Enhancing citizen participation through data subject right delegation

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Abstract. Data subject rights (DSRs) such as the right of access and the right to data portability can provide citizens with information about how their data are used in society. Researchers in academia and civil society alike have used such rights to investigate and improve transparency in democratic institutions. Researching with DSRs, however, is quite hard to conduct, requires some legal and technical knowledge, and suffers scalability limitations. One method to improve this is through delegation, where data subjects allow researchers to take the lead in exercising DSRs on their behalf. In this paper we present initial results from a user study investigating the acceptability of delegation of DSRs. We find that 86.67% of our 55 participants are willing to delegate their DSRs, and across three hypothetical research scenarios, the most acceptable delegate is a researcher conducting studies. Our findings can guide researchers in developing platforms that improve citizen participation in digital democracy studies that employ DSRs as a data collection tool.

Keywords: Data protection · Data subject rights · Digital democracy · Citizen participation.

1 Introduction

In our data-driven world, personal data, held by powerful data controllers, are at high risk of abuse. One such abuse can be the unethical use of data analytics in political campaigns. The Cambridge Analytica scandal and the UK Parliament's Digital, Culture, Media, and Sport (DCMS) Committee's inquiry into the role of disinformation in Brexit exposed how data controllers trade and use personal data to profile the political opinions of electorates [6,8]. The data in possession of these data controllers may be inaccurate, and so the use of these kinds of data in politics can cause political disengagement of a section of the public by politicians who govern them [7]. While data protection regulations can attempt to mitigate these unethical abuses, practical implementation of these regulations and the data rights that they confer citizens may be incomplete [2]. To measure data controllers' behaviours around personal data, a growing number of academics have used various data subject rights (DSRs), for example, the right of access, to collect data in research studies [3], for instance investigating the implementation

of access rights [2] or the technical details of portability rights [11]. Beyond academia, civil society researchers have used DSRs to help members of the public to request data held about them by political parties [7].

As part of ongoing work, we conducted a systematic literature review of current Data Subject Rights Driven Studies (DSRDS), that is, research studies that employ DSRs as a methodology for data collection [4]. We note in our review that there are several scalability limitations to DSRDSes, for instance, data subjects need technical and legal knowledge to exercise their rights. Asghari et al. propose the notion of *delegation*, where participants allow other people, who may be more knowledgeable and skilled, to take the lead in the process of exercising their DSRs [1]. Delegation may help with the collective exercise of these rights, and so reveal occurring patterns that can enable citizens [5,2], and also help bring the participatory successes of citizen science [10] in engaging the public in scientific and knowledge discovery to the world of personal data.

We are developing a citizen science framework to allow public participation in the process of knowledge creation through collective data subject requests to data controllers. Our position is that delegation will improve citizen participation in DSRDSes to enhance digital democracy. The delegate can handle the complex bureaucratic process of exercising data subject requests while the citizens are involved in the data analysis. Asghari et al. tested the idea of delegation to a circle of friends and families [1], but expanding this circle to include researchers or other users may introduce new risks and privacy concerns. We therefore need to understand the public perception of delegation. In this paper, we present results of a user study ($n = 55$) on the willingness of delegation. We asked participants the following questions:

1. Are people willing to delegate their DSRs in research studies?
2. When, to whom, and why would people delegate their DSRs?

Our results reveal participant willingness in delegating DSRs to a number of potential delegates, the most popular being a researcher conducting studies for the benefit of establishing facts and producing new knowledge. This suggests that citizens may delegate their DSRs for research studies that will enhance digital democracy.

2 Methodology

To understand public acceptance of delegating DSRs, we conducted a questionnaire user study to measure participants' willingness to delegate. The questionnaire was implemented on the Qualtrics platform, with participants recruited through word of mouth, mailing lists and social media. Participants were restricted to students at the University of St Andrews aged 18 or older, and the study was approved by the University of St Andrews ethics committee.

Participants were asked to consider delegation of DSRs in three hypothetical research scenarios based on existing studies: the right to data portability

being used to audit *medical* systems [12]; the right of access being used to understand the trading of location and behavioural data for *tracking* [9]; and the right of data portability being used to understand *file* formats returned by data controllers [11].

3 Results

3.1 Are participants willing to delegate their DSRs?

We analyse delegation willingness responses in each of the three scenarios. Figure 1 shows that 89.09% of the 55 participants are willing to delegate their DSRs in the medical and tracking scenarios. We observe that fewer participants (81.82%) are willing to delegate in the file scenario. Overall, 86.67% of the 55 participants are willing to delegate their DSRs.

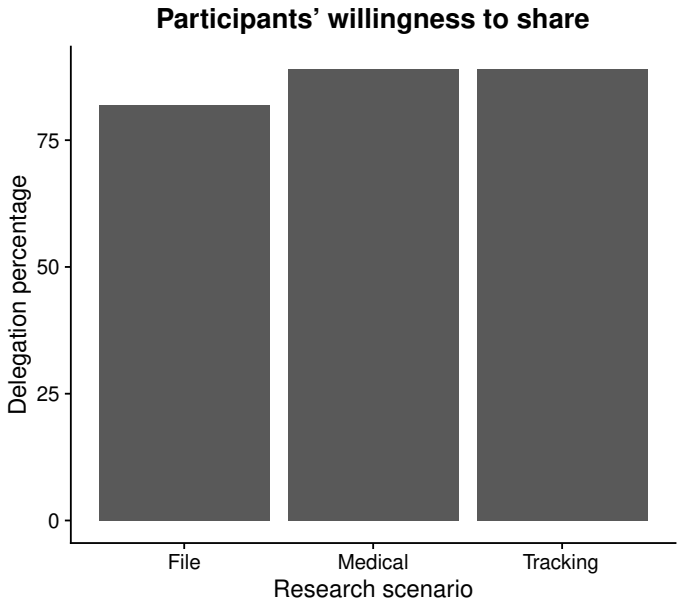

Fig. 1. Participants' responses to the question "Would you delegate your DSRs?". Across all three research scenarios, the majority of participants are willing to delegate their DSRs.

3.2 To whom are participants willing to delegate their DSRs?

We asked participants which types of delegate they would be willing to use. Across the three research scenarios, a researcher conducting studies was the

most popular choice in two scenarios (35 participants in both website tracking and file). For the medical scenario, 42 participants chose a family member, with 38 choosing a researcher. Overall researchers proved the most popular choice. Using the Freeman-Halton extension of Fisher's exact test, we reject the null hypothesis at $p = 0.05$ that the type of delegate and the research scenario are independent. In other words, there is no evidence that there is no relationship, and we will this in future work to determine if and when researchers might be able to use delegated DSRs.

3.3 Why would participants delegate their DSRs?

We asked participants to explain their reasons behind choosing to delegate or not to delegate. We aggregate the data from the three research scenarios and looked at each potential delegate in turn. When delegating to a researcher, the most popular reasons were because of the benefits of the research, and trust in the researcher. When delegating to a family member or friends, the most popular reasons were trust and the personal relationship. The least popular class of delegates was colleagues: reasons for delegating to them included a working relationship and trust. One participant also suggested delegating to a lawyer, as a lawyer might be "more qualified". The minority group that chose not to delegate cited mainly privacy concerns and lack of trust, among other reasons for their decisions.

4 Contribution to workshop and discussion

Our initial results show participants' willingness to delegate their data subject rights to mostly researchers to establish facts and build new knowledge. The minority that chose not to delegate cited mainly privacy concerns and lack of trust, among other reasons. If these concerns can be alleviated, then it may be possible to use delegation to enhance citizen participation in digital democracy research. For example, we could use delegation to hypothetically audit the personal data of the members of public held by political parties.

Building on our results from this work, our next step is to develop a data subject rights citizen science framework to test the possibility of engaging the public in local, regional, or national-level political decision-making on issues that affect their lives. Citizen science has been successful in crowdsourcing evidence to support claims in a decision-making process [10]. Given the difficulty in exercising data subject rights, we posit that the idea of delegation will motivate participation in this kind of citizen science project. These rights are by design meant to empower citizens, and their collective exercise can create a power shift that favour citizens against those charged with governing them [5].

We would like to discuss the following issues in the workshop:

1. How can delegation improve public participation in DSRDSes that aim to investigate digital democracy?

2. What do our results reveal to researchers employing DSR in studies?
3. Can the transparency, fairness, and accountability principles of data protection regulations help convince the public to participate in DSRDSes? How could we communicate these to participants?
4. We are looking at how to design and build a citizen science framework to allow public participation in DSRDSes and would welcome feedback.

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Democratic Platform Economy: A study of cooperative organizing among knowledge working freelancers

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Abstract. The research project explores potentials for cooperative organizing among digital knowledge working freelancers in a Danish context. Through a methodological lens of co-operative design (Bødker et al. 2000) the project aims at developing democratic digital solutions which can support decent, secure and still flexible digital platform work. The project spans 3 phases: (1) Research on challenges, expectations and future-oriented narratives related to work among knowledge working freelancers. Through pretotyping and co-creating processes with segmented target groups under the auspices of collaborating unions, the project is exploring potentials of cooperative organizing. (2) Identification of relevant digital tools and best practice related to platform cooperativism and data democracy; democratic digital platform models and tools related to labor data-analytics under collective or individual control. (3) Based on the previous findings, potentially development of a freelance platform MVP (minimum viable product) through existing no-code software (e.g. Sharetribe) and prototypes for work-related data control based on open-source solutions (e.g. WeClock). The project thereby aims at providing both practical, theoretical and methodological knowledge for supporting democratic ownership and control in the digital sphere.

Keywords: Platform Cooperativism, Digital Freelancers, Knowledge Work, Sociotechnical, HCI, Co-operative Design

1 Introduction

Digital work platforms create opportunities for companies, workers and self-employed and provide improved access to services for consumers through digital organization. Digital work platforms have been studied at the intersection of scientific traditions such as 1) software development 2) organizational studies 3) political economy and 4) communication and cultural studies. Although these four approaches brings different interpretations, the concept of platformization suggests that these should not be seen as mutually exclusive, but in practise are closely related (Poell et al. 2019; Van Dijck 2021). This speaks to a long socio-technical tradition which seeks understanding of the relationship between technology and human subjects (e.g. Bødker et al. 2000; Orlikowski 2007; Bjørn-Andersen 2017).

New ways of working are also associated with new challenges, and especially gray areas concerning the employment status of platform workers has led to a significant

research effort which sheds light on negative aspects of the platform economy. The digital platform economy thus challenges the labor rights and social protection of a precarious workforce (Piasna et al. 2021; Ilsøe et al. 2022), decreases workers' autonomy in algorithm-based platform work (Wood et al. 2019; Möhlmann et al. 2021), and constrains trade unions in protecting platform workers (Vandaele et al. 2019; Ilsøe 2022). Addressing these challenges invites solution-oriented research about alternative forms of organizing, which express and enact collective aspirations or hopes for the future.

Questions about who owns and controls the digital infrastructures of work and how this affects the well-being and working conditions of platform workers become relevant to posing alternatives to the currently dominant order of the platform economy. Platform cooperatives, defined by democratic ownership of digital platforms and governed by the cooperative principle of one member one vote, have, as several studies show, the potential to create better working conditions among platform gig-workers (Scholz et al. 2016; Schneider 2018).

This study explores potentialities of such alternative organization among knowledge working digital freelancers in a Danish context. Specifically, the research focuses on the relationship between autonomy, job satisfaction and democratic ownership, on the one hand, and control of platforms and work-related data, on the other. Potentialities for platform cooperative organizing, and new models for work-related data control, are thus examined as alternative or supplementing strategies to collective agreements and regulation as sorts of digital spaces of resistance, which may enhance the potential for better work lives among digital freelancers.

Through HCI inspired collaborative research and development with stakeholders such as unions, knowledge working freelancers, tech developers and cooperative business partners, the research aims at contributing to the interdisciplinary exploration, promotion and becoming of new models of collective organizing related to democratic ownership and participatory governance in the digital sphere. The methodological framework draws on concepts such as co-operative design with a strong emphasis on clarifying participants mandate or limits to influence the process (Bødker et al. 2000) and elements from design anthropology (Gunn et al. 2013) focusing on a close relation between empirical findings from the stakeholder group and an ongoing iterative development process. Ultimately, exploring potentials of democratic ownership and coooperative governance as imagined or plausible futures in collaboration with the participants themselves, raise interesting questions and methodological concerns about facilitation, common language and how to invite for different levels of citizen engagement at different stages in the process (Arnstein 2019).

2 Research Design

The project's target group is knowledge-working digital freelancers. Knowledge work is a broad category defined as work centered on creating, applying, communicating or gathering knowledge in ways that involves independent and discretionary decisions (Dupret et al. 2021). The project's target group focuses under the auspices of

cooperating trade unions HK, DJ, PROSA and DM on subgroups such as graphic designers, translators, IT developers, UI/UX, photographers and videographers, communicators and journalists, financial and project management, etc. who are used to working on digital platforms, findings tasks online or are assumed to do so at a greater extend in a near future.

The research design is inspired by the well-tested Rockwool Foundation's Intervention Model, which spans 3 phases, where research, social innovation and practical/technical knowledge interact as the foundation of the project. In the exploratory phase, the aim is to identify, through research, the places where the need for innovation is greatest. The work is done in the field through quantitative, qualitative and co-operative design thinking methods (e.g. pretotyping – Savioa 2019) to learn from the multiple relevant stakeholders in general, and more specifically from the digital knowledge-working freelancers whose working lives we want to improve. It is seen as a strength if the worker participants are members of a trade union, as they are then protected by the applicable collective agreement practice, which makes questions about further need for alternative organization relevant.

The new insights are used in the design and prototype phase as a basis for creating an effort that is usable and can function in the target group's everyday life and reality. We test the efforts through early platform prototypes based on no-code software (e.g. Sharetribe) or open source data tools (e.g. WeClock) to experiment in interaction with the target group. We learn and continuously switches between development and testing to learn more about where and how positive change can be created, which (importantly) can also be realized in practice in the specific context of organizing for member/employee-ownership and participatory governance structures.

After a well-tested design and prototype phase the third pilot and evaluation phase begin. In cooperation with the project's third-party stakeholders (unions, tech companies, and cooperative business partners), we get started with pilot testing and research-based impact evaluation to investigate whether the efforts create the expected results, is cost-effective and scalable.

Issues to discuss

Currently being in the first exploratory phase of the project, I would highly appreciate input and reflections and the co-operative design methodology and specifically:

- Methodological reflections related to co-operative design for specifically democratic ownership and control/governance?
- Reflections on how to balance a high degree of democratic involvement/control based on different levels of participation, while securing a clear mandate (more or less centralised and in relation to other third party stakeholders e.g. unions) to proceed with the project?

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Technology-Mediated Citizen Participation in Emergency Management: balancing social capital and efficacy

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Abstract. Integrating citizens in Emergency Management can make the process more efficient and communities more resilient. However it is a challenge to balance the needs of the authorities with the capabilities of citizens, a challenge that depends also on many cultural issues. In this paper we summarise the experience of more than one decade of work in envisioning technologies to integrate citizens in the EM process, technologies that aim at respecting the needs and expectations of the involved agencies whilst trying to exploit the valuable social capital of individuals and communities. Drawing on the outcomes of several projects, we examine the contribution of coproduction to exploit social capital, the value of participatory and action research approaches, and the role of gamification and emotional affordances to promote civic engagement..

Keywords: Citizen participation; Crisis Informatics; Civic technologies.

1 Citizen Participation in Emergency Management

Crisis informatics deals with the integration of ICT technologies in the context of emergency management (EM so forth), a process that is composed by four phases, namely preparation, response, mitigation and recovery [1]. The rise of mobile and social computing paved the way to research on the integration of ICT to improve the EM process as shown in the compilation at [2]. As any other sociotechnological system, a user-centric perspective is required to deal with the needs, expectations and limitations of the different agents involved in this process, such as different national and transnational governmental agencies and corps, ngos, volunteers, etc. However, the Federal Emergency Management Agency (FEMA) EM defines EM as "the managerial function charged with creating a framework within which communities reduce vulnerability to hazards and cope with disasters" [3, p. 4] and, hence, communities, and not only official agencies and corps, become a relevant agent usually referred to as first-first-responders, since they are in the area even before the crisis happens.

Though EM has traditionally been approached from a top-down perspective, with official agencies and organizations adopting a command-and-control structure to address situations [4], one of the primary missions of governmental agencies should be to empower communities. This empowerment involves reducing their specific vulnerabilities and enabling them to handle disasters using their own resources. In essence, it means fostering the creation of resilient communities by integrating their social capital and individual abilities in a coproduction service through civic participatory technologies (civic techs so far). Viewing EM as a coproduction service entails seeking ways to

incorporate participants who are not part of the EM corps and agencies and providing civic techs that are useful for all, that is, for the EM workers, the authorities and the citizens.

There are many works about integrating citizens but this is an exemplary case of the need for *adhoc* solutions, since different (organizational) cultures will need different approaches. Since 2010, and after ten years of collaboration in different projects related with crisis informatics with the General Directorate of Civil Protection of the Spanish Ministry of Interior, our research group started to work on integrating citizens in the EM process. At the beginning this approach was perceived as not particularly useful by many stakeholders who feared to lose efficacy and control. In the words of a high level officer during one of the first focus groups we run to understand the perception of the authorities [6], "the best thing citizens can do is to leave the area and let us work". Whenever technologies are integrated into the EM process, the affordances that can be enabled by such technologies need to be aligned with the existing protocols and resources. When technologies are used to integrate citizens in the loop, this challenge becomes even greater being information overload, safety and trust the main hindrances affecting their adoption by EM agencies [5]. On the other side, citizens might not feel the need to participate in the process if there is no clear reward, especially in the phases of prevention or preparation where no danger is perceived. However, citizens have shown to be valuable assets in many real crisis and emergencies and becoming aware of the risks you could be threatened by as a community is required to contribute to the solution if the risk happens [7, 8].

2 Emergency Management as a coproduction service

Viewing EM as a coproduction service involves engaging individuals and groups outside the official EM structures to actively contribute in any of the four phases of EM [9]. By including these external participants, the aim is to leverage diverse perspectives, expertise, and resources to enhance the overall effectiveness and resilience of the EM efforts. This inclusive approach recognizes that valuable contributions can come from individuals and communities not directly affiliated with the traditional EM organizations, leading to more comprehensive, democratic and collaborative solutions in times of crises.

The primary objective becomes to capitalize on and strengthen the social capital within communities to enhance their ability to recover from unexpected events, making them more resilient and, at the same time improving the sustainability, efficiency and openness of EM agencies and corps. People tend to rely on the familiar social structures, resources, and authority relationships that they are accustomed to in their daily lives [8],[9]. Therefore, it is essential to integrate them into the EM process, as their involvement is not a burden but a necessity. As discussed in [9], this integration can affect any of the 4 phases of EM as summarized in Table 1.

Table 1. Different perspectives of the EM phases [9]

EM Phase	Top-down/command and control	Coproduction
Mitigation	Deciding what to do when a risk has been determined and implementing a risk reduction program	Reducing the vulnerability of social capital
Preparedness	Developing a response plan and training first responders	Enhancement of social capital
Response	Providing emergency aid and assistance	Utilization of social capital in problematic situations
Recovery	*Provide support till the community returns to normal*	Reestablishment of social capital

To provide technological solutions that integrate citizens, our project adopted an action research methodology to explore the practical application of technology in real-life scenarios and to understand the outcomes and impact of its implementation. Action research follows a cyclic process, engaging both the researchers and clients (in this context, the EM stakeholders) in collaboratively seeking solutions to a problem. This process involves taking actions, such as developing prototypes, and learning from the evaluations to determine if the goals have been achieved or if there are still challenges to address. The iterative nature of action research allows for continuous improvement and informed decision-making throughout the project.

The first step to move to a coproduction service is to fully understand the benefits of integrating citizens and communities from the point of view of those responsible from the service. In order to identify such useful contributions, we run a number of exploratory focus groups with EM workers and authorities in which we made use of two conceptual frameworks:

- ecologies of participants, to model the different types of participants [10], and
- the theory of the crowd capital [11], that defines for each type of participant the capabilities that can be expected taking into account how they are structured, the information they can provided and the processes they can involved in.

The results, summarized in figures 1 and 2, both from the research reported in [12] were a categorization of citizens and their capabilities that inspired the rest of the civc techs developed as described in [9, 12]. Both results were validated by professional workers in order to guarantee the validity and utility of citizen contributions in the operational protocol.

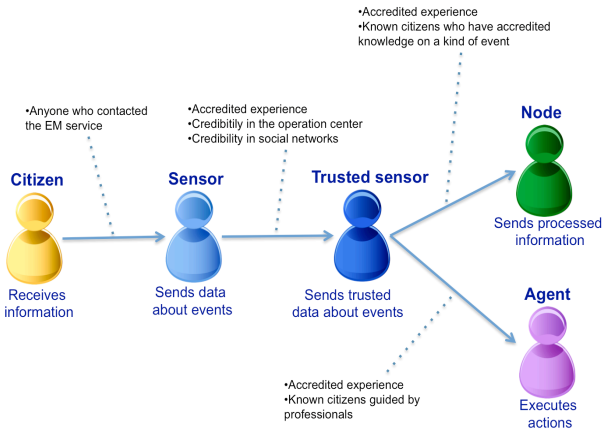

Fig. 1. Ecology of participants in EM as a coproduction service [12].

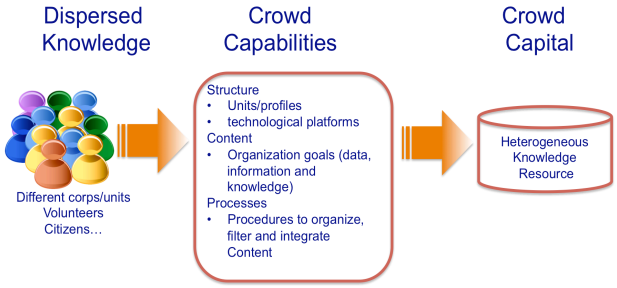

Fig. 2. Conceptual framework to identify participants capabilities in EM as a coproduction service[12]

3 Engaging citizens in Emergency Management processes through situated motivational affordances and gamification

Emergencies and crisis are multidimensional events that are not easy to solve nor we are completely prepared for, and humans play a key role solving, experiencing and creating critical situations. In the previous section we introduced some conceptual frameworks and approaches to integrate the perspective of the practitioners, workers and authorities who are in charge of the EM process. However, the point of view of citizens needs also to be incorporated.

Social and ubiquitous computing present numerous opportunities to involve citizens in activities that contribute to the betterment of their communities. The technology is readily accessible, but certain challenges persist in effectively engaging people in activities that may not offer immediate external rewards or whose impact is not immediately apparent. Overcoming these obstacles is essential to harnessing the full potential

of technology for community benefit and fostering sustained participation from individuals. In [13] we analyze how well-designed gamification and situated motivational affordances can be exploited to provide civic techs that engage citizens and are perceived useful by those responsible from the EM process. Through an action research process we designed and evaluated in-the-wild an app to participate in early warning missions, as part of the mitigation phase in EM.

The situated motivational affordances model serves as a conceptual framework for guiding technology development to address human motivational needs [14]. This model identifies two key actors to consider:

- the *Artifact* being developed: the civic tech iWarn in our case, and,
- the *Situation* in which it will be used in our case early warning participatory activities in the context of urban environments.

Both elements must be integrated during the design process. The Artifact facilitates various activities within a specific Situation (as depicted by the arrow from Artifact to Situation in Figure 3). Each of them possesses motivational features known as Situational and Artifactual motivational affordances, respectively, and forces designers to focus on the satisfaction of specific human motivations.

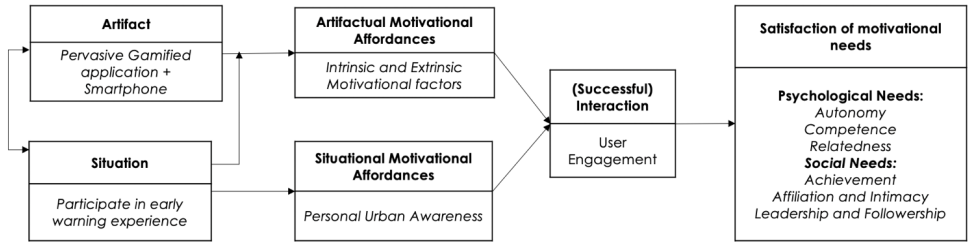

Fig. 3. Application of the Situated Motivational Affordances Model in IWarn [13]

An Artifactual Motivational Affordance links a function in the app within the technological artifact with a user's motivational needs. For example, incorporating badges into a gamified app can cater to the desire for competence if they remain private or stimulate the desire for leadership if they are public. In [13] we describe how different gamification components can be used to promote such motivations in an effective way

A Situational Motivational Affordance connects a characteristic of the usage context with a user's motivation. For instance, when using a walking app, the act of moving around can enhance users' knowledge about the area and fulfill their desire for learning. In this case, we introduce the personal urban awareness concept [13] that analyzes three potential affordances enabled by the use of the artifact and that are again connected with motivational needs: increasing the interest in the explored environment, perceived usefulness to acquire knowledge on the area and, strenghtening the connection with the surroundings.

All these affordances materialize during the interaction process, which we measure building on the concept of user engagement.

In [13] the process to design and evaluate civic techs based on this framework and following an action research cycle is fully described, including the questionnaires used during the final evaluation. The IWarn app was evaluated in an in-the-wild deployment where 4 emergency workers and 17 citizens took part in a real exercise for one week. Our results suggest that the gamified elements helped to improve intrinsic and extrinsic motivation and user engagement.

4 Conclusions

Transitioning from a top-down EM approach to a participatory one, where communities are empowered and actively engaged, can significantly improve the overall effectiveness of the EM efforts as well as to make administration closer and more open to citizens. Additionally, by acknowledging the importance of social dynamics and building upon the strengths of communities, we can enhance their resilience and ability to cope with disasters.

In this paper we have summarized the work carried out in our research group to envision civic technologies applied to EM that consider the needs and expectation of all the involved stakeholders. To analyze the perspective of EM workers, practitioners and authorities we rely upon conceptual frameworks (namely ecologies of participants and the theory of crowd capital) that helped to structure the discussions in focus groups and identify relevant requirements concerning safety, information overload, efficieny and trust. On the other hand, to understand citizens expectations the situated motivational framework is used as the inspiring tool to design and evaluate technologies focusing on human needs and motivations.

Social computing offers many possibilities to engage citizens in their communities, but apart from deployments, what is still needed is a strong conceptual framework that could help in the design of efficient and motivating applications that respect differences in terms of (organizational) cultures. Generic solutions that fit all the situations will not work as EM is a multidimensional process, not an event, in which each participant perceives the situation and contributes to its solution in a different way [14]. However, such conceptual frameworks, heuristics or design patterns could contribute to share knowledge on specific developments that could inspire further research and innovation endeavors.

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Trust, Mediation, and the Collective Evidence of the Senses: can these be preserved and extended with digital democracy?

Oliver Dowlen (Sciences Po)

ABSTRACT

This paper sets out to discover principles that can be used in the design of political procedures so that digital elements can be incorporated in such a way as to maintain and improve their democratic value. It is based on the notion of trust and the dangers that could occur if digital means replace, hide or obscure certain important elements within the democratic process.

The method or framework of analysis consists of three principles. The first is reverse design thinking. Here the reasons for using existing non-digital apparatus or procedures are re-constructed by looking carefully at the qualities or features of the procedures or apparatus in question. The second is the principle of mediation and the necessity for agreed, impartial, mediating processes in all successful, rule-governed and shared political arrangements. The third is the collective evidence of the senses. Here my claim is that trust and confidence in political systems can only be maintained if first-hand evidence of their modus operandi is available in the public domain.

In the light of these principles the paper then examines three case studies: the ballot box, the vote count, and electoral communications. In each I look at the problems that could arise if they were replaced by exclusively digital means. In each case I also explore how a combination of digital and non-digital elements could help to develop and maintain trust in their ongoing operations.

KEY WORDS

Digital democracy; ballot box; vote counting; election communications; trust; mediation; the evidence of the senses.

INTRODUCTION.

Recent events in the United States have indicated the importance of public trust in electoral procedures, and, since elections are central to the current model of

democracy, this also illustrates how democracy itself could be undermined if that trust starts to diminish. We have already seen how any slight imperfection or any misunderstanding in the collecting or counting of votes can provide ammunition for those who wish to discredit the system as a whole, and it is also clear that as public trust decreases, the strength of partisan and potentially tyrannical forces increases.

These perils would have been well known to any self-declared late medieval republican who might be seeking to hold together a shared political system under extreme pressure from internal factionalism often linked to external threats. The perceived stability of universal franchise electoral democracy has, however, somewhat hidden these dangers from us. The point of this paper is that, while the digitalised world can make communication simpler and quicker, and has made information much more accessible, it also has the capacity to generate mistrust and set in motion the dangers that can follow from that mistrust.

This paper sets out to highlight these dangers and does so by first looking at non-digital democratic solutions in a way that seeks to isolate and articulate principles and procedural priorities that could then be adapted to the design of digital and computer-based elements in our current forms of democracy. My claim is that, to combine digital and non-digital elements successfully in the design of the modern democratic polity, we must be acutely aware of the distinction between means and ends. If these get confused or if the desired democratic outcomes are not well-understood and well-articulated, we might easily find that we are being led by what is technologically possible rather than what is democratically desirable.

METHOD

The central feature of the method is the comparison between proposed digital solutions or applications and non-digital solutions where there is greater direct human contact with, or oversight of, the process in question. The bulk of the paper consists of three case or contextual studies: the ballot box, the observed count and the nature of electoral communication. The main question in all three is what might be

gained and what might be lost if key features in these procedures or technologies were to be given over to digital means. I also look briefly in each of these contexts at how digital and non-digital means might be combined together successfully to serve broader democratic ends.

Three major principles or perspectives inform my analysis and discussion of these studies. These require some explanation.

The first is what I call "reverse design thinking". The essence of this is to reconstruct the relationship between means and ends where the end result is known and tangible, but the process of problem-solving that lead to the adoption of a particular procedure or the use of a particular piece of apparatus is unknown or only partly known. By looking at democratic procedures and democratic apparatus form this perspective, we can gain an insight into the design process which can then inform future design proposals. This was a valuable approach in trying to understand lottery selection where in any given context the historical fact of its usage was known, but there was no direct literature to indicate exactly *why* it was used.[1] Electoral apparatus and procedures are less obscure, but this reverse design framework for analysis is valuable, especially as we are considering the introduction of new digital means that might replace existing arrangements.

The second principle is that of the mediative capacity of political procedures. Again, the origins of this lie in the study of lottery selection for political purposes. One of the major political advantages of using lotteries is that the process takes on the role of an anonymous mediator that (who) replaces a decision that might otherwise be taken by a stakeholder or a competing party or individual. This is quite an extreme example of the political need for impartiality, but as a framework for understanding the necessity of shared, agreed, procedures it can be very helpful. Lottery decisions effectively take power away from political actors, which is exactly

[1] Dowlen (2008)

the role taken by those formal institutional structures that guarantee the fairness and equality of the democratic process.

My third methodological principle for the assessment of digital democracy concerns the importance of the collective evidence of the senses. For a procedure to be collectively recognised as fair it must be perceived as such by observers or witnesses and, in its essential form, it must be perceptible by those witnesses and observers. Just a brief consideration of the importance of eye-witness accounts in criminal cases or other forms of inquiry will demonstrate the importance of this principle. Democratic principles must operate within the public sphere – even the protection of the secrecy of the ballot must be universally recognisable. The broader the collective guarantee of the integrity of any procedure, the greater will be the public trust in its operation. Conversely, if key points in the procedure are observed only by a few, however well trusted and trained they might be, the procedure has a more limited capacity to generate public trust. In practice, this principle is closely related to the notion of impartiality and the mediation process discussed above.

CASE STUDY ONE: THE BALLOT BOX

The ballot box has been used in elections in Britain since 1872, but as a device for collecting, conveying, and concealing votes it has a longer history that includes use in ancient Athenian democracy and in the Venetian republic. It is via the Venetian link, and the work of James Harrington[2] and his followers in the proprietary American colonies that the ballot box became an integral feature of Western democracy. Its use revolves around two main functions: maintaining the secrecy of the votes and collecting the votes prior to the count.

When the Athenian *dikastai* or jurors voted in the people's courts they had to place small metal beads in the receptacle that was passed amongst them. Each voter had two beads, one to use in support of the proposal, and one to use to register their disapproval. These two beads were almost identical, but each had a small

[2] Harrington (1992)

distinguishing feature. The object of this was to prevent anyone from knowing who had voted for what.[3]

These and other similar arrangements tell us that the essence of citizen participation of major decisions lay in the guarantee of the independence of each voting citizen. Perhaps this is best summed up by the West New Jersey *Concessions and Agreements* of 3rd March 1676. These stipulate that balloting boxes or "trunks" are to be used at elections "for the prevention of partiality, and whereby every man may freely choose according to his own judgement and honest intention". [4]

The fear here is that if any outside agent was to know the nature of a citizen's vote, then pressure could be applied to make that voter change their allegiance. This understanding enables us to view these simple forms of voting apparatus as anti-power mechanisms designed to protect the individuality of the citizen and their freedom of political expression. In doing so they also protect the shared political order from "partiality" or those concentrations of power that can lead to forms of despotism or tyrannical rule.

In this way, and for these reasons, the receptacle into which the votes were placed assumes the status of some sort of sacred or inviolable space where votes were collected and hidden until the moment came for them to be counted. The inviolability of this space was of such a nature that it could be observed and witnessed by all if voting took place in one location. If the box or urn had to be transported any distance to the count then additional safeguards would have had to be put into place to ensure that it was not tampered with, mislaid, or swapped during its journey. The essential principal of the ballot box in terms of the collection of votes is that what is put into the box comes out of the box: the input should match the output.

In both these functions, the maintenance of the secrecy of the individual vote and the transport of the collected content of accumulated votes, the integrity of the system lay in the common witnessing of the mechanism and the common understanding of how and why it was used.

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[3] Staveley (1972)

The question that I now wish to pose is: if this black box is replaced by a computerised voting system with its own electronic black box, then would these functions (the preservation of secrecy and the match between input and output) and its status as a commonly understood mechanism be compromised or open to compromise?

My first instinct in answer to this question is the worry that neither of these two functions can be adequately demonstrated or publicly understood if the manual tools are replaced by electronic means. Although we cannot see into the ballot box, we can understand how, with suitable guarantees, there would be no action within the box between the time it was sealed and the time it was opened in the count. Such a guarantee cannot be easily given or understood in the case of computer voting. We do not see or understand the journey taken by our tiny electronic impulse within the confines of the computer and have no easily understood guarantee that it would not be changed or altered within the computer or, indeed, that it would remain secret. While experts can seek to reassure us that the digital means are fit for purpose, the fact that we require expert knowledge for this reassurance constitutes an erosion of the public nature and the demonstrable integrity of the voting system.

On way in which digital means could be used to generate greater trust in any voting system would involve the appointment of citizen observers at every voting station. These observers would film the sealing of the box, which would then be electronically tagged. They would then accompany the sealed, tagged, box to the count, filming the journey up to the point where the box was opened. Here the eye-witness role of the observers would be extended and authenticated by their filming activity. If the citizen observers were randomly-selected citizen volunteers (suitably trained) then this would give the wider public confidence in their ownership of the political process – an essential part of any democratic system.

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[4] New Jersey Statutes (c.1700) p. 405.

CASE STUDY TWO: THE COUNT.

If we now apply the same comparative analysis to the count, we can immediately recognise the hand count as a semi-public affair. In most democracies it is open to candidates and other members of the competing parties plus other non-partisan witnesses. This maintains the fairness of the procedure and assures the neutrality of those who are actually doing the counting. If replaced by computer counting this immediately does away with the semi-public nature of the operation and restricts participation to a few well-trained operatives. In democratic terms there are two desirable outcomes: first that the count is accurate and second that the procedure as a whole is trusted by the competing candidates, by their parties and by the wider public. My instinct is that the latter is as important as the former. Counting votes is not a complex activity and does not have to be done by computer. On the other hand, it can be argued that the social and procedural benefits of the witnessed hand-count should be preserved as integral to any shared, commonly understood democratic system.

As with the transporting of the ballot boxes there are ways that modern technology can be combined with older systems to re-generate public trust and a sense of the common ownership of the procedure. The entire count process could be filmed and put online to place it more securely in the public domain, there might even be a way that an electronic machine, similar to those used to count money, could be used to check or corroborate the hand count. Again, if this was to be done in the semi-public arena of the count, then trust would be maintained.

The important point here is that, while every vote is a private matter, elections are public affairs and if the count is subject to public witnessing there will be greater public trust in the process. Obviously there has to be a limit to the number of witnesses, but this can be enhanced though filming, and/or through the use of special non-partisan citizen witnesses.

CASE STUDY THREE: ELECTORAL COMMUNICATIONS.

In respect to electoral communications, the spread of digital technology can clearly increase public access to the electoral platforms of the candidates. It also means that debates and public meetings can be more widely accessible. Here, however, a clear line has to be drawn between official sites, which would be subject to rules to ensure fairness, and the huge "natural agora" of social media postings that now accompany election campaigns. To place restrictions on the latter would be tantamount to restricting the freedom of expression and should be avoided as much as possible.

In the natural agora we find a situation similar to that of the free market economy: there is a nominal openness and freedom of expression, but in practice those with the greatest power over the networks will tend to dominate. Likewise, the initial openness and freedom is likely to become subsumed by the movement towards monopoly in matters of information control.

Alert voters will, of course, learn to read between the lines and suspend their final judgements on the material according to their knowledge of the sources. In this sense there is little difference between how we might react to digital material and how we might learn to "read" the products of other media: newspapers, journals or television channels, except, perhaps, for a possible difficulty in tracing the sources with digital communications. Not everyone tempers their belief in respect to the sources of the material they encounter, however. Distortions occur and can multiply quicky and important arguments can easily get lost from the public view.

Thus, while it is important that the natural agora is maintained, the sole reliance on this "open", chaotic, sphere for electoral material could work in a manner contradictory to the ideals of equality and fairness in the distribution of the information and arguments that should underpin the electoral process.

On the other hand, where the state is in control of digital electoral communications, there is always the possibility that the fairness and inclusiveness of the process of disseminating electoral material might be compromised or even become subject to more partisan state control. The extent that this might happen depends on the level of electoral impartiality exercised by the state and its status as a

mediating body in the competitive electoral process. It should be noted, however, that with digital communications the concentration of controlling power can be greater, mainly because it is harder for the public to discern or to counteract that power.

In terms of reverse design thinking, the key to electoral communications lies in the principle of equality. This is primarily exhibited in the frameworks that demand an equal amount of official exposure be given to each candidate's communications with the voters. Perhaps the clearest historical analogy can be found in the Athenian *dikasterion* or people's court where speeches for and against the motion in question were timed with a water clock to ensure that they were of equal length.[5] We also see this in televised election debates where equal time is given to each candidate, and in the restrictions placed on election expenditure. Again, the ruling principle, however badly it might be applied in practice, is that of equality. Thus, while the natural agora is anything but equal, some level of regulation based on equality is required for election communications to ensure that voters can make clear judgements about the candidates and the desirability of the programmes that they offer. The equality of this presentation is the equivalent of the starting line in a race.

This brings us directly to the question of mediation and the need for trust and impartiality in the organisation of electoral communications. In terms of digital communications, the public must be able to trust that the digital output matches the candidates' input. There therefore has to be a clear line between the digital material, the system by which it is disseminated, and its authorship or origins. This is best achieved if digitally acquired knowledge is backed up by non-digital knowledge: the collective evidence of the senses, local links, traceable origins for material, and procedures that are securely in the public domain.

Perhaps the best way forwards would be to have a group of citizens in each constituency responsible for some level of organisation and oversight of public debates, question and answer sessions, and electoral communications in general.

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[5] Hansen (1999)

These citizens could be randomly selected from a pool of non-partisan local nominations and then trained for the tasks required of them.[6] If debates and speeches were then put out on an electoral website, the clear perception of their origins within a citizen-led agency would generate trust in the system and a genuine sense of the public ownership of the electoral process. In this way also, the tendency for all electronic electoral communications to be seen as emanating either from an unknown and unaccountable centralised source of concentrated power or from more chaotic truth-distorting partisan sources could be avoided.

RESULTS and SPECIFIC CONCLUSIONS.

1) Reverse design analysis of the procedures in question indicates the importance of first-hand knowledge and the evidence of the senses in creating trustworthy basic procedures and forms of electoral apparatus.
   We should therefore ensure that this trust is maintained and not undermined by digital processes by constructively seeking to incorporate elements of first-hand knowledge in all proposed digital electoral innovations.
2) Trusted, impartial mediation procedures are required to generate and maintain trust in electoral procedures.
   The centralisation of power through knowledge and control is a danger inherent in the use of digital technology, especially where these concentrations of power are hidden from the voting public. Again, this can be counteracted by the insertion of non-digital safeguards within digital electoral proposals or schemes.
3) Electoral procedures require a careful balance between individual rights and the collective acceptance of the structural elements of the processes involved.
   Citizen witnesses in key areas can help protect both the rights of individual voters and the fairness of the public procedure as a whole.
4) In the introduction of digital electoral technology there is a danger that the capabilities of the new means will override and obscure the original desired outcomes or desired ends of any democratic procedure.

[6] See Dowlen (2017) for a scheme using randomly selected citizens as Parliamentary witnesses.

Digital means should be good servants to the democratic process, not bad masters. Democratic ideals and principles must be placed in the forefront of all electoral design proposals.

GENERAL CONCLUSIONS and IMPLICATIONS.

One of the difficulties we are faced with when looking at possible ways of using digital means to improve democracy is that new proposals are not usually presented in a context of the extension of democracy beyond the electoral model where citizen participation is almost entirely limited to voting. This can result in innovation being led by a consideration of available digital means rather than being assessed in terms of new and challenging democratic goals. In a context or within a discourse that seeks to extend citizen participation in, oversight of, and shared ownership of, the political system, there is more likelihood that digital options would be assessed on the grounds of their democratic content. Within such a new, forward-looking, democratic landscape it would be more than obvious that any innovation should be initiated, carried out, overseen, or, at the very least, approved, by the demos itself.

In an exclusively electoral model of democracy there is always the danger that the gap between political office holders and the citizenry will grow wider. This gap can only really be bridged by the extension of first-hand knowledge, interaction, and experience on the part of the citizenry. The design of any new digital form of democracy or democratic communication, therefore, has to address the question of whether the proposal in question might be used *in the place of* giving genuine opportunities for citizens to take an active role in the political system. In an era in which the capacity for the digitalized control of the citizens by the state, even in liberal democracies, is steadily increasing, the need to extend and defend democracy through first-hand citizen participation (with appropriate digital assistance) could not be greater.

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Digital models of citizens participation in Spain. Historical background, legal considerations, and evaluation of some contemporary initiatives in major cities

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Abstract. This contribution examines citizens participation platforms at municipal level in Spain from the perspective of their sociohistorical context. For this, I will consider the recent political history of democratic participation in the country and its legal framework, as regulated by the 1977 Constitution and its development. In the final part, I draw some conclusions that could help to evaluate current digital democracy platforms at municipal level, using the examples of Madrid, Valencia, and Barcelona. These three large Spanish cities introduced online democracy systems almost simultaneously from a converging political tradition and perspective.

Keywords: Online democracy, Municipal Politics, Spanish politics

1 Municipal Politics and Democracy in Spain since 1977

The fall of Franco's regime, the democratic Constitution and the general elections of 1977 were followed in Spain by the municipal elections in 1979. In 1985, a Law Regulating the Bases of the Local Government (Ley Reguladora de Bases de Régimen Local LRBRL) was passed, culminating the democratic redesign of the country's municipal administration. In these years of political effervescence accelerated changes, the LRBRL regulated citizen's participation at municipal level against a backdrop of strong community organizations.

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The following twenty years of consolidation of liberal democracy, economic growth, globalization, consumerism, and Europeanization went in hand with a decreasing interest in citizens' participation. However, during the late 1990s and early 2000s, academics and activists were greatly enticed by the expansion of the Latin American Left (since Hugo Chávez's rise to power in Venezuela in 1999 and the arrival of leftists governments to many other countries). In 2001, a World Social Forum was organized in Porto Alegre as an alternative to Davos Forum. The 2003 summit hold a "Life after capitalism" workshop on participatory economy, politics and media (cf. de Sousa, 1998; Z Magazine, 2003). The contributors' proposals included participative budgets plans for local governments (that is, the allocation of portions of the council's budget to a citizens' body). The 2004 meeting in Mumbai debated on free software and participants expanded to 75.000. In Spain, these experiences spurred on pioneering -albeit less radical- initiatives of local government administration combining participation and information technologies.

The politicization of the Spanish citizenry grew back in intensity after the sudden 2008 economic crisis amidst tax rises, budget cuts, soaring unemployment and widespread criticism of the establishment. The government measures to counteract the crisis included a controversial Sustainable Economy Law (2009), with an Intellectual Property Commission empowered to close web pages without judicial intervention if presumed to unlawfully distribute copyrighted content. Meanwhile, critical Internet users' groups (such as Exgae) accused the government of abuse of power. They vindicated the neutrality of the web and co-ordinated with other groups with converging demands, (such as the Facebook page Democracia Real Ya, the web Huelgageneral.net, etc.). Iceland and Greece had already hold massive demonstrations in 2008. In 2011 the Arab Spring had started. On May 15, 2011, several online groups -leaded by Democracia Real Ya- called for demonstrations that mobilized hundreds of thousands of people all over the country. The social media became makeshift political forums with an important role in organizing protests that demanded more democracy, improvements in the standard of living, protection of individual liberties, etc. Many people acquired, in the process, the basic digital skills needed to be informed and participate (cf. Razquin, 2017).

The same 2011, elections were held, and the socialist were ousted from power by the conservatives. The new government quickly dispersed the protesters by force. Having lost the streets, the Indignados vanished from Spanish politics. In 2014, however, a group of academics and activists founded the Podemos political party-movement with the intention of resurrecting the legacy of 15M. In a backdrop of unresolved debates and immobilism of the traditional parties, a relative success in the European elections, with 5 MEPs, set off a new wave of mass activism. Podemos, however, had yet to evolve into conventional politics. Unable to organize the 2015 municipal elections (with more than 8,000 city councils in Spain), the interregnum was filled by a myriad of independent lists, largely forged in the social media and public assemblies. Many of these, such as Ganemos Madrid, Barcelona en Común, Valencia en Común, etc. incorporated experimental proposals for participation in their electoral programs: participative budget initiatives, citizen juries, democracy by lottery, assemblies and digitization. The Madrid and Barcelona lists ended up running their cities, and the Valencian one supported a socialist mayor, being able to introduce online participatory democracy policies in their councils, some of which are still in place today.

2 The institutional framework of digital democracy in Spanish municipalities

Citizens' participation in Spanish municipal politics has an overall consultative nature subordinated to an elected council. In a typical case, the mayor is appointed by the councilors, and these are elected by universal suffrage. They form the municipal corporation in charge of the local government. In addition, apart from the rights to vote, of information, to take up public employment, etc., the Spanish Constitution recognizes the right of petition, consisting in the right to inform the public authorities of certain facts, request their action, or both. Individuals or groups of citizens are thus entitled to make proposals to be discussed by the councilors (if supported by a given number of voters). Councils can also hold consultative referendums with the government's permission. The LRBRL also urges the councils to encourage citizen participation by favoring the use of IT, and to support the local community groups.

Within this framework, councils are autonomous administrations that enjoy wide powers and institutional flexibility. In the practice, this allows many other locally designed means of citizens 'participation, and here is where participative budget initiatives, community sectorial or district meetings, surveys, data collection, etc. are put into practice, giving shape to the main online democracy platforms of Spanish municipalities.

3 Digital Platforms: DecidimVLC, Decide Madrid, Decidim Barcelona

mentioned above, the decisions made on these platforms must be validated by the municipal corporation following their citizen participation policies. Their main shared feature, in Madrid, Barcelona and Valencia's case, is their focus on participatory budget: citizens decide on the use of a certain amount of money previously allocated by the city council and fragmented into many small projects. In 2022, Decidim València has 16 million euros to this end (out of a 1,4 billion municipal budget); Madrid had 50 million (out of 5.7 billion) and Barcelona had 30 million (out of 2,5 billion). In Valencia, the proposals are voted on and then submitted to municipal officials that evaluate their feasibility and give the final approval.

In addition, Decide Madrid includes a petition system. Citizens can make proposals to be discussed and voted by the councilors if they are supported by at least 1% of the electorate. They can also initiate informal debates on the website, which works at the same time as a transparency repository for public consultations of regulations, ordinances, plans, etc. Overall, beyond being a decision-making tool, Decide Madrid resembles a brainstorming infrastructure where the Council looks for hidden gems. The website is finally linked to IGUALA, an advanced analytics data driven system that supports decision-making to rebalance the urban space. IGUALA generates a map according to an Aggregate Territorial Vulnerability Index for social well-being and equality, Environment and mobility, Education and culture, Economy and employment and Health.

Barcelona has a consultative body on general policies (Consejo de la ciudad, there are other sectoral and territorial ones) that includes representatives of community groups, elected individuals and citizens designated by lottery among those registered with the website. Like in Madrid, participatory budgets are combined with the possibility of contributing to regulations drafts in webpages with relevant technical information. There is also a space for citizens' proposals that works as a digital version of the right to petition (to call for a referendum, take initiatives to the plenary of the council, etc. For this, the support of a certain number of voters is needed (between 88,000 in the former's case to about 3700 in the latter's).

Decidim Barcelona combines the support of democratic processes with an interest to widen usability of the IT tools (for mobile phones, PCs, etc.), free software, security, and a sophisticated grasp of different democratic participation models (assemblies, sortition, suffrage, etc.). The platform is managed by the Metadecidim Association, which was established in 2019 by a participatory budget initiative. The structure of Decidim is based on guidelines by the City Council: a) For participatory processes: possibility to publish comments, publication of public calls for presential meetings and their records, a repository of proposals and their support, and the results and reports. b) For the participation bodies: publication of their scheduled meetings and their minutes, as well as relevant documentation. c) For citizen initiatives: publication of accepted proposals and online petition sheets of signatures when the identity of the signatories can be guaranteed. (Barcelona Council, 2022).

4 Conclusions

A reflection on Spanish municipal digital platforms of citizen's participation points out to wider issues on the furtherance of democracy. Approaching them from a historical-political perspective can give us an insight of what the users understand by a democratic process, which is the goal of their design. On another front, despite the variety of democratic procedures displayed in these platforms, the political development of online democracy in Spain at municipal level seem to take place in an outdated legal framework. For these platforms are highly dependent on unstable council initiatives

based on municipalities and participation processes conceived in the 1980s. There is an enormous room for improvement in areas such as the legal validity of online democracy and its standards, the use of data obtained from the citizens, the conditions of public software, etc.

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Designing IT For Governance – the case of employee-owned businesses

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Abstract. We investigate three small employee-owned businesses: a consultancy, a software company, and a company within art restoration and how they apply and reshape digital resources to commonly govern the business as there is no tool that caters for their specific needs. Using the concept of digital bricolage as a lens we find that the businesses apply a combination of digital resources at hand to solve problems, but to a lesser extent to create new opportunities. We furthermore find that common values shape the bricolage, an aspect not found in literature. We found that among the companies there exist values that shape the use. The values are different between the companies and shared internally. This has implications for the design of future tools that can help companies to govern collective decision making.

Keywords: employee ownership, design, digital bricolage

1 introduction

This paper investigates the use of digital tools for organizational decision making and development in a specific work environment where employees jointly own the company and make decisions based on democratic ideals in addition to other values and needs. In this research, we analyze three small democratically owned businesses – a consultancy, an art restoration company, and a software company. We investigate how they use online communication platforms to govern the democratic organization and to perform work tasks and decision-making with different results. According to [4] communication occurring in employee-owned businesses is complex and little understood. We aim in this paper to add to the sparse literature on communication and organizational development under these specific premises. This knowledge might form the basis of developing new digital tools for cooperative governing.

1.1 Employee-owned businesses

Employee-owned businesses are a subcategory of democratically owned businesses, which are driven by the "cooperative principles" as defined by The International Cooperative Alliance (ICA) [14]. The principles important to employee democracy in the

businesses are voluntary and open membership, democratic member control, and member economic participation [14]. The way different companies practice the democratic principles varies, but key is, that all owners are employees, that all (or most) employees are owners, that the business is not for creating profit for the few, that one owner has one vote, and, that the statutes define how employee-owners participate in the organizational governance.

The employees play an active role in governing the company and are expected to be active in the negotiations and building of policies and work disciplines [4]. This requires participating in ongoing discussions about how the company should progress, what projects to accept, and how the daily tasks should be distributed and performed.

Often companies invest a lot in their effort to find appropriate channels that encourage discussions and keep records of decisions. To this end they experiment with a variety of digital tools and platforms – they creatively use and combine digital tools and resources in a flexible and improvisational manner to achieve the specific goal of governing the company – they, over time, create a digital bricolage by repurposing, adapting, and recombining existing technologies and resources in novel and innovative ways.

1.2 Digital bricolage

The concept of digital bricolage draws on the theory of bricolage [8]. Bricolage is a repertoire of resources at hand that develops and is assembled over time. Within studies of technology, bricolage has been used to describe the many technologies organizations use for business and communication purposes. Common to the concept of bricolage is: the stock of digital resources are compiled over time, that there are emergent ways of using them, and that the outcome is recombined when new needs arrive [5, 8]. In short, digital bricolage is constituted of the situations in which bricolage occurs, the process of bricolage, the specific resources on which bricoleurs draw, and the recombination when new needs arrive.

Bricolage is performed by bricoleurs that use known resources that are collected during unplanned encounters, they begin assembling the resources to solve a specific problem. The assembly is not perceived as an ideal solution, but through what is known and trials and experimentation the bricoleurs are satisfied with the outcome when it works. The bricoleurs only use what they know and do not move boundaries [10]. Thus, bricolage is different from making rational choices between adequate resources [8].

In the following we will use bricolage as a lens and will focus on the three constitutive elements of bricolage namely 1) the stock of resources, 2) the emergent way of using these resources, and 3) the expected outcomes.

2 Method

The study belongs to a larger research project conducted over a period of sixteen months. This study included 3 employee-owned businesses in Denmark. We conducted semi-structured, qualitative interviews with three employee-owners [9]. Two research-

ers conducted the interviews based on an interview guide. The interviews lasted between 50 to 120 minutes and were audio recorded and transcribed verbatim. The interviews are analyzed using the lens of digital bricolage that provides an overall thematic structure. We have thus looked at what platforms and channels they use, how they use them, and the underlying intended goals. We allowed for themes to occur that ran across the three patterns [5].

2.1 The cases

The companies are: A Consultancy, working within research, analysis, and communication founded in 2014 with five employee-owners. We interviewed one of the founders. A Software company, started in 2016, and turned into a cooperative in 2021 with seven employee-owners. We interviewed the former owner, now an employee-owner. An Art restoration company, started in 2020 and turned into a cooperative in 2022 with four employee-owners. We interviewed one of the founders.

The structure for decision varies between the three employee-owned businesses. The Consultancy is the most structured and many formal meetings, most are face to face but with information and discussions prior to the meetings are online. The list of meeting contain: A weekly check-in meeting on the week ahead. A bi-weekly meeting on projects and staffing. A monthly meeting on internal wellbeing. A quarterly meeting on strategic issues. Art restoration are together one day a week at the workplace and meet every third to cover all issues. Between the meeting they discuss and make decisions online. The Software company has a general assembly where decisions are taken but no structure for small, daily decisions, these are taken ad hoc and mainly online.

Common to the businesses are that, on an organizational/business level, they value ownership and influence, and transparent structures. They do not appreciate work for profit or individual gains. The businesses are governed by equal access to responsibility and tasks with continuous evaluation and they draw on the collective resources. There is focus on well-being, with specific agendas for this issue. For the individual owners the motivating factors are the right to possess their own work and freedom and flexibility despite a lower salary. Common is also a need for structures that are implemented over time as needs occur.

3 Findings

Looking at the findings with the lens of bricolage we have investigated 1) the constitution over time of the stock of resources; 2) the specific way of using the resources 3) and the specific outcome.

The findings revealed that values have an impact on how platforms are used and perceived. The democratic ideals and the collective decision processes are values of high esteem at both the Consultancy and the Art restoration company. Furthermore, the Art restoration company emphasizes that they are friends, and this creates a situation where it becomes necessary to separate work and private life.

The Software company has values related to open source and no use of software from “aggressive” software providers. This makes it harder to find an ideal software for online decision making and organizational development. The value of open source is deemed higher than the wish for an aligned structure that is easy to follow. Furthermore, agile development comes with democratic ideals and values [3], and the software developed specifically for this purpose fits well with the ideals in the Software company.

Company values have an impact on the use of platforms, with the Consultancy paying attention to the democratic ideals, the Art restoration company values friendships, and the Software company has values related to open source and individual needs. This has, to our knowledge, not been covered in the literature.

4 Discussion

Looking at the existing literature on digital bricolage these cases tie well into it and we see that the practices constitute trial and error, and the result is to implement rules to transform and develop the micro-enterprises, as reported by [6].

We found that the situation at hand is characterized by lack of structure, and this is overcome when a specific structure is agreed upon. Similarly, we also found that increased team awareness and channels for informal communication reduced the need for e-mail. This fits well with [6], but what has not previously been reported is how the shared organizational values shape the resource combination, in our case the values of democracy, friendship, and open source. Thus, the combination of resources and the specific way of using the resources are influenced by the values that are shared among the employee-owners.

The companies might be satisfied with their present practice, but as [11] points to, bricolage can have a positive influence, but it may also be considered detrimental as it may comprise both the “second-best solutions” and a “tinkering trap” and lead to compromises that may not provide the best results. In our case we see this as the employee-owners use what they know of beforehand and do not seek other possibilities that might fulfill their goals better. Thus, there is a need to develop tools that can take the specific needs of employee-owned businesses into account.

5 Conclusion

The literature on digital bricolage focuses on three areas, namely the resources, the way, and the outcome. The cases that we have looked at show similarities and differences between the interviewed companies and similarities and differences in relation to the literature.

All companies have struggled to find the right combination of resources to communicate and advance their business, while one is still struggling. This is furthermore intensified as they all have a further task, not mentioned in the literature, which we claim is collective governance. Like [12] we found that unbalanced activity on Slack was a barrier to effective communication. Contrary to their findings of low availability

of key persons and lack of organizational support as barriers, we found that the barriers are lack of structure, and that the barriers are overcome when a collective structure is agreed upon. Similarly, we also found that increased team awareness and informal communication reduce the need for e-mail.

Finally, we found that the company values will have impact on the use of future platforms, with the Consultancy paying attention to the democratic ideals, the Art restoration company values their friendships, and the Software company has values related to open source and individual needs. This has, to our knowledge, not been covered in the literature and should be considered when designing new platform.

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Audit4SG: Democratizing Auditing Artificial Intelligence and Ontology Development Methodologies

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Abstract. This position paper introduces the methodological and philosophical departures that were made while working on a web tool currently under development for external and non-expert users to audit artificial intelligence. The tool is being developed as a proof-of-concept to operationalise relational ethics and also contributes to the field of ontology development. The paper calls for two radical democratisation processes, the democratisation of ontology development methodologies and the democratisation of auditing artificial intelligence.

Keywords: ontology development methodologies, auditing artificial intelligence, expert, non-expert.

1 Introduction

This position paper introduces the methodological and philosophical departures that were made while working on a proof-of-concept web tool that is currently in development for external and non-expert users to audit artificial intelligence. In particular, the tool aims to target initiatives and projects which claim to deploy or use the rhetoric of artificial intelligence for social good (AI4SG) [1, 2]. It is limited to three domains of education, economic empowerment, and equality and inclusion. The tool has two components, an ontology of auditing artificial intelligence in OWL2 built to operationalise relational AI ethics. The second component of the tool is being built with StencilJS (frontend) and Nodejs, Express, and Postgres (backend). From a design perspective, the goal of the tool is to provide an intuitive, exploratory, and open-ended way to audit AI systems relationally, rather than following a solutionist approach of providing problem-solution mapping.

The tool follows Birhane's [3] provocation to reinterrogate and redefine various common terms in AI ethics, such as transparency, fairness, accountability etc. The

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name of the project and the tool Audit4SG is a play on this fundamental problematic of AI4SG, which tends to leave the categories of the 'social' and 'good' uninterrogated. Actor-network theory (ANT) [4] has rethought the very concept of social in the discipline of sociology. Social has emerged in science and technology studies (STS) as a network of human and non-human actors whose contours and relationships remain under perpetual reconfiguration.

Such a view of the social necessitates a methodological outlook that remains open-ended eschewing tendencies of fixing or reifying the object of study. The open-ended approach of ANT is particularly conducive for reinterrogating common-sensical scales such as urban, global, national, home etc. or, for that matter, the state itself. A tacit scalar acceptance of the state as a common-sensical vantage point from which legitimate knowledge production must be made has been a symptom of recent AI ethics debates [5] as a consequence of the ubiquitousness of big tech corporations and their platforms, which have flourished in a relatively deregulated ecosystem.

A statist outlook forecloses the possibility of rethinking democracy while limiting itself to post-political manoeuvres of management [6]. The goal of our project is hence twofold. On the one hand, the ontology development process sidesteps the role of an ontology engineer. This aims to demonstrate the possibility of engaging with semantic web technologies from diverse fields without any intermediary. Secondly, the web tool aims to destabilise auditing by moving the field away from experts to non-experts, i.e., anyone whatsoever and aims to bring back the field of AI ethics and the normative field of AI4SG to the domain of citizen science.

2 Methodology of ontology development: Democratising ontology development

To suggest that ontologies and knowledge graphs have still not witnessed wider uptake in social sciences isn't an exaggeration compared to the industrial, biological, and medical fields. This, even though semantic web languages such as OWL2 lend themselves particularly well to non-standardised expressions, and the open-world assumption of the language means that the fundamental insecurity of underdetermination by social scientists is accounted for. It is precisely due to this fluidity and openness of OWL2 that logicians who value logical rigour have been arguing for the development of stricter first-order languages.

While the slow uptake of semantic web technologies by social scientists would need to be interrogated and studied more rigorously in future, one of the causes of the slow uptake could be attributed to the increasingly complex methodological strictures being argued for by newer ontology development methodologies which have had the effect of decoupling the 'domain expert' and the ontology engineer.

The ontology development process was led by two anthropologists/sociologists. A systematic literature review of two fields, AI4SG and relational AI ethics, was conducted. Following this, a scoping review of the three domains, education, economic empowerment, and equality and inclusion, was also conducted. A set of competency questions were developed to determine the scope of the ontology [7]. As the ontology

was built for a tool, the competency questions were the same as the auditing questions that the tool will cover. Step 1 and 2 of the UPON Lite methodology [8] was followed, but the latter steps, which required working with ontology engineers, were discarded. Instead, Protégé was used to develop the ontology with the aid of visualisation plugins like VOWL. Akin to previous work, visual aids were found to be a particularly enabling method [9].

3 Towards an auditing tool for non-experts: Annotations as provocations

The auditing questions and the design for the web tool are currently being generated by building them backwards from the ontology. This allows for a second verification and mobilisation of as many classes and properties as possible. The web tool will also query a concise but citation-based annotation which will be added to the ontology. The user will have the option to include or exclude relational components in their auditing methodology. The annotations will not provide definitive and/or authoritative guidance; rather, the annotations will be provocations to rethink various ethical parameters, approaches, and relationships between types of users of AI systems, types of end-users, funders, developers, harms, risks etc. Such a relational stance towards auditing privileges multiple pathways and the propensity to mobilise situated knowledges, partial perspectives and dissensus [10].

The goal of the tool is to dissociate auditing from its current checklist-based objectivist and technical approach, i.e., to move it away from a rational to a relational outlook. For this, we draw inspiration from the Latin etymology of 'auditing', *audiō*, to hear, to pay attention to. In the process we aim to dissociate auditing artificial intelligence as a domain of experts to reappropriate it towards a citizen science initiative.

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Designing a public participation digital architecture in formal policymaking processes

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Abstract. This paper addresses the issue of how to avoid obstacles and improve digital systems design for citizen participation in formal policymaking processes. Public consultations conducted in the United States while setting the policy on net neutrality (2014-2017) were researched using an analytical tool comprised of four evaluating dimensions and a combination of critical discourse analysis and socio-technical methodology. The study demonstrates the effects of digital platforms' affordances and architecture on undermining public participation in institutionalized policymaking. This system of control through design (as a central component alongside other methods) established hierarchical power relations and structured discrimination between groups of participants. Furthermore, the properties of the digital management system's design and its technical failures facilitated dark participation and large-scale manipulation of the process. Concluding the research findings, several recommendations are suggested for designing a better digital environment that enhances participation as a democratic practice.

Keywords: participation process design, public participation in policymaking, digital platforms affordances

1. Background

Policymaking on the net neutrality (NN) rules has been on the top-level agenda of internet regulation in recent years. On a technical level, it deals with questions of network management and the ability of internet service providers (ISPs) to block, throttle, or prioritize content, services, or applications. Besides technical specifications, NN is about shaping the web playing field: regulating corporates' commercial relations and affecting the balance of power between powerful corporations and web users.

In nowadays digital public sphere, regulatory decisions on NN implementation have enormous consequences on citizens' ability to participate in social life. This case study, thus, connects participation with communication policy and democratic theory in the context of formal decision-making in institutionalized politics. As such, it can be formulated as participation on the ability to democratically participate in various spheres of life.

2. The case studies

Implementing NN rules in the United States (US) was, and still is a lengthy public, economic and juridical battle. In 2014, the Federal Communication Commission (FCC) launched a Notice of Proposed Rule Making (NPRM) to establish a comprehensive regulatory policy on NN. As part of the policymaking process, it held a public consultation procedure and received about four million comments. The process ended with the decision to impose strict NN rules on ISPs. In 2017, the FCC launched another policymaking process intending to repeal NN rules. This time it received about twenty-two million comments.

In both cases, the FCC used an electronic comment filing system (ECFS). This digital online platform managed the consultation procedures (sending, collecting, registering, storing, and retrieving comments) and had a web-based user interface through which participants uploaded comments to a central database.

3. Methodology and a model of evaluation

An analytical model was developed, including four evaluating dimensions - background, process, content, and result – and twelve operational analysis parameters. A combination of socio-technical analysis and critical

discourse analysis (CDA) methods was used [1][2][3]. The commenters were classified into five groups - government officials, stakeholders, experts, civil society organizations, and privet citizens.

The socio-technical aspect analyzed the ECFS interface, affordances, and architectural design. Data and meta-data were inspected, the system user guide was read, and the commenting process was tested by simulation. Digital objects were understood as cultural elements that shape participation by encrypting social conventions and hierarchical relationships into a "sociotechnical protocologic" [4][5][6]. The system interface was analyzed according to the parameters of visibility, natural mapping, feedback, affordances, and constraints [7]. Platform affordances were seen as a communicative interaction between the complexity of the digital environment's technological characteristics and perceptions of the human agent [8][9][10][11].

4. User experience and digital affordances

The user interface maintained clean and simple graphics. However, it was textual-oriented with minor use of conventional iconic signs. No supplementary information nor further readings on the consultation issue were provided.

The in-site navigation for submitting a comment required multiple clicks. An 'express filing' submission process was three-staged (filing, review, confirmation) with seven mandatory fields to fill in the first stage, while a 'standard filing' had the option of attaching a file and submitting different types of filing (including 'notice of exparte' and 'reply to comments'). Either way, the identifier field of each procedure was its administrative proceeding number.

The whole process of uploading a comment was exhausting for an ordinary citizen. An illustration of that was the consequences of comedian John Oliver's segments on his late-night show. Using the ECFS API, Oliver offered his viewers shortcuts for sending comments. The very high volume of comments sent within a short period caused the system to crash twice (and that was not the only technical failure of this aging system).

5. Digital platform design as an architecture of control and exclusion

The ECFS was based on the logic of a vertical and unidirectional flow of information without intending to be a deliberative arena. It was merely a channel through which participants could submit their comments to the relevant proceeding. The system user guide specified the target users in the following order: attorneys, public interest groups, concerned citizens, journalists, bloggers, and others.

The system's interface offered two tracks for submitting comments but directed citizens to the shorter 'express filing' track and designated the second track ('standard filing') for expert users. It also provided savvy actors with digital tools for uploading bulk comments and allowed them to offer uniform comments ready to submit by their supporters. The FCC stated on its website that individual comments should be submitted by "clicking on the express link to file an express comment" while it "strongly encourage[s] parties who seek to file a large number of comments or group comments to do so through the public API" [12] (see Fig. 1).

Indeed, most of the comments submitted through the system were based on pre-prepared templates [13][14]. The 'standard filing' track was mainly used by corporations and advocacy groups [15][16] and amounted to less than 3% of all comments in both procedures.

The FCC clarified in advance that it is not obliged to consider all comments, only those that will be "useful and effective." The decision of whether the comment contained valuable information worthy of consideration remained at the Commission's discretion. As can be learned from its final reports, most comments were not seriously considered.

The overall meaning is that policymakers created an architectural design of control and exclusion through the digital platform and its affordances. This design has predefined comments trajectories and established hierarchical power relations by creating a gap between the bureaucratic apparatus and the public and structuring discrimination between organized stakeholders (economic corporations, civil society organizations) and the individual citizen. Citizens' role in these decision-making processes was systematically undermined.

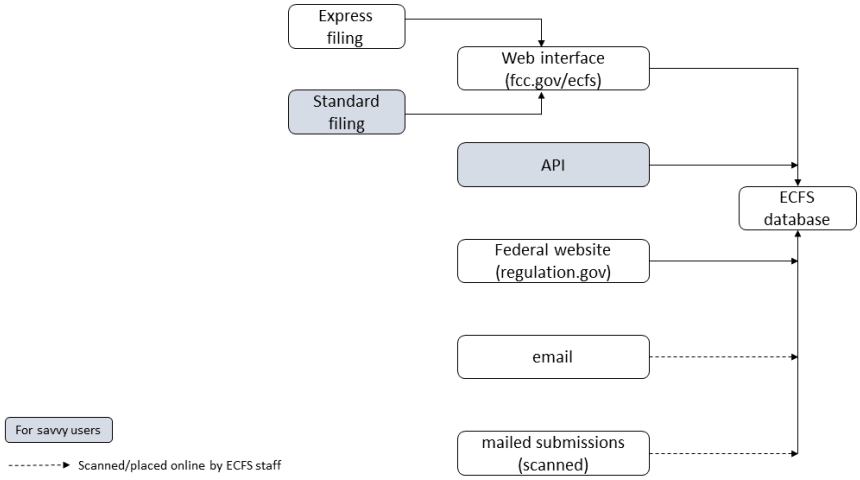

Fig. 1. The technical design of filling comments to proceedings

6. Verification and data integrity

The ECFS debuted in the 1990s, hardly managed to handle the high traffic volume, and collapsed several times in both procedures. However, its primary failure was not keeping data integrity and verification mechanism. According to FCC's statement, the reason for not implementing a user verification mechanism was to avoid placing obstacles on public participation. This avoidance created a significant barrier as it contaminated the second procedure due to large-scale manipulation. As the New York Attorney General's office confirmed in its investigation [17], nearly eighteen million comments sent to the ECFS were fake. About half of them favoring the repealing were part of an astroturf campaign held by subcontractors hired by three ISP companies. About another half of the counterfeit responses that supported the implementation of NN were engineered by a nineteen-year-old college student using a fake email address generator.

This large-scale manipulation was made possible through the advanced technological tools that facilitated the astroturf campaign and fake comments. Although evidence of identity theft was published in real-time, the FCC refused to halt the process. As one of its commissioners stated, a consultation procedure is not an opinion poll and is not subjected to quantitative count. Indeed, the FCC provided raw data but published no quantification or analysis performed on the database.

7. Implications and recommendations

The analytical model and the combined methodological tools, as described above, proved helpful in researching institutionalized participation processes. It may reveal master narratives encoded within digital infrastructures [6], uncover socio-technical interactions of human and non-human agents, and allow a systematic analysis of participatory processes.

Designing and assessing public participation in formal policymaking should be done according to democratic requirements. Under the assumption that technical architecture embeds power relations and digital infrastructure design means political power [18], decision-makers should adopt equality in designing a digital platform that facilitates participation before considering properties such as convenience or efficiency. Practically, a digital system design must not prioritize or channel participants, use design affordances to "invite" user behavior [19], or construct any pre-determent hierarchy between types of participants, as these might detract from its democratic essence. In addition, a digital platform should enable horizontal relations and rational deliberation between participants [20] instead of merely offering a vertical information transfer mechanism.

The user interface must be simple and intuitive, providing visual and iconic cues relating to the user's mental model [7]. It should also avoid bureaucratic obstacles such as administrative identifiers. As already well founded in scholarship literature, a participation management system should provide accessible, comprehensible, and

complementary information [21][22] in order to avoid a technocratic environment with limited accessibility and diversity [23][24][25], especially in value-laden and complex fields of policymaking [26] where mass participation does count [27]. Furthermore, a consultation process must be accompanied by data analysis and not just provide raw data as was done in the researched cases.

Digital democracy requires an appropriate digital infrastructure and a sophisticated toolkit. Current e-participation systems should be prepared to manage the challenges of mass, false, and computer-generated comments [28] and apply innovative computational methods to extract insights [29]. Although the preferences addressed by a comment are important, the content of the comment and arguments presented are equally important, and attachments should also be processed and analyzed. The large-scale manipulations performed in these cases were significant in scope but not rare as a phenomenon. The properties of the digital environment enhance the activity of controlled non-human objects that undermines fair competition in the marketplace of ideas [30]. Given the availability of sophisticated technological tools, a digital system must include verification methods and counter tools to maintain an ethical and transparent process.

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Fair and Inclusive Participatory Budgeting: Voter Experience with Cumulative and Quadratic Voting Interfaces

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Abstract

Cumulative and quadratic voting are two distributional voting methods that are expressive, promoting fairness and inclusion, particularly in the realm of participatory budgeting. Despite these benefits, graphical voter interfaces for cumulative and quadratic voting are complex to implement and use effectively. As a result, such methods have not seen yet widespread adoption on digital voting platforms. This paper addresses the challenge by introducing an implementation and evaluation of cumulative and quadratic voting within a state-of-the-art voting platform: Stanford Participatory Budgeting. The findings of the study show that while voters prefer simple methods, the more expressive (and complex) cumulative voting becomes the preferred one compared to k-ranking voting that is simpler but less expressive. The implemented voting interface elements are found useful and support the observed voters' preferences for more expressive voting methods.

1 Introduction

Digital voting platforms have granted the opportunity for increased citizen participation and inclusive decision making [1–3]. For instance, in participatory budgeting community members directly decide how to spend a public budget, fostering a bottom-up decision-making process that encourages civic engagement and transparency. However, optimizing online voter experience is challenging [4], especially when implementing complex voting methods to use in participatory budgeting campaigns, for instance, cumulative and quadratic voting. These methods require a user interface (UI) with which voters can convey complex preferences, but without sacrificing simplicity to maintain an engaging voter experience. Similarly, it was initially argued that the use of knapsack voting would be too burdensome [5] as voters need to approve projects that do not surpass the available budget.

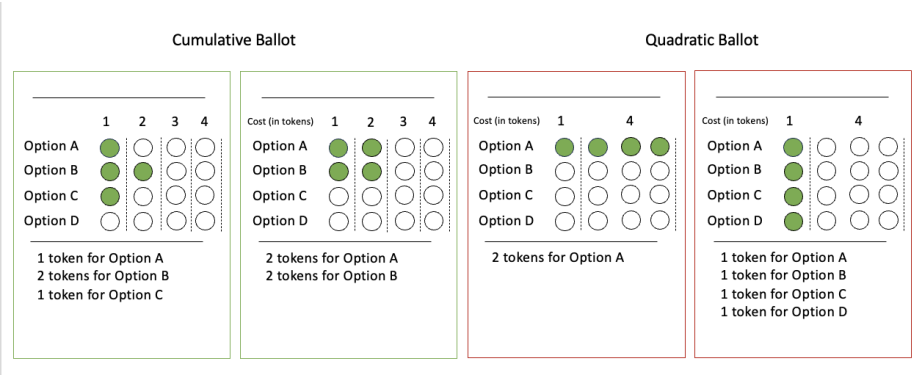


Figure 1: Example of cumulative and quadratic ballots. The two ballots to the left highlight an example of cumulative voting. The two ballots on the right highlight an example of quadratic voting. Notice that is not possible to distribute more than one token for two options in quadratic voting, due to the cost of tokens increasing quadratically.

However, it was later demonstrated that it was possible to implement knapsack voting with the appropriate voter interface [6]. Therefore, in this paper, we conduct an empirical study to assess and optimize voter experience with cumulative and quadratic voting on the Stanford Participatory Budgeting platform. This study provides new insights about the integration of complex voting methods to digital voting platforms.

Cumulative voting [7] and quadratic voting [8] are part of a group of voting methods that allow voters to distribute their votes across multiple candidates in elections or projects in participatory budgeting. It could lead to more inclusive and representative results [9], increasing minority's turnout relative to the majority, and the minority's share of winning seats/projects [10]. Specifically, cumulative voting enables voters to express their preferences in a non-linear way (i.e., it means that they can distribute a fixed number of points across different options). This approach is different from ranked voting, where the voter ranks the options, or approval voting, where voters pick up the options they prefer. Quadratic voting is similar to cumulative voting, however, the increase of the points on an option as a result of expressing stronger support is not linear but quadratic [11]. This means that expressing a strong preference would be more costly [12] (see Fig. 1.

Despite their potential benefits, quadratic and cumulative voting are not widely adopted in most voting platforms. Most voting platforms tend to use more straightforward voting methods such as plurality or majority voting [1, 13]. These methods are simpler to understand and administer, but they do not provide the same level of flexibility as cumulative and quadratic voting. We successfully implemented cumulative and quadratic voting on the Stanford Participatory Budgeting platform[1] [14], a popular open-source platform used for several campaigns in North America, and recently in Europe (i.e. Aarau city in Switzerland). The effective implementation of cumulative and quadratic voting relies not only on the underlying voting method, but also on the design and usability of the voter interface.

[1]Available at `https://github.com/DISC-Systems-Lab/SPB` (last access: July 2023).

2 Case Study: Cumulative and Quadratic Voting

Cumulative and quadratic voting are a group of flexible multi-option preferential voting methods that enable participants to distribute a number of points across multiple options based on the intensity of their preferences. This flexibility allows voters to express their support for a range of options, rather than being limited to a single choice, as is highlighted in Fig. 1. As a result, the voters can prioritize their preferred options, putting more weight on their top choices while still compromising and providing support to other options they find acceptable. The feature that distinguishes cumulative and quadratic voting from other voting approaches is its ability to allow voters to make complex trade-offs among the options they support, i.e. more points on the most preferred option exhaust the available points left for other options and vice versa. This design enables cumulative and quadratic voting to encode and capture a richer amount of information regarding voter preferences.

Moreover, cumulative voting provides a voice to minorities by empowering them to concentrate their voting power on specific choices that are important to them. In other words, they can allocate more weight to a topic that holds significant importance and sensitivity for them. This mechanism ensures that their preferences are not marginalized by the decisions of the majority, thereby providing a more inclusive decision-making process [10].

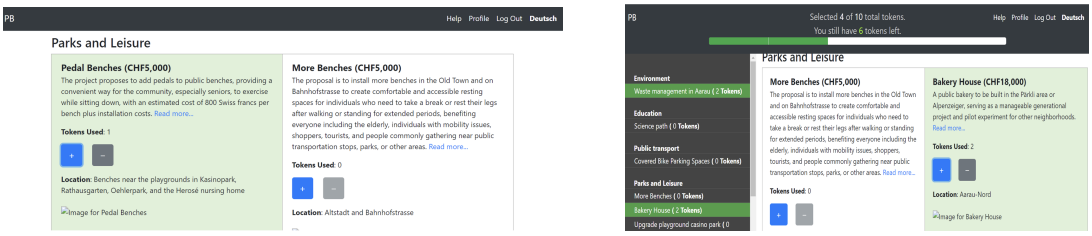
3 Voting Interface and Voter Experience

The Stanford Participatory Budgeting interface supported until recently by default k-approval voting, k-ranking voting, knapsack voting and pairwise comparison voting. Implementing cumulative and quadratic methods required an additional user interface (UI) to assign a number of tokens, keep track of tokens assigned, remove tokens, and redistribute them to other projects. To have an intuitive voter experience, the designed UI should simplify the process of point allocation, tracking, and redistribution. The following provides some requirements for implementing such a UI:

- **Point allocation:** Providing voter-friendly interface elements (i.e., buttons or sliders) that allow a voter to set the number of tokens they choose to assign to each option. The UI should reflect the remaining tokens available and update dynamically as voters allocate their tokens.
- **Points tracking:** Display a visual representation or numerical count of the tokens assigned to each option. This could be shown as a progress bar, a numerical value, or other intuitive visualization that allows voters to easily see the distribution of their tokens.
- **Cost:** Voters are able to make trade-offs between their prefered projects and the token budget exhaustion via a fine-grained control.
- **Removing and redistributing tokens:** Include interactive controls that enable voters to remove tokens from an option and add them elsewhere to adjust their allocations in real-time. The UI should reflect the changes made and update points tracking accordingly.

The platform should ensure that voters do not exceed the total number of tokens available or encounter any errors while assigning or redistributing tokens. It requires clear feedback messages and notifications to guide voters and prevent any unintended mistakes. Testing and voter feedback can also be valuable in refining the UI design to ensure a smooth and efficient voter experience. In this context, we conducted an experiment to compare voter satisfaction regarding the UI flexibility in keeping track of tokens assigned to the options. The experiment aimed to assess how different UI designs or variations impact user experience and the effectiveness of cumulative and quadratic voting. For simplicity, we opted to focus on the cumulative voting method. As cumulative voting shares a number of similarities with quadratic voting, the findings can be generalized to quadratic voting and other distributional methods with the support of some tailored additional explanations.

During the experiment, participants were presented with different versions of the UI, each offering varying degrees of flexibility and ease of use in terms of points allocation and tracking, see Fig. 2a and 2b. The side and point bars are borrowed graphical elements from the Knapsack voting of Stanford Participatory Budgeting



(a) A simple UI.

(b) An augmented UI.

Figure 2: UI comparison for cumulative voting. The point and side bar show the number assigned and remaining tokens.

4 Empirical Study

4.1 Design

A study was conducted using Qualtrics and sent to 90 Media and Communication students from the University of Fribourg, Switzerland. In total, 27 students responded. We asked the survey respondents to vote in two voting scenarios using the Stanford Participatory Budgeting platform (k-ranking[2] and cumulative vote), with follow-up questions assessing their preference for the voting method and UI design.

4.2 Results

Table 1 provides an outline of the results of the study. We began by asking respondents to indicate, on a scale of one to ten, how well ranked voting and cumulative voting allowed them to express their preferences. The mean response for ranked voting was 6.06 and cumulative voting was 7.63,

[2]This is implemented using a k-approval interface combined with a ranking step

suggesting respondents felt that cumulative voting was a more effective method to express their preferences. A t-test was conducted to compare the mean scores for ranked voting and cumulative voting. The test had a p-value of 0.15, demonstrating significance at 95% confidence.

In the following question, 75% of respondents suggested that cumulative voting was their preferred voting method, 19% suggested that ranked voting was their preferred method and 6% were unsure. We then asked a semantic differential question, in which respondents rate their preference between a challenging method that was more accurate in expressing preferences and a simple method that was less accurate in expressing preferences. The normalized mean value in the range $[0, 1]$ presented was 0.687 (where a value of below .5 represents favorability towards a complex but more accurate voting method and a value of greater than .5 represents favorability towards a simple but less accurate voting method). In this sense, the value of 0.687 highlights that respondents where favourable towards a simple but less accurate voting method. For these results a t-test was conducted and had a p-value of ¡.0001 demonstrating significance at 95% confidence.

Question Number	**Question**	**Results**
1	Please indicate how well you were able to express your preferences with ranked voting (0-10)	6.06 (mean)
2	Please indicate how well you were able to express your preferences with cumulative voting (0-10)	7.63 (mean)
3	Indicate your preferred voting method	Ranked Voting = 19% Cumulative Voting = 75% Unsure = 6%
4	Please indicate your preference between a complex but accurate (0) and simple but less accurate voting method (1)	0.687 (mean)
	Which is the most helpful when voting?	No Additional Interface = 0% Top Bar = 26% Side Bar = 6% Top and Side Bar = 68%

Table 1: Overview of the study results.

Finally, to assess the changes that were made to the user interface to convey information from the more complex voting methods, we asked respondents to select their preferred user interface, between the four layouts highlighted in Fig. 3 (participants were exposed to Option C in k-ranking and Option D in cumulative voting in the voting exercise). 26% selected Option B (Top Bar), 6% selected Option C and 68% selected Option D (Top + Side Bar). Option A (No Additional Graphics) received no support.

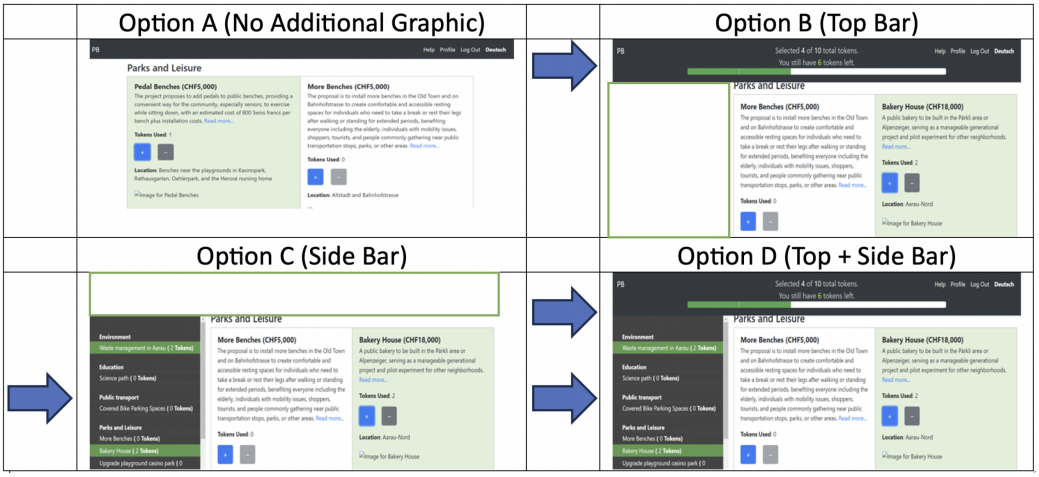


Figure 3: User interface question.

5 Conclusion and Future Work

In this study, we sought to address challenges with cumulative and quadratic voting on digital voting platforms, as well as assess the impact of the voter interface representing information from such voting methods. To do so, we implemented cumulative and quadratic voting on the digital voting platform Stanford Participatory Budgeting, and adapted the user interface. Through an experiment we find that cumulative voting, although often overlooked due to its perceived complexity, emerged as a preferred method over ranked voting according to the empirical findings. Interestingly, while participants regarded cumulative voting as superior, they also expressed preference for simple but less accurate voting methods.

These findings suggest that even with its complex nature, the effective implementation of cumulative and quadratic voting is feasible. Participants' preference towards simplicity in voting processes indicates the potential benefits of platform-level solutions aimed at simplifying cumulative voting. Additionally, our research highlights that tailored interface features could enhance voter satisfaction.

By analyzing user feedback and preferences, we have presented a case for the integration of cumulative and quadratic voting in digital platforms. This study underscores the importance of voter interface design in shaping voter interaction and experience, potentially leading to broader adoption of more expressive voting methods such as cumulative and quadratic voting. In doing so, the findings from this paper have implications for fairness and inclusion, as cumulative and quadratic voting can encourage fair and inclusive results [9, 10].

We will build on the findings from the paper through research conducted in a field test in Aarau, Switzerland. The field test has used the cumulative voting on Stanford PB platform, with the adapted user-interface changes outlined within this paper, in a real-world participatory budgeting vote. This should grant further information as to the impact of distributional voting methods on participatory budgeting and strengthen the findings presented within this paper. Future research will also study and compare the different interface interventions required between cumulative and

quadratic voting.

6 Acknowledgements

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Digital Democracy in a Digitopia*

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Abstract. The recently funded DIGITOPIAS project aims to co-create technology that allows people to lead self-determined lives, make informed choices, and actively engage in democratic structures. In this paper, we argue that digital participation in democracy should be accessible, that real-world and public spaces should be closely linked with digital participation opportunities, and that forms of digital participation will need to be adapted to the needs of different groups of citizens. We illustrate our argument with data from the SHARE survey of older citizens in Europe and discuss how solutions might be co-created and evaluated.

Keywords: digital participation · digital democracy · accessibility · co-design.

1 The Challenge

Citizen engagement and participation is fundamental to democracy. In Germany, local government processes increasingly require active citizen involvement. This is especially important when responding to challenges such as climate change, which require concerted action on many levels. When citizens are actively engaged in the political response to these challenges, they may generate new, disruptive ideas, and the resulting measures are likely to be more legitimate and more widely accepted.

Digital tools show great promise in facilitating such active participation and co-creation [9]. German local authorities increasingly offer standard services, including appointment booking, online. Online services can point to in-person opportunities for discussion and engagement and vice versa.

However, there is no single digital tool that can reach all relevant stakeholders equally well, since citizens differ widely in their use of, acceptance of, and access to technology. Although decisions often affect many different, heterogeneous groups of citizens, the opportunity cost of engaging with offerings such as

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focus groups or town halls is high for many. Therefore, there is a danger that the people who attend such events tend to form a small, relatively closed bubble [7].

The Digital Participation work package of the DIGITOPIAS project aims at co-creating accessible services that allow German citizens to engage actively and constructively with local political decision making and local public services.

2 All Online After COVID-19?

The COVID-19 pandemic has precipitated a shift towards moving life online. However, we need to critically examine whether groups that have traditionally been less likely to use the Internet, such as older people, have followed suit and increased their online activity.

We used data from respondents of Wave 9 [3] of the SHARE data set [4], which was collected during the second wave of the Covid-19 pandemic. SHARE is a major longitudinal data set that documents the life and wellbeing of people aged 50 and over in over 20 European countries, including Germany. We only considered respondents who answered the questionnaire themselves, were aged 50 or older, and located in Germany, since DIGITOPIAS is set in the country.

We identified n=2032 respondents (age in years: M=70 (SD=8.6), range 59–97, gender: 45.96% (n=934) male, 54.04% (n=1098) female)[4]. 73.22% (n=1488) had used the Internet at least once since the outbreak of the pandemic, and of these, 91.87% (n=1367, age in years: M= 68, SD=7.5, range: 50–91 years, gender: 49.23% (n=934) male, 50.77% (n=694) female) had an adequate internet connection. Participants were then asked whether, again since the outbreak of the pandemic, they had used the Internet more often, equally often, less often, or not at all for four common tasks, including accessing government services. Preliminary unweighted overall findings for those with an adequate internet connection are summarised in Table 1.

Older people were least likely to use the internet for getting information about government services, followed by management of finances. The situation was different for online purchases and health information search, where there was a clear net increase in use of the Internet. Thus, the data indicate a wide gap between older Germans' use of the Internet for government-related information compared to areas such as e-commerce.

3 Parameters for Co-Design

Given the challenges to online engagement that still exist after the pandemic-enforced move to digital services, we contend that three parameters need to be considered when co-designing technologies for democratic and public digital participation.

[4] non-binary and other genders not covered

Table 1. Change in Older People's Use of the Internet After the Outbreak of the Covid-19 Pandemic.

Internet used for ...	More	Same	Less	Not At All	Don't Know
searching for health-related information	420 (30.72%)	520 (38.04%)	105 (7.68%)	322 (23.56%)	0 (0%)
information about government services	80 (5.85%)	272 (19.90%)	62 (4.54%)	951 (69.57%)	2 (0.15%)
managing finances such as paying taxes or online banking	90 (6.58%)	738 (5.38%)	20 (1.46%)	521 (38.11%)	0 (0%)
buying / selling goods or services	427 (31.24%)	494 (36.14%)	63 (4.60%)	383 (20.02%)	0 (0%)

Parameter 1: Accessible and Inclusive. Digital participation needs to be designed to be easily accessible to people with a range of perceptual, motor, and cognitive abilities. If people need others to mediate between them and the digital participation interface, there is a risk that their voice will not be heard.

Parameter 2: Bridging Digital and Analogue Places. Forcing civic participation into digital spaces only will lead to the exclusion of many voices. Therefore, we need to provide spaces where people can engage in more traditional ways, and use the data collected in those spaces to complement digital data.

Parameter 3: Sociotechnical Context. The digital divide systematically disadvantages those of lower socioeconomic status, those who live in rural areas, and those who face discrimination—in other words, those who depend the most on government measures that ensure equal opportunities. In our co-design work, we therefore need to engage in particular with those at risk of marginalisation.

4 Looking Ahead

We plan to put our approach to co-designing civic participation into practice in two use cases, developed in close collaboration with the city of Oldenburg in the North West of Germany.

We will draw methodological inspiration from computational social science [1], participatory approaches [5], and citizen science. Citizen science often involves place-based, situated work [8], and the community is actively working on reaching different groups of society [6, 2]. We will also involve institutional and legal stakeholders, because without their active engagement, civic participation risks being less effective [10].

Use Case 1: New Spaces for the City. Citizens are the experts by experience in what makes a city livable. As Oldenburg opens up new spaces for housing and mixed use, we plan to co-design solutions that will allow us to engage with people who have a range of accessibility and inclusion needs, and people from

different social groups. Those solutions will be deployed in place around the new spaces and online, for those unable to come in person.

Use Case 2: Opening Up Digital Spaces in the Analogue World. We plan to co-create a network of places that provide opportunities for easy digital participation where people from different backgrounds mingle naturally, such as shopping malls, public transport, as well as places where people spend their spare time (sports clubs, gyms) and places that cater for specific age groups (day care centres, care homes, schools).

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