Producing Project

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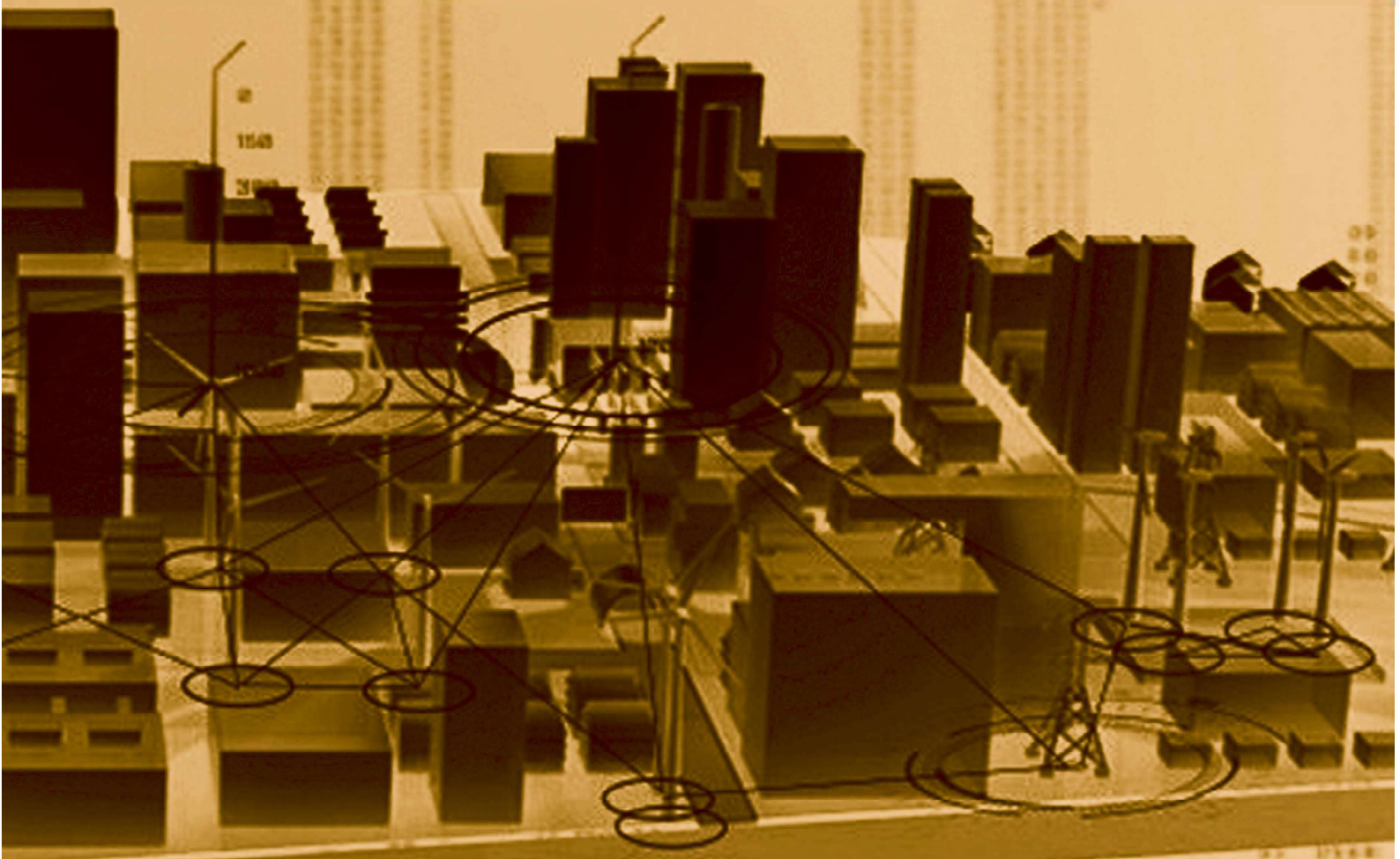

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The transformations created about the design activity by the several challenges started by the economic crisis, climate change and environmental emergencies, together with the impact of the Web and ICT on social and productive systems, highlight many critical issues, but also significant prospects for updating concerning places, forms, contents and operating methods of "making architecture", at all levels and scales.
In this context, the cultural tradition and disciplinary identity of Architectural Technology provide visions and effective operating practices characterized by new ways of managing and controlling the process with the definition of roles, skills and contents related to the production chains of the circular economy/green and to real and virtual performance simulations.
The volume collects the results of the remarks and research and experimentation work of members of SIT*d*A - Italian Society of Architectural Technology, outlining scenarios of change useful for orienting the future of research concerning the raising of the quality of the project and of the construction.

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3.19 DIGITAL TECHNOLOGIES AND PRODUCTION OF INHABITED SPACE IN THE ATHROPOCENE

Marina Rigillo[*]

Abstract

The rise of ITC technologies identifies an epochal innovation, which does not yet find a shared cultural positioning, due to the dimensions and the speed of the change. The value of innovation is not only qualifies for its technological content, but also for its impact on the inhabited space (housing, building, city) and on lifestyles, so that it is increasingly urgent to make such cultural change correspondent with new design approaches, integrating consolidated project methodologies with completely new ICT processes and tools. The paper aims to describe the change underway through a review of research and events, with the purpose of identifying the supporting elements and to hinge them within the technological culture of architecture.

Keywords: Digital Technologies, Inhabited Space, Life Styles, Knowledge Transfer, Anthropocene

Background

The rise of digital technologies has led to the overwhelming transformation of contemporary society, permeating the quality of production processes, the characteristics of goods and services, and (above all) the nature of the relationship between people and objects, and of the objects between themselves, now required to develop a continuous and ever more intense interaction. The Third Industrial Revolution, forecasted by Rifkin in 2011, has actually been overlooked and overcome by the advent of the Fourth, which has established an "epochal" paradigm shift, historic for the size, speed and scope of transformation and for its consequent impacts on the social system (Schwab, 2016, pp.8). It is not inappropriate to use the term "epochal", since the combination of Information Technology (IT) and Operational Technology (OT) - which typically characterizes the value of these innovations - has created a new, unimaginable scenario where biotic and abiotic systems combine in a single cognitive world (Schwab, 2016). Such scenario is characterized by the presence of enormous opportunities for growth and development, and by identical, equally tre-

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mendous, risks of devastation, so that - not improperly - Google researchers have created the term "Augmented Humanity" to describe the potential of the advances produced in the man-machine relationships.[1] It is precisely the extent of innovation that solicits scholars and intellectuals' efforts so that our technological future, and evidently our present too, has to be framed within clear rules, ethically acceptable, and consistent with the need of managing social, political and cultural aspects of the revolution underway. In line with the rise of ICT tools in every production sectors, the scientific community has begun to wonder on both the nature of transformation and the needs and drives of human beings in the digital age, not only with the purpose of reducing the risks associated with such exceptional acceleration, but even to explore the historical and philosophical dimensions connected to it.[2] Regarding the latter, in his last book *Homo Pluralis*, Luca De Biase, emphasizes the idea of narrative as a conceptual device to prefigure (and evaluate) potential scenarios made by the coevolution between ITC development, humanistic culture and scientific tradition:

> «Given that the research on these topics can no longer be purely technical and related to engineering, new disciplines are established [...] (disciplines) that define new fields of experimentation [...] disciplines such as digital humanities, post human philosophy, the logic of complexity and of self-organizations [...] Therefore a sort of narrative experiment emerges: imagining a vision, learning to tell its consequences, interpreting current facts in the context of that narrative, and see if everything can stand in front of the progressive unfolding of the story» (De Biase, 2016, p. 57).

The storytelling of our, near future is the field of action of outstanding research centres such as the Institute for the Future of Palo Alto, the MIT Center for Collective Intelligence, or the European Association of Digital Humanities, fully engaged in exploring the ongoing directions of the relationship between society and science, as well as the progress in collaborative thinking and collaborative design, as new frontiers in governing the new decisional processes, that are necessarily plural, and interconnected. In the same way, contemporary art is ever more rising as a narrative device to provide forecasts of the global society. Since the 60s, the alliance between artists and engineers gave the way to research lines oriented at exploring the man/ machine relationship[3], ac-

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1 See the Empathetic Computing advances, especially referring to the relationships man-machine chain; machine to machine; machine-to-human (VINT, 2014).

2 See Pierre Levy on the notion of IEML, Information Economy MetaLanguage (https://pierrelevyblog.com/), Luciano Floridi on the philosophy of Information (http://www.philosophyofinformation.net/), the Deep Ecology definition and the Environmental Philosophy on www.deepecology.org/platform.htm.

3 In 1966 the exhibition *9 Evenings*, produced by the EAT group (Experiments in Art and Technology, founded by Billy Klüver and Robert Rauschenberg), as well as the "legendary" expositions titled *The Machine as seen at the End of the Mechanical Age* (MOMA, NY) and *Cybernetic Serendipity* (ICA, London, UK), both in 1968, collect suggestions coming from cybernetics, art and humanities (Gere, 2004).

knowledging the ability of the artistic medium to generate original points of view to prefigure unimaginable conditions:

> «By the year 2000, technology will undoubtedly have made such avances that our environment will be as different from that of today as our present differs from ancient Egypt. What role will art play in this change?» (Hultén, 1968, p. 11).

After 50 years, art continues to question the new boundaries of the new electronic habitats (physical as well as anthropological and psychic)[4]. The focus of the reflection is mainly oriented to climate change, as well as to the exacerbation of social and economic differences. In an age where the capacities of Augmented Humanity do not find yet principles of ethical refounding, the projections on our future offer images of a planet at risk, in which human beings, and other living species, interact with the abiotic world through the widespread real time and responsive technologies, where both the monitoring and control of living conditions are integral parts of the human/ environment relationship. A world in which the human being loses his ontological centrality to assimilate as "Info-org" into the relational flows of an "Infosphere" of which he is an essential part, but no longer the *first dominus* (Floridi, 2014)[5], just as the built environment expands beyond its canonical boundaries to include spaces of nature that in no case, and at no latitude, it is still possible to define "unspoilt".

The production of inhabited space

The concept of *Anthropocene* (Crutzen, Stoermer, 2000) culturally supports the narrative of our present and allows us to typify the man/ environment relationship in the digital age according to two main assumptions: the technical (as well as ethical) responsibility of human beings with respect to the maintenance of the planet's vital functions and, simultaneously, the value of research (and the technological advancement) as the only, possible order for a very uncertain future[6].

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[4] Significantly, in 2018, two events draw attention to the extent of the changes taking place. The exhibition *Art in the Age of Internet, 1989 to Today*, at the Institute of Contemporary Art / Boston, February 7 - May 2018, offers a dreamlike insight into digital contemporaneity by analysing the perception of personal identities and corporality; whereas, the exhibition *Después del fin del mundo* (at the *Center de Cultura Contemporània* de Barcelona, October 24 2017 - April 28 2018) focuses on the consequences of climate change such as social inequality, food production and the transformation of the inhabited space. On the other hand, cinema, with *Blade Runner 2049*, propels us into a future in which enabling technologies control an alienated (and alienating) everyday life.

[5] Cf. Luciano Floridi Ted Talk at: https://www.youtube.com/watch?v=c-kJsyU8tgI.

[6] Crutzen and Stoermer wrote «Without major catastrophes [...] mankind will remain a major geological force for many millennia, maybe millions of years, to come. To develop a worldwide accepted strategy leading to sustainability of ecosystems against human induced stresses will be one of the great future tasks of mankind, requiring intensive research efforts and wise

The result is a new awareness on the community of destiny (Morin, 2002) between the biotic and abiotic system, which is reflected in the demand of operations to increase sustainability and resilience of the inhabited space, whether built or natural. Contemporary habitats evolve indeed rapidly into a techno-social environment (Pierre Levy Blog) whose configuration is affected not only by the quality and quantity of the available information, but rather by the ability to process the latter in a tailor-made approach, that can meet specific and local needs[7]. The search for mathematical/cognitive models aimed at finalizing the growing number of data becomes an integral part of the architectural project, which acquires new opportunities of shaping the inhabited space thanks to the capacity of managing an increasingly important data set, that always corresponds to more complex performances. One can envisage an idea of inhabited space whose project proceeds - equally - through practices established in the discipline and the algorithms' production (equally implementing its efficiency, technological innovation and social shared practices), so that the image - and the value - of the next, smart environments derives from the combination of hyper-specialized experiments and of bottom up processes[8], of great entrepreneurial drivers and of green and circular economies.

The term smart characterizes, in this sense, the capacity to create fundamentally new living spaces (housing buildings, cities, natural landscapes), consistent with the new lifestyles and with the social implications connected to these, environments characterized by the capacity of integrating consolidated technologies with completely renewed processes and tools. Human habitats of the digital era are developed according to coevolutionary processes (determined by the interaction between technological advancement and social culture reasons) and through project experiences still difficult to decode: experiments carried out in these years (rather those of immersive architectures, in which users operate as an active and responsive subject with respect to the use and transformation of space) tell us about a world that rapidly updates cultural references and technical tools, creating a new production of digital infrastructures aimed at facilitating communication and the interconnection between subjects, objects, processes[9].

A revolution that gives great importance to the project and the technological culture that sustains it.

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application of the knowledge thus acquired in the Noösphere, better known as knowledge of information society» (2000, p. 17).

7 «the future is not […] infrastructure and software as a service, but […] a lot of loosely connected miniservices [that] can be easily assembled like Lego blocks and on top of which you can build agile and resilient applications» (https://pierrelevyblog.com, accessed August 21 2018).

8 See "Arduino", the first - all Italian - experience of "digital handicraft".

9 Cf. the work of the Edilstampa IT Revolution in Architecture series, directed by Antonino Saggio.

On the one hand, in fact, digital innovation offers elements for rethinking the idea of space, whose identity is also affirmed through the redefinition of its codes: the dualism, between material and immaterial, the repositioning of the recognised boundaries of architecture (internal / external, artificial / natural), the concept of time (throughout the revolutionary turning from static to dynamic). On the other hand, IT and OT technologies open up new technological design perspectives, that are required to update their rules and practices, developing a deep knowledge of digital systems, of their potential and the culture that generates them. It is not just a matter of adding new technical devices to those already in use, but rather of reformulating the logical structure of the design process, of its expected performances and of the subjects involved, in a viewpoint in which the actions of sensing, processing, visualizing and feedback characterize the technical domain of the future (Arthur, 2011).

Knowledge Transfer

The outlined framework presents prominent challenges for the production of the inhabited space. The establishment of ITC technologies requires the creation of a specific knowhow, able to test effective models of collaborative thinking and codesign, for the efficiency of the objectives required for the contemporary environment. Consolidated practices of the project and of the construction process must achieve a rapid conceptual and operational adaptation to respond to the paradigm shift. The inhabited space of our present (somehow future) evolves through narratives that must take into account the characteristics of the markets, the requests of increasingly larger social groups and the need for a technical class able to interpret the bottom up demand for change, already expressed by the digital society. Much remains to be done. Italy, in particular, presents a backward construction sector for skills and investments, too constrained by the traditional structure of decision-making and of construction process, thus, unable to generate competitive positions on the global market. There is a lack of a methodological framework as well as in practical implementation to test the applications of ITC innovations in consolidated processes. Further, there is a trend in mainly developing product innovation, aiming to increase the market of high or very high user target in terms of economic accessibility; similarly, some important experiences (for example the Italian Pavilions for Expo 2010 and 2015) demonstrate how the BIM based design is still, essentially, prerogative of cultural and industrial elites, and very far from intercepting current practices. There is a cognitive debt that requires new, strategic alliances between the research and construction sector, to develop “cutting-edge” technologies - new hardware that, by their nature, are assigned to hyper-specialist skills - and bottom up software, which respond to local and specific needs to facilitate the capacities of companies with different positions on the market.

An alliance able to launch innovative practices of technology transfer, where top down modalities are integrated and substantiated by "clustered" exchange of knowhow and experience, to enhance the "embedded knowledge" that continues to characterize the actors of the construction process and the quality of building as well. An alliance aimed at creating new skills and professionals, so that the introduction of enabling technologies (or rather dedicated software) into the construction process responds to the demands of cultural and economic democracy, necessary to guarantee human responsibility in the environment transformation processes, also interpreting the needs of inhabited space, according to the new, crucial ethics of living. As the Institute For the Future studies reiterates, we will need new stories to imagine the essence of our future, living environments, social relations, markets and businesses (IFF, 2016). Research in architecture has to provide firmness and quality to these spaces.

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