

THE DEVELOPMENT OF A HUMAN-CENTRED WORKING METHOD FOR DESIGN MEETINGS

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Abstract

The problem today in the building industry is that the client and society do not get the values they want. Client values are profitability, usability, flexibility and quality, while society wants to save energy and avoid waste and pollution. One of the underlying problems is that there is a lack of specific working methods for expert designers to work with one another and with clients. A particular human-centred working method is to be developed and tested for design meetings to help solve the problems referred to above.

Key words: Design meetings, Human behaviour, Metaphors, Working methods, Constructing objects.

INTRODUCTION

This paper describes the initial results of a study aimed to enhance the multidisciplinary collaboration during building design by studying the cognitive processes between expert designers during design meetings, such as the perceptive, the creative, the communicational, the learning and also the emotional and the teamwork processes (Tschimmel 2004). The result of the study will be a particular working method that can help solve the problems in the construction industry.

PROBLEMS

Research shows that building users are increasingly dissatisfied with a building's performance. One of the underlying reasons could be that the expert designers lack the competence and support systems to design in a collaborative way (AWT 2000; ARTB 2000). This can lead to a building design that is an addition instead of an integration of design results.

During the initial phase of the design process, the expert designers have to take a great many aspects into consideration and weigh up the value of each of these aspects. However, the expert designers lack the competence to do so. Expert designers in the building design domain are, for example, architects, urban designers, structural engineers, building engineers, process designers, contractors, installers and building physicists.

GOAL

Researchers have found that particular interventions during design meetings can lead to better building performance. Friedl (2001) found that it is necessary to organise and manage the design process. The quality of the design depends on the social process in which participants engage and the competence of the specialist designers working within 'object worlds' (Bucciarelli 2002). Higher levels of positive emotional interaction (by agreeing and showing support) tend to be associated with positive group outcomes (Gorse 2002). The paradigm of the 'Reflective Practitioner' (Schön 1984) gives the designers a language to communicate with one another (Dorst 1997). The design activities naming, framing, moving and reflecting structure the design process (Valkenburg 2000; Reymen 2001). To obtain the desired interaction, the group had to work alternately in a generative and focusing mode (Hohn 1996).

The goal of the study is to contribute to the enhancement of multidisciplinary collaboration by providing a working method for design meetings.

Figure 1 shows an overview of the study.

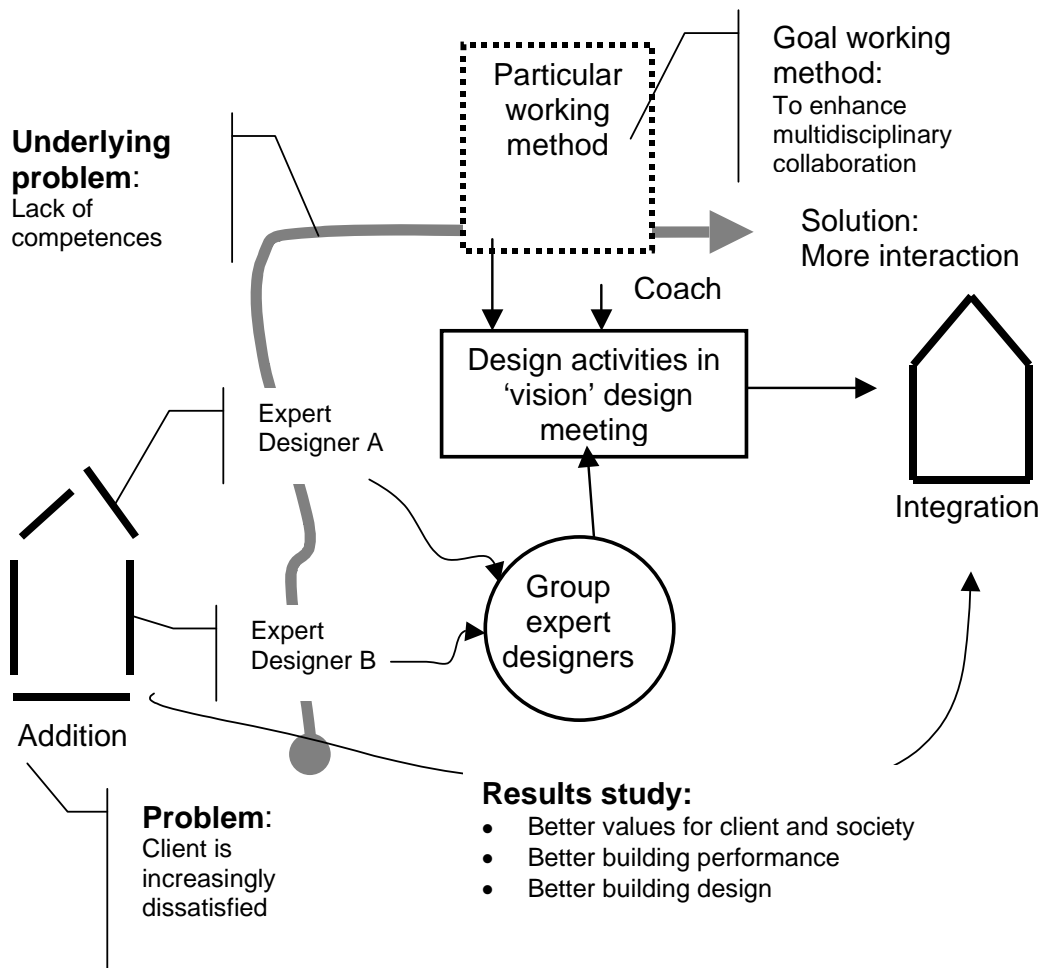


Figure 1 Study field

LITERATURE SURVEY

To attain the goal referred to above, it is necessary to know what we mean by expert designers, knowledge, multidisciplinary collaboration, design meetings, design group, coaching and design activities (by means of a literature survey in this section), and what the interaction is between the designers (by means of an interaction model in the next section).

Expert designers

A competence is a combination of knowledge and insight, skills, personal characteristics and motivation (Plantinga 2004, p. 8). Working as an expert designer in a collaborative way requires a specific competence profile.

Dreyfus (2003 cited Dorst and Reymen 2004) distinguishes seven distinct levels (from 1 to 7) of design expertise, corresponding with seven ways of perceiving, interpreting, structuring and solving problems. The expert designer is ranked at level 5 and is described as follows: 'the real expert responds to specific situations intuitively and performs the appropriate action straightaway. There is no problem-solving and reasoning that can be distinguished at this level of working. This is actually a very comfortable level to be functioning on and a lot of professionals do not progress beyond this point.'

To work in a collaborative way in a group, these design expertises are not enough, but the designers must also be competent in co-operating and communicating. As described by Meijers et al. (2005), this '...has the competence of being able to work with and for others. This requires not only adequate interaction, a sense of responsibility, and leadership, but also good communication with colleagues and non-colleagues. He or she is also able to participate in scientific or public debate'. These competences are required for working in a collaborative way.

But each designer has his own expertise. Gardner (1993) distinguishes eight kinds of intelligence:

1. Verbal linguistic intelligence (Poet)
2. Logic-mathematical intelligence (Scientist)
3. Visual-spatial intelligence (Artist)
4. Body kinaesthetic intelligence (Dance)
5. Naturalist intelligence (Naturalist)
6. Interpersonal intelligence (Freedom fighter)
7. Intrapersonal intelligence (Psychologist)
8. Musical/rhythmic intelligence (Composer)

Each person, such as a designer, has his own strong profile. It can be a barrier to working together but it can also cause changes that strengthen each other by using all these competences as much as possible.

Knowledge

The knowledge of an expert designer is mainly accumulated through experience. Nonaka and Takeuchi (1997) called it ‘tacit knowledge’ and say that this kind of knowledge is difficult to express in a formal language. To exchange ‘tacit knowledge’ first requires ‘socialising’: ‘feelings, opinions and mental models of the relevant designers had to be exchanged to build up mutual trust’.

Multidisciplinary collaboration

Kvan (2000) distinguishes between the terms collaboration and co-operation. He notes that ‘co-operation’ relates to working together for mutual benefit, while ‘collaboration’ relates to working together to achieve shared goals. Kvan also distinguishes closely coupled design processes from loosely coupled design processes, where participants each contribute expertise from their particular domain at moments when they have the knowledge appropriate to the situation. In a closely coupled design process, the participants work intensively with one another, observing and understanding one another’s moves, the reasoning behind them and the intentions. Kvan’s description explains the meaning of multidisciplinary collaboration.

Design meetings

Reymen (2001) described ‘a design session as a period during which one or more designers are working on a subtask of a certain design task’, and ‘a design task at a certain moment to meet the design goal at that moment, starting from the current design situation. A design task is performed by design activities.’ We use some concepts from these descriptions to explain what we mean by a design meeting, viz. a set of prepared design activities performed by a group of designers to work face-to-face on a design task with the help of a coach and support systems to reach a transferable design result.

In ‘The creative workshop method’, Emmitt (2004) distinguishes six types of workshops:

1. (partnering) building effective relationships: team-building, common goals, ethics in co-operation, roles and partnering agreement
2. vision: basic product values, knowledge and experience, whole-life approach
3. realism: fulfilling project values, design alternatives, project economy
4. criticism: presentation of conceptual design, value reflection
5. design planning: production information, delivery, value engineering
6. planning for execution: process plan to map the various production activities

This development of a working method will focus on the ‘vision’ type of workshop, where the designers sit at a table. This type of workshop requires a shared understanding between the designers of product and process. In his comment on the ‘vision’ workshop, Christoffersen (2004) mentioned the following aspects: frame and process, dreams and visions, value debacle, value base and evaluation of the ‘building effective relationships’ workshop.

Design group and coaching

Expert designers working together during a meeting form a cross-functional group. In subsequent meetings, the composition of the group can be different. This is why we do not focus on teamwork or team development with the relevant aspects such as forming, storming, norming, performing and adjourning (Robbins 1998, p. 242) within a programme of design meetings. What we do is focus on an effective and efficient group process and try to achieve that by careful preparation and coaching within the context of *one* meeting. The role of the coach is crucial. The task of the coach is to provide ‘a style of support in which the expert designers come into action by themselves’ (Lingsma 1999, p. 12).

Design activities

During a design meeting, a coach can let the designers perform a wide range of design activities, which are necessary to attain a certain design result. A number of activities may be suitable for ‘vision’ design meetings and are based on the existing insights and theories of cognitive processes, such as perception (verbal, visual and tactile), communication, (creative) thinking, (experiential) learning and (interdisciplinary) collaboration.

By harnessing people’s creativity, Sanders and William (2001) identified several forms of human behaviour: Say (say, think), Do (do, use) and Make (know, feel, dream).

Each level of knowledge (explicit, observable, tacit and latent) requires a carefully chosen technique (interviews, observations and generative sessions) (Sleeswijk Visser et al. 2004).

Sanders (2001) writes: ‘The creativity-based research tools enable creative expression by giving people ambiguous visual stimuli to work with. Being ambiguous, these stimuli can be interpreted in different ways, and can activate different memories and feelings in different people. The visual nature liberates people’s creativity from the boundaries of what they can state in words. Together, the ambiguity and the visual nature of these tools allow people much more room for creativity, both in expressing their current experiences and ideas and in generating new ideas.’

Creativity techniques make tacit knowledge of designers explicit. Root-Bernstein et al. (1999) used a trans-disciplinary view to define creativity: ‘Creative thinking in all fields occurs preferably before logic or linguistics come into play, manifesting itself through emotions, intuitions, images and bodily feelings. The resulting ideas can be translated into one or more formal systems of communication such as words, equations, pictures, music or dance only after they are sufficiently developed in their prelogical forms.’

To express the latent and tacit knowledge of the designers, creative thinking with the aid of creative techniques is useful for a vision-based session. The purpose of a ‘vision’ design session is to reach an agreement between the different designers about the process and product. This means that the designers create and share knowledge. In educational terms, they learn from one another. A generative or creative technique to help achieve this purpose should be a philosophy called ‘serious play’. Serious play is a serious activity to create innovative ideas.

Schrage (1999) describes the essentials of serious play as follows: ‘Serious play is about improvising with the unanticipated in ways that create new value. Any tools, technologies, techniques or toys that let people improve how they play seriously with uncertainty are guaranteed to improve the quality of innovation. The ability to align those improvements cost-effectively with the needs of customers, clients, and markets dramatically boosts the odds for competitive success’. John Varney (2005) gives a special meaning to ‘serious play’. SERIOUS refers to the left brain (logical, analytical, fragmentary, mechanical, efficient) and PLAY to the right brain (imagination, pattern-forming and recognising, holistic, organic, effective).

Papert (1999) says, ‘Constructionism is the idea that knowledge is something you build in your head. Constructionism reminds us that the best way to do that is to build something tangible –

outside your head – that is personally meaningful. Furthermore, that knowledge is best constructed in a social context where the participants make something sharable.’

In his inaugural lecture, Martens (2005) says that people use two complementary means for communicating ideas, opinions and interactions. ‘Descriptions’ for spoken and written languages and ‘depictions’ for gestures, drawing a picture, images and sketches. The last means is helpful for forming opinions and ideas, where the opinion is not determined by externally agreed interpretation. In our view, it does not stop with drawing pictures, but constructing objects is also a helpful means. It is probably a matter of tactile intelligence or tactile thinking as a counterpart to conceptual thinking. Donald Schön (1992) tells us that ‘Design knowledge is knowing-in-action’. Constructing with materials helps the designer express the knowledge that he cannot say.

Designers’ interaction circle

Designing is a social process. This means that designers communicate with one another. A designer shows what he thinks (by acting) and gets a reaction from another designer (by reacting). What a designer thinks is based on his mental model, a representation of reality that is built in order to understand, predict and explain the world (Badke-Schaub 2004). By integrating acting (doing, skills), reacting (feeling) and thinking (knowledge), the experience can grow (Dewey 1958) and the mental model change. Reflecting is a special kind of experience, namely an experience with regard to one’s own experiences. It is a crucial phase in a learning process (Kolb 1983) and in a design process.

The acting and reacting activities can be performed in a wide range of languages (Birkhofer and Jänsch 2003, p. 106) and can be disturbed by a specific barrier around the designer. Buciarelli (2002) called this the ‘object world’. Designers can have their own language, tools, codes, unwritten rules and scientific paradigm. The acting and reacting activities are described in detail in the designers’ interaction circle (see figure 2). We call a coherent collection of acting and reacting activities a working method.

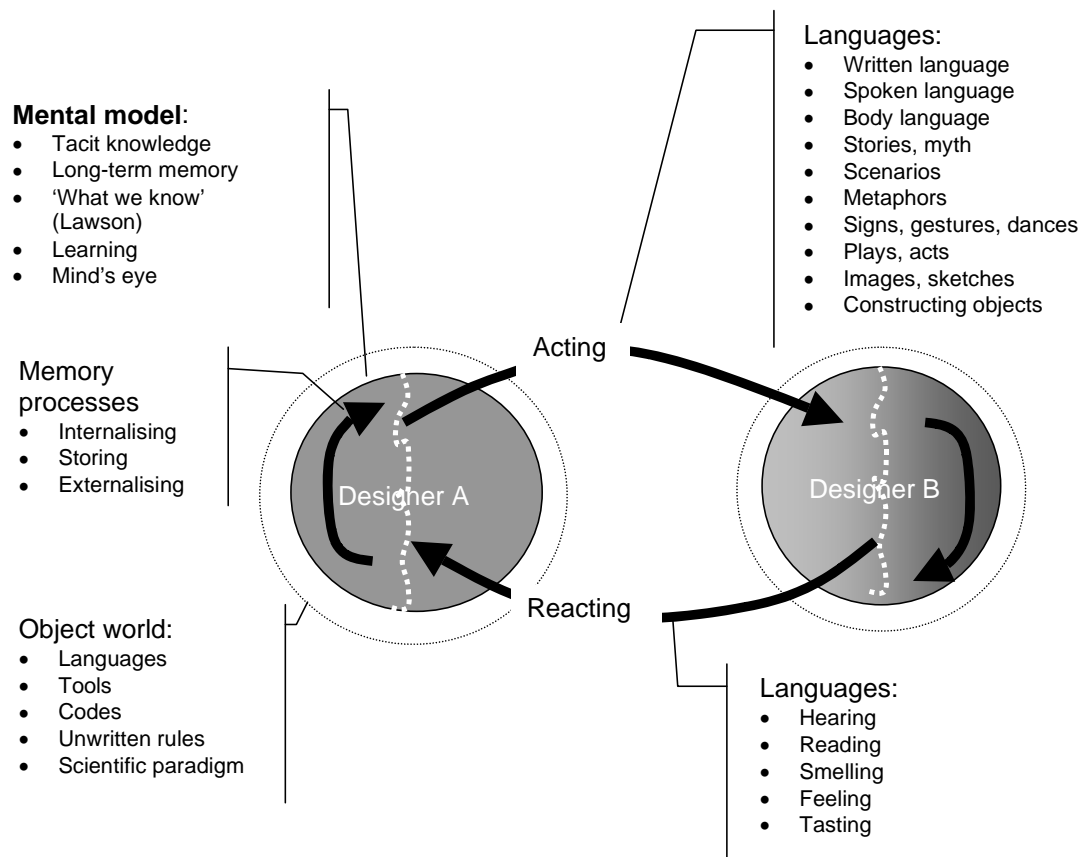


Figure 2 The designers’ interaction circle

PARTICULAR WORKING METHOD

Researchers believe that designers who work together effectively produce more knowledge and share more tacit knowledge, and that it is necessary to organise and manage the design process (Friedl 2001). Use of a working method specifically for a face-to-face 'vision' design meeting with expert designers is one way of achieving this.

The particular working method is a set of coherent design activities, which consists of a wide range of acting and reacting languages, and has been developed on the basis of the following design parameters.

- Using the rational and tacit knowledge of the designers
- Using the left and right brain alternately
- Using description and depiction
- Using a wide range of intelligences
- Using visual and conceptual thinking
- Learning from one another
- Taking time for reflection
- Constructing metaphoric objects with one another
- Working in a generative and focusing mode
- Taking time for incubation

Two parameters need some further explanation.

'Visual thinking is thinking in images and events. It can be described as spatial thinking. Visual thinkers prefer to organise their world with non-linguistic means. They see mental images or situations and events, in which several things are visible at the same moment, interact with one another and form a meaningful entity. It is simultaneous, non-verbal thinking, a manipulation of spatial events. Most visual thinkers have a holistic cognitive style, which means that they are 'good' in not losing themselves in details, in the discovery of co-ordinating relations and in giving personal, biased total descriptions of problems.' (De Groot and Paagman 2003, p. 85). This description may indicate that building designers are more visual thinkers than conceptual thinkers. Incubation requires some explanation. Design meetings held with expert designers have shown that for complex design tasks, the designers need an incubation period to find ideas and concepts (Van Gassel and Rutten 2004).

A wide range of design activities can be developed using these design parameters as a basic premise. A division into the following categories can be made: constructing objects, writing, mapping, sketching, storytelling, playing, acting, reflecting, releasing and relaxing. Some activities are well known but others have been specially designed, such as 'constructing objects'. This activity is explained in more detail in the next section.

CONSTRUCTING OBJECTS

Constructing objects is part of a design meeting with the following steps:

1. imagining oneself in the problem, getting a feel for the problem
2. formulating the design task
3. generating new visions by constructing an object
4. formulating an answer to the design task

Step three, constructing objects, comprises the following activities:

- constructing an object together with special materials
- explaining what you are doing and giving meaning to the objects
- listening to the opinions of the other designers
- presenting the significance of the object to one another
- describing the significance

The materials required to construct the object are well chosen. Tests show that the materials cannot have a meaning on their own.

During construction, the designers will give the object a specific significance by telling stories. We call the object with that specific meaning a metaphoric object. A metaphoric object is a transfer of meaning between two domains: a source domain (from which the metaphorical expressions are drawn) and a target domain to be understood (Lakoff 1980). In step 4, this meaning is to be transferred to a design result as an answer to the design task.

The activities ‘constructing an object and telling a story about it’ are an attempt to inspire and stimulate the designers to work in a rational and emotional way. The opportunity to get innovative and share solutions should be greater (Bijl 2002).

Experiences with constructing objects

Van Gassel (2005) describes tests with the ‘constructing objects’ activity. The designers (in these tests novices and advanced beginners) were interested in participating in this kind of design activity: they like it, find it easy and fun and they learn from one another. ‘Developing an answer to the design task was difficult’ and the designers were also not really satisfied with the design results. The conclusion was to find another way to transfer the ideas generated from the source domain to the target domain.

A group of designers (novices and advanced beginners) experimented with the ‘constructing objects’ design activity to develop a shared vision for a compact campus. One of the participants quoted his experiences in his reflection report as follows: ‘The creativity method used was not known to the participants involved with the session, which led to a misinterpretation of the assignment. As a result, the campus was not visualised in the conceptual or metaphorical way as intended. Neither did people explicate or communicate their ideas effectively, complicating effective adaptation and improvement of ideas. Since people seemed very involved with the playthings, it was hard to bring the group to an effective shared interpretation of the task’ (Goossens 2005).

Initial experiences with the ‘constructing objects’ design activity carried out by expert designers has given the indication that the embedding of this activity within the design meeting had to be carefully programmed. An assignment designed to get the group involved in the ‘constructing objects’ design activity is necessary.

NEXT STEPS

The next steps in this study are:

- To set up a model for design meetings, working methods and design activities, as an enlargement of the designers’ interaction circle.
- To develop a guideline, including strategies and heuristics (Badke-Schaub and Stemple 2003, p. 130), to use the particular working method and a workshop to learn to use this method.
- To test the particular working method in the building industry with the aid of expert designers to determine the benefits.

The measuring of the design activities during the face-to-face design meetings will be carried out by video interaction. The determining factors are the type of design activities and the socio-emotional interaction according to the Bales method (Gorse 2002). The supporting emotion, offering information, asking questions and negative emotion will be measured. A higher level of positive emotional interaction tends to be associated with positive group outcomes.

At the same time, various external conditions had to be measured to gain an understanding of how external factors such as the character of the expert designer and the design task and design result influenced the design activities.

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