PROBLEMS IN TRANSDISCIPLINARY DESIGN PRACTICES OF MANAGEMENT AND ARCHITECTURE

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ABSTRACT

The professional practices of manager and architect are entwined in the design process of a building. However, the management experiences serious problems to understand architectural design and to confront these with their ideas of organisation design. In many cases this has considerable impact on the cost for society, for instance, costly reconstructions after completion. Although exact data on the cost of reconstruction directly after completion of the building are not yet available, the Dutch government buildings agency estimates that the cost for such a follow-up absorbs 5% of the total budget for buildings in their portfolio. Improvements in the design process may therefore lead to substantial benefit for societies. A confrontation of the images of organisation with the images of architecture in the beginning phases of the process, for example, in articulating the wishes of the customer or in using advanced three-dimensional virtual representations to confront organisational and architectural design. The aim of this paper is to explore the initial problems in this area within health care.

Keywords: Architectural design, Hard systems, Health care, Organisation design, Soft Systems

INTRODUCTION

Problems to connect organisation and architectural design are relatively new. Even though early initiatives connect both design problems in a systems perspective (Handler 1970) an approach encompassing the youngest systems ideas remains absent. From within this newer perspective it can be argued that the differences in properties of technical and social systems complicate this interdisciplinary design process. Whereas the technical system is basically fixed, is the social system basically fluid and kaleidoscopic in nature (Checkland and Holwell 1998). We would expect manager and architect to overcome this difference and to design both systems in close harmony and to aim at a fit of organisation and building in the design process (Mobach and Rogier 1995). An interesting example of empirical connections between hard and soft is in the design of the architect Frank Gehry of the Guggenheim museum in Bilbao, the capital city of the Basque country. The design of the museum is a masterpiece of hard mathematical calculation through its combined material of glass, orthogonal limestone blocks, and curved and bent titanium panels. At the same time these calculations were the result of the soft people process between Thomas Krens (director of the New York Guggenheim museum and explorer of venues
Problems in Design Practices

beyond its main building in New York), Frank Gehry, the Guggenheim foundation, and the Basques authorities. In this soft part of the design process various interests were explored and elaborated in hard materials design. Interests such as the creation of an institute contributing to the identity of the Guggenheim foundation, of a building to exhibit art, and of an intervention to master the violent image of the Basque country and to transform its capital into an international centre for culture, finance and tourism (Mobach 2003). However, in theory both professions are supported by their own related but different design methodologies. Systems science, especially an interdisciplinary synthesis of hard and soft approaches on the subject still to be developed, may contribute to the methodological support of both professional practices, since human and technical design questions of construction will always emerge as an interdisciplinary interconnected system of hard and soft problems. But within systems science, two separate and contrastive traditions support human decision-making in the design of technical and social systems. Although some systems ideas of a synthesised framework are present in rudimentary form, an elaborated framework applicable for this specific design process does not yet exist.

At last years conference in Shanghai it was concluded that, over the last years, the differences between the hard and the soft tradition have been described extensively within the systems movement (Mobach 2003). Today, for example within one of the leading soft approaches, soft systems methodology, it is held that the hard approach is a special case within the soft framework; a relation of apples and fruit rather than of apples and pears (Checkland 1985). Still no elaborated methodological framework supports clarification and intervention in the interdisciplinary interconnected knots of hard and soft problems on the subject. But in the design practices, manager and architect do need to find accommodations to unravel these problem knots allowing opportunities for a synthesised design. In the design of a new building, manager and architect can rely on either hard or soft approaches combined with intuition and professional experience rather than on a robust interdisciplinary scientific framework capable of synthesising hard and soft design problems. We would therefore expect manager and architect to experience problems with an interdisciplinary synthesis in the design and we would also expect these problems to emerge in process and outcome of the design. It is yet unclear where and how these problems would occur and where a connection between the hard and soft systems approaches would be meaningful for the purpose of management and architectural sciences and for both professional practices. New research should therefore investigate what synthesis of the soft and the hard systems approaches may be appropriate for the interdisciplinary design of human and technical design questions of construction. A first step in this research is to explore the problems and problems situations in current design processes.

DESIGN PRACTICE

The ideas behind two residences for children with serious diseases are illustrative for how soft and hard may converge in organisation and building. The first residence is a playground in a hospital to be designed in near future, the second is an already completed holiday facility to support a mental time-out for seriously affected families.
Problems in Design Practices

The first example is in the design ideas of the planned Children’s City, close to the paediatric section of an academic hospital (VU) in Amsterdam, The Netherlands (Meijer 2003). The ideas were formulated by the management of the hospital and show the influence an organisation may have on architectural design. It was found that it is nice for hospitalised children to do something else than lying ill in bed. The management argued that a positive and playful environment stimulates the recovery of the patient child. ‘A child should be able to behave as a child. In addition, long-term illness affects the physical growth as well as the intellectual growth negatively. It is very important that children learn the right things at the right time. Therefore a meeting place with other children is vital for their development’. In this meeting place children from the clinics, outpatients’ clinic, and infant visitors mix. The soft meaning of this intended design is that the meeting place should stimulate the children’s intellectual growth, and, at least for a part of them, aims to distract them from their illness. An important proposed organisational design principle is multi-functionality. The target group is very divers. The users vary from zero to sixteen years of age. The design must create space for everyone, but also respect the fact that an adolescent usually does not play with a pre-schooler. Different programmes in various rooms will take place in different rhythms. Specific activities are planned to be organised daily, other activities like a theatre performance weekly, and yet other activities like a market at Queen’s anniversary day or a Christmas market yearly. The management vision on architecture is that the City (630 m²) comprises various thematic rooms. For example, at the ‘players home’ of Ajax Amsterdam it is envisaged that the children play table football or, every now and then, they do have the possibility to have a conversation with players from Ajax or ask a signature. In the ‘Spottersnest’ the children can watch climbing and landing aeroplanes of the near airport Schiphol and see the according radar data on a screen, while others follow animals of the Amsterdam zoo on a webcam. In the theatre a clown can give a joyful performance, and for the ones which need a quiet place to relax, the ‘snoezel’ rooms will satisfy their needs with the soft sound of the sea. Currently, a selection between architects is being made through an open competition. This example illustrates the firm grip that the management has on the future architect. It also shows a rather strong and fairly consistent connection between soft and hard. The transformation from soft design question into hard design solutions has been prepared very well.

The second example is in the designed building of Villa Pardoes, a children’s hotel near an amusement park (De Efteling) in Kaathuvel, The Netherlands (Poll 2001). Villa Pardoes is a holiday residence for children with life-threatening diseases. It is another example of a design that aims to help very ill children. It is based upon the US-concept of ‘Give Kids the World’. The soft meaning of this realised design was that the villa should provide relaxation for very ill children between 4 and 12 years of age and stimulate contact between partners in adversity. It was found that ill children like to be together for a week, but only under the condition that their family is around. This idea is expressed in close connection with the organisation activities and the building. The soft meaning of relaxation and distraction is transformed into concrete organisation design. In order to reach children with life-threatening diseases, intense relations are kept with academic hospitals, patient organisations, and other medical institutions. A medical commission, together with the doctor in attendance, determines if the child is not too ill for a stay. If it is by any means possible, the child and the family are welcome in the villa. The staff of the villa decides which combination of families may be the most suitable. The age of the children is dominant.
in the decision for combination, mainly to stimulate the possibilities for friendship between the children. For a week, the child and the family are pampered mainly through volunteers. The first evening they are offered a buffet. The other evenings they cook themselves in brightly coloured kitchens. The children and their family can stay for free. The involved staff puts also efforts in fund-raising. Companies can rent the villa to enable a free stay for the families. For less than €14,000 per week a company can rent the whole villa to support eight affected families. Although the apartments are completely adapted to these special circumstances, the visual presence of medical devices is minimised. It is stressed that families do not need to be confronted with the illness unnecessarily. Specific devices, for instance, lifting devices, shower stretchers, and resuscitators are therefore only available upon request. There are good agreements with the doctors available in the neighbourhood. The family can also enjoy other facilities in the area. Five amusement parks, but also the neighbouring theatres and museums allow free access for the families. As such, the relatively hard organisation design consistently aims to provide ‘untroubled’ relaxation and distraction. A bridge between the soft and the hard design practices. The soft meaning of relaxation is also well expressed in soft architectural design principles and related hard design solutions. For the interior architecture themes as fantasy, adventure and nature were used as soft guiding principles. These soft principles were transformed into hard architectural forms. The building is not adapted to the needs of children, but uniquely designed and constructed for children that need distraction and precious time to play. The main architectural form of the big villa is a snail’s shell. The central hall is filled with toys, plants, and small sculptures. It does explicitly not relate to the aura of a hospital, although it is highly sophisticated if medical equipment is necessary. A snail track is used for signposting. The snail’s shell also includes various common spaces where families can meet, talk, eat or play at a computer. The shell comprises eight apartments with three bedrooms each. The rooms have themes like ‘Barbie’ and ‘Beach’. In Barbie everything is pink instead of the hospital white. All interior details refer to the Barbie dolls. The room is extremely popular among young girls. In the rooms of the ‘Beach’ theme the colours and the furniture refer to sand, sea and shells. Other atmospheres are created by the images on the glass of the skylights, for instance, the stories from the close located amusement park ‘De Efteling’ and the appearance of small leaflets. If the sun shines the shadows of the leaflets emerge on the wall. It then appears as if the house is in the middle of a forest. The interior space is conveniently arranged. Parents do not need to pay attention all the time. Parents can talk while the children do whatever they like to do. Again this second example also shows a very close connection between the soft meaning of the design and its elaboration in managerial and architectural practices. The example also shows how strongly organisation and architecture are blended, and how consistently the soft and the hard design are interwoven. The transformation from soft design question into soft and hard design directions and solutions has been prepared very well.

**DESIGN PRACTICE PROBLEMS**

The above examples seemed to suggest that a connection between soft and hard design is rather unproblematic in practice. Unfortunately, in many cases this is not true. Studies in the UK indicate that 51% of the cost of quality failures after premises handover is due to problems in the design. The Dutch government buildings agency
estimates that the cost for a follow-up of the design process (intervention in the construction process or reconstruction after completion) absorbs 5% of the total budget for buildings in their portfolio (Mobach 2003). Even regarding the relatively small Dutch total production volume for organisation buildings (so-called utility buildings), at the public and the private sector of € 1.52 and € 6.34 billion respectively in 2000, the problems have considerable financial substance.

A longitudinal comparative case study at a general hospital in The Netherlands of six years was therefore held in order to explore the experienced problems in the design process. The study reveals some of these hard, soft and interrelated problems. A summary of the results is given for the purpose of this work. In the research of this design process three systems perspectives had relevance (Haselhoff, 1987). The dynamic system: the ever-changing organization, with flexibility as a major criterion. The social-cultural system: the meaning of the organisation at its stakeholders, with the attribution of meaning as a major criterion. The technical-economical system: the efficient performance of the organisation through time, with efficiency as a major criterion. The technical-economical system was chosen as the dominant hard perspective, and the social-cultural system and the dynamic system were chosen as the dominant soft perspectives.

**Hard Systems Design**

In the *hard tradition* it is held that the relation between cause and effect can be visualised since constraints are firm and goals are unambiguous (Rosenhead 1989). A problem is ‘out there’ and can be solved in one best way, mostly resulting in a mathematically sophisticated solution. Such as the calculation of the efficiency or the profitability of a manufacturing process in organisations, can the strength of materials in architecture or the translation of a complicated architectural form into manufacturing data be calculated and incorporated in the best design solution within defined constraints. As such are the hard approaches an indispensable constituent for the interdisciplinary design questions of the managerial and architectural professions.

It was found that the argumentation of hard calculable facts at the studied design process was very good, both in organisation design and in architectural design. Almost everything in the discussions was in the end reduced to $m^2$, $m^3$, €, and estimated market share expressed in number of patients. Other applied and relatively hard design principles were decisions based on interdependencies and workflow. Departments with strong dependencies, like the obvious relation between the operating room and the sterilization room for instruments, were positioned close together. Other principles applied were related to the workflow, horizontally and vertically. In the horizontal principle did a high score on patient traffic and patient immobility secure a position close to the central hall. For instance, the outpatients’ clinics with most visitors, like internal diseases and surgery, have priority for a position close to the entrance. Other departments with immobile patients, like orthopaedics, are also close to the entrance. In the vertical principle did a high score on human traffic secure a position on the ground floor. The outpatients’ clinic with the highest frequency of patient visits on the ground floor, the clinic with mainly visitors on the first, the operating facilities with internal traffic on the second, and the technical installations with the lowest frequency of visits by maintenance engineers on the third floor.
Problems in Design Practices

This first part of the study has revealed the great importance of hard issues in the design process of hospital and architecture. The hard design was very well elaborated.

**Soft Systems Design**

In the *soft tradition* it is argued that a problem is messy and created through the attribution of meaning to events (Checkland 1981, Checkland and Scholes 1990). The soft methodological framework supports clarification and intervention in messy problem situations. It helps to improve the understanding in these situations, to organise a debate, for example, about a design to improve organisational effectiveness, to change organisation culture or to transform such new organisational concepts into architectural forms, and it also helps to seek accommodations which make such changes possible. In this conception people learn from such problem situations rather than 'just' solve them (Argyris and Schön, 1978, Argyris 1992, Flood 1999, Schön, 1983, Senge 1990). In a process of appreciation they debate possible courses that may be followed and the relationships these courses will affect (Vickers 1965, 1983). In these courses people set standards or norms rather than goals. Vital is that the soft tradition allows different worldviews on the same events (Wilson 2001), evidently leading to different purposeful actions in practice.

In this case study it was found that the argumentation of soft issues about meaning of the hospital organisation and effects of organisation dynamics was very poor, in organisation design as well as in architectural design.

The influence of the hospital on the design of the soft *social-cultural system* was very limited and mainly reactive. The architect decided where and how to make interventions in the system. He introduced images of other buildings to stimulate the debate, but the response of the decision-makers was very poor. There was no profound debate and no interest whatsoever at the side of the hospital. The hospital has failed to raise a fundamental discussion on issues like atmosphere, aura, and its basic values and beliefs. Decision-makers felt a lack of competence in this area or overestimated it. In this context one of the respondents argued: ‘Discussions about colour, lighting, and the length of the corridors are in the domain of the architect. I am not the first person to talk about these issues.’ Other more powerful decision-makers overestimated their expertise and discussed individual components of the design, the colour of the facing brick or a paving tile, without discussing the concept behind the other constituents of architecture. One of the most powerful respondents argued at a meeting: ‘Last weekend I took a walk with my wife and saw yellow facing brick, would that not be anything for our building?’ One of the architects was rather annoyed about this remark, because the discussion about should be about the emergent properties and not only about details of the design. Such behaviour is regarded unprofessional in this profession. Consequently, this position hindered the professionalism and exchange of knowledge in the discussion. As such, the full potential of the creativity of the architect was not used and the hospital missed a wonderful opportunity to find common ground and influence the design decisions of the architect.

The design of the soft *dynamic system* was hardly discussed. The most important ‘judgements of fact’ were frozen, mainly to bridge the fluid social system with the
Problems in Design Practices

principally static architectural form, which is a very common practice these days. With hindsight not wise, because the ever-changing hospital organisation made that the building was outrun by the changes at the hospital even before completion of the building. A very poor design solution if it comes to sustainability. The fit between hospital and building was poor both on large ‘facts’, 15,000 patients more than expected, and also on relatively smaller ‘facts’, new professional developments (new disciplines), new organisation structures (closer connection between outpatients’ clinic and day treatment) and changes in the hospital (growth and shrinkage of disciplines). The current building is too small and the flexibility is very limited.

This second part of the study has revealed the poor attention for soft issues in the design process of hospital and architecture. The soft design was poorly elaborated.

Interrelated Soft and Hard Systems Design

Earlier it was assumed that the interconnectedness of hard and soft problems in the design process is a sophisticated process to support (Mobach 2003). For example, the very meaning of emergence is that one can never in advance be sure which problem proves to be which. Simple problems can eventually prove to be very complex, vice versa. In addition, organisational problems make it hard for both professions to determine the current and desired state of the systems at hand, as well as to transform their assumptions about these systems into architectural forms and materials. For instance, differences between espoused theory and theory in use (Argyris and Schön 1978), and between intention, emergence and realisation (Mintzberg 1994) may seriously limit the possibilities to optimise the interdisciplinary interconnected design outcome, not to mention the possibilities to design the best solution. But also problems to set the time frame and the boundary for the designed entities (De Leeuw 2000), as well as problems to incorporate organisational dynamics in the design process itself have considerable impact.

Moreover, it was assumed that even though the professional design practices of manager and architect need both hard and soft systems approaches there is a blind spot in current literature. Custom-made syntheses between hard and soft approaches, applicable to interdisciplinary synthesised design questions of manager and architect on the subject, do not yet exist. But, the last ten years there has been a significant rise of related meta-methodologies trying to connect hard and soft approaches (Deallenchbach 1994, Flood and Jackson 1991a, 1991b, Jackson and Keys 1984, Jackson 2000, Mingers and Gill 1997, Van Gigch 1991). The most important approaches being the critical approach and the multi-methodological approach, which both can be seen as particular forms of methodological pluralism. The critical systems approach (Flood and Jackson 1991a, 1991b, Jackson and Keys 1984, Jackson 2000, Mingers and Gill 1997), combines more than one methodology, either in whole or part depending on the specific problem situation. Both methodological combinations seek to make a richer picture of the problem situation and to improve related human decision-making. However, it was supposed that non-rigorous inquiry in this area would throw manager and architect back upon intuition and their professional experience to complete the interdisciplinary synthesised design task. But how did this emerge in practice?
Problems in Design Practices

It was found that the argumentation of interrelated soft and hard issues was almost absent. Consequently, the relation between the soft meaning of the hospital and the extremely soft organisation dynamics in relation with the hard calculable outcome was almost absent, both in organisation design and architectural design. The transformation of soft concepts, as such not being very vivid in this case, into decisions and hard facts was not thoroughly worked-out. For example, the relation between social-cultural system and the technical-economical system was not very well addressed in the discussion. As was mentioned earlier, a discussion on issues as atmosphere and aura was very poor, and a discussion on its basic values and beliefs was absent. Consequently, the relation with, for instance, architecture, organisation structure and performance was not worked out. In addition, the relation between dynamic system and the technical-economical system was also not addressed in the discussion. Possible changes in the hospital were sometimes discussed, but decisions that encompassed the consequences for the designed building were almost absent. Interventions after contracting-out are complex, unpopular, and expensive. However, since most design processes of large buildings as hospitals take a long time the organisation mostly has changed. An interesting question in this context may be: ‘What changes in organisation at what point in time of the design process it may be strong and important enough to unfreeze the process and make modifications?’ More precise decisions in the delicate process of freeze and unfreeze may reduce cost for society and improve the sustainability of the building.

This third part of the study has revealed the great negligence of the interrelated soft and hard issues in the design process of hospital and architecture. The interrelated design was almost absent.

CONCLUSION

The meeting between hospital organisation and architecture has revealed a major priority of hard issues that have steered many decisions in the design process. The focus on hard steering measures has limited the degrees of freedom for the architect substantially. On one hand, the frozen hospital indicators support the design process as they tend to bridge the gap between the fluid hospital organisation and the fixed building. On the other hand, this gap can never be fully bridged as organisational changes through time are continuous. This will be an ever-present property of the designed organisational system. New research should explore where exactly to unfreeze and freeze the hard variables. The meeting also revealed a very limited depth in discussion about soft issues. Issues of atmosphere and aura of the building in the context of hospital organisation were poorly addressed, issues of organisation culture were even absent. The meeting of both professions also revealed an almost complete absence of arguments on interrelated problems of both hard and soft nature. It is therefore concluded that the explorative study indeed revealed some interesting problems of manager and architect with an interdisciplinry synthesis in the design process and the final building. The intuition and professional experience of management and architect was mainly limited to the hard approach. Soft systems approaches and interrelated soft and hard systems approaches may therefore be an interesting next step to improve the decisions in the design practice. A confrontation of the images of organisation with the images of architecture in the beginning phases
Problems in Design Practices

of the process, for example, in articulating the soft issues and interrelated issues of the customer or in using advanced three-dimensional virtual representations to confront organisational and architectural design and explore the connection between hard and soft systems.

REFERENCES

Problems in Design Practices