#CivicTech For And By Citizens: A Review And A Meta-Evaluation

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Abstract
This paper takes a first step to systematically review and collectively evaluate #CivicTech works done in the computer science discipline, especially the vibrant community of CSCW. Based on 50 full papers published in CSCW, we ran a quantitative content analysis of the works. We found that civic tech is a growing young field with interests from all over the world, across academic, governmental, and commercial sections. While we are progressing well towards the goal of "for the citizens", "by the citizens" remains largely absent. We call for a more balanced approach to civic tech, both in developing cutting edge technologies and in adapting laymen and popular technologies for civic purposes.

Author Keywords
civic engagement; citizens; CivicTech; GovTech; political participation; social capital

CCS Concepts
•**Social and professional topics** → Computer supported cooperative work;

Introduction
The field of #CivicTech is truly interdisciplinary. One such intersection is found in the overlapping interests in developing technologies for civic purposes between social scientists and computer scientists. "Civic technology" and "digital

Definitions
Civic tech: Saldivar et al. [3] defined civic technology as "technology (mainly information technology) that facilitates democratic governance among citizens". This definition is intended to be broad enough to include both government-centric and citizen-centric approaches. Our definition is inclined to the latter approach, which stresses both for and by the citizens. Civic tech needs to not only serve the citizens but also engage them in its design and implementation (e.g., participatory design). However, we are fully aware of the difficulty with such a definition, which may find citizen participation in design easy to say but hard to do.

civics" are terms used to refer to technological innovations aimed "for the public good" [1].

A recent report[2] emphasized "promoting civic outcomes" as an important criterion to identifying civic tech projects. The report listed a wide range of technologies, including e-government and community participation, as forming the spectrum [1].

This paper takes a first step to systematically review and collectively evaluate works done in the computer science discipline, especially the vibrant community of CSCW. Based on 50 full papers published in CSCW, we ran a quantitative content analysis of the works to understand four key questions critical to the development of the #CivicTech field:

- Which civic groups are served, and which civic topics are focused on?
- What technologies are used or designed?
- Who are designing or supporting the design of civic tech?
- What are the limitations and challenges for the field?

Related Work

Two systematic reviews [3, 4] of civic tech platforms provide us an initial description of the field. Researchers found that:

- Many civic tech initiatives exist. Skarzauskiene & Maciulene [4] found 614 such platforms and Saldivar et al. [3] found 1,246 such papers.
- Government-oriented civic tech is a leading genre of civic tech. Governments used platforms to engage citizens to improve their services and functions. Examples include participatory budgeting, urban planning, policy-making, or public sector innovation.
- Citizen-oriented civic tech is also growing, with focuses on a large range of issues from mundane ones such as improving quality of life, to grand ones such as building a stronger democracy with transparency and accountability in the government.
- Both studies point out a lack of collaboration between stakeholders; and a limited engagement of citizens in academic- and practitioner-led projects.

These two reviews provide a bird's eye overview of the field, but there are some notable missing pieces. First, they lack a meta-evaluation of the field: if the field is growing well, what had been done right? Are there any significant problems with the field? Second, the nudge-type of design is not emphasized in their reviews. Nudge-type design rely on existing platforms and make influence through playing user psychology. Although not so innovative, these nudge-type civic techs have long been studied by scholars who pay close attention to how widely-used information technology makes an impact on citizens [2].

Our paper tries to address the above-mentioned limitations of existing works by emphasizing both whole-sale and piece-meal solutions, and by carefully evaluating the effectiveness and sustainability of civic tech projects.

Method

A keyword search on papers published by CSCW up to March 2020 was conducted using the selection criteria: research article, full text, and the keyword "civic" in the abstract. We found 63 papers, with 50 full papers involving civic tech. We then developed a codebook of 22 items and used 10 papers to assess inter-coder reliability between

[1] https://blogs.microsoft.com/on-the-issues/2016/04/27/towards-taxonomy-civic-technology/
[2] https://knightfoundation.org/wp-content/uploads/2019/06/knight-civic-tech.pdf

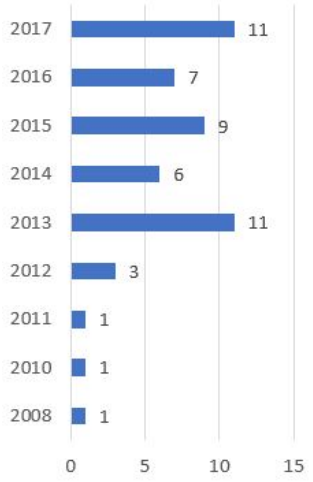

Figure 1: Number of publications per year (2008-2017)

two coders (Scott's Pi: 0.89). Disagreements were resolved through discussion. Five results each from the first and second coders were included with the remaining papers for the final coded dataset.

Results

We found that civic tech papers started to appear in 2008 and first peaked in 2013 (see Figure 1). Since then, the number of full papers published were steady with about 10 each year. However, this trend stopped since 2018, which may be a worrying signal. We note, however, that 8 extended abstracts were published in 2018 and 2019, which may indicate that these studies are still works-in-progress.

Location wise, 38% of the research were conducted in the US, followed by virtual locales without specific identification of a physical locale, and then European countries. There was one paper each from China, Taiwan, South Korea, and Mexico. Despite being mainly developed in the geographical West, a vast majority (92%) either claims that their contribution has no national boundary or does not clearly identify the physical limits.

Civic groups wise, 32% studies targeted general citizens and 26% targeted online citizens. 14% aimed for helping community/organization members and 12% targeted volunteers. Minority groups, e.g. elderly, homeless people, and Native Americans also appeared in the target user groups.

Civic topics wise, 60% of the papers focused on citizen engagement, 18% social capital, 12% political participation, and 10% others. A closer look at the topics shows a highly diverse range of issues being addressed. Those ranked at the top of the long list include urban planning, citizen science, neighborhood issues, disasters, and minority groups.

We found 60% of technologies studied are existing and only 20% are tailor-made. Among those, which are supposed to be design heavy, most of them do not have a clear design approach (84%) nor an empirically based evaluation of the effectiveness of the technology designed (80%). 10% of studies combined both existing technologies and researchers' own inventions. When we look closer to the specific technologies, popular social media platforms such as Twitter (32%), Facebook and websites (24% each), and emails (16%) were the mainstream. It is to our pleasant surprise that most civic techs (72%) are still in use, probably because many such technologies are existing platforms or applications. But there are still some civic techs no longer in use, which suggests the challenge of sustainability.

It is expectable that as we focus on academic research, 98% of the papers involve academics as the main designers of the studies. The pattern is reversed if we look at the designers of the technologies used in the studies: companies such as Facebook and Twitter (62%) became the dominant group and academics only designed 24% of the technologies. Half of the studies (50%) were supported by the governments, followed by foundations and organizations. Companies only provided support to a mere 4% of the studies we analyzed. Research partnership wise, most studies were solely run by academics (68%). If partnership did exist, they were most likely to be schools (16%), followed by governments and organizations (8% each).

Discussion

Although the field looks generally healthy, our empirical data suggest some limitations and challenges we need to keep in mind. At least two areas of improvement exist along the line of "for the citizens". Firstly, citizens from non-democratic or non-Western contexts are under-served by civic tech. These contexts differ in aspects like tech development capacity, political systems, and cultures. We should

not assume the universality of technological design in these contexts, especially for civic purposes. Secondly, most civic tech designs still target general citizens, which is understandable considering the youth of the field. However, we need to expand our target users to help those who are in high need of help, such as the minorities. Civic tech is not only for the majority of citizens but also for taking care of the minority, in order to enhance social justice and keep social integration.

What seems to be largely absent in current civic tech research is the goal of "by the citizens". Despite prominent design theories such as participatory design, most studies do not involve citizens in the design phase, but instead merely as naive users. Civic tech scholars need to build infrastructure to reach out to civil society partners.

Limitations

Our study is only a first step leading towards a larger project. Thus, many limitations exist. Firstly, our search is limited to one keyword "civic". Secondly, the database we use is only the ACM Digital Library. Thirdly, we note that there are many practitioners who design civic tech but do not always document their practices in the form of academic papers. Lastly, we authors are located in a Global South location. Although this rather marginal position has its advantages (e.g., urge us to be open to both the West and East), we recognize the limits of our perspectives.

Conclusion and Future Work

In conclusion, we found that civic tech is a growing young field with interests from all over the world. We believe that academics across disciplines but with shared interests need to join forces; both academics and practitioners around the world should come together to address these common civic challenges. We also call for a more balanced approach to civic tech, both developing cutting edge technologies (e.g., AI, VR/AR) and adapting laymen and popular technologies (e.g., social media). The latter is no less challenging than the former and involving citizens in the design of both technologies and processes [5] would be key.

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