

# D o s s i e r E d i t o r i a l

---

## Technological innovations and design

**Leyla TANAÇAN, Aslıhan TAVİL, Ecem EDİS**

*Istanbul Technical University, Faculty of Architecture, Istanbul, TURKEY*

Architectural technology is the art of building, a discipline that aims to bring together artistic, practical and procedural skills: the fusion of three separate worlds which is integrated in the product of architecture. As a brief definition; architectural technology is a link between conceptual design and production which translates design intent into physical reality. Therefore one of the main goals of an architect is to increase the role of the technology in architectural design by linking these technologies to human experience through the material forms they represent and by bringing to an understanding of the technology in the process. The role of technology in architectural design is that, architectural technology is the way which human beings create metaphorical ideas that place them in nature through the manipulation of habitable form that redirects natural force. Moreover, this approach has to involve the treatment of space as a matter, and a move away from the creation of solid forms, shells, envelopes, and the engineered language of structure. It permits the potential for buildings to have depth, discovery, mystery, and shadow, to be truly multi-sensory, to be a multifaceted experience of the metaphysical.

In the 21st Century's global environment, two major factors can be identified as affecting the context of architectural technology. One is prevailing and ever advancing globalization of every aspect of human life, mainly due to highly developed transport and distribution systems as well as augmentation of information, communication and knowledge technology (ICKT). Therefore it is getting impossible to mention originality in the architecture area since contemporary design become vigorous all over the world by repeating itself. A consequence of this repetition is the appearance of the building typology which is independent from the cultural and climatic factors all over the world. Globalization causes the cultural identity to become homogeneous which can be a serious threat for architecture. In this sense, innovative approaches may discourage the design with regard to the cultural interaction. The other factor affecting the context of the architectural technology is the need and desire of people to reevaluate and reinstate the existence of locality in the places where human activities and culture occur. Considerable attention should be paid to the interaction between these two factors, with the recognition that the global paradigm presents an overwhelming challenge to the local paradigm. It is necessary to take into careful consideration both of these elements of architectural context, especially the local paradigm, which at the moment seems to be weakened and close to losing the battle over its counterpart.

However to be optimistic about the future, the dialectical process between these opposite paradigms of global-universal and local-particularity could turn out to provide positive energy that invigorates architectural creation.

The driving force of the technological innovation is to create building design which is sensible of human nature, compatible with biological rhythm, makes human beings satisfied. Basic approach in all of these pursuits is the desire of providing the deserved human requirements in the environment. At that point we comprehend that architecture tries to open a new road and the technological factors start to take an active role at the ground of the pursuits of architecture rather than cultural factors, by providing data from absolute scientific areas and the technology aims to develop new multifunctional knowledge based materials and construction systems adjusted to human needs. By the influence of new technologies developed by multi-disciplines; a new design approach that meets the human requirements beyond the defined up until now and even haven't been discovered by human beings, has become dominant. These multidisciplinary and large scaled research activities have the potential of increasing the chance of the technological breakthrough. This can be possible by developing tailor made materials and technologies through the distinct disciplines.

The human being in the core of the technological innovation can not be thought out of the environment. As a matter of fact, the report of world commission on environment and development weaves together social, economic, cultural, environmental issues. Global solutions implicit in the Brundtland Definition have two concepts: futurity and resource conservation. Futurity places a duty on the present to consider the needs of future generations, especially in terms of handling of the planet in a fit and wealthy condition. Resource conservation places a duty of care upon the present with respect of all nonrenewable resources, water, land, energy, biodiversity, minerals etc. This need has lead to a new paradigm to architectural design. Conceptually a triangle exists where the approach to building design is constrained by interactions between energy, environmental and ecological factors which affect the whole world and that the policies need to address local, national and international issues to be effective across a broad front. In order to sustain ecosystems and accord with laws of thermodynamic building must: consume resources no faster that the rate at which nature can replenish them (first law). Designers face new pressures. It is important to emphasize that architects need to consider the effects of their decisions in relation to these laws over the entire building life cycle. This may well inhibit or limit the range of materials used and act in a more environmentally responsive manner that may lead to the use of new details and materials to reduce the environmental impact of the building. Thus any strategy to achieve economic, ecological and social objectives must include measures to improve functionality, durability and efficiency of materials and technologies used for architecture.

Essentially, the definitions regarding what architectural activity is mainly based on Vitruvius's definition in which the articulation of *firmitatis* (firmness), *utilitatis* (utility) and *venustatis* (aesthetics) is found. Today, considering architecture as an important representative area of the economical activity, we see that architecture transforms towards the economical actions. Although architects, as Kahn also remarks, "try to acquire new sense of form to enable their work be a part of their age and will afford delight and service for their contemporaries" with their best intentions, they are under the influence of economical actions developing out of their control. This influence appears in all fields of the profession from education to practice. The significance of art and utility usually can be postponed. What ever the ultimate goal of technological development in architecture which is basically to

create a comfortable living environment and serve the customers' needs while minimizing environmental impact throughout their entire lifecycle, doesn't it have an implicit goal that directs the manufacturers, producers and the construction sector on the global market arena to be in a leading position and to attract and employ well-educated people?

Briefly, technology, innovation, economy, design in general and architecture in specific are mutually affecting fields in which their interactions can be viewed from differing perspectives at differing scales. Setting forth an absolute mechanism of interaction is not possible and is not rational as well due to complex nature of relationships. Our contributors in this issue help us to highlight these differing perspectives at differing scales.

The invited paper "The role of the architect in housing design: Old and new" by Eric Dluhosch mainly criticizes the traditional role and work process of architects in the socially and technologically changing world, and highlights the separation among architects and end users especially when designing for anonymous users. He mentions that adapting the methods of other fields such as operational research, control engineering, etc. has only changed the labels in the design process but the main problem of understanding users and their expectations or by his words "the need for a more responsive mode confronting increasing demands of user input in design" remained the same. There is a problem that needs to be solved in decoding and encoding the information transferred among architect and user/society when thought in terms of information technology. In this respect, instead of taking part only in initial phases of design (i.e. preliminary, design and construction documents phases), he suggests five possible roles covering all building related fields as; taking part in (1) planning team transferring societies' ideas, (2) clients' team, (3) design team like in the traditional process, (4) construction industry and (5) manufacturers' team. He finally suggests an approach for eliminating the gap between architect and end users focusing on process rather than product.

The other invited paper "The technology of sentient buildings" by Ardeshir Mahdavi points out that the contemporary buildings are expected to meet an extensive set of requirements. They must be conceived, constructed and operated in a manner that is functionally adequate, environmentally sustainable, occupationally desirable and economically feasible. Therefore the optimization of the overall performance of buildings represents a non-trivial task and requires effective and well tuned technologies. He explores the notion of sentient building technologies and its potential to address certain aspects of indoor environmental control problems in buildings. For this aim he presents the concept and a prototypical implementation of a simulation-assisted systems control in buildings, using a lighting control scenario. He demonstrates how the overall framework of sentient building technologies allows, in principle to incorporate simulation based predictive models as an integral component of the control logic repertoire for building systems.

"Transformations created by ICT on the architectural design and its education" by Ahu Sökmenoğlu and Gülen Çağdaş mainly focuses on the transforming effects of the information, communication and knowledge technologies (ICKT) on the architecture design and its education considering that ICT creates serious economical, social and cultural transformations in the contexts of human, human life and space affecting the architectural education. Since ICT has become a part of the architectural design and production processes, its tools, concepts, methods and forms experienced serious transformations. Therefore ICT deserves its own area of research in the architecture design field. In the first part of the paper for

revealing this idea, 'representation', 'design process' and 'communication' are proposed as the major subjects of the research field on this issue to reach a better understanding the "information architecture". In the second part of the paper, the authors discuss the major issues that have to be considered for the integration of ICT and architectural education. At that point, it is mentioned that architecture platforms have to manipulate technology in service of architectural design instead of adapting architecture to technological changes. Therefore, the aim should be how to manipulate, orient, transform and manage technology in the name of architecture. Finally, questioning the contemporary position of the architecture and ICT to introduce the opportunities and risks and the necessity of new educational model to control and lead transformation process, are the most important issues introduced in this paper.

The paper "ETP: European Technology Platforms - A challenge for Turkey's strategic innovation agenda" by Attila Dikbaş and Işıl Akkoyun focuses on technology and innovation in European Union, and puts forth the place and importance of 'technology platforms' in innovation and identifying key research needs. As stated, technology platforms are tools for boosting European industrial competitiveness and have strategic importance or potential in knowledge-based growth. Technology platforms are also stated as tools for fostering effective public-private partnerships, but the importance of being industry-led is highlighted for being effective. The authors additionally investigate and discuss Turkey's position in research and innovation with respect to European Union strategies. They state that strategic targets of European technology platforms and Turkey's 'national innovation policy document' are parallel and overlap in some points, but further efforts are required for identifying future challenges of innovation and research activity in areas which will foster the well-being in society and the competitiveness of business and industry.