

Strengthening e-Participation through Design Thinking. Relevance for Better Digital Public Services

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ABSTRACT

In response to a lack of public participation, public administrations have been looking to e-participation as one strategy to overcome current barriers, such as lack of legitimacy and capacity, issues of representativeness, inclusiveness, equity and power balance, difficulties in effective implementation, and appropriate inclusion of citizens in decision-making processes. To tackle these challenges, literature has recognised the importance of including design thinking methodologies to reinforce public engagement and translate citizens' suggestions for digital public service implementation. Acknowledging that research in this area is still limited, this paper proposes a rationale for the relevance of design thinking in implementing effective e-participation. Reviewing the relevant literature, the study proposes four different areas in which design thinking can support more effective citizen engagement in e-participation: (i) Meaning creation and sense-making, (ii) Publics formation, (iii) Co-production, and (iv) Experimentation and prototyping.

CCS CONCEPTS

• Human-centered computing; • Interaction design; • Interaction design process and methods; • Participatory design;

KEYWORDS

e-participation, design thinking, digital public services, citizen engagement

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1 INTRODUCTION

Participatory approaches have seen a steep increase in interest since early '2000 [104] when governments across Europe have started engaging citizens in participatory decision-making aiming at increasing the quality, transparency, and efficacy of policies and

public services [24, 98]. Nowadays, EU Member States have built a long and established tradition of fostering dialogue with citizens to strengthen public engagement in the democratic process, with several public dialogues organised involving various levels of governance and bringing together civil society and institutions as equal partners [60:19]. The emergence of new Information and Communication Technologies (ICTs) and their new affordances have also favoured increased experimentation in public participation [14, 38] to respond to increasing institutional distrust and dissatisfaction with public services. Public administrations have thus been looking to participation enhanced by ICTs (or e-participation) [1] as one strategy to overcome barriers [57]. Websites, digital platforms, and social media have been exploited as digital spaces for democracy [90]. Against this backdrop, public initiatives, often prompted by research projects [94], have been established to experiment with new digital participatory formats [35] seeking to introduce and consolidate citizen participation as one strategic practice for public service design and provision. Currently, the relevance and strategic potential of e-participation are demonstrated both by recent academic studies and practice-based research [24], highlighting its importance to voice the concerns and needs of multiple stakeholders. Research shows how, bringing diversity into the loop, e-participation can help link top political priorities with the concerns of the population, such as addressing social inequalities and increasing the quality of public services [5, 72, 85]. Several limits are also acknowledged, including public trust in government [50], lack of accountability and transparency [76], the lack of capacity to process and actualise the proposals that emerge from e-participation exercises [64]. Despite several contributions addressing these issues, product-oriented and provider-centric perspectives are still predominant. Here, one area worth investigating is the adoption of design thinking (DT) methodologies for e-participation as a way to reinforce public participation and translate citizens' suggestions into service implementation [79]. However, research articulating the relevance and benefits of this approach and of pathways to practical uptake in e-participation is still limited. Building on this theoretical gap, this paper proposes a rationale for the relevance of DT in implementing effective e-participation, ultimately leading to designing and implementing better public services. The study also explores notions of co-creation, co-design, and co-production, and proposes four different areas in which DT can support more effective citizen engagement.

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2 THE THEORETICAL BACKGROUND ON E-PARTICIPATION

Electronic government (or e-Government) refers to the application of ICTs to several government functions and procedures to increase efficiency, transparency and citizen participation [65]. Under this umbrella, e-participation refers to ICT-supported participation in processes related to government and governance. This encompasses all aspects of technology-mediated interactions between civil society and the political and administrative spheres, transversally to areas as diverse as internal administrative processes, public service implementation, and policy-making [70]. Over the years, e-participation has been explored by several scholars and research organisations. In 2016, the OECD proposed a pathway to digital government with three main stages: (1) digitisation, where public services are government-centred, and users are passive receivers of government decisions; (2) e-Government, where public services are citizen-centred and users actively participate in service delivery; (3) digital government, where public services are people-driven and users can voice their demands and needs while contributing to shaping political priorities. E-participation, as a specific type of public participation [40, 46], is thus a central element in the pathway towards digital government where both the role of citizens and the channels of interaction with the government are defining elements. The link between government and citizens can be further framed into levels of e-participation, considering the varying degrees of power and influence given to citizens. Critical views also characterise the notion of e-participation, mainly doubting the effectiveness of citizen engagement in public service design and delivery, due, for instance, to the lack of citizens' knowledge and expertise and the efficiency reduction in decision-making [102]. Despite these barriers, most of the service management literature emphasises that users' collaboration is desirable for the co-creation of public value [46, 49, 51, 74].

Against this backdrop, it is relevant to focus on at least two aspects: the role of citizens according to the diverse degrees of power and influence and the barriers to achieving effective e-participation.

2.1 The role of citizens and the degree of power and influence in e-participation

Numerous scholars have focused on e-participation enquiring about the role of the citizen and describing several possible interactions with the government [44, 96], ranging from citizens as customers to citizens as partners or co-creators of the public good [63]. In this wide scale of participation, citizens can be engaged with several objectives. They can be recognised as valuable resources to be tasked with specific activities (i.e., data collection on specific priorities, like pollution levels or signalling areas that need improvement) linking to practices like participatory sensing. Citizens can also volunteer to participate in public activities, providing opinions and ideas as experts in a topic (i.e., civic crowdfunding as a way to actively engage citizens as idea proposers and funders). As data collectors, citizens have a passive role while as idea proposers, they contribute actively to developing innovative solutions.

E-participation offers a range of ways to involve the population in contributing to understanding, ideating or implementing proposals to tackle societal challenges, aiming to lead to more legitimate

and desirable solutions [91]. The underlying assumption is that engaging citizens directly in developing and delivering public services can provide opportunities to verify and improve public service effectiveness. Among scholars who have classified the different types of e-participation, Linders [63] divides government-citizen interactions into: (a) Citizen Sourcing, sharing citizens' opinions to help the government, C2G; (b) Government as platform, knowledge transfer from government to citizens, G2C; (c) "Do It Yourself" government, citizens self-organisation to develop services, C2C; (d) Collaborative planning and groupware, the organisation of workshops and training sessions for joint discussion, GwC. Further, recent studies have also demonstrated the potential of engaging citizens in administrative tasks to increase trust in government [87].

Several experimentations have been proposed recently,¹ attempting to shift away from the passive role of society in public life while several studies nurtured theoretical frameworks towards the establishment of a common ground [1]. For instance, [85] analyse relevant works that describe e-participation levels. Building on the e-Participation levels of [85], Figure 1 adds a reasoning on the different hierarchies and features (last column).

Each level represents a step in the ladder of e-participation, describing the distribution of power and influence between civil society and government, ranging from the lowest degrees of mere information and tokenism (level 1) to the highest degrees of control and power to take decisions given to citizens (level 5).

Current activities in EU member states confirm the will to continue to support and enhance citizen engagement [24] going beyond mere info-giving and sterile consultations towards proactive engagement. However, the field of e-participation is still characterised by a lack of empirical studies that bring evidence to understand how to establish better citizens-government interactions [1].

2.2 Barriers to achieving effective e-participation

Despite its rising relevance, e-participation has several shortcomings, including scattered and heterogeneous knowledge and several common limits and barriers frequently highlighted in the literature and practice.

Issues include: (a) the *lack of legitimacy* of the approach for policymakers [40] or citizens. Citizens' consultations (whether using digital channels or more traditional ones) are often conducted or designed in a manner that does not identify public opinion and allow solid engagement (cf. opinion polls). (b) The *lack of capacity* and the need for highly specialised expertise [64]. Citizen participation demands new skills both from civil servants and citizens: the former need to become enablers and facilitators [89]; the latter need to be willing to actively engage, and capable of contributing meaningful discussion. (c) The *doubts about representativeness, inclusiveness, equity, and power balance* [50]. One of e-participation difficulties is choosing the relative importance of different voices to be channelled into the decision-making process, also showing progress and impact. The lack of diversity and representativeness is not easily

¹For instance the H2020 Co-VAL explored the notion of value created in public administration via the participation of citizens and civil servants. Other examples include: UserCentriCities, DECIDO, ACROSS, Gov3.0, Big Policy Canvas, Policy Cloud, AI4PublicPolicy, DUET, IntelComp, INTERLINK, NetZeroCities, E-Sides, AEGIS, Big Data Ocean, Digitranscope.

		Macintosh, 2004 [65]	Tambouris et al., 2007 [94]	Teran & Drobnjak, 2013 [96]	Santamaria- Phileo et al., 2019 [85]	
Level	Description levels	Labels				Degrees of control and power
5	Citizens have dominant authority in decision-making about a particular initiative	eEmpowering	eEmpowerment	eEmpowerment		Level 5 refers to the empowerment of citizens who gain power and influence, namely the possibility to define the process of collaboration and steer its evolution in partnership with the government
4	Citizens use communication channels (ICT) to make collaborative decision-making		eCollaborating	eParticipation	e-Collaborating	Level 4 refers to <i>collaboration</i> and <i>participation</i> , and introduces a discrete degree of influence, operatively involving citizens in public initiatives (e.g., in experimentations with living labs) where people can offer innovative ideas and contribute to shaping public services
3	ICTs provide citizens and governments with the possibility of establishing channels for discussion		eInvolving	eDiscussion		Level 3 refers to <i>involving</i> and <i>discussing</i> , and recognises a slightly higher level of influence. It entails community-building activities and engages citizens through multiple public discussion formats (e.g., townhalls).
2	Citizens are consulted, a bidirectional flow of information exist	eEngaging	eConsulting	eConsulting	e-Consulting	Level 2 refers to <i>consultation</i> and introduces a two-way relationship. It allows the collection of citizens' opinions and feedback on specific public initiatives. Governments establish the topics for consultation, formulate the questions, and oversee the procedure. Still, this level guarantees a limited degree of influence of participants in decision-making, as citizens are invited to contribute their opinions on confined topics
1	Citizens are informed (through ICT tools) about aspects of the participation initiative	eEnabling	eInforming	eInforming	e-Informing	Level 1 refers to <i>informing</i> citizens, engaging them in a limited way. This level cannot be considered participation de facto but a one-way flow of information from the top (e.g., the government) to the bottom (e.g., citizens). Citizens are merely informed about the objectives and operative programs of public institutions

Figure 1: Adaptation of e-Participation Levels [85].

solved; it can be even amplified when processes are not well designed, especially when mediated by digital technologies. This is exacerbated by involving small and unrepresentative numbers of citizens and focusing on relatively marginal issues. (d) The *difficulties in implementing participatory processes as part of the process of policy design* [103], are often hampered by a lack of accountability and transparency [76]. Stakeholders are usually consulted at a late stage, when a draft policy already exists, hindering institutional integration and uptake of public participation processes outputs [73]. E-participation effectiveness is often linked to clarifying how the output impacts the democratic process, otherwise it may be perceived as a “democracy-washing” legitimating action that public officials decided *a priori*. (e) The *appropriateness of participation* in all areas of decision-making. Insufficient research has been conducted on when and what type of engagement is appropriate to different types of policies and stages of the policy-making process

[44, 71]. Existing taxonomies lack granularity and focus on degrees of involvement rather than on the initiative objectives (e.g. citizen juries or user panels) in specific social, cultural and regulatory circumstances. As a result, such processes rarely affect the core stages of decision-making and policy execution. (f) The *limited focus of applied tools and methodologies* to the collection of information at the beginning of policy and service design process (ideation) and of citizens' needs (priorities issue).

Ultimately, *e-government solutions frequently falling short of user expectations* still cause low levels of acceptance [45], affecting e-participation [95]. Consequently, citizen engagement remains a critical practice needing reinforcement. Recent literature has thus proposed ways to overcome barriers; among them, the use of co-creation, DT and co-design methods as valid alternatives to integrate societal inputs early in the process and develop solutions that increase the citizens' sense of ownership of public services

[8, 10, 23]. This paper specifically focuses on understanding how this can happen, proposing ways in which DT and co-creation can be effectively integrated into the process of e-participation.

2.3 Design thinking (DT) for public sector innovation

DT is currently considered a consolidated approach to innovation capable of impacting the processes and operations of organisations across several layers, namely organisational, strategic and operative [33]. At an organisational level, DT impacts the culture and the mindset both of individual people and of the broader community that gravitates around an organisation; at a strategic level, it helps identify new avenues and possibilities for innovation; at the operative level, DT modifies how goods and services are realised, manufactured and proposed to people. Building on this broad influence, DT is further recognised for helping organisations engage users more effectively and leveraging their inputs for ideating and implementing innovations [6, 15, 33, 61, 62]. Several scholars have recognised a few differentiating principles of DT. *Abductive reasoning* [66] is the main reasoning pattern used to solve problems, distinguishing DT from more traditional deductive and inductive logics [29]. It consists in developing novel hypotheses inherent to the problem-context that challenge the dominant paradigms through the “what-if” and other heuristics techniques. DT is further characterised by *human-centricity* [15] as it starts the problem-solving cycle from the understanding of human behaviours and needs; the activity of *framing and reframing* helps propose novel perspectives from which the same issue can be approached [29]; the centrality of prototyping and practical experimentation as a way to *learn-by-doing* in iterative cycles [30].

DT is nowadays increasingly valued as an approach to innovation in the public sector. As early as 2013 [36], the expert group on public sector innovation of the European Commission was outlining the need to innovate the public sector by exploring alternative ways to respond to societal challenges through new or improved processes (internal focus) and services (external focus). The development of citizen-centred services also via digital platforms has been a focus since then, culminating in a new entrepreneurial culture for public managers, a change in mindset, and a more personalised response to public issues. A direction further consolidated by the Tallinn declaration of 2017² [93], specifying the need to adopt user-centricity to design better public services and revise existing procedures.

In the practice, the push to innovate governmental procedures through DT can be witnessed through the spread of Public Sector Innovation (PSI) labs. In a study of 20 PSI labs, McGann et al. [68] showed that about half of these labs declared to be design-led, with DT prevalent in labs inside public administrations and in those funded by governments, and co-design widely used as a tool to engage users in governmental processes. Kimbell [52] found that applying DT to the public sector: (1) shifted the focus to people and how they experience things; (2) flattened hierarchies temporarily

through co-design; (3) enabled people inside and outside government to collaborate on public issues.

Against this backdrop, DT has been increasingly valued by public institutions building on its principles and practices [16, 22, 61, 81]: (a) *human-centricity*, in DT innovation develops through an in-depth understanding of the characteristics and needs of final users or beneficiaries as well as of the contexts of use; (b) *engagement through co-design*, in DT human-centricity is reached through the direct involvement of the citizens in the process of innovation, where people become experts directly involved in the design team of a solution; (c) *prototyping*, as solutions are tested through “quick and dirty” prototyping to facilitate early assessment and allow multiple solutions to emerge before the final one; (d) *experimentation* in real contexts, with prototypes used and assessed by citizens in real contexts to evaluate their intrinsic features with respect to their expectations and the contexts of use.

Building on this, the possibility to complement and boost e-participation with DT and co-creation approaches [47] is an opportunity to go beyond tech-driven or market-inspired innovation in the public sector. Overall, DT might contribute to overcoming barriers in e-participation. For instance, it might help close the gap between policies and how they are experienced by citizens as they interact with public services [71], offering a different way to understand public problems and make policy tangible [4].

Further, introducing a stronger and more explicit DT culture in e-participation might help overcome a rooted and ineffective way of thinking while aligning frames around real problems and empirical evidence [17]. However, public innovation that takes a citizen-centred and value-driven approach is ultimately disruptive to the existing public governance paradigm [7], requiring significant transformation and severely challenging the command-and-control logic of current hierarchical public organisations.

3 METHODOLOGY

Acknowledging the theoretical gaps described so far, this study asks how can design thinking support effective e-participation, as citizen engagement through digital means?

This contribution performs a literature review building on two streams of research. On the one hand, it analyses notions developed in the field of e-participation from 2000 to 2022 – [1, 55, 65, 69, 70, 78, 82, 85, 103] reviewing grey and scientific literature to capture the fundamentals, state of the art, findings, current relevant topics and challenges. In this area, notions are identified reviewing theoretical frameworks and extracting the most relevant areas where DT can make a relevant contribution. On the other hand, the study reviews DT selecting contributions that have specifically linked this notion to public sector innovation and citizen engagement to reveal how DT can contribute to overcoming barriers to e-participation. Finally, the analysis draws conclusions discussing the relevance of specific DT activities for making digital public services design and implementation more effective. The analysis and its results are summarised in Figure 2 and further described in the remainder of the paper.

²The main principles for the successful implementation of digital public services are listed as: digital by default, citizen-centricity, inclusiveness, trustworthiness, accessibility, openness, transparency and interoperability.

Author(s)	DT activities for e-participation	Relevance for digital public services
[2, 3, 12, 28, 29, 43, 48, 52, 59, 61, 67, 99]	Meaning creation and sense-making (e.g., through producing a fine-grained understanding of a place and its inhabitants; translation of empirical knowledge into meaning, through data visualisation)	Supporting critical analysis of the context, including a deeper understanding of the stakeholders involved and their needs; informing decision-making with insights coming from people
[2, 3, 9, 18, 20, 23, 26, 27, 32, 34, 37, 52, 54, 56, 58, 84, 86, 99, 101]	Publics formation (e.g., through integration of agonism to shift from consensual decision-making to challenge mainstream positions)	Considering and including multiple and various perspectives; making different voices heard and relevant
[7, 8, 10, 23, 31, 46, 49, 51, 63, 64, 74, 89, 92]	Co-production (e.g., harnessing the creativity and imagination of local communities that become active players in steering the management of public resources for the places they inhabit)	Favouring greater collaboration between citizens and public authorities through the collaborative development of digital public services, further strengthened by a co-investment and co-development of new solutions with citizens acquiring a certain degree of decisional power
[13, 19, 68, 80, 83, 88, 97, 100, 105]	Experimentation and prototyping (e.g. through production of fictional scenarios or fictional artefacts that can help evaluate new ways of doing things)	Favouring greater acceptance of new digital public services as well as new norms and procedures, by shortening the distance between decisions taken by public authorities and the people affected by them

Figure 2: The DT activities relevant to e-participation and their relevance for the design and implementation of digital public services.

4 DESIGN THINKING FOR E-PARTICIPATION IN DIGITAL PUBLIC SERVICES

In the following we describe how DT might enhance e-participation and help overcome barriers. Each paragraph analyses one of the activities anticipated in Figure 2, detailing its characteristics and reporting on methods and examples.

4.1 Meaning creation and sense-making

In the innovation management literature, meaning creation is known as a process capable of generating value by leveraging intangible benefits, such as symbolic and emotional relationships with products and services [21]. Designers drive this process by focusing on redefining innovation problems through direct research with citizens (user research). The aim is to extract qualitative data as first-hand evidence coming from observation of daily behaviours and transform them into insights that can touch upon the deeper *reasons-why* behind people's actions. Qualitatively studying and interpreting people's needs, helps designers reach proposals that have value for the context in which they are enacted.

This process is at the core of DT and one of the main contributions this practice can make to strengthen e-participation. In the early stages of the process, DT can assist public authorities in engaging citizens more effectively by providing methods for: (i) critical analysis of the context of operation as a complex ecosystem [28], (ii) user research to grasp local needs more deeply, (iii) capturing factors that could influence the success or failure of new proposals [48, 52, 59]. The focus on the context as the combination of people, behaviours and environments can further orient e-participation activities by making public issues (and their consequences) tangible and specific, thus enabling people to participate as experts of a situation [28, 29, 43], and empowering them to act as local innovators [12]. Furthermore, support in making public issues clearer for the population (with the aim of participation) is offered by data visualisation methods [2, 3] that can help make sense of vast amounts of

information to communicate public concerns more effectively. Aiming at legibility while avoiding reduction of complexity [99], data visualisation can support information provision in two directions: informing governments about contextual conditions, and sharing inputs with the public through clear and reliable representations. As two complementary perspectives, both concur to more effective information provision as the first step in effective e-participation.

We can thus say that in this area the main contribution of DT to e-participation resides in transforming how problems are identified, perceived, and framed [29, 67], putting people at the centre of the process DT helps decision-makers reduce their individual cognitive biases [61], while enabling the development of more desirable services without neglecting the requirements of government.

4.2 Publics formation. Engaging publics supporting awareness and plurality

Engagement in e-participation is based on premises such as a good understanding of the issue addressed and of the possibilities for action. However, to enable action the provision of clear information is not sufficient. To act as experts, citizens need to be empowered with the possibility of challenging the dominant position and accepting change. Here, the notion of public formation is crucial, because linked to the generative role publics can have [58]. Public formation is based on the notion of infrastructuring [20], namely the process that identifies and forms social and material dependencies and commitments among those who constitute the public [9]. In e-participation, public formation is a fundamental premise to creating a favourable environment where an expert public can enter positive dynamics of discussion and exchange, acting as an effective change maker.

DT can act as a means for the construction of publics [25], facilitating the identification of needs, framing of the problem, supporting the definition of possible future consequences, and hence favouring negotiation between multiple perspectives. In the process

of public formation, data visualisation methods can provide additional support [2, 3], contributing to making controversies explicit up to the extent of provoking controversies for generative discussion [27, 99]. Further, the notion of agonism is central, as a way to include a plurality of perspectives (agonistic pluralism) [9, 26] to provide a scaffolding for effective participation, presupposing the possibility to challenge dominant positions and consensual decision-making principles, in favour of tolerant disputes among passionately engaged publics. Literature discussing these topics is rich in the design domain and involves several avenues of research. “Social design” focuses on the societal and political implications of designing while taking into account its uneven and unequal effects. Examples of these reflections span the domains of democratic design [86], urban innovation and city planning [18], policy-making in general [37], and policy-making in the science, technology and innovation domain [23]. In this research area, DT provides agency to those affected by means of including pluriversal perspectives and reflection in the public discussion [34].

“Design for sustainability” is also centred on engaging publics in generating and assessing new designs aimed at enabling ecological sustainability [32]. This practice integrates perspectives from the social and behavioural sciences [56] and elaborates on the role of designers as cultural mediators to recognise DT as pivotal in influencing the public discourse [52, 54] because capable of creating environments, experiences, artefacts, and systems of communication.

“Service and systems design” also focus on public formation by engaging ecosystems of stakeholders that cooperate for systems change [84]. This area of research considers that efforts occurring within multi-actor service systems are influenced by institutional frameworks and other interdependencies, requiring to put the attention on such aspects for a lasting change in practice [101].

4.3 Co-production. From “asking the citizens” to “co-producing with citizens”

Co-production is a term originally associated with the work of Ostrom [75] who used co-production describing a process where “inputs from individuals who are not “in” the same organisation are transformed into good and services” [75]. This term suggests a different type of relationship between the public service provider and beneficiary. Specifically, the beneficiary is not a passive consumer of services but a “co-producer”. With this role, citizens can play an active role in producing public goods and services with co-production happening potentially at three levels: the individual, group, and collective level. Individual co-production indicates situations in which an individual is the producer and beneficiary at the same time (e.g., home-schooling services); group co-production describes situations where a specific group of citizens are both producers and beneficiaries (e.g., residents of a neighbourhood engaging in watch schemes); collective co-production involves a group of citizens as providers of a service (e.g., time-banking) but the beneficiaries are the wider community. Despite specificities, the assumption is that these relationships offer the basis for a different form of efficiency in managing public resources and delivering public services [31, 64], promising also to enhance public participation. Public sector innovation labs are spaces that allow citizens to participate in the

development of alternative e-government solutions [8, 46, 63, 74] to overcome high failure rates in user experience [51, 97]. Despite many positive aspects, these labs also suffer from many criticalities, like the tensions stemming from innovations proposed by citizens in opposition with established practices in public institutions. The models of engagement of these labs might become relevant also to e-participation to integrate multiple types of knowledge while going beyond interest representation. A direction might be a systematic approach to value creation that emphasises the interplay between e-participatory procedures and the larger societal context [92]. In the process, DT can provide specific support, temporarily flattening hierarchies and favouring collective exploration and idea generation.

4.4 Experimenting and prototyping. Bridging the gap between theory and practice

Governments are applying DT also to test new methods to prototype with citizens for public services delivery [53, 100]. Prototyping can be described as an iterative cycle of building and testing, during which designers build representations (prototypes) useful to learn about and refine ideas [11, 39, 42]. Prototyping can support communication both within a team and with external actors. Prototypes can be used as *boundary objects* [80], namely artefacts enabling dialogue across diverse domains of expertise and practice. As such, they contribute in overcoming barriers and constraints to the implementation, mitigating fear of failure and allowing the verification of hypotheses prior to large-scale roll outs [83, 88, 100]. As concretisations of an envisioned future [105], prototypes bridge the realm of possibilities with concrete actions and directions for experimentation. Prototypes of digital public services can be experimented by citizens in real but controlled contexts, comparing their performance against expectations. As such, just like any other approach to experimentation, prototyping represents an opportunity for citizens and public officials to test novel solutions, minimising the risks associated with innovation. Experimenting with prototypes allows running into low-impact failures at early stages, while allowing the development of organisational learning [19].

Beyond triggers of learning, prototypes are also recognised to be powerful means for knowledge exchange [13, 19]. They might enable citizens and public officials to interact and collaborate on specific challenges, establishing a shared language and acknowledging differences constructively. While prototyping, the interplay of multiple actors might lead to improved dialogue because temporarily infringing functional, hierarchical, and organisational barriers [13]. This dynamic opens the process, ultimately contributing to developing collectively owned solutions before the implementation.

5 DISCUSSION: CHANGING INSTITUTIONAL CULTURE

Public organisations are progressively introducing DT and co-creation to foster innovation and change [22]. Specifically, DT is increasingly recognised as a way to enable the socio-cultural and political transformation needed to incorporate citizen engagement in the practices of public institutions [52]. However, introducing DT methodologies implies profound transformations in the organisational culture [22, 33] not only top-down leadership but also

participation from all levels of the organisation. The introduction of DT in e-participation for designing better digital public services should thus be primarily based on learning-by-doing and proneness to experimentation, complemented with appropriate reflections to achieve sustainable transformation, such as transfer and retention of relevant knowledge within the institution [77]. ICTs can be leveraged to ensure the effective inclusion of citizens, empowering them to contribute to value creation. Allowing practices such as co-production, prototyping and experimentation with citizens [19], e-participation can be further embedded in public institutions through capacity and capability building in both institutions and people leading to a genuine and long-lasting transformation.

From an institutional perspective, this learning is central to raising awareness of advantages and benefits, feeding reflexivity [6, 41] on how to revise existing policies, practices, and procedures.

6 CONCLUSIONS: LIMITS AND BARRIERS TO DT INTRODUCTION IN E-PARTICIPATION

The inclusion of DT in e-participation also presents several implications. The traditional top-down approach adopted by governments can constitute a source of difficulties. Rethinking traditional channels and practices implies challenging the established culture in public authorities. Introducing DT in e-participation does not simply constitute an opportunity for improving bottom-up processes but could also be regarded as a risk of disruption of established procedures and roles. Simultaneously, genuine engagement in co-production implies major shifts in the organisational and political culture of public institutions. Furthermore, the need to develop specific skills in facilitation and negotiation for public officials is another critical point.

The literature highlights that not enough research has been conducted regarding when and to what extent e-participation is appropriate for different situations. Existing taxonomies and frameworks point out a lack of understanding on the matter, highlighting how the attention is mainly focused on exploring the degrees of engagement rather than its appropriateness in light of specific social, cultural, or regulatory circumstances. Experts and decision-makers agree that e-participation effectiveness requires to go beyond simple info-giving or mere consultations, preferring more proactive strategies. However, a further possible impediment might come from the side of citizens. These have diverse resources and knowledge, time availability, willingness to participate and skills. In order to prevent disparities and inequalities, such diversities should be carefully considered. Adequate preventive and mitigation strategies should be created and put into effect.

From the perspective of the institutional culture, governments not prone to experimentation show highest resistance to embed e-participation, because of a lack of understanding of the advantages and strengths. To provide avenues for citizens to influence decision-making, changing institutional structures and procedures is also crucial, being a factor that might prevent the uptake of e-participation tools and practices.

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