Reflecting on Design Methods and Democratic Technology Development: The Case of Dutch Covid-19 Digital Contact-Tracing Application

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Abstract
This article explores the idea that democratic technology development in public governance can be enhanced by adding an experiential dimension to it. Our work is situated in the context of an appathon organized by the Dutch government to initiate the development of a Covid-19 contact-tracing application. The appathon stimulated a multifaceted debate on technology design and societal values, and raised a crucial question: how can design methods enhance democratic technology development? To answer this question, we first identify three main democratic values (i.e., citizen participation, collective decision making, and critical engagement) that underpin three influential design methods: participatory design, adversarial design, and speculative-critical design. Next, based on design theory, we argue that these methods can bring three experiential qualities to democratic technology development: ownership, contestation, and imagination. We then situate this theoretical reflection in a reflexive thematic analysis of publicly available discussions that took place during the appathon. This makes it possible to identify opportunities to deploy participatory design, adversarial design, and speculative-critical design to engage citizens in political decision making directly and experientially. Based on our analysis, we highlight how abductive design reasoning may help iteratively deliberate sociotechnical challenges when using participatory design, adversarial design, and speculative-critical design. Ultimately, this paper explicates the role of design methods and practices in political participation.
Introduction

When associating design with democracy, it is tempting to position design as a means of creating tangible artifacts, systems, and spaces (e.g., voting polls, municipality websites, online discussion forums) that facilitate civic participation. This is not surprising, since the systematic creation of material outcomes has historically been one of the key strengths of the design profession. However, design has expanded its scope as a discipline: design methods are increasingly deployed in social innovation, public governance, and policymaking. Moreover, democratic values such as participation and critical-political engagement resonate strongly with the values underlying participatory and critically-oriented design methods. In this article, we will further explore the relations between design and democracy by revealing the common values that drive three influential design methods, on the one hand, and democratic practices on the other. This empirical analysis can guide future practices for democratizing technology development.

The development of digital applications for public governance is one of the central domains in which the democratic values and the values of participatory and critically-oriented design methods intersect. In today’s digital societies, digital systems and interactive artifacts are increasingly being designed and deployed to facilitate public governance. A recent and illustrative example of this is the digital contact-tracing applications (apps) that numerous countries developed in 2020 to help prevent the spread of Covid-19. For example, in the European Union, 21 different apps were designed and deployed for this purpose in 2021. The Dutch contact-tracing app, eventually dubbed CoronaMelder, has a particularly interesting story since the government explicitly decided to make its development a public process.

In April 2020, the Dutch government announced plans for a public appathon—also known as a hackathon, but in this case directed explicitly at developing an app. By live-streaming the two-day appathon as a public event and involving a multidisciplinary team of academics and professionals to critically review the draft design proposals (prepared by public and private parties), the Dutch government aimed for a transparent approach that could engage the citizens. On the one hand, the appathon embodied a participatory, democratic approach by engaging the public and live-streaming part of the discussions. On the other hand, its democratic character was questioned for various reasons. Primarily, choosing a pressure cooker-like method (the appathon) to address a complex sociotechnical challenge not only seemed naïve, but also posed the risk of “ethics washing” by engaging ethicists in a process whose very initiation implicitly legitimized the notion of developing a contact-tracing app in the first place. In addition, the event triggered a multifaceted societal debate on the potential violation of civil liberties (e.g., privacy and autonomy) by any future app. This criticism makes the appathon a fruitful case study on the relationships between design methods and democratic practices. Could a participatory and critically-oriented design approach have helped enhance the democratic nature of the process?

In this article, we enter the interdisciplinary discussion between design and democracy through a methodological angle. We recognize from our own practices in design research that technological artifacts result from technical,
political and other choices, and are influenced by the methods and contexts in which these choices happen. Therefore, we want to unpack the democratization potential of design methods and practices, which may eventually advance the democratization potential of technological artifacts. That’s why the choice for and organization of the appathon raise questions around the democratic promise (or deficit) of pressure-cooker type methods, particularly when viewed through the lens of participatory and critically-oriented design methods.

Our core assumption is that participatory and critically-oriented design methods rely on democratic values and involve citizens in making, reflecting, and envisioning. Therefore, using these methods to involve citizens in political decision making may enhance democracy by bringing an experiential dimension to democratic ideals and values by enhancing the way citizens experience democratic values and ideals through material forms of inquiry. We also assume that, if the connection between design and democracy is better explored in interdisciplinary scholarly discussions, future processes for technology development may benefit from material and experiential design practices to express political ideas. Borrowing from the work of Carl DiSalvo and other participatory design researchers, we aim to address this experiential deficit in democracy through design.

In what follows, we first address this question: what are the main democratic values that underpin participatory and critically-oriented design methods? Next, we use these values as a deductive framework to analyze the Coronavirus appathon videos that are publicly available online. In doing so, we examine the dynamics of communication between citizens, invited experts, government officials, and software developers to identify the democratic potential (and deficits) of the appathon. Next, we reflect on how participatory and critically-oriented design methods may help involve citizens in political decision making directly and meaningfully. We conclude with further research questions that accompany our theoretical and empirical analysis.

Design Methods and Democratic Values

The work of philosopher John Dewey points out that democracy is not simply a way of choosing a government that represents the majority, but rather the process of forming a majority by making it possible for a “public” to come together to address an “issue,” through engaging individuals in debate and reform. Therefore, engaging citizens in deliberations regarding the functions of institutions and social practices is vital to democracy. However, citizen participation in political decision making seems to have always raised both theoretical and practical questions in political theory. For instance, Dewey’s participatory focus has been criticized by Walter Lippmann, among others, for overburdening society with the responsibility of “knowing what’s going on and [having] an opinion worth expressing on every question which confronts a self-governing community.” According to Lippmann, not citizens but a specialized class of experts should guide political processes—a notion called “guided” democracy.

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10 DiSalvo, *Design as Democratic Inquiry*, 16–33.
12 Ibid., 21–32.
13 Ibid., 24.
Participatory democracy emerged in the 1960s and 1970s as a counter-proposal to guided democracy and advocated for greater (direct and indirect) participation of citizens in collective decision making, for example regarding voting rights for everyone, without class, gender, or racial discrimination.\(^{14}\) Although promising greater citizen involvement, participatory democracy did not fully address when, where, and how citizens should participate in democratic regimes.\(^{15}\)

Perhaps to compensate for the democratic deficits of the participatory model, deliberative models of democracy became dominant in the 1980s and 1990s.\(^{16}\) Deliberative democracy can, very briefly, be defined as a normative theory of democracy and accompanying deliberative practices that foreground citizen participation, multiple forms of communication (for instance reason-giving, or storytelling), and collective decision making.\(^{17}\) Deliberative scholars often research small-scale deliberative forums (mini-publics) with the aim to scale such participation up to the societal level.\(^{18}\) Recent literature on democratic deliberation also addresses the practical challenges of organizing large-scale political discussions. Design has entered the discussion on deliberative democracy mainly through its role in alleviating such practical challenges. For instance, designing online discussion forums may facilitate asynchronous deliberation (while also posing risks such as polarization).\(^{19}\)

Parallel to this development of a variety of democracy models, several design approaches have emerged that can also be connected to specific visions of democracy. The transition from participatory to deliberative democracy (1960s–1990s)\(^{20}\) also marks the emergence of participatory design as a politically-motivated Scandinavian approach to involving industrial workers in the design of their own work environments.\(^{21}\) In addition, the focus of democratic deliberation on mini-publics and consensus-building parallels the scale and the main goals of participatory design. Therefore, there seems to be an intimate link between “democratizing democracy” and “democratizing design,” perhaps owing to the sociopolitical context of the time. In this regard, citizen participation and collective decision making stand out as two main democratic values underpinning participatory design.

In parallel, Chantal Mouffe contrasted deliberative democracy with a kind of agonistic pluralism that foregrounds the antagonisms among overlapping yet disparate worldviews that lead to unresolvable ideological conflicts and debate in society.\(^{22}\) According to Mouffe, the “perfect harmony” suggested by a deliberative model is not democratic precisely because it refuses to undertake the work of transforming antagonism into agonism: making room for contestation, conflict, and the complexity of power structures in society.\(^{23}\) Mouffe’s focus on agonistic pluralism inspired DiSalvo’s adversarial design—a form of political design that reveals and complicates the diverse ideological frameworks that underpin agonistic politics through computational artifacts (such as interactive maps).\(^{24}\) In adversarial design, citizens come together not for collective decision making, but to critically engage with each other’s perspectives as a means to foreground conflict and contestation. As a result, citizen participation and critical engagement stand out as the two main democratic values underpinning adversarial design.

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15 Ibid., 752.
18 Ibid., 29.
23 Ibid., 755.
Although deliberative democracy and agonistic pluralism seem mutually exclusive, they may, in fact, complement each other: “The point thus is not only that deliberation and agonism can be somehow reconciled but also that, in her view, in authentic politics, they will be always present at the same time so that we will inevitably find elements of agonism in deliberation and of deliberation in agonism.”

This signals that participatory design and adversarial design may be positioned as complementary (if not intertwined) design approaches in shaping the experiential dimension of democracy. Noteworthy here is that both methods invite citizen participation, where participatory design mainly focuses on collective decision making and adversarial design on critical engagement.

Finally, we feel that a discussion of design and democracy is essentially incomplete without addressing the role of imagination in creating vibrant experiences of democracy. To address this methodological role, we draw from another critically oriented design approach: speculative-critical design, which uses provocative artifacts as a medium to explore the wide-ranging societal implications of new developments in science and technology. A core intention of speculative-critical design is to challenge the status quo and facilitate imagining alternative social orders through material and experiential forms such as props, scenarios, digital artifacts, and so on. “This form of design thrives on imagination and aims to open up new perspectives on what are sometimes called wicked problems, to create spaces for discussion and debate about alternative ways of being, and to inspire and encourage people’s imaginations to flow freely.”

Underpinning this definition of speculative-critical design, both critical engagement with alternative futures and collective decision making about those futures stand out as two main democratic values.

In summary, we argue that participatory design, adversarial design, and speculative-critical design are rooted in three main democratic values: citizen participation, collective decision making, and critical engagement. Participatory design, with its roots in democratic deliberation, highlights citizen participation and collective decision making in forming publics. Adversarial design, with its roots in agonistic pluralism, highlights citizen participation and critical engagement in forming publics. Finally, speculative-critical design, with its power of imagination, highlights critical engagement and collective decision making about the futures these publics may want to engage with.

Preliminary Theoretical Framework

Based on the discussion in the previous section, we understand citizen participation, collective decision making, and critical engagement as three main democratic values underpinning participatory design, adversarial design, and speculative-critical design and position these methods as the threads tying these values together. The theoretical roots of these design methods and associated democratic models indicate that design enters the political realm through a diverse set of participatory and critical design practices that can enhance the formation and functioning of publics. These practices add a “lived experience” dimension to democracy—they help express and reframe the ways in which people understand the competing interests, ideologies, and worldviews that underpin the products, services, and systems that surround
In the following paragraphs, we further elaborate on the interdependencies between participatory design, adversarial design, and speculative-critical design. Figure 1 illustrates our preliminary theoretical framework.

**Participatory Design: Ownership**

Participatory design helps integrate disciplinary expertise with the situated experiences of people whose lives will be impacted by the resulting technology. To ensure the involvement of all relevant stakeholders, participatory designers utilize a growing repertoire of generative methods and supporting tools and techniques—collage-making, role-playing, diary studies, visual mapping, Lego mock-ups, and so on. These tools aim to express and enhance collective creativity and can be adopted and adapted to any design situation. More importantly, participatory design involves stakeholders as partners in the design process, which creates a sense of responsibility and ownership. This links to DiSalvo’s argument in favor of relying on a sense of care in organizing communities. Consequently, because of this dual focus, participatory design has the potential to link citizen participation with collective decision making.

**Adversarial Design: Contestation**

In a healthy democratic society, spaces of contestation are as necessary as spaces of consensus, and it is these spaces of confrontation and contestation that adversarial design aims to generate. Because of this, adversarial design links citizen participation to critical engagement in our theoretical framework. Similar to participatory design, adversarial design invites citizen participation, and thus, it can be considered a form of community-based participatory design. Unlike participatory design, which is more focused on collective decision making, adversarial design exposes implicit power dynamics and conflicting interests that emerge in publics and, with that, invites them. In the following paragraphs, we further elaborate on the interdependencies between participatory design, adversarial design, and speculative-critical design. Figure 1 illustrates our preliminary theoretical framework.

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**Figure 1**

A preliminary theoretical framework of how design methods and democratic values are interrelated. © 2022 Deger Ozkaramanli.
critical engagement. As a result, adversarial design has the potential to link citizen participation and critical engagement in the proposed theoretical framework.

**Speculative-Critical Design: Imagination**

When practiced in a participatory manner, speculative-critical design facilitates collaborative and critical reflection on the status quo and imagination of alternative social structures than those in power. Thus, speculative-critical design may bring a new and essential dimension to collective decision making with its focus on imagining and making the wide-ranging implications of new technologies tangible and experientable. Therefore, in our theoretical framework, speculative-critical design has a participatory focus, and it invites critique and imagination simultaneously. With this, speculative-critical design links critical engagement and collective decision making and may help publics reason with technological solutions that seem attractive for addressing today’s challenges yet may create bigger challenges than they solve in the future.

In summary, we understand Figure 1 as follows: three main democratic values (citizen participation, collective decision making, critical engagement) can be lived out through three unique experiential qualities (ownership, contestation, and imagination), which are fostered by participatory design, adversarial design, and speculative-critical design, respectively. Ownership mediates citizen participation and collective decision making, contestation mediates citizen participation and critical engagement, and imagination mediates collective decision making and critical engagement. Based on these theoretical relations, we propose that experiential democracy combines these approaches and their democratic promise. As DiSalvo states, “When these modes of designing swirl together, there is a possibility of emergent practices that blend imaginative making and politics toward engaged inquiry (Sanders and Stappers, 2008, 2012).”

Next, we turn our attention to the Coronavirus appathon to explore the promise of our theoretical ideas in a real-world case study. The appathon is interesting because it sparked a multifaceted political debate on technology-society relations as well as the values driving technology development to manage public health. For instance, prior to the appathon, a letter signed by sixty academics (among others) was sent to the Dutch parliament to highlight concerns about the permanent effects of surveillance technologies. During the appathon, participating academics emphasized that they were taking part to help appathon participants think critically about the proposals (versus helping to rank them). Following the appathon, the media framed the event as a failure, emphasizing that none of the apps had “won.” A foundation focusing on responsibly connecting technology to society wrote, “This was a hasty process with naïve expectations that never had any chance of being fulfilled.” This widespread attention and the plurality of perspectives indicate political engagement and the formation of publics around issues such as public health, public surveillance, and techno-solutionism on the one hand, and the forms of citizen participation in political decision making on the other. Our attention is on the latter—the forms of citizen participation.
The Appathon Case

We understand the appathon as a democratic attempt to develop a technology to help address the complex and urgent challenges posed by the Covid-19 pandemic. It was partially live-streamed online as a public event, a multidisciplinary team of academics and professionals helped develop the proposed apps, and citizen input was sought through email and social media. At the same time, the criticism that it attracted motivated us to ask the following research questions:

- What definition of democracy was implied by the appathon?
- How might the lived experience focus of participatory design, adversarial design, and speculative-critical design help enhance democratic technology development?

Appathon Format

From 700 applications, the Ministry selected seven proposals (four consultancies, one consortium of research and commercial organizations, and two citizen initiatives). In addition, academics and professionals—experts—from the fields of epidemiology, healthcare, privacy, information security, and information technology participated in the discussions. Finally, officials from the Ministry and the director of national health services also joined in. Figure 2 visualizes the format of the event.
The appathon took place at the Ministry of Public Health, Wellbeing and Sport, and was hosted by a professional presenter. It consisted of plenary discussions and question and answer (Q&A) sessions. On the first day, each organization joined a topical panel session on four different design requirements defined by the government: privacy, security, effectiveness, and user-friendliness. On the second day, each organization joined a mixed-expert panel session to address questions on all topics. Each day also consisted of plenary sessions in which the teams could present their work.

**Data Collection**

The appathon was partially live-streamed online, a broadcast comprising 7.5 hours of conversations (in Dutch and partially in English). The available videos were transcribed using intelligent verbatim transcription on an AI-supported software. The transcripts were translated to English using Google Translate, and a native Dutch speaker revised them. In addition, we conducted 45-minute, semi-structured interviews with two experts (one academic in medical ethics and a data ethics professional) who took part in the panel sessions and transcribed them in the same manner. The procedure for these interviews can be found in Appendix A. We did not interview additional experts as the third author of this paper was part of the expert panel on privacy and could contribute to the analysis through firsthand experience.

**Research Methodology**

The transcripts were analyzed using reflexive thematic analysis and blended coding, so a combination of deductive (theory-driven) and inductive (data-driven) coding. Reflexive thematic analysis is used to systematically analyze patterns in meaning across items that constitute a qualitative data-set. Reflexive thematic analysis offers flexibility for developing themes organically and relies on constructivist (versus [post]positivist) epistemologies. This aligns with our research questions for two reasons. First, the dataset is large and heterogenous, consisting of conversations about a variety of topics among different participants. This requires flexibility in the coding procedure. Second, our interest is in analyzing how these conversations are located within wider socio-political contexts regarding democratic values, which requires a reflexive approach.

For deductive coding, we searched for the three main democratic values proposed in the previous section, namely citizen participation, collective decision making, and critical engagement. Through inductive coding, we examined specific features of the appathon-format that might have prevented or contributed to experience-based citizen participation.

We followed Virginia Braun and Victoria Clarke’s six recursive phases of data analysis: (1) familiarization; (2) initial coding; (3) searching for themes; (4) reviewing and developing themes; (5) refining, defining, and naming themes; and (6) writeup. The first author watched the appathon videos and read the transcripts in Dutch; the second author read them in English (Phase 1). The first author was the primary coder, and to aid in
forming the initial codes, the second author coded 38% of the transcripts. We coded only the items which were directly related to our research questions and discussed and modified the codes as we worked (Phase 2). Next, the codes were aggregated and sorted into potential themes and sub-themes (Phase 3), and revised twice (Phase 4). We reviewed the final themes for internal consistency (Phase 5). This resulted in the overview shown in Appendix B, from which we synthesized our findings (Phase 6).

Findings

Our analysis helped identify the shortcomings of the appathon that did not fully address citizen participation, collective decision making, and critical engagement (deductive coding). In addition, we identified specific features of the appathon format that might have prevented or contributed to citizens’ experiencing the appathon as a democratic process (inductive coding). We call these insights *barriers to* or *enablers of* experience-based citizen participation.

*Indirect Citizen Involvement (versus Direct Citizen Participation)*

We identified 90 quotes (out of 318) on indirect citizen involvement (Appendix B). These quotes indicate the effort to involve citizens in the event, but the engagement was indirect and mediated by the presenter — via email or social media, for example. The presenter played the most central role in the appathon (Figure 2), and effortlessly switched from the role of TV presenter, to critical viewer, to discussion leader. He posed citizens’ questions to relevant parties and occasionally clarified discussions to ensure accessibility to all viewers. When closing the appathon, the presenter said that the broadcast had received approximately 2000 questions and 3500 tweets. The content of these tweets, however, did not emerge during the livestream of the appathon. In fact, there were only 27 (out of 318) instances in the coded sample where the presenter posed citizens’ questions (Appendix B). It was not clear whether those questions were an adequate representation of all the questions received, and if not, how the rest of the citizens’ questions were processed.

In addition, there were nine different instances in which public opinion and trust were discussed.

*Excerpt 1.* Software development team

“How do you follow the public opinion? What consequences do you draw from this and how do you convert these into guiding principles about how this will work? On the other hand, you might also want to influence public opinion somewhat, to at least make the whole system workable. But that’s a balancing act we’re in right now.”

Our interviews revealed that the behind the scenes discussions among the experts, which were not part of the coded sample, could have been insightful for the public.

*Excerpt 2.* Interviewee

“Unfortunately, in the livestream, you only see us asking questions. But behind the scenes, it was very nice to discuss with the other experts between the
sessions. It would have been very, very helpful for all the Dutch people to see what the experts were saying about all the apps that were presented.”

Despite the limited means of participation, the citizens who did follow the appathon were deeply engaged with the event and its content. Some actively asked questions; others reviewed the source code of the apps and shared their critiques on social media. In sum, the transparency of the appathon brought more questions to light than could be addressed during the event, and it was not clear whether and how citizens’ input was utilized after the appathon ended.

Q&A Sessions (versus Collective Decision Making)

We identified 35 quotes (out of 318) that framed the function of the appathon as a collaborative platform, but less than half (13 instances) indicate nuanced knowledge exchange and consensus-building among the participants, for instance by exchanging email addresses to share further remarks. At the start of the appathon, the director of national health services indicated that the event would hopefully serve as a collaborative platform to build an app: “So it is a good idea to really sit together with a couple of people and to build it together.”

Despite the intention to create a collaborative space, the panel sessions followed a traditional Q&A format, and were strictly moderated. For instance, the experts were not provided with the opportunity to ask follow-up questions when they did not receive concrete responses from the software developers. This ended some discussions abruptly (see Excerpt 3), and our interviews confirmed that the time pressure was indeed a disruptive factor (see Excerpt 4).

Excerpt 3

Expert: “Is it possible to use the app if you only have self-reported symptoms? So without having a positive result from a doctor?”

Software-developer: “We have foreseen that it’s only the medical authorities who can generate the codes to report. So we don’t want people to report themselves. Otherwise, you might get too many positives in the market.”

Expert: “That’s a problem. Because then it will take too long. Because it’s going to spread fast, so you need to have the reporting period between having symptoms and the test be very short. And that is not a possibility at this moment. So self-reported symptoms should also give a notification.”

Panel facilitator: “I think the point is clear. This is not in the app. I think we should go to the next question.”

Expert: “Okay.”

Excerpt 4. Interviewee

“So what I really didn’t like about those sessions is—OK, we could address our questions. We got answers. Some of them were answers we enjoyed. Others were only giving us more questions. But we didn’t have the room to address our concerns or our views, or our perspectives with the company. So it was only question, answer, question, answer. But you couldn’t say, ‘Hey, from my expertise, I really would recommend you to do.’...’ Well, actually, I did this between the lines. But it wasn’t the right place to do that.”
In summary, although the intention was to achieve multidisciplinary collaboration, the instances of collective decision making were limited by the traditional Q&A approach and the time pressure of the event. Coupled with the sociotechnical complexity of the issue, the approach triggered a number of critical questions instead of creating new solution spaces.

One-Way Criticism (versus Critical Engagement)

Critical engagement was mainly attributed to the experts here: 70% of the codes in this theme involved interactions with experts, and 27 quotes (out of 73) illustrated that the presumed role of the experts was to ask the “right” questions (Appendix B).

Several experts challenged the design requirements defined by the government, suggesting that they should be debated in relation to each other and in connection with societal debates on similar issues. For instance, one expert pointed out that the debate over privacy was broader than the coronavirus crisis. “There needs to be accountability and supervision, and that it should be public and people should have a lot of questions about it.”

Another expert pointed out that there were multiple, competing human rights to be considered, including privacy.

During the panel sessions, the experts were not always able to obtain concrete or complete responses to their questions. Statements such as, “What we see is sometimes too little to form an opinion,” or “So far, little has been done to make this app suitable for the Dutch context, we really stand at the beginning” indicate this. Another factor that hindered critical engagement by all parties was the software development teams' taking the critical questions of the experts as a sign of distrust (see Excerpt 5).

Excerpt 5

Expert: “But you don’t yet have any concrete ideas about that, do you? About how to get that trust…?”

Software developer: “I think we should all have a bit of standard trust towards each other, that we are all here with a good intention. It’s all broadcasted live, we are all here together today. In that regard, I think there is a lot of openness towards each other. Of course, it also means that sometimes words are said, and that someone does not agree with the other… But we are really confident that our app will meet all those requirements. It definitely needs to be improved in certain areas, which we are all working hard on.”

In summary, this theme revealed that “critical engagement” was nearly synonymous with “experts asking critical questions” during the appathon, where the real purpose of asking such questions — having an informed debate in the democratic sense — was not evident.

Barriers to and Enablers of Experience-Based Citizen Participation

Using inductive coding, we looked for specific features of the appathon that might have prevented or contributed to citizens’ experiencing the appathon as a democratic process, namely the barriers to and enablers of experience-based participation. These are (a) time pressure (barrier), (b) market thinking (barrier), (c) the contradictory role of the government (solutionism...
Values driving experience-based participation

Barriers to experience-based participation

- Time pressure
- Solutionism
- Market thinking

Enablers of experience-based participation

- Learning by doing
- Working iteratively

Collective decision-making

Citizen participation

Critical engagement

Values driving experience-based participation

1. [barrier] vs. learning by doing [enabler], and (d) working iteratively (enabler). The numbered lines in Figure 3 denote conflicting relationships among these barriers and enablers.

We arrived at these relationships by comparing each barrier and enabler to the values underpinning experience-based participation—citizen participation, collective decision making, critical engagement—in terms of potential conflicts. For instance, to arrive at line 1 in Figure 3, we asked, “How does time pressure influence collective decision making?” The conflicting relationships are particularly relevant for our research questions, as they point to the multiple definitions of democracy implied by the appathon. The details of how we identified these relationships are further explained in the following paragraphs.

Time Pressure
The limited time allotted to the panel sessions did not allow for debate on complex topics and hindered the unpacking of any emergent questions or concerns. Because of this, it curbed collective decision making and critical engagement (Line 1 and Line 3, Figure 3). For instance, when asked, “How would you compare the effectivity of your app to that of traditional contact-tracing processes?” the moderator intervened, asking the software developer to answer this question in only 30 seconds. What is more, not all of the citizens’ questions were addressed during the appathon due to time...
pressure, thereby reducing citizen participation (Line 2, Figure 3). The fast pace of the appathon was also criticized by the citizens, which the ministry officials acknowledged during the closing session.

Excerpt 6

**Ministry Secretary:** “The time pressure delivered a lot of nice things, which we will discuss later. But it has also unsettled people and created all sorts of images and ideas … ‘They will wrap this up in a week, tak tak tak, a decision on Tuesday and an app on Wednesday,’…. This was never the intention, but I understand that the choice of a pressure-cooker method has created that image.”

Market Thinking

The tone of the appathon was competitive, similar to hackathons in corporate settings. Mostly large consultancies were invited to address the sociotechnical challenge, ones that could clearly benefit from this process in terms of future profit and visibility. The conversations featured terms typically used in competitive (versus collaborative) commercial settings. For instance, the software development teams were asked to “pitch” their apps, and the presenter wished them good luck with their pitches. Some teams used the term “the Dutch market,” which could have been expressed as “Dutch society” when discussing a technology relevant to everyone in society. When evaluating their own app proposals, the software development teams qualified them as “nearly unhackable” or “outstandingly secure.” As one of our interviewees nicely summarized, “The appathon was a ‘competition,’ and they were there to win,” which has negative implications for both critical engagement (Line 7, Figure 3) and collective decision making (Line 9, Figure 3). Moreover, there were instances when building trust in the app proposals was construed as the “job of marketing,” which seems to separate design decisions from their social and ethical implications and reduces the role of citizens to mere customers. This notion of citizens as customers conflicts with the idea of citizen participation (Line 8, Figure 3).

Contradictory Role of the Government

It became clear during the appathon that the main goal was to obtain insights for a parliamentary debate on developing the Dutch contact-tracing app. However successful, the government’s stance was also contradictory—advocating solutionism on one hand, and learning-by-doing on the other (Line 12, Figure 3). Prior to the appathon, the Ministry had decided on a solution (an app) and had defined four design requirements against which the app proposals would be evaluated (privacy, security, effectiveness, user-friendliness). One of our interviewees criticized these decisions as a “technology push,” saying, “This is presenting the solution before you even have a really clear view on what the problem is.” The government’s solutionism was resistant to collective approaches to decision making (Line 4, Figure 3), relegating citizens to the role of “validators” rather than “co-creators” of the app (Line 5, Figure 3). And the predefined design requirements did not leave much space for debate on emergent concerns, limiting critical engagement further (Line 6, Figure 3).
Surprisingly, the appathon eventually became an exercise in finding and refining new questions to be addressed when developing the contact-tracing app (instead of assessing solutions). These new questions pertain both to software development teams recognizing the sociopolitical nature of their design decisions, and to government officials defining new legal frameworks to protect civil liberties, including (but not limited to) privacy. The Ministry acknowledged these unexpected outcomes in the closing session, and re-emphasized that they were “learning by doing” while forming a broad strategy to deal with the pandemic.

Working Iteratively
The software development teams were given the opportunity to improve their apps based on the feedback received on the first day of the appathon and a chance to present their apps again on the second day. This created room for failure—at least on the first day—and deepened the discussion and debate on the second day. It also meant that the teams working on the app proposals had to implement the desired changes overnight. The tight schedule limited teams’ ability to work iteratively in an insightful manner (Line 10, Figure 3). And having only one evening to implement experts’ feedback was not sufficient—most of the feedback was not immediately actionable and required in-depth, multidisciplinary discussion. Due to a lack of time, the software development teams opted for “quick technological repairs” (Line 11, Figure 3).

Discussion
The reflexive thematic analysis of appathon videos revealed the democratic potential and deficits of the appathon. Although the appathon barely displayed the experiential qualities that we suggested in Figure 1 (ownership, contestation, imagination), it did reveal concrete opportunities to discuss how participatory design, adversarial design, and speculative-critical design may be implemented in democratic technology development in the future. In what follows, we discuss these insights by going back to our research questions.

• What definition of democracy was implied by the appathon?
• How might the focus on lived experience in participatory design, adversarial design, and speculative-critical design (Figure 1) help enhance democratic technology development?

The Mixed Definition of Democracy Implied by the Appathon
The analysis of the appathon indicates that transparency is an important yet insufficient precondition for democratic technology development. The appathon had a rigid format and was mainly guided by the questions of experts and not those of citizens. The participating organizations and experts were selected by the government, and the selection procedure was not made public. Because of this, the appathon shares features with guided democracy and with participatory democracy— it resembles guided democracy in that mainly government officials and select experts led the discussions; it resembles participatory democracy since citizens were indirectly involved (through elected government officials) and directly involved in the appathon (through individual emails and tweets).
The experts selected could more freely participate in the appathon than the citizens; however, time pressure and the traditional Q&A-style sessions only allowed for superficial (rather than reflective) communication between the experts and the app developers. Because of this, relevant emerging concerns and conflicts could not be handled properly. The lack of productive collaboration and collective decision making contradicts the social learning processes that often characterize deliberative platforms. Although there were clear moments of conflict between the perspectives of the experts and the app developers, the values underpinning these conflicts were not exposed or debated. Because of this, both parties missed opportunities to structure and utilize discord as an agonistic mechanism. Consequently, we argue that the appathon diverged noticeably from both agonistic and deliberative practices of democracy.

From the perspective of participatory design, adversarial design, and speculative-critical design, the appathon was almost completely devoid of opportunities for direct and meaningful citizen participation. The depiction of the appathon in Figure 2 partially aims to communicate this indirect “viewer” role citizens were in, which undermined ownership, contestation, and imagination. Democratic design experiments in civics often engage citizens with material forms of participation so that they can live out their democratic rights and responsibilities. This experiential dimension of democracy was not part of the appathon.

Reflecting on the Appathon through the Lenses of Three Modes of Design

The preliminary theoretical framework (Figure 1) may help examine and restore the experiential deficits of the appathon. Our goal here is not to redesign the appathon, but rather to offer an alternative format for democratic technology development. For instance, the Ministry could intentionally create deliberative platforms for citizen participation or use existing ones (such as civic society or citizen forums). This would shift the focus from the immediate experiences of individual citizens to the shared experiences of citizen collectives. Moreover, participation is vital for citizens to learn from and grow with the complexity of technological questions facing democratic society. For this, participatory design, with its roots in political empowerment, offers methods and tools to empower citizens and other stakeholders to experience and address problems collectively.

In implementing participatory design, tools and techniques such as telling, enacting, and prototyping should replace the traditional Q&A and assessment-focused sessions. In this way, participatory design helps co-create and deepen design requirements instead of working with a rigid set of requirements determined by the government. In addition, such active participation builds trust in the reflective capacities of all the stakeholders in making choices, and doing this in association with others to mitigate polarization and advance social learning. Arguably, these would also boost the deliberative potential of democracy — although how exactly design methods enhance democratic deliberation requires further research.
In implementing adversarial design, it may seem counterintuitive to provoke confrontation and conflict in the context of government practice. Conflicts, however, are vital to agonistic pluralism, and adversarial design offers a valuable approach to surface conflict productively. For example, issue-oriented (versus technically-oriented) hackathons might be more appropriate than an appathon during the early stages of addressing socio-technical challenges. The term “issue-oriented” here refers to drawing people together to articulate societal issues, conditions, and consequences by using material artifacts (such as prototypes). The main goal is to mediate (versus solve) public affairs, which include the conflicts inherent in stakeholders’ perspectives and worldviews. This is exemplified, for example, in the market mindset of the app developers versus the critical engagement of the experts and citizens.

In implementing speculative-critical design, citizens and other relevant stakeholders collaboratively create speculative visions—through scenario writing and prototyping—of utopian and dystopian futures involving a new technology (in this case, a digital contact-tracing application). Speculative enactments open the field for questions such as, “How will people understand their lives with these data?,” and “What would it be like if these data were commonplace and public?” and acting out their responses to these questions through improvisational drama. The enactments can be recorded and presented to larger audiences for reflection, discussion, and debate. Similarly, bespoke booklets materialize how imagined technologies may mediate everyday interactions in the home context by enabling participants and technology developers collaboratively sketch and discuss everyday scenarios. These speculative-critical design techniques invite imagination, anticipation, and critique simultaneously.

**Revisiting the Enablers of and Barriers to Experience-Based Citizen Participation**

Contrary to the solution-focused aims of hackathons, it became apparent during the appathon that the goal was not to select a winning app, it was to gather input for a parliamentary debate on the topic. This indicates that the appathon was, in fact, an exercise of better understanding and reframing the contact-tracing challenge (versus finding a solution). This resembles the co-evolution model of problem and solution in design processes. Working iteratively and learning-by-doing (as enablers of experience-based citizen participation) aligns with the iterative cycles of problem-framing and solution-finding suggested by the co-evolution model. In this type of abductive design reasoning, the only known variable at the start of the design process is the impact to be achieved (for instance, stopping the spread of Covid-19); the design team often starts reasoning from this impact to creatively explore what to create and how to create it. This reasoning characterizes conceptual design practices such as participatory design, adversarial design, and speculative-critical design.

In line with the co-evolution model, we recommend that democratic technology development should focus on alternating between the
problem and solution spaces, using abductive design reasoning to collaboratively formulate design requirements and viable solutions until a good bridge is formed among these spaces. This helps reveal sociotechnical challenges in their true complexity and instils flexibility in deliberative processes by working iteratively in a reflective and creative manner. Alternation is also in line with the constructivist approach to the term “experiment” as part of democratic experimentalism.

Figure 4 shows how we envision applying these methods in practice to replace pressure-cooker type methods, such as the appathon.

Will the practical implications of our theoretical framework — the transition from Figure 1 to Figure 4 — be responsive to the solutionism, market thinking, and time pressure (all barriers to experience-based citizen participation, see Figure 3) that characterized the appathon? We contend that our preliminary framework could remove the first two barriers (solutionism and market thinking), but not definitively address the third barrier (time constraints) to experience-based participation.

First, the addition of the co-evolution model to Figure 4 grounds participatory design, adversarial design, and speculative-critical design in design methodologies. This model offers an alternative form of reasoning to conventional decision making that encourages iteration and reflection — one of the unique contributions of design to multi- or transdisciplinary collaboration spaces. In other words, applying the co-evolution model to understand public issues

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72 Van der Bijl-Brouwer, “Problem Framing Expertise.”
74 Dorst, “Design beyond Design.”
is the antidote to solutionism, and helps actors to better grasp nonlinear and complex public issues, such as public health crises, educational reform, or transitions to green energy. Rather than a linear, problem-solving approach (by setting design requirements and finding solutions to meet those requirements, for example), co-evolutionary problem framing suggests that design requirements are unplanned and exploratory, and emerge through “safe” design experiments.

Second, we argue that the proposed framework weaves together methods whose roots are anchored in critical design practices and engages with the political dimensions of design in ways that will not tolerate or be guided by the neoliberal discourse (market thinking) prevalent during the appathon. Otto Von Busch and Karl Palmas highlight the risks of introducing design thinking to public services, carefully teasing out three main pitfalls: the possibility of using citizen feedback to control dissent, limitation of direct engagement with citizens and hence limitation in the scope of democratic deliberation, and approaching problems in the public sphere as managerial (versus political) issues. These arguments illustrate why moving design methodologies to the political realm requires a critical examination of the values underlying the type of design methods used in public governance. Although participatory design, adversarial design, and speculative-critical design stand up to this challenge, these methods by themselves cannot determine political uses and results. Future research is needed to examine what happens when these design methods meet real-world software development teams, governments, and large corporations (the method’s users). We speculate that deploying such methods can at least slow down neo-liberal agendas and techno-solutionism, as long as they are adopted with commitment to underlying democratic values.

Third, using participatory design, adversarial design, and speculative-critical design will not necessarily relieve the time pressure of a crisis situation—all three approaches come with a learning curve, and their integration and implementation in real-life settings require a transdisciplinary mindset. Learning and incorporating these methods and mindsets will likely take more time, not less. However, we argue that engaging citizens with the political, in a critical and imaginative manner, at the early stages of technology development may compensate for the time taken or “wasted” upstream, because these methods help shape the building blocks and foundation for the future technology responsibly, and purposefully.

Conclusion

The goal of this article is to suggest an experiential dimension to democratic technology development in public governance. In the first part, we explicate the three main democratic values (citizen participation, collective decision making, and critical engagement) that underpin three reflexive design methods (participatory design, adversarial design, and speculative-critical design; Figure 1), and argue that these methods can bring three experiential qualities (ownership, contestation, imagination, respectively) to democratic technology development. In the second part,
we explore this argument through the real-world case study of a Covid-19 digital contact-tracing app developed during a national appathon. We found out that the appathon implied a “mixed” definition of democracy, diverging most noticeably from agonistic pluralism and democratic deliberation practices. Although the appathon barely featured any experience-based citizen participation, it did reveal concrete opportunities to discuss how participatory design, adversarial design, and speculative-critical design may be implemented in democratic technology development in the future (Figure 3). Moreover, our analysis revealed how grounding these methods in the co-evolution model of design practices may enhance their implementation (Figure 4).

Our main contribution is threefold. First, we unpack three main democratic values underpinning three design methods (participatory design, adversarial design, and speculative-critical design) and, based on design theory, argue that these methods may bring three important experiential qualities (ownership, contestation, and imagination, respectively) to democratic technology development (Figure 1). Second, we address the question of how to involve citizens directly and meaningfully in political decision making when developing new technologies for public governance (Figure 4). Third, we emphasize the value of complementing our theoretical framework with methodological insights from abductive, co-evolutionary problem reframing practices in design. Ultimately, this paper builds on DiSalvo’s democratic experiments in civics,78 and it adds to the scholarly discussion on how design and democracy are related, while pointing design researchers and practitioners to the political relevance of their methods.

Limitations and Future work
Not all the appathon discussions were available online, which may have prevented a more nuanced analysis within the identified themes. At the same time, we feel that the available videos are representative of what happened. The social media posts (tweets) of citizens also could have been analyzed to reveal insights into whether and how citizens felt engaged in or disengaged from the appathon. Given our focus on better understanding the organization of the appathon (versus responses to it), we did not perform a social media analysis, and so see it as a valuable opportunity for a follow-up study.

Implementing the proposed theoretical framework in public governance will not only entail applying participatory design, adversarial design, and speculative-critical design, but it will also expand these approaches through new research questions. For instance, participatory design has been criticized for having lost its initial political motivation,79 which the proposed framework may help restore. At the same time, this means revising the methods and tools of participatory design, and implementing them reflexively by focusing on questions like “Who are the stakeholders? Who establishes the identity of these stakeholders and how? Who is responsible for the initial framing of the problem?” Similarly, adversarial design has been criticized for being optimistic,80 and...
so implementing adversarial design in technology-driven governance would entail convincing stakeholders of the value of exposing conflicts at the cost of any discomfort the act may produce. Moreover, both adversarial design and speculative-critical design would have to spark critique in a way that feeds directly back into collective decision making instead of happening in a detached fashion. However, this may be challenging to internalize within the scope of a single project, because the focus of critique in critical design lies at the periphery of mainstream practices, working as a boundary activity. As a result, implementing these three methods to achieve democratic ends also means transforming them, giving rise to new research questions on the critical-political qualities of design methods.

Last but not least, our goal is not to position design as a heroic discipline that can guarantee democracy, but rather to explore and expand what design can bring to democratic technology development in public governance. Participatory and critically-oriented design methods often entail “working in the small” with local communities. This article experiments with expanding their focus to national issues with global significance — working in the large. The pressing research question here is how to scale up the experiential power of these methods in order to achieve large-scale impact. Using theory to problematize existing practices of technology development, and with that, identifying opportunities for the democratic potential of design to enhance these practices are promising steps in this direction.

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Declaration of Interests

There are no conflicts of interest involved in this article.

References


Appendix A

Online semi-structured expert interview outline

- Introductions
- Consent for audio-recording
- Sharing screen to show introductory slides to research project; end with showing a two-min video snippet from appathon to remind the participant of the event.

First 10 minutes elapse.

- Pose questions in a semi-structured manner
- First author leads the discussion, second author presents slides, asks follow-up questions, and closes the interview.

45 minutes have elapsed.

- Wrap-up and share information about the rest of the research process.

Total: 45 minutes.

Guiding questions
1. How would you define your expertise?
2. You took part in the appathon. How would you summarize that experience?
   a. How did you feel/what did you think when you watched the short video snippet just now with us?
3. What happened behind the scenes? Did you, for example, get to ask all your questions?
4. How would you describe your conversations with the (a) companies, (b) other experts, (c) citizens?
5. Do you know what happened to your/expert feedback?
6. Have you been invited to an appathon/hackathon before? What do you think about the effectiveness of such pressure-cooker exercises?
7. If this was a topic to explore with your students and colleagues, how would you frame the challenge for them?
   a. What would be the first step in trying to tackle such a challenge?
   b. Would you choose an appathon format, and how would you organize it (differently)?
8. What do you think about the outcome — should it have been an app?
## Appendix B

### The overview of main themes, subthemes, and the respective number of codes

<table>
<thead>
<tr>
<th>Theme</th>
<th>Sub-theme</th>
<th>No. of Codes per sub-theme</th>
<th>No. of Codes per theme</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indirect citizen</td>
<td>Citizens watching the appathon</td>
<td>11</td>
<td>90</td>
</tr>
<tr>
<td>involvement</td>
<td>Citizens emailing questions</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>(vs. citizen participation)</td>
<td>Presenter posing citizens' questions</td>
<td>27</td>
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<tr>
<td></td>
<td>Presenter clarifying/simplifying explanations for viewers</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Citizens using social media</td>
<td>6</td>
<td></td>
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<tr>
<td></td>
<td>Citizens examining open source codes</td>
<td>8</td>
<td></td>
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<tr>
<td></td>
<td>App developers involving citizens in their processes</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Appathon participants discussing public opinion</td>
<td>9</td>
<td></td>
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<tr>
<td>Question and answer</td>
<td>Expressing the value of bringing different perspectives together</td>
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<td>35</td>
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<tr>
<td>sessions</td>
<td>Forming consensus following experts' questions</td>
<td>13</td>
<td></td>
</tr>
<tr>
<td>(vs. collective decision</td>
<td>Not forming a consensus following experts' questions</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>making)</td>
<td>Identifying improvement opportunities in app proposals</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>App developers being asked to summarize next steps in app development</td>
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<tr>
<td>One-way criticism</td>
<td>Expressing the role of experts in the appathon</td>
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<td>73</td>
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<tr>
<td>(vs. critical engagement)</td>
<td>Debating effectiveness of the app</td>
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<td>Debating privacy issues</td>
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<td>Debating privacy and security issues</td>
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<td>Debating security issues</td>
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<td></td>
<td>Debating the acceptance of the app</td>
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<tr>
<td>The role of the</td>
<td>Identifying next steps</td>
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<td>65</td>
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<tr>
<td>government</td>
<td>Setting initial design requirements</td>
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<td></td>
<td>Clarifying what the appathon is/is not for</td>
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<tr>
<td></td>
<td>Guiding organizations in decision making</td>
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<td>Reassuring the public about the protection of civil liberties</td>
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<tr>
<td></td>
<td>Finding new questions to be addressed</td>
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<tr>
<td></td>
<td>Creating new legal frameworks</td>
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<td></td>
<td>Learning by doing</td>
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<td>Discussions over the efficiency of participating organizations</td>
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<td>Appathon participants expressing experiences about the pace of the appathon</td>
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<td>Strict time moderation of appathon activities</td>
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</tr>
<tr>
<td>Working iteratively</td>
<td>No subthemes</td>
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<td>13</td>
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**Total number of codes**: 318