Co-Creating Digital Public Services

Introduction

Co-creation is understood differently across domains of application and research fields. For example, in the management and business literature co-creation is often described as a business model that allows responding effectively to changing consumer demands: Instead of companies creating or influencing a demand, customers co-create innovative solutions and value. In contrast, in research fields such as (collaborative) learning, co-creation is mostly related to the co-creation of (shared) knowledge. Overall, the role of technology in co-creation differs: Whereas in some domains technology is understood as an enabler of co-creation (e.g. knowledge or value co-creation enabled through digital platforms), in others technology is the goal of co-creation (e.g. co-creation of digital artefacts). The co-creation of digital public services differs insofar from these examples, as technology is understood as an enabler as well as an objective: It aims to co-create (public) value for public administrations and citizens through the co-creation of digital public services.

This chapter reviews the key literature and concepts relating to the co-creation of digital public services. For this task, it is firstly important to consider what kind of digital public services may be suitable for co-creation. In order to do so, the first section of this chapter defines what a digital public service is (e.g. with respect to different types of service providers, different types of services and service delivery) and considers what kind of digital public services allow for meaningful citizen participation. To better conceptualise different degrees participation, the subsequent section reviews Arnstein’s (1969) “ladder of citizen participation” and related work. This allows distinguishing between different degrees of non-participation, (consultative) participation and beyond. Thirdly, the chapter reviews traditional participatory approaches that provide the basis for the co-creation of digital public services: (1) co-production of public services, (2) co-design of technology and (3) civic open data use.
Co-production of public services refers to the collaboration of at least two parties (public administration and citizens) and has to be distinguished from other forms of civic self-empowerment such as volunteer work or self-organisation, because the public administration is not taking part in such activities. In general, co-production refers to the long-term involvement of citizens in the planning, building and provision of public services. It aims to increase efficiency, effectiveness and user/customer satisfaction of a service. Co-produced services can be substitutive for or additive to existing services. The majority of co-produced public services involve physical objects and direct human interaction (e.g. garbage separation for recycling). Digital services have so far received little attention in co-production.

Co-design refers to the tradition of user involvement in the design and development of information systems since the 1970s. There are three, partly overlapping co-design approaches, each granting different levels of control over design decisions to users: User-Centred Design (UCD), Participatory Design (PD) and User Innovation (UI). Whereas participation of users is mostly limited to the role of informants in user-centred design, their scope of action can be substantial in participatory design projects. So far, co-design projects are mainly conducted within an organisation or directed towards single digital artefacts. What has received little attention so far is the extent to which such approaches are transferrable to public sector innovation.

Civic open data use is a new mode of government-citizen collaboration that emerged as part of the open government movement and the provision of open government data for civic use. Many public administrations and governments provide part of their data under open licenses, so that technology-savvy citizens may use and re-use it. While the role of public administrations is somewhat reduced in this approach, civic tech organisations and individual activists design and develop digital tools (“civic technology”) to solve particular civic/social problems. However, technology-savvy activists who run most projects do not necessarily consider or engage a wide range of user groups (e.g. older adults are rarely considered as partners or participants). In addition, the approach is lacking, so far, a participation framework between government and civil society actors that ensures the development of sustainable and scalable digital solutions.

Reviewing those three approaches to co-creation allows to identify specific challenges but also ideas for the co-creation of digital public services. The chapter hence proceeds to consider the framing conditions for co-creating digital public services such as existing public information infrastructures, existing collaborations, budget constraints and corresponding policies. The subsequent section of this chapter considers different roles citizen may assume in co-creation processes. These roles include for example explorers, data creators, designers, or diffusers. The chapter closes with an examination of how the three traditional approaches respond to the three aspects that will guide the further analysis of this book’s empirical examples: (1) the sharing of control with citizens, (2) the sharing of lived expertise and (3) the enabling of individual and social change. Our own approach and framework for co-creation is described in detail in chapter four, followed by the accounts of our three co-creation projects in chapters five, six and seven.
Digital Public Services

The understanding of what digital public services are and how their maturity may be assessed has changed over the past two decades. Twenty years ago, the maturity of eGovernment services was understood with respect to the technological and organisational complexity of ICT systems against their actual integration into governmental organisations. Layne and Lee (2001) for example, argued that the maturity of eGovernment services may be assessed according to its level of integration (from the provision of information, to transactions to back-office integration; see Fig. 1).

A similar model was developed by Moon (2002) that features five stages: (1) Information/dissemination catalogue, (2) two way communication, (3) service and financial transactions, (4) vertical and horizontal integration, and (5) political

Fig. 1 Dimensions and stages of eGovernment development (Layne & Lee, 2001)
participation (e.g. online voting). Both models emphasise the complexity of eGovernment projects in transforming public sector service delivery as a transformation of its organisation through the integration of more sophisticated technology.

In contrast, the model proposed in the 2009 Benchmark Report by EU Member States emphasises a different rationale: user-centricity (European Commission, 2009). It describes the evolution of eGovernment services along policy concerns with regards to citizens as customers and designers of public services.

In this model, the early approaches to eGovernment services focussed on their availability (administration centric), including the inclusiveness and accessibility of these services. In the Manchester declaration of the biannual Ministerial eGovernment Conference (2005), “user-centricity” was first introduced:

A user-centric approach can contribute towards reductions in the administrative burden on businesses (especially SMEs) and citizens, can improve quality of life and can contribute towards trust in government and democracy.

The aim was to develop eGovernment services in a way that by 2010 “all citizens, including socially disadvantaged groups, will have become major beneficiaries of eGovernment”. eGovernment was meant to contribute to higher “user satisfaction with public services” in general. At the Ministerial Conference in Portugal (2007) it was declared:

It is imperative for governments to ensure citizens and businesses benefit from these investments. Understanding and recognising the importance of citizen-focused services and the reduction of administrative burden is therefore crucial to success.

In 2009 (Malmö) the ministers agreed on the following policy objectives to be met by 2015: (1) eGovernment services should be designed around the needs of users (citizens or businesses) and in collaboration with third parties; (2) eGovernment services should be user-centric, catering for the different needs of users (flexible, personalised, multi-channel, inclusive) and delivered in the most effective ways; (3) public administrations should actively seek collaboration with third parties on the development of eGovernment services in order to stimulate innovation and maximize public value.

The Benchmark Report of 2009 introduced the term “user experience” for the first time which goes beyond usability and accessibility. eGovernment initiatives were meant to include a “user satisfaction monitoring”; service development needed to be driven by “user-empowering technologies”.

Our future challenge will be to change the mindset of Administrations, and change the model of public services delivery to one that is clearly engaging and involving the customer in all aspects of the process. This opens the door to opportunities to reduce the cost-to-serve the customer, and improve service quality. We must go over a ‘tipping point’ to reap such rewards, and in so doing move from an Administration-centric to a Customer-centric service delivery model.

However, the 2017 declaration (European Commission 2017) is rather reserved. It is stated that the most recent EU eGovernment Action Plan (2016) has been a “significant step in this transformation journey”. However, “more needs to be done and faster to ensure its implementation”. The accompanying Benchmark Report shows
no progress in user experience. In addition to more user-centricity, it also asks for citizen engagement: That digital means are used to empower citizens and businesses to voice the views, allowing policy makers to collect new ideas, involve citizens more in the creation of public services and provide better digital public service.

In addition to the demand to more citizen engagement, there is the legitimate question whether there is a restriction on the types of public services that are suitable for co-creation. In the maturity model depicted in Fig. 2 we find no differentiation between different types of services. Rather, there is a general assumption that all eGovernment services need to be citizen-centric and citizen-driven. It does make sense, however, to differentiate between different types of public services as certain services are more suitable for co-creation. In general, public services can be distinguished by three criteria:

- The kind of interaction between service provider and user
- The kind of service provider
- The area or domain of the service

Different types of eGovernment services may be distinguished according to the kinds of interaction they enable between service providers and users. Layne and Lee (2001) introduced the categories of information, communication, transaction and integration. The bi-annual benchmarking of eGovernment services in EU-Member States uses a similar five stages maturity model. Each stage is connected with different technical, organisational and legal requirements and not equally suited for co-creation with civil society organisations or citizens as end user: Horizontal integration is achieved, when different services are integrated, that are regularly used together in a certain life situation, e.g. when people are moving from one place to another, they have to provide changes of their address with many offices and businesses. With horizontal integration, they have to enter these data

![Fig. 2 eGovernment maturity model. A pathway to customer-driven centricity (European Commission, 2009)](image-url)
Vertically integrated services automatically catch data from central registers and relieve users from entering these data at all. Both ways require interoperability between the different services. If they are run by different government agencies, there is a need for inter-organisational coordination. It is difficult to imagine that individual citizens can be of any help for advancing such service integration, as these are intra- and inter-organisational processes. In contrast, information services seem more suitable for co-creation between service provider and prospective service users.

A second distinction of public services refers to the kind of service provider. In the eGovernment context, the main focus is on government agencies at national, regional or local level. Many of the services provided by these agencies are regulated by law; their development and design is governed by public procurement regulation, co-determination of employees representatives and accessibility guidelines. However, the term public service also applies to services of public interest, which may be provided by government agencies, social welfare organisations or other civil society organisations. Examples for such services are pre-schools, civic meeting centres, consultation services, which may be partly under government licence and with government funding. In most cases, such service providers have more autonomy over the information services they provide and therefore may allow for more openness in a co-creation project.

Finally, a third criterion refers to the area or domain of a service such as social welfare, health, environment etc. These areas are regulated to different degrees with respect to which information have to be provided and which information may not be published. For example in Germany the publication of information on “hygiene control in restaurants” has been forbidden by court.

In sum, citizen-driven service development of public services has been promoted greatly at European and national level for the past decade. The examples above provide a glimpse into the ways in which Members States and the European Commission reiterate the importance of customer-centricity:

[...] the importance of user presence is repeated over and over again in different shapes: involvement, empowerment, collaboration, flexible and personalized user satisfaction” (Gidlund, 2012, p. 12).

In order to allow for meaningful engagement in the co-creation of digital public services, the term public service needs to be extended to services in the public interest and offered by social welfare organisations and other non-profit civic society organisations, which complement governmental services. Within the narrower frame of eGovernment services, it is information services, which offer most scope for action for citizen engagement. This engagement or participation can have different levels of intensity. These levels are reviewed in the next section.
Citizen Participation

There exist different typologies for modelling the degree/level of citizen participation in participatory projects. The initial “ladder of citizen participation” was proposed by Arnstein (1969) and subsequently amended for contexts such as research (von Unger, 2014) or open government (Prieto-Martín, 2014). What these models have in common is that they all distinguish between four overall degrees of participation (including non-participation).

The first level, non-participation, can be depicted through different modes of civic engagement. While Arnstein proposed (1) manipulation and (2) therapy; von Unger listed instrumentalisation and instruction. None of these modes of engagement substitute for genuine participation although we do find self-proclaimed citizen engagement projects employing such methods. For example, manipulation occurs when citizens are placed on “rubberstamp advisory committees or advisory boards for the express purpose of ‘educating’ them or engineering their support” (Arnstein, 1969, p. 218). This is similar to von Unger’s framing of non-participation in which citizens are instrumentalised to carry out specific tasks and follow instructions of those in power. Therapy is a mode of engagement in which citizens are engaged in activities that distract from the real cause of issues concerning citizens.

Arnstein (1969) defined the second level as degrees of tokenism towards participation. Prieto-Martín argues this stage on the participation ladder may also be understood as consultative participation rather than Arnstein’s somewhat “pejorative” token participation. He argues that public authorities cannot abandon “their role as guarantor of the ‘general interest’ and the rights of minorities” (p. 5) and hence rightly points out to connote this stage more positively as it may be the most appropriate approach for certain participation contexts. Overall, the stage includes information, consultation and advice: Informing citizens about their rights and responsibilities can be seen as a first step toward legitimate citizen participation. However, as Arnstein points out, very often, this is a one-way process in which those in power inform citizens without seeking to be informed themselves and hence not providing any feedback channels. The consultation of citizens may be a legitimate step towards participation, if it is combined with other modes of engagement. However, if consultation solely relies on surveys, neighbourhood meetings or public hearings without a transparent decision-making process, then this mode of participation remains symbolic at best. Arnstein states “when powerholders restrict the input of citizens’ ideas solely to this level, participation remains just a window-dressing ritual. People are primarily perceived as statistical abstractions, and participation is measured by how many come to meetings, take brochures home, or answer a questionnaire” (p. 219). Advice is the last of the three levels of consultative participation. Here a few, selected members of a community are allowed to participate, they are, however, not accountable to a constituency. Alternatively, they may be involved in the planning of a service and advise decision-makers; it is however the decision-makers that ultimately judge the legitimacy or feasibility of the citizens’ advice/suggestions (Arnstein, 1969; Prieto-Martín, 2014). With all of these
degrees of consultative participation, the decision-making power lies ultimately with public authorities.

(Collaborative) participation begins when power is (re-)distributed between citizens and public administrations (Prieto-Martín, 2014). The initial degree of participation is “collaboration” (Prieto-Martín, 2014) or “partnership” (Arnstein, 1969).

Partnership [or collaboration] can work most effectively when there is an organized power-based in the community to which the citizens leaders are accountable (Arnstein, 1969, p. 221, emphasis added).

The outcomes of collaboration (or partnership) should influence final decisions in a meaningful way. Prieto-Martín speaks of “honest cooperation” to signal all participants collaborate to “find and develop the best solutions” (p. 6). Partial decision-making power and delegated power allow citizens to reach (dominant) decision-making authority of a particular plan or program. Participatory budgeting, in which citizens determine by majority vote which of a set of proposed actions should receive funding, are one example. Finally, if citizens take control, e.g. community controlled schools or neighbourhood programs, their power goes beyond a participatory framework (Fig. 3).

Of course, the stages proposed in this ladder are not as clear-cut as they have been described. Rather, within participation projects, there is often no sharp distinction between the stages and we find many forms of citizen (non-)participation that are partly overlapping. Hence, these stages should be rather understood as an analytical framework for analysing and evaluating participation projects. In addition, this typology depicts those in power and the powerless as homogeneous groups that

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**Fig. 3** Ladder of citizen participation in digital public service co-creation. Adapted from (Arnstein, 1969; Prieto-Martín, 2014; von Unger, 2014)
juxtapose each other. In reality, we find many divergent views, competing interests and different capabilities in each of the groups. However, as Arnstein argues, “in most cases the have-nots really do perceive the powerful as a monolithic ‘system’, and powerholders actually do view the have-nots as a sea of ‘those people’” (p. 217). Examples of such discourses may be found in most policy frameworks promoting the engagement of “the civil society” or “the ageing population” as described in the previous chapter.

Co-Creation and Co-Production

In order to understand how these different types of participation play out, Manzini (2015) developed a map of citizen involvement that locates different modalities of participation with respect to (1) the degree of collaboration between service providers and service users (low to high degree of collaboration) and (2) the degree of active participation of service users in the planning, design and delivery of public services. The degree of active involvement ranges from passive to active participation. In the case of passive participation, citizens are seen as passive users of a service; other stakeholders play the role of active providers of services. In this scenario users are served by providers. The degree of collaborative involvement ranges from no collaboration to intensive collaboration between service providers and service users. The outcome is a map which depicts four different modalities of citizen involvement (Fig. 4):

1. Being served represents the mode of least engagement and depicts the traditional mode of service design and provision. Citizens are not involved in its planning, design or provision, they are service users.
2. Co-management represents a mode with low involvement of citizens as service users, they are however selectively included for collaborative tasks (e.g. in the provision of a service).

Fig. 4 Map of citizen involvement (adapted from Manzini, 2015)
3. *Co-production* represents a mode of engagement in which citizens are actively and collaboratively involved in the planning, design and delivery of public services.

4. *Do-it-yourself* represents a mode in which citizens are simultaneously provider and users of a service.

The concept of co-production is related to public services in the sense that since public services are characterised through a merger of production and consumption, they always depend to a minimum on the involvement of citizens. Osborne, Radnor, and Strokosch (2016) define co-production as the voluntary or involuntary involvement of public service users in any of the design, management, delivery and/or evaluation of public services (p. 640). In their understanding, any service delivery process is always co-produced, be it voluntary (and willingly) or not, and argue that “a service does not have any intrinsic value to its users” but that its value is co-produced. They understand co-creation only as the co-creation of value through the co-production of services. Others have argued that co-creation can be understood as a process of active citizen participation and hence similar to Manzini’s understanding of co-production as an active and collaborative undertaking (de Jong, Neulen, & Jansma, 2019; Voorberg, Bekkers, & Tummers, 2015). Here, co-production is the provision of services through regular, long-term relationships between professionalized service providers (in any sector) and service users or other members of the community, where all parties make substantial resource contributions (Bovaird, 2007, p. 847).

Hence, co-production refers to the collaboration of at least two parties (public administration and citizens) and has to be distinguished from other forms of civic self-empowerment such as volunteer work or self-organisation (“do-it-yourself”), since in those activities the administration is not taking part. It refers to the long-term involvement of citizens in problem definition and solving (see Fig. 5). Crucially, the planning stage concludes with a definition of a problem that needs to be solved. Subsequently a solution is being developed.

Bovaird and Loeffler (2012) identified two types of co-production: *substitutive co-production* as the outsourcing of work (and costs) and *additive co-production* as activities of the administration to enhance the impact of civic engagement. In this view co-production is understood as an impact-oriented form of collaboration between public administrations and citizens, that aims to unfold the capacities, potentials and strengths of all parties concerned with the objective of enhancing the quality of life in neighbourhoods, cities or regions, and to achieve efficiency gains jointly (Löffler, 2015, p. 319). It also aims to trigger “behaviour change” and preventing “future problems” (Bovaird & Loeffler, 2012). Thereby the rapid development of ICTs can support attempts to co-produce public services as it facilitates access to public data, enhances transparency and enables closer relationships and new forms of interaction between government and citizens.
In a comprehensive literature review on the co-production of public sector services, Voorberg et al. (2015) undertook a detailed analysis of 122 reports covering different public sector domains, with a dominance in health care (30 cases) and education (15 cases). In 52% of the contributions, no objective is mentioned at all. Twenty-nine percent of the cases wanted to gain more effectiveness or efficiency, 8% aimed for more customer satisfaction and only 7% aimed to increase citizen involvement (Table 1). The authors assume that in those cases where no objectives were mentioned explicitly co-production itself was the goal and the justification, independent from any outcome (ibid, p. 1341). Voorberg et al. identify the following critical factors for achieving the goals of a co-production project on the government-side:

- Compatibility of public organisations with citizen participation, mentioned in 47 reports (46%)
- Open attitude towards citizen participation (22%)
- Risk-averse administrative culture (18%)
- Presence of clear incentives for co-creation (win/win situation) (14%)

In addition, on the citizens’ side:

- Characteristics, e.g. skills, intrinsic values, marital status, family composition, level of education (33%)
- Customer awareness, feeling of ownership, being part of something (30%)
- Presence of social capital (30%)
- Risk aversion by customers, patients, citizens (7%).

Voorberg et al. (2015) based their review on 5358 articles in English-speaking journals and book chapters which appeared between 1987 and 2013 and which contained the word “Co-creation” or “Co-production” in its title or abstract. They found 1337 reports on co-creation and 4021 on co-production. Further selection criteria were involvement of citizens, public sector services, empirical findings, among others and finally led to 122 reports for detailed analysis (Voorberg et al., 2015, p. 1338).
Arnstein (1969) argues that “roadblocks” to “genuine” participation lie on both sides: On the side of government and public authorities these include racism, paternalism and a resistance to power redistribution; on the side of citizens they include the political socio-economic infrastructure, in particular in poor communities and difficulties in organising accountable representation. Actions to overcome barriers on the citizen side found in the reviewed literature include lowering the thresholds for participation, e.g. by offering a plebiscitary choice instead of asking citizens about complicated policy issues or following an inviting policy to generate a feeling of ownership. Often times, providing financial incentives are coupled with futility, alienation, and distrust in government. The review of Voorberg et al. (2015) mentions influencing factors such as social capital and the need that government explicitly invites, encourages and supports citizens in a co-creation process. They conclude that government not only has to overcome internal barriers but also has to enable, encourage and support citizens to get involved.

Although 50% of the reports mentioned some kind of objective only 24 (20%) report an outcome or impact. Among the different dimensions most frequently effectiveness is reported, i.e. the number of people reached, the amount of garbage separated or knowledge improved (Table 1).

Voorberg et al. (2015) embarked their review in order to identify whether the big hopes for co-creation (as co-production)—they speak of a „magic term” can be based on evidence in order to help public sector decision makers decide whether and how to initiate such processes. In sight of this review, Voorberg et al. (2015) conclude that it is not clear whether co-production does indeed contribute to the outcomes it claims to accomplish. They further question, “if there is a relationship between several degrees of citizen involvement (co-implementing, co-design and initiator) and the outcomes of social innovations” (p. 1348). The result is that in the majority of cases, co-creation is considered as a virtue in itself (see also de Jong et al., 2019).

Overall, co-production is about increasing efficiency, effectiveness and user/customer satisfaction of a service (no matter if public or private). Co-creation in contrast can include some of these aspects but goes beyond them; the participation of citizens is an end in itself, because it aims to intensify one of the fundamental principles of democracy and civic participation. Hence, while co-production of public

### Table 1 Goals and outcomes of co-production (Voorberg et al., 2015, p. 1341, 1345)

| Co-production objectives | Goal explicitly named \( (n = 122) \) | Outcome reported \( (n = 24) \) |
|--------------------------|---------------------------------|-------------------------------|
| Gaining more effectiveness | 22 (18%) | 14 (59%) |
| Gaining more efficiency | 13 (11%) | 1 (4%) |
| Gaining more customer satisfaction | 10 (8%) | 1 (4%) |
| Increasing citizen involvement | 8 (7%) | 6 (25%) |
| Strengthening social cohesion | n.a. | 1 (4%) |
| Democratizing public services | n.a. | 1 (4%) |
| Others | 5 (4%) | n.a. |
| No objective mentioned | 64 (52%) | n.a. |
services is a promising and innovative idea and an option to respond to “bureaucratic burden”, incomprehensible administrative forms and procedures, we learn from the literature review conducted by Voorberg et al. (2015) that in general there is no evidence that the idea really works (for digital services) and that the desired results are achieved. The cases of co-production reported dealt mostly with physical objects and direct human interaction (for example garbage separation for recycling reasons). In order to understand, how user participation may be performed for the design of digital services, two approaches to co-design are now reviewed: participatory design and user-centered design.

Co-Creation and Co-Design

So far, there has been little attention to user participation for the design of digital public services (Karlsson, Holgersson, Söderström, & Hedström, 2012). However, there is a long tradition of user involvement in Information System Development (ISD). Ever since the users of Information Systems (IS) became a different group of professionals from those that design and implement such systems, there was a gap between the expertise of professional software systems developers and prospective users.

In general, we can distinguish between three, partly overlapping user participation approaches: User-Centred Design (UCD), Participatory Design (PD) and User Innovation (UI). The level of control (as described in Arnstein’s participation ladder) over design decision increases for participating users from user-centred design to participatory design to user innovation. In the following, I will only review participatory design and user-centred design as these two approaches assume some sort of collaboration between those developing systems and those using the systems. Both approaches are reviewed with respect to the modes of participation and levels of control they allow as well as citizens’ willingness and ability to participate.

Participatory System Design (PD)

The classical model of PD dates back to the late 1970s with at least three different origins and approaches. To date, there are different directions of this approach. However, they share 11 overall goals as illustrated by Karlsson et al. (2012) in Fig. 6 below.

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2 Since 1990 there is a bi-annual international conference on participatory design, started by Computer Professionals in Social Responsibility. The proceedings are available online at http://ojs.ruc.dk/index.php/pdc/issue/archive and show the great variety of thoughts and research findings on participatory design over 25 years, which cannot be summarised exhaustively in this section.

3 The approaches can be compared by contributions of their proponents in a reader edited by Schuler and Namioka (1993).
As one of the first, Enid Mumford at Manchester Business School described case studies of information systems which were not meeting the objectives of users, because system developers had a too narrow understanding of the requirements and identified a knowledge gap between users and systems developers. To achieve a knowledge symbiosis, she worked as consultant and organised co-operative system development processes, published best practice cases (Mumford, 1981; Mumford & Henshall, 1979) and developed the ETHICS-Method. In this approach, “system” was conceived as a socio-technical work system, which has to meet the needs of an organisation and of the employees. Karlsson et al. (2012) identified this as the overarching goal of participatory design: To ensure a better fit between technology and the ways people (want to) perform their work (PD-G1, see Fig. 6 below). The way to achieve this is structured into seven steps from (1) needs assessment, (2) identification of constraints and (3 and 4) specification of technical and social objectives via (5) check of compatibility between different technical and social solutions to (6) the detailed technical and work design and (7) evaluation (Mumford & Weir, 1979). As such Mumford describes three levels of participation so that users participate in decision-making (PD-G11, Fig. 6 below): users as advisors (PD-G6, Fig. 6 below); selected users as representatives who make design decisions (PD-G7, Fig. 6 below) and participation as consensus between all users concerned (PD-G8, Fig. 6 below).

Fig. 6 Goal analysis of participatory design approaches (Holgersson & Karlsson, 2014; Karlsson et al., 2012)
In contrast the *Scandinavian approach* was based on political and philosophical considerations, emerging from a trade union perspective (Greenbaum, 1993; Kubicek, 1980). Within the context of office automation on the one hand and Industrial Democracy on the other, trade unions in Norway, Denmark and Sweden questioned whether the participation of employees should take place under the control of management and capital owners. They were in doubt on whether such processes would indeed meet workers’ interest, since such systems could potentially replace them (Bjerknes & Ehn, 1987; Ehn, 1988). Starting from the claim that those affected by a technology should be able to influence it (PD-G2, Fig. 6 below), participation had to be regulated by technology agreements, negotiated by trade unions and management, including job security, health and ergonomic issues of computer work stations and visual display units, qualification programs and more. In cooperation with a computer science department, trade unions set up projects to explore user participation in this contexts and developed new methods (PD-G3, Fig. 6 below). Most famous are the *DEMOS* and the *UTOPIA Projects* (Ehn, 1988).

In the US, elements of the British and the Scandinavian approach were integrated in the *Quality of Work Movement*. Because of the much lower degree of unionisation there was no chance of union involvement in systems and work design (Greenbaum, 1991). Rather the transfer was limited to the idea of merging the different views of system analysts and users in particular for the development of (management) information systems where users have much more discretion in how they use the information and functions of these systems compared to more deterministic legacy systems in accounting or for order processing. Greenbaum speaks of “*Cooperative Design*” (Greenbaum & Kyng, 1991). However, there was still a commitment for users and systems developers to cooperate (PD-G3), in particular for users to know of possible technological options (PD-G5). In addition, according to Karlsson et al. (2012) users must have access to relevant information (PD-G9) and have the possibility to take an independent position to the problem (PD-G10).

Despite differences between the approaches, they all focus on the development of individual software for intra-organisational information systems within a company. The development is conducted either by an internal IT Department or via an individual contract with a software development company. In such processes, the user departments are well-defined; representative users can be assigned to such participatory or cooperative design projects.

In recent years, this setting has changed as software projects target users outside of organisational boundaries (e.g. digital public services). This has led to new challenges with respect to participation and cooperation between software developers and prospective users. Information systems for eGovernement services target users

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4 Morton Kyng and colleagues from the Computer Science Department at Aarhus University in Denmark collected new methods for cooperative design between computer specialists and employees, which had been developed in these trade union projects such as Future Workshops, Organizational Games, Mock-up-Designs and Cooperative Prototyping in order to allow for a full understanding of the future system in the planning process by the participating employees and systems analysts at the same time (Bødker, Grønbæk, & Kyng, 2012).
who are not members of a specific organisation. Yet, the development of such services faces similar challenges with respect to understanding prospective use context and use practices.

A main challenge to software development for extra-organisational users is that traditional PD models relate to intra-organisational development of intra-organisational information systems: Internal users can easily be identified, are assigned by their managers to a project, which takes place at their work place and during paid working hours. They are motivated to participate because they learn first-hand about changes of their future job and have a chance to influence this change. In contrast, external users are more difficult to identify and motivate. They use an online service only occasionally and can potentially opt-out. Kubicek and Taube have called them “occasional users” (Kubicek & Taube, 1994). For a number of reasons it is more difficult to involve extra-organisational users in the co-design of information systems:

1. Participation requires time and usually requires a commute to where the co-design intervention takes place;
2. Participation requires to engage with people that do not necessarily know each other;
3. Participation requires engagement with software developers and software development, a topic area not familiar to most people.

There is only very little research on co-design with external occasional users. Early case studies of a school information system and a one-stop government service centre in Germany demonstrated that in both cases, users (parents and citizens) were reluctant to participate in the design of these systems (Breiling, Haunhorst, & Membrey, 1979). Stark (1998) reports on financial, schedule and information barriers and doubts the legitimacy and effectiveness of the participation of patients in the development of a patient health card.

In an interview study with 99 citizens from age 18–84 years, Holgersson and Karlsson (2014) determined criteria for citizens’ willingness and ability to participate in participatory design projects. The experience of citizens with respect to technology design and use was documented. They determined that the oldest age group of their respondents (70+) showed little interest in participating in the design of digital public services according to participatory design principles. As the main reason they listed their modest use of digital public services. For example, one respondent stated: “If you do not use a service you will not see any problems with it either’, and ‘to participate in development of a service you never use and never will be using would be very odd” (p. 7). However, those citizens who had prior positive experience of collaborative forms of design, favoured participatory design over other approaches. In addition, Holgersson and Karlsson (2014) identified personal incentives and a “strong social commitment and feeling of obligation to participate when called upon” (p. 7) as the main drivers for citizens’ willingness to participate in PD projects.
User-Centred Design (UCD)

In the last 30 years, software development has moved from an individual craft to industrial production. Instead of developing bespoke software, organisations now purchase standard software products (e.g. from SAP or Microsoft). In these cases, there is not much discretion regarding the design of functions and interfaces on the organisation’s side and therefore only limited options for participative or cooperative systems design. In contrast, work processes often have to be adapted to the software system and this re-design and process re-engineering may become subject to employee participation.

As one alternative to participatory design, user-centred design emerged in the 1980s. It was part of the area of human-computer interaction and has become increasingly relevant in the design of digital public services (Kubicek, Gerhard, & Jarke, 2019). Iivari and Iivari (2011) list four principles according to the ISO 13407 standard:

- The active involvement of users and a clear understanding of user and task requirements;
- An appropriate allocation of function between user and system; iteration of design solutions; and multidisciplinary design (p. 126).

They observe that these principles are quite ambiguous and develop a framework of four dimensions of user-centeredness based on a review of 347 papers.

- User-centeredness as user focus;
- User-centeredness as work-centeredness
- User-centeredness as user involvement or participation;
- User-centeredness as system personalisation.

Extending this analysis further, Karlsson et al. (2012) identify nine goals related to user-centered design. They analysed and categorised the goals and highlighted all those goals, which could potentially be controlled by users/citizens in grey (Holgersson & Karlsson, 2014). Overall, user-centred design aims to develop systems that serve their users (UCD-G1, see Fig. 7 below). As outlined in ISO 9241 the system’s interfaces should relate to the needs of users (UCD-G3, Fig. 7 below). Holgersson and Karlsson (2014) argue that in early UCD research “developers were promoted as being system designers and builders” (UCD-G4, Fig. 7 below) whereas “users were seen as passive advisors who respond to the developers’ needs” (UCD-G7, Fig. 7 below). In order to gain sufficient knowledge about the domain in which a system was ought to be deployed (UCD-G6, Fig. 7 below); developers had to spend sufficient time in this domain to appreciate users’ needs (UCD-G5, Fig. 7 below). Recently, the role of users has become more active by involving a small number of users as representatives (UCD-G9, Fig. 7 below). Hence, users may participate to a varying degree in the decision process (UCD-G8, Fig. 7 below).

In their study, Holgersson and Karlsson (2014) determined that those citizens that said they prefer user-centred design approaches over participatory design approaches did so because of (1) a lack of time for a more time-consuming process, (2) a general satisfaction with existing services or (3) only infrequent or little use of digital public services. They mostly favoured participation as advisors over the
more time consuming and demanding participation as representatives. Hence it allowed for a more passive and reactive form of participation.

**Summary**

In sum, the co-design of digital public services corresponds to design thinking-approaches that first aim to develop a joint understanding of the “right problem” (first phase) and subsequently develop the “right solution” (second phase). Such projects start from a general problem focus (first circle in Fig. 8) and through the analysis and understanding of the future use context and users, a concrete problem definition is developed (second circle in Fig. 8). The first part of the first phase allows for exploring the problem area and opening up of the problem space (divergent thinking); the second part of the first phase defines a specific area to focus upon.
and concludes with a *problem definition* (convergent thinking). Only then, do participants embark on exploring and developing potential solutions (divergent thinking), which is converging through prototyping and the refinement of a specific *solution*.

**Co-Creation and Civic Open Data Use**

A new mode of government-citizen collaboration has emerged as part of the open government movement and the provision of open government data for civic use (e.g. Baack, Djeffal, Jarke, & Send, 2020; Emaldi, Aguilera, López-de-Ipiña, & Pérez-Velasco, 2017; Toots et al., 2017). Many public administrations and governments provide part of their data under open licenses, so that technology-savvy citizens may use and re-use it. While the role of public administration is somewhat reduced in this scenario, so-called civic hackers are “deploying information technology tools to enrich civic life, or to solve particular problems of a civic nature” as Hogge (2010, p. 10) noted in a study commissioned by the Open Society Foundation. These civic hackers are political activists that aim to support their communities through digital means; they are—in a way—an “elite” that is capable of apprehending the meaning and possible uses of open data, and subsequently act on it (Schrock, 2016).

Civic technology is strongly associated with the digitalisation of the public sector in general and the idea of “open government” in particular. Interactions between public authorities and citizens are increasingly mediated by digital technologies as more and more public services are provided via digital channels. However, in many cases these services are not used widely and in particular, older citizens are excluded above average, as digital services do not meet their needs and expectations. In the
past decade the idea of “open government” (European Commission, 2014; House -Oversight and Government Reform, 2007; Office of the President, 2009; Presidential Directives EO 13392, 2005) has attracted attention, encouraging the development of so-called civic apps (digital applications that are based on open government data and developed by civil society actors such as Code4America). These civic apps are meant to provide for better and user-centred services and to foster public participation and engagement in the development and provision of public services using open government data.

There are different models on how government and citizens may interact with respect to open data. Sieber and Johnson (2015) distinguish four modes:

• **Data Publishing**: Governments provide data as open data via local or national portals. According to the requirements of the Open Knowledge Foundation, Open Data should be freely available to everyone to use, re-usable and re-publishable as users wish, and absent mechanisms of control such as restrictive licenses.5

• **Code exchange**: Government explicitly encourages the development of saleable or internally useful products based on its provision of open data as mentioned in the introduction. The provision of data is accompanied by promotional or other forms of supportive activity and is often framed in the context of an “app” contest, i.e. apps developed by a developer community, including private businesses and civil society. It is the “outsourcing app-development by government”.

• **Civic Issue Tracker**: In this model, the direction of interaction is reversed. Government invites citizens to report problems like potholes or noise complaints or to give feedback on published data and documents. This mode may be applied independently from the two previous modes, but can also be combined, when citizens are invited to act as „sensors of their environment“ and report data on phenomena they are physically close to in a crowdsourcing approach.

• **Participatory Open Data**: Here open data is reciprocal. Data provision from authoritative sources may be followed by a request for additional data and be amended by citizen-generated data that can support service delivery and open a new channel for discussions about policy. This can take place in a co-management framework and includes the on-going co-creation of raw data between both governments and governed and the co-production of services.

Sieber and Johnson (2015) see governments “at a crossroad” taking a choice between these modes, as they are driven by different motivations: The **first two modes are motivated by the call for transparency** based on freedom of information requirements and/or providing resources for economic development. The **third mode is motivated by a concern for a more responsive relation of government to its citizens** while the **fourth mode demonstrates a fundamental change of the role of government** and calls for a degree of flexibility, which is hardly found. However, the authors promote the “Participatory Open Data Model”, because the first two modes

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5 See for example also Open Knowledge Foundation.
pose the risk that governments „outsourcethemselves“. If, for example, Google collects all transport data and offers public transport information, people may start asking why they pay taxes if others provide public services for free. In the authors’ view, the fourth model is a necessary reaction to ongoing changes in the digital world and in line with the principles of the Open Government Partnership.

Nevertheless, this model is in conflict with the established structures of representative democracy and the rule of law: If citizens are invited in this way as co-producers, they expect that government will follow their suggestions and contributions. However, it is open how to deal with conflicting demands and how to give the silent majorities a voice. For example, issue trackers (such as FixMyStreet) are much more widely used in those parts of a city where people with higher socio-economic status live. Studies have demonstrated that after the introduction of issue trackers, those parts of the city are more likely to receive attention by public authorities, because their issues become visible, whereas issues in other parts of the city remain invisible (Marres, 2017).

Those who volunteer as co-producers have no mandate from their co-citizens but may pursue their individual interests. They are not accountable to their communities in Arnstein’s sense. According to the existing law, the decision which services are provided by local government has to be taken by the elected council within the approved annual budget according to procurement law. Any proposal for new services has to be considered and finally decided within these limits. This may be one of the reasons why the fourth model has almost not been realised so far.

In sum, public authorities and governments on all levels (local, regional, and national) are placing an increasing emphasis on opening their data repositories to encourage new and collaborative forms of service design and delivery (Shakespeare, 2013). However, such open data is normally read-only (that is, citizens are usually not able to suggest changes, correct errors, etc.) and there is little return for local governments (M. Lee, Almirall, & Wareham, 2015; Hunnius & Krieger, 2014; Kubicek & Jarke, 2020). Often developers anticipate the needs and wants of citizens based on their own experiences with lack or insufficient knowledge about prospective user groups. In order to create value that benefits administrations as well as citizens, it is crucial to engage citizens in the process of open data service app development, especially those who are often forgotten when it comes to technological innovations. So far, the field of civic open data use (civic tech/civic hacking) is mainly dominated by younger and tech-savvy “civic hackers” that develop services for their communities and cities (Gooch et al., 2018; Lee et al., 2015). Older citizens—if at all—are often only marginally involved in such kind of civic technology engagement. In those cases where citizens are involved they mainly act as data collectors (e.g. Gooch et al., 2018).

Thus, there is a need to bring together city administrations as data owners, technology developers and older citizens as knowledgeable individuals and prospective users in order to co-create valuable public services based on open data in participatory design processes. The articulation of this need may be found in the publication of several funding lines (of e.g. the European Commission) in which research and innovation projects are proposed that co-create public digital services. Mobile Age,
the research and innovation project upon which this book is based, was one of such projects.

**Framing Conditions for Co-Creating Digital Public Services**

The first part of this chapter provided an overview about the objectives of some of the roots of co-creation: co-design, co-production and civic open data use. Those approaches cover different phases in the life cycle of service planning (plan), design and provision (run). Figure 9 situates the three approaches along those phases, the first white triangle depicts the scope of activity in the planning phase (from general idea to a problem focus), the last the provision of a service (from the roll-out to the provision of a service). The design phase has been given more room in this figure because it is the heart of co-creation activities and user engagement. It starts with a general problem focus and spans over four steps: exploring a problem area, defining an area to focus upon which leads to the developing of potential solutions and prototyping. Participatory design (and other co-design approaches) provide a phased model of the design process that does not start with a well-defined problem to only develop a solution, but rather demands that users come to be involved in the identification and definition of a problem. In contrast, co-production projects often start from a pre-defined problem and are interested in co-producing solutions which are also provided in partnership. This long-term view on the sustainable provision of a solution is not something that is well covered in the participatory design literature, which tends to focus on research-led design projects. Co-production initiatives on the other hand are often driven by public-sector stakeholders. Civic open data projects include, by definition, civic stakeholders already in the planning phase and

![Fig. 9](image_url) An overview of digital public services co-creation and how traditional approaches feature in the process of service planning, design and provision
cover the design and running of a service. However, it has to be noted, that they rarely include non-tech savvy citizens. The sustainable maintenance and running of a civic app poses a major challenge as they rarely get integrated into eGovernment portals (Lee et al., 2015).

Co-creating digital public services goes beyond the design of a stand-alone application/a digital prototype as is often the case in co-design projects. What makes the co-creation of digital public services so challenging is that these services need to be integrated in eGovernment service platforms in order to be sustainably maintained, they have to align and be compatible with the existing public sector information infrastructure.

However, rather than understanding such an infrastructure as something that is “just there”, ready-at-hand, completely transparent, something upon which something else ‘runs’ or ‘operates’” (Bowker, Baker, Miller and Ribes, 2009, p. 99), infrastructures need to be considered as an array of activities consisting of often invisible (maintenance) work and continuous negotiations between various stakeholders. In the case of public sector information infrastructures, existing collaborations between various stakeholders, existing policies and strategies, the existing IT and (open) data infrastructures, procurement laws, interoperability requirements, budget constraints and other legal and organisational restrictions need to be considered. Co-creation activities will lead to new or amended collaborations, new knowledge and amended (open) data sets, which need to be maintained. Finally co-creation activities produce one or more technical outputs such as apps. These need to be embedded into the existing information infrastructures such as eGovernment or Open Government portals.

Conceptually, Star and Ruhleder (1996) have listed a number of aspects that define an infrastructure: It is embedded in other structures, social arrangements and technologies, it is transparent to use in that it does not have to be re-invented or assembled for each task and it has a certain reach or scope. Using an infrastructure and being acquainted with its structure and inner logic, means that its use is learned as part of membership in a specific community of practice. In the case of an eGovernment infrastructure this relates to the community of civil servants that have learned to use the infrastructure in a specific way or the communities of citizens and businesses using it in different ways (usually with the public servants being the service providers and citizens and business being the service users). The use of such an infrastructure hence links to particular conventions of practice, for example of what is required for a tax return. Infrastructures also embody standards. These standards allow, for example, for different infrastructures to be interoperable. Furthermore, it is build on an installed base. Optical fibres for example, often run along old rail lines; the Internet coverage in rural areas is many times sketchy. Often infrastructures only become visible upon breakdown. As long as an infrastructure runs smoothly, many people will not notice their existence (or will pay no attention to its existence). Finally, changes occur in modular increments. An infrastructure is never changed all at once or globally, because it means different things locally and is hence complex and layered. Any changes require negotiations between various stakeholders and hence take time.
The following Fig. 10 provides some of the aspects of public information infrastructures that influence the openness and scoping of co-creation projects. Areas in white depict the scope for activities allowing for divergent and convergent thinking; areas in grey depict framing conditions.

Overall, information infrastructures are systems of classifications and as such enact certain representations of the world.

The design and use of information systems involves linking experience gained in one time and place with that gained in another, via representation of some sort. Even seemingly simple replication and transmission of information from one place to another involves encoding and decoding as time and place shift. Thus the context of information shifts in spite of its continuities; and this shift in context imparts heterogeneity to the information itself. Classifications are a very common sort of representation used for this purpose. Formal classification systems are, in part, an attempt to regularize the movement of information from one context to another; to provide means of access to information across time and space (Bowker & Star, 2000, p. 290).

These classifications are important objects for cooperation across social worlds (e.g. between civil servants and citizens). Bowker and Star (2000) have demonstrated this comprehensively in their seminal book “Sorting things out”: Classification systems organise and are organised by work practices. Public information infrastructures that provide, for example, digital public services such as eGovernment services, are most commonly organised around the silo structure of public administrations. This means that citizens who want to use a government service have to understand—to some extent—how public administrations work and how service portfolios are organised. They need to understand and know the “conventions of practice”. Since many citizens do not use the same public services on a regular basis, they may lack an understanding of the conventions under which a public information infrastructure was designed. Kubicek et al. have described this as a mismatch between the view of

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**Fig. 10** Aspects of public information infrastructures influencing the openness and scope of co-creation projects
information recipients and information providers. Bowker and Star (2000) argue that “one of the interesting features of communication is that, broadly speaking, to be perceived, information must reside in more than one context” (p. 290, emphasis in original). This means that public information infrastructures, and digital public services more specifically need to be meaningful to both parties—service users and service providers. Citizens’ misunderstanding of digital public infrastructures, their inability to make sense of the “conventions of practice” is perceived as “administrative burden”. Bowker and Star (2000) observed that

People often cannot see what they take for granted until they encounter someone who does not take it for granted (p. 291).

Part of the reason for this mismatch is the way in which information systems are designed and structured. Widely known in information management is the knowledge pyramid which was first sketched by Russel Ackoff in 1988 (Weinberger, 2011). It depicts the relation between the world, data, information knowledge and wisdom. Each of the layers signifies a process of classification (reducing, abstracting, processing, organising, analysing, interpreting, and applying) that configures our perception of the world. While most scholars agree with the order of world, data, information, knowledge and wisdom; the interrelation between them is contested (e.g. Frické, 2009; Kitchin, 2014) (Fig. 11).

**World-Data** Within critical data studies, scholars have argued that data are not mere and objective representations or by-products of the (social) world but that the relationship is recursive. In order to grasp the entanglement of data and world, Kitchin (2014) introduced the concept of “data assemblages”. He argues that data do not simply exist as neutral, objective entities, but are always framed technically, economically, ethically, temporally, locally and philosophically. Data do not exist independently of the knowledge and the ideas, instruments, practices and contexts within which they are generated, processed and analysed (see also Borgman, 2015; Gitelman, 2013).

One way to make sense of data is to think of them as the central concern of a complex sociotechnical assemblage. This data assemblage is composed of many apparatuses and elements that are thoroughly entwined, and develop and mutate over time and space (Kitchin, 2014, p. 24).

The data-world relationship is recursive, because data capture and represent world, however, their role in meaning-making and decision-making processes also shape and change (our understanding of) the world (e.g. Beer & Burrows, 2013; Jarke & Breiter, 2019; Selwyn, 2015). For example, Rajão and Jarke (2018) demonstrate how open government data about deforestation of the Amazon do not simply represent deforestation but allow environmental NGOs to assume a more active role in policy-making while at the same time place governmental agencies in a more vulnerable position. In addition, patterns and practices of deforestation changed because of the use of satellite imagining by law enforcement agencies: The size of individual deforested areas decreased (so to avoid detection by certain satellite imaging systems) while the overall size of deforested areas increased. Hence by
making deforestation—a fuzzy and ambiguous social phenomenon—available as object of knowledge and intervention, satellite images and associated data infrastructures produce particular (new) kinds of deforestation within a recursive data-world relationship (Rajão & Vurdubakis, 2013).

**Data-Information** In contrast to the more simplified version of information in the knowledge pyramid, there exist many different understandings to the concept of information. A prominent one was proposed by Buckland (1991) who distinguishes between three different aspects:

- **Information-as-process**: This understanding relates to the ways in which what a person knows is changing when he or she is informed. Information is understood as informing somebody.
- **Information-as-knowledge**: Here information is understood as the element that is being sharing in information-as-process. It is the knowledge which is communicated.
- **Information-as-thing**: In this understanding, information is an attribute for objects such as data or documents if they are regarded as “informative”.

In the most common understanding information “extends beyond data and facts through adding value that aids interpretation” (Kitchin, 2014, p. 10). Information adds meaning to data through the ways in which data are organised and processed.

**Information-Knowledge** Similar to the other concepts, knowledge is also understood differently. Some have depicted knowledge as something that can be easily extracted and moved around. The learner or knowledgeable individual is seen to be a passive container in which knowledge is entered.
As if it were food or money, this perspective implies, knowledge exists prior to and independent from the knowing subject, who creates no knowledge in the act of appropriation. That is, the production, circulation and consumption of knowledge are viewed as autonomous activities (Gherardi, 2000, p. 212).

This cognitive- or container-view on knowledge inhabited discourses in knowledge management studies where knowledge was seen as a “production factor distinct from the traditional ones of capital, labour and land” (Gherardi, 2000, p. 212). For others, knowledge is more than this. Polanyi (1966) conceptualised tacit knowing as something highly personal and difficult to communicate: It is embedded in the experiences of individuals (such as the knowledge on how to ride a bike or how to swim) and includes mental models and beliefs. These models and beliefs are often taken-for-granted assumptions about the world. Based on the idea of tacit knowing, Polanyi (1966) famously stated: “We can know more than we can tell” (p. 4). Explicit knowledge, in contrast, is defined as articulable and objective; it can be codified, stored in databases and libraries, and ultimately circulate easily. The difference between tacit and explicit knowing may be summarised in the following quote: “The knowledge that I have of my own body differs altogether from the knowledge of its physiology” (Polanyi, 1966, p. 20). Yet, as Polanyi argued these two modes are not separate but constitutive of each other (e.g. my knowledge of the physiology of human bodies will shape the way in which I experience and know my own body and vice versa).

In co-design research, it has been argued that it is difficult to “extract” user’s knowing and that often users do not know what they know and want. This is because users and those designing and providing services belong to different “communities of practice” (Lave & Wenger, 1991). Membership in a community of practice is based on the learned performance and knowledge of a community’s shared practices. This learning is situated in practice and part of the ongoing sociomaterial reconfigurations of the lived-in world.

Activities, tasks, functions, and understandings do not exist in isolation; they are part of broader systems or relations in which they have meaning. These systems of relations arise out of and are reproduced and developed within social communities, which are in part systems of relations among persons. The person is defined by as well as defines these relations. Learning thus implies becoming a different person with respect to the possibilities enabled by these systems of relations. To ignore this aspect of learning is to overlook the fact that learning involves the construction of identities (Lave & Wenger, 1991, p. 53).

Participants of co-creation projects belong to different communities of practice: social care service providers, local government, software developers, and also older adults. They also belong to multiple communities. For example, somebody may belong to a community of practice of older residents of a particular neighbourhood which shares practices of moving around in this neighbourhood (e.g. by bike, on foot or public transport) and knowing which places to go to for recreation and which places to avoid. Simultaneously they may belong to a community of practice of older adults using digital devices to coordinate their hobbies (e.g. WhatsApp groups for sports or knitting clubs). Such practices may not necessarily be easy to communicate and are sometimes not even apparent to those performing them. They are only...
meaningful when regarded in context with our interactions with the world (Rouse, 2001). Hence, knowledge is not something that is possessed by a community but rather an activity through which its practices are performed and put into context. In other words, our practices are dependent on the very situations and contexts in which they are performed.\(^6\)

It is hence important to consider how information systems and information infrastructures as systems of classification are produced. Data about the world reduce complexity within specific contexts and “data assemblages” (Kitchin, 2014). The ways in which data are being organised, produces particular information classifications. If future users of a system are not involved in the design and decision-making about what classifications an information system should include, they may find it difficult to impossible to make sense of it. The following Fig. 12 illustrates this challenge.

Co-creation provides the opportunity to service providers to allow for encounters that demonstrate what should not be taken for granted when it comes to designing digital public information services.

From Citizens as Users to Citizens as Co-Creators

Figure 2 depicted an eGovernment Maturity Model, which mapped out a “pathway to customer-driven centricity”. In contrast to previous maturity understandings, the most mature eGovernment services are those, which are “customer-centric” and “customer-driven”. This move toward customer-driven customer-centricity requires different ways of planning, building and providing services. Above different roots for the ideal to co-create digital public services with citizens were described: civic participation in the co-production of public services, user participation in the co-design of digital information systems and civic engagement in civic open data use. There are a number of challenges associated with those approaches: So far, experiences in co-producing public services are mainly limited to physical objects and direct human interaction (for example garbage separation for recycling reasons). Voorberg et al. (2015) question in the conclusion of their comprehensive review, if the positive outcome and impact of co-production can indeed be demonstrated. The challenges to co-producing public services are different, when it comes to co-designing digital services. Above, some of these challenges have been discussed in relation to co-design (be it participatory or user-centred design approaches). One of

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\(^6\)This claim relates back to Wittgenstein’s argument that ‘if a lion could talk, we could not understand him’ (Wittgenstein, 1984: PI 223). This seemingly paradox argument (surely if a lion could speak, we could translate from its language into our own) rests upon the assumption that every sentence has a clear meaning. Yet Wittgenstein argues that the meaning of words only derives from its use: ‘The meaning of a word is its use in the language’ (PI 43). The practice of speaking is only learnable through a shared usage and hence a shared cultural context. Something we do not share with animals.
the biggest challenge using co-design approaches as starting point for the co-creation of digital public services is that design studies are usually based on small-scale projects or conducted within a particular organisation that has a clearly identified user base (e.g. Oostveen & van den Besselaar, 2004). With respect to the civic use of open government data, sustainability is a major challenge (Lee et al., 2015). So far, there are only few examples of successful user involvement, usually working with communities and leaving a dominant role to the researchers/designers (Bason, 2010; Britton, 2017; Damodaran & Olphert, 2006; DiSalvo, Nourbakhsh, Holstius, Akin, & Louw, 2008; Merkel et al., 2004). The success of such participatory projects depends on the involvement of appropriate and representative users (Gidlund, 2012). However, the ways in which users are constructed in each of the co-creation approaches are very different. The roles citizens as future users of a digital public service may assume differ from other forms of citizen participation but also from other forms of participatory software development as their involvement spans over the service planning, design, and provision (Gomillion, 2013):

- Traditionally, end-users only provided information on needs and requirements and gave feedback while the experts (designers, software developers) performed the programming and design-related tasks. In co-creation, end users may also be involved in programming and design activities themselves.
- End-users define or influence the architecture of the system, not only single features and interfaces.
- End-users take over responsibility for the services and systems developed and may maintain (certain aspects of) it.
While participation in some co-creation initiatives is limited to then co-design of the interface of an application, others also involve citizens in generating content. Hence, participants can take different roles in the co-creation process. In general, the roles citizens may assume have been either defined along the service design and provision process—plan, build, run (e.g. Voorberg et al., 2015):

- Citizens as initiator
- Citizens as co-designers
- Citizens as implementers

or with respect to specific tasks—exploring, forming ideas, designing, diffusing (e.g. Nambisan & Nambisan, 2013):

- Explorer: Identify problems to be solved
- Idea former: Generate solutions to well-defined problems
- Designer: Design and/or develop implementable solutions
- Diffuser: Facilitate the adoption and diffusion of the developed solution

These roles may be assumed at different times of a co-creation process. During the planning for a co-creation process, citizens may be involved as initiators or explorers, while in the subsequent phase they may be involved as idea formers and co-designers. Lastly, citizens may be involved as implementers or diffusers of services. In addition, the role of a data curator (as defined in the approach to civic open data use) was also relevant to our project.

Differences Between Co-Creation and Other Participatory Approaches

The three approaches presented above (co-production, co-design, civic use of open data) do not only differ with respect to the types of contributions they expect and enable, they also pursue different goals or objectives. These include moral as well as pragmatic considerations. There are three overall goals, which will guide the further analysis of this book’s empirical examples: (1) the sharing of control with citizens, (2) the sharing of lived expertise and (3) the enabling of individual and social change. In the following, I review the differences between the traditional participatory approaches and co-creation with respect to these three aspects. This will allow to better analyse the specific challenges and opportunities of co-creating digital public services.

Sharing Control with Citizens

Rooted in the political agenda of Scandinavian participatory design, one of the main aims of participatory approaches is the destabilisation of power structures by sharing control over the design process and outcome (Vines, Clarke, Wright, McCarthy,
& Olivier, 2013). This is grounded in a moral proposition: Participatory design is commendable because “the people whose activity and experiences will ultimately be affected most directly by a design outcome ought to have a substantive say in what that outcome is” (Carroll & Rosson, 2007, p. 243). Humans ought to be regarded as “actors”, not “factors” (Bødker, 2006). This moral imperative is present in many of the calls by funding agencies such as the European Commission and has been inscribed into policy frameworks. It is hence important to consider the institutional framing of participatory projects in order to understand “the sources of power and influence different project participants were able to mobilize” (Bratteteig & Wagner, 2016, p. 429). This includes for example considerations about the (hidden) agendas participants may have.

When considering what is meant with the sharing of control in the context of co-creation projects, there are two questions to be answered: How can control be shared in a multi-stakeholder process, and what decisions in a co-creation process are covered? This relates on the one hand to questions around the types of engagement methods employed and on the other to the openness and scope of a co-creation project.

The following Table 2 summarises the relevant goals for sharing control for the different participatory approaches presented: Participatory Design (PD), User-Centered Design (UCD), co-production and the civic use of open data. For each of the approaches, the table provides (1) the rational for sharing control, (2) the anticipated parties to be involved, (3) the role(s) of users in decision-making, and (4) the requirements for users to act. The rationale differs from moral considerations in participatory design (those affected by a system should be able to influence its design) to considerations about the effectiveness and usability of a system in the three other approaches. In all cases, the parties involved include users and either service providers (co-production) or system developers (PD, UCD and civic open data use). The roles of users in the decision-making process range from users as advisors to users as representatives (of a larger population). In PD, there is also the proposal to seek consensus among all users. In the civic use of open data, users do not only participate but actually steer the development of services. For all approaches, a sense of ownership and knowledge about possible options is required.

The degree of user participation, their agency and control differs substantially across participatory design contexts. For the purpose of this book, it is not only important to consider potential roles citizens (or other co-creating stakeholders) may assume but also how these roles may be performed and what is feasible in the context of digital public services.

As the unicorn, the participating citizen is easily imagined but difficult to track down in practice. The betrayal is, however, two-folded, not only do the symbolic and discursive nature of ‘citizen-driven development’ fail co-creation facilitators, but citizens are also failed in several ways. The abstract concepts of use and user put forward in images and ideographs legitimate particular practices while discouraging others. In this case citizens might be motivated to participate in a number of areas but when they do so these are not acknowledged and made visible since they are not estimated profitable by the public authority (Gidlund, 2012, p. 18).
Table 2  Summary of relevant goals concerning the sharing of control for different participatory approaches

| Rationale for sharing control | PD goals (e.g. Karlsson et al. 2012; Vines et al. 2013) | UCD goals (e.g. Karlsson et al. 2012) | Co-production (e.g. Voorberg et al. 2015; Bovaird & Loeffler, 2012) | Civic use of open data (e.g. Sieber & Johnson, 2015) |
|-----------------------------|--------------------------------------------------------|--------------------------------------|---------------------------------------------------------------|--------------------------------------------------------|
| People affected by a decision or change should be able to influence it | The information system should depend on interface needs. The needs of users should dominate the design of the interface | Substitutive co-production as the outsourcing of work. Additive co-production as activities of the administration to enhance the impact of civic engagement. | Exploiting potential of open data. Allow for user-centred and creative ways of open data-based service development. Cost-efficient way of service design and delivery. |
| Commitment for both users and systems developers to cooperate | Systems developers steer process and allow for selective user involvement | Collaboration between public service provider and citizens/service users through regular and long-term relationships | Different modes of interaction between data providers and citizens as service developers. |
| Users must participate in decision making – Users as advisors – Users as representatives – Consensus among all users | Users may participate in decision process – Users as advisors – Users as representatives | Users participate – Voluntary or involuntary – Collaboratively or on their own | Users steer the development of services. |
| Users need knowledge of possible technological options – Users must have access to relevant information – Users must have possibility to take an independent position | Not applicable | Feeling of ownership | Citizens take ownership. |

User roles in decision-making

- Users must participate in decision making
  - Users as advisors
  - Users as representatives
  - Consensus among all users

- Users may participate in decision process
  - Users as advisors
  - Users as representatives

Potential for open data

- Exploiting potential of open data
- Allow for user-centred and creative ways of open data-based service development
- Cost-efficient way of service design and delivery

Parties involved

- Commitment for both users and systems developers to cooperate
- Systems developers steer process and allow for selective user involvement
- Collaboration between public service provider and citizens/service users through regular and long-term relationships
- Different modes of interaction between data providers and citizens as service developers

Requirements for users to act

- Users need knowledge of possible technological options
  - Users must have access to relevant information
  - Users must have possibility to take an independent position

- Not applicable
- Feeling of ownership
- Citizens take ownership
Arnstein (1969) developed the ladder of citizen participation for many different types of activities. For the purposes of this book, which is interested in civic participation in the planning, design and delivery of digital public service, we need a more nuanced understanding of those in power (e.g. government/public authorities or social care service providers) and those sought to participate (e.g. service users). In addition, we need to consider the type of service and service domain, for which citizen participation is sought. Hence, we need to look at the types of decisions to be made in participatory service design and scope of action that participants may have. Lee et al. (2018) propose a framework on design choices for co-creation based on a number of co-creation projects conducted by the team of authors. These design choices relate to four different aspects:

• The preconditions of the a co-creation project, which relate to the purpose of a co-creation project, its openness and the scope of design,
• Its prospective participants relating to the diversity of their knowledge, the differences in their interests and the distribution of power over design decisions,
• The anticipated project results, in particular its outputs as well as outcomes, and
• The way in which co-creation events ought to be organised (the setting for co-creation and the types of activities).

Of course, these categories are interrelated. Depending on the openness of the task, the solution is more or less predictable. The abilities and interests of the people involved are also an important aspect to consider. People can get creative at varying levels in different stages of the process and with respect to their expertise and interest in certain tasks. Finally, co-creation projects will differ in their structure, frequency and duration of interaction. With regard to the creation and design of public online services, for example, there may be a series of workshops with different objectives and participants or a regular project with a defined goal and termination, running over several months with the same team.

Sharing Expertise with Citizens

By involving users in software design, their specific expertise about their work processes (or own relevant circumstances) and how they may be supported can be fed into the requirements’ specification. Although user involvement usually involves higher costs, there is agreement that the outcome of such involvement leads to higher user satisfaction and take-up. Traditionally, the sharing of expertise was hence defined as one of the main objectives and rationale of co-design and co-production approaches. Establishing citizens as experts and providing a space for them to contribute their experience turned out to be one of the most important motivations for participation in our co-creation project. To include future users’ input in the design process makes also sense pragmatically as it said to increase the chances of a successful design outcome by taking into account their “expert perspectives and
preferences regarding the activity that the design will support, and most likely transform” (Carroll & Rosson, 2007, p. 243) (Table 3).

In the following, I outline, how expertise may be understood in the context of co-creation projects and what implications this has for the choice of engagement and design methods. Whereas expertise used to be defined as something logical, our understanding has moved towards ideas of expertise as something practical: “something based in what you can do rather than what you can calculate or learn” (Evans & Collins, 2008, p. 23). If this tacit knowing of future users is of interest in co-creation projects, in particular beyond the obvious and conscious needs or desires of users, then the question arises how reflection about and articulation of this knowledge may be facilitated. One answer may be found in Orlikowski’s (2006) account of “material knowing”. Similar to Polanyi who stressed the proximal character of tacit knowing, Orlikowski (2002, p. 249) argues that knowledge is not something static or a stable disposition, but something that is continuously produced and reproduced in everyday practice. A practice view on knowledge leads us to understand […] knowing as emergent (arising from everyday activities and thus always ‘in the making’), embodied (as evident in such notions as tacit knowing and experiential learning), and embedded (grounded in the situated socio-historic contexts of our lives and work). And to this list I want to add another critical dimension, and that is that knowing is also always material. […] Everyday practices and the knowing generated as a result is deeply bound up in the material forms, artifacts, spaces, and infrastructures through which humans act (Orlikowski, 2006, p. 460, emphasis in original).

This understanding of knowing-in-practice relates to the arguments of scholars in material gerontology that understand ageing as a sociomaterial practice and process not happening exclusively in human bodies, but also “in and through material environments as well as due to social ascriptions of meanings” (Höppner & Urban, 2018, p. 5). Knowledge about ageing is produced in interaction with the social and material world.

| Overall goal | PD goals (e.g. Karlsson et al., Vines et al.) | UCD goals (e.g. Karlsson et al.) | Co-production (e.g. Voorberg et al., Bovaird & Loeffler, 2012) | Civic use of open data (e.g. Sieber & Johnson, 2015) |
|-------------|----------------------------------------|--------------------------------|------------------------------------------------|-----------------------------------------------|
| Sharing expertise | Systems developers need knowledge of the actual use context | System developers shall have extensive use context knowledge | Citizens or civic organisations have the expertise to deliver specific public services | Citizens or civic organisations have the expertise to design and deliver digital services |
|              | Systems developers need to enable users to share knowledge | System developers should spend ample time with users in their milieu to appreciate their needs |                                                                 |                                               |
In co-creation projects, we hence need to provide materials that allow participants to act on, and in so doing, perform their knowing. Design artefacts such as mock-ups or prototypes may be understood as “boundary objects” binding different communities of practice engaged in co-design activities together (Bjögvinnsson, Ehn, & Hillgren, 2012, p. 105). Star and Griesemer (1989) proposed the concept of “boundary objects” in order to understand the ways in which they enable collaboration between different communities of practice. Boundary objects are used across communities or work domains and are “plastic enough to adapt to local needs and the constraints of the several parties employing them, yet robust enough to maintain a common identity across sites” (p. 393). In use, these objects become strongly structured and differentiated through work practices, yet they remain recognisable to the different worlds. Star and Griesemer (1989) originally described four types of boundary objects which Gasson (2005) discusses with respect to software development projects:

- **Repositories**, such as libraries, which allow differences in the unit of analysis used by different groups. Star (2010) suggests that repositories come “from the need for an assembly of things that are conceived iteratively” (p. 603). Heterogeneity of the things assembled can be maintained without becoming confrontational. The advantage of a repository is its modularity.

- **Standardised forms**, methods, and procedures, which enforce normative work practices across knowledge boundaries and provide a shared format for solving problems. As such, these objects circulate easily and provide a standardised way of collecting information.

- **Models or ideal types**, which provide an abstraction that works for all knowledge domains. It can be a diagram or other description which does not accurately describe any details about anyone locality or thing but which is adaptable across sites because of its vagueness. It can hence facilitate communication and cooperation across different sites.

- **Coincident boundaries**, such as a district or country, which provide a common boundary of analysis while permitting different internal contents. “The result is that work in different sites and with different perspectives can be conducted autonomously while cooperating parties share a common referent” (Gasson, 2005, p. 411).

Star (2010, p. 603) later refined the concept stating that an object is not just a thing but that its materiality is derived from action. Objects are “a set of work arrangements that are at once material and processual” (p. 604). Interpretive flexibility grants objects the ability to overcome boundaries, to become “boundary objects”. These objects are viewed differently, for example by different professions allowing them to communicate. Hence “these common objects form the boundaries between groups through flexibility and shared structure” (Star, 2010). The term boundary is not meant to divide between two communities of practice but rather signifies the shared space in which they meet. They form boundaries between groups through flexibility and shared structure.
One of the big challenges in any software development project is the coordination of expertise. In this respect, it is important to consider the aggregation and coordination of individual expertise (Faraj & Sproull, 2000, p. 1555). Boland and Tenkasi (1995, p. 356) suggest that boundary objects facilitate processes of “perspective making” and “perspective taking”. Perspective making describes a process in which a community specifies and refines its knowledge domains and related practices. Through this process, they are able to collate and align their perspectives and thereby develop common meaning structures (ibid). Boland and Tenkasi describe perspective making as a social practice, often based on narratives of experience and grounded in reflexivity. Ultimately, perspective making leads to some form of representation which explicates the knowledge (e.g. in the form of boundary objects).

Perspective taking, in turn, starts with an understanding of what others know and requires an interpretive reading of the accounts that others have given.

For perspective taking, we need a shift in emphasis, to focus on the individual’s ability to make his or her own understanding visible for self-reflection. Once a visible representation of an individual’s knowledge is made available for analysis and communication, it becomes a boundary object and provides a basis for perspective taking (Boland & Tenkasi, 1995, p. 362).

One example of a boundary object that Boland and Tenkasi provide is that of a cause map depicting a physician’s understanding of quality in medical care. By drawing the map, the physician makes his or her perspective visible (possibly even for him or herself). The map can then be exchanged with other physicians in different departments of the hospital. As such, this map (or boundary object) allows for perspective taking across different communities of practice (p. 362). Figure 13, was adapted from Boland and Tenkasi (1995) and depicts their concept of perspective making and perspective taking.

In Mobile Age we have used and amended a number of methods to allow us the facilitation of perspective taking and perspective making amongst the older participants as well as between older participants and the Mobile Age teams. Some of these methods will be introduced in the next chapter and discussed in the chapters presenting the three co-creation projects.

**Enabling Individual and Social Change**

Finally, all approaches (co-production, co-design, civic open data use) recognise that participatory processes are motivated by enabling (or enforcing) some kind of change. This change may either be on the individual or social/organisational level. In order to creating a lasting impact, co-creation needs to understand peoples’ current practices, experiences and how future design products may become appropriated (ISO 9241-210, 2010; Vines et al., 2013). Table 4 below summarises the goals from all four approaches with respect to kinds of change they are pursuing.
Individual Change  In particular participatory design and user-centred design aim to induce individual change and ensure the uptake of a design solution through user involvement. Co-creation aims to create value beyond the mere development of technical artefacts. In the three co-creation projects described in this book, the value proposition of the co-creation processes related to more age-friendly communities and neighbourhoods which allow for social participation. To assist older adults to remain in their communities and neighbourhoods with some level of independence, rather than in residential care homes, requires to consider not only their immediate housing options but also ‘transportation, recreational opportunities, and amenities that facilitate physical activity, social interaction, cultural engagement, and ongoing education’ (Wiles, Leibing, Guberman, Reeve, & Allen, 2012). Appropriate information about the available resources in a neighbourhood can have a positive effect on social participation, if it relates to the (mediated) information practices, the abilities and limitations of older adults (Beneito-Montagut, Cassián-Yde, & Begueria, 2018). A study conducted by Wiles et al. (2012) characterises “ageing in place” by the positive perceptions of older adults as a sense of attachment and social connection, a sense of security and familiarity and a sense of identity, linked to independence and autonomy. Hence, mobility and social connectedness within the

Fig. 13  Perspective making and perspective taking (adapted from Boland & Tenkasi, 1995)
immediate environment are particularly relevant when engaging older adults (Manchester & Facer, 2017; Wiles et al., 2012).

**Social Change** As such, the output of a co-creation process (e.g. digital public service) refers to a socio-technical innovation in the form of software and data that is embedded into a larger public information infrastructure and provided to (all) citizens. The value of such a service for older adults needs to meet a value proposition and provide a more relevant service of higher quality and better usability than existing ones. Above all, and this is the tension that I alluded to above, the service needs to be sustainable. True change may only be implemented, if the co-created service is provided on a permanent basis. Co-creation methods hence need to be evaluated against their ability to contribute to a service’s sustainability and enabling lasting change.

**Table 4** Summary of relevant goals for enabling change for different participatory approaches

| Overall goal | PD goals (e.g. Karlsson et al., Vines et al.) | UCD goals (e.g. Karlsson et al.) | Co-production (e.g. Voorberg et al., Bovaird & Loeffler, 2012) | Civic use of open data (e.g. Sieber & Johnson, 2015) |
|--------------|---------------------------------------------|---------------------------------|-------------------------------------------------------------|--------------------------------------------------|
| Individual and social change | Ensure a better fit between technology and the ways people (want to) perform their work | Information systems are there to serve the user | Gain more effectiveness | Shift responsibility to civil society organisations |
| | | | Gain more efficiency | Allow for open collaboration |
| | | | Gain more customer satisfaction | |
| | | | Strengthen social cohesion | |
| | | | Democratise public services | |
| | | | Change behaviour to prevent future problems | |

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