Chapter 9

Digital Creativity: Embracing New Technologies for Architectural Innovation

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ABSTRACT

This chapter tackles the topic of digital creativity and the use of new technologies for architectural innovation. Architects exploit the possibilities offered by digital media, with a direct repercussion on the design process and style. It is vital to understand that new technologies are not to be isolated from traditional media, innovation may arise by the combination of analogue and digital techniques and design methodologies. New media opens up new possibilities and designers should experiment, evolve and use the immense power of computation to make the best of his designs. We must acknowledge the current generation of designers is witnessing a transition phase, as it comprises of both “digital natives” and “digital immigrants,” it is therefore a unique opportunity to examine the influence of digital media in architecture and education, critically observe the technological advances and integrate analogue and digital tools for form-finding.

INTRODUCTION

The current generation of architects and designers in general has witnessed a unique shift in the design praxis, as we started our architectural education with hand-drawn plans of all scales, trained to use analogue and digital media, and very often concluded in our professional praxis adopting computational tools and digital design methods of all types. Inevitably these unique circumstances of the transition era have led to both positive and negative effects with regards to both design research and praxis. Never before in the history of design was there such a drastic shift in the way we design and make, and furthermore in the way we think. The generation to follow, those currently enrolled in university programs across different design disciplines, is a completely different one, there is a big discontinuity taking place. Marc Prensky refers to them as digital natives\(^1\) while we are probably the last generation of digital immigrants\(^2\). We are therefore passing through a moment of “…singularity– an event which changes things so fundamentally
that there is absolutely no going back…” (Prensky, 2001), and this is marked by the arrival and rapid dissemination of digital technology.

The capabilities of new technologies are enormous, and this is only the beginning. Designers were not prepared for such a drastic shift and often times the new media have encouraged the production of inconceivable and almost frenetic forms, just because the technology has liberated the morphological vocabulary for the design and construction of buildings that do not necessarily demonstrate awareness about the environment and the quality of life of their future inhabitants. Hensel and Menges authors of Morpho-ecologies criticizing this generalized attitude have remarked that “Materials are CNC-machined into the most hysterical shapes just because contemporary manufacturing makes it possible, with little regard for the inherent morphological and performative capacities of the employed materials and material systems…” (Hensel and Menges, 2007 p.20). This is a something that designers and particularly educators of architecture need to raise and bring into the architectural discourse. It is the duty of current educators to teach and inspire their students to use the immense power of computation for the generation of optimized designs, rather than contemplating merely the aesthetic result of a computer generated design that complies with the global digital fashion in architecture.

William Mitchel considers the Computer Revolution as the third major revolution in human history after the Agricultural revolution in the Neolithic era, and the Industrial Revolution of modern times. He remarks that “…just as the industrial revolution replaced human muscle power by energy consuming machines, the computer revolution is replacing human brain power by information processing machines…” (Mitchell & McCullough, 1995).

More specifically, with regards to architecture, Professor Parthenios during Critical Digital Conference at the Graduate School of Design at Harvard explained that “…conceptual design is not a linear process, it consists of sub-processes which are individual but interact with each other…” (Parthenios, 2005). It is not easy to map the designer’s mental process and therefore it is not clear to what extend the digital media affect the end result or the design process itself, as very often the stages of design, prototyping and analysis alternate in a feedback loop optimizing the entire workflow. Parthenios refers to critical points of change, that require that the designers reconsider aspects of their designs and processes, move forward or take steps backwards to improve and adjust their work.

There is no doubt that the use of CAD systems in architecture strongly affects the design object, but the real power of computation mainly relates to the design process. The great advantage of the use of CAD systems is not fully exploited when we replicate processes that could be done by hand, computational thinking mainly relates to the integration of design parameters and constraints, and how the computer can aid the designer to integrate all requirements. In these lines John Fraser emphasized that he “…rejects the notion that a CAD approach should reflect the traditional non-cad architectural methodology on the grounds that, first, the present architectural design process is fundamentally unsatisfactory in any known form and not worth imitating and, second, imitating the human process is unlikely in any case to represent the most imaginative use of a machine…” (Frazer & Connor, 1979).

It is important to distinguish computational from computerized architecture. Terzidis in his book “Algorithmic Architecture” gives a clear definition of the above terms.

Computation is a term that differs from, but is often confused with, computerization. While computation is the procedure of calculating, i.e. determining something by mathematical or logical methods, computerization is the act of entering, processing, or storing information in a computer or a computer system. Computerization is about automation, mechanization, digitization, and conversion. Generally, it
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