Virtual Environments as Enablers of Civic Awareness and Engagement

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ABSTRACT

The wide availability of accurate sensors currently hosted by smartphones are enabling new participative urban management opportunities. Mobile crowdsensing (MCS) allows people to actively participate in any aspect of urban planning, by collecting and sharing data, reporting issues to public administrations, proposing solutions to urban planners, and delivering information of potential social interest to their community. Although collected data can be very helpful to enhance the quality of life of citizens, mobile users are still reluctant to use their devices to take advantages of the opportunities offered by the digitized society, mainly due to privacy issues. From August to December 2018, the city of Florianópolis, capital of Santa Catarina, in southern Brazil, was used as a living lab environment for an MCS application called ParticipACT Brazil, a socio/technical-aware crowdsensing platform. While the current literature focuses on MCS from a purely technical point of view, this research demonstrated that a multidisciplinary approach that includes both human sciences and ICT is needed in order to better identify critical issues, highlights the untapped potential of MCS paradigm, and suggests research methodologies that could provide benefits for all the actors involved (researchers, public administrators, and citizens).

KEYWORDS

Civic Awareness, Civic Engagement, Cloud Computing, Mobile Crowdsensing, Participation

INTRODUCTION

Mobile Crowdsensing (MCS) is a recent sensing paradigm that leverages on the worldwide availability of sensor-rich smartphones and relies on people willing to collaborate toward continuous data harvesting processes. By installing an MCS application, smartphones can become part of a (large-scale) mobile sensor network (Chessa, Corradi, Foschini, & Girolami, 2016) connected to each other through cloud servers. MCS can enable virtual Community of Actions (CoA) interested in identifying solutions to surrounding critical issues (i.e. traffic congestions, delay in public transport, lack of

city services and so on) and participate to public utility services by sharing useful information to neighbors. In this scenario, citizens are both actors and beneficiaries of a participatory system that put both individuals and communities at the center of urban planning managements with the final purpose to speed up the settlement of city problems. The limited investments required to develop and maintain MCS platforms and applications made the MCS paradigm very attractive to urban managers. Nevertheless, despite its potential, MCS still struggling to establish itself within the wide public as a useful recognized tool that could foster city life enhancement.

ParticipACT Brazil is a socio/technical-aware crowdsensing platform (Bellavista, et al. 2018) developed by the University of Santa Catarina (UDESC) in partnership with the Federal University of Santa Catarina (UFSC) and the University of Bologna (UNIBO) in Italy. The goal is to exploit information and communication technologies (ICTs) to structure large databases and thereby improve the management of smart cities by using data from a crowdsensing campaign. In ParticipACT, users engage in data gathering activities by complete cooperative tasks assigned by administrators. However, to correctly identify urban issues and therefore provide useful data, a certain level of civic awareness is required from the user participant.

Participatory sensing requires active involvement by both administrators and users in a double intervention. On the one hand, the administrator of the crowdsensing application must start a campaign in which it defines the tasks to be performed by the user; on the other, the user must enable sensors readings on a specific target. In brief, the active participation of people is subordinated to actions on the mobile devices and requires willingness and consent, which implies a certain level of awareness regarding the surrounding environments and knowledge of the issues that affect the local community. A relevant aspect related to social environments, individuals and collective behaviors, and social barriers must be taken into account in order to fulfil the goals of an MCS experiment. Therefore, the ParticipACT project adopted a multidisciplinary perspective that considers both technological and social innovation as part of a common research process capable of producing significant benefits for both researchers and end users.

In this article, the authors present the results of the last campaign of ParticipACT Brazil, executed in 2018, and reflect on the emerging importance of civic awareness and social commitment in general MCS processes. The first section introduces a technical and socio-cultural background related to MCS while the second part highlights the experimental results collected via ParticipACT experiments in the Brazilian area of Florianópolis. The last section introduces the ongoing research directions related to Mobile Crowdsensing methodologies.

CIVIC ENGAGEMENT THROUGH MCS TECHNOLOGIES

According to Gartner (2016), there are more than 1.4 billion smartphones sold worldwide by 2015, while Statista (2018) estimates the number of smartphone users will reach 2.87 billion by 2020. In a worldwide scenario, where the spread of mobile devices is now pervasive, advances in wireless communications, intelligent sensor-rich devices and social computing applications are offering new opportunities for detection and management that are promoting new forms of involvement and participation virtual, especially in densely populated areas. Some empirical investigations have sought to identify which factors influence the civic engagement: structural aspects of the State and society (such as socioeconomic development, political and social institutions and individual attributes), linked to material resources and personal motivations have been combined in different ways by researches of different disciplinary area to understand the constraints of social commitment within the digital context (Borba & Ribeiro, 2010; Norris, 2002).

According to Norris 2001, in the virtual environment, there are four strands mapped in engagement studies: cyber-optimists, cyber-pessimists, cybernetics and multidirectional visionaries. For the first group, the Internet created communication structures and, consequently, new opportunities for participation that are substantially different from the participation in the offline space. The network

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