MAPLE/D: a systematic method for the architect of the future

M. Fendl Dresden University of Technology, Germany

Abstract

This paper presents a systematic method for architects of complex buildings tasks working in interdisciplinary groups called MAPLE/D *Method of Architectural Planning and Design*. MAPLE/D was developed within the framework of an extensive research project sponsored by the *DFG Deutsche Forschungsgemeinschaft*.

The concept of MAPLE/D is based on

- the think tool of *Creative Thinking* which claims to separate and simultaneously combine analytical-theoretical and creative synthesising-practical tasks,
- the combination of five developed models: the *Scientific Criteria Model*, the *Stakeholder Model*, the *Issue Model*, the *Process Model* and the *Competency Model* and
- a number of methodological tools for the implementation of the models.

The combination of the think tool, the five models and the methodological tools is supposed to help architects managing complex planning and design tasks as well as making them aware of certain competencies, such as *Soft Skills* and *Hard Skills,* which they need for applying the systematic method MAPLE/D. This paper gives a detailed presentation of MAPLE/D.

MAPLE/D: a systematic method for the architect of the future

Introduction

A Systematic Approach to a Future-Oriented Planning and Design Method for Architects of Complex Building Tasks Working in Interdisciplinary Groups Called MAPLE/D Method for Architectural Design [1]. The double entendre of the title "The Architect of the Future" is chosen to express that this paper strives for a systematic method for architects who on the one hand plan and design *in the future* and who thus design *the future* on the other. Architects who want to work successfully also in the future and who want to be indispensable partners for the client while planning [2] and designing [3] complex buildings in the future have to work in interdisciplinary groups to develop architectural proposals for the future.

Framework

The framework of this paper is an extensive research project on planning and design methods which focuses on ways how architects could systematically develop goal-oriented architectural solutions for complex building tasks – e.g., for social facilities and healthcare buildings (more details in Fendl 2002).

Methodology

Study of literary sources

Initially, the study of literary sources was done to find the requirements made on the architects' job and to identify issues that determine architecture and that are to be fulfilled. The basic research on the term and the essence of *architecture* and on the job profile of the *architect* produced the following central requirements for architects managing their tasks successfully. These requirements have been formulated as a hypothesis.

Hypothesis

To preserve their important role in the construction professions for the future within the planning and design process architects are expected

- to do their work systematically, comprehensibly, independently and reliably,
- to involve all important experts and to consider the stakeholders' interests,
- to transform all essential issues into an effective architectural proposal,
- to proceed systematically and therefore efficiently and
- to fulfil a co-ordinator's, presenter's and mediator's job as well as to contribute their own specific competencies regarding the creative development of a formally appealing architectural proposal with aesthetic value and
- to support the problem-solving process by using his/her analytical and synthesising abilities (Fendl 2002: chapter 2).

Objectives

To meet all of these requirements simultaneously, the architect is expected to use a systematic method for planning and designing. However, the question still stands: how can such a method be used? This question defines my research objective: The aim of this paper is to discuss a recently developed planning and design method for architects of complex building tasks. Meeting the

requirements mentioned above can be achieved especially by integrating interdisciplinary knowledge of other experts and stakeholders.

Main findings

The criteria catalogue for MAPLE/D

The result of the analysis of literary sources is a criteria catalogue as a basis for the development of future-oriented planning and design methods in architecture. It is thus the starting point for finding ways that support systematic architectural planning and designing. The criteria catalogue includes:

- the *Scientific Criteria Model* to support the architects to work systematically, comprehensibly, independently and reliably,
- the *Stakeholder Model* to identify all important experts and stakeholders,
- the *Issue Model* to record all essential issues completely and to transform them effectively,
- the *Process Model* to proceed systematically and efficiently and
- the *Competency Model* to present, co-ordinate the process and to mediate between those involved in the process as well as to contribute the architect's personal specific creative and formal competencies and
- the principle of *Creative Thinking* considering the different abilities of the two brain hemispheres as an underlying "think tool".

Combining these five models with the think tool *Creative Thinking,* a planning and design method for architects of complex building tasks working in interdisciplinary groups called *MAPLE/D Method for Architectural Design* can be derived:

The network of MAPLE/D

The idea of MAPLE/D is to provide a grid as an open basic structure. This grid consists of the five models embedded in the principle of *Creative Thinking* mentioned above and a number of methodological tools that dock the five models (see *Figure 1*).

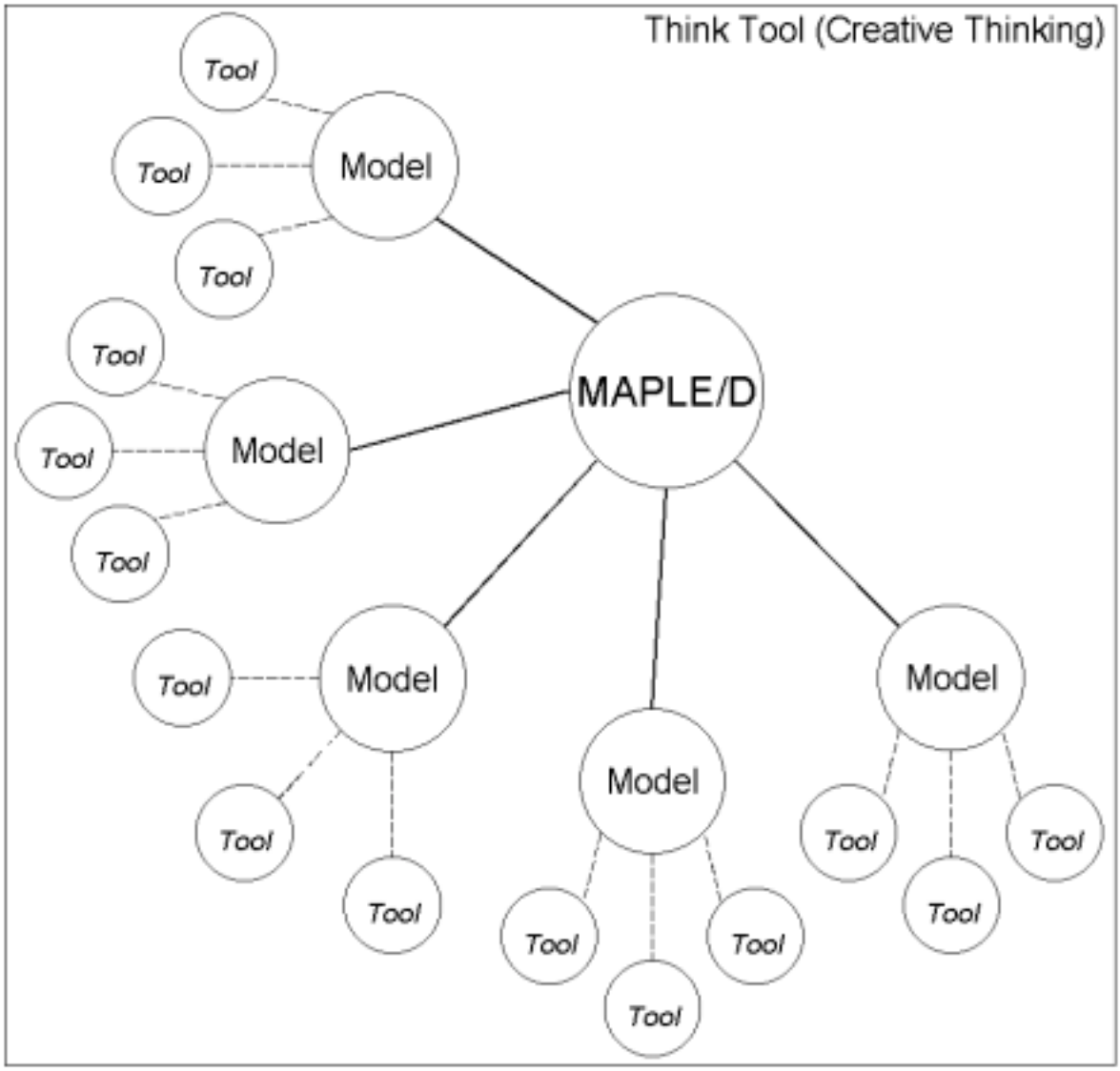

Figure 1: The Network of MAPLE/D

This cross-linked network of the underlying think tool, the five models and the methodological tools, forms the *heart* of MAPLE/D. The methodological tools are named in the following chapter and are to be understood as an offer for the architect while developing an architectural proposal. This modular system works as a *direction sign* within the process of planning and designing and has to be assimilated to the specific building task. The architect has to prove in each individual case (building task) which of the methodological tools proposed suits his/her requirements best.

MAPLE/D

The detailed presentation of MAPLE/D is therefore carried out as follows: First, the principle of *Creative Thinking* as a think tool is explained. Then, the models are each described briefly and illustrated with a figure. Afterwards, the features and the objectives of each particular model are commented on and selected methodological tools are assigned.

Differentiation between the terms planning and design

This paper starts from the fact that there is a difference between the terms *planning* and *designing* just as between the German terms *Planung* and *Entwerfen* (Fendl 2002: chapter 2.3):

Planning (Planung) is defined in this paper as a systematic information processing procedure to develop a goal-oriented architectural proposal (which contains the elements *Information* and *Control* and the steps *Planning/Design Impulse, Planning of Planning, Formulation of the Problem, Setting the Goals, Generation of Alternatives, Prognosis, Evaluation, Decision* and *Drawing up the Plan*).

Designing (Entwerfen) is a creative process within and simultaneously to *planning*. Within this process, an unpredictable proposal for a unique architectural object for a certain use and for future construction is systematically or intuitively developed (in advance).

Planning is therefore a rather analytical-theoretical activity while *designing* is a rather creative synthesising-practical activity. Basically, the activities of the *analysis* of planning and of the *synthesis* of designing are inseparable. Both are run simultaneously during the whole process and cover the whole process of planning and designing from the *Planning/Design Impulse* up to *Drawing up the Plan,* i.e. the architectural proposal. But both activities, *analysis* and *synthesis* are carried out with varying intensity as shown in *Figure 2*.

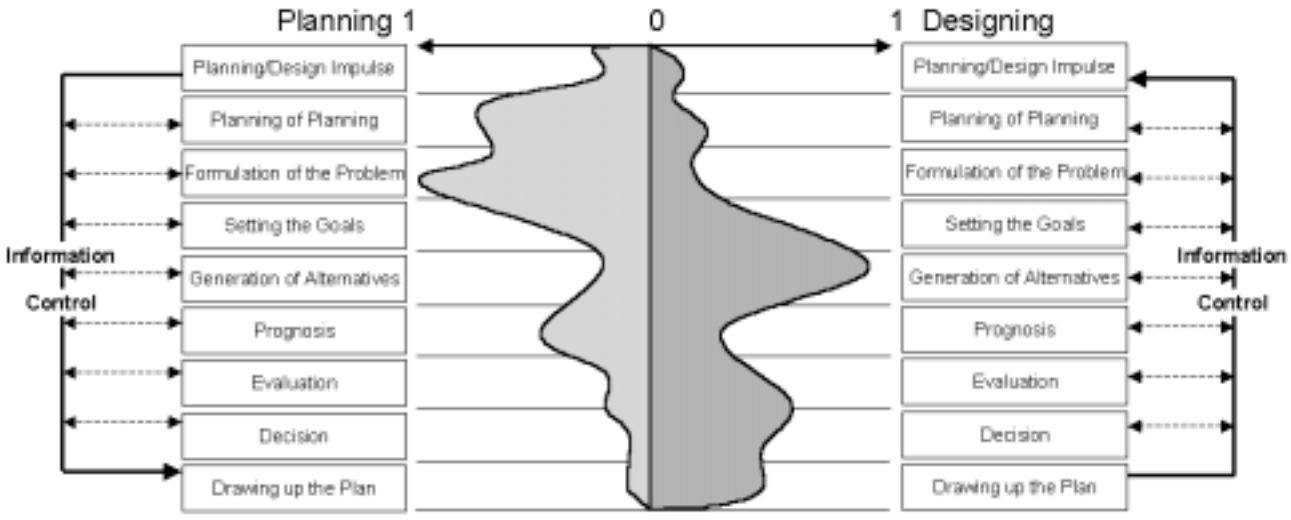

Figure 2: Inseparable Activities of Analytical Planning and Synthesising Designing

The principle of creative thinking

This "*inseparable subdivision"* of these two entirely different activities is based on the investigation by *Linneweh* about *Creative Thinking – kreatives Denken* (Linneweh 1994). *Linneweh* demands the differentiation between analytical and creative work. The reason for this is that the two hemispheres of the brain work differently: Whilst the left hemisphere concentrates on talking, reading, writing, analysing and logical thinking, the right hemisphere is rather emotional,

intuitive, dynamic, it overviews situations instead of analysing them, it loves art, music, dance and other beautiful things (Weyh 1991: 102).

The principle of convergent and divergent thinking

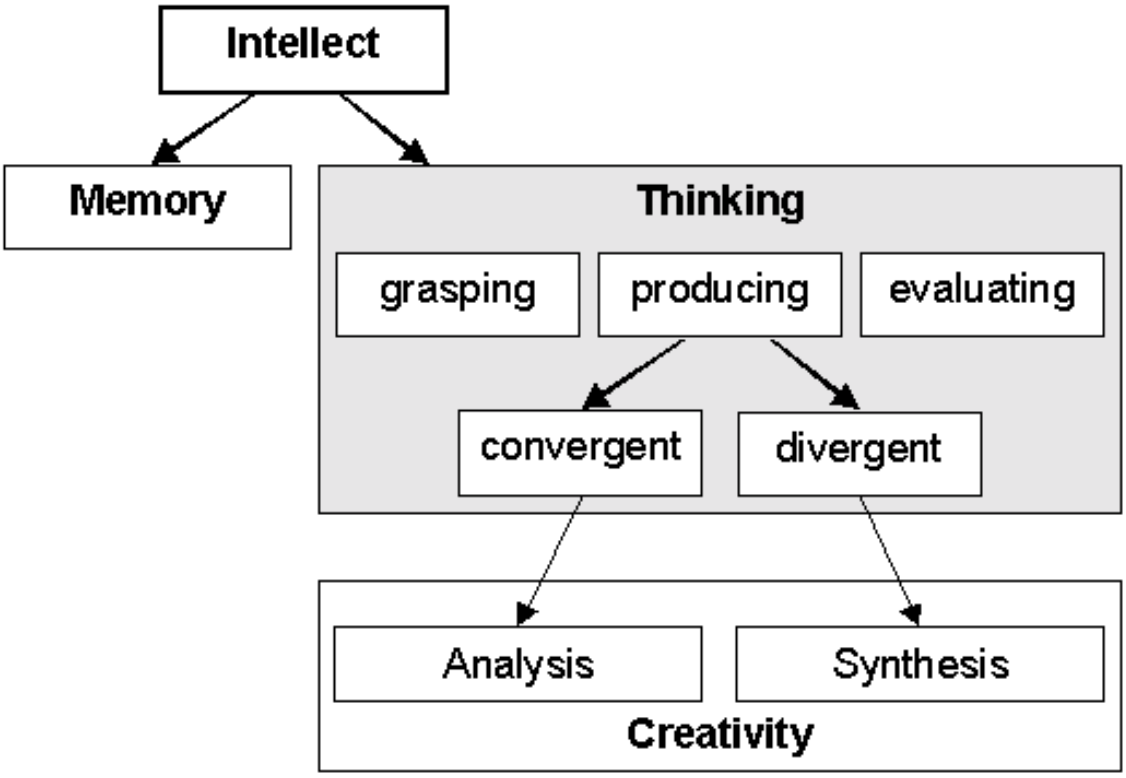

Figure 3: Structure of Intellect Model by Guilford and Components of Creativity (Linneweh 1994: 15 and 28)

Linneweh refers to *Guilford* who subdivides thinking into *grasping*, *producing* and *evaluating thinking* (see *Figure 3*). For the problem-solving process, i.e. for analysing the problem and developing a resolution, the architect is simultaneously grasping, producing and evaluating thinking and therefore needs both abilities of the brain. What the architect needs in the end is – in scientific terms – on the one hand *Convergent Thinking* and *Divergent Thinking* on the other (see *Figure 3*). *Convergent Thinking* is focussed, logical thinking in considerate, systematic steps. It starts from the *Reality Principle* by *Freud*. In contrast, *Divergent Thinking* is free, inordinate and visionary thinking which cannot be logically understood. It is based on the *Pleasure Principle* by *Freud* (Linneweh 1994: 17).

Unfortunately, the working intensity of the two hemispheres varies greatly over time and one cannot control them consciously. At any time, one of the two is dominating the other. In addition, there are right-brained people, whose right hemisphere tends to dominate in general. Of course, there are also left-brained people who generally proceed in a rather considerate and logical way. Therefore this paper proposes to consider this "inseparable subdivision" *consciously* when looking at planning and design method to support the problem-solving process.

A suitable methodological tool for the parallel consideration of *Convergent* and *Divergent Thinking* is the strategy of *Controlled Divergence*. The phrase *Productive Creativity is Controlled Divergence* by *Linneweh* (Linneweh 1994: 17) points out that creativity is *Divergent Thinking* combined with *Convergent Thinking*, i.e. with controlled thinking.

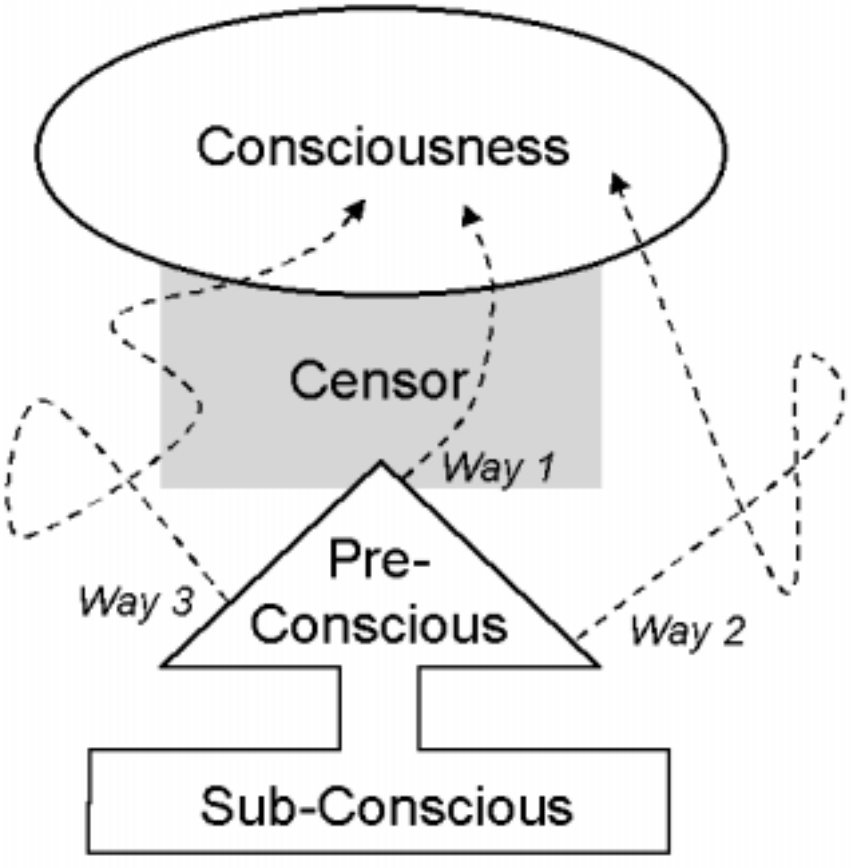

Figure 4: Model of Information Processing in Creativity by Linneweh (Linneweh 1994: 25)

The approach of *Controlled Divergence* goes back to *Freud* who divides the psychic part of humans into *consciousness* and the *sub-conscious*. In addition, *Freud* presents the phenomenon of the *pre-conscious* as a kind of information memory of own experiences and knowledge. This knowledge is used as a *Censor* which controls problem-solving procedures (see *Figure 4*).

Way 1 is the exclusively *convergent* way, the direct way toward an idea only controlled by the *Censor*. Therefore, the *Censor* rejects all ideas which are not yet known to it.

Way 2 shows the exclusively *divergent* way, the inordinate creative search for ideas. It is not controlled by the *Censor* and is therefore just as unpromising as *way 1* .

Way 3 is the combination of *way 1* and *way 2*. After – an uncensored – inordinate creative phase the *Censor* is used as a control element to exclude erroneous ideas and to identify other possibilities. (Linneweh 1994: 25ff.) In other words: When applying the approach of *Controlled Divergence, Divergent* and *Convergent Thinking* alternate.

This *Model of Information Processing in Creativity* is the basis for the differentiation between the terms and activities of *planning* and *designing*.

The scientific criteria model

The *Scientific Criteria Model* shown in *Figure 5* is a normative model that appeals to architects to do their job of planning and designing in a certain "scientific" way, i.e. to follow a procedure which is comprehensible for anyone involved. The aim of a scientific procedure is to produce

architectural proposals which are systematically developed, objectively well-founded, therefore transferable, intersubjectively transformable and last but not least evaluable.

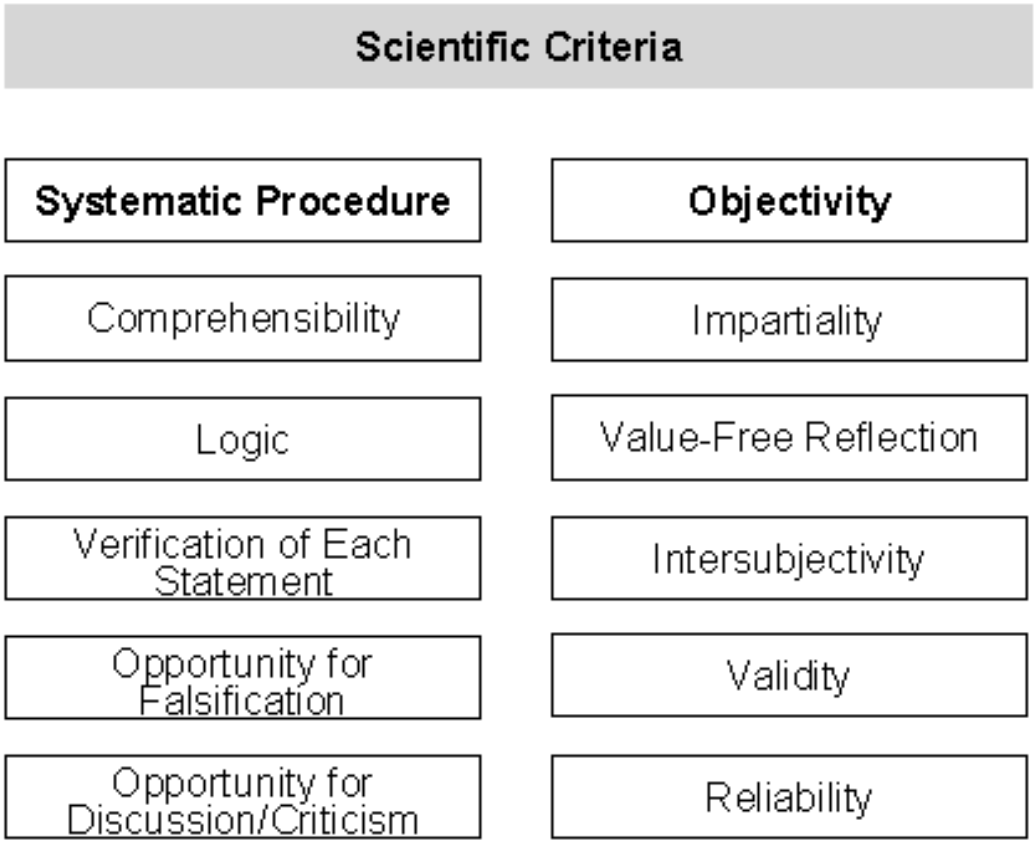

Figure 5: Scientific Criteria Model

The *Scientific Criteria Model* consists of a normative list of criteria that have to be fulfilled when working "scientifically", i.e. comprehensibly and rationally. The purpose of this model is to help the architect be conscious of the requirement to work orderly, to give specific reasons for decisions, to provide logically reasoned arguments, to prove the correctness of statements, to give other people involved the opportunity to prove that black is white and to discuss and criticise statements (see left column). In addition, the model is supposed to make the architect aware of the necessity of being independent, impartial, to act value-free, to make the other stakeholders involved understand decisions, to strive for significant, valid and firm decisions (see column on the right). Methodological tools for the implementation of the scientific criteria model are, e.g. text, diagrams, checklists, questioning (Rogge et al. 1995).

The stakeholder model

The *Stakeholder Model* helps the architect to identify the stakeholders of the architectural proposal. The example of a *Stakeholder Model* in *Figure 6* shows stakeholders and groups of stakeholders in the field of hospital design. By detailing or expanding this model again and again, all persons with a *stake* in the architectural proposal can be identified. The model includes users of the future building as well as planners. The identification of the stakeholders is beneficial to discover the information potential and knowledge that any of the stakeholders can provide and eventually to encourage communication and interaction between the stakeholders.

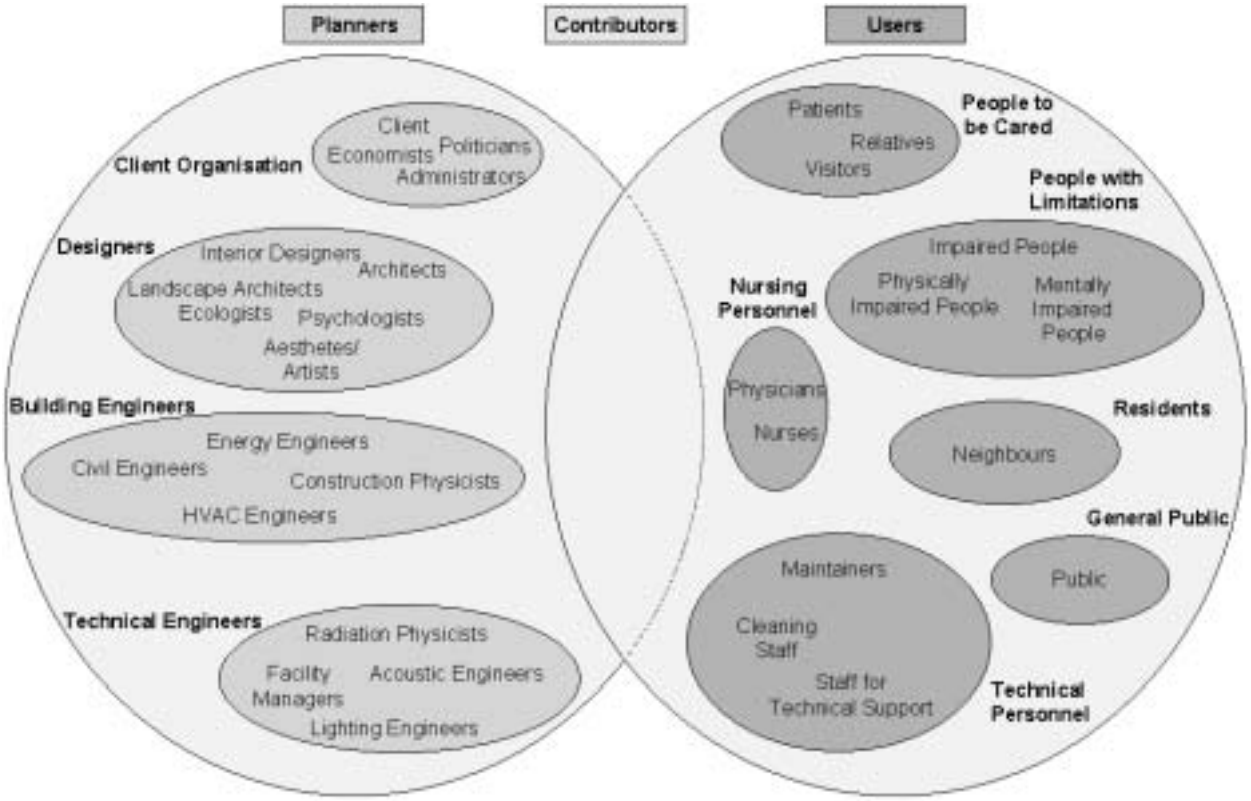

Figure 6: Example of a Stakeholder Model

The *Stakeholder Model* is based on the *Stakeholder Approach* which is explained by *Carroll* (Carroll 1989, Jennings, no year: 1-7, Freeman 1984: 25). The *Stakeholder Theory* claims to involve all individual people and groups who have a stake – an interest or a share – in a project (Carroll 1989: 56f.). In this model, the stakeholders basically consist of the two groups *users* and *planners* – and the overlapping group who are called *contributors*. The *Stakeholder Model* helps the architect to identify the specific stakeholders of a project and to include them into the planning and design process in order to ascertain their knowledge and their experiences which are helpful for the development of an architectural proposal. Methodological tools for the implementation of the *Stakeholder Model* are, e.g. tables, graphs, set models, mind maps (Grothe-Senf 1999: 119ff.), stakeholder/responsibility matrix (Carroll 1989: 71).

The issue model

The *Issue Model* shown in *Figure 7* contains a basic framework of issues (features) which determine the quality of architecture and which have to be fulfilled to achieve certain goals. These goals are in turn derived from the *Physical* and *Psychological Needs of Users*. The issues need further specification and can consequently serve as a basis for the development of an architectural proposal.

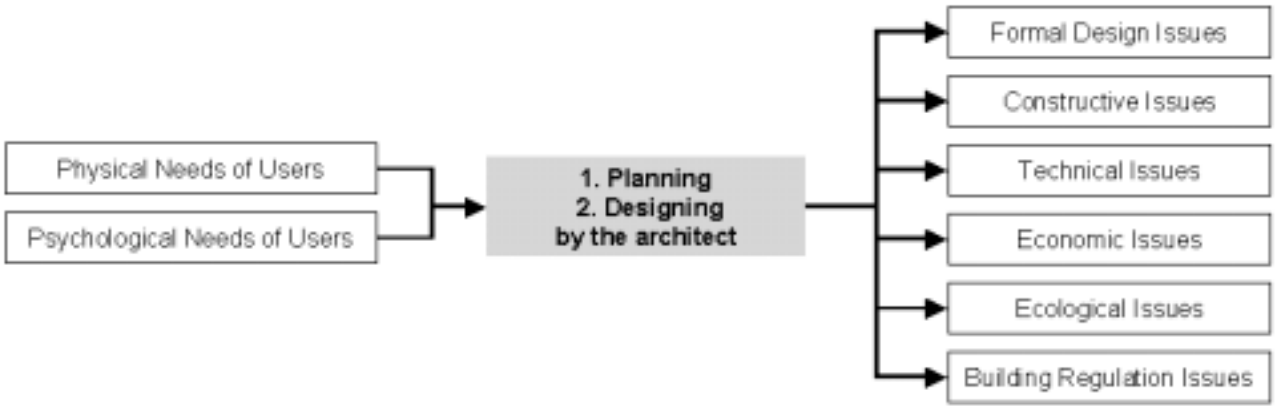

Figure 7: Issue Model

The *Issue Model* represents the *Physical* and *Psychological Needs of Users* which have to be ascertained. The issues which determine the quality of buildings and of architecture, respectively, can be derived from these needs. These issues are *Formal Design Issues, Constructive, Technical, Economic, Ecological Issues* as well as *Building Regulations Issues*. The architect must take into account these issues theoretically and transform them practically into an architectural proposal. This procedure of *theoretical consideration (= planning)* and *practical transformation (= designing)* is accompanied by a precise progressive refinement of the issues. Methodological tools for the implementation of the *Issue Model* are, e.g. study of literary sources, questionings, the application of the *Building Performance Concept* (Preiser et al. 1997), the concept of *Total Quality Management* (Müller-Böling 1993: 3636ff.) or of the *House of Quality* (Hauser and Clausing 1988: 63ff., Steed et al., no year: 1-7). The overall aim of the *Issue Model* is to help the architect draw up a *goal-oriented, effective architectural proposal*.

The process model

The *Process Model* in *Figure 8* breaks the process of architectural planning and designing down into steps and adds two extra elements. The *starting element* is *Information* and the *basic element* is *Control*. The key steps of planning and designing in the core of the *Process Model* are: *Planning/Design Impulse, Planning of Planning, Formulation of the Problem, Setting the Goals, Generation of Alternatives, Prognosis, Evaluation, Decision* and *Drawing up the Plan*. The steps cannot be followed mechanically much like a recipe, they are *not* a recipe for success. The elements and steps are rather supposed to advise contributors and planners which the substantial steps are.

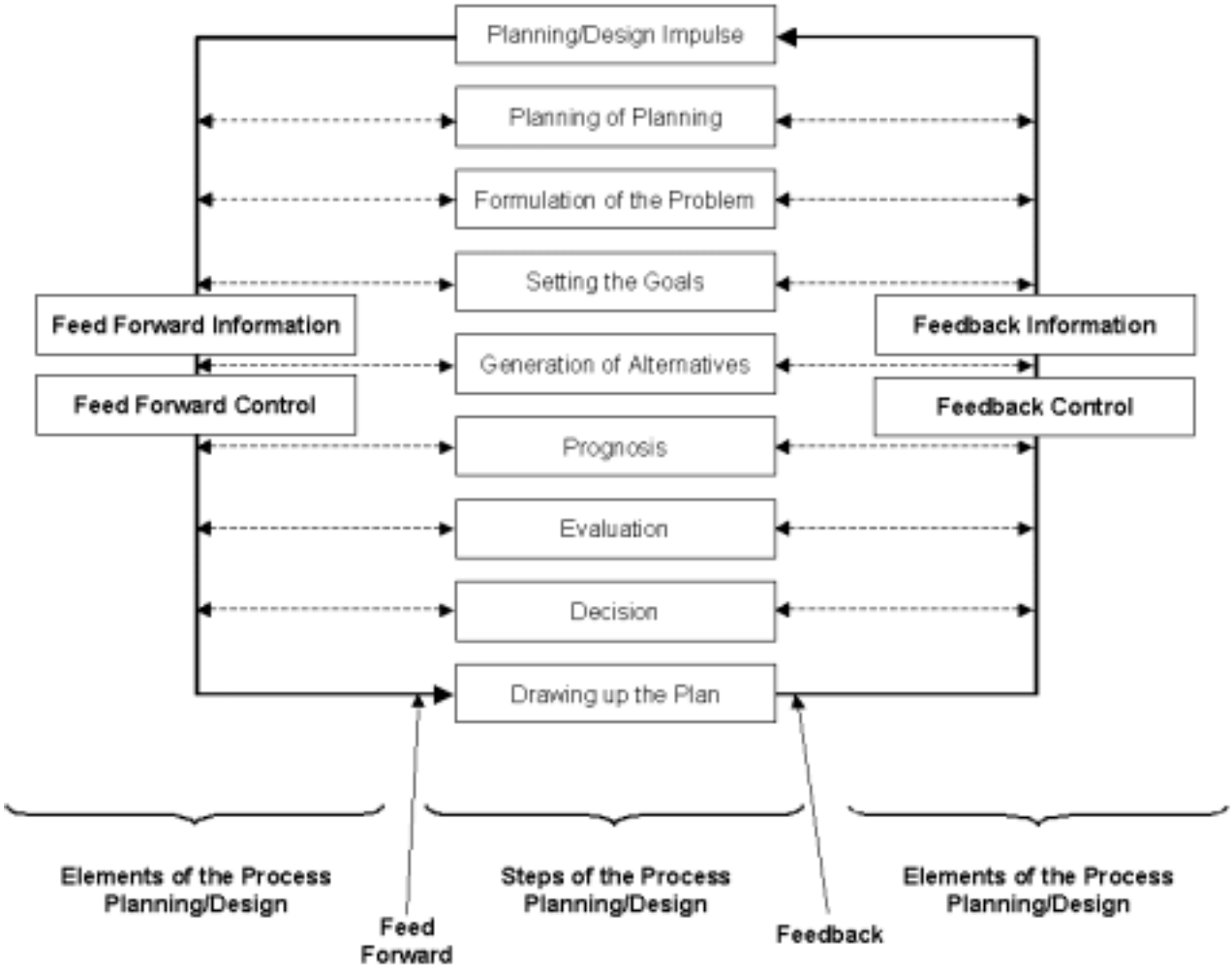

Figure 8: Process Model

Thus, the *Process Model* supports a systematic procedure while structuring the process of planning and designing. Each of the steps has to be checked to find out if it is essential or unnecessary. But not every step has to be followed one after the other. Far from it. Any step *can* be taken, skipped or repeated during the planning and design process at any time and if necessary. This is why the single steps are not directly connected in this diagram.

Let us have a closer look at the elements and steps of the *Process Model*:

- The purpose of the *starting element Information* is to gather, record and process information as completely and correctly as possible. Appropriate quantity and good quality of information can be reached, e.g., by using the methodological tools of *Information Technology* or *Empirical Social Research* (Bea et al. 1997: 280ff.).

- The step *Planning/Design Impulse* serves to clarify whether the general decision for a building type at the specific location is right or wrong. To get adequate information at this early stage, the methodological tool *Expert Questioning* (Bischoff et al. 1995: 113f.) can be helpful, for example.

- *Planning of Planning* is supposed to prepare the systematic procedure of planning, designing and including the stakeholders. To consider all important aspects, *Planning of*

Planning can be carried out systematically by applying, e.g., the systematic *Critical Path Method* (Meyer-Meierling 2000: 307).

- The *Formulation of the Problem* is the precise description of the planning and design task. The methodological tool *Cross-Linked Thinking* (Grothe-Senf 1999: 106ff.) may be helpful to include all important critical issues and subtasks.

- *Setting the Goals* is the derivation of goals from the *Formulation of the Problem.* The goals have to be set as precisely as necessary and as unprecisely as possible to give architects the creative freedom they need for the development of alternative architectural proposals. An example for a methodological tool is *Goal Programming* (Schierenbeck 1993: 251).

- *Generation of Alternatives* is the discovery, collection, further development and combination of different resolutions. Systematic *Brainstorming Techniques* (Bronner 1999: 61f.) may be useful, for example, to stimulate the contributors' fantasy and to utilise their ideas.

- *Prognosis* is the forecast of the consequences of the alternative architectural proposals for people and the environment. The methodological tool *Delphi Technique* (Hansmann 1993: 3551) can be applied to obtain sufficient information, a high degree of certainty and therefore a high-quality prognosis.

- The step *Evaluation* of the alternative proposals considers the original planning and design task, the problems and the goals to place the alternatives in a certain order. If the architect wants to assess values objectively and correctly, i.e., in a way that is comprehensible to the stakeholders, he/she can apply the methodological tool *Value Benefit Analysis* (Schulte 1996: 538ff.), for example.

- *Decision* is either the rational confirmation of the order mentioned above or an independent selection process by a single person or a heterogeneous group. *Decision Matrices* (Bronner 1999: 56) are a useful methodological tool for making rational, comprehensible decisions.

- The step *Drawing up the Plan* aims at a clear, complete and correct illustration of the architectural proposal. To avoid misunderstandings, incompleteness and mistakes – and consequently construction deficiencies – precisely and systematically carried out *Verbal, Visual and Virtual Illustrations* (Fendl 2002: glossary) are particularly helpful.

- On the one hand, the *basic element Control* supports the *feedback monitoring* and *feed forward guidance*. On the other, it supports the *effectiveness* and *efficiency* of the procedure of planning and designing. *Control* is therefore supposed to avoid planning and design mistakes that would cause high expenses unless noticed before the structure is built. *Checklists* or the methodological tool of *Design Control* (Fendl 2001), which has been elaborated by the author, are suitable to implement the *Control* step within the *Process Model*.

The overall aim of the *Process Model* is to help the architect be *efficient* while planning and designing systematically.

The competency model

The models we have presented so far cover the more *rational aspects* of planning and designing. In addition, the previous models are all more or less instructions advising the architect how to proceed and what to do. But to apply these models successfully within the planning and design process, the architect needs to possess certain abilities. Therefore, the following *Competency Model* was developed to provide a knowledge grid which contains and describes these abilities. Moreover, the *Competency Model* represents the rather *non-rational aspects* of planning and designing in terms of the social structure of the interdisciplinary groups and of the creative and formal design abilities:

The *Competency Model* in *Figure 9* shows *Soft Skills* and *Hard Skills.*

- The *Soft Skills* are derived from the stakeholders, i.e. from the *interdisciplinary groups of users and planners*, who are supposed to communicate and interact being guided and accompanied by the architect. Therefore, the *Soft Skills* include the *Communication Competency* and the *Interaction Competency*.

- The *Hard Skills* are derived from the issues which are considered and transformed into a formally appealing architectural proposal. Therefore, *Creative Design Competency* and *Formal Design Competency* are mentioned in the *Competency Model*.

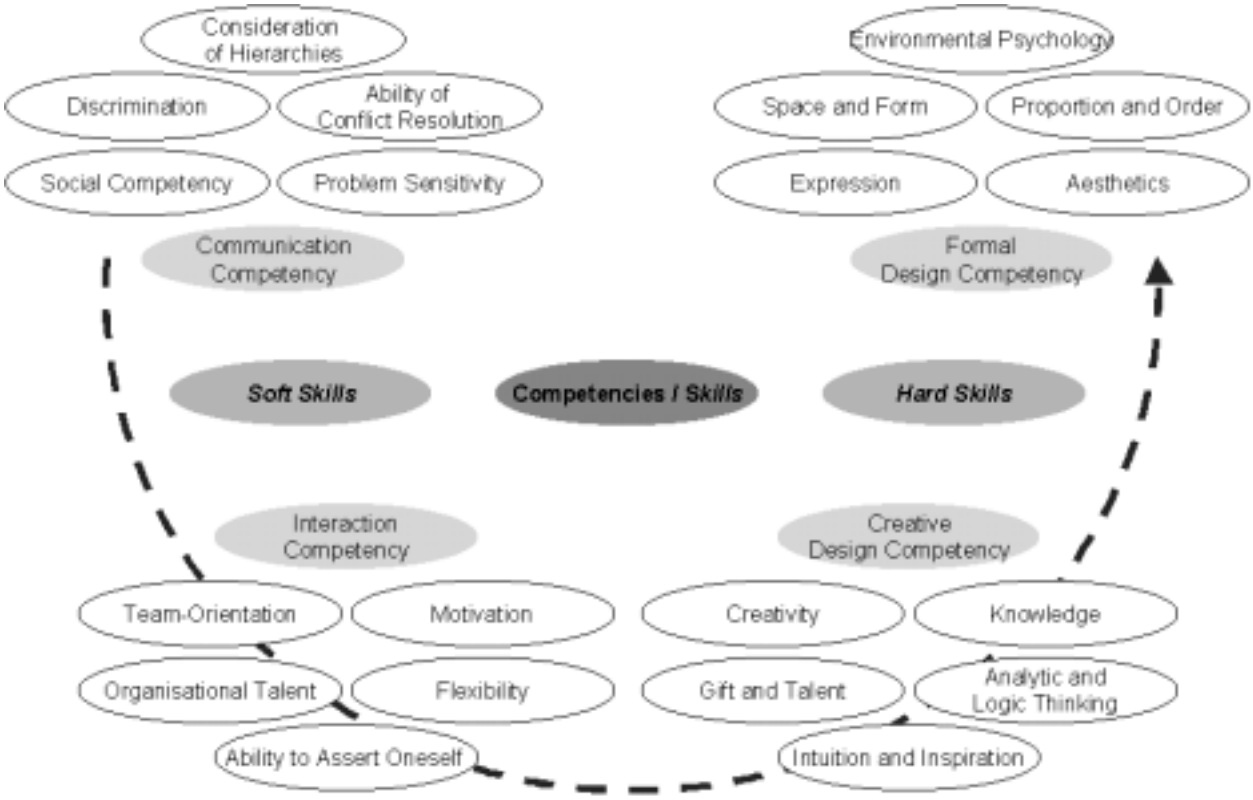

Figure 9: Architecture-Specific Competency Model

Soft skills

The basis for any problem-solving activities is *communication*. Communication is in turn the basis for any *group interaction*. The essential *Soft Skills* that an architect should possess are therefore supposed to support his/her task to foster the communication in the form of a presenter's job and

the interaction within and between the groups in the form of a co-ordinator's job. The consequently required *Communication Competency* consists mainly of social competency, problem sensitivity, discrimination, ability of conflict resolution and the understanding and recognition of hierarchies. The *Interaction Competency* comprises team orientation, organisational talent, motivation, flexibility and the ability to assert oneself. Methodological tools for the implementation of the *Communication Competency* are, e.g., *Presentation Techniques* (Wahren 1994: 236f. and Blin 2001: 11ff.) and *Meta Communication* (Bischoff et al. 1995: 137ff.) for presentations; and for the *Interaction Competency* these are, e.g., *Workshop* (Sanoff 2000: 80ff.) and *Mediation* (Bischoff et al. 1995: 75ff.) which are beneficial to co-ordinate stakeholders.

Hard skills

In addition to the interdisciplinary work in groups, the architect works in a *design team*. This team is supposed to develop a formally appealing architectural proposal. The essential specialised knowledge of the architect – the *Hard Skills* – should support his/her ability to design. In other words, he/she is expected to transform the theoretical requirements into a practical architectural proposal using his/her *Creative Design Competency* on the one hand and to develop a formally appealing architectural proposal using his/her *Formal Design Competency* on the other. Therefore, the *Creative Design Competency* requires knowledge, intuition and inspiration, gift and talent, creativity and the ability of analytical and logical thinking. The *Formal Design Competency* of the architect takes a lot of different aspects into account, including the following: expression, aesthetics, proportion and order, space and form and environmental psychology. Methodological tools for the implementation of the *Creative Design Competency* are, e.g., *Map Exercise* (Blin 2001: 13ff.) and *Semantic Intuition* (Warfield et al. 1975) to put the theoretical issues into practice. Useful implements for the *Formal Design Competency* are *Design Games* (Sanoff 2000: 76ff.) and *Charrette* (Sanoff 2000: 48ff. and Healey 1991) which are advantageous for the development of a formally appealing architectural proposal.

Analysis of existing methods

After this closer look at the components of the theoretically developed criteria catalogue including the five models, the think tool and the methodological tools, it seems to be reasonable to find out whether there are other methods in architecture which take account of these components. The criteria catalogue is therefore the basis for the analysis of existing planning and design methods for complex building tasks focusing on *social facilities and healthcare buildings*. The results of this analysis are summarised in *Figure 10*.

Criteria Catalogue for Theoretical Planning and Practical Design and the Development of Future-Oriented Planning and Design Methods																										
Classification of Analysed Planning and Design Methods in the Field of Social Facilities and Healthcare Buildings		USA							UK							GER										
		a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u	v	w
Creative Thinking	*Convergent and Divergent Thinking*																							
1. Scientific Criteria Model	*Systematic Procedure*	♦			♦	♦	♦	♦	♦			♦	♦	♦	♦	♦				♦	♦	♦		
	Objectivity		♦	♦	♦	♦	♦	♦		♦	♦	♦	♦		♦		♦	♦	♦	♦		♦		
2. Stakeholder Model	*Users*	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦		♦	♦	♦	♦	♦	♦	♦	♦	♦	♦
	Contributors	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦
	Planners	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦
3. Issue Model	*Physical Needs of Users*	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦		♦	♦	♦	♦	♦	♦	♦	♦
	Psychological Needs of Users	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦		♦	♦	♦	♦	♦	♦	♦	
	Formal Design Issues	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦		♦	♦	♦	♦	♦	♦	♦		♦	
	Constructive Issues	♦	♦	♦	♦		♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	
	Technical Issues	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	
	Economic Issues	♦	♦		♦	♦	♦	♦	♦	♦		♦	♦	♦	♦	♦	♦	♦		♦	♦	♦	♦	
	Ecological Issues	♦	♦		♦	♦	♦	♦	♦	♦		♦	♦	♦	♦	♦	♦	♦		♦	♦		♦	
	Building Regulations	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	
4. Process Model	Starting Element: *Information*	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦		♦		♦	♦	♦	♦	♦	♦	♦	♦
	Planning/Design Impulse	♦			♦	♦	♦					♦	♦	♦	♦					♦				
	Planning of Planning	♦			♦	♦	♦		♦			♦	♦		♦	♦				♦	♦			
	Formulation of the Problem	♦		♦	♦	♦	♦	♦	♦		♦	♦	♦	♦	♦	♦			♦	♦	♦			
	Setting the Goals	♦		♦	♦	♦	♦	♦	♦		♦	♦	♦	♦	♦	♦			♦	♦	♦			
	Generation of Alternatives	♦		♦		♦	♦		♦		♦		♦	♦	♦	♦	♦	♦	♦	♦	♦	♦		♦
	Prognosis	♦				♦	♦	♦					♦		♦					♦	♦	♦		
	Evaluation	♦				♦	♦	♦	♦				♦	♦	♦					♦	♦	♦		♦
	Decision	♦				♦	♦	♦	♦					♦	♦					♦	♦	♦		♦
	Drawing up the Plan	♦					♦		♦					♦	♦	♦				♦	♦			♦
	Basis Element: *Control*	♦		♦		♦	♦	♦	♦		♦		♦	♦	♦				♦	♦	♦			♦
5. Competency Model	*Communication Competency*			♦	♦	♦	♦	♦			♦	♦			♦	♦				♦	♦		♦	
	Interaction Competency			♦	♦	♦	♦	♦			♦	♦				♦				♦	♦			
	Creative Design Competency			♦	♦	♦			♦		♦	♦					♦	♦	♦		♦			
	Formal Design Competency																				♦			

Figure 10: Results of the Analysis of Existing Planning and Design Methods for the Architectural Design of Social Facilities and Healthcare Buildings [8]

This classification is broad rather than narrow, in other words: if one of the methods deals in the slightest with one of the aspects of the think tool or the models, it has been considered and marked with a diamond. An absolute intersubjective correspondence is therefore not possible. Most of the planning and design methods deal merely with aspects of *descriptive planning and design logic* rather than with aspects of a *normative process-oriented planning and design methodology*. In addition, it is obvious that not one of the analysed methods covers all components of the criteria catalogue.

The results of this analysis of existing methods combined with the theoretical findings regarding the requirements of the architects' job and the features of architecture confirmed the author in her opinion that it could be advantageous to elaborate on the *integral approach using the five models, the think tool and methodological tools* mentioned above.

Empirical study

Therefore, it is planned that MAPLE/D will be empirically tested by architects who will practically apply and evaluate *the method MAPLE/D itself* and who will also evaluate *the architectural proposal* to find out whether MAPLE/D is useful for the practising architect. Work on this empirical study which is already being prepared (Fendl 2001 and Fendl 2002: chapter 6), started in April 2002 and will be completed in July 2002. It can be presented and discussed at the conference.

Summary

To sum up the concept of MAPLE/D (see *Figure 11*) it can be said that the *Scientific Criteria Model* is a tool to support the architect while he/she develops a *comprehensible* architectural proposal. The *Stakeholder Model* helps to identify the stakeholders. The architect's interest focuses on the stakeholders and their needs because they determine the issues. The latter are ascertained by implementing and detailing the *Issue Model*. The *theoretical planning activity analyses* the needs and issues, while the *practical designing activity synthesises* them into an architectural proposal. The basis for this "inseparable subdivision" of theoretical and practical activities is the think tool *Creative Thinking* comprising *Convergent* and *Divergent Thinking*. In doing so, the stakeholders, i.e., the interdisciplinary users and planners, are permanently involved through communicating and interacting with each other. This calls for the architect's *Soft Skills* which are shown in the *Competency Model*. This model goes even further by supporting the *practical transformation* and the *aesthetic value* of the architectural proposal: it contains important *Hard Skills* of the architect, e.g., the *Creative Design Competency* and the *Formal Design Competency*. It explains central terms to the architect and provides a corresponding methodological body. With that, MAPLE/D is not only a systematic method for the planning and design process, is also answers the question, *how* to use such a systematic method, particularly with the *Competency Model*.

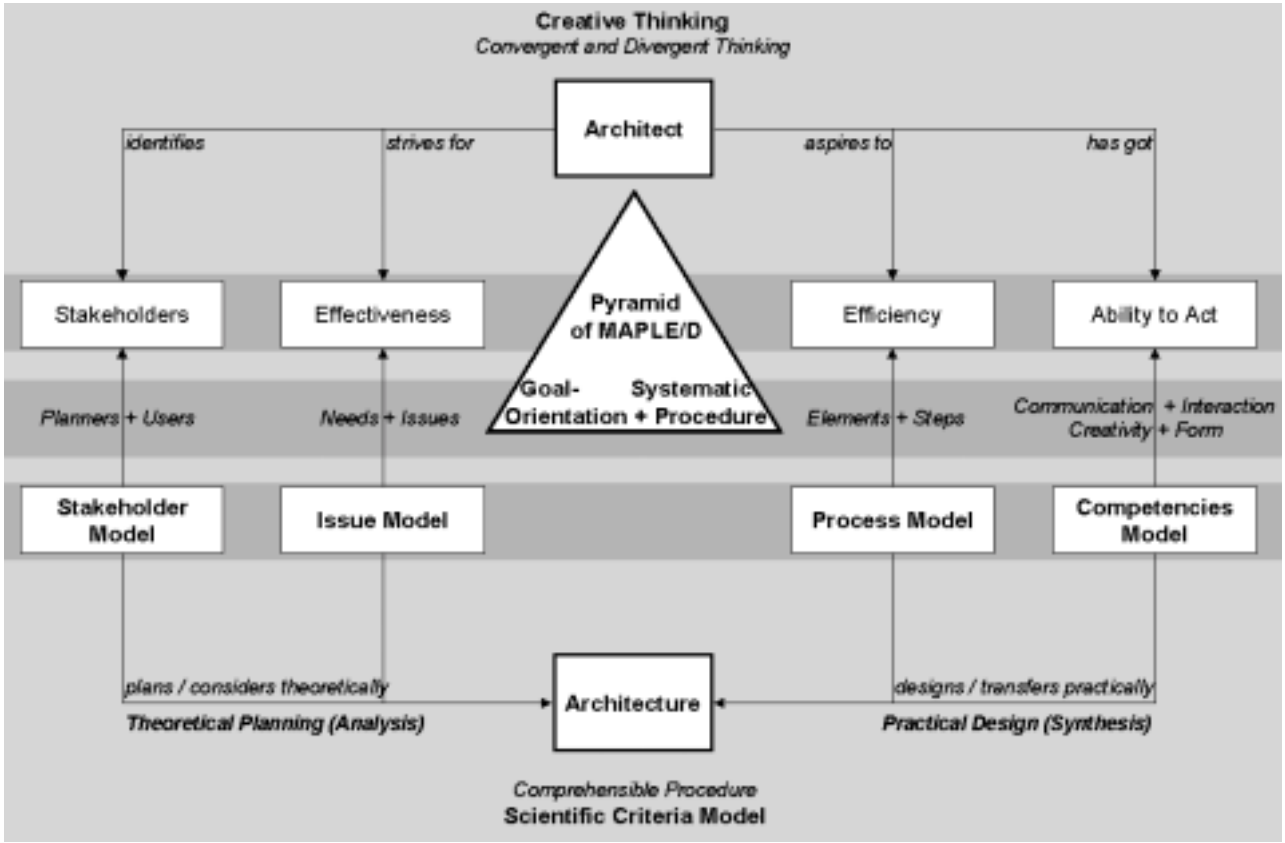

Figure 11: Concept of MAPLE/D

The overall aim of MAPLE/D is to provide a systematic method for architects of complex building tasks working in interdisciplinary groups, e.g. social facilities and healthcare buildings (see *Figure 10*), by making the architect aware of important aspects of planning and designing, which is important for the future of the architectural profession. MAPLE/D is therefore an offer for architects to deal with the aspects mentioned earlier, to prioritise in each specific case and to *effectively* and *efficiently* plan and design *future buildings* and thus *our future*. But only a conscious

architect can make MAPLE/D an effective and efficient tool while planning and designing, because:

"A fool with a tool is still a fool."

Conclusion and outlook

With MAPLE/D, this paper presents a planning and design method for the architect of the future. The first step has already been made by developing a theoretical normative basis for this method. It is followed by the second step: the evaluation of the effectiveness and the efficiency of the method through an empirical study. Furthermore, the long-term objective of this research project is to develop a knowledge-based database for methodological architectural design – especially for social facilities and healthcare buildings. In addition, the method is meant to be a basis for further research as well as for architectural education. Moreover, this method is intended to be a basis for further discussion among researchers and a starting point for teachers to redesign the curriculum concept in architecture.

Finally, the applicability of MAPLE/D to design professions other than architectural is conceivable to a certain extent: The think tool *Creative Thinking* comprising *Convergent* and *Divergent Thinking* can be applied within any problem-solving process as well as the *Scientific Criteria Model*. The *Stakeholder Model* and the *Issue Model* can be adapted to other design professions with regard to the respective stakeholders and the specific issues, i.e. performance requirements of the "product" to be designed. The *Process Model* is especially applicable in architecture because of the long-term process and the consequences of architectural planning and designing. The *Competency Model* is design specific in its way of considering communication and interaction as well as creative and formal design competencies. Wherever these are important issues, the *Competency Model* might be of help to structure and to overlook competencies necessary for designing. It may be adapted and broadened.

Your comments, questions and proposals are most welcome. Please contact: Monika.Fendl@web.de.

Acknowledgements

This research project on planning and design methods in architecture has been funded since May 2000 by the *DFG Deutsche Forschungsgemeinschaft* represented by Dr Juergen Hoefeld whom I would like to thank very much for his support. My special thanks go to Ms Katrin Poenisch-Poerschke from the Language Centre of Dresden University of Technology who committed herself greatly to the proof-reading of this conference paper.

Footnotes

[1] German: *MAPLE/D **M**ethode der **a**rchitektonischen **Pl**anung und des **E**ntwerfens/des **D**esign.*

[2] The term *planning* is used synonymously to the German word *Planung* which covers the analytical-theoretical part of the English term *design*.

[3] The term *designing* is used synonymously to the German word *Entwerfen* which covers the synthesising-practical part of the English term *design*.

[4] Bortz and Döring 1995: 181, Chalmers 1986:41ff., Chmielewicz 1994: 98ff., 209ff., 281ff., 285ff., Eichhorn 1972: 286ff., Frey 1970: 32ff., Lienert 1989: 13ff.

[5] Bundesanstalt 1999: 5, HOAI 1995: § 15, Landtag 1994: § 1 and 4, Architektenkammer 1998: preambel.

[6] Joedicke 1976: 11, Johannes 1989: 21ff., Laage 1978: 17, Maser 1993: 79ff. and 175, Rittel 1970 in: Rittel 1992: 75.

[7] Architektenkammer 1998: preamble, Blin 2001, Duden 1983, Grandke et al. 1998, Herrmanns 1989, Matthaei 1990, Schnier 2000, Szyperski 1989, Wahren 1994, Weyh and Krause 1991.

[8] These are the analysed methods which are relevant for the systematic architectural design of social facilities and healthcare buildings:

USA
a = AIA Design Process (AIA Handbook 1994)
b = AIA Design Guidelines (AIA Guidelines 2001)
c = Universal Design (Preiser and Ostroff 2001)
d = Pena u. a.: Programming (Pena and Parshall 2001)
e = Sanoff: Community Participation (Sanoff 2000)
f = Hardy und Lammers: Hospital Planning and Design Process (Hardy and Lammers 1986)
g = Preiser: POE Post-Occupancy Evaluation (Preiser et al. 1988)

UK
h = RIBA Plan of Work (RIBA 1983)
i = NHS: Health Building Notes (NHS HBNs, various years of publication)
j = Inclusive Design (Hall and Imrie 2001)
k = Salisbury: Briefing (Salisbury 1998)
l = NHS: CIM (NHS CIM 1994)
m = DHSS: CAPRICODE (Department Capricode 1986)
n = MARU: Route Map (MARU 1994-2000)

GERMANY
o = HOAI: §15 Leistungsphasen (HOAI 1995)
p = Dirichlet u. a.: Krankenhausbau (Dirichlet et al. 1980)
q = Neufert: Bauentwurfslehre (Neufert et al. 2000)
r = Barrierefreies Planen und Entwerfen (DIN 1995, for innovative application of the DIN norms see: Schmieg and Fendl 1999a and Schmieg and Fendl 1999b)
s = Schmieg: Zielplanung und Hospital Extension (Schmieg 1997 and Fendl and Schmieg 2001)
t = Joedicke: Entwurfsmethodik und Krankenhausbau (Joedicke 1976 und Joedicke et al. 1995)
u = Lohfert: Methodik der Krankenhausplanung (Lohfert 1973)
v = Ottow: Krankenhausplanung (Ottow 1990)
w = Tsavalos: Grundrissplanung (Tsavalos 1997)

References

AIA. 2001. *"Guidelines for Design and Construction of Hospital and Healthcare Facilities."* New Edition. The American Institute for Architects Academy of Architecture for Health, The Facilities Guidelines Institute with Assistance from the U. S. Department of Health and Human Services. AIA Press.

AIA. 1994. Haviland, David (ed.): *"The Architect's Handbook of Professional Practice."* 12th ed. 4 Volumes. Washington, DC: AIA Press.

Architektenkammer, Bayerische. 1998. *"Berufsordnung der Bayerischen Architektenkammer."* http://www.byak.de/service_gesetze_berufsordnung.html, 07.01.2002. München.

Bea, F. X., E. Dichtl and M. Schweitzer. 1997. *"Allgemeine Betriebswirtschaftslehre, Band 2: Führung."* 7., neu bearb. Aufl. Stuttgart: Lucius & Lucius.

Bischoff, Ariane, Klaus Selle and Heidi Sinning. 1995. *"Informieren, Beteiligen, Kooperieren. Kommunikation in Planungsprozessen. Eine Übersicht zu Formen, Verfahren, Methoden und Techniken."* Dortmund: Dortmunder Vertrieb für Bau- und Planungsliteratur.

Blin, Jutta. 2001. "Bildungsziel: Handlungskompetenz. Manuskript zum Vortrag im Rahmen der Fachtagung "Bildungslandschaft Zittau/Görlitz" des Bildungswerkes für Kommunalpolitik Sachsen e.V. am 03.05.2001", Januar 2002 an der TU Dresden, Fakultät Wirtschaftswissenschaften. Zittau.

Bortz, Jürgen and Nicola Döring. 1995. *"Forschungsmethoden und Evaluation für Sozialwissenschaftler."* 5th ed. Berlin: Springer.

Bronner, Rolf. 1999. *"Planung und Entscheidung: Grundlagen, Methoden, Fallstudien."* 3rd ed. München: Oldenbourg.

Bundesanstalt für Arbeit. 1999. *"Blätter zur Berufskunde: Diplom-Ingenieur / Diplomingenieurin Architektur.* 3-IN 01." Bielefeld.

Carroll, Archie B. 1989. *"Business & Society. Ethics & Stakeholder Management."* Cincinnati: South-Western Publishing Co.

Chalmers, Alan F. 1986. *"Wege der Wissenschaft. Einführung in die Wissenschaftstheorie."* 2nd ed. Berlin: Springer.

Chmielewicz, Klaus. 1994. *"Forschungskonzeptionen der Wirtschaftswissenschaft."* 3rd ed.. Stuttgart: Schäffer Poeschel.

DHSS. 1986. Department of Health and Social Security *"Capricode, Health Building Procedures."* London: HMSO Her Majesty's Stationery Office.

DIN. 1995. Deutsches Institut für Normung *"Bauen für Behinderte und alte Menschen.* 3rd ed. Berlin: Beuth.

Dirichlet, G., F. Labryga, P. Poelzig and G. Schlenzig. 1980. *"Krankenhausbau."* Stuttgart: Verlagsanstalt Alexander Koch.

Duden. 1983. *"Schülerduden. Die Kunst. Ein Sachlexikon für die Schule."* Mannheim: Dudenverlag.

Eichhorn, W. 1972. "Der Begriff Modell und Theorie in der Wirtschaftswissenschaft." In: *Wirtschaftswissenschaftliches Studium* (7/8) 286-288.

Fendl, Monika. 2001. "Value Through Design Control. A Theoretical Approach Towards a Strategy for a Controlled Planning and Design Process. Paper prepared for the *Conference Value Through Design* held on The University of Reading Campus on September 14-15 2001. Organised by CIB W96 Architectural Management & The Design Research Society & Department of Construction Management & Engineering, The University of Reading, England, UK." Online: http://hsss.slub-dresden.de/hsss/servlet/hsss.urlmapping.MappingServlet?id=998987005203-3837. Architekturinformation TU Dresden, *Schriftenreihe der Fakultät Architektur* (34) ed. by Schmieg, Heinzpeter.

Fendl, Monika. 2002. *"Planungsmethoden in der Architektur. Grundlagen von Planungs- und Entwurfsmethoden für Architekten komplexer Planungsaufgaben in interdisziplinären Teams dargestellt anhand des Bereich Sozial- und Gesundheitsbauten."* Technische Universität Dresden, Dissertation, publication in preparation.

Fendl, Monika and Heinzpeter Schmieg. 2001. "Case Study. Systematic strategy to develop a concept for the extension of a hospital and to design an integrated private medical practice for radiology and radiotherapy." Online: http://hsss.slub-dresden.de/hsss/servlet/hsss.urlmapping. MappingServlet?id=998986084500-7488. Architekturinformation TU Dresden, *Schriftenreihe der Fakultät Architektur* (33).

Freeman, R. Edward. 1984. *"Strategic Management. A Stakeholder Approach."* Melbourne: Pitman.

Frey, Gerhard. 1970. *"Philosophie und Wissenschaft. Eine Methodenlehre."* Stuttgart: Kohlhammer.

Grandke, Sven, Peter Schmitt, Herbert Emmerich and Wolfgang Hentschel. 1998. *"Schlüsselqualifikationen in neuen Organisationsformen. Ein Kriterienkatalog für die Praxis."* Berlin: DIN Deutsches Institut für Normung.

Grothe-Senf, Anja. 1999. *"Kreative Seminargestaltung am Bespiel Umweltmanagement. Praxisleitfaden zur Motivation und Schulung."* München: Hanser.

Hall, Peter and Rob Imrie. 2001. *"Inclusive Design. Designing and Developing Accessible Environments."* London: Spoon.

Hansmann, Karl-Werner. 1993. "Prognose und Prognosemethoden. In: Wittmann, Waldemar (ed.): *Enzyklopädie der Betriebswirtschaftslehre. Handwörterbuch der Betriebswirtschaftslehre."* (2) 5th ed. Stuttgart: Schäffer-Poeschel, 3546-3559.

Hardy, Owen B. and Lawrence P. Lammers. 1986. *"Hospitals: The planning and design process."* 2nd. ed. Rockville, Maryland: Aspen Publishers Inc.

Hauser, John R. and Don Clausing. 1998. "The House of Quality. Design is a team effort, but how do marketing and engineering talk to each other?" *Harvard Business Review* (3) 63-74.

Healey, Eduard H. 1991. “Planning a library in one week.” *American Libraries,* 22 (4) 302-339.

Herrmanns, Henner. 1989. “Architekturästethik. Visuelle Simulation und Aufmerksamkeitsverhalten der Benutzer.” *DBZ - Deutsche Bauzeitschrift* 37 (1) 53-59.

HOAI. 1995: “Honorarordnung für Architekten und Ingenieure. Verordnung über die Honorare für Leistungen der Architekten und der Ingenieure” geändert am 21. September 1995 <http://www.hoai.de/> 07.01.2002. Berlin.

Jennings, Marianne (no year): “Stakeholder Theory: Letting Anyone Who's Interested Run the Business - No Investment Required.” Conference Paper: <http://www.stthom.edu/cbes/conferences/marianne_jennings.html> 11.02.2002. Arizona State University.

Joedicke, Jürgen 1976. *“Angewandte Entwurfsmethodik für Architekten.”* Stuttgart: Karl Krämer.

Joedicke, Jürgen, Joachim A. Joedicke, Hans P. Haid, Herbert Fukerider and Georg Geiselbrecht. 1995. *“Krankenhausbau auf neuen Wegen. Klinikum Nürnberg Süd.”* Stuttgart: Karl Krämer.

Johannes, Ralph. 1989. “Methodisches Entwerfen. Teil 1.” *Planen und Bauen (Zürich)* 22(10) 20-25.

Laage, Gerhart. 1978. “*Handbuch der Architekturplanung*.” 1st ed. Stuttgart: W. Kohlhammer.

Landtag, Sächsischer. 1989. “Sächsisches Architektengesetz “ vom 17./19.04.1994. <http://www.aksachsen.org/html/architektengesetz.html> 08.10.2001. Dresden.

Lienert, Gustav A. 1989. “*Testaufbau und Testanalyse*.” 4th ed. München: Psychologie-Verl.-Union.

Linneweh, Klaus. 1994. *“Kreatives Denken. Techniken und Organisation produktiver Kreativität: Kreative Denkprozesse, Problemlöseverhalten, Planungssystematik, Techniken der Ideenfindung, Soziale Kreativität.”* 6th ed. Rheinzabern: Verlag Dieter Gitzel.

Lohfert, Peter. 1973. *“Zur Methodik der Krankenhausplanung. Optimierungsmöglichkeiten bei der Planung von Krankenhäusern mit Hilfe einer planungsbegleitenden, systematischen Funktionsanalyse, zugleich Diss.”* Düsseldorf: Werner-Verlag.

MARU. 1994-2000. Lecture Documents. London, Southbank University.

Maser, Siegfried. 1993. *“Zur Planung gestalterischer Projekte.”* Essen: Die blaue Eule.

Matthaei, J. Michael. 1990. *“Grundfragen des Grafik-Design. Wahrnehmen und Gestalten.”* Augsburg: Augustus.

Meyer-Meierling, Paul. 2000. *“Gesamtleitung von Bauten. Ein Lehrbuch der Projektsteuerung.”* Zürich: Hochschulverlag an der ETH Zürich.

Müller-Böling, Detlef. 1993. “Qualitätsmanagement.” In: Wittmann, Waldemar (ed.) *Enzyklopädie der Betriebswirtschaftslehre. Handwörterbuch der Betriebswirtschaftslehre* (2) 5th ed. Stuttgart: Schäffer-Poeschel 3625-3638.

Neufert, Ernst; Peter Peter, Ludwig Neff. 2000. *“Bauentwurfslehre. Grundlagen, Normen, Vorschriften über Anlage, Bau, Gestaltung, Raumbedarf, Raumbeziehungen, Maße für Gebäude, Räume, Einrichtungen, Geräte mit dem Menschen als Maß und Ziel.”* 36th ed. Braunschweig: Vieweg.

NHS. 1994. National Health Service Estates *“Executive: Capital Investment Manual. CIM. Overview.”* London: HMSO Her Majesty's Stationery Office.

NHS Estates. various years of publication. *“Health building notes”* London: HMSO Her Majesty's Stationery Office.

Ottow, Johann-Christoph. 1990. “Planung und Durchführung von Krankenhaussanierungen. Bericht aus der Krankenhausbauforschung.*” DAB - Deutsches Architektenblatt, Ausgabe Baden-Württemberg*, 22 (1) 115-120.

Pena, William M. and Steven A. Parshall. 2001. *“Problem Seeking: an Architectural Programming Primer.”* 4th ed. New York: Wiley.

Preiser, Wolfgang F. and Elaine Ostroff (eds.). 2001. *“Universal Design Handbook.”* New York: McGraw-Hill.

Preiser, Wolfgang F., Harvey Z. Rabinowitz and Edward T. White. 1988. *“Post-Occupancy Evaluation.”* New York: Van Nostrand Reinhold.

RIBA. 1983. Royal Institute of British Architects (ed.) “Plan of work for design team operation.” Reprinted from *RIBA Handbook*, reprint of 1973 ed. London.

Rittel, Horst W. 1970. “Der Planungsprozess als iterativer Vorgang von Varietätserzeugung und Varietätseinschränkung.” In: Joedicke, Jürgen et al. (ed.): *Arbeitsberichte zur Planungsmethodik* (4): Entwurfsmethoden in der Planung 17-31.

Rittel, Horst W. 1992. “Planen - Entwerfen - Design. *Ausgewählte Schriften zu Theorie und Methodik*.” ed. by Reuter, Wolf D. Stuttgart: W. Kohlhammer.

Rogge, Klaus- Eckart (ed.), R. Bürgy, F. J. Geider, H. Müller and Ch. Rott. 1995. *“Methodenatlas.”* Heidelberg: Springer.

Salisbury, Frank. 1998. *“Briefing your architect.”* 2nd ed. (Previous ed. published as: “Architect's handbook for client briefing.” London: Butterworths, 1990.) Oxford: Architectural Press.

Sanoff, Henry. 2000. *“Community Participation Methods in Design and Planning.”* New York: John Wiley & Sons, Inc.

Schierenbeck, Henner. 1993. “Bankbetriebslehre.” In: Wittmann, Waldemar (ed.) *Enzyklopädie der Betriebswirtschaftslehre. Handwörterbuch der Betriebswirtschaftslehre.* (1) 5th ed. Stuttgart: Schäffer-Poeschel. 241-258.

Schmieg, Heinzpeter. 1997. “Weitsichtig. Zielplanung für das Zentralinstitut für bildgebende Diagnostik und weitere Funktionsstellen im Städtischen Klinikum Karlsruhe.” *AIT - Architektur, Innenarchitektur, Technischer Ausbau*. 105 (11) 74-75.

Schmieg, Heinzpeter and Monika Fendl. 1999a. *“Wohngebäude für Menschen mit Behinderungen. Ist für deren architektonische Planung die DIN-Norm 18 025 eine ausreichende Grundlage?”* (online: <http://www.tu-dresden.de/arige/sozialb/forschung/fendl03.pdf> Wissenschaftliche Zeitschrift der Technischen Universität Dresden, 48 (5/6) 63-72.

Schmieg, Heinzpeter and Monika Fendl. 1999b. “Variabel: Anpassungsfähiges, barrierefreies Wohnen nach DIN 18 025 Teil 2 für ältere Menschen.” *AIT - Architektur, Innenarchitektur, Technischer Ausbau* 107 (11) 106-108.

Schnier, Jörg. 2000. “Das As im Ärmel des Architekten.*” Wolkenkuckucksheim - internationale Zeitschrift für Theorie und Wissenschaft in der Architektur* (TU Cottbus), 5 (2) http://www.theo.tu-online: cottbus.de/wolke/deu/Themen/002/Schnier/schnier.htm, 29.10.2001.

Schulte, Christof (ed.). 1996: *“Lexikon des Controlling*.” München: Oldenbourg.

Steed, Hammond and Paul (no year): *“The Schoolhouse of Quality.”* <http://www.shp.com/pdf/SOQ_process.pdf>, 10.02.2002. Cincinnati.

Szyperski, Norbert, Udo Winand and Heinz J. Musshoff (eds.). 1989. *“Handwörterbuch der Planung.”* Stuttgart: Schäffer Poeschel.

Tsavalos, Haralabos. 1997. *“Grundrißplanung mit den Methoden der künstlichen Intelligenz. XPS-OP - ein Expertensystem zur Unterstützung der Grundrißplanung der Funktionsstelle OP.”* Karlsruhe, Diss.

Wahren, Heinz-Kurt E. 1994. “*Gruppen- und Teamarbeit in Unternehmen*.” Berlin: de Gruyter.

Warfield, J. N., H. Geschka and R. Hamilton. 1975. *“Methods of Idea Management.”* Columbus/OH: Academy for Contemporary Problems.

Weyh, Helmut and Patrick Krause. 1991. *“Kreativität. Ein Spielbuch für Manager.”* Düsseldorf: ECON Verlag.

Durling D. & Shackleton J. (Eds.) *Common Ground : Design Research Society International Conference 2002*, UK. ISBN 1-904133-11-8