The impact of information technology on design methods, products and practices

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The paper examines the impact of the IT revolution on the design professions, especially that of architecture. It looks at the impacts of past technological revolutions on established methods, products, and practices, and examines the potential impacts of ubiquitous computing, telecommunication, mass-customization and embedded computing on methods of design and construction, and on the products of architecture. This examination leads to conclusions about the implications of these technologies on the nature of architectural practice in the future.

Keywords: architectural design, built environment, computer aided design, design practice, drawing(s)

Assessing the impact of technological revolutions—especially fast-paced ones like those induced by information technology—is difficult, especially when we are still in the midst, if not at the very beginning of the revolution. Nonetheless, or perhaps because we are witnessing only the early effects of information technology on the processes and products of architecture, it is necessary to venture an assessment of accomplishments and an informed view of emerging opportunities in need of further development. To reduce the risk of early obsolescence, this paper only deals with trends, rather than specific products, and only in areas where the new technology promises to have major impacts: the trend towards a more distributed yet integrated process of architectural design; the automation of construction technologies and buildings themselves; and the emergence of an alternative inhabitable space—Cyberspace.

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Technological revolutions have been historically closely linked to social evolutions: almost every time society invented new tools, methods, and techniques to manufacture and distribute the products needed for its

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survival and growth, these inventions impacted society itself economically, culturally, politically, and in many other ways. Typically, these inventions were incremental refinements of earlier technologies and social structures. But some have had a 'revolutionary' force, causing major economic, political, and social changes. Information technology is such a revolutionary force: it has made the production, manipulation, and dissemination of information cheap and easy. It has made information more readily accessible, hence eminently shareable. It has also made it possible to re-define the traditional sequences of information production and consumption, and re-assign the responsibilities and the privileges of owning it. Consequently, it has had a revolutionary impact on information-centric enterprises, and has been coercing other types of enterprises to adapt information-based practices so they too can benefit from the phenomenal growth potential associated with this technological revolution.

Architectural design is an information-centric enterprise: it analyzes current states of being and devises plans for new states of being that are deemed preferable to the current ones. To do so, it gathers and processes information from many different sources, re-arranges the information, produces new information, simulates its expected impacts and evaluates its desirability. The information it produces is then used by traditional, heretofore information-poor, practices to construct and realize the outcomes of the design phase, which are later used by information-rich habitation practices.

Hence, a technological revolution that impacts information processing has the potential to affect the core processes and products of architecture, and have a 'revolutionary' effect on the profession and the discipline of architecture. It can do so by transforming the current strictly hierarchical design process into a *network* of design, manufacturing, marketing, and management organizations, where the responsibility for design operations is distributed across multiple professions, organizations, and geographic locations. It can do so by transforming the access to the information from a sequential process into an *interleaved* one, where decisions are made in an a-synchronous yet coordinated manner. It can accentuate and promote the *configurational* principles underlying architecture (the integration of disparate standardized products and services into a unique whole), thereby promoting mass-customization and lowering costs without sacrificing quality.

Furthermore, by embedding inter-connected computational devices in both the building components themselves and the means of assembling