Policy Research Working Paper 10195

The Haves and the Have Nots

Civic Technologies and the Pathways to Government Responsiveness

Jonathan Mellon
Tiago C. Peixoto
Fredrik M. Sjoberg

WORLD BANK GROUP
Governance Global Practice
September 2022

Policy Research Working Paper 10195

Abstract

As civic life has moved online scholars have questioned whether this will exacerbate political inequalities due to differences in access to technology. However, this concern typically assumes that unequal participation inevitably leads to unequal outcomes: if online participants are unrepresentative of the population, then participation outcomes will benefit groups who participate and disadvantage those who do not. This paper combines the results from eight previous studies on civic technology platforms. It conducts new analysis to trace inequality throughout the participation chain, from (1) the existing digital divide, to (2) the profile of participants, to (3) the types of demands made through the platform, and, finally, to (4) policy outcomes. The paper examines four civic technology models: online voting for participatory budgeting in Brazil, online local problem reporting in the United Kingdom, crowdsourced constitution drafting in Iceland, and online petitioning across 132 countries. In every case, the assumed links in the participation chain broke down because of the platform's institutional features and the surrounding political process. These results show that understanding how inequality is created requires examination of all stages of participation, as well as the resulting policy response. The assumption that inequalities in participation will always lead to the same inequalities in outcomes is not borne out in practice.

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The Haves and the Have Nots: Civic Technologies and the Pathways to Government Responsiveness

Jonathan Mellon[12] *
Tiago C. Peixoto[2]
Fredrik M. Sjoberg[2]

1 West Point Department of Systems Engineering 606 Thayer Rd, West Point, NY 10996 USA
2 World Bank, 1818 H Street, NW Washington, DC 20433 USA

* Corresponding author: jonamellon@gmail.com

Classification (JEL): P16, D72, D73, H41, and H7.

Keywords: digital government, civic technology, digital divide, political participation, government responsiveness.

The question of who participates when political action moves online has been the focus of digital democracy's critics and proponents (Mossberger, Tolbert and Mcneal, 2007, p. 150). Techno-optimists argue the Internet brings in individuals who usually abstain from politics (Kann *et al.*, 2007; Harris, 2008; Kim, Russo and Amnå, 2017; Wang and Shi, 2018), while techno-pessimists point to the exclusion of traditionally under-represented groups who lack access to the Internet due to financial resources or technological literacy (Norris, 2001; Chadwick, 2006; Anduiza, Gallego and Cantijoch, 2010; Gurstein, 2011; Vicente and Novo, 2014; Sobaci, 2018). While participation in civic life is seen as inherently valuable, civic participation's primary aim is to affect policy (Verba, Schlozman and Brady, 1995).

However, both techno-optimists and techno-pessimists share a common assumption: that *who participates* is the primary determinant of *who benefits* from digitally-mediated civic participation (e.g. Shkabatur, 2011; Carman, 2014; Åström and Karlsson, 2016; Pak, Chua and Vande Moere, 2017; Mcgee *et al.*, 2018; Grossman, Humphreys and Sacramone-Lutz, 2020). If more men participate, digital civic participation's outcomes must be better for men, whereas if younger people participate, outcomes must be congruent with younger people's preferences. The divide between techno-pessimists and techno-optimists about who benefits from digital participation has therefore often come down to claims about which people are mobilized by digitally-mediated participation.

Most studies of inequality in digitally-mediated civic participation take participation as the end point of the process (Norris, 2001; Carpini and Scott, 2002; Mcneal and Tolbert, 2003; Hindman, 2009; Nam, 2012; Büchi and Vogler, 2017). Papers that *do* focus on the policy response to digital civic participation tend not to link the outcomes directly to data on who participated (Clark *et al.*, 2013). There is therefore relatively little work tracing inequality through the full digital civic participation process.

We argue that the link between the demographics of who participates through digital channels and the beneficiaries of the participation process is not necessarily straightforward. For

participation divides to translate into inequalities in who benefits, there are two key steps: 1) inequalities in participation must translate into inequalities in what is demanded via the participation, and 2) inequalities in what is demanded must translate into inequalities in policy outcomes. Even if both links exist, each link's strength will determine the extent to which inequalities in participation map onto inequalities in policy outcomes. While these links are plausible, we argue they are contingent on the institutional design decisions embedded in the online platforms and the surrounding political context.

This paper reviews four cases of public participation on civic technologies (civic tech) platforms where data from existing studies allow us to trace the full process of inequality through 1) the initial digital divide, 2) participants' demographics, 3) demands made through the process, and 4) policy outcomes. We examine online voting in the Brazilian state of Rio Grande do Sul's participatory budgeting (PB) process, the local problem reporting Fix My Street (FMS) platform in the United Kingdom, the Iceland online crowdsourced constitution process, and the global petitioning platform change.org.

Participation on these platforms is government/civil society-led rather than citizen-led (Simonofski, Fink and Burnay, 2021) in that the platform is specifically designed for a particular type of civic engagement and there is a clear policy goal of the participation (Peixoto and Fox, 2016) rather than political discussion as an end itself (e.g. on social media). While the design of e-participation platforms and the social contexts of these platforms vary substantially, we chose four cases that illustrate each combination of a large or small digital divide and low or high constraints on the choices participants can make through the platform.

This paper first describes what might affect links between 1) the digital divide, 2) inequalities in participation on digital platforms, 3) inequalities in demands made through the platform, and 4) inequalities in the policy response to demands made through the platform. We then analyze the four case studies through this theoretical lens, looking at whether each link holds in practice. None of the four cases fits the assumed model of digital inequality, with at least

one step in the chain being broken in each case. We conclude by describing circumstances and institutional designs that can lead to inequalities in access being reproduced in policy outcomes.

From Digital Divides to Divided Outcomes

In this section we analyze how inequalities in digital access and participation may translate into inequalities in policy outcomes. Figure 1 shows the assumed model linking digital divides to differential impacts. Digital divides are reflected in unequal participation which leads to unequal demands made online and unequal responses from government. However, each link's presence or absence is an empirical matter.

Figure 1 Assumed model of linkages from digital divides to unequal outcomes of digitally mediated participation

From inequalities in access to inequalities in participation

The first step in this sequence is the most studied. This stage argues people with more access to technology (either because of financial constraints or technological literacy) will be overrepresented in digital participation (Robinson *et al.*, 2015; Mcgee *et al.*, 2018). The digital divide reflects different abilities to use online resources and technology in general as well as simple differences in Internet access. This skill divide has led some scholars to argue that moving civic activity online will lead a technological elite to dominate these activities or become power users (Jankowski and van Selm, 2000) (DiMaggio *et al.*, 2001; Hargittai, 2003) who wield outsized power online (Bright *et al.*, 2020).

However, inequalities in digital participation result from more than just inequalities in digital access. Online participation reflects divides in digital access (Bennett, Maton and Kervin, 2008) *and* traditional divisions in political participation (Bimber and Davis, 2003, p. 165; Escher and Riehm, 2017). Where inequalities in digital access favor traditionally underrepresented sections of society such as young people or time-poor workers (Dahlberg, 2001), the digital divide may *reduce* inequalities in political participation. However, in other cases the digital divide

reinforces existing divides in political participation such as favoring richer and more educated people (Bimber and Davis, 2003, p. 166; Gibson and Ward, 2003).

Translation of participation into demands

The analysis of digital inequality often ends with participants' demographics. However, it is an empirical question how participation inequalities translate into demands made through the participation. There are two conditions for participants' demographic composition to affect demands made through the platform. First, there must be average differences in priorities, knowledge, preferences, values, identity, or interests between demographic groups. Second, these differences must be relevant to the decisions made on the platform. Both links need to be strong to meaningfully affect the demands made. A weak link at either stage will reduce the relationship between participants' composition and the demands made through the process.

To demonstrate that both conditions are necessary, consider scenarios where one is absent. Suppose there are differences in the average ideological position of educated and non-educated civic platform users, but ideology is irrelevant to the decisions made through the platform (for instance if the process decided whether to make a town's flag orange or purple). In this case, there are differences in political attributes between demographic groups, but these attributes do not map onto decisions made through the platform. Consequently, we would not expect to see a difference in the demands made through the process depending on how educated the platform's users are.

We can also consider the opposite scenario where there is no average difference between the women and men's ideology, but a contentious decision is made about homeless shelter funding. We would not expect to see differences in the process's outcome depending on whether the platform's users were disproportionately male or female.

There are many possible politically relevant differences between demographic groups, but most can be categorized into knowledge, priorities, preferences, values, identity, and interests (these categories are not mutually exclusive).

Knowledge can vary across demographic groups in many ways. Women may be better informed about issues around birth control than men, more educated people may have technical knowledge of particular policy issues, people on welfare benefits may better understand that program, and people will generally know their local area well (Bright, De Sabbata and Lee, 2018). Such knowledge can change decisions people make on a platform, particularly where the platform assumes users bring knowledge rather than the platform providing it to them. Demographic groups can also differ in their priorities. Everyone might agree it is good that a new road would improve the economy and that it is bad that the road would harm local wildlife, but differ about how to weigh these considerations. Relatedly, there are often large demographic differences in values. For instance, educated people hold more liberal attitudes towards immigrants and minorities on average (Hainmueller and Hiscox, 2007) and evangelical Christians are more likely to oppose abortion (Wilcox and Niversity, 1988). Similarly, people may be more inclined to help people they consider part of their in-group (Hornsey, 2008). Finally, there are often (perceived or actual) differences in interests between demographic groups. Richer people benefit from low tax rates, while poorer people benefit from redistributive spending, and people working in a particular industry disproportionately benefit from subsidies to that industry.

However, it is important to emphasize that the extent to which differences between demographic groups affect the demands made through the participatory process will depend on how strongly the decisions to be made are linked to these attributes. For instance, evangelical Christians' views on abortion will not affect decisions made through a platform unrelated to abortion.

The same logic of how inequalities in participation translate into the demands made through a system applies to offline participation. Demographic categories vary in how strongly they predict vote choice. Class voting has largely disappeared in many western democracies after previously being the main structuring force of politics. However, the decline of class voting often reflects parties no longer offering policies specifically targeting particular social classes rather than a change in voters' values and attitudes in different classes (Evans and Tilley, 2017). Class differences in attitudes are still present, but they no longer map easily onto the political choices facing voters. Similarly, the gender gap in party

support varies substantially across countries and seems to reflect whether men and women have clearly differentiated economic interests in society (Iversen and Rosenbluth, 2006).

Government response to demands

The final link in the chain is how the government responds to demands. Again, digital civic engagement studies have largely assumed government response to be a function of what demands are made, with governments producing public goods directly in response to demands (Shkabatur, 2011; Pak, Chua and Vande Moere, 2017; Mcgee *et al.*, 2018). However, the link between government response and demands will vary with the institutional-design decisions embedded in the platform, and the government's priorities.

Table 1 Different ways governments can respond to demands made through a civic tech platform

Response approach	**Detail**
Engagement dependent	Fixed response after reaching a certain level of engagement. For instance, many government-run petition platforms have a fixed number of signatures that need to be reached to trigger a response.
First-come, first-served	Demands met in the order received.
Bias-correction	Respond to requests in a way that attempts to correct for biases at earlier stages of the process. For instance, by prioritizing demands from demographically underrepresented users or areas
Clientelism	Respond to requests in a way that maximizes the benefits to the ruling party's core supporters
Electoral maximization	Respond to requests in a way that maximizes the benefits to the median voter
Fig leaf	Only grant requests that the government planned to implement anyway.
Ignore	Ignore or reject all demands made through the platform

In fact, there are many possible ways a government might respond to demands made through civic platforms. Table 1 highlights seven possible ways in which a government might respond to requests on a civic platform. Each approach will have different effects on how the demands made through a platform translate into who benefits and therefore on how the composition of users on the platform affects who benefits. Although governments decide how to respond to demands, the platforms can play a role in structuring those decisions. Platforms can choose to pre-filter, amplify, or downplay demands, and—by enabling certain actions—allow the users to do the same. For instance, signing petitions, upvoting, liking, commenting, and other user interactions allow certain demands to be emphasized by users, meaning the users play a role in which demands are more or less likely to be met.

For instance, Hale et al. (2018) found that highlighting top petitions on the UK petitions website changed the distribution of signatures across petitions likely due to the social information provided (Margetts *et al.*, 2011). However, the decision to allow these types of interactions is a platform decision that affects the way the government considers demands.

The relationship between demands made and the outcomes of political processes is highly variable in offline settings as well. Some literature suggests governments are highly responsive to the ideological preferences of citizens (Caughey and Warshaw, 2017) and that—once citizens participate—their voices are heard relatively equally (Hindman, 2009, p. 17). However, other research suggests the demands of certain privileged groups in society, such as rich donors, hold far more sway over policy than those of other voters (Bartels, 2010). Offline research also points to the importance of institutions in mediating how demands translate into policy, such as studies finding proportional electoral systems exhibit higher income redistribution because governments need more of the population's support to gain power (Austen-smith, 2000).

Other goals of civic engagement

In this paper we only consider the benefits of digital civic engagement in terms of policy outputs. While policy change is a key outcome of civic engagement, we do not claim that it is the only important outcome of participation. First, civic participation of any kind is often seen as a first step on a ladder of participation (Arnstein, 1969), with initial success or even just contact encouraging further and deeper engagement. Indeed, this rationale is explicitly cited by MySociety for encouraging participation on FixMyStreet (Stempeck, 2012), a widely replicated (FixMyStreet.Org, 2015) civic tech platform. Second, participants in digital civic platforms cite a wide range of outcomes as a success beyond simply directly changing policy including raising awareness of a cause, creating solidarity and fulfilling a sense of civic duty (Wright, 2016). Future work should also examine how the design of civic engagement platforms affects these wider goals.

Case Study Methodology

Our analysis focuses on quantifying the strength of each link in the inequality pathway shown in Figure 1 on four digital civic engagement platforms. The analysis of each platform draws primarily on quantitative analyses (both from existing studies and new analysis) and analysis of the design and functioning of each platform. However, our methodology for using the four cases together follows the qualitative logic of theory generation and explication. As we described above, existing studies implicitly assume that inequalities in digital participation translate straightforwardly into inequalities in policy outcomes. By examining four case studies in detail, we demonstrate the existence of mechanisms of inequality transmission or attenuation in each of these cases. The goal is not to generalize about the prevalence of these mechanisms beyond the four cases, but to carefully demonstrate examples of mechanisms that could affect inequality on digital civic engagement platforms beyond the simple transmission mechanism assumed so far.

The four cases are all examples of dedicated digital participation platforms (Simonofski, Fink and Burnay, 2021) either run by the government or civil society organizations. We limit our focus to forms of participation with a clear policy goal rather than less structured citizen-led participation such as discussion on social media. This allows us to systematically examine the outputs (policy response) of each process as well as its inputs (who participates).

When selecting the cases for this study, we focused on two key dimensions: 1) the size of the digital divide in internet access/usage and 2) whether or not the online participation process constrained the potential demands able to be made through the platform. We chose civic tech platforms that exemplify each combination of these two dimensions as shown in Table 2.

We focus on the size of the digital divide because it determines the starting point of inequality that may be amplified or attenuated through the platform. The Iceland Crowdsourced constitution and Fix My Street in the UK both operate in contexts with relatively small digital divides due to high Internet penetration and digital literacy. This contrasts with the Rio Grande do Sul participatory budgeting vote which was conducted in Brazil where there are still large demographic divides in Internet access and

digital literacy. Similarly, Change.org is a worldwide platform, so the large divides in digital access between women and men could affect what demands are made through the platform.

We focus on how much the platform constrains the choices available to participants because demographic inequality is only likely to translate into differences in outcomes where the choices available are differently preferred across groups. Change.org and the Iceland crowdsourced constitution process put almost no limits on what online participants could demand through the platform. This is in sharp contrast to Fix My Street and the Participatory Budgeting vote which both limit the demands that could be made. In the case of Fix My Street, the platform is restricted to requests about local public infrastructure and in the PB vote, the possible policies were pre-selected by previous offline meetings attended by citizens, so online participants could only make demands listed on the ballot.

Table 2 Situating the four case studies in terms of the size of digital divides and how the platform constrains the choices made

		Digital divides	
		Small	Large
Constraints on requests	Low	Crowdsourced constitution (Iceland)	Change.org (worldwide)
	High	Fix My Street (United Kingdom)	Participatory budgeting (Rio Grande do Sul, Brazil)

Our analysis of each case uses existing studies of inequalities where available. However, where the existing studies do not conduct the exact analysis we need, we supplement the existing studies with new analyses of data from the relevant platform. Table 3 shows the source we use for understanding inequality at each stage of the digital civic engagement process on each platform.

Table 3 Sources for understanding inequality in each stage of the digital civic engagement process for the four case studies

Platform	Digital divide	Participant profile	Nature of demand	Impact on citizens
Participatory budgeting	Official statistics	Spada et al. (2016) Mellon, Peixoto and Sjoberg (2017) New analysis	Mellon, Peixoto and Sjoberg (2017) Halkin, Sjoberg and Mellon (2017)	Mellon, Peixoto and Sjoberg (2017) Lorenz and Bremen (2005) Halkin, Sjoberg and Mellon (2017)
Crowdsourced constitution	Official statistics	Hudson (2018) Helgadóttir (2014)	New analysis	Hudson (2018)
Change.org	Official statistics	Mellon et al. (2017)		
Fix My Street	Official statistics	Cantijoch, Galandini and Gibson (2016)	New analysis	

Case study 1: Participatory budgeting in Rio Grande do Sul

Our first case study is the Rio Grande do Sul (Brazil) regional participatory budgeting (PB) vote. This vote was the second and final stage of the PB process, which defines part of the allocation of the state's budget. In the first (deliberative) stage, through multiple in-person meetings across regions of the state, citizens were able to propose, deliberate, and come-up with a pre-selection of capital improvement projects to be submitted to vote. In the second and later stage, the final voting takes place, which can be cast either in-person or online.

The PB system was framed as a redistributive effort to give disadvantaged people more say in how money was spent to help them (Halkin, Sjoberg and Mellon, 2017). It would therefore undermine the

goals of the system if the online vote empowered traditionally advantaged demographic groups at the expense of the disadvantaged groups the PB process aimed to help.[1]

Several studies have examined the Rio Grande do Sul PB vote, with studies covering the 2012 (Spada *et al.*, 2016) and 2014 (Halkin, Sjoberg and Mellon, 2017; Mellon, Peixoto and Sjoberg, 2017; Peixoto, Sjoberg and Mellon, 2017) votes. These studies allow us to track whether inequalities in Internet access and participation affect demands made through the PB process, and the outcomes of the PB process – that is, which investment projects get finally selected for implementation.

Digital divide

Using the framework above, we first examine whether there is a digital divide in Brazil. Internet access in Brazil was 54% in 2015 (Statista, 2019), with notable demographic gaps in access. Using the 2005 census, Olinto (2009) found substantial education (more educated have greater access), age (younger people have greater access) and racial (white people have much greater access) gaps in Internet access but modest gender (men have slightly greater access) divides.

Digital divide → participant profile

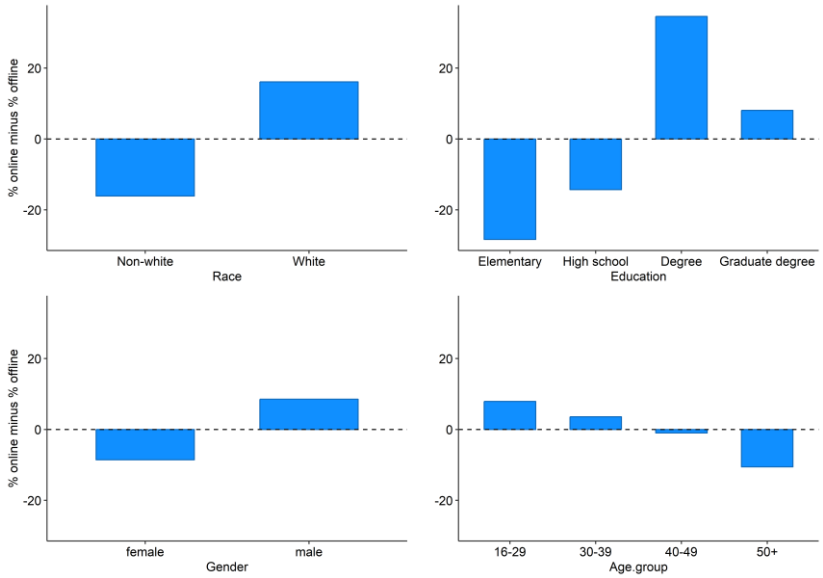
Both Spada et al. (2016) and Mellon, Peixoto and Sjoberg (2017) concluded that online voting's availability substantially changed the electorate rather than merely providing a convenient option for voters who would have participated anyway. This means the online electorate's composition affects the overall composition of participants.

The Internet access divide among Brazilians creates a potential for inequality, but this does not entail that participatory inequality will occur along the same lines. In this case, however, Mellon, Peixoto and Sjoberg (2017) show the differences between the online and offline voters in the 2014 PB vote (using online and offline exit polls) closely track the digital divide. They found online voters skewed younger than both offline voters and the general population, and that online voters were more educated and male than either the general population or offline voters (see Figure 2 using the same data). We

[1] The fieldwork for this study was conducted with the assistance of Aptivate.

additionally plot the racial breakdown on the same figure which shows a substantial racial gap, with white respondents overrepresented among online voters compared to offline voters. These divides exactly mirror the divides in Internet access.

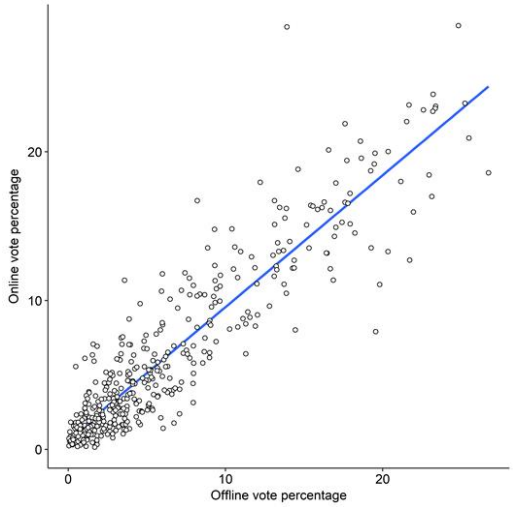
Figure 2 Difference between the percentage of people in each of four social groups among online and offline PB voters in 2014. Data from Mellon, Peixoto and Sjoberg (2017) online and offline exit polls.



Participant profile → Nature of demands

The structure of the PB vote allows us to look at technology's effect on demands made. Because the vote was conducted in 28 separate districts online and offline, we can compare the online and offline support for each proposal. Figure 3 (adapted from Mellon, Peixoto and Sjoberg (2017)) shows the vote share for each proposition was similar in the online and offline votes. Despite the demographically distinct electorate in the online voting process, the demands made through the PB system are largely indistinguishable from those made offline (Mellon, Peixoto and Sjoberg, 2017), although the online vote was sufficient to change the outcome of the PB vote in 2 of the 28 districts (Halkin, Sjoberg and Mellon, 2017). Even where there were differences between offline and online voters, however, Mellon, Peixoto and Sjoberg (2017) find these do not vary systematically across policy areas and are not related to whether a proposal was redistributive.

Figure 3 Percentage of support for each PB proposition within each Coredes among online voters and offline voters. Data from Mellon, Peixoto and Sjoberg (2017) summary of election results data.



Nature of the demand → impact on citizens

Although the chain is already broken by the lack of a link between participants' demographics and the demands made to government, we still need to look at how demands translate into government policy. Implementation of PB is the least documented step of the process, and there are only qualitative accounts of the spending (Halkin, Sjoberg and Mellon, 2017). However, we can look to the institutional structures to help understand the policy outcomes.

Although the government committed to implementing the top measure in each region and funding the next highest voted ones after that (Halkin, Sjoberg and Mellon, 2017), the amount of funding available to each area is distributed according to a planning matrix emphasizing needs and favoring poorer socio-economic groups (Lorenz and Bremen, 2005; Halkin, Sjoberg and Mellon, 2017). The ability for the PB process to create unequal outcomes is therefore constrained by the redistributive institutional design.

Across the whole process, the PB vote deviates from the assumed path from a digital divide to unequal outcomes. The digital divide affects the profile of participants in the online PB vote. However, this participatory inequality does not substantially affect the demands made through the PB system. There are several possible reasons why this might be the case. The first is that the process's deliberative stage may pre-vet proposals likely to divide voters at the next stage. Because the deliberative stage is

consensus-based, the results of it are likely to be less polarizing than many examples of direct democracy. Second, the rules about what can go onto the PB ballot may be sufficiently restrictive that the options are not allowed to vary enough to create divisions along socio-demographic lines. Finally, the less optimistic interpretation is that PB voters are simply not sufficiently informed about the projects to make an informed decision and lack the cues to choose according to their economic interests.

Regardless of which explanation is correct, the institutions surrounding the PB vote limit the simple link between the socio-demographic profile of participants and the demands made through the system. The digital divide does not contribute to inequality of outcomes in the PB process.

Case study 2: Fix My Street

The second case study is the UK-based local problem reporting platform Fix My Street (FMS). FMS is a non-governmental platform run by MySociety that allows people to report problems in their local area to local government to get them fixed. Common problems reported through FMS include potholes, abandoned vehicles and broken streetlights. The problems can then be reported as fixed either by the user themselves, or by another user such as the local authority. FMS sends an automated reminder to ask users whether a problem is fixed after 28 days (Sjoberg, Mellon and Peixoto, 2017). Users can submit problems through the FMS website or via the smartphone app.

FMS has been particularly successful in the UK context because of Britain's unintuitive overlapping layers of local government[2] which make it difficult for people to know which level of government they should report a problem to. FMS bypasses this problem by automatically routing the report to the level of government responsible for addressing the problem.

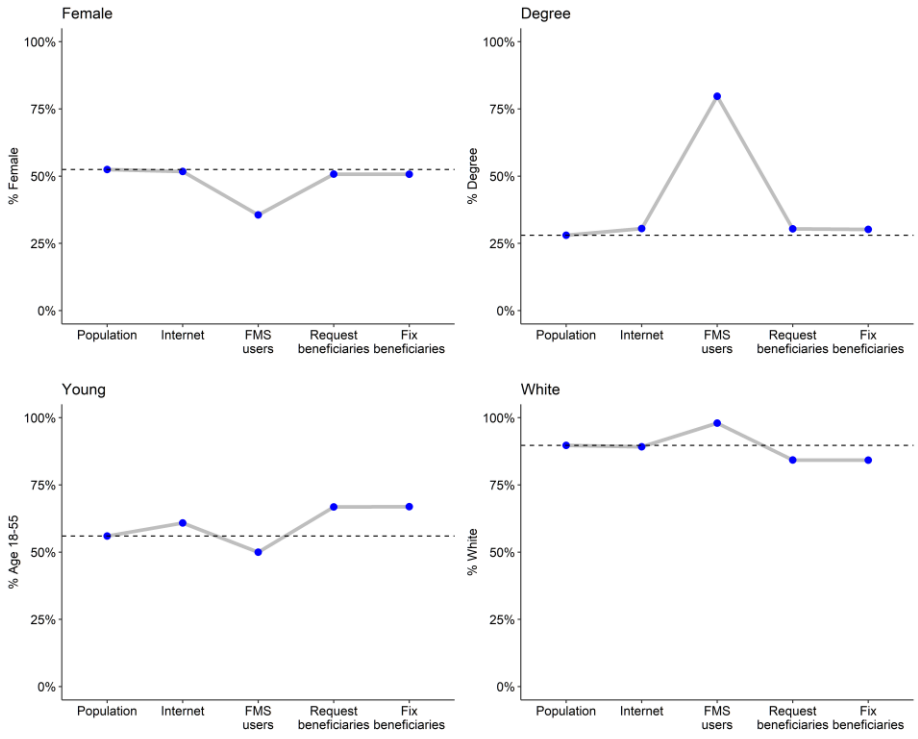
[2] Unitary Authorities, metropolitan boroughs, London boroughs, non-metropolitan counties, local education authorities, County Councils, non-metropolitan districts, Mayoralties, Parish Councils and Police and Crime Commissioner areas, as well as several other idiosyncratic structures in certain areas.

For this case study, we use the results of two studies of FMS (Cantijoch, Galandini and Gibson, 2016; Sjoberg, Mellon and Peixoto, 2017), data on the digital divide from the UK office of National Statistics (Office for National Statistics, 2019), and a novel analysis of FMS platform data.

Figure 4 shows how inequalities in four demographics (gender, education, age, and ethnicity) vary at each stage of the FMS process from the population proportion through to the policy outcomes from FMS participation.

To look at which areas request fixes and where problems are fixed, we use trace data from the FMS platform covering 309,708 reports in 7,010 wards in 309 English Local Authorities between 2007 and 2014. Among the wards, 99.5% had at least one FMS report in this period. We merge this data set with ward level census data on demographic composition, to look at which demographic factors predict higher FMS usage.

Figure 4 Percentage of population/participants/beneficiaries at each stage who are part of each social group: female, degree holders, 18-55 year old, and white.



Digital divide

The UK has relatively high Internet penetration, but the ONS nonetheless reported 15% of adults did not use the Internet in 2014 (when most of these studies were conducted). Additionally, there are still substantial gaps in digital literacy even among those with access to the Internet (Office for National Statistics, 2019).

As Figure 4 shows, digital literacy varies across demographic groups. The largest demographic splits are by age and education. Older British people are much more likely to be digitally illiterate in the UK and lack Internet access (Office for National Statistics, 2019). In 2017, 13% of those aged over 50 lacked Internet access, compared with 2% of those aged 50 or under (Internet Access, Opinions and Lifestyle Survey (OPN), 2017). The education gap is even stronger: 26% of people with no qualifications lack Internet access compared with 1% of those with a degree (Office for National Statistics, 2017).

Other demographic groups show less dramatic splits. Women have slightly lower digital literacy than men on average (Office for National Statistics, 2019), but broadly similar levels of Internet access (Office for National Statistics, 2017). Ethnic minorities are *more* likely to have Internet access in the UK, although this difference disappears after accounting for age.

Digital divide → participant profile

We analyze FMS users' demographics by comparing a survey conducted by Cantijoch, Galandini and Gibson (2016) to the UK Annual Population Survey to look at how over or under-represented different groups are. Men are substantially overrepresented on FMS (66% of users) and the average age of FMS users is much higher than the whole adult population (55 years compared to 48 in the adult population). Ethnic minorities are substantially underrepresented on FMS (2% compared to around 12% of UK adults in the 2016 Annual Population Survey). However, the single largest overrepresentation on the platform is of highly educated people: 80% of FMS users reported attending

college or university. This compares to about 25% of the over-18 year old population in Britain (Office for National Statistics, 2016).

As Figure 4 shows, the FMS users' demographics diverge substantially from the general population. However, the divides in participation on FMS do not track the digital divide. FMS users are older, more male, more educated, and less likely to be an ethnic minority than the general population. While lower levels of education predict lower access to technology in the UK, there is only a small gender gap in access to technology, and it is actually younger people who generally have easier access to technology. Similarly, ethnic minorities have as good or better access than the white population.

Taken together, the participation inequalities on FMS more closely resemble the inequalities in political and civic participation more generally in Britain rather than the inequalities in access to technology.

Participant profile → Nature of demands

FMS participants are sufficiently unrepresentative of the general population for concerns about equality to be relevant. However, it is important to look at whether the requests made through the platform reflect the unequal profile of participants.

The demands made through FMS are much more constrained than those in PB and are limited to local public infrastructure repairs. This means participation's benefits accrue beyond the individual making the request. Instead, the benefit is felt by people who live in a particular geographic area. We approximate this by looking at the demographics of people who live in the local area where the public good is provided. We use electoral wards (the geographic area represented by local council members) as the areas that approximate the beneficiaries of a public good improvement.[3] We calculate a particular request's beneficiaries using 2011 census data to estimate the number of people in that group who live

[3] Ward sizes in the UK vary in size, but typically contain around 5,000 people.

in the ward the request refers to. We then sum the beneficiaries in and out of the group across all the fixes and look at whether they disproportionately favor a particular group.

With this in mind, we can look at whether FMS fulfills the two criteria for inequalities in participation to translate into inequalities in demands made through the process. FMS participants can potentially differ from non-participants in two ways which map onto the decisions made through FMS. First, participants have different personal interests e.g., they will prefer that the pothole on their street is fixed than one on the other side of the city. Second, participants will differ in their knowledge of their area compared to other areas. That is, even if participants are motivated to report problems in other areas, they will be more likely to encounter problems near them.

In both cases, the key determinant of whether demographic groups will have different knowledge and interests to each other is the level of residential segregation. If an over-represented group tends to live in areas highly segregated by group membership, then this will tend to lead to inequalities in the outcomes of the process. However, if a demographic group is not residentially segregated, inequalities in the participant profile will not matter.

We can see this when we look at gender. There is almost no geographic variation in the gender balance of different areas in the UK. Among the wards, 99.7% are between 40% and 60% female (the handful of outliers are due to idiosyncratic things such as the presence of the large all-male boarding school Eton). Consequently, the very high gender imbalance in participation on FMS has little effect on inequalities in demands made through the platform. Women and men are simply too residentially integrated for geographically-concentrated public goods to differentially benefit one group over the other.

We find a positive relationship between the average level of education in an area and the number of reports submitted from that area. This matches the inequality in participation documented by Cantijoch, Galandini and Gibson (2016). Although the relationship is reasonably strong, the overall effect on who benefits is fairly minor as we can see in Figure 4, where educated people are only slightly more likely to benefit from FMS requests than less educated people.

While there is some residential segregation by ethnicity in Britain, there is no relationship between the percentage of non-white people living in an area and the number of reports submitted to FMS. This may be because ethnic minorities are still reasonably integrated overall, and that their population sizes simply are not large enough for other ethnic minorities to constitute most of their neighbors. If minorities in Britain happen to live near demographic groups who do submit reports to FMS, then this can easily cancel out their underrepresentation in terms of participation.

Perhaps the most surprising finding is that there are *more* reports submitted from areas with younger populations. This is the opposite of the inequality we saw at the participation stage where the average participant was substantially older than the whole adult population. This reversed relationship likely results from the fact that areas with higher levels of education also tend to be younger. Consequently, the age gradient in participation is reversed in terms of who stands to benefit from the demands made through the FMS platform.

Nature of the demand → impact on citizens

The participants on FMS look extremely unrepresentative of the British population. The demands made look much more geographically representative but there are some remaining inequalities, particularly favoring younger and more educated areas. However, there is still a final step to translate these demands into government response. The question therefore remains whether the government's response to these demands replicates the inequalities or changes them.

Overall, there is no strong evidence that government response counteracts biases in reporting (see the appendix for models). The proportion of problems that the government fixes within 35 days is weakly related to the education of the area (more educated areas have a slightly smaller proportion of problems fixed) and the proportion of 18-55-year-olds in the area (areas with more young people have a higher proportion of problems fixed). This means government response slightly reinforces the age divide and slightly reduces the education divide present in demands. The proportion of problems fixed is unrelated to the gender or ethnic balance of an area. In short, the evidence suggests that government

response to FMS reports mostly replicates inequalities at the demand level rather than ameliorating or exacerbating them.

Our results match those of Hamel and Holliday (2019) in the US who find that there are minimal differences in how quickly US municipalities respond to 311 requests from rich and poor neighborhoods. At least so far, there is little evidence that local governments either correct for or exacerbate reporting biases in service requests.

Once again, we do not see a simple translation of inequalities in technology access to inequalities in the impact on people. The participant profile on FMS does not match the inequalities in technology access in the UK and instead looks more similar to the demographic divides seen in traditional offline forms of participation such as voting.

These participation inequalities do not straightforwardly translate into unequal demands made through the platform either. The educational divide in participation is the only inequality that translates directly from participation to the demands made. The gender and ethnic minority divides are absent in terms of demands made and the age gradient actually reverses.

The link between the demands made and the impact on people is straightforward in the case of FMS. Local governments appear to fix problems at the same rate regardless of what type of area the report was received from. This means the distributive effect of FMS is determined by how equal the demands made through the platform are.

Case study 3: Iceland Crowd-sourced 2011 Constitution

Our third case study concerns the development of a new constitution for Iceland using input from the population through online engagement. The financial crisis of 2008-2009 had an especially strong effect on the Icelandic economy and was widely seen as discrediting the political establishment. This led to sustained calls for revising the Icelandic constitution.

The process proceeded in several steps. First, a seven-member expert constitutional committee prepared background information about options for constitutional change. Next, this information was presented to a randomly chosen National Assembly of 950 people. The National Assembly met for one day and agreed that a new constitution should be written. The constitution was written by a group of 25 newly elected Constitutional Council representatives[4] who had not previously been involved in politics.

At this stage, the Constitutional Council chose to open several avenues for online civic engagement. They allowed anyone to make public suggestions via the Constitutional Assembly's Facebook page and website. This generated 3,600 comments and 320 formal suggestions (Gylfason and Meuwese, 2016), many of which were integrated into the final draft of the constitution.

The final constitution was approved overwhelmingly in a public referendum (67% in favor). However, the constitution was not ratified by Parliament and the next elections in 2013 were won by a party opposing constitutional change.

Digital divide

For our purposes we are particularly interested in the crowd-sourced stage of the constitution making process and the effects it had on the final document. Iceland has the highest Internet usage in the world (96% (Hudson, 2018)), so there is only limited scope for Internet access to prevent participation. However, there are variations across demographic groups in usage of digital tools such as search engines, email attachments, chat and VOIP. The gender differences are generally relatively small, but there are substantial age and education gaps for all of these tools (Helsper, 2014), ranging from 12 to 48 percentage points. There is therefore at least some potential for inequalities in Internet access to affect the constitutional crowd-sourcing process.

[4] The election of these representatives was ruled as invalid by the Supreme Court, but the parliament still appointed the winning candidates to a Constitutional Council with the same mission, so this did not change the process substantially in practice.

Digital divide → participant profile

The Constitutional Council crowdsourced suggestions, with 311 submitted by 204 people (Hudson, 2018), with around 77% from men and 13% from women (and 10% from organizations) and most submitters between the ages of 40 and 65 (Helgadóttir, 2014). As we have seen in previous cases, inequalities in participation far exceed those seen in access to digital tools. The gender gaps online are very small in Iceland, but the gender participation gap is large.[5]

Participant profile → Nature of demands

We calculate the demographic balance of the origins of the demands made in the constitution by looking at the gender balance of the creators of the included proposals as listed by Hudson (2018). Of 29 successful proposals from the public, 24 were from men, 4 from women and one from an organization.

Although Icelandic names are common enough that is hard to definitively identify the creators of all the successful proposals, the ones who could be identified appear to be overwhelmingly from high status white collar occupations such as academics, economists, statisticians and psychologists.[6] The people also appear to fit the age profile described by Helgadóttir (2014) of generally being between 40 and 65.

The demands made (by inclusion in the draft constitution) therefore seem to originate with a group that is not representative of the Icelandic population in general. A qualitative examination of these proposals does not suggest these proposals are heavily skewed towards the narrow material interests of urban, older, educated, men, but we cannot know whether some issues were ignored entirely because of the lack of representation of young, rural, less educated, or female people in the process.

[5] In fact a smaller offline consultation actually produced a more gender-balanced set of submissions, with proposals from 26 men, 14 women and 13 organizations (Helgadóttir, 2014).

[6] See the appendix for the list of successful proposers and their occupations and gender where they were able to be identified.

Nature of the demand → impact on citizens

The impact that the constitution had on the population is straightforward to determine because the Icelandic Parliament ultimately did not ratify the new constitution (Hudson, 2018). The inequality at various stages of the process ultimately had no impact on people from underrepresented groups. This is an important step, because we should avoid assuming a political process necessarily affects policy or the population at all. The effects of any digital political process only matter if they are implemented. The Icelandic case therefore highlights how the government response to participation is crucial to how it benefits different groups. In this case, the government response was the only factor that mattered because it retained and exercised veto power.

Case Study 4: Change.org

Change.org is the largest online petitioning platform, with hundreds of millions of users and millions of petitions. It is available in nearly every country and has extremely low barriers to entry, requiring just a handful of steps to create a petition and the ability to sign a petition with a single click. Change.org petitions have been created on a wide variety of topics and are aimed primarily at governmental decision makers, although there are certainly a significant proportion of petitions aimed at commercial actors and private citizens as well (Karpf, 2016). Petitions are directed at a named set of targets, and the platform strongly encourages spreading the petition via social media. Petitions generally gain traction through a combination of social media sharing and traditional media coverage (Karpf, 2016).

This case study draws on the analysis of Mellon et al. (2017) who trace the gender balance on change.org from the participation stage to the outcome of that participation in terms of petition success. That analysis covers 132 countries in terms of the gender balance at the participatory stage, but focuses on nine countries with sufficient numbers of petitions to look at petition success as well.

Digital divide

Although the digital divide for gender is relatively modest in the countries covered in the previous three case studies, some countries have much more substantial gender divides in access, with women across the world having lower access to the Internet (Alliance for Affordable Internet, 2016). This is particularly noticeable in developing countries (Antonio and Tuffley, 2014), where gaps are particularly large.

Digital divide → participant profile

On change.org, we only have limited access to demographic information about users. One demographic variable that can be inferred is the gender of the user based on their first name. There are two relevant forms of participation on change.org: petition creation and petition signing.

Across the world, Mellon et al. (2017) find women are substantially overrepresented among change.org users (57% of all users) but are always underrepresented in terms of petition creation (44% of petitions are created by women). This pattern is nearly universal, with women underrepresented in petition creation compared to petition signing (Mellon *et al.*, 2017) in 71 of 76 countries.

The gender bias in change.org participation probably does not reflect differences in access to the Internet between men and women. Since women are over-represented in terms of signing petitions, they clearly have the technical means to access change.org. Therefore, women's underrepresentation in petition creation does not reflect a digital divide. Instead, the participatory divides seem to reflect the divides we see in offline forms of participation where women generally engage in so-called thin forms of participation (such as voting) at the same or higher rates than men (Inglehart and Norris, 2000; Leighley and Nagler, 2014) but engage in thick acts of participation such as running for office and donating to parties at far lower rates (Verba, Schlozman and Brady, 1995; Karpowitz, Mendelberg and Shaker, 2012; Wolak, 2014).

Participant profile → Nature of demands

In terms of the demands made through the platform, the male skew of petition creators means the contents of petitions skew strongly towards the issue preferences of men on the platform (e.g. economic justice and gay rights) and away from topics which are popular with women on the platform (e.g. animal rights and women's rights) whether measured by the topics of the petitions signed or created by each gender (Mellon *et al.*, 2017). This inequality in demands reflects the lack of restrictions which change.org places on petitions. Petitions can be created on sufficiently varied topics that their appeal can differ between men and women.

Nature of the demand → impact on citizens

However, just creating a petition does not automatically affect policy. Only 3.4% of petitions on change.org are successful (self-declared victory by the petition creator). This means there is substantial scope for the demographic impact of demands to differ substantially from the demographics of those users who originally made the demands. Female petition creators turn out to be far more successful than male petition creators (1.4 times as likely to succeed). In all 9 countries with sufficient data to study the gender breakdown, female petition creators have higher success rates than male petition creators. In fact, women are so much more successful than men that the majority of successful petitions are created by women (Mellon *et al.*, 2017).

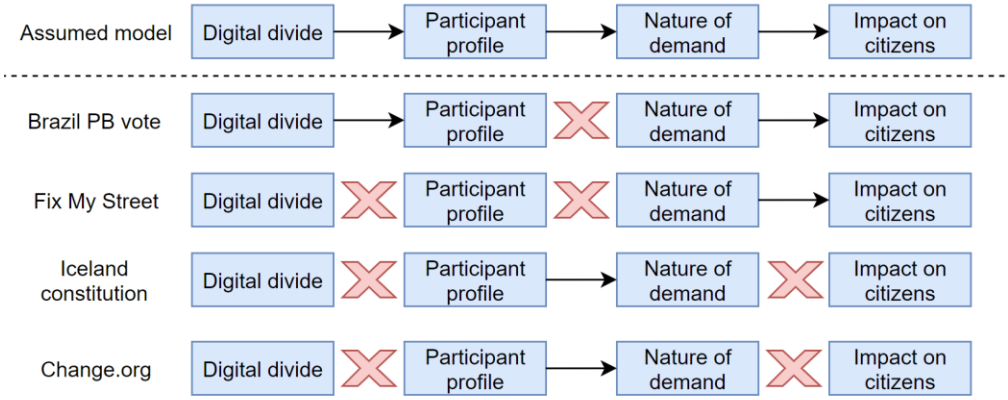
Change.org again challenges the simple model of how the digital divide affects the outcomes of digital participation. The participant profile is skewed in terms of petition creators in favor of men who tend to dominate online discussion spaces. However, the skewed demands made through the system have relatively little influence on which topics are covered in successful petitions. Due to the low level of overall success and the strong relationship between signatures and victory, it is the preferences of signers that dominate the policy outputs of change.org. Consequently the topics of successful petitions more closely resemble female issue preferences than male issue preferences (Mellon *et al.*, 2017). This suggests the composition of change.org's userbase exercises substantial influence over the policy

outcomes of the process, but that this happens by influencing which demands succeed rather than influencing which demands are made.

Discussion

We have examined four digital participatory processes, where citizens were given a chance to affect government policy or implementation online. Figure 5 shows the assumed linkages from the digital divide to impact on citizens via the composition of participants and the demands made through the digital participation platform. In every case study, one or more linkages broke down, so inequality did not transfer through to the next stage.

Figure 5 The assumed model of inequality in digital participation and the empirically observed relationships across the four case studies. The crosses show where the hypothesized relationship failed to hold. In all four cases, at least one of the hypothesized links failed to hold, breaking the link between the digital divide and beneficiaries of digitally mediated civic participation.



Across the four case studies, only Brazil was clearly a case where inequalities in digital participation closely matched the demographics of the digital divide, with white, male, younger and educated citizens being overrepresented in line with their overrepresentation on the Internet more generally in Brazil. Part of the reason why this was present in Brazil but not in the other cases is that Brazil still has relatively low Internet penetration. Where Internet access is low, even accessing digital civic participation may be the major bottleneck for participation. However, in other countries where access is much higher, other factors are likely to differentiate those who choose to participate or not. For instance, in a country like Iceland where 96% of citizens have Internet access, there is simply not much

room for Internet access to be a major dividing line in who participates. In other words, as overall Internet penetration increases, we should expect digital inequalities in participation to resemble general inequalities in civic participation rather than reflecting remaining divides in basic access.

Although the inequalities in participation online do not reliably resemble inequalities in digital access, all the cases we examine show that citizens who engage online are systematically more privileged than the general population or people who participate offline. It is therefore still important to track how inequality at the participation stage affects the rest of the participatory process. In fact, even at this stage, none of the case studies we examined saw a simple translation of inequality from participation to inequality in policy outcomes.

In the case of FMS and the Rio Grande do Sul PB vote, the inequality in participation did not translate substantially into inequality in demands or outcomes. In the case of FMS this is because geographically distributed benefits are felt beyond the individual who participated. There is simply not enough housing segregation in the UK to make the inequality in participation relevant to inequality in outcomes. In the case of the PB vote, the inequality in participation did not translate into an inequality in demands because voters from very different demographics groups voted essentially indistinguishably.

In the case of change.org and the Iceland crowd-sourced constitution, the inequality in participation translated into inequality of demands (at least in terms of reflecting the demands made by a demographically unrepresentative subgroup of the population). However, in both cases these demands did not translate into unequal outcomes. For change.org, the male-biased petition creators turned out to be irrelevant because it is petition signers (who skew female) who have the power within the online petitioning world rather than petition creators. In Iceland, the demands reflected the priorities of the people who participated online, but these had no effect on outcomes because the constitution was never passed by the legislature.

This is not to say that inequality in participation will never affect the distribution of outcomes. Instead, the chain of inequality from participation to outcomes must hold at each step. In fact, we can construct an alternative version of each case where the outcomes would be unequal. If FMS was run in

a heavily racially segregated city with almost no housing integration, racial inequalities in participation could easily translate into inequalities in outcomes. For PB, if the proposals more directly pitted the preferences of educated people against those who are less educated (for instance by increasing low wage benefits or low skilled immigration), voters might find it easier to translate their social identities into political behavior. If there were only a handful of petitions per week on change.org, the importance of agenda setting would become more important because the choices of petitions for users to sign would be more limited, shifting the balance of power back towards creators of petitions. Finally, it is easy to see how outcomes could have been affected in Iceland if the Icelandic Parliament had ratified the constitution.

Conclusions

Is digital civic engagement good or bad for democracy in terms of aligning policy with the preferences of the population? This debate has traditionally turned over whether digital platforms allow people to participate who would not otherwise have been able to or whether technology presents a barrier that excludes people. However, our results suggest that the demographic composition of participants is only part of the answer to this question. Just as important to policy outcomes is how the platform translates civic participation into policy demands and how government responds to those demands. None of the four case studies of digital civic engagement fits the simple model whereby inequalities in Internet access and digital participation translate straightforwardly into inequalities in policy outcomes. These cases show the importance of studying the full process of digital civic participation and not to simply assume unequal inputs will result in equivalent unequal policy outcomes.

The process by which participation is translated into demands made to the government and how these demands are translated into policy are political and institutional questions. While civic technology platforms pay a lot of attention to design from the perspective of user experience, there has been less focus on how these platforms act as political institutions which encourage certain types of demands and

actions while discouraging others. Platforms like change.org which tend to exhibit superstar effects where a few demands attract a lot of attention will have substantially different effects on politics than platforms like Fix My Street which transfer demands to decision makers with equal weight. These results suggest that designers of civic tech platforms should spend time considering how their platform design decisions influence the choices and outcomes of the political process they are enabling. Similarly, the design of platforms such as Fix My Street and Participatory Budgeting votes reduces the influence of participatory inequalities on outcomes by limiting the choices that can be made through the platform.

Governments should also consider how they choose to respond to demands made through digital civic engagement platforms since these choices shape the democratic impact of the platforms. If a government chooses to respond to petitions that achieve more than a certain number of signatures, this will have different effects on democratic outcomes than debating the most popular petition in each constituency or choosing petitions at random. The participatory budgeting case study illustrates a government response that limits the effect of unequal participation on policy outcomes by allocating spending according to a planning matrix that incorporates the level of need of different areas.

The most obvious way in which government response shaped the policy outcomes of civic engagement platforms was by government simply failing to act on demands. The Iceland constitution, for instance, had no policy effect because the digital civic engagement process was insufficiently embedded in the political system to have any effect at all. However, it is not clear that democracy would have been better served (in terms of representing the whole population's preferences) if the government had simply adopted the crowdsourced constitution given that it largely reflected the inputs and preferences of middle-aged, educated, urban men in professional occupations. However, the government could have chosen to integrate the crowdsourced constitution with other processes that attempted to correct for participatory biases (such as recruiting additional participants from underrepresented groups to revise the draft).

Digital civic engagement is not inherently good or bad for democracy. Instead, its effect is a combination of who participates on digital platforms and the choices of platform designers and governments.

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Appendix

Table 4 Bivariate regression estimates of proportion of problems fixed predicted by single demographic proportion within ward with and without council fixed effects.

Variable	Estimate	SE	P	Council fixed effects
18-24	0.024	0.040	0.552	FALSE
18-24	0.042	0.043	0.330	TRUE
18-55	0.096	0.021	0.000	FALSE
18-55	0.187	0.027	0.000	TRUE
Degree	-0.160	0.019	0.000	FALSE
Degree	-0.139	0.026	0.000	TRUE
Female	-0.063	0.126	0.616	FALSE
Female	-0.109	0.128	0.395	TRUE
White	-0.009	0.014	0.541	FALSE
White	-0.051	0.025	0.040	TRUE

Table 5 Proposers of successful proposals for draft constitution (Hudson 2018). Gender based on manual name coding and occupation based on searches of publicly available websites and descriptions. Occupations based on best available evidence but there is the possibility that some may be misidentified.

Name	Gender	Occupation	proposal
arni stefan arnason	male	academic	animal rights
Olgeir Gestsson	male	?	ban government ministers voting as MPs

Hjalti Hugason	male	academic	places the religious articles in the human rights section, and adds protections for a broader category of organizations.
Ludvig Larusson	male	psychologist	bans conscription.
Herdís Þorvaldsdóttir	female	actor?	adds specific protections for vegetation soil etc
Hans Tomas Bjornsson	male	academic	bans discrimination on basis of genotype
Samtök hernaðarandstæðinga	organization	organization	bans conscription.
Kristinn Már Ársælsson	male	author	adds language requiring the government to keep minutes of meetings and to make this public
Kristinn Már Ársælsson	male	author	adds requirements about publishing information about financial contributions to candidates and parties.
Kristinn Már Ársælsson	male	author	adds language on referenda and initiatives in line with this proposal.
Valdimar Samuelsson	male	statistician	changes the language on gender discrimination in line with this proposal.
Sigurður Jónas Eggertsson	male		adds new provisions to the article on education that is in line with this proposal
Bergsteinn Jʔonsson	male	Executive director of UNICEF in Iceland	changes child rights language in line with this proposal.
Þórlaug Ágústsdóttir	female	academic	introduces new language in the preamble that reflects this proposal
Guðmundur Hörður Guðmundsson	male	university PR manager	adds language on environmental protection that includes the interests of future generations, as proposed here
Hjörtur Hjartarson	male	?	lowers the necessary threshold for a popular intitiative from 15% to 10%, as proposed here.
Örn Leó Guðmundsson	male	Sales & marketing	includes the fact that the natural resources are the "everlasting" property of the people, as proposed here
Frosti Sigurjónsson	male	CEO	lowers the necessary threshold for a popular intitiative from 15% to 10%, as proposed here.
Smári McCarthy	male	activist/politician	removes language allowing police to attend public assemblies and replaces this with language about restrictions in a democratic society.
Kristinn Már Ársælsson	male	author	removes some speculative language about the ability of the Althingi to hold secret meetings.
Jón Guðmundsson	male		changes the provision on freedom of association in line with this proposal.
Þórlaug Ágústsdóttir	female	academic	adds a right to access the Internet.
Sigrún Helgadóttir	female	academic	makes changes to the protections of nature and the environment in line with this proposal
Svavar Kjarrval Lúthersson	male	?	makes Internet access unrestricted.
Nils Gı´slason	male	?	removes the phrase "ever expanding" from the discussion of human rights protections, as was proposed here.
Sigurður Hr. Sigurðsson	male	?	requires asylum seekers to receive a speedy trial.
Svavar Kjarrval Lúthersson	male	?	changes referendum language to follow this proposal.
Daði Ingólfsson	male	?	Draft 18 removes government protection of religious groups, as proposed here.
Jakob Björnsson	male	economist	Draft 16 changes language on the preservation of natural resources in line with this proposal.