Empowerment Approaches in Digital Civics

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ABSTRACT

The pace and magnitude of recent advancements in digital technologies have set the scene for a complete transformation of our citizenship experience. In the past, HCI research has been concerned with aligning technological progress with top-down organizational models of government institutions or exploring the needs of individual bottom-up community initiatives. However, this approach has proved too rigid for systemic issues and HCI researchers have started to meet these wicked problems halfway, rather than from two opposing sides. This involves putting emphasis on how citizens and organizations can incorporate existing technologies and involve dialogue and co-creation in their process. In this paper we highlight several directions of HCI research that follow the trail towards civic empowerment. Based on these, we identify a set of strategies that might help researchers contribute to a more inclusive orientation of civic tech.

CCS CONCEPTS

• **Human-centered computing → HCI theory, concepts and models**.

KEYWORDS

participatory action research, participatory design, empowerment, digital civics

ACM Reference Format:
Silvia Cazacu, Nicolai Brodersen Hansen, and Ben Schouten. 2020. Empowerment Approaches in Digital Civics. In *32ND Australian Conference on Human-Computer-Interaction (OzCHI '20), December 2–4, 2020, Sydney, NSW, Australia.* ACM, New York, NY, USA, 8 pages. https://doi.org/10.1145/3441000.3441069

1 INTRODUCTION

The fast-changing, reciprocal relationship between civics and technology is worth analyzing for the many ramifications it has on societal interest areas such as governance, service provision and citizen empowerment. The domain of civics traditionally encompasses the rights, duties and responsibilities of citizens in the process of governance such as the act of voting, reporting crimes and suspicious behaviors, volunteering and community participation or paying taxes. As computers affect a growing number of everyday life aspects nowadays, technologies for civic participation make governing activities more rapid and inclusive as they increase and diversify the stakeholders in domains such as social services [69], place-based community engagement [64], health [7], education [108], urban planning [9]. These new technological affordances have furthermore enlarged the range and depth of civic responsibility and activism with a growing number of citizens choosing to get involved in processes that in the past were traditionally left to governing institutions [26].

1.1 HCI research and civic tech

Civic tech, also known as civic media or digital civics, is a domain situated at the intersection between civics and technology and encompasses a variety of outlets such as online platforms for civic debate [2, 62], crowdsourcing platforms for city related open data uploaded by private citizens or government institutions [56, 92, 106], mobile apps for civic engagement [16, 28, 44], urban screens and interfaces that add an extra layer of information to the city [34], and sensor-based systems for real-time data collection [61]. It continues with offline activities such as civic workshops [77], townhall gatherings [98], civic hackathons [60], cultural installations [25], civic initiatives and new business models in place-making [15, 86, 102] and interdisciplinary research labs [17, 79, 83, 87, 101]. Considering the depth of the implications for ongoing societal challenges and the rapidity with which computation touches many disciplines along the way, the Human-Computer Interaction (HCI) domain has shown an active interest.

The ever-growing body of research in HCI has broadened considerably over the last two decades to address how computation affects our public lives and thus shifted the focus from users to citizens [31] by taking into account a diversification of environments, devices, activities and thus, interactions [12]. In this context, HCI focuses on designing new tools, platforms and approaches that increase democratization and civic participation by redefining the interactions between citizens, communities and organizations.

1.2 The two sides of tech-mediated participation and emergent views

The focus of current HCI research in digital civics mainly follows the two longstanding political approaches to civic participation: the top-down participation model and bottom-up community model [21]. The first model is linked to the increasingly popular smart city agenda that relies on big data, crowdsourcing and civic engagement in policymaking. In this context we remark on the adoption of e-government and e-participation tools [88] with the purpose of simplifying public service distribution by increasing the number and diversity of citizens reached through digitization. However,

OzCHI '20, December 2–4, 2020, Sydney, NSW, Australia

ACM ISBN 978-1-4503-8975-4/20/12.
https://doi.org/10.1145/3441000.3441069

critics suggest that these tools mainly remain focused on increasing service efficiency, reducing operational costs and thus are reduced to one-way, tokenistic communication or 'pseudo-participation' [85].

Another approach to civic engagement relies on sharing and crowdsourcing data from citizens to facilitate transparency in policymaking, local organization and public service provision [68]. However, the smart city debate can easily stay too focused on technological innovation and miss out on ever translating the gathered data into meaningful action [105]. Additionally, various projects have surfaced in recent years with strategies that focuses on contributing to a more inclusive, collaborative, and experience-based discourse within civic media. They supports citizen narratives to take shape [10] and engage in context rich negotiations on a city-wide scale [5]. While carrying out rapid progress regarding the citizen-government interaction, these strategies too can remain restricted to a specific context without accomplishing the ample progress promised by the top-down participatory agenda.

Looking on the other side of the civic engagement spectrum we observe it relies on motivation from collective initiatives to carry out an increasing number of community-led aspects of governance. Here, HCI research explores new civic interactions to support participation from local communities such as the data-in-place section within HCI where data from the street environment is used to facilitate place-bound community engagement [96] or redesign the local community relationship with voting as an interactive social activity [51, 104]. Another interesting turn in HCI is related to place-making. Here, researchers develop new tools that support the increasingly complex interactions of participatory urban planning, for example: by engaging the community in the urban transformation process through culturally sensitive community building activities [20], by empowering the disadvantaged members of a community to engage in collective storytelling through location-based applications [65] or by making use of games and play to foster engagement in complex city-making activities [27]. Nevertheless, critics remind us that a common trap of such approaches is that they might promote an overly simplistic idea of place-bound togetherness and hint towards physical proximity or virtual gathering of like-minded people who share similar interests, leaving out the complex networks of stakeholders that transcend locality and are characterized by differences rather than similarities [21].

1.3 Middle-out and smart citizens

There are voices who advocate for a holistic approach in designing digital civics which strengthens the similarities between the two models without undermining the particularities of local contexts [84]. As the name suggests, 'middle out design' proposes to adapt the participatory design methodology to a continuous process of cross-disciplinary collaboration between both experts and practitioners, and community organizations [40, 41]. Addressing wicked problems such as social injustice, poverty, public health, or access to education and housing require both the expertise and organization capabilities of government institutions as well as the motivation, engagement and collective power of local communities. This calls for a shift of paradigm in interaction design that views citizens as co-creators of value rather than users and consumers of goods and instead focuses on building capacities for negotiation, co-design and meaningful exchanges [35]. Furthermore, the possibility to escape the technology-driven and often artificial, industry-lead rhetoric of the smart city in favor of a strategy that supports smart citizens [90] might clear the space for more inclusive, participatory and human-centered objectives in digital civics. If treated with care, this opportunity could set society on a new path of enhanced citizenship experience where citizens embrace their diverse cultural experiences and create together new ideals and future strategies.

In this paper we investigate this new wave of HCI research that purposefully blurs the boundaries between organizational structures and nourishes a culture of empowerment and ownership to build foundations for a new culture of civic conscience and social resilience. We focus on work that challenges the limited civic engagement rhetoric by using approaches that promote institutional dialogue and context aware policymaking, as well as work that takes a critical stand on participatory design and research by focusing on its lasting impact on communities. We begin with several areas of interest in relation to civic empowerment and participation by reviewing a subset of HCI work in smart commons for civic engagement, community hacks, e-participation and place-making. Based on these, we highlight several strategies for empowerment that might prove useful for contributing to a more inclusive and purposeful debate on the role of HCI research and civics.

2 DIRECTIONS IN DIGITAL CIVICS FOR EMPOWERMENT

2.1 Smart city 2.0

One category of interest for HCI concerns smart commons – the use of pervasive technologies to facilitate the collaboration between public authorities and citizens for policymaking, infrastructure, management and service provision. We call this body of work 'smart city 2.0' because it moves beyond using information and communication technologies (ICTs) to improve the efficiency and experience of city life and explores new ways to meet the needs, vulnerabilities and motivations of stakeholders. For example, Harding et al. [47] believe that the design process of public engagement services is almost exclusively aimed at the citizen experience and does not account for the operational difficulties and inflexible legislation context faced by public institutions when dealing with civic complaints and notifications. This situation can trigger frustration on both sides caused by delays and a lack of transparency in dealing with civic issues and will, in time, decrease civic trust in these services. Their study stands out among related research because it advocates for an equal resource allocation to accommodate both public institutions and citizens needs. Corbett and Le Dantec [19] add to this work by conducting a qualitative study on trust work – the strategies and activities of public authorities to create, maintain and increase trust among citizens. Trust is difficult to operationalize because it involves empathy, cultural awareness and constantly readjusting stakeholders' expectations, but understanding the mechanisms of trust is crucial for designing technologies that support civic participation.

Like trust, civic literacy is an important part of redefining the smart city through engaged and accountable citizens. When community activists, organizers and volunteers are well accustomed

to the way the city works in the back end of service provision, the power distance between public authorities and citizens decreases and both parties are able to contribute with tailored and meaningful efforts to the city space [12]. This can be made possible, for example, through flexible and integrated ICT designs that support civic actions which challenge the status quo [3]. Here, technology becomes almost an activist in itself because it facilitates and coagulates a variety of civic work into city or nationwide social movements that would otherwise remain bound to a single neighborhood.

Alongside efforts to improve platforms and services, designers are documenting the multitude of experiences of those in the front lines of civic work as well. Hunter et al. [53] challenge the lack of transparency in the data collection process and co-creates tangible prototype with community members for citizen data collection. The approach highlights the necessity to make data collection mechanisms easy to understand and thus presents an alternative to the practices and technologies which ignore the human aspects. Asad et al. [5] have engaged in a collaborative effort with public institutions, service providers and city residents of Atlanta,GA, USA to define which parameters of civic engagement can trigger change, while maintaining sensitivity towards conflicting values, cultural nuances, and existing development strategies. Similarly, Balestrini et al. [8] challenge the lack of context and cultural sensitivity from top-down approaches related to smart cities and develop a framework that enables communities to design and use sensing technologies that contribute to data commons on domains of interest for the city. Here as well, emphasis is placed on empowering groups of action to build skills in working with technology in order to collaborate with experts and local authorities in making impactful decisions based on common visions.

2.2 Community hacks and Public IoT

In this category we have included work that has challenged the way technology is currently being introduced with a top-down approach from companies, public authorities and service providers. This approach often leaves citizens with little options for personalization or reconfiguration. The main concern of these researchers is however not to solve the problem, but to give citizens the tools to rethink their options, and re-appropriate technologies that already exists according to their own values, constraints and desires. This can start with a change of attitude towards technology and its active role in shaping civic life. When we consider computing as a non-human actor that influences public life, we can design services and IoT systems that advocate for sustainable civic behavior and manage public resources with awareness to social injustice [58]. As identified in a qualitative investigation on cycling policies, infrastructure and communities [4], design and advocacy are two domains related through their change-making approach that relies on problem identification followed by a series of sequences that ultimately triggers an improvement to the original state. Therefore, it might be worth exploring how designers can become facilitators of new strategies, efforts and platforms that take civic issues further and mobilize support from communities, public authorities and private companies.

Fox et al. [38] began an inquiry into public resource management and availability by investigating the role of public IoT in how menstrual hygiene products are being distributed on a city level. The researchers combine a qualitative investigation into the process and structures behind public hygiene accessibility with the deployment of a sensor system for menstrual product dispensers in public facilities. Next to generating context-aware insights into a systemic problem, this work opens a larger discussion about the human capacities needed in order to address such issues with sensitivity and responsibility.

We can observe this new tendency in HCI research to propose new domains of application for IoT sensor systems, networks and data commons which are not directed towards the supply chain management and industrial purposes but are used to support social interactions and address social issues. DiSalvo and Jenkins [22] set up a system that monitors fruit ripeness in the city which was developed in collaboration with an urban foraging community that collects fruit and donates them to social services providers. Here, smart city technology helps to promote civic behavior of volunteers, sustainable life in the city through alternative wasteless food supplies, and to develop community economy and togetherness. Similarly, technology can also contribute to more inclusive conversations between diverse stakeholders by making inherent values visible and promoting individual contribution to shared resources [57]. This approach can reframe existing practices in the domain of civics into more socially cohesive arrangements that are flexible to the particularities of everyday life.

However, as Mann et al. [74] suggest that HCI is still not sufficiently concerned with power inequalities, legal and ethical considerations nor with issues such as anxiety of control brought by the lack of transparency and regulations in working with citizen data harvested by such systems. Projects where sophisticated smart city infrastructure is used to collect and use citizen information for commercial interests rather than the public benefit must be opposed by initiatives that value civic privacy and offer more equitable, socially just, ethical and sustainable life alternatives in return for data [67, 73].

2.3 Collaborative governance

The first category of work shows the increasing interest in making city data infrastructure understandable and accessible to citizens, while the second shows how existing civic tech can be repurposed according to unique citizen needs. Next, we will highlight an orientation in HCI research concerned with supporting the collaboration between public institutions and communities so that a better civic experience can be co-created. Scherer et al. [89] propose a model for multi-stakeholder cooperation and service co-creation across the public, private and civic sectors that relies on online collaboration. SocialGov is a public platform that integrates crowdsourcing, online community platforms and social media to facilitate accurate and rapid data provision; it also provides an online environment for personalized information, community discussions and progress updates which relieves the financial pressure and time constraints on government organizations and increases civic responsibility by making citizens service co-producers. On the other hand, relying solely on online interactions might sometimes hinder the process,

as offline community activities play a big role in aggregating long-term results. It is thus best to facilitate online-offline continuity [81] through a clear and consistent message across channels and consider the online communication as a vector to improve and coordinate offline work [95].

Meng et al. [78] report on a participatory design experiment where grassroots activism through crowdsourced neighborhood data empowers the members of a community to participate in acts of care and responsibility towards (common) public property. Inspired by a philosophical model of "caring democracy" where equality, diversity and empowerment are values being reinforced through collective vigilance, the data collection process enables residents of communities to report whenever negative behaviour towards city property such as neglect, abandonment, or littering takes place. Moreover, scholars propose new ways of interpreting civic duties through discovery and reflection as well. For example, technology can help citizens to creatively explore and co-create civic points of views about social issues by writing and designing manifestos [75].

Finally, we have observed that there is a growing interest in civic technologies designed to support engagement between citizens, civic organizations and public service providers and authorities. Nonetheless, more work needs to be done in what concerns how the variety of citizen data gathered is translated into actions with impact on a community level. Along this line of argumentation, Johnson et al. [59] present a case study that focuses on building resources for collective action by facilitating and controlling discussions regardless of physical location through a digital platform. With this work in mind we highlight the role of the researcher in nurturing a continuous connection with the community in order to create meaningful results for both research, organizations and participants.

2.4 Placemaking and city play

Another side of research on civic engagement looks directly at collaborating with communities to develop urban initiatives organically while leaving room for both improvement and healthy failure. Several papers address the necessity of strengthening the bond between people, and civic organizations through the place they share, address and wish to improve. Fredericks and Tomitsch [43] introduce self-representation as an approach to civic engagement that uses playfulness to attract participants in the design and research of the contemporary public space. By combining full body interaction with various situated urban technologies and digital research set-ups, researchers propose an engaging alternative to urban participation that promotes cultural and social diversity through self-expression. Slingerland et al. [93] address a different diversity gap in participatory activities involving young citizens and report on a participatory design approach where children take the lead in city exploration by co-creating outdoor playing activities. Foth [30] analyses several case studies of placemaking initiatives and highlights the importance of motivation to promote civic engagement over time and with different types of stakeholders to avoid remaining hyperlocal and fragmented or only address surface concerns instead of deeper community issues.

Similarly, Mushiba and Heissmeyer [82] propose an urban exploration game where participants engage with the city landscape unguided but connected to one another through a soundscape broadcast over the entire group of participants. The researchers use a radio transmitter carried by a group leader to ensure that everyone remains in range and can explore freely and without any predefined goals. Here technology becomes a silent partner in the game that facilitates a continuous experience. It enables critical reflection and provides valuable intuition-based insights to community stakeholders which lead to future initiatives sensitive to human experiences. But humans are not the only users which cities should be designed for. Considering the current ecological crisis, and the global pandemic which are fueling worldwide economic uncertainty, reimagining cities as part of an ecosystem of actors which are not only human becomes more important than ever. In response, researchers have looked to other disciplines to reconsider the reach and practices of design in a socio-technically complex world [18, 29].

As many smart city examples demonstrate that they cannot address these crises by placing the human at the center of urban design, researchers advocate for a post-anthropocentric perspective on design and technology [107]. An HCI domain of interest is media architecture which, according to Foth and Caldwell [33] should adopt more-than-human design principles and push for stricter regulations to mitigate the negative impact on non-humans of factors such as light and sound pollution or troublesome materials and architectures In this context, Turner et al. [103]) consider the partnership between people and animal companions when designing a place-making activity that facilitates a different citizenship experience of exploring the city during dog walks. They identify dog pauses during walks as opportunities for their owners to connect with other people and design a location-based system to collect dog activity data, as well as share it with other walkers in the proximity. In this project, technology adds an extra layer of contextual information onto the physical environment that enables the discovery of urban places and other community members while caring for non-human companions.

3 DISCUSSION: STRATEGIES FOR EMPOWERMENT IN HCI

Civic experience is a topic that only recently became of interest for HCI researchers, therefore it consists of many separate strands that are being developed in parallel with societal transformation and technological advancement. The common denominator within these directions is citizen's capacity to work with technology and gradually become a co-creator of value together with service providers, organizations, and communities. This paper started from the curiosity to explore some of the ways HCI researchers address this shift of paradigm; our goal was to map out their intentions by sometimes reading between the lines rather than provide an exhaustive literature study focused on keywords and citation rate. The only hard criterion in our study was that included studies be no more than five years old, so that we can present some fresh perspectives that are inspired by our contemporary daily life.

We separated our findings into 4 categories based on the approach these papers take on the common topic of civic empowerment. We believe that the examples we describe here speak more than anything of the determination to co-create a more equitable,

livable, ethical, friendly, and inclusive participatory society in collaboration with a growing number of connected disciplines. Some of the work we highlight addresses gaps in literature such as Slingerland et al. [93] while some propose entirely new directions of research such as Kinnula et al. and Dombrowski et al. [24, 63]. If we take a step back from the four main directions highlighted with a few examples here, we will see that HCI has developed a few approaches for civic empowerment which we highlight in this section.

The first one is **facilitation** and is maybe the most important side of participatory design because it helps people from various backgrounds connect, it raises the quality of the discussions and it contributes to successful and potentially ongoing collaborations. A growing number of researchers understand that soft skills and good support material are instrumental for their work to engage in multidisciplinary environments as illustrated by recent CHI workshops [42, 46, 50]. As a result, we observe how these efforts are increasingly being documented in research papers that illustrate that designing activities and artefacts in an integrated format can trigger valuable reflections on civic experiences from both researchers and participants [23, 66]. For example, gamification can steer debates and help to communicate argumentation on difficult topics such as ethical technology [10], while speculative design is ideal for channeling beliefs, visions and concerns with a critical view of the future [48]. With a surge of participatory design and research projects in the recent years, the integration of such approaches together with the multitude of environments they engage becomes a growing interest in HCI [72, 99].

Infrastructuring and institutioning is a second approach that involves participatory and co-design practices and organizational models which ensure that research activities and results will lead to sustainable innovation throughout and after the process of participation of various actors such as citizens, organizations and institutions [71], as well as challenge public institutions to reconsider and adapt their role in this ecosystem [55]. This approach aims to empower people, organizations and civic institutions to improve their knowledge and skills in order to affect their communities more significantly and with lasting results [36, 45]. Such recent work can be seen in supporting mutual improving learning in the public sector [1], exploring alternative perspectives on design and sustainability [70], building resilience for the everyday life [91], engaging citizens in the process of collective resource management [13], empowering vulnerable and marginalized communities [54] and expanding the reach of participatory design practices beyond workshop settings towards social, cultural and political spheres [39]).

Another approach is **addressing the risk of tokenism** which challenges participatory research to get involved more strategically with the depth of the activities of grassroots communities and public institutions [100] rather than acting as mere observers of a straightforward process that follows government agenda. As Monno and Khakee [80] point out, we need to radically address the power dynamics behind public institutions and citizens and communities to be able to create conditions for translating public concerns and ideas into real action. For example, immersive technologies such as AR and VR could contribute to a low - threshold discussion space between the two parties by supporting ideation, creative discovery and in-situ experimentation with urban spaces [32]. On the other hand, technologies such as smart maps that feed algorithmic public planning can make us focus too much on data visualizations and too little on the people's lives that are mapped, creating an illusion of participation to city-making when in fact the outcomes are pre-decided by algorithms [76]. Cardullo and Kitchin [14] sound the alarm on such theater-like practices by urging us to reframe the neo-liberal smart city agenda towards ideals of smart citizenship that shift the power from giant institutions and organizations to citizens.

Finally, the last approach to empowerment focuses on **following diversity** in order to respond to the rapid societal transformations by expanding their areas of interest, improving their skillset and getting in touch with smaller and sometimes less represented communities. This led to a diversification of interests, types of collaborations and new methodologies highlighted through work in mental health and wellbeing [11], breastfeeding and maternal health [52], intimate technology and menstrual health [37], intimate care and body excretions [49], social justice and addressing inequalities through interaction design [24], climate change and environmental justice [94], human rights activism [6], place-based media interactions for cultural diversity [34] and neighborhood activism [97].

4 CONCLUSION

Our goal has been to explore how civic empowerment is approached by participatory design and research through observing how the work conducted at the intersection between HCI research and civic technology is being reported in ACM papers published in the last five years. We have identified an emerging trend of cross-disciplinary collaboration that cuts across organizational models to access diverse expertise in order to improve citizenship experience and proficiency. We highlighted several examples of HCI work that showcase how current societal problems can be addressed through new agendas for a smart city 2.0, organizing community hacks and Public IoT, supporting a collaborative governance and designing for community placemaking. Consequently, we have identified that the common strategies they employ are **facilitation, infrastructuring and institutioning, addressing tokenism** and **following diversity**. Based on these findings, we emphasize the emerging trend in HCI research that focuses on the softer side of civic tech by encouraging the human actors to become more proficient in using technology as opposed to refining the capabilities of the technological actors like in the past. This approach has benefits on both sides of the human-computer relationship, because on one hand it facilitates technological literacy and a more even adoption of technology in civic processes, while on the other it fine-tunes and diversifies computers to be more in tune with the civic experience.

ACKNOWLEDGMENTS

This research is part of STEC (Smart Technologies Empowered Citizens) funded by NWO, no: 652.001.005. We would like to thank our anonymous reviewers for their thoughtful comments which strengthened the arguments of our paper.

REFERENCES

[1] Mette Agger Eriksen, Per Anders Hillgren, and Anna Seravalli. 2020. Foregrounding learning in infrastructuring-to change worldviews and practices in the public sector. In *ACM International Conference Proceeding Series*, Vol. 1. Association for Computing Machinery, 182–192. https://doi.org/10.1145/3385010.3385013

[2] Artikulate. [n.d.]. Artikulate - Online Debate platform for India. Popular debate topics in India. https://www.artikulate.in/

[3] Mariam Asad and Christopher A Le Dantec. 2015. Illegitimate Civic Participation: Supporting Community Activists on the Ground. In *Proceedings of the 18th ACM Conference on Computer Supported Cooperative Work & Social Computing*. 1694–1703. https://doi.org/10.1145/2675133.2675212

[4] Mariam Asad and Christopher A. Le Dantec. 2017. Tap the "Make This Public" Button. In *Proceedings of the 2017 CHI Conference on Human Factors in Computing Systems*, Vol. 2017-May. ACM, New York, NY, USA, 6304–6316. https://doi.org/10.1145/3025453.3026034

[5] Mariam Asad, Christopher A Le Dantec, Becky Nielsen, and Kate Diedrick. 2017. Creating a Sociotechnical API: Designing City Scale Community Engagement. In *Proceedings of the 2017 CHI conference on human factors in computing systems*. 2295–2306. https://doi.org/10.1145/3025453.3025963

[6] Paula Astrid Mendez Gonzalez, Sofia Castaneda Mosquera, María Paula Bernal Tinjaca, Ricardo Mejía Sarmiento, Roberto Alejandro Morales Rubio, Juan Camilo Giraldo Manrique, and Santiago Baquero Lozano. 2020. Participatory construction of futures for the defense of human rights. In *ACM International Conference Proceeding Series*, Vol. 2. Association for Computing Machinery, 10–16. https://doi.org/10.1145/3384772.3385155

[7] Madeline Balaam, Rob Comber, Ed Jenkins, Selina Sutton, and Andrew Garbett. 2015. Feedfinder: A location-mapping mobile application for breastfeeding women. In *Conference on Human Factors in Computing Systems - Proceedings*, Vol. 2015-April. 1709–1718. https://doi.org/10.1145/2702123.2702328

[8] Mara Balestrini, Yvonne Rogers, Carolyn Hassan, Javi Creus, Martha King, and Paul Marshall. 2017. A City in Common. In *Proceedings of the 2017 CHI Conference on Human Factors in Computing Systems*, Vol. 2017-May. ACM, New York, NY, USA, 2282–2294. https://doi.org/10.1145/3025453.3025915

[9] Mara Balestrini, Yvonne Rogers, Carolyn Hassan, Javi Creus, Martha King, and Paul Marshall. 2017. A City in common: A framework to orchestrate large-scale citizen engagement around urban issues. In *Conference on Human Factors in Computing Systems - Proceedings*, Vol. 2017-May. 2282–2294. https://doi.org/10.1145/3025453.3025915

[10] Stephanie Ballard, Karen M. Chappell, and Kristin Kennedy. 2019. Judgment call the game: Using value sensitive design and design fiction to surface ethical concerns related to technology. In *DIS 2019 - Proceedings of the 2019 ACM Designing Interactive Systems Conference*. Association for Computing Machinery, Inc, 421–433. https://doi.org/10.1145/3322276.3323697

[11] Nataly Birbeck, Shaun Lawson, Kellie Morrissey, Tim Rapley, and Patrick Olivier. 2017. Self harmony: Rethinking hackathons to design and critique digital technologies for those affected by self-harm. In *Conference on Human Factors in Computing Systems - Proceedings*, Vol. 2017-May. Association for Computing Machinery, 146–157. https://doi.org/10.1145/3025453.3025931

[12] Kirsten Boehner and Carl Disalvo. 2016. Data, design and civics: An exploratory study of civic tech. In *Conference on Human Factors in Computing Systems - Proceedings*. Association for Computing Machinery, 2970–2981. https://doi.org/10.1145/2858036.2858326

[13] Andrea Capaccioli, Giacomo Poderi, Mela Bettega, and Vincenzo D'Andrea. 2016. Participatory infrastructuring of community energy. In *ACM International Conference Proceeding Series*, Vol. 2. Association for Computing Machinery, 9–12. https://doi.org/10.1145/2948076.2948089

[14] Paolo Cardullo and Rob Kitchin. 2019. Smart urbanism and smart citizenship: The neoliberal logic of 'citizen-focused' smart cities in Europe. *Environment and Planning C: Politics and Space* 37, 5 (aug 2019), 813–830. https://doi.org/10.1177/0263774X18806508

[15] CityofAsylum. [n.d.]. City of Asylum | Giving Voice. https://cityofasylum.org/

[16] CityofBoston. [n.d.]. City of Boston apps | Boston.gov. https://www.boston.gov/departments/innovation-and-technology/city-boston-apps

[17] Civic Media Lab. [n.d.]. Civic Media Lab | Innovation and Ideas. http://www.civicmedialab.ng/

[18] Rachel Clarke, Sara Heitlinger, Ann Light, Laura Forlano, Marcus Foth, and Carl DiSalvo. 2019. More-than-human participation. *Interactions* 26, 3 (apr 2019), 60–63. https://doi.org/10.1145/3319075

[19] Eric Corbett and Christopher A. Le Dantec. 2018. Going the Distance. In *Proceedings of the 2018 CHI Conference on Human Factors in Computing Systems - CHI '18*, Vol. 2018-April. ACM Press, New York, New York, USA, 1–13. https://doi.org/10.1145/3173574.3173886

[20] Clara Crivellaro, Alex Taylor, Vasilis Vlachokyriakos, Rob Comber, Bettina Nissen, and Peter Wright. 2016. Re-making places: HCI, 'community building' and change. In *Conference on Human Factors in Computing Systems - Proceedings*. Association for Computing Machinery, 2958–2969. https://doi.org/10.1145/2858036.2858332

[21] Michiel De Lange and Martijn de Waal. 2013. Owning the city: New media and citizen engagement in urban design. *First Monday* 18, 11 (2013).

[22] Carl DiSalvo and Tom Jenkins. 2017. Fruit Are Heavy. In *Proceedings of the 2017 Conference on Designing Interactive Systems*. ACM, New York, NY, USA, 541–553. https://doi.org/10.1145/3064663.3064748

[23] Carl Disalvo, Tom Jenkins, and Thomas Lodato. 2016. Designing speculative civics. In *Conference on Human Factors in Computing Systems - Proceedings*. 4979–4990. https://doi.org/10.1145/2858036.2858505

[24] Lynn Dombrowski, Ellie Harmon, and Sarah Fox. 2016. Social justice-oriented interaction design: Outlining key design strategies and commitments. In *DIS 2016 - Proceedings of the 2016 ACM Conference on Designing Interactive Systems: Fuse*. Association for Computing Machinery, Inc, 656–671. https://doi.org/10.1145/2901790.2901861

[25] Vince Dziekan and Sven Mehzoud. 2014. Activating exUrbanScreens : Applying Curatorial Design toward Affective Experience in Civic Media Spectacles. *Curator: The Museum Journal* 57, 4 (oct 2014), 485–504. https://doi.org/10.1111/cura.12087

[26] Sheena Erete and Jennifer O Burrell. 2017. Empowered participation: Exploring how citizens use technology in local governance. In *Conference on Human Factors in Computing Systems - Proceedings*, Vol. 2017-May. 2307–2319. https://doi.org/10.1145/3025453.3025996

[27] Gabriele Ferri, Nicolai B Hansen, Adam Heerden van, and Ben A.M. Schouten. 2018. Design Concepts for Empowerment through Urban Play. *DiGRA Conference* (2018), 1–20.

[28] Fix It Find It. [n.d.]. Find It, Fix It - Service Request Mobile App - Customer Service Bureau | seattle.gov. http://www.seattle.gov/customer-service-bureau/find-it-fix-it-mobile-app

[29] Laura Forlano. 2016. Decentering the Human in the Design of Collaborative Cities. *Design Issues* 32, 3 (2016), 42–54. https://doi.org/10.1162/DESI_a_00398

[30] Marcus Foth. 2017. Lessons from urban guerrilla placemaking for smart city commons. In *ACM International Conference Proceeding Series*, Vol. Part F1285. Association for Computing Machinery, 32–35. https://doi.org/10.1145/3083671.3083707

[31] Marcus Foth. 2018. Participatory urban informatics: towards citizen-ability. *Smart and Sustainable Built Environment* 7, 1 (2018), 4–19. https://doi.org/10.1108/SASBE-10-2017-0051

[32] Marcus Foth, Glenda Caldwell, Joel Fredericks, and Kirsty Volz. 2018. Augmenting cities beyond bedazzlement: Empowering local communities through immersive urban technologies. In *Workshop Proceedings of Augmenting Cities and Architecture with Immersive Technologies, Media Architecture Biennale (MAB-18)*. Media Architecture Biennale.

[33] Marcus Foth and Glenda Amayo Caldwell. 2018. More-than-Human Media Architecture. In *Proceedings of the Media Architecture Biennale 2018, Beijing, China*. ACM, New York, NY. https://doi.org/10.1145/3284389.3284495

[34] Marcus Foth, Martin Tomitsch, Laura Forlano, M Hank Haeusler, and Christine Satchell. 2016. Citizens breaking out of filter bubbles: Urban screens as civic media. In *PerDis 2016 - Proceedings of the 5th ACM International Symposium on Pervasive Displays*. Association for Computing Machinery, New York, NY, USA, 140–147. https://doi.org/10.1145/2914920.2915010

[35] Marcus Foth, Martin Tomitsch, Christine Satchell, and M Hank Haeusler. 2015. From Users to Citizens. In *Proceedings of the Annual Meeting of the Australian Special Interest Group for Computer Human Interaction on - OzCHI '15*. ACM Press, New York, New York, USA, 623–633. https://doi.org/10.1145/2838739.2838769

[36] Marcus Foth and Troy John Turner. 2019. The Premise of Institutioning for the Proliferation of Communities and Technologies Research. In *Proceedings of the 9th International Conference on Communities and Technologies - Transforming Communities*. 24–28. https://doi.org/10.1145/3328320.3328398

[37] Sarah Fox, Noura Howell, Richmond Wong, and Franchesca Spektor. 2019. Vivewell: Speculating near-future menstrual tracking through current data practices. In *DIS 2019 - Proceedings of the 2019 ACM Designing Interactive Systems Conference*. Association for Computing Machinery, Inc, 541–552. https://doi.org/10.1145/3322276.3323695

[38] Sarah E. Fox, Rafael M.L. Silva, and Daniela K. Rosner. 2018. Beyond the prototype: Maintenance, collective responsibility, and public IoT. In *DIS 2018 - Proceedings of the 2018 Designing Interactive Systems Conference*. Association for Computing Machinery, Inc, 21–32. https://doi.org/10.1145/3196709.3196710

[39] Christopher Frauenberger, Marcus Foth, and Geraldine Fitzpatrick. 2018. On Scale, Dialectics, and Affect: Pathways for Proliferating Participatory Design. In *Proceedings of the Participatory Design Conference (PDC), Hasselt, Belgium*, Vol. 18. ACM, New York, NY. https://doi.org/10.1145/3210586.3210591

[40] Joel Fredericks, Glenda Amayo Caldwell, Marcus Foth, and Martin Tomitsch. 2019. The City as Perpetual Beta: Fostering Systemic Urban Acupuncture. In *The hackable city: Digital media and collaborative city-making in the network society*, M de Waal and M de Lange (Eds.). Springer, 67–92.

[41] Joel Fredericks, Glenda Amayo Caldwell, and Martin Tomitsch. 2016. Middle-out design: Collaborative community engagement in urban HCI. In *Proceedings of the 28th Australian Computer-Human Interaction Conference, OzCHI 2016*. Association for Computing Machinery, Inc, 200–204. https://doi.org/10.1145/

3010915.3010997
[42] Joel Fredericks, Callum Parker, Glenda Amayo Caldwell, Marcus Foth, Hilary Davis, and Martin Tomitsch. 2019. Designing smart for sustainable communities: Reflecting on the role of hci for addressing the sustainable development goals. In *ACM International Conference Proceeding Series*. Association for Computing Machinery, 12–15. https://doi.org/10.1145/3369457.3369550
[43] Joel Fredericks and Martin Tomitsch. 2017. Designing for self-representation: Selfies, engagement and situated technologies. In *ACM International Conference Proceeding Series*. Association for Computing Machinery, 248–256. https://doi.org/10.1145/3152771.3152798
[44] GoMobilePGH. [n.d.]. Go Mobile PGH | Pittsburgh Parking Authority. http://www.gomobilepittsburgh.com/
[45] Nicolai Brodersen Hansen, Christian Dindler, Kim Halskov, Ole Sejer Iversen, Claus Bossen, Ditte Amund Basballe, and Ben Schouten. 2019. How participatory designworks: Mechanisms and effects. In *ACM International Conference Proceeding Series*. Association for Computing Machinery, 30–41. https://doi.org/10.1145/3369457.3369460
[46] Nicolai Brodersen Hansen, Gwen Klerks, Maria Menendez Blanco, Laura Maye, Angelika Strohmayer, Martijn de Waal, and Ben Schouten. 2020. Making Civic Initiatives Last. In *Companion Publication of the 2020 ACM Designing Interactive Systems Conference*. ACM, 433–436. https://doi.org/10.1145/3393914.3395921
[47] Mike Harding, Bran Knowles, Nigel Davies, and Mark Rouncefield. 2015. HCI, civic engagement & trust. In *Conference on Human Factors in Computing Systems - Proceedings*, Vol. 2015-April. Association for Computing Machinery, 2833–2842. https://doi.org/10.1145/2702123.2702255
[48] Ingi Helgason and Michael Smyth. 2020. Ethnographic Fictions. Association for Computing Machinery (ACM), 203–207. https://doi.org/10.1145/3393914.3395872
[49] Karey Helms. 2019. Do you have to pee? A design space for intimate and somatic data. In *DIS 2019 - Proceedings of the 2019 ACM Designing Interactive Systems Conference*. Association for Computing Machinery, Inc, 1209–1222. https://doi.org/10.1145/3322276.3322290
[50] Luke Hespanhol, Hilary Davis, Joel Fredericks, Glenda A. Caldwell, and Marius Hoggenmueller. 2017. Digital outreach: Designing technologies for diversity, participation and social inclusion. In *ACM International Conference Proceeding Series*. Association for Computing Machinery, 648–650. https://doi.org/10.1145/3152771.3156193
[51] Luke Hespanhol, Martin Tomitsch, Ian Mcarthur, Joel Fredericks, Ronald Schroeter, and Marcus Foth. 2015. Vote As You Go: Blending Interfaces For Community Engagement Into The Urban Space. In *Proceedings of the 7th International Conference on Communities and Technologies (C&T '15)*. Association for Computing Machinery, New York, NY, USA, 29–37. https://doi.org/10.1145/2768545.2768553
[52] Alexis Hope, Catherine D'Ignazio, Josephine Hoy, Rebecca Michelson, Jennifer Roberts, Kate Krontiris, and Ethan Zuckerman. 2019. Hackathons as Participatory Design. In *Proceedings of the 2019 CHI Conference on Human Factors in Computing Systems - CHI '19*. ACM Press, New York, New York, USA, 1–14. https://doi.org/10.1145/3290605.3300291
[53] Trevor Hunter, Peter Worthy, Stephen Viller, and Ben Matthews. 2018. Designing for citizen-centric smart cities. In *Proceedings of the 30th Australian Conference on Computer-Human Interaction*. ACM, New York, NY, USA, 162–166. https://doi.org/10.1145/3292147.3292217
[54] Faheem Hussain, Abdullah Hasan Safir, Dina Sabie, Zulkarin Jahangir, and Syed Ishtiaque Ahmed. 2020. Infrastructuring hope: Solidarity, leadership, negotiation, and ict among the rohingya refugees in Bangladesh. In *ACM International Conference Proceeding Series*. Association for Computing Machinery. https://doi.org/10.1145/3392561.3394640
[55] Liesbeth Huybrechts, Henric Benesch, and Jon Geib. 2017. Institutioning: Participatory Design, Co-Design and the public realm. *CoDesign* 13, 3 (jul 2017), 148–159. https://doi.org/10.1080/15710882.2017.1355006
[56] InTheAir. [n.d.]. In the Air. http://intheair.es/
[57] Tom Jenkins. 2018. Cohousing IoT. In *Proceedings of the Twelfth International Conference on Tangible, Embedded, and Embodied Interaction*, Vol. 2018-Janua. ACM, New York, NY, USA, 667–673. https://doi.org/10.1145/3173225.3173244
[58] Tom Jenkins, Christopher A. Le Dantec, Carl Disalvo, Thomas Lodato, and Mariam Asad. 2016. Object-oriented publics. In *Conference on Human Factors in Computing Systems - Proceedings*. Association for Computing Machinery, 827–839. https://doi.org/10.1145/2858036.2858565
[59] Ian G. Johnson, Dalya Al-Shahrabi, and John Vines. 2020. From Creating Spaces for Civic Discourse to Creating Resources for Action. Association for Computing Machinery (ACM), 1–14. https://doi.org/10.1145/3313831.3376464
[60] Peter Johnson and Pamela Robinson. 2014. Civic Hackathons: Innovation, procurement, or civic engagement? *Review of Policy Research* 31, 4 (jul 2014), 349–357. https://doi.org/10.1111/ropr.12074
[61] Sami Kaivonen and Edith C.H. Ngai. 2020. Real-time air pollution monitoring with sensors on city bus. *Digital Communications and Networks* 6, 1 (feb 2020), 23–30. https://doi.org/10.1016/j.dcan.2019.03.003
[62] Kialo. [n.d.]. Debate platform powered by reason - A tour of Kialo | Kialo. https://www.kialo.com/tour
[63] Marianne Kinnula, Netta Iivari, Sirkku Kotilainen, Jussi Okkonen, and Sumita Sharma. 2020. Researchers' Toolbox for the Future: Designing the future of technology with and for children CSS Concepts. In *Proceedings of the 2020 ACM Interaction Design and Children Conference: Extended Abstracts*. ACM, New York, NY, USA. https://doi.org/10.1145/3397617.3398064
[64] Gwen Klerks, Nicolai Brodersen Hansen, Ben Schouten, and Daisy O'Neill. 2020. Designing Community Technology Initiatives : A Literature Review. In *32ND AUSTRALIAN CONFERENCE ON HUMAN-COMPUTER INTERACTION (OzCHI '20)*. ACM, New York, NY, USA, Sydney, NSW, Australia, 20. https://doi.org/10.1145/3441000.34410671
[65] Matthias Korn and Jon Back. 2012. Talking it further: From feelings and memories to civic discussions in and about places. In *NordiCHI 2012: Making Sense Through Design - Proceedings of the 7th Nordic Conference on Human-Computer Interaction*. 189–198. https://doi.org/10.1145/2399016.2399046
[66] Sandjar Kozubaev, Chris Elsden, Noura Howell, Marie Louise Juul Søndergaard, Nick Merrill, Britta Schulte, and Richmond Y. Wong. 2020. Expanding Modes of Reflection in Design Futuring. Association for Computing Machinery (ACM), 1–15. https://doi.org/10.1145/3313831.3376526
[67] Marc Langheinrich. 2001. Privacy by Design-Principles of Privacy-Aware Ubiquitous Systems. In *Ubicomp 2001: Ubiquitous Computing*. 273–291.
[68] Christopher A Le Dantec, Mariam Asad, Aditi Misra, and Kari E Watkins. 2015. Planning with crowdsourced data: Rhetoric and representation in transportation planning. In *CSCW 2015 - Proceedings of the 2015 ACM International Conference on Computer-Supported Cooperative Work and Social Computing*. 1717–1727. https://doi.org/10.1145/2675133.2675212
[69] Christopher A. Le Dantec and W. Keith Edwards. 2008. The view from the trenches: Organization, power, and technology at two nonprofit homeless outreach centers. In *Proceedings of the ACM Conference on Computer Supported Cooperative Work, CSCW*. 589–598. https://doi.org/10.1145/1460563.1460656
[70] Kristina Lindström and Åsa Ståhl. 2020. Un/making in the aftermath of design. In *ACM International Conference Proceeding Series*, Vol. 1. Association for Computing Machinery, 12–21. https://doi.org/10.1145/3385010.3385012
[71] Thomas Ludwig, Volkmar Pipek, and Peter Tolmie. 2018. Designing for collaborative infrastructuring: Supporting resonance activities. *Proceedings of the ACM on Human-Computer Interaction* 2, CSCW (nov 2018). https://doi.org/10.1145/3274382
[72] Peter Lyle, Cláudia Silva, Mariacristina Sciannamblo, and Maurizio Teli. 2018. Communication in infrastructuring, or tales from a collaborative project. In *ACM International Conference Proceeding Series*. Association for Computing Machinery, 156–161. https://doi.org/10.1145/3292147.3292179
[73] Monique Mann, Angela Daly, and S.Kate Devitt. 2019. What Is (in) Good Data? *Good Data, Amsterdam: Institute of Network Cultures Theory on Demand Series* (2019).
[74] Monique Mann, Peta Mitchell, Marcus Foth, and Irina Anastasiu. 2020. #BlockSidewalk to Barcelona: Technological sovereignty and the social license to operate smart cities. *Journal of the Association for Information Science and Technology* 71, 9 (sep 2020), 1103–1115. https://doi.org/10.1002/asi.24387
[75] Sónia Matos, Simone Ashby, Ricardo Rodrigues, and Julian Hanna. 2019. Youth, politics & civic participation: The 'Manifesto machine'. In *ACM International Conference Proceeding Series*. Association for Computing Machinery, 5–8. https://doi.org/10.1145/3328320.3328374
[76] Shannon Mattern. 2020. Post-It Note City. *Places Journal* 2020 (feb 2020). https://doi.org/10.22269/200211
[77] Brian McInnis, Marta Poblet, Alissa Centivany, Karen Levy, Juho Kim, and Gilly Leshed. 2017. Crowdsourcing law and policy: A design-thinking approach to crowd-civic systems. In *CSCW 2017 - Companion of the 2017 ACM Conference on Computer Supported Cooperative Work and Social Computing*. 355–361. https://doi.org/10.1145/3022198.3022656
[78] Amanda Meng, Carl DiSalvo, and Ellen Zegura. 2019. Collaborative Data Work Towards a Caring Democracy. *Proceedings of the ACM on Human-Computer Interaction* 3, CSCW (nov 2019), 1–23. https://doi.org/10.1145/3359144
[79] MIT Media Lab. [n.d.]. Projects ‹ Civic Media — MIT Media Lab. https://www.media.mit.edu/groups/civic-media/projects/
[80] Valeria Monno and Abdul Khakee. 2012. Tokenism or Political Activism? Some Reflections on Participatory Planning. *International Planning Studies* 17, 1 (2012), 85–101. https://doi.org/10.1080/13563475.2011.638181
[81] Gaia Mosconi, Matthias Korn, Christian Reuter, Peter Tolmie, Maurizio Teli, and Volkmar Pipek. 2017. From Facebook to the Neighbourhood: Infrastructuring of Hybrid Community Engagement. *Computer Supported Cooperative Work (CSCW)* 26, 4-6 (2017), 959–1003. https://doi.org/10.1007/s10606-017-9291-z
[82] Mark Mushiba and Holger Heissmeyer. 2018. Dérive: An exploration of critical play for urban place-making. In *ACM International Conference Proceeding Series*. Association for Computing Machinery, 329–331. https://doi.org/10.1145/3283458.3283525

[83] Participatory Publics Lab. [n.d.]. Participatory Publics Lab | GVU Center. https://gvu.gatech.edu/research/labs/participatory-publics-lab

[84] James Pierce, Phoebe Sengers, Tad Hirsch, Tom Jenkins, William Gaver, and Carl Disalvo. 2015. Expanding and Refining Design and Criticality in HCI. In *Proceedings of the 33rd Annual ACM Conference on Human Factors in Computing Systems*. 2083–2092. https://doi.org/10.1145/2702123.2702438

[85] Kathleen H. Pine, Margaret M. Hinrichs, Jieshu Wang, Dana Lewis, and Erik Johnston. 2020. For impactful community engagement: check your role. , 26–28 pages. https://doi.org/10.1145/3401720

[86] Placetesting&Placemaking. [n.d.]. Placetesting & placemaking - Brand Urban Agency. https://brandurbanagency.com/en/expertise/placetesting-placemaking-en/

[87] Play and Civic Media. [n.d.]. Play and Civic Media - Amsterdam University of Applied Sciences. https://www.amsterdamuas.com/create-it/shared-content/research-groups/play-and-civic-media/play-and-civic-media.html

[88] Sabrina Scherer and Maria A. Wimmer. 2014. Trust in e-participation: Literature review and emerging research needs. In *ACM International Conference Proceeding Series*, Vol. 2014-Janua. Association for Computing Machinery, 61–70. https://doi.org/10.1145/2691195.2691237

[89] Sabrina Scherer, Maria A Wimmer, and Sergiusz Strykowski. 2015. Social government: A concept supporting communities in co-creation and co-production of public services. (2015). https://doi.org/10.1145/2757401.2757417

[90] Ben Schouten, Gabriele Ferri, Michiel de Lange, and Karel Millenaar. 2017. Games as Strong Concepts for City-Making. In *Playable Cities*, Anton Nijholt (Ed.). Springer, Singapore, 23–45. https://doi.org/10.1007/978-981-10-1962-3_2

[91] Bryan Semaan. 2019. 'Routine infrastructuring' as 'building everyday resilience with technology' when disruption becomes ordinary. https://doi.org/10.1145/3359175

[92] Sensornet. [n.d.]. Sensornet | Meetinstituut Sensornet. http://geluidsnet.nl/

[93] Geertje Slingerland, Stephan Lukosch, and Frances Brazier. 2020. Engaging children to co-create outdoor play activities for place-making. In *ACM International Conference Proceeding Series*, Vol. 1. Association for Computing Machinery, 44–54. https://doi.org/10.1145/3385010.3385017

[94] Robert Soden and Nate Kauffman. 2019. Infrastructuring the imaginary how sea-level rise comes to matter in the San Francisco Bay area. In *Conference on Human Factors in Computing Systems - Proceedings*. Association for Computing Machinery. https://doi.org/10.1145/3290605.3300516

[95] Alexandra Stiver, Leonor Barroca, Marian Petre, Mike Richards, and Dave Roberts. 2015. Civic crowdfunding: How do offline communities engage online?. In *ACM International Conference Proceeding Series*. Association for Computing Machinery, 37–45. https://doi.org/10.1145/2783446.2783585

[96] Alex S Taylor, Siân Lindley, Tim Regan, David Sweeney, Vasillis Vlachokyriakos, Lillie Grainger, and Jessica Lingel. 2015. Data-in-Place. In *Proceedings of the 33rd Annual ACM Conference on Human Factors in Computing Systems - CHI '15*. ACM Press, New York, New York, USA, 2863–2872. https://doi.org/10.1145/2702123.2702558

[97] Nick Taylor, Loraine Clarke, Martin Skelly, and Sara Nevay. 2018. Strategies for engaging communities in creating physical civic technologies. In *Conference on Human Factors in Computing Systems - Proceedings*, Vol. 2018-April. Association for Computing Machinery. https://doi.org/10.1145/3173574.3174081

[98] Helen Teague, Charle Pruett, Chris Kyker, and Ashley Bryan. 2016. Civic Participation, Public Sphere Pedagogy, and Blended Learning Produce an Intergenerational Town Hall Meeting. *In E-Learn: World Conference on E-Learning in Corporate, Government, Healthcare, and Higher Education* (2016), 888–897.

[99] Gemma Teal and Tara French. 2020. Spaces for participatory design innovation. In *ACM International Conference Proceeding Series*, Vol. 1. Association for Computing Machinery, 64–74. https://doi.org/10.1145/3385010.3385026

[100] Maurizio Teli, Marcus Foth, Mariacristina Sciannamblo, Irina Anastasiu, and Peter Lyle. 2020. Tales of institutioning and commoning: Participatory design processes with a strategic and tactical perspective. In *Proceedings of the 16th Participatory Design Conference (PDC 2020)*, Vol. 1. Association for Computing Machinery, 159–171. https://doi.org/10.1145/3385010.3385020

[101] The Mobile City. [n.d.]. The Mobile City | Mobile Media and Urban Design. http://themobilecity.nl/

[102] Transformcity. [n.d.]. Transformcity Amstel 3. https://zocity.transformcity.com/

[103] Jane Turner, David Browning, and Ann Morrison. 2018. Pathways & paws(es): Engaging human-animal partnerships for community building and slow cities. In *ACM International Conference Proceeding Series*. Association for Computing Machinery, 184–188. https://doi.org/10.1145/3292147.3292197

[104] Vasilis Vlachokyriakos, Rob Comber, Karim Ladha, Nick Taylor, Paul Dunphy, Patrick McCorry, and Patrick Olivier. 2014. PosterVote: Expanding the action repertoire for local political activism. In *Proceedings of the Conference on Designing Interactive Systems: Processes, Practices, Methods, and Techniques, DIS*. 795–804. https://doi.org/10.1145/2598510.2598523

[105] Ding Wang. 2016. HCI, policy and the smart city. In *Proceedings of the 30th International BCS Human Computer Interaction Conference, HCI 2016*, Vol. 2016-July. https://doi.org/10.14236/ewic/hci2016.35

[106] WirelessLeiden. [n.d.]. Stichting Wireless Leiden. https://wirelessleiden.nl/

[107] Tan Yigitcanlar, Marcus Foth, and Md Kamruzzaman. 2019. Towards Post-Anthropocentric Cities: Reconceptualizing Smart Cities to Evade Urban Ecocide. *Journal of Urban Technology* 26, 2 (2019), 147–152. https://doi.org/10.1080/10630732.2018.1524249

[108] Wei Zheng, Yan Zhou, and Yi Qin. 2019. An empirical study of incorporation of augmented reality into civic education. In *ACM International Conference Proceeding Series*. Association for Computing Machinery, 30–34. https://doi.org/10.1145/3341042.3341054