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Anthopoulos, Leonidas; Janssen, Marijn; Weerakkody, Vishanth

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Introduction to the Special Issue on Citizen Centricity in Smart Cities

LEONIDAS ANTHOPOULOS, University of Thessaly, Greece
MARIJN JANSSEN, Delft University of Technology
VISHANTH WEERAKKODY, University of Bradford

City digital transformation is being performed across the globe and it is being supported by several initiatives and policy groups. Nevertheless, this transformation is mainly technology oriented. Although there have been several interesting and impactful outcomes, like solutions for enhancing municipal efficiency and local living, the results lag behind expectations. Real transformation should also change structures and address the whole range from social to technical aspects. People-centricity in this transformation is an emerging topic that is attracting attention and some initiatives have launched. People-centric transformation can be defined as a multi-stakeholder approach to digital transformation that realizes sustainability, inclusiveness, prosperity, and human rights for the benefit of all. The aim of this special issue is to better understand all aspects of citizen centricity and how it can change the orientation of city digital transformation process. The special issue highlights the main elements of people-centricity in cities: inclusiveness, openness, engagement and empowerment via securing citizen awareness, data privacy, service simplification and transparency, and technological availability and observability.

1 INTRODUCTION

Cities around the world are in the process of digital transformation with the guidance and support of several initiatives and policy-making groups (i.e., the European Commission with the Intelligent Cities Challenge initiative [1]). However, many cities mainly focus on technology and processes for their digital transformation and prioritize efficiency and effectiveness in delivering administrative services and promoting local living. This has resulted in limited digital transformation and the results have lagged back the expectations. People-centricity in this transformation is an emerging topic that is attracting attention and some initiatives have launched (i.e., the United for Smart and Sustainable Cities Thematic Group "Enabling People-Centered Cities through Digital Transformation" [2]). *Digital transformation* has been defined as "a fundamental change process enabled by digital technologies

that aims at bringing radical improvement and innovation to an entity [e.g., an organization, a business network, an industry, or society] to create value for its stakeholders by strategically leveraging its key resources and capabilities" [3]. In this respect, *people-centricity* can be defined as "a multi-stakeholder approach to digital transformation that realizes sustainability, inclusiveness, prosperity, and human rights for the benefit of all".

This special issue addressed people centricity in city digital transformation and invited works that highlight how corresponding policy-making and emerging technologies can alternate the orientation of city digital transformation process to prioritize citizen needs, and make cities resilient, inclusive, and sustainable. Collected works focused on the following topics:

—Human-centric design, implications for the governance, control, and performance evaluation.
—Inclusiveness in all its varieties to build inclusive smart cities.
—People centricity in mobility ecosystems.
—Citizens as Developers and Consumers.
—Human-centric design in digital health services.
—Crowd flow prediction and estimation in urban environments.
—Smart citizenship frameworks.
—Enhancing smart service efficiency (utility network design optimization, multi-tenancy, and so on.)
—Energy transition in an urban context (e.g., the development of microgrids and their governance)

Eight outstanding works structure this special issue and addressed the above topics. Some of them are significantly extended versions of the ACM International Smart City Workshop entitled "WebAndTheCity'22: 8th International Workshop on The Web and Smart Cities", which took place in conjunction with The Web Conference 2022 [4], while the rest were collected after an open call to the scientific community.

The first work is authored by Anouk van Twist is entitled "Often people don't understand the complex world: How Local Governments deal with Political Contestation about the Smart City" and discusses how local governments can deal with political contestation against smart city initiatives. The author highlighted the inclusiveness, openness, and empowerment citizen-centric parameters, he examines whether deliberation can be the means for local governments, and he performs interviews with local government servants in Netherlands to compare three depoliticizing strategies that are based on a silent ideology within the government, and a lack of practical methods to organize agonistic channels for engagement: (1) inclusiveness of citizens with a rational and reasonable behavior; (2) openness of alternative but reasonable viewpoints; and (3) contestation permission, but only if it is perceived at the right time and in the right context.

Then, Kitzing and Göbel with their article entitled "Defining Anonymity Properties of Data Sets with the Compliance Assertion Language (COMPASS)" introduce a new approach to improve the verification and communication of the processing of **Personally Identifiable Information** (**PII**). The **Privacy-Enhancing Verification Component** (**PE-VC**) is used to check whether a system is compliant to the law with respect to privacy preservation. They highlighted the openness citizen-centric parameter and utilize evidence from Germany to validate that the data protection officers formulate legal anonymity requirements with the Compliance Assertion Language (COMPASS), while they need less information about the exact steps executed for the de-identification with respect to privacy and without any further intervention of other software components.

The article entitled "SocioCoast: Design and Implementation of a Data-Driven Platform for Citizen Science in Coastal Areas" and authored by Chatzivasili, et al. follows, which introduces the "SocioCoast framework" consisting of a web Knowledge Platform and a mobile application that focus on citizens' science and crowdsourcing in coastal areas. They use evidence from Cyprus to demonstrate their approach. The authors highlighted the empowerment citizen-centric parameter, and they envision that their work can preserve and protect the environment via users' involvement and observations, more specifically the coastal areas via the information provision about these areas and crowdsourcing.

The fourth article that was delivered by Neumann et al. is entitled "Participating Citizens = Smart Citizens? Applying the Human-Centered Design Approach on a Digital Care Platform", it highlighted the inclusiveness citizen-centric parameter, via focusing on the smart care sector. They considered the implementation of a digital care platform that is target group-oriented and built according to the needs of the individual stakeholders. They also define a business model that is appropriate for the platform after applying a human-centered design approach that focuses on all perspectives and allows a deep understanding of the opportunities and challenges. The authors follow human-centric and user-centric design of a digital care platform to validate whether human-centered design approach is applied to evaluate the benefits of a care platform for users and service providers. The results of this article's analysis are recorded with the help of a Benefit Model and show that the value proposition of the proposed smart care platform concern corresponding care service simplification and transparency.

Fornaroli and Gatica-Perez in their article "Urban Crowdsourcing Platforms Across the World: A Systematic Review" perform a systematic academic literature review on urban crowdsourcing platforms that gather citizen-generated data. It aims at shedding light on the state of research and development of these platforms. It uses the PRISMA statement for systematic reviews and collected articles from Elsevier's Scopus, the **Social Science Research Network** (**SSRN**), Wiley Online Library, ACM Digital Library, and IEEE Xplore. This review highlighted the engagement citizen-centric parameter, it returned a good collection of platforms, classified according to specific criteria, while useful conclusions about their main features, including their location, purpose, and data characteristics are highlighted as citizen-centric features, which are also important to depict how these platforms perform and how they can enhance citizen participation.

Nikolaou and Anthopoulos follow with their article entitled "Multi-Tenancy and Observability in Smart City Platforms", which analyzes the multi-tenancy software architecture pattern for smart city platforms, especially considering their performance for crowdsourcing data. The authors consider observability as one of the key features of a smart city platform, which can ensure that its operational requirements are met. The authors examined whether multi-tenancy - which emerged to optimize the use of compute resources and minimize the operational cost of large-scale deployments like the smart city platform- can serve this feature. The article highlighted the *engagement* citizen-centric parameter and concluded that multi-tenancy might not be the optimum software architecture for smart city platforms compared to the single-tenant approach. Enhancing the performance of crowdsourcing data platforms is crucial for securing citizen interest and participation in local activities.

The seventh article is authored by Voelz et al. is entitled "Citizen-Centric Design of Consumable Services for Smart Cities" and examine citizen *engagement* citizen-centric parameter in service design (or co-design) in cities. The authors recognize the utilization of emerging information technologies that manage complex processes within cities, but which also enable the simplified integration of citizens into identifying problems and creating corresponding solutions. More specifically, the article examines how citizens can design and later execute their own services within a smart city environment by employing conceptual modeling and microservices. Their proof of concept was based on a drone tour guide case, which confirmed the reusability of the co-developed microservices although they have not been standardized yet and they require community awareness. They performed citizen workshops, to exchange innovative ideas between different stakeholders with the design thinking methodology.

Finally, the last article from Rob Cristiaanse recognized cities as an ecosystem consisting of "Human Centricity as Leading Design Principle for Smart City Innovations: Implications for the Governance, Control, Reporting and Performance Evaluation of Well-being of Civil Society Actors" and questioned the appropriate governance structure that minimizes the transaction costs in governing and controlling in the build and service design for large-scale organizations that behave in similar means to a city. The article highlights the openness citizen-centric parameter and investigates the notion of the governance of common goods and the problem of organizations - how or when to balance control mechanisms. It introduces a mathematical model to explicate information needs in a bilateral contract and use these insights in the case study, initialized and inspired by the procurement process of transportation services at the Prinsenstichting in the Netherlands.

Results show that the information problem emerges when the object of what is exchanged between two parties is not considered as the unit of analysis.

The above articles' outcomes depict that the main elements of people-centricity in cities concern *inclusiveness, openness, engagement, and empowerment* that can ensure citizen participation, service co-design and use, and crowdsourcing for realizing a city that prospers, operates for the good of all, is resilient and sustainable. However, these elements can be established only when community awareness is raised, data privacy, service simplification and transparency are ensured, and technological availability and observability are performed. Future research can utilize these outcomes and explore them further in real scenarios in order for digital transformation in cities to prioritize people and their needs.

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