A Planning Tool for Glass-Covered Halls and Courtyards

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ABSTRACT: In this interdisciplinary project an instrument for planning, construction and maintenance of atria buildings was developed. The analysis of existing planning tools has revealed that knowledge represented therein is restricted to each particular discipline and its presentation is often didactically unsatisfactory. This project pursues the aim of unifying existing knowledge from the various disciplines involved into one didactically appropriate instrument making use of understandable language. The tool, developed in interdisciplinary cooperation among various specialized fields, can be utilized jointly by BRENET-partners, specialised experts from planning offices and private industry. It consists of a manual subdivided into five parts, a complementary website publishing updates and additional information as well as a professional training concept. The selected target group for this planning tool are potential building clients, architects, specialist planners, private industry and academia.

Keywords: interdisciplinary planning process, tool

1. INTRODUCTION

The characteristic feature of the class of buildings known as atria is the inner courtyard open to the sky. The functions of this courtyard are various. Apart from being a source of lighting and ventilation for the adjacent structures, it also serves as a central show-piece area in its own right.

The glass architecture, characterized by its transparency, lends a completely new aspect to the formerly introverted character of traditional courtyards. With the new understanding of architecture, freed of the constraints of building history and taking into account all the possibilities offered by industry, technology and new materials, it became possible to develop new multi-storey glass-covered courtyards and halls with major focal-point character out of the open, uncovered courtyard of the traditional atrium.

These atria buildings are complex systems which place major demands on planning. If the interlinking of technological, economic, environmental and stylistic factors are not considered during the planning phase, significant complications can arise later in operation and maintenance, which subsequently can only be partly rectified and at considerable cost. One example among many concerns the difficulties of managing indoor climate in buildings with extensive glass surfaces.

The results of the preliminary investigation showed that on the one hand a large number of specialized studies, case studies and dissertations about atria are available. On the other hand, this literature is of limited use in planning and construction. A diversity of terminology in the disciplines involved a decentralized body of knowledge and a lack of a comprehensive overview can all be cited as possible reasons. The increased demands of modern construction require interdisciplinary cooperation among all of the specialities required for the planning process. There is a clear need for contextual thinking and the merging of knowledge.

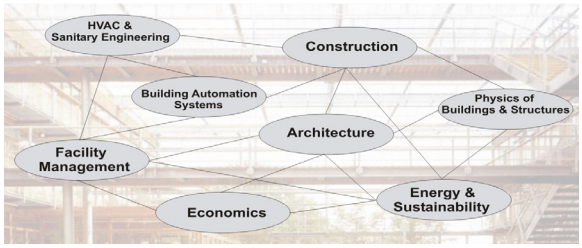

Figure 1: Scheme representing the interdisciplinary network in building

2. CONTENT AND GOALS

The tool presents the collection and integration of knowledge from various fields (architecture, construction, HVAC, building automation systems, physics of buildings & structures, energy sciences, sustainability, economics, construction bylaws and facility management) and sectors (construction planning, industry, research and didactical design) to the planning team with special view to a holistic and sustainable approach. Apart from the relevant contents arising from the various fields' involved, special attention is paid to the planning procedures themselves, and alternatives to conventional practice are proposed.

The planning tool does not presume to replace the comprehensive reference books available within the various disciplines. Rather its purpose is to foster awareness of the necessity of cooperation between professional fields and to serve as a basis of discussion for successful planning. For this reason this tool attempts to address a broad spectrum of those involved in the planning process: building clients, architects, specialist planners, subcontractors and, of course, students should view the atrium as a complete system.

The instrument presents the interlinking of the various relevant planning factors for the conception, operation and maintenance of atria. Checklists, in addition to documenting specialized knowledge and interfaces between disciplines, also serve as reference and decision aids, and demonstrate the consequences of particular choices for the other specialities involved in the planning.

The concept of the instrument and the media it utilizes are adapted to the user and where it is being applied. The planning tool consists of three elements, which exist both in relation to one another, but can function autonomously: a manual subdivided into five parts, a complementary website publishing updates and additional information as well as a professional training concept.

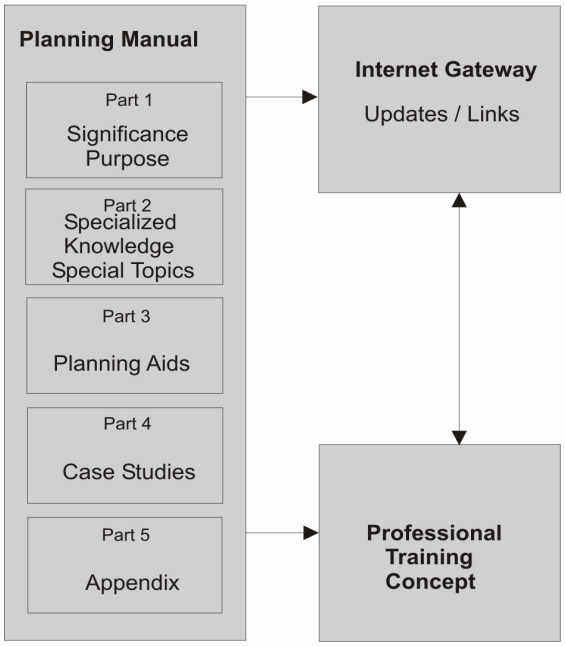

Figure 2: The three elements of the planning tool

3. METHOD

The following steps were carried out and serve as the basis for the planning tool:

- Research and gathering of case studies.
- Analysis of the case studies, taking into account both specialized and interdisciplinary aspects, with the goal of identifying both potential interaction of specialities and problem areas in planning atria.
- Type classification of atria in terms of various aspects.
- Analysis of the planning process based on interviews with experts involved with the planning of atria, glass-covered courtyards and halls (architects, specialist planners and industry).
- Analysis and assessment of existing planning manuals and electronic media with regard to didactic design, quality of contents and communication of a holistic approach.
- Conceptual development of the five-part manual, a complementary website and a professional training concept. In this connection the manual, website and training concept are to be regarded as self-contained units which are nevertheless interlinked.
- Semester projects and diploma theses related to this overall project.

4. THE PLANNING TOOL

Figure 3: The manual

4.1 The Manual

The interdisciplinary requirements of the instrument are reflected in the subdivision of the manual into five parts. The topics relevant to the

planning of atria are presented by authors from various disciplines and institutions. At the same time the concept, arrangement and layout of the handbook serves to reveal the close relationships among the individual topics and areas of overlap.

Part 1: Presentation of the potential, significance and purpose of atria from the respective points-of-view of the different parties involved in planning (investor, user, architect, planning specialist, lecturer)

Part 2: Presentation of current specialized knowledge and related material regarding the planning of atria (architecture, construction, HVAC & sanitary engineering, physics of buildings & structures, building automation systems, energy, sustainability, economics, construction bylaws and facility management)

Part 3: Clarification of concepts throughout the field of interdisciplinary planning, highlighting their necessity

Presentation of the areas of overlap and formulation of planning aids (check lists, questionnaires, EDP-tools, etc.)

Part 4: Presentation of high-quality case studies with regard to significant subtopics (design, economics, energy, engineering & construction)

Part 5: Appendix: corporate directory, corporate portraits

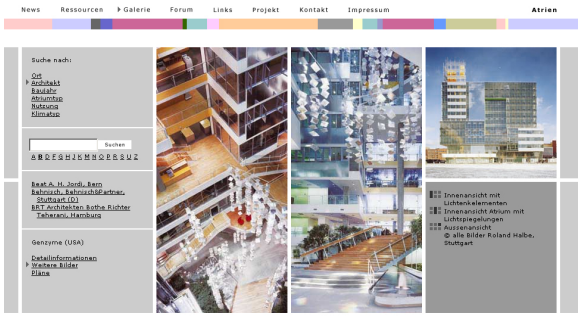

Figure 4: Screenshot from the databank buildings on the website www.atrien.ch

4.2 The Website

The website serves as a present addition to the manual. It allows constant updates on current knowledge and experience and provides a forum for selected topics (e.g. fire prevention, light design, façade construction or energy concepts), which can be presented in detail.

A central element of the website is a data base 80 buildings at present), in which high-quality examples of atria buildings will are archived with photos, elevations, facts, figures and links.

4.3 The Professional Training Concept

A concept aimed to its intended audience requires that training courses are individually adapted to the requirements of the participants. Prior to developing a detailed training concept, it was necessary to evaluate the requirements of various groups in a first phase. Then, in a second phase the courses were planned in close cooperation with appropriate professional associations (SZFF, SIA, etc.) At present we plan one to four sight-events with referring experts and in addition articles to technical topics in the SZFF magazine.

Figure 5: The professional training concept

5. CONCLUSION

The planning tool "Atria" was officially presented at the exhibition Swissbau 2005. The manual, which is available throughout German-speaking Europe (CH, D, A) is marketed by a reputable architecture publisher (Birkhauser Verlag).

Experiences gained with the instrument and new knowledge will be integrated directly into professional training programmes and will also be reflected in the constantly updated Internet website. Thus a continuous optimization of the planning tool is assured.

Figure 6: Successful interdisciplinary work, here in the atria Alterra Wageningen by the architect Stefan Behnisch

ACKNOWLEDGEMENT

The project was carried out under the auspices of the Building and Renewable Energies Network of Technology – brenet – in cooperation with the Swiss Center for Window and Facade Construction – SZFF [1].

The Project "Atria" was supported by the Federal Office for Professional Education and Technology (OPET) [2] through the Swiss Innovation Promotion Agency (CTI) [3]

Table 1: Participants in the research project

Lucerne School of Engineering and Architecture (HTA) [4]	brenet
Zürich University of Applied Sciences Winterthur (ZHW) [5]	brenet
Lucerne School of Art and Design [6]	
Swiss Center for Window and Facade Construction (SZFF) with the coordination of SZFF-member companies by Tuchschmid AG	association
Siemens Building Technologies Ltd	industry
Hälg Facility Management AG	industry
Gruenberg & Partner AG	industry
External authors	

In order to assure both interdisciplinary exchange and depth of knowledge, a representative of academia and a representative of industry were assigned to each element of the planning tool. This "tandem" coordinated the team of authors responsible. The responsibility within the team for the didactic design, the homepage and the training manuals, was assumed by the Lucerne School of Art & Design.

In order to enable rapid and up-to-date networking among the project partners and institutions as well as to reduce the administrative overhead, a BSCW server (Basic System for Cooperative Work) was set up at the HTA. In hindsight it is noted that the exchange of information was accomplished by this means, but that little use was made of the potential of the BSCW to support discussion forms. It confirms the assumption that a key element of interdisciplinary exchange is direct communication and exchange of specialist knowledge. For this reason, workshops for the participants were regularly held during the course of the project.

REFERENCES

[1] Schweizerische Zentralstelle für Fenster- und Fassadenbau
[2] Bundesamt für Berufsbildung und Technologie (BBT)
[3] Förderagentur für Innovation (KTI)
[4] Hochschule Technik+Architektur Luzern
[5] Zürcher Hochschule Winterthur (ZHW)
[6] Hochschule Gestaltung+Kunst (HGK)