Digitization and Globalization

CAADRIA 2007

Proceedings of the 12th International Conference on Computer-Aided Architectural Design Research in Asia

19-21 April 2007
Nanjing, China

Edited by
Yu Gang
Zhou Qi
Dong Wei

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Preface

Turning to 21st century, the globe has been rapidly becoming a small village as the transportation and communication tools become more efficient and more easily available to the public. So has this been happening in AEC (Architecture, Engineering and Construction) industry. Digital technology has apparently changed the working process in the AEC industry, but not as efficiently as in manufacturing industry, such as automobile production. It might be mainly because of the diversified components and scattered sites with lower industry standards, especially against the background of customization and vernacular traditions of architecture. What roles can digital technology play in this development and how can we steer correctly this inevitable trend?

To answer these questions, we need more exchange and collaboration in all fields. CAADRIA 2007, again, provides us such a chance to get closer to our goals. Specially, this event will be happening in China again, after 7 year break. China now is the biggest construction site in the world, trying to catch the pace of globalization and modernization. More lessons need to be learnt from all over the world. We firmly believe that CAADRIA 2007 will be such an attractive moment to share the expertise and ideas for mutual benefit.

The A[th] International Conference on Computer-Aided Architectural Design Research in Asia received 180 abstracts from over 30 countries. After fully rigorous reviews of both abstract and the full paper by an international review panel of 65 reviewers, we accepted 76 papers for publication and presentation at CAADRIA 2007 in Nanjing.

We would like to acknowledge the keynote speakers; CAADRIA EXCO for their support, especially Bharat Dave and Marc Aurel Schnabel; the review committee from different countries and areas; the organizing committee; staff and student assistance from School of Architecture in Southeast University; and all the conference supporters.

Conference Committee

Nanjing, China, April 2007

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COMPLEX SYSTEMS IN ARCHITECTURE BEYOND CAAD

Prof. Ludger Hovestadt
ETH Zurich, Switzerland

Louis Sullivan maxim "form follows function" (1896) describes the fundamental conception of the unit of production and form in architecture at the beginning of the 20th century (e. g. international style, MoMA, 1932). This unity seemed lost during postmodernism as stated by Robert Venturi (1966/1972) and Charles Jencks (1977). According to Manuell Castells extensive culture-sociological study "The information Age: Economy, Society and Culture "(1996—1999), information technologies shifted the industrial born equilibrium in the 70's (D. Bell 1976) and enabled at present the course of action of some parts of society to explode. We see in architecture, supported by CAAD methods (Kalay 2004) the possibilities of computer simulation and Virtual Reality, an explosion of forms bordering on mannerism (e. g. exhibition "non-standard architectures", Centre Pompidou, Paris, Migayrou 2003), which apparently developed synchronously to the successful digitalization of the media. On the other hand, the advancement of digitalization on other areas of the built environment, like production, logistics, management, automation or finances, did not receive consideration by a majority of architects. But it is exactly this process which completely overlaps (today) the technical models of "old" reality (see e. g. Baudrillard, 1978; Lyotard, 1979, Derrida, 1972; McLuhan, 1962; Negroponte, 1998). In view of this new situation, it is misleading and deceptive to speak about digital? Or virtual architecture? yet, as there are no non-digital or non-virtual realities. The still unusual and new dynamic of information technologies, paired with the current reluctance to accept this new kind of the reality, seems to be a main cause for many of the current controversies. Therefore, the aim for future research should be to understand the fundamental cybernetic principles (see e. g. Shannon, 1946; N. Wiener, 1948; Bertalanffy, 1949; J. H. Holland, 1992) and to learn to apply onto other domains (see e. g. Maturana, 1970/1980; Luhmann, 1984; Prigogine, 1984) and to find a new balance for our current asymmetrical realities.

If we view buildings and the built environment in the sense as being information-technical (Shannon, 1946) instead of mechanical systems (Newton, 1674), then they clearly gain in efficiency as the elements reach undreamt-of liberties without endangering the coherency of the overall system. New design methods, Grammars (Stiny and Gips, 1971), Case Based Reasoning (Shank, 1982), Simulation, Evolution (Frazer and Burnell, 1970) increase the adaptivity and flexibility of a design solution by an orders of magnitude, increase the planning speed and drastically reduce the planning risks. Computer-controlled production methods (Parsons, 1948; D. Schodek, 2004) enable the mass production of individual designed buildings. Thus the building industry reaches the well-known standard of

FROM HOW WE THINK TO HOW WE FEEL

Prof. Chiu-Shui Chan, Ph. D.

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Thinking is the basis for knowledge of the world and for reactions to the world based on that knowledge. In the fields of design, the body of knowledge utilized by designers is specialized, because it is acquired through a process of professional education and develops through professional training. Because of this specialized body of knowledge, designers have unique thinking routines and special views toward the environment, and consequently, react to the environment uniquely. It is also possible that designers would react to the environment differently than non-designers. This concept is based on the premise that a human's mind is an information processor that accepts information occurring in the environment, applies the specialized knowledge stored in memory, and generates unique responses to the environment. This notion outlines the study of how designers think and how they cognitively feel and react.

Studies on design thinking can be approached by exploring design processes and design products. Cognitive science is such a method, used to explore design thinking processes — the driving forces of individual style shown in design products. Studies, however, are rare due to the fact that feeling and cognitive reactions are intangible factors. However, the intangible factors could be detected and tangible through simulations. Immersive virtual reality technology is a tool appropriate for simulating an environment and testing human cognitive reactions to that environment. As long as an environment is digitally established and displayed in full scale, the human reaction to the environment could be detected instantly and reliably.

By exploring how designers think and process information to the understanding on how designers react to the built environment, it is possible to find the connections between thinking, knowledge and emotional reactions. These reactions could be interpreted as parts of problem solving activities. Results of this line of research might provide hints for evaluating design quality and clues for understanding how information technology can improve interactions between humans and machines.

AN APPROACH OF DIGITALIZED URBAN DESIGN

Prof. Dong Wei

Basic Concept

- A World Trend in Urban Planning and Design

- Digital/Intelligent Approaches : This is a new era, a era of science and technology, culture and environment. New digital cultures bring inevitable changes to our world and to the techniques, research methods and practices of planning and design. Step by step, the computer technology transforms urban planning, architecture design and conservation. New digital methods using computer not only for drawing / showing making, but also to make analyses which improving the creative thinking of planners or architects.

Digital Planning and Design

➡ The City as a Complex Adaptive System

The nature and society are Complex Adaptive Systems, and the city is a specific man-made one as well

linear thinking is replaced by network structures

SCIENCE-BASED URBAN & ARCHITECTURAL APPROACH

- Types of Scientific System

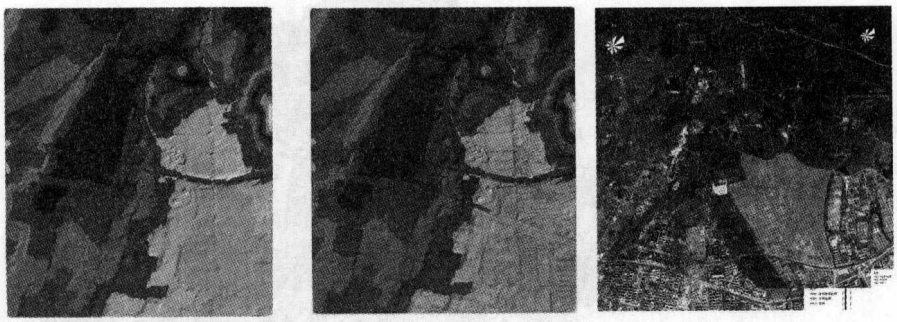
- a) Simple System: Limited factors with simple way of description of the world based on Newtonian law of action and reaction.

- b) Inorganized Complex System: too much random and variable factors to make rational relations in between.

- c) Organized Complex System: all factors are well organized

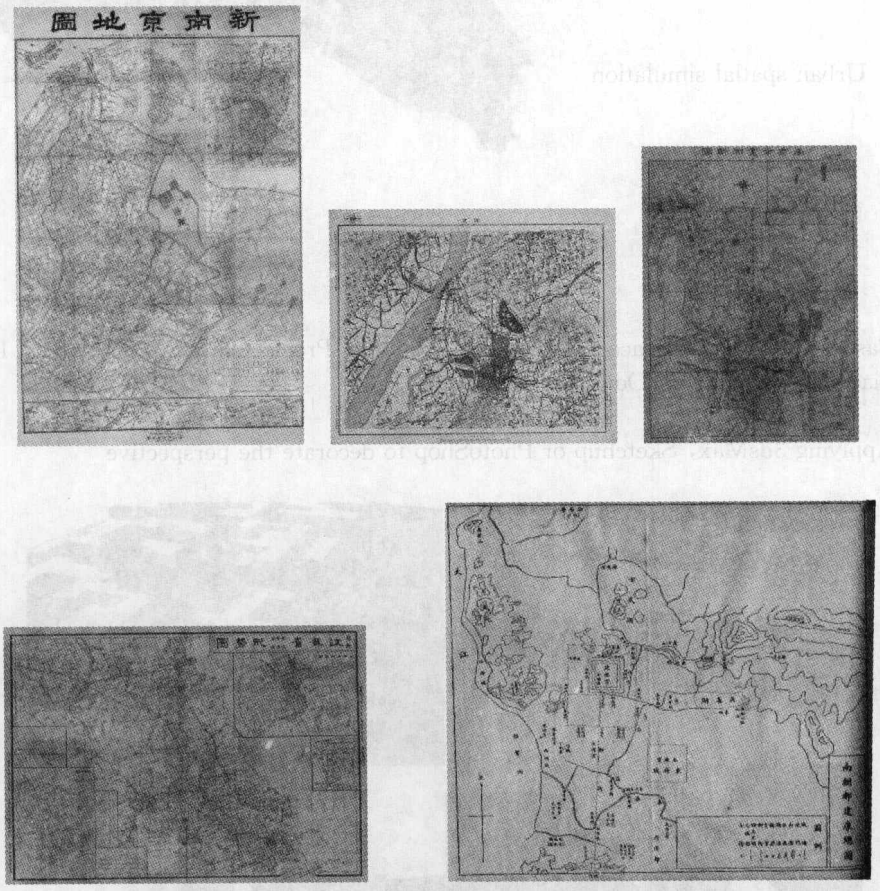
Case 1: Environmental Analysis on Ming Xiaoling Mausoleum (1376－1405), The World Heritage Site of Nanjing

3D Map for Spatial and Environmental Analysis



Case 2: Remapping of historical Nanjing

Historical Maps of Nanjing



Case 3: Urban Design for Wuxi City, Jiangsu Province

Project Leader : Prof. Wang Jianguo, Prof. Yang Jianqiang and Dr. Hu Mingxing

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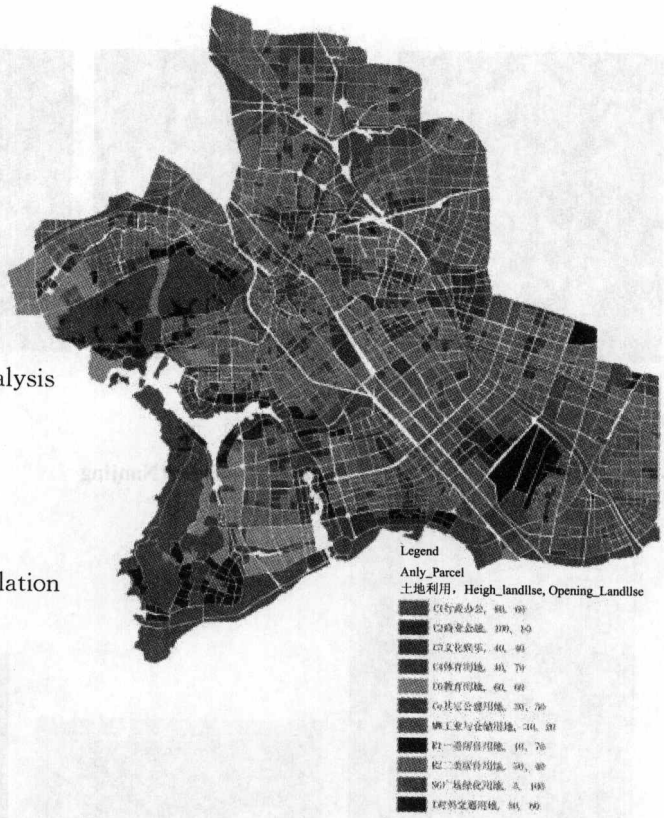
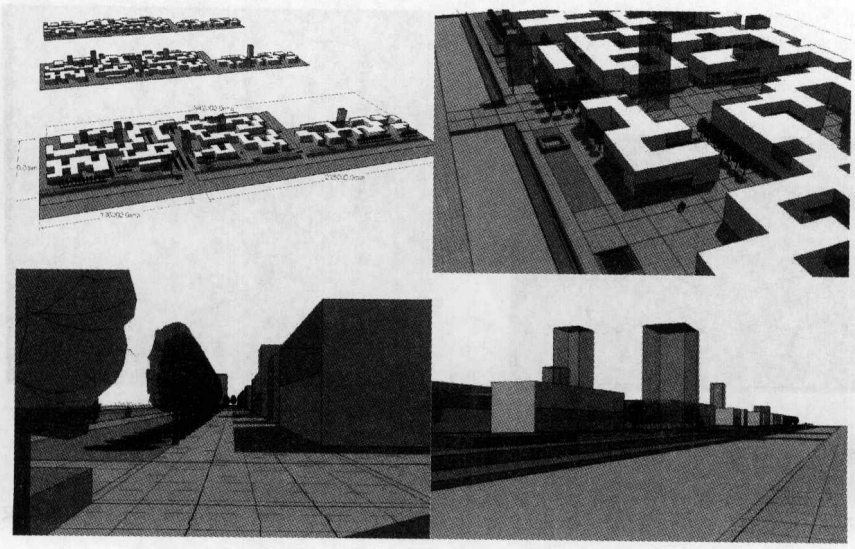
- GIS Data-base
- Urban resource analysis
- Urban spatial simulation



Case 4: Generative Space-Collaboration Teaching Project with ETHZ by Mr. Li Biao (SEU) and Mr. Odilo Schoch (ETHZ)

Applying 3dsMax, Sketchup or PhotoShop to decorate the perspective

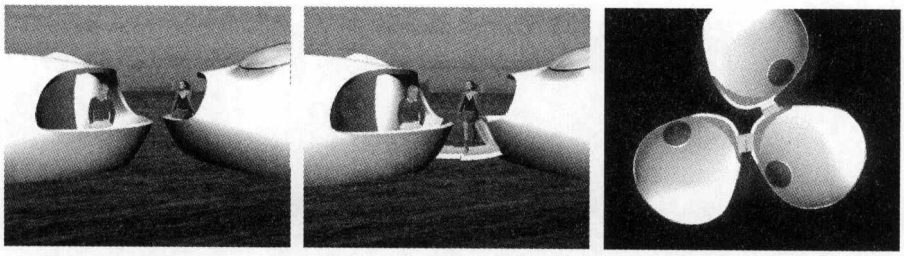


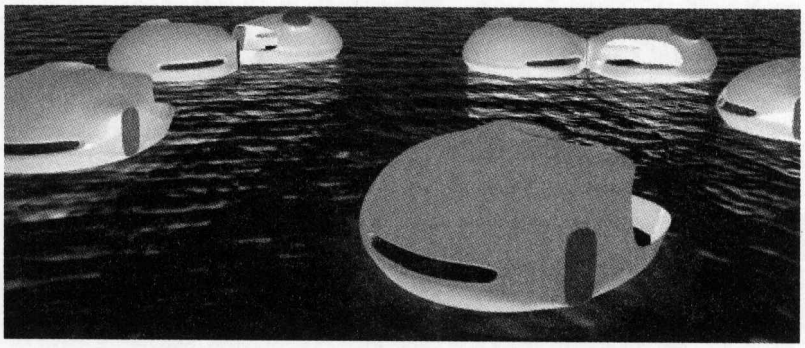
Case 5: Floating Hotel Design for Rotterdam, The Nederland

Course Director : Prof. Dong Wei; Teachers: Dr. Gao Yuan, Ms. Du Rong (SEU)

Course Director : Prof. Kas Oosterhis; Teacher: Dr. Thomas Anderson (TU Delft)

From Swarm to Social Behavior Control





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