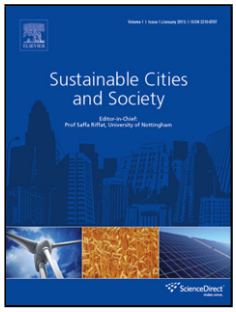

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ICT of the New Wave of Computing for Sustainable Urban Forms: Their Big Data and Context–Aware Augmented Typologies and Design Concepts

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Abstract

Undoubtedly, sustainable development has inspired a generation of scholars and practitioners in different disciplines into a quest for the immense opportunities created by the development of sustainable urban forms for human settlements that will enable built environments to function in a more constructive and efficient way. However, there are still significant challenges that need to be addressed and overcome. The issue of such forms has been problematic and difficult to deal with, particularly in relation to the evaluation and improvement of their contribution to the goals of sustainable development. As it is an urban world where the informational and physical landscapes are increasingly being merged, sustainable urban forms need to embrace and leverage what current and future ICT has to offer as innovative solutions and sophisticated methods so as to thrive—i.e. advance their contribution to sustainability. The need for ICT of the new wave of computing to be embedded in such forms is underpinned by the recognition that urban sustainability applications are deemed of high relevance to the contemporary research agenda of computing and ICT. To unlock and exploit the underlying potential, the field of sustainable urban planning is required to extend its boundaries and broaden its horizons beyond the ambit of the built form of cities to include technological innovation opportunities. This paper explores and substantiates the real potential of ICT of the new wave of computing to evaluate and improve the contribution of sustainable urban forms to the goals of sustainable development. This entails merging big data and context–aware technologies and their applications with the typologies and design concepts of sustainable urban forms to achieve multiple hitherto unrealized goals. In doing so, this paper identifies models of smart sustainable city and their technologies and applications and models of sustainable urban form and their design concepts and typologies. In addition, it addresses the question of how these technologies and applications can be amalgamated with these design concepts and typologies in ways that ultimately evaluate and improve the contribution of sustainable urban forms to the goals of sustainable development. The overall aim of this paper suits a mix of three methodologies: literature review, thematic analysis, and secondary (qualitative) data analysis to achieve different but related objectives. The study identifies four technologies and two classes of applications pertaining to models of smart sustainable city as well as three design concepts and four typologies related to models of sustainable urban form. Finally, this paper proposes a Matrix to help scholars and planners in understanding and analyzing how the contribution of sustainable urban forms to sustainability can be improved through ICT of the new wave of computing and its novel technologies and applications, as well as a data–centric approach into evaluating this contribution and a simulation method for strategically optimizing it.

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