorporate user feedback in most of the design and delivery phases to gain an early understanding of the users' actual pain points with the existing analog service and their needs for the digital service. In these processes, the goal is to shift most of the workload of the standard service delivery to a digital platform or other technological solution so that public servants have free time and resources to work on complex or difficult cases that need face-to-face interactions with citizens or even cross-departmental collaboration (Lember, Brandsen, and Tõnurist 2019). When public servants design, develop, and implement a digital public service, a multitude of stakeholders need to be involved; therefore, applying the concept of co-production to better understand these different phases may illuminate new paths to public service transformation and innovation, with the term stakeholder to denote the variety of actors involved in the different co-production phases as described by Strokosch and Osborne (2020).

To empirically investigate the co-production of digital public services and consider how co-production frameworks and theories need to be adjusted, we draw on 40 interviews with international digital transformation experts selected based on their expertise and experiences in public sector digital transformation projects to answer the following research questions: (1) Which different phases of the co-production of digital public services can be distinguished? (2) What roles do different service users or other stakeholders play in each of the co-production phases of digital public services? and (3) How are they involved in each co-production phase?

We find that the co-production of digital public services can be distinguished into five distinct phases: co-planning, co-design, co-implementation, co-delivery, and co-assessment. For each phase, we identify the service users and other stakeholders who are brought into the process as needed. We also show how continuous assessment and feedback are not only happening in the value-in-use phase but are a feature of all co-production phases to iteratively improve digital service delivery in three ways in line with Nabatchi, Sancino, and Sicilia (2017) prospectively, concurrently, and retrospectively. Involving service users prospectively from the beginning in the planning, design, and implementation phases increases opportunities for early feedback that can be used to improve the quality of service concurrently and long before it is made available to the public. The organization can learn faster about potential pitfalls, receive empirically relevant feedback on their prototypes, incorporate the feedback, and learn together with its stakeholders retrospectively.

In this paper, we conceptualize each of the co-production phases, identify the roles that service users and other stakeholders play, and show how they co-assess their progress along the way. We conceptually examine how the roles of service users and other stakeholders are changing in the co-production of digital public services and how their roles might change in each of the phases and derive an expanded theoretical framework of co-production for digital public services.

Co-Production and Digital Public Services

Co-production has evolved from a general process through which external stakeholders provide input to public bureaucracies (Ostrom 1996) to, more specifically, integrating citizens in the planning (Bovaird 2007), design (Nabatchi, Sancino, and Sicilia 2017), implementation, and assessment (Loeffler 2020) of public services. Loeffler and Bovaird (2019) Conceptualize co-

production as a linear process that consists of co-commissioning priority policies, budgets, or outcomes, co-designing improved services, co-delivering services, and co-assessing public services. Others suggest that co-production can be interpreted as a cycle, where each phase follows the next one (Nabatchi, Sancino, and Sicilia 2017). In these studies, co-production has predominantly focused on the value-in-use moment or the actual delivery of analog public services, such as social services, health care, education, and the like, where the service users, by design, need to directly interact with the service provider and play an active role in service delivery, that is, the moment the service is actively used.

However, the co-production of digital public services is different than that of analog services. To fully include this difference in conceptual models or frameworks of coproduction, we first need to understand the difference between analog and digital public services and how this influences coproduction. In our understanding, analog service delivery means that public services are delivered through the direct or indirect interaction between public service providers and service users. Prominent examples are the co-production of medical treatments by engaging patients (Sorrentino et al. 2017; van Eijk, Steen, and Torenvlied 2019), education through the interaction between teachers, students, and their parents (Jakobsen 2013; Thomsen 2017), or participation incentives to plan or design public services (Barbera, Sicilia, and Steccolini 2016; Frieling, Lindenberg, and Stokman 2014). Those analog co-production processes are characterized by collaborative elements, for example, sharing resources, developing mutually trusted relationships, and acknowledging power relations (Loeffler and Bovaird 2016). Paying attention to those collaborative processes is a crucial way to ensure co-production success (Albert et al. 2023).

Public services are digital services if they are delivered either fully or partially with the help of digital technologies (Larsson and Skjølsvik 2021). This implies that the direct collaborative processes present in analog co-production processes are replaced and/or supported by digital

technologies through which public services are delivered (Casula, Leonardi, and Zancanaro 2022; Meijer 2011; Polzer and Goncharenko 2022), adding more contextual complexity to the co-production process. An example is the submission of a citizen's tax return through an online platform where there is no direct contact with the tax administration's representatives. How these digital public services are co-produced has not been discussed in the literature so far. The current theoretical contributions on co-production either explain how the context of individual services can be systematically integrated into the study of co-production (Bovaird et al. 2019; Nabatchi, Sancino, and Sicilia 2017; Steiner et al. 2022) or how multiple actors contribute to public value creation through co-production in holistic public service eco-systems (Osborne et al. 2022; Petrescu 2019). So far, the empirical evidence focuses exclusively on analog public services and the role of citizens or service users only.

To understand the context of service delivery, Steiner et al. (2022) distinguish several contextual factors: socio-political factors, government level, geographical, and the individual service setting. However, one contextual variable, the mode of public service delivery, is not part of existing theoretical frameworks: whether public services are delivered by digital means or in an analog fashion has so far not been conceptualized. This distinction is relevant to most public service delivery because it shapes the service delivery context as a whole, and especially the processes underlying the co-production phases.

Larsson and Skjølsvik (2021) conceptualize the different modes of interaction and types of digital services that can be co-produced using two dimensions: a) the level of interaction and b) the data used to deliver the service. In their model, citizens can either co-produce by interacting directly with the state (dialogue service) or by providing data (self-serving service); they can also co-

produce passively by allowing the government to use their data to automate services to make service delivery more efficient (automated and registry-based services).

When conceptualizing the co-production of digital services, for this article, we extracted the following phases of coproduction from the literature that guides this empirical inquiry and highlight the differences in the digital context:

(1) Co-commissioning is about planning future services by developing solutions to societal problems in collaboration with the affected service users (Sørensen and Torfing 2018). This phase includes activities such as deciding prospectively on desired outcomes, strategies, or public budgets (Barbera, Sicilia, and Steccolini 2016). Hence, its temporal dimension is prospective, aiming to plan a future service (Nabatchi, Sancino, and Sicilia 2017).

(2) *Co-design* is about involving the service users and other stakeholders affected by the service: new solutions are designed with service users, not for them (Trischler, Dietrich, and Rundle-Thiele 2019; Bason 2018). This approach challenges how public servants see their function and role because co-design is a collaborative endeavor happening concurrently – while public servants are in the process of redesigning or designing a service.

(3) Co-delivery refers to joint activities between public servants and their service users to deliver a public service (Bovaird 2007). The focus here is on the service users' role during and their experience while using a service (Osborne, Radnor, and Strokosch 2016), and has a concurrent focus. The final service users might, however, not have been part of the previous phases.

(4) Co-assessment represents the evaluation of co-delivery after citizens have started to use the service. Improvements are derived by monitoring and evaluating public service delivery arrangements (Loeffler and Bovaird 2019; Nabatchi, Sancino, and Sicilia 2017). Thus, it is, per definition, a retrospective (Nabatchi, Sancino, and Sicilia 2017).

Given this broad range of phases and the theoretical ambiguity regarding the roles of the stakeholders and their activities in each phase, we derive our first research question under the assumption that digital public service transformation might broadly follow a similar set of phases and approaches but with a focus on understanding what may be similar or different in the coproduction of digital versus analog services:

Research question 1 (RQ_1): *Which different phases of the co-production of digital public services can be distinguished?*

The role of service users and other stakeholders in the co-production phases

Due to different conceptualizations and perspectives of the theoretical concept of co-production, there is a need to clarify how various stakeholders are involved in the practice of creating and implementing digital public services (as opposed to analog services). The importance of defining stakeholders is emphasized by McBride et al. (2019) who show that all modes of co-production require contributions from public sector organizations and citizens. Nabatchi, Sancino, and Sicilia (2017) differentiate between groups of service providers. They include various actors such as public agencies, public servants, professionals, or private service providers. To conceptualize the user side, they introduce the term lay actors, which can include citizens, clients, consumers, service users, community members, families, or neighbors.

This latter category's critical role in public service delivery has recently been addressed by Osborne et al. (2022:639) who adopt an ecosystem view of co-production. Their viewpoint integrates "individual actors, service users, staff and other key stakeholders" resources and technologies, and the interactions between them; even if some stakeholders in the ecosystem have shared goals, the stakeholders are also likely to have multiple and competing agendas. This has implications for public service delivery, as the context of the ecosystem (i.e., its political, financial, legal, and historical factors) and the multiple, complex needs and goals of the involved service

users and stakeholders shape how public value is created. Thus, public bureaucracies not only need to know who the stakeholders are but also in which phase of the co-production cycle they may need to be involved or even excluded so that other stakeholders can be given a more prominent role.

In the context of digital public service delivery, the mode of co-production is changed because the direct interactions between public servants and citizens are mediated by digital technologies at the point of service delivery or the value-in-use phase. Thus, the interaction between the service users and stakeholders might change when public bureaucracies move from analog to digital service delivery. In this article, we, therefore, focus on identifying the roles different stakeholders have in each phase of the co-production of digital public services to improve our understanding of the actor constellations in digital co-production. Therefore, our second set of research questions includes:

Research Question 2 (RQ_2): *What roles do different stakeholders play in each of the co-production phases of digital public services?*

and

Research Question 3 (RQ_3): *How are stakeholders involved in each co-production phase?*

Research Design

Research focusing specifically on the phenomenon of co-production of digital public services is scarce. Therefore, we designed our empirical inquiry in an interpretive manner to identify and understand the co-production practices in public bureaucracies and how public servants orchestrate the digital transformation of public services. Given that the large body of literature focuses on the co-production of analog public services and the relative newness of digital transformation as an empirical phenomenon, we chose an abductive approach (Timmermans and Tavory 2022). The objective of an abductive approach is to integrate data with the existing theory throughout the data

collection and analysis process to identify new or surprising findings that emerge and can supplement the existing theory (Gioia, Corley, and Hamilton 2013). Based on these insights, we aim to expand the existing theory on co-production and derive future research questions.

The abductive procedure enables us to explore the co-production of digital service delivery in-depth and to expand the theoretical and empirical knowledge on how digital public services are co-produced in public bureaucracies (Haverland and Yanow 2012; Schwartz-Shea and Yanow 2013). Our initial empirical observations consider the co-production of digital public services in a much more elaborate fashion than the previously published understanding of the co-production of analog public services: many different stakeholders are involved in each of the co-production phases, and service design is not left to professional service designers only. As Timmermans and Tavory (2022:15) stated: "this observation is unlike others we have" and indicates "a surprising finding in light of our expectations."

Data generation

We chose an expert interview approach to uncover and explain current practices by studying practitioners deeply involved in public sector digital transformation projects. Experts distinguish themselves from public servants in charge of implementing digital public services on the front- and back-end. The experts in our sample provide a more holistic perspective beyond the project-level perspective (Caley et al. 2014).

Interview guide development

The data was collected using an interview guide that included several themes relevant to the digital transformation of public administrations in general and the co-production of digital

public services specifically: the digital transformation themes are based on Mergel, Edelmann, and Haug (2019), the barriers to the digital transformation of public services are based on Wilson and Mergel (2022), and the co-production phases based on the conceptual framework described above. The resulting interview guide addresses the following themes: definitions of digital transformation, digital strategies to transform analog to digital services, and involvement of stakeholders in the design, development, implementation, and delivery of digital public services, and observed outcomes as a result of the co-production practices of digital public services.

This semi-structured interview guide left enough freedom to dive deeper into the experts' individual experiences, to ask more global questions when appropriate, and to stimulate discussion to extract experts' perspectives and identify patterns in their practices. This approach enables us to compare the answers systematically while being able to adapt the questions to the individual circumstances of the interview context and the different backgrounds of the interviewees (Barriball and While 1994; Longhurst 2003). This process is in line with the abductive approach of the overall research design to uncover surprising empirical findings to inform new theory (Timmermans and Tavory 2022).

The expert interviewee selection process

Expert knowledge is increasingly necessary when traditional types of empirical data are insufficient to address particular issues in a specific context (Caley et al. 2014). Expertise can be local and/or general, existing at different spatial and temporal scales or different functional levels (McBride, Fidler, and Burgman 2012). Caley et al. (2014) define an expert as "someone with comprehensive and authoritative knowledge in a particular area not possessed by most people" (p. 232). Expertise has several characteristics, such as the breadth of perspective, degree of critical assessment, and awareness of limitations of knowledge, and the expression of expert knowledge

can range from the specific to the synoptic (Drescher et al. 2013). Expert knowledge then "signifies the knowledge one needs to probe into the causes of problems and the principles of problem-solving strategies […] and has more comprehensive knowledge that enables him [sic.] not only to solve problems but moreover to identify and to account for problem causes as well as for solution principles" (Pfadenhauer 2009:82).

To access such expert knowledge and help explain the observed phenomenon, we sought out experts for this study based on their status in the field of digital transformation. They are known to have high-level expertise on the progress of digital transformation projects in public bureaucracies or are actively working on digital transformation projects in public administrations. For the recruitment of the interviewees, we first used a purposive sampling approach. The criteria for interviewee selection were informed by the research questions and the general aims of this study (Ritchie et al. 2013). From the initial set of experts, we then used snowball sampling to extend the size of the sample by asking each interviewee to identify other people they know to be experts in this field (Biernacki and Waldorf 1981).

The experts included in this study are listed in Table 1. All except one of the interviewees came from Europe, with eight from Italy, six from Spain, five from Denmark and Austria, Germany, and France, respectively, as well as one each from Estonia, Belgium, the United States (US), Israel, Greece, and the European Commission from all levels of government. The experts included public servants in senior positions from national, regional, and municipal governments; education and government-owned enterprises; chief executive officers (CEOs) from non-profit organizations; and senior consultants from private sector consulting companies. This sample was found to be ideal as it includes organizations that advise or provide them with the relevant IT services.

Table 1: Experts interviewed by country and organization

Level of Government or Type of Organisation	**Number of Experts**	**Position***	**Country***
Supranational	1	- Advisor to EC	- EU
National	16	- Head of Department: Public Entity - Head of Department: Ministry - Senior Advisor: Ministry	- Denmark - Italy - Spain - Austria - Germany - Estonia - France - Greece
Regional	6	- Head of Department: regional government - Head of a Public Entity - Member of the Regional Council	- Spain - Austria (2) - France - Italy
Municipal	6	- Head of Department: municipality - Councillor	- Austria (2) - Italy - Israel Spain
Consultancy	4	- Senior Consultant	- Austria - Germany - Italy - Spain
Education	1	- Head of Department & Senior Lecturer	- Germany
Private Enterprise owned by Government ("in-house association")	4	- Heads of Department	- Italy
NPO	2	- CEO	- Italy - France
Total number of expert interviews:	**40**		

*Positions, organizations, and countries are listed in alphabetic order

The interviews were conducted by telephone or Skype and recorded with the permission of the interviewees, lasted on average one hour, and were transcribed verbatim. The interviewees were ensured anonymity using an informed consent form that was signed upfront by each interviewee.

The anonymity of the data collected, the safe storage of the data, and the interviewee's rights were explained to each expert at the beginning of the interview. The data was safely stored at the University's secure cloud server, and only the three researchers involved had access to the anonymous interview transcripts for analysis. During and after each interview, the research team wrote memos to note the most important aspects, new insights, and open questions that arose from each interview (Razaghi, Abdolrahimi, and Salsali 2020; Birks, Chapman, and Francis 2008).

Data analysis

To answer our research questions, we applied a thematic analysis of the interview data. Two steps guided the data analysis. First, we selected those portions of the transcripts that focused on the phases and roles of the stakeholders. Second, we coded the extracted data in two coding cycles (Miles, Huberman, and Saldaña 2014).

During the first coding cycle, we conducted a thematic aggregation of the data. We specifically focused on the roles of stakeholders and the co-production process as perceived by the experts. We applied holistic codes to identify the co-production stages of the conceptual framework derived from the literature. For example, the code "co-planning" was used for all data chunks that describe instances in the interview transcripts where the interviewees talked about the involvement of stakeholders in the planning of digital public service delivery. The initial holistic coding enabled us to gain an overview of the themes that are present in the data to identify the potential answers to our research questions.

In the second coding cycle, we summarized the codes gathered through the deductive and inductive coding steps of the first coding cycle into broader categories and then concepts. In the second step of the first coding cycle, we used process and descriptive codes to code the data chunks

identified during the holistic coding (Saldaña 2016; Holton 2007). We used descriptive codes to identify individual stakeholders and their roles in the data. In addition, we used process codes to identify the phases and steps during the overall co-production process. This enabled us to differentiate between different types of stakeholders and their involvement in distinguishable co-production phases.

We treat the information in the data not as objective facts but rather as the manifestation of the experts' knowledge on co-production that cannot be assessed objectively. The purpose of qualitative research here is to gain new insights and inform existing theory (Haverland and Yanow 2012). To verify our procedures and develop a shared understanding of the codes, categories, and concepts, two coders performed both coding steps separately and, after each step, met to discuss their results and, if necessary, refined individual coding decisions. Through this procedure, we aimed for a shared interpretation of the data and concepts emerging from the expert interviews to establish an equivalent of inter-coder reliability in qualitative research (O'Connor and Joffe 2020). To remain in line with the abductive research paradigm, during the coding process, the discussions between the two coders, as well as the final write-up of the results, were informed by the literature streams on co-production and digital public services. We used it to delineate the roles of service users and their activities in the different co-production phases. Through this iterative approach, we were able to identify findings not present in the literature yet. Figure 1 below shows our research design from the theoretical framing to the data collection and analysis:

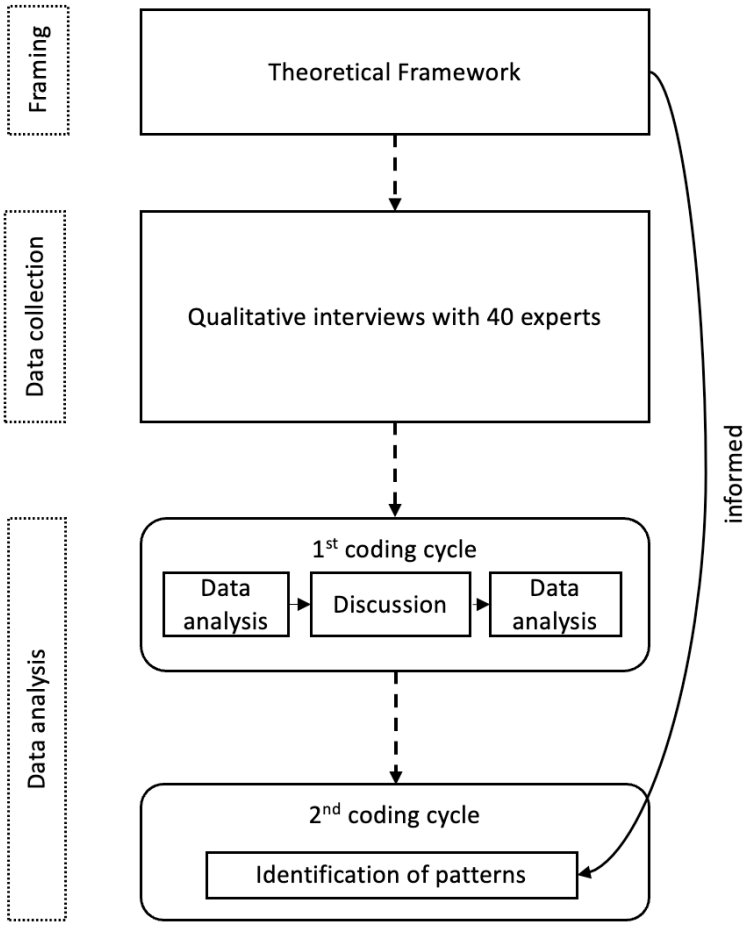

Figure 1: Research design

Findings

We matched our interpretation of the experts' statements to each co-production phase previously extracted from the theoretical and empirical literature on co-production. We carefully evaluated when and how the experts included different service users and other stakeholders and the types of co-production approaches they used during the different co-production phases. The overarching pattern that emerged from the data analysis is that the co-production of digital public services is characterized by the involvement of a multitude of stakeholders and that co-production is not limited to the co-delivery or value-in-use phase, as predominantly stated in the literature.

First, we note that in addition to citizens and other service users identified in the literature review, additional stakeholders appear who are unique to the empirical context we are aiming to understand. The digital service co-production includes representatives from private sector IT firms, consultants, and non-governmental organizations or civil society groups that play an intermediary role between the initial co-planning and the final delivery or assessment phases. Other than previously assumed, citizens are not continuously involved in all co-production phases when it comes to digital public services. The second major result from our analysis includes the identification of a fifth co-production phase that has not been part of previous co-production phases in the literature: the co-implementation of digital public services that occurs between designing and delivering a digital public service. In the following, we present the findings along the co-production phases and describe the different stakeholders, their roles, and how they are involved in each co-production phase.

Table 2: Co-production of digital service development – definition, roles of stakeholders, and approaches to involvement

	Co-Commissioning	**Co-Design**	**Co-Implementation**	**Co-Delivery**	**Co-Assessment**
	Prospective co-production phase	*Concurrent co-production phases*			*Retrospective co-production phase*
Phase definition	Co-commissioning involves citizens and service users in planning the key components of the digital public service by identifying user's needs.	Co-design involves citizens and other service users in the design of a digital public service to develop prototypes and experiment with services together with public administration.	Co-implementation represents the collaboration between public administration and private sector IT providers to implement a digital service.	Co-delivery is characterized by the active use of digital public services instead of the existing analog service.	Co-assessment engages service users actively or passively in the ongoing evaluation of services.
Roles	Citizens or other service users	Citizens or service users contribute	IT service providers provide technical	Citizens or service users	Citizens or service users provide

	Co-Commissioning	Co-Design	Co-Implementation	Co-Delivery	Co-Assessment
	Prospective co-production phase	*Concurrent co-production phases*			*Retrospective co-production phase*
	provide ideas and voice their needs Experts: provide knowledge Public servants: listener, open-minded to users' needs and experiences	knowledge and time Private sector organizations contribute expert knowledge Public servants facilitate co-design process	competence and infrastructure Design experts provide knowledge on service design and usability servants providing legal framework	use digital services Public servants use information provided through the digital service	feedback to the service Public servants implement feedback
Methods	Workshops, consultation formats, e.g., participatory budgeting Living labs	Design-workshops Living labs Prototypes Online tools that involve the participants are rarely used in this stage	Develop and implement websites, apps or specific online services IT providers, design experts and public servants collaborate to implement the service	Citizens or service users use online services in form of websites or apps Improving services by devoting time to updating public databases or digitizing public files	Commenting functions Surveys or feedback apps Workshops

Co-commissioning

The experts, while not using this theoretical terminology, identify potential service users' (for example, citizens') needs before any public service is designed. Of the 40 interviews analyzed, 27 experts mentioned that they try to detect the needs of citizens in service delivery through collaborative co-commissioning processes. The goal of this initial assessment is to collect ideas to improve or (re-) design public services and not solely rely on the policy interpretations of public servants.

To design co-commissioning processes, public servants use a range of approaches to engage with the stakeholders and collect their ideas. This includes "traditional" planning methods such as participatory budgeting, consultations, or workshops to discuss shortcomings of existing public services. In some cases, living labs and focus groups are used to detect stakeholders' needs and collect ideas. By using these methods, public bureaucracies can understand the stakeholders' needs and views on how a digital service should look like, as this expert describes: "We then invited […] 15, to a co-creation workshop, the Citizens' Conference. The 15 of them were there, and each one was guided individually: one citizen, one employee. The employee asked the citizen very intensively, very precisely, about the respective steps to experience this from his view." The underlying intention is that the (re-) designed digital service should fit the users' needs and then be used regularly by the citizens and other service users. This approach supports public servants who need to know how public services should be designed according to stakeholders' needs.

However, it is not always clear if the experts distinguish between co-commissioning and co-design phases in practice. These phases can include different types of services and modes of delivery. For example, one expert described that they invited citizens to develop a new app, and they used co-commissioning to find out which kinds of features the citizens wanted: "A nice example of transformation is if you look at the story we made with the [anonymized]-App. The exciting thing about it was first the development process, which was participatory and was designed so that [the result] would then be accepted. The second is, of course, to capture and collect issues that specifically bother the citizens, […] the things that disturb [them] specifically, that need to be solved." The expert lumps together the co-design and co-development phases, highlighting that, in practice, the phases might be much more intertwined than in our theoretical constructs.

The role of public servants is important in the co-commissioning process. The experts explain that public servants need to be open-minded and treat stakeholders as equals rather than see themselves as the sole experts. According to one of the experts, opening the planning process of a service reduces control: "Again, it's risky, because then you expose yourself to criticism, if you resist, you do not achieve what you are supposed to achieve, or if you're disappointed and you drop it, and then people […] won't forget about it. So, it's a big effort in communication." The expert highlights here the risk for public bureaucracies when they commit to implementing co-produced ideas. If they decide not to implement the ideas, they have to communicate this to the participants of the co-production process. Otherwise, they might risk losing their trust or willingness to participate in future co-production processes. The co-commissioning phase cannot be fully outsourced to external consultants or IT service providers. Instead, public servants need to remain highly involved in the project to be able to ensure that their stakeholder's needs are continually reflected in each co-production phase.

In addition to public servants, two other stakeholder groups participate in the co-commissioning process: the general citizenry and so-called 'expert users' with in-depth knowledge and experience of the service in question. One expert explains their approach: "We created a panel of main actors that were allowed to contribute with their expertise on the routes, on the bicycles, on everything that is going to be considered specifically for the design of those public policies linked to the promotion of bicycles' use, to the promotion of a specific public policy." Besides these knowledgeable citizen users, private sector organizations or NGOs are mentioned as additional professionals who provide their specific expertise and resources to facilitate the co-production process. They play an important role in continuously reflecting the original intentions and needs of future service users.

Co-design

After collecting the initial insights from future service users of the digital service, the next stage of the co-production process is the co-design stage. Experts explain that this stage includes activities for the user-centric development of a digital public service. According to the experts, this occurs by experimenting with different service designs or testing ideas that were developed collaboratively with stakeholders.

Approaches to co-design include experimentation and testing, which vary only slightly in comparison to the co-commissioning stage. In co-design, the focus is on idea-collection, the development of initial prototypes of the digital service, or other tangible outputs that serve for early tests with potential users. The approaches help to gain a grounded understanding of stakeholder needs and collect information about the first experiences with the prototypes of the future digital public service. Prototypes are developed in service design workshops using design thinking (and other human-centered design methods), as noted by an expert: "We have invited the citizens to workshops, we have discussed the strategy text, we have a design thinking process, we are working on a digital city service […]. We have used design thinking; we asked citizens - we had an open space, so for us, this has simply become a bit routine for app development." This quote shows how public servants are actively facilitating the involvement of future users in the co-design phase instead of focusing only on their professional insights on how to design digital public services.

In some cases, the experimental environment of living labs is used to co-design services, where stakeholders can experiment and test alternative prototypes. One expert describes hackathons as a method to involve stakeholders actively in the technical design of a prototype. Similar to the co-commissioning phase, during the co-design phase, stakeholders provide feedback and ideas while they test the prototype, experiment with it, and propose a new feature. This phase

is used to collect direct feedback from potential future service users of a digital public service: “Whenever you enable citizens to experiment with solutions, start adding new features, without making a big fuss around it, but enabling citizens to start using them and learning that this is actually a good feature, and then the government can start expanding that feature.” The redesign or adjustment to the user needs, therefore, happens early during the co-design phase instead of after the service is launched, and expansive new contracts might have to be budgeted for to make adjustments.

The roles of participants in the co-design process are similar to those in the co-commissioning stage. The experts highlight citizens as the core participants: “Finally, it is understood that you have to focus on the user's view to align the processes afterward. In that sense, I would say that normal user behavior is at the center of the alignment of our processes in the public domain. Therefore, the administration is also well advised to involve users, citizens, and companies in designing their processes.” The citizen’s or other service users’ task is then to provide input and suggest improvements to the prototype. Their knowledge can significantly improve the existing service. At times, private sector organizations that participate in the co-design process, such as start-ups, provide knowledge on digital technologies and contribute resources to the co-design process. The role of public servants is to facilitate the co-design process and extract insights from the stakeholders. Public servants draw up internal service development processes and invite stakeholders to jointly develop the service with them. Similar to the co-commissioning process, the public administration needs to be open to the citizens’ contributions and commit to the implementation of the (re-) designed process.

Co-implementation

The co-implementation phase was highlighted by six of the 40 experts – for other experts; it might have been clear that public administrations outsourced IT development and implementation to IT service providers decades ago. Co-implementation is not the same as the actual co-production or value-in-use phase. Instead, in this phase, private sector organizations are commissioned by public administrations to help with the co-implementation of the digital public service. Representatives from private sector organizations, such as IT service providers, lend their technical expertise or infrastructure to implement the prototypes and make sure that the new app or IT product of the digital service fits into the technology stack. In contrast to the co-commissioning and co-design stages, citizens are not involved. As an expert task, these software development and deployment steps are fully outsourced to external service providers and not performed in-house.

IT service providers use different approaches to develop services. The experts mentioned the development of mobile applications and platforms for the delivery of online services. Here, a public administration lists the technical requirements based on the prototype to ensure compliance with existing laws and regulations and defines usability features. This includes, for example, privacy and security issues, but also the look-and-feel so that a new digital public service does not feel alien in comparison to the existing service landscape of a public administration: “Even more important than quickly implementing this digital service, is to try to make it coordinated and consistent with that of all other public administrations. To make the citizen feel at home when moving from one site to another... so that the citizen always finds the same concepts and the same organization of information.” This example shows that a certain degree of coordination between the different stakeholders is necessary to provide services with consistent design and functionality. These considerations are important because they do not affect the technical implementation of an individual service but the whole service system.

Two main groups of stakeholders participate in the co-implementation phase. The first group includes private sector organizations that contribute technical knowledge and infrastructure to the process. These are IT service implementers who are either already established on the market or innovative start-ups who want to collaborate with public administrations to implement their software solutions. Design experts may also be involved in the co-implementation of a digital public service: “The issue of usability is something that is always, always underestimated. For example, you cannot give an app to be developed by a software developer because these guys will never have the right idea. They are guys who have to interact with these things every day, so they have no idea about the pragmatics of interacting with an app, a portal, a site, or whatever. So, the point is you need to involve the experts, and there are very few who know about usability.” While there might be some path-dependency in giving contracts to the existing IT service providers who were also responsible for the agency’s website, the partners need to be carefully selected in a digital co-implementation process.

Co-implementation is characterized by the collaboration between private sector organizations and public administrations. Public servants commission representatives from private sector organizations for the technical implementation and design experts for designing services with usability in mind. As a result, the quality of a digital public service is improved because this collaboration ensures that the interests and needs of stakeholders are incorporated into the final product. Public servants have to set rules for the collaboration that ensure that the design experts’ and IT service providers’ specific knowledge is implemented consistently: “It is aimed at the community of people who are experts in user experience, design, graphics, etc., who try to produce a series of semi-finished products in the form of a kit of icons, site templates, things like that, that can be used by providers of public bureaucracies to build a digital service.”

It is important to note here that the co-implementation process is the only stage where citizens play no role in the co-production process. Instead, it represents a collaboration between IT service providers, design experts from private sector organizations, and representatives from the public administration. The co-implementation process, therefore, requires expert roles and their knowledge to create the digital public service – a capacity that has been outsourced for a long time now to external IT service providers and consultants and is no longer kept in-house.

Co-delivery

After the service is implemented with the help of private sector organizations and design experts, the co-delivery of the digital public service starts. The experts explain in our interviews that stakeholders participate in the initial use of the digital service by testing it and providing input before it is made available to the general public. In co-delivery, the main goal is to provide user-friendly digital public services.

Two approaches encourage the co-delivery of digital public services. First, service users engage in co-delivery by discovering the new digital service on a public bureaucracy's website and taking the step from requesting an analog service to trying out the digital public service. The underlying digital platforms or linked mobile apps provide access to digital services, such as tax filing or national e-ID services. Other examples include platforms for reporting incidences, such as potholes or broken street lamps, that need to be fixed.

A second approach to foster co-delivery is by requesting citizens' help in the improvement of digital public services. As an example, an expert describes how volunteers updated the database of a public library so that an open-source map is always up to date. Furthermore, these volunteers help to digitize files: "[The] National Archive has handwritten documents that are being scanned,

so you have them as pictures, but the handwritten text cannot be automatically transferred to searchable text: they have a project where people, voluntary, engage in, typing the text, they look at the scanned document, and type the text, and save it in the database, so it can be searched in the future." We interpret citizens engaging in improving existing services as examples of co-delivery, even though no website or app is used to deliver the service. Instead, the citizens are participating by improving the back end of the service so that the service can be delivered more effectively and efficiently in the future.

The main stakeholders involved in this stage are citizens, as most digital public services are targeted toward them. A few experts also mentioned instances in which private sector organizations, as well as universities, were part of the co-delivery process by providing knowledge to improve existing public services: *"*In many instances, if you give them the opportunity, they can suggest services that may be created and delivered in innovative ways. That's why it is so relevant to have a community of advisors, firms tied to you and properly coordinated that can help detect service delivery problems and/or co-create and co-design some services*."* Opening up public bureaucracies to the possibility of co-delivering digital public services with the help of their users can lead to efficiencies so public servants can work on more complex cases that need to be delivered in an analog manner.

In contrast to analog co-production, the role of public servants during the co-delivery phase becomes rather passive or limited: users directly interact with the digital services or a service platform. As a result, the interactions between public servants and citizens lead to indirect and usually asynchronous interactions. The asynchronous nature of these interactions is central to enabling the co-delivery process:

> "This has been going for a little while and started in (our city) last year, where citizens can report anything they notice. From the pothole to the defective bulb, whatever is

> automatically geolocated by the app and thus enables further electronic processing with a high degree of automation. That is certainly something where one can say that we must use the citizens' resources and, at the same time, somehow give the citizens added value. To stick to the example, I regularly report defective light bulbs, and if I see that they are not replaced, then I will stop reporting them at some point. Both sides will have to assume their new duties. The one side to be active, to get in touch, to make the effort, and the other side to accept the additional responsibility to process it."

This quote shows how digital platforms are serving as mediators between public servants and citizens so that oftentimes, there is no direct interaction necessary anymore. It also highlights how tasks that were once conducted by public servants can now be transferred to citizens, and their expertise is used in addition to the professional expertise of public servants.

Co-assessment

Finally, the experts point out co-assessment opportunities when digital public service users participate in the ongoing evaluation of the service. We identified two main approaches as part of the co-assessment stage: 1) evaluating the service by collecting feedback from users and 2) testing the service continuously even after its implementation. A digital public service is in use once the service has been implemented at scale. To collect user feedback, public servants use commenting functions on websites, online surveys for evaluating a service, user statistics, and technical reports. This can be seen as a continuous test of the service with its users. As a result, the service can be improved with the input from this evaluator data, and they together are co-creating a continuous feedback cycle: "It's when you get users involved in testing and evaluating the services that are created, which can then continue to improve the service. Designing, creating, implementing, evaluating, and getting feedback and then going back to square one again. We're in a continuous cycle of improvement. This will never stop. Users are very important. You can get them on board and get them to help you continually evaluate the service." This quote shows how the user data and

their feedback are continuously used to update the service either to eliminate erroneous functions or to increase their usability.

The main stakeholders in this stage are citizens or other service users, such as NGOs or private sector organizations, who are invited to continuously test and provide feedback on digital public services. Other stakeholders might include private sector organizations, expert groups, and civil society associations. Like the previous phases of the co-production process, public administrations play an important role in making co-assessment successful. First, the task of public servants is to commit to implementing the feedback of service users: "Because you know, we tried a lot in the past to engage stakeholders, but then, if we were not able to give them correct feedback on how it happened, we just lose them. So, the idea is to build a relationship of trust so they know that if they help you, they do something. It's not just wasting their time." This reflects the public servants' crucial role in facilitating meaningful collaborations in co-assessment processes. They should ask proactively for feedback and be open-minded about the feedback provided. In addition, when public servants fail to communicate their decisions or do not communicate effectively, they may jeopardize future collaborations with citizens or voluntary input during the co-assessment phase. Therefore, the experts in our sample emphasized the building of trust between themselves and the participants during the co-assessment processes.

Second, public servants have to provide the right incentives for citizens to participate in co-assessment activities. There are different ways this can be done. Three experts highlight that citizens should be paid (or rewarded with other (non-) material goods): "The problem is, of course, the cost to the citizens' time. Everything that costs time and is not considered in terms of the long-term effect that it can achieve but is considered in the short-term, that is, loss of time, means that what one needs – are incentives, however, they look like material incentives, status incentives, for

example […] provide them with a feeling or awareness of raised social status." This shows that co-assessment activities might also have limits and that the users of digital public services might have to be incentivized or nudged to help improve the service while they are using it.

Discussion and conclusion

Our findings show that the co-production process for digital public services extends beyond the co-delivery stage. During the different co-production phases, the stakeholders' roles are changing. Especially in the early stages of co-production, these roles are characterized by the exchange of knowledge and experiences that enable the administration to design user-friendly services (by including citizens' knowledge) and implement them efficiently and effectively (by including expert knowledge). The role of citizens who were traditionally considered as the main co-production actors changes along the different phases: In co-commissioning, they voice their needs and interests and are seen as a source of information. They are then replaced by other stakeholders in the co-implementation phase and continue to engage in co-assessment activities in parallel to the development of the digital public service. Later, they enable the co-assessment phase process by actively using the digital service and providing continuous feedback, helping public servants to continuously improve or even expand the digital public service.

We observed that the role of public servants is changing throughout the co-production process. During the early stages, they predominantly serve as facilitators; for example, public servants actively recruit participants. In co-implementation, the public servants act as product managers and distribute information to the co-producing stakeholders (for example, to adhere to legal requirements). In the later stages, their task is to ensure that user feedback is collected and implemented. Therefore, public servants actively contribute to a cyclical, iterative co-production

process that enables incremental improvements in service delivery. In addition, the role of public servants highlights that they are actively trying to yield control over the decision-making process, especially in the co-design and co-implementation stages. For example, in the co-design stage, several experts described public servants need to incentivize citizens to participate in co-design.

Our findings are based on public servants' opinions who serve in senior positions at different government levels and organizations (as listed in Table 1). We aimed to gain insights from experts at this level, not to study if and how the level of experts' seniority impacts the implementation of digital public services, but which actors and in what roles they involve them in different co-production phases and how they implement digital public services. As a result, we did not include the perspectives of front-office or street-level bureaucrats, who are involved in the co-production differently during frontline service delivery – which is mostly reserved for face-to-face analog service provisions.

We also observed that the co-production process starts with analog approaches but becomes digital throughout the process. The planning stage mostly remains analog. User-research methods or traditional citizen consultation methods are used to provide an easy and accessible way to collect ideas and experiences. In the co-design stage, the process slowly turns into a digital one. Here, prototypes of digital public services are developed. In the co-implementation phase, prototypes are programmed and displayed as websites, apps, wireframes, or other types of online services evaluated by citizens in the later phases.

As initially outlined, the co-production literature provides a range of frameworks and definitions with, at times, little agreement on shared definitions, making it difficult to apply them to new types of services, such as digital public services (Bovaird 2007; Brandsen and Honingh 2016; Brandsen, Steen, and Verschuere 2018; Steiner et al. 2022). The insights gained from the

empirical analysis of the interviews with digital transformation experts allowed us to support the existence of five distinct co-production phases. We show how shifting the delivery mode from analog to digital public service delivery also changes the approaches of how stakeholders are involved in all co-production phases. Each phase relies on experiences and knowledge that can only be provided through the involvement of multiple stakeholders (Flak and Rose 2005; Scholl 2001).

We were able to show that some of these phases are *prospective* (preparing for future phases of the co-production cycle), others are *concurrent* and support ongoing co-production, and finally, some are *retrospective* by moving valuable information about user needs back into the co-production cycle to iteratively adapt the already existing digital public service. Future research can draw on these phases, for example, to test whether digital public service delivery processes remain consistent across different types of services or are unique to digital transformation projects. They can also use our findings to purposefully integrate different types of public service users or other stakeholders using the methods we derived here to proactively create an improved service design.

Existing research on co-production highlights predominantly the role of citizens as an integral part of the value-in-phase phase of the co-production process and as providers of knowledge (Leino and Puumala 2021; Ryan 2012). However, the phases leading up to the actual co-production are rarely empirically discussed in the literature and, therefore, remain a black box. Our study now also emphasizes the important role that citizens play in digital public services. However, in the specific context of digital public services, their role is changing, and they become more involved and beyond the actual use phase. Their needs, expressed during the co-commissioning and co-implementation phases, enable public servants to view the service from an external perspective (Bason 2017).

In addition, the existing co-production literature has almost solely focused on the role of citizens in co-production processes when they are co-delivering the service (Loeffler and Bovaird 2016). The roles other professional and non-professional stakeholders can potentially play have received less attention and have so far not been conceptualized in the literature. Our analysis shows that other stakeholders are an essential part of digital public service co-production, and their knowledge needs to be integrated into the co-production phases. Professional knowledge, as provided by IT experts from the private sector, is necessary during the co-implementation of a digital public service. This highly specialized knowledge enables public servants to carry out the re-design, implementation, and delivery of a service in an effective way so that all stakeholders see their needs matched and are willing to use the digital service once it is released to the public. In the first two phases, we show how co-production focuses on knowledge sharing about the needs for a prospective service, whilst the subsequent phases focus on the actual experiences of the users interacting with either a prototype or the actual digital public service.

We have shown that each phase is unique, and different stakeholders take on a variety of roles during each phase, creating an ecosystem of co-producers, as suggested by Osborne et al. (2022). Future research can test whether the dynamics within these phases are generalizable across all types of co-production processes and or are purely context-specific to digital public service delivery. In the context of the co-production of digital public services, public servants will need to know who the stakeholders are, who needs to be on board to create usable and widely accepted digital public services, and how to use the different methods for each co-production phase. Public servants can choose from the menu of methods to proactively design for the expected outcomes.

Finally, during the use phase of a digital public service, the service is delivered and assessed continuously by its users (Loeffler 2020; Loeffler and Bovaird 2019). We have shown here that

feedback gained during the assessment phase can be retrospectively used and fed back into earlier co-production phases to iterate the design of digital public service. We add to the emergent literature on co-assessment by providing a new definition of the co-production phases in a digital setting, operationalizing the approaches of the co-production of digital public services and the roles of the stakeholders in the process. Additional research is needed to understand better how user-centricity leads to increased use and satisfaction, especially with digital public service delivery.

Due to the multiplicity of actors involved in the co-production of digital services, these co-production processes might look similar to collaborative governance approaches. However, the concept of collaborative governance focuses on involving different types of actors to solve a problem or to, even more broadly, improve the delivery of public services (Strokosch and Osborne 2020). In contrast, the concept of co-production only focuses on the delivery of public services and how value is created by the interaction of different actors. Thus, the concept is narrower in general. Whereas older, more narrow approaches to co-production focus on dyadic interactions between users and producers of public services (Brandsen and Honingh 2016; Nabatchi, Sancino, and Sicilia 2017), recent theoretical advancements of the theory suggest that the concept of public service ecosystems, when connected to co-production, can capture the complexity of these multiple-actor constellations (Osborne et al. 2022; Petrescu 2019). Our article adds to this stream of literature by showing how these multiple-actor relations are relevant for the co-production of digital services as well. Given that the focus of our article is on the 'how' of co-production processes, providing a close look at what is happening in the different phases of the co-production process, future research can analyze what is co-produced and how these activities described in the findings contribute to the co-production of public value in for digital public service. New insights into what each co-producer can add as value to each of the phases might help public servants understand how they can engage with them in future scenarios.

In Figure 2, we summarize our insights and combine the conceptual phases from the literature with our empirical findings in an expanded theoretical framework for digital public service co-production. It includes the order of the phases of co-production, approaches linked to them, as well as the actors that are involved during each of the phases:

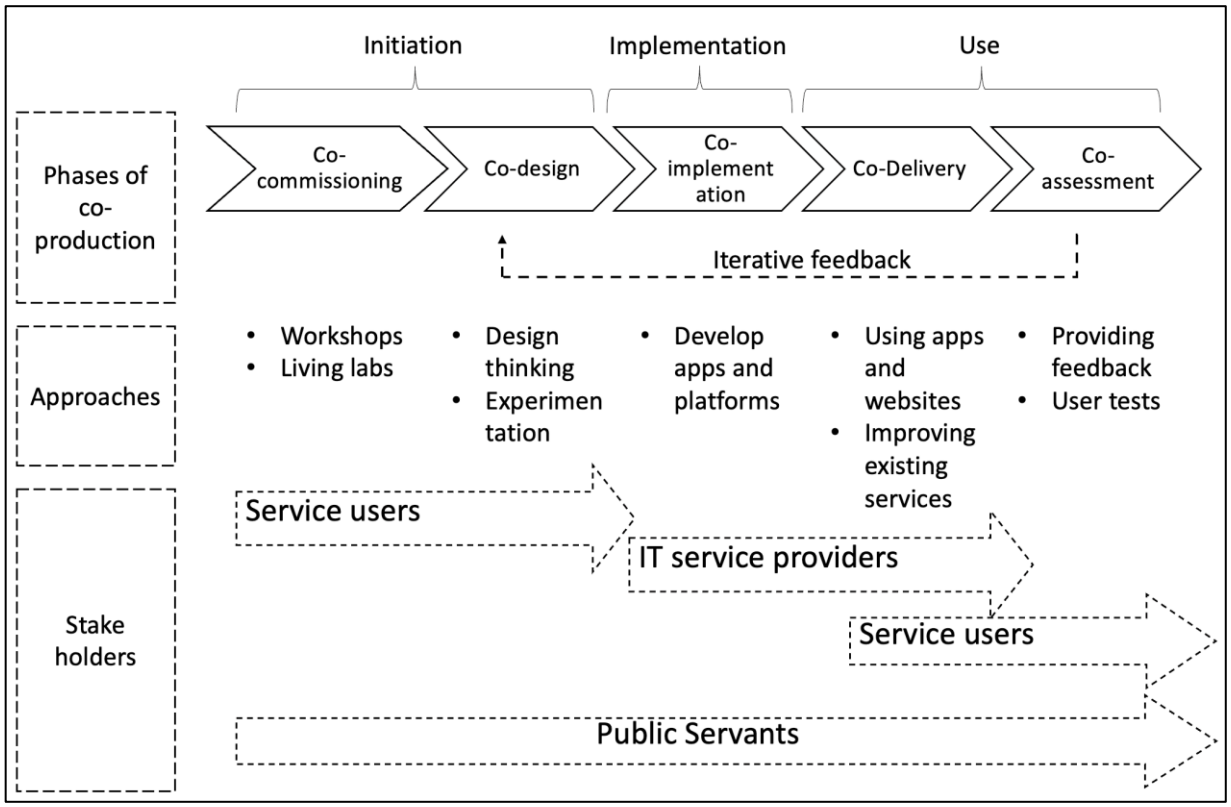

Figure 2: Co-production framework for digital service delivery

Limitations of our research approach

Our research design has two limitations that influence the conclusions we draw in this study. First, given the rather recent development of the field of digital transformation, the initial selection of experts is based on our reading of the literature, practitioner blogs, and social media updates, and we had to rely on a snowball sampling procedure. We also asked the experts to provide us with suggestions for further experts to be interviewed at a similar level. Therefore, our sample is heavily

biased toward Western bureaucracies and experts of similar seniority, reflecting their attention focus when it comes to digital public services. The results presented here need further validation in other bureaucratic, political, and cultural contexts.

Second, we did not have an opportunity to triangulate the data with other sources (Carter et al. 2014; Guion, Diehl, and McDonald 2011). The results presented in this study are drawn from the analysis of qualitative interview data only. Expert knowledge is unlikely to be completely accurate or transferrable to every local context (Caley et al. 2014). The statements made by the experts were not validated by additional documents or observations in the experts' organizations. To remedy this flaw, additional small n (in the form of case studies) and large N analyses are needed to test and improve the theoretical framework we have presented in this study. To alleviate some of these limitations, we aimed to be as transparent as possible in describing our data collection and analysis procedure in-depth. Furthermore, we use quotes from the interviewees to illustrate how we reached our empirical and theoretical conclusions. We do this to increase the transparency of the research process and to increase the quality of our qualitative research (Ospina, Esteve, and Lee 2018; Shah and Corley 2006).

As mentioned, the experts can always only provide their viewpoints based on their in-depth knowledge of specific digital transformation cases. While this might limit the transferability of our findings to all public administration contexts, we believe that situations in which the theoretical concepts and empirical phenomena are present allow for the application of our findings even across contexts.

At the same time, our study is – to the best of our knowledge – the first study that aims to understand how different roles emerge in the co-production phases, and it expands the existing theoretical knowledge by proposing a new theoretical model of co-production. We added a new

phase – co-assessment – to the already established co-production process and provided novel insights on how each phase plays out in a unique and evolving case of digital public services.

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