

Concepts for Global Work Environments in Architectural Education and Practice: A Field Report

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Introduction

Based on experiences in architectural practice, education, and research, the following case studies have been accumulated over several years in the fields of architectural project communication and development of virtual platforms. Both subjects support a transparent and interdisciplinary project approach towards a fluent and open interaction between participants. The process is a demonstration of the synthesis among architectural practice, education and research. It is based on the synergy effect between these fields and points out how technical innovations can influence them. It illustrates the experimental and applicable potential of critical analysis in the subject areas. The project proposes digital communication tools that widen the field of activity for all participants and promote learning. The method is developed through each "case study" (project step) described later in the paper, and is motivated by the success of each project.

The success of an international project (case study 01), in which the virtual communication played a crucial role, was the catalyst for using interdisciplinary digital methods in teaching. In the following case study (02), which was the re-organization of a traditional design studio setting at the university, we questioned the role of traditional studio teaching by proposing a method that would enable students to share their knowledge and information with students at other universities. The benefits of inter-college communication turned out to be the key element in developing an interdisciplinary

Internet design studio network: the Netzentwurf.

In additional case studies both in practice and education, the virtual/real network idea was used as a way to introduce interdisciplinary facets in design and development. Based on the synergy between architectural practice and education, multiple competences were brought together to meet the challenge of shifting the profession toward communication and job sharing.

Case Study 01. The Gehry Experience

The Neue Zollhof Development as a catalyst and an experiment in communication via electronic media in architecture

The firm of Frank O. Gehry and Associates, Santa Monica, California, served as a field of experimentation in order to bring together a heterogeneous group of project participants to participate in the schematic and design development phases of the Zollhof project in Düsseldorf, Germany. To begin with, it must be said that due to the design method of the office, which is well documented in numerous publications, the design process itself was affected only insignificantly by the employment of digital media as a communication and information tool. On the other hand the enhancement during the design development, construction document, and construction phase was considerable for the whole project development and the participants from the teams in the United States and Europe.



Figure 1. Zollhof development: Schematic design phase and final buildings linked together through a complex communication process

The problems that had to be solved in the project were multifold. First, communication among the Santa Monica team involved in the design process that included sketches, models, drawings, and digital building information. Secondly a line of information flow and management had to be established to connect the design team in Santa Monica with consultants that were located in Europe and Germany. This second line of communication required the team to send precise descriptions of project steps to the participants abroad, as well as receiving and processing a flow of responses returning to the Santa Monica office in very short intervals. All planners involved had to be disciplined, specific, and skilled in communication in order to successfully employ the digital media for the transfer of information and to consider interdisciplinary or architectural code aspects, etc. Furthermore, the international cooperation turned out to be a challenge, since the teams worked on sequential two shifts of nine hours. Therefore they had to rely on task and information transfers between the continents in the early morning and late evening. The advantage of this working method was the *project advancement over night*.

Although not obvious at a first glance, there was an impact on the design process just by

the way the project teams had to advance and document each design step. In doing so, the progression was clearly documented and understandable to everybody. The process demanded a highly articulated project description in text and images that were refined and exchanged daily. This contrasts with regular project processes in which cooperation between design teams and consultants is less close and the project evolution is not accessible to everybody.

The employment of digital communication tools started to dissolve the role of the prime architect or designer toward a more team-related and democratic structure, in which all participants had quick access to all necessary information. As a result, the vertical hierarchy was set aside in favor for transparent communication tools and platforms.

Case Study 02: Academia Reflects

The introduction of digital communication tools in the design studio setting

With the establishment of the Netzentwurf, an Internet based design studio at a German university, the authors were able to introduce virtual project spaces within the profession right before the turn of the millennium. The

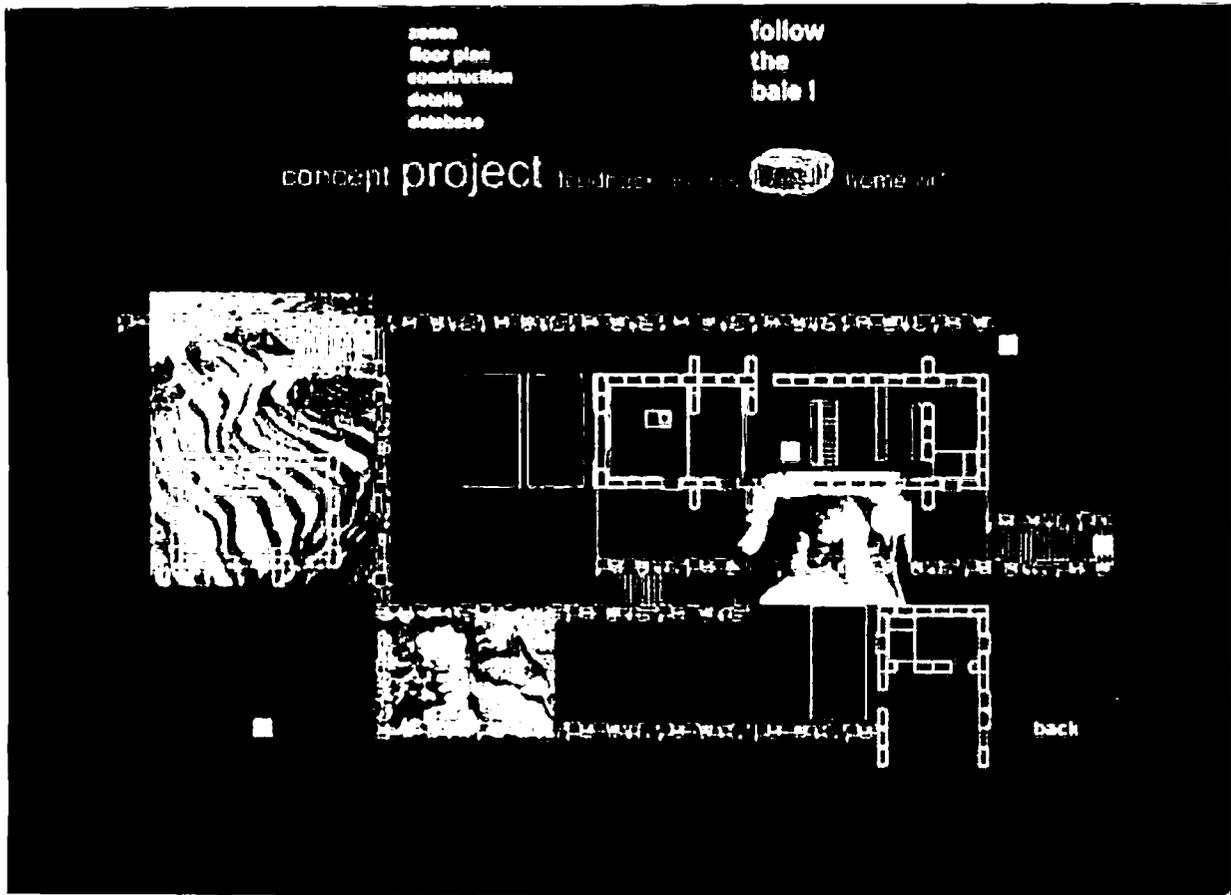


Figure 2. Internet based design studio: The Straw Bale House, California/Germany

development of the Netzentwurf studio setting was influenced by the experience of the first case study project as well as by related research projects in the field of virtual project platforms.

Starting with a simple concept, the first Netzentwurf used elementary techniques such as typical Internet browsers and pure html as a display description language. Alongside the technical aspects of the studio, the challenge persisted to incorporate computer-based tools into the design process to enhance communication between all participants. Design exercises differed from those of regular design studios by demanding solutions for more complex design problems that required coordination with multiple teachers, consultants, and sources of information (integrated planning approach).

Based on the experiences made in the first case study, the main intention behind the

Netzentwurf was to use digital communication media for intensive communication with partners and teachers that were located outside the student's own school. This required the use of Internet based presentation methods to ensure universality in accessibility. Another goal was the use of the Internet for specific and remote information access. Both objectives were reached successfully over the following years. For the efficient progress of the work, the studio structure was divided into two work phases. First the investigation phase, which was to gain and establish information through the Internet and distant project participants and consultants. The result of that diverse pool of knowledge was accessible to all as a project analysis on the Internet. Secondly, this specific information was used to focus on the design process and to influence both schematic and design development. The goal was to create a resourceful virtual workspace through which information was aggregated

and shared by all members. In most projects it was successfully reached.

Based upon that experience, the structure of the *Netzentwurf* got re-organized toward a separation of the technical and analytical aspects. The students simultaneously deepened their technical skills and prepared physical as well as digital models of the site and its surroundings. They collected basic information on the chosen topic before they started the actual schematic design process.

In summary, it may be said that students who were able to combine both technical skills with an outstanding understanding of conceptual design development, presented some of the best results. They used the web as a challenge to gather and share information. Those projects adapted to the Internet as the chosen media of (architectural) communication. On the other hand, there were participants who were satisfied with a less sophisticated employment of the technique, but nonetheless could present very successful conceptual and architectural projects.

Nevertheless, a subsequent analysis of the work and information flow showed that the solely reliance on digital communication media as a guarantee for intense interaction cannot fully replace a physical group-to-group contact. The mere presence of these communication channels and willing participants are insufficient in fostering the desired communication process. The *Netzentwurf* organizers understood that in future projects a certain degree of prescribed interaction would be necessary to open up a wider dialogue among students, teachers, and consultants.

Case Study 03. Interference for the Practice

The ETH World project (Swiss Federal Institute of Technology in Zurich)

For the international design competition of the Swiss Federal Institute of Technology, ETH, in Zurich, an interdisciplinary design group that consisted of architects, designers, web-designers, content managers, and communication/e-learning experts was established at the beginning of the project. Background was the general understanding of

the importance to open up early and intensive communication that then influences the design process from the initial phase on.

Within the design and development process of the *ETH World* project, the experiences from the *Netzentwurf* were applied directly on a professional level. Emphasis was on a horizontal hierarchy that would allow the team to take all design and content decisions on the basis of each participant's individual field of knowledge and practice. A deliberate schedule of physical meetings/brainstorming turned out to be very supportive. As a result, the work process was effective and satisfying.

The competition's design task was to create a virtual teaching and research environment, the *ETH World*, which would perform parallel to the existing physical world of academia at the *ETH Zurich*. This environment should be supportive in the formation of coherent, interdisciplinary, and global project groups that would mainly cooperate via the Internet.

Drawing upon the experiences with group work processes and the implementation of virtual platforms, the *ETH* project group started to extend the required competition program of a virtual communication platform with respect to the given task. A digital platform for inter-personal communication was introduced. It functioned as a virtual forum for the formation of interfaces to business, politics and culture, as well as an instrument for addressing and maintaining future links with students, alumni, faculty, and other *ETH* members.

As an emblem, the compass was selected as the main navigation tool. It symbolized a cosmopolitan approach with global perspectives as well as freedom of movement and personal orientation.

Considering the fact of an ever-increasing flow of information, one of the main tasks within the proposed virtual environment was to sort out relevant information in order to offer it straight to potential users. To this end, mediators were introduced and became increasingly important for the project. Moreover, their implementation reflected the developed working method that the team employed successfully in real space and time.

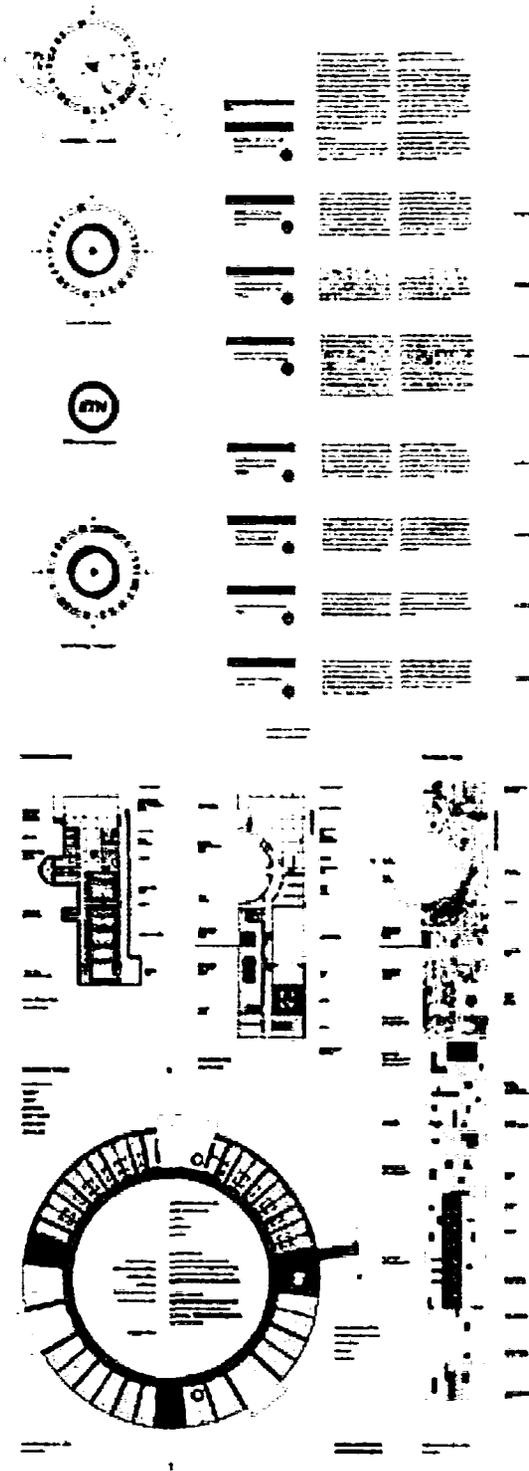


Figure 3. Virtual and physical representation at the ETH World Zurich competition

Rather than providing a pure virtual environment, the virtual community had to be supported by active face-to-face interfaces both in the sense of interface occupation as well as the development of the community. The mediator as a real contact person functioned as a competent contact partner locally and on the Internet, had a high degree of availability, and maintained the interdisciplinary approach by a specialist training. Supported by intelligent and flexible profiling systems, the mediator could offer customized information services, such as research and teaching services, service providing facilities (Active Server Pages - ASP), contact making and much more. The mediator would also support the completion of online research and teaching by organizing physical meeting places for group contacts and workshops.

The design group deduced that the virtual construct of the ETH World should be created with an equal balance through the creation of virtual and real infrastructure. Hence, the newly defined goal was to focus on the balance between virtual (web) and real (architectural) space. In other words, the task was the extension of the given competition brief about a physical manifestation of the virtual space.

The project group suggested the *Interfacing Forum* as an entirely new institution in the real space of the existing Höggerberg campus. Also based on the symbol of the compass, its design implied the same statements that were valid for the virtual emblem. The forum was designed as the interface between real and virtual and was thereby meant to be equally active in both worlds. Beyond offering real space for the mediators and spin-offs, the forum was able to take over the role of a technology transfer station, providing the initiation and arrangement of research and teaching projects in cooperation with the outside world. The development of the *Interfacing Forum* and its adjacent *Backbone Park* as an addition to the Höggerberg Campus opened a broad bandwidth of extra future possibilities. In this sense, the proposed idea was a physical reflection of the platform idea of the virtual space.

Although the proposed project extended the standard competition brief, it was recognized within the group of final winning projects.

Case Study 04. Learning from Zurich

The Liquid Campus (LCx) Project

The experiences of well-chosen face-to-face round table meetings, as well as the understanding of the advantages of a horizontal project hierarchy within a design team lead to the further development of the *Netzentwurf* structure. It culminated in the Liquid Campus Project. At that time, approximately 500 students from universities all over Europe had participated in the *Netzentwurf* studio, making use of the provided platform and communication tools and the very rich source of web-based architectural graphics that were collected over the first years. Comparable to the ETH World project, the Liquid Campus not only used digital tools for communication and the design process, but it certainly employed the parameters of digital communication and distance learning/teaching to define and develop the design topic itself. Based on questions about current and future forms of architectural practice and education, the exercise was to develop a virtual campus for a global university. That campus would have manifestations in the virtual as well as in the real world. To support this whole approach, the studio structure was understood as performing a situation of distributed practice.

As an instant reaction to the previous case study experiences, the most important change in the strategy and organizational structure of the *Netzentwurf* was the establishment of physical meetings within the project process. To deepen the communication between the involved groups, the organizers concluded that *Netzentwurf* groups have to physically meet during the process. Also supportive would be the formation of interdisciplinary design groups from different participating schools that were consulted by a teacher from a remote university. Students were even more obligated to use web-based technologies in order to communicate and push their projects. This studio setting provided a high degree of prearranged interaction, opening up the dialogue among all participants from the initial phase.

For this specific studio project it meant the re-introduction of physical face-to-face meetings: a three-day introductory workshop, a midterm review, and a collective final review that was

held in the public space of the Museum of Communication in Frankfurt four month later. The project teams that worked over the Internet to produce their collaborative project solutions comprised three students and a tutor, each located at a different university. An interesting phenomenon was the form of communication methods and tools used by the students: Besides the Internet with email, ftp-transfer, and video conferences as the main communication channels, every type of idea-exchange was employed, including telephones, faxes, and even highway restaurants at half-way points that served as actual meeting spaces.

In retrospect, the project was considered to be successful by almost all participants; the presented work covered a large bandwidth between the real and the virtual architecture. The presentation setting in the Museum of Communication reminded the group of the differences between build and virtual architecture. Nevertheless, it has to be mentioned that the organization of and the participation in such a studio setting demands a considerably higher amount of energy both from the students as well as from the studio teachers and organizers. However, the results of those projects and the very specific work experience paid off with the additional effort.

For the further development of the *Netzentwurf* strategy, the *Netzentwurf Marketplace* was introduced. This web-based collaboration platform is an independent web site. It is virtually open to every school worldwide that has an interest to use it as a studio communication and collaborative design development tool. Participating universities work from this Internet platform; it ensures an easy data and knowledge exchange by using similar software that is supported by various operating systems. Providing this libertarian and democratic tool, the organizational hurdles of collaboration work are reduced. Within the virtual portal, participating schools of architecture, landscape architecture, interior design, etc. can offer their design topics to a large community of students. Those participating students can choose topics from remote universities, receiving virtual consultation through web-based media from the teachers at the remote location, and getting simultaneously face-to-face support and consultation at their home University.

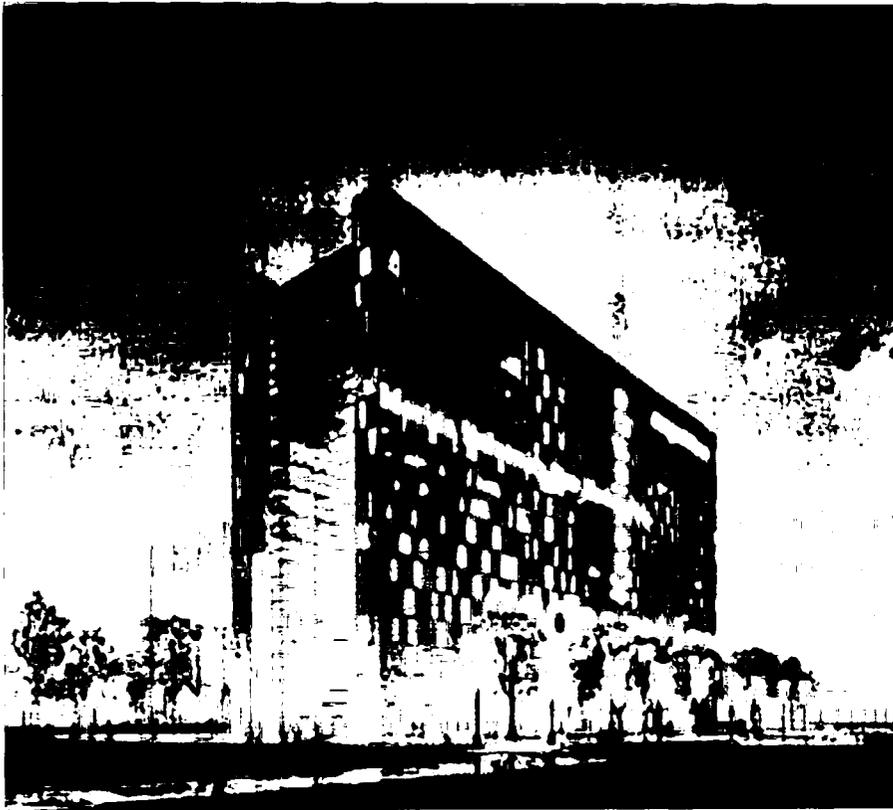


Figure 5. KoopX Network: Recent international competition entry for a media center in the New Harbor City near Shanghai

of the various members in currently three different locations worldwide is possible through the employed digitalization standard at all design, development, and planning stages. Collective endeavor revolving around computer networks and established Internet standards underwrites the efficient exchange of ideas, skills, information, and planning processes. This work process ensures that talents can be deployed where they are most valued and where they can achieve the best results in line with the set objectives.

Although the network's working method relies on the Internet and a virtual project platform, the face-to-face communication and brainstorming, as well as the personal contact with clients, is still valued at a very high level and thereby mandatory. Within the structure of KoopX, all aspects of the above-described case studies were implemented and so far successfully applied in a professional setting. Conditional upon the members' cultural experiences, the structure is even able to overcome the difficulties of various cultures.

KoopX is recently located in Berlin, Germany with branches and members in China and the United States. The most recent projects include architectural, landscape, and urban competitions, and project developments in the Peoples Republic of China.

Conclusion

The critical and continuous analysis of the design and project processes lead to a long-term project development in which the organizers were able to improve a simple initial idea toward a contemporary and complex working structure. Throughout the years, the projects' improvements were based on the synergy among the fields of architectural practice, education, and research. The current development considers present characteristics in the field of architecture and successfully addresses a broad bandwidth of today's necessary communication, design, and human aspects. The future goal of the ongoing processes in education and practice will be the further

development of the network idea not merely with the option to adapt to future demands that develop in the field of the architectural profession, but with the objective of influencing this evolution and preparing the next generation of architects.

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