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EDITORIAL

Design trade-offs in cultures of participation: empowering end users to improve their quality of life

The society we live in today is frequently referred to as knowledge society or knowledge economy, and the futurist Toffler (1981) refers to it as 'The Third Wave Society' by arguing it is as distinct as the previously much longer lasting agricultural society and industrial society. Toffler predicted the trajectory technology and society would take – from centralised, mass industrial institutions to decentralised, 'de-massified', customised niches and networks, which would require knowledge and technology as key elements.

In the last decades, Information and Communication Technology (ICT) have made tremendous progress, but their development and adoption have not necessarily led to an improvement of *quality of life* (Fischer 2018). The digital age transforms human life style, habits, culture, organisational activities and architectures. In turn, services and applications of ICT continuously evolve with the social world in order to meet human and organisational requirements. From this perspective, *cultures of participation* (Fischer 2011) have emerged as the result of the shift from consumer cultures, where people are passive recipients of artefacts and systems, to cultures in which users are actively involved in the development of solutions to their problems.

Cultures of participation need to be supported by the design of digital networked environments (Benkler 2006) through traditional and innovative technical infrastructures. This requires that designers understand related challenges and provide socio-technical environments for empowering end users to develop critical thinking skills, grow ideas, and adapt or create their own digital artefacts; in this way, users may become active contributors in personally meaningful activities (Caivano et al. 2018).

However, designing such socio-technical environments is not a straightforward process: *design trade-offs* (Fischer 2018) must always be dealt with, in order to identify a satisficing solution (Simon 1996) in a particular context, on the basis of specific people's objectives, preferences and values. Trade-offs can be recognised in all those situations where one needs to renounce to something in order to gain something else. Problem solving usually represents one of these situations, and three types of trade-offs are of special interest: (1) Trade-offs in balancing the goals to be achieved and the constraints associated with tasks and sub-goals for achieving it (Newell and Simon 1972), (2) trade-offs associated with switching between problem framing and problem solving (Schön 1983) and (3) trade-offs in conquering tame problems versus wicked problems (Rittel and Webber 1984). These trade-offs operate on different levels of abstraction and for different domains. Identifying, exploring and evaluating design trade-offs represent a unique challenge in designing socio-technical environments for quality of life.

In Europe 2020 strategy,[1] one of the most important objectives for quality of life is *social inclusion* (Bjerknes and Bratteteig 1995; Nygaard 1986). It is the process of improving the terms of participation in society, particularly for people who are disadvantaged, such as disabled people, elderly people, learners of all ages and all groups that have to cope with the use of non-convivial tools (Illich 1973). In such contexts, designing for cultures of participation and social inclusion means to take into account all the peculiar characteristics of stakeholders and the diversity of user differences to find out what trade-offs have to be dealt with for satisfying their expectations and reaching the desired outcomes (Barricelli et al. 2018).

Meta-design ('design for designers') (Fischer, Fogli, and Piccinno 2017), *end-user development* (EUD) (Lieberman et al. 2006; Paterno and Wulf 2017; Barricelli et al. 2019) and *collaborative knowledge construction* (Mørch, Caruso, and Hartley 2017) could facilitate dealing with design trade-offs by fostering the creation of socio-technical environments in which end users can be creative and participate in design activities. The monopoly of highly trained computing professionals acting as 'high-tech scribes' should be eliminated with design environments supported by meta-design. This does not mean that there is no place for professional programmers and system designers in the future, but it suggests that one of the most important objectives of the professional computing community should be to create

systems that will put owners of problems in charge. Achieving this goal is not only a technical problem but requires also considerable social effort, knowledge and skills (such as new forms of knowledge sharing). If the most important role for computation in the future is to provide people with a powerful medium for expression, then the medium should support them in working on the task of their interest, rather than requiring them to spend intellectual resources on the medium itself. The context for human development is always a socio-cultural setting of people and technologies, never an isolated technology or knowledge in a vacuum. Our current cultures largely move in the direction of making learners increasingly independent of high-tech scribes. This is manifest in that learners have acquired true computational fluency by growing up with digital media as a primary representation for thinking, learning, working and collaborating. The right kind of socio-technical environments (bringing people and media together) will allow learners to become independent of high-tech scribes in the context of personally meaningful problems, such as complex problem solving, social activities and collaborative knowledge construction.

Figure 1 synthesises the relationships among the above concepts.

While several approaches and tools have been proposed over the years to support cultures of participation and social inclusion, a reflection on the design trade-offs that led to their proposals or that emerged during their development is still missing. Moreover, the impact on the quality of life of proposed solutions is rarely critically analysed.

The aim of this special issue is to fill this gap and describe recent research studies concerning the design of systems empowering end users to participate in personally meaningful activities with a focus on the design trade-offs associated with quality of life.

Overview of the selected papers

This special issue received 13 articles from all over the world. After a rigorous double-blind review process, six research papers have been selected to be included in the special issue.

By considering the trade-off between autonomy and control in socio-technical system design, **F. Cabitza, A. Locoro and A. Ravarini** present a literature review about alternatives to the traditional design discourse, with the aim to describe a wide range of approaches that address 'wicked problems' in more sustainable and resilient ways; to this end, they propose 'de-design' as a way to de-emphasise design as a theoretical construct, by reconsidering practice as the leading principle of digital innovation.

D. Fogli, A. Piccinno, S. Carmien and G. Fischer reflect on the role of meta-design as a way to foster social inclusion in the domain of assistive technologies; their paper examines different design projects in which caregivers must accept the role of end-user developers, and identifies new guidelines for meta-design supporting social inclusion.

Methodologies and frameworks to support the design of smart interactive experiences (SIE) – usage situations enabled by the Internet of Things that empower users to

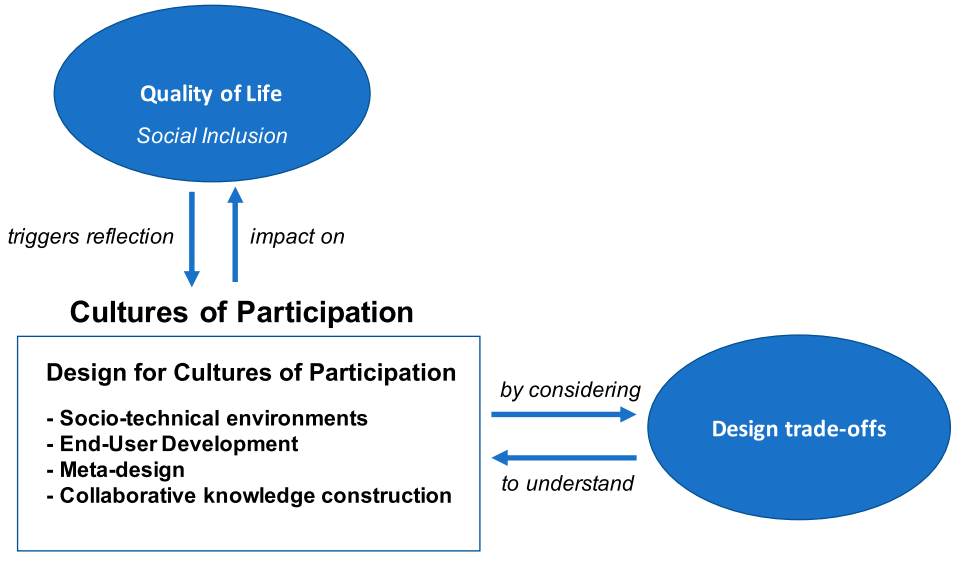

Figure 1. Relationships among the main concepts discussed in the special issue.

interact with the surrounding environment – are discussed in the paper by **C. Ardito, G. Desolda, R. Lanzilotti, A. Malizia and M. Matera**; the authors explore the trade-offs of three EUD paradigms for SIE design by domain experts, in order to identify an architecture of a platform that might be tailored to different design situations.

J. Derboven, R. Voorend and K. Slegers discuss design trade-offs with reference to the HeartMan case study, a project aimed at developing a self-management system for patients with chronic heart failure. Drawing upon the literature and analysing the results collected in design and evaluation phases with the contribution of 118 heart patients, three categories of trade-offs are explored to offer new insights about the development of self-management technology.

The paper by **R. Gennari, A. Melonio and M. Rizvi** discusses the trade-offs emerged in the design of interactive tangible solutions for supporting children's conversations in classrooms and scaffolding of social norms; an approach based on meta-design and action research has been adopted and the paper illustrates the role of these methods in the genesis and emergence of ClassTalk, a tangible for class conversation.

Finally, the paper by **S. Valtolina, B. R. Barricelli and S. Di Gaetano** presents a user study that compares traditional GUI-based interfaces with conversational interfaces (chatbot-based systems); by exploring the design trade-offs related to the efficiency and effectiveness of communication of these different interaction paradigms, the authors propose their vision regarding the benefits of using a chatbot for providing a better communication strategy between users and systems.

Conclusion

The papers included in this special issue contribute to a deeper understanding of design trade-offs in different application domains, where participation of end users supports appropriation of socio-technical environments addressing challenges associated with improving the quality of life and fostering social inclusion. With this special issue we hope to inspire additional reflections on the impact that existing and future technology can have on the quality of life, and help identifying novel methodologies and frameworks to cope with the growing complexity we are facing.

Note

1. https://ec.europa.eu/info/business-economy-euro/economic-and-fiscal-policy-coordination/eu-economic-governance-monitoring-prevention-correction/european-semester/framework/europe-2020-strategy_en

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