

Co-Design: digital tools for knowledge-building and decision-making in planning and design

Co-Progetto: strumenti digitali per la costruzione della conoscenza e il supporto alle decisioni nella progettazione collaborativa

Digital tools for design process, nowadays extensively popular, opened enormous operational possibilities, not only for technical practices, but also to collaborative and participatory design. Through these technological innovations, from urban planning and environmental design applications to the practice of architecture, exploration of alternative solutions is potentially faster being also potentially effective and easier understand and assess processes.

In order to create more effective design workflows at different scales, this capability requires the definition and the implementation of interoperability (not limited to setting formats!) that optimizes the integration of information among the various project sectors.

Within this framework of co-design it is expected to highlight not only research and practice related to building at different scales (environmental and urban process), but also to focus on the specific character of drawing applications, which should be able to present an understandable "communicative interface" for everyone involved.

L'utilizzo di strumenti digitali, oggi ampiamente diffuso nei processi progettuali, ha aperto enormi possibilità operative non solo per gli aspetti specializzati, ma anche per sviluppare forme di progettazione collaborativa e partecipata. Con questa strumentazione l'esplorazione di soluzioni alternative, dalla pianificazione alla scala territoriale ed ambientale fino alla progettazione alla scala dell'oggetto edilizio ed architettonico, potenzialmente diventa più rapida e di più agevole comprensione e valutazione.

Queste potenzialità rendono ora importanti, per una realizzazione ancor più efficace dei progetti alle varie scale, la definizione e l'implementazione di requisiti di interoperabilità (non solo di formati!) che ottimizzino l'integrazione delle informazioni fra i vari settori progettuali.

Si vuole con questa tematica di co-design favorire non solo l'indagine sulla costruzione del progetto alle varie scale (in questo caso quella ambientale ed urbana), ma anche centrare l'attenzione sul carattere specifico del Disegno progettuale, che deve poter rappresentare una "interfaccia comunicativa" completa e comprensibile per tutti i soggetti coinvolti nel processo.



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GUEST EDITORIAL

Current advances in Information and Communication Technologies (ICT) are affecting the way the design professionals create their products and new approaches arise. However, we can observe different pace in design digital uptake depending on the domain of interest and on the scale, with variations in different world regions where more or less fertile conditions for innovation can be found. Indeed, global communities of digital designers are growing around the world.

When it comes to design of cities and territories, in the last decades after a temporary transition from traditional analogue methods, tools, and media to Computer Aided Design (CAD), Building Information Modelling (BIM) and Geographic Information Systems (GIS) are increasingly becoming common tool in architectural and engineering design and in spatial planning. While the transition is far from being completed, best practices already showed the potential of the digital innovation in design and planning. While the design tradition conveys an invaluable rich heritage of principles, methods and approaches, digital innovation not only offers quantitative advantages (i.e. more for less), but may enable the development of new paradigms, enriching the complexity of information embedded in design products (i.e. better for less). This aspect is starting to be evident even among the most reluctant and sceptical scholars and professionals, who until recently often saw the digital design uptake in its early stages as a mere instrumental issue.

While in architecture the CAD revolution first, and the current BIM diffusion are characterised by fast and widespread progress, the GIS introduction in planning have been much slower, still sensibly growing. The factors affecting the pace of digital innovation in design in the various domains may be many, from the critical mass of those involved to the complexity of the design domains. Contextual factors such as research advances and regulatory frameworks may have their contribution too. Development and diffusion of technology standards surely helped to boost the diffusions to the wider practice.

In spatial planning and design, the diffusion of digital

spatial information fostered a process of innovation. The diffusion of regional and local geographic information systems run by public and private agencies and the recent advances in Spatial Data Infrastructures (SDI) enabled the sharing of Authoritative Geographic Information (AGI) to the public at large, allowing planning and design professionals to access more accurate data and perform faster and better analyses to study past (Craglia & Campagna, 2010), present and future territorial dynamics to inform design. In the last decade in addition, the diffusion of Volunteered Geographic Information (VGI) enabled to investigating social dynamics and citizens perceptions, preferences and values, contributing to earn new insights on the relationships between communities and places in real-time. Likewise, geospatial information technologies became cheaper, faster, more interoperable, and accessible to all. The integration of GIS, with dynamic simulation and parametric models, ICT service orientation as well as advanced visualization tools and user-friendly interfaces is facilitating the shift from the early paradigm (Harris, 1989) to a 2nd generation of Planning Support Systems (Campagna, 2016) integrated with social networking technologies, able to accompany those involved in planning and design along the whole process.

In the light of the above premises, this Disegnarecon special issue on Co-Design aims at highlighting how digital technologies in general are changing the design paradigm in spatial planning, at all scales from urban design to regional planning. The focus, given the specific design domain, is on spatial Information Communication technologies. The transdisciplinary contamination between planning and design and Geographic Information Science gave birth in the last decade to Geodesign, an approach embraced by a fast-growing community worldwide. Left aside any risk to focus on buzzword, geodesign is both an old and a new approach. It finds its roots in a long design tradition in architecture and environmental planning, but eventually it is currently reaching a new paradigmatic evolution step forwards thanks to the current maturity of spatial information technologies.

Since worldwide consensus on the urgency of ensuring sustainability of development was reached with the Rio

Declaration on Environment and Development and on the principles underpinning this broad and major goal, Agenda 21 set the means to achieve it. From a planning and design perspective, these include the savvy use of environmental resources, the improvement of the quality of life of human-beings, without neglecting economic development. Beside the major pillars, the means to achieve the targets include sound informed participatory decision-making.

Geodesign take these principles on-board and make it operational up to a point which would not be possible without extensive use of spatial information and communication technologies. According to Steinitz (2012) the complexity of current development challenges and the high risks involved require design to be a multi-actors action. Design is not anymore an endeavour of individual designer; rather, as far as the working scale entails growing complexity, designers should work in synergy with geographic scientists, and experts in information technology, responsible to enable the digital uptake in design workflow. In addition, the community, the people of the place, should have a relevant part role and give a substantial contribution in the process. This way, design becomes collaborative in essence.

The urban planners and architects are claimed to act as decoders of collective values, and the use of visualization digital tools, based on modelling and simulation, to give support to opinion making and decision making (Moura, 2015; Moura, 2016).

The articles presented in this DisegnareCon issue document through a variety of case studies how researchers in South America, North America and Europe are facing the co-design challenges. They show viable ways how the collaboration between design professionals and geographical sciences experts with the support of Information Communication and geo-spatial Technologies may offer powerful tools for earning better insights to inform design. In addition, several studies are reported which propose methodologies and the tools for the inclusion of community preferences, visions, perceptions, and values with knowledge building and decisions-making and design in spatial planning.

Parametric modelling emerges as a powerful tool at the interface between design and planning to understand ongoing dynamics and simulate possible futures. Different applications are presented which highlight the potential for different application domains. Benevides et al and Castro et al show how 3D parametric modelling can be used to study ongoing process of physical development in urban settlements, while Moura et al apply these parametric modelling to handle flood management in urban areas. But parametric modelling can be also applied to integrate information on urban and territorial dynamics with the preferences of the design team to support urban design thanks to the integration of multi-criteria analysis techniques.

From this collection of experiences also emerges clearly as collaboration and participation can be substantially facilitated thanks to the use of ICT. Sá et al, Sá and Magalhães, and Longo and Ribas show how social media technology can be used to facilitate data collection and sharing between experts and the broader community. Davies also discusses as crowdsourcing can be considered an alternative source of geographical data to complement official data repositories, arguing how the new sources may represent, if properly used, important dimensions in knowledge building which are usually not considered in traditional official data, and how they can express the view of multiple agents in society.

Spatial Models were developed and applied in some studies to produce information from data, with the goal to construct knowledge about place, culture and territory. Spatial models are the base of geoprocessing IT and must be applied to produce representation models in different scales of the territory. The thematic was developed by Souza, and Fonseca to analyse the geography of health, by Rocha et al to analyse green infrastructure, and by Lage to analyse cultural heritage areas. Motta et al presented a proposal to use IT and parametric modelling to compose variables and to produce multicriteria analysis, with the goal to include the thematic in architectural courses.

Geodesign emerge as a novel approach to deal with all the iterative phases of a planning and design process, starting from the analysis of past, present and current urban and territorial dynamics, to co-design creations,

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assessment and decision-making. From the studies presented in this issue several geodesign perspectives emerges from the integration of expert knowledge in design (Casagrande and Moura), to collaboration, participation and negotiation (Rivero et al; Monteiro et al). Lanfranchi and Fozino contribute with a robust review of the literature, quite useful to the discussion of the state-of-the-art. Rivero et al and Monteiro et al document full-fledged geodesign studies to coordinate authorities in integrated planning and to handle collaboration and participation in informal settlements where deprived community are often otherwise excluded from process the outcome of which will eventually affect their lives. In addition to that, with a novel approach, Freitas and Moura and Cocco and Campagna pave the way to the understanding of the design process itself. Making advantage of advanced analytical tools and of the design process log-data recorder in state of the art planning support systems, they analyse the evolution of the design as well as the influence of the actors participating in the design process, respectively.

The number is also composed by the transcription of an interview with Carl Steinitz, held on Belo Horizonte, Brazil, in the School of Architecture from the Federal University of Minas Gerais, in 2017.

The experiences from research and practice documented in this special issue contribute to demonstrate all the baseline assumptions. This collection can be considered a further call for these approaches to become mainstream in planning and design research and education. If it will be the case, we can expect that the professionals of the future will succeed to foster more sustainable and democratic design, spatial decision-making, and territorial development bringing innovation into practice.

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guest editors*

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