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About the first issue

This is the first issue of the Journal of Technology in Architecture Design and Planning (JTADP), an interdisciplinary, technology-oriented journal devoted to the promotion of knowledge and debate on architecture, design, and planning. JTADP is the first peer-reviewed, international academic journal of the Istanbul University Faculty of Architecture, and its Editorial Board consists of researchers from various countries and various fields related to technology, architecture, design, and planning.

With such a multi-faceted set-up, JTADP’s scope may need to be elucidated in order to inform prospective contributors and quality-concerned readers about what to expect. Because technology is defined as a process that covers the transformation and use of basic and applied sciences’ data into production within creative processes and the analysis of their social effects, technology naturally constitutes the essence of architecture, design, and planning activities. The fact that technology occurs as a process in all kinds of design activities emphasizes the organic and inseparable unity these three aforementioned fields and their sub-headings have with technology. Technology, and therefore architecture, design, and planning, involve creativity and intelligence being combined with science, art, engineering, economics, and social studies in order to increase the quality of human life. The point one should note here is that technology is not only related to science and engineering. It is also a reflection of fields such as art, sociology, psychology, and economics. Because the dimensions of technology have not been adequately addressed in scientific publications in the fields of architecture, design, and planning, the decision has been made to have JTADP focus on these issues with the aim of exploring the interfaces among design, architecture, and planning and their practical applications.

Many people contributed to the preparation of the first issue of JTADP. First and foremost, we would like to thank Prof. Dr. Gülen Çağdaş, who accepted our invitation to have her as the editor of the first issue and has made important contributions with her valuable publishing experience. We would like to thank Gülçe Kırdar, who had supported Prof. Dr. Çağdaş, as an assistant guest editor. This first issue would not have been possible without the support and hard work of Istanbul University Press. We would like to thank Istanbul University Press General Operations Manager Dr. Metin Tunç, operations chief Esma Çavuşoğlu and operation assistants Özgür Özdemir and Selin Dizbay for their assistance and guidance.

This first issue of the journal has 6 research articles. We would like to thank all the authors who responded to our call for papers and sent their work to JTADP, all the valuable researchers who accepted our call to referee, and Lecturer Elizabeth Mary Earl and Lecturer Rachel Elana Kriss from Istanbul University, who provided proofreading for the accepted articles.

JTADP is just at the beginning of its life. We believe that it will grow with the contributions of valuable researchers and be a platform for making important contributions to the academic world.
Editorial

The subject for the Faculty of Architecture’s first issue of the Journal of Technology in Architecture, Design, and Planning (JTADP) is decision support systems. The main objective of this issue is to discuss the use of computational approaches in architectural and urban studies.

Decision-making is a process that involves people’s cognitive abilities in terms of learning, reasoning, and critical thinking. The goal is to make the most appropriate decision regarding complex or uncertain problems. In most cases, the decision-making process is based on the experience of an expert. This expert faces difficulties in changing conditions that require the support of computational systems. Decision Support Systems (DSSs) are systems that support experts regarding the cognitive process of decision-making. Different disciplines’ use of DSSs to solve complex or ill-defined problems has become widespread in parallel with the developments in information, communication, and knowledge technologies. DSSs assist experts by offering alternatives using artificial intelligence that has been specialized for a particular problem. A DSS is a computer program that takes the relevant knowledge experts use as inputs to produce outputs for finding the solutions best suited to the problem.

The first category is data-driven DSS methods and encompasses techniques such as data mining, knowledge discovery in databases (KDD), Bayesian belief networks (BBN), and the analytical hierarchy process (AHP), as well as various statistical tools. These methods provide a solid foundation for extracting relevant information from large data sets and identifying patterns to aid in decision-making. The second category involves methods based on first-generation artificial intelligence (AI), which include knowledge-based systems, expert systems, and case-based reasoning approaches. These systems employ rule-based reasoning to assist in decision-making by drawing upon established knowledge and expertise to provide informed recommendations. Lastly, the third category comprises computational intelligent systems such as cellular automata, multi-agent systems, artificial neural networks, fuzzy logic, genetic algorithms, and swarm intelligence. These advanced techniques leverage cutting-edge computational intelligence paradigms, thus contributing to more effective decision support using optimization and simulation models. These methods form the basis for a wide array of DSSs, each tailored to specific use cases and decision-making scenarios, ultimately enabling enhanced decision-making processes in various disciplines.

The scope of the decision-making applications has a wide range in the urban, architectural, engineering, and design domains at different scale and for various topics such as regional and urban planning, land use planning, urban management, facility selection, transportation, environmental issues, structural issues, construction, interior design, industrial design, and evaluations. Within the scope of this issue, articles are expected that present different computational tools, technologies, methods, and applications for decision-making in different fields.

In this context, the first issue of JTADP discusses the use of DSSs with regard to their various usage possibilities in the architectural and urban research domains, their different computational methods and approaches, and their role in problem solving. The focus is on DSSs at the building scale, with a particular emphasis on how computational models are used for decision-making, before shifting to the urban scale and discussions on the role of optimization and simulation methods in decision-making.

The first section includes studies on DSSs at the building level through the use of computer models as a decision support tool. Alim BATTLAL and Sevil YAZICI investigate the potential of Nitinol-based foldable facade systems for creating climate-adaptive structures. Their study transfers the foldable properties of Nitinol as a smart material into an algorithmic modelling environment using
computational design and simulation tools, simulating responsive folding techniques and generating folding unit alternatives to develop a kinetic facade system. This system is composed of foldable units and aims to support sustainability decisions at the building scale. Their work highlights the significant contributions DSSs have in enhancing the sustainability of architectural practices through the innovative use of responsive folding techniques. Ihsan Kasım KARATAŞ, Barış YILDIZLAR, and Barış SAYIN’s study offers an insightful approach to assessing seismic performance in historic masonry buildings. Using a three-dimensional finite element (FE) model, they conduct a seismic performance analysis of the KLP Building at Istanbul University’s Cerrahpaşa Campus with the aim of supporting safety decisions during restoration. This research underlines the pivotal role DSSs have in enhancing the seismic performance of historic masonry buildings while being restored.

The second section focuses on DSSs at the urban scale using optimization and simulation methods as a decision support tool. Merve Deniz TAK and Naime Hülya BERKMEN explore daily walking tour route potentials for visitors to the Historic Peninsula using the generative design method of single objective optimization as a decision support tool. This study considers site topography and road conditions, aiming to reveal the diverse route potentials within the peninsula’s protected areas. By establishing nine distinctive sightseeing routes prioritizing walkability and immersion in historical texture, TAK and BERKMEN offer valuable support for travel decisions made by city planners, tour guides, and the travelers themselves. Next, Emirhan COŞKUN’s research applies cellular automata in urban growth modeling through geospatial techniques using population and urban form attributes data to conduct a suitability analysis with a specific focus on the dense city of Istanbul. COŞKUN’s analysis serves as a valuable decision support tool that facilitates a more comprehensive approach to urban policy-making and transformation.

In the third section, the studies by Emre İŞLEK and Mehmet Emin ŞALGAMCIOĞLU and by Gülce KIRDAR offer distinct but complementary perspectives on the intersection of technology and urban studies. İŞLEK and ŞALGAMCIOĞLU’s study delves into the transformative impact Information and Communications Technologies (ICTs) have on architectural practices. Their study uses grounded theory methodology to analyze six case studies that have different ICT adaptation levels and workflows. Their research reveals how architects can hybridize their practice with new ICT technologies by considering the potentials and drawbacks of the constantly developing ICT habitat. This study offers crucial insights into the role of ICTs as a decision support tool facilitating change and innovation in architectural design processes. Gülce KIRDAR handles the use of decision support methods within big data in urban studies by conducting a systematic literature review. The author explores the use of big data in urban studies through selected state-of-the-art studies on urban informatics that utilize big data to support urban decision-making through exploratory research. The study underlines the trend in big data studies for urban planning and decision-making and emphasizes the pivotal role of data-driven computational and spatial statistical methods. This study aims to present the growing trend in big data studies for urban planning and decision-making.

As the guest editors for the first issue of the Journal of Technology in Architecture Design and Planning, we would like to express our sincere gratitude for being invited to the Dean, Prof. Dr. Kutgün EYÜPGİLLER. We hope this journal will be a platform for sharing information and discussions for academicians, researchers, and practitioners in this context.

Emeritus Prof. Dr. Gülen ÇAĞDAŞ, Guest Editor, Istanbul Technical University
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