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(RE)CONSTRUCTING THE WICKED PROBLEM THROUGH THE VISUAL AND THE VERBAL: THE CASE OF A DIALOGUE BASED ARCHITECTURAL COMPETITION

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Wicked problems are open ended and complex societal problems. There is a lack of empirical research into the dynamics and mechanisms that (re) construct problems to become wicked. This paper builds on an ethnographic study of a dialogue-based architect competition to do just that. The competition studied had the purpose of selecting a design, a project and a design team for a large multifunctional building in Copenhagen. As a part of the competition, four different architect-teams had to come up with solutions on how to transform an old brewery site into a multifunctional building. During the competition, the invited architectural teams presented their designs and team organization in three parallel workshops for a panel of client advisors, user representatives as well as a professional jury board. Our data consists of semi-structured interviews with key informants before, during and after the competition and participant observations from all the workshops. We focus on the dynamic interplay between design visualizations and verbal dialogues and the ways in which contradictions and tensions emerge and play out. When the architect teams present their solutions at the workshops, the visualization processes creates new knowledge and insights, but at the same time present new problems related to the ongoing verbal feedback. The design problem being (re) constructed appears as Heracles' fight with Hydra: Every time Heracles cut of a head, two new heads grow back. The paper contributes to understanding the relationship between the visual and the verbal (dialogue) in complex design processes in the early phases of large construction projects, and how the dynamic interplay between the design visualization and verbal dialogue develops before the competition produces, or negotiates, "a winning design".

Keywords: architectural competition, design visualizations, wicked problems

INTRODUCTION

Architectural competitions are used in the early design phases to visualize alternative aesthetics and functionality of building and construction projects. How the building is visualized and how the selection process is organized is different from project to project. In this paper we present and analyse a new form of architectural competition

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organized to select a design *and* an architect-team for a large building project. We understand architectural competitions as social technologies used by clients to visualize different possible solutions to a design problem (Kreiner, 2010). We contribute with a practice-based analysis of a new form of dialogue-based competition within the Danish construction industry. In the last decade a number of new forms of competition procedures have been used by client organizations in Denmark (Georg, 2015; Kreiner, 2010; Kreiner, 2012; Kreiner *et al.*, 2011). The use of dialogues between the architects, the client organization and the jury board as a part of architectural competitions is not unproblematic, because new concerns emerge in practice and the organizers of the competition have to balance justice, efficiency and creativity in new ways (Kreiner, 2010). In a more general sense, the dialogue-based competition also points to the significance of the relation between the client and the design team. Empirical studies from the Netherlands have investigated the paradoxical tensions between economic and architectural values that are a part of the negotiations between client organizations and architects (Bos-de Vos, *et al.*, 2015). Volker (2012) showed how new EU competition procedures, which promoted upfront specifications of success criteria, created a tension between artistic freedom in architectural design and bureaucratic procedures.

David Stark (2011) points at an important distinction between head-to-head competitions and architectural competitions. In head-to-head competitions such as soccer matches the referee can easily calculate and “count” who score most goals. In an architectural competition, however, the criteria to pick the winner are less well defined because the jury board develops the criteria of evaluation during the valuation process. In traditional open architectural competitions the jury board select a design without knowing the identity of the architect behind the entries (Kazemian and Rönn, 2009). Empirical studies of the jury boards' work in different kinds of anonymous competitions have found that some of the evaluation and assessment criteria is developed during the process (Silberberger, 2012; Van Wezemael *et al.*, 2011). Recently, new forms of competitions have emerged that that allows for face-to-face interactions such as dialogue-based competition procedures. These are being used in Danish construction projects like public schools (Kreiner, 2012; Kreiner, 2010; Kreiner *et al.*, 2011) urban development projects (Georg, 2015) and hospital constructions (Harty *et al.*, 2015). During the interactions the client organization can get insights into economic and functional aspects of the future building before a design is selected. The dialogues between the jury board, future users and architect teams can facilitate mutual learning processes, because the teams can integrate inputs from future users and other stakeholders before the final project is submitted. Empirical studies have found that dialogues in a competition speed up learning processes. Yet it is also difficult to learn in such dialogue-based competitions because the feedback that the architect teams get can be ambiguous (Kreiner *et al.*, 2011). In dialogue-based architectural competitions the criteria for selecting a winner are not a priori given, instead they emerge as a part of the competition process, and they are based on the jury members' professional judgments of the designs (Kreiner, 2012).

In our case the client organized the specific competition procedure, because they wanted to *see* how the four different invited architect-teams developed their designs, and how they presented themselves as a potential collaborative team for a jury board. The winning team was awarded the right to further develop their building design together with the client organization after the competition ended. The competition brief comprised a building project of more than 80.000 square metres with a budget of

1.3 billion Danish kroner (DKK), or approximately 170 million Euro. The building had to be finished within a strict timeframe, because the main user was a University College with 10.000 students. These students were scheduled to move from different locations in Copenhagen to their new campus in the building. The campus building is scheduled to be opened fall 2016. When finished it will consist of 29 stores and its 100 metres height will make it among the tallest buildings in Copenhagen. The building is also part of the development of a new major 600.000 square metres city area, the Carlsberg City District.

We describe and analyse the work of designing and selecting the design for the building as a *wicked problem*. Rittel and Webber (1973) defined wicked problems as complex societal problems with no optimal solution. Wicked problems entail contradictions and it is not clear how a wicked problem should be defined and solved. They might be solved in a number of different ways - depending upon peoples' "world view" (Rittel and Webber, 1973, 166) - and are therefore different from tame problems where an optimal solution exists. Rittel and Webber's distinction between wicked and tame problems draws attention to the knowledge conditions within which a solution to a design problem is worked out. More specifically, the distinction underscores the fundamental uncertainty that characterizes the wicked problem, i.e. a condition where there is no certain knowledge regarding what the problem is, nor about methods for solving it.

We are not the first to link building design and construction to the concept of wicked problems. Winch (2010) relates the distinction between tame and wicked problems to different phases in a project. For tame problems it is sufficient to rely on prior knowledge and it is clear where the boundary of the design problem and solution lies. By contrast, for wicked problems, prior knowledge is not sufficient, nor is it possible to fully describe the boundary of the design problem and the solution (Winch, 2010). The problem boundaries are unclear in the architectural competition, where different solutions are being developed and explored before the jury selects a winning solution. Other researchers have used the concept in relation to a study of an architectural competition (Kreiner, 2012). Based on an empirical study of a dialogue-based architectural competition for a public school Kreiner shows that the problem has no analytical solution. The nature of the design task is discovered during interaction and addressed sequentially when the participants in the competition are working with the problem (Kreiner, 2012).

A few studies have approached the study of the architectural competition from an actor-network theory (ANT) approach focusing on BIM (Sørensen *et al.*, 2015) and the role of a sustainability assessment tools in a competition (Georg, 2015). The ANT approach has been put to good use in exploring the role of the visual devices in knowledge intensive contexts such as scientific laboratories (Latour, 1986), and more recently in construction management contexts when exploring visual and virtual representations in hybrid design practices (Harty and Whyte, 2009; Harty *et al.*, 2015).

In this paper we use ANT to explore how the wicked problem is being reconstructed as it emerges in practice during the architectural competition, by focusing on how contradictions and tensions unfold in the dynamic interplay between visual representations of the building and the design team during the dialogues at the workshop. We seek to explore how this verbal aspect of the interaction between the jury board and the teams changes the role of the visual during the competition process. The role of visualizations are different when competitions are organized so that

architect teams can discuss their work with the jury board before they hand in their final design proposal. Yet, it is an open empirical question how the role of the visual changes, and more specifically, what roles the visual can play in generating new ways of viewing and (re) constructing the wicked design problem during the dialogue-based competition.

METHODOLOGY AND DATA COLLECTION

Our case study is based on a comprehensive dataset spanning the entire competition process. We observed planning-meetings before the competition process, all 12 workshops (each architect-team had three workshops with the jury board), and the final meetings of the jury board. We also conducted semi-structured interviews before, during and after the competition process with key informants, and took more than 200 digital photos of the work at the workshops, audio recordings from all 12 workshops. After the presentations we collected the power point presentations used by the teams at the workshops. The data collection started one month before the process competition began, with observations of meetings were members from the client organization together with consultants from the Danish Association of Architects were writing the competition brief and planning the progression in the workshops and the competition process.

In these observations focus was on the work of preparing for the competition process. The researchers were provided with agendas before the meetings and with access to a shared digital folder (Dropbox) where documents and pictures were uploaded. When the competition started focus was on how the architect teams were presenting their design visualizations and team organization at the workshops, and how they engaged in dialogue with members from the jury board and further negotiate the overall design task and challenges. We focused on how the understanding of the design task and problem developed in the negotiations at the workshops.

Our aim was to develop an understanding of how the on-going feedback and evaluations of the teams' designs at the workshops had an impact on the (re)formulation of the wicked problem. The aim of using different methods such as observations, semi-structured interviews, documents, and digital photos was to understand how visualizations and materiality was a part of the studied practices of problem identifying, setting, negotiating and reproducing. Our case story is organized accordingly: first, the reader is introduced to the background, which involves a large city development project. Next we focus our case description on the particular project task of designing a house within this larger city development project. Our case description and analysis focus on how one of the architect-teams approach the wicked problem at the first workshop in the competition, and furthermore, how the team then interact with the jury board and use visualization devices during the workshop and with what implications for the reconstruction of the wicked problem.

The Case of a Dialogue-based Architectural Competition

Developing Carlsberg City

When the Carlsberg Group decided to move their brewery to Jutland they left a large area of 33 acres situated in Copenhagen. The area is very attractive for development and is being turned into housing, business, educational institutions and recreational area. In 2006 Carlsberg organized an international open architectural competition to find a master plan for the Carlsberg City District area. 221 proposals were handed in and the winner of the open competition was the Danish architect firm Entasis, with a

proposal called “Our space”. One idea in the selected proposal was to reintroduce the density of the classical city. The vision of the master plan is to develop common spaces with inspiration from sociology, architecture, art and engineering to create a socially, economically and environmentally sustainable city.

An important source of inspiration is Giambattista Nolli's plan of Rome from the 18th century – the Nolli Map. To define the spatial contours of squares and buildings the master plan used the seven kilometre underground system of cellars that had been established by the brewery to store and transport beer. In the master plan the common spaces and the 'life' between the houses are considered more important than the buildings themselves to develop a coherent city. Therefore, the selected plan is also a critique of the modernistic epoch of city planning, because the buildings are isolated here. The public spaces outside - and between- the buildings are very important in the master plan.

The new Carlsberg City District is designed according to variations in scale in the master plan, because the idea is that one should be surprised when people walk around the city. On the one side the master plan is inspired by the small scale classical city houses common around Copenhagen, but also introduces towers, a new aspect in Copenhagen where the city skyline has been strictly regulated with limitation on building height. During the process competition the client organization negotiated with potential future users of the building. As it turned out, one of these prospective users did not fit very well with the small town design concept and user identity inscribed into the master plan. The new and very large user that emerged after the master plan was finalized was the University College and it wanted to establish a new campus for 10,000 students. Therefore the design competition became not only a way to visualize how the University College could be a part of the future building, but also how this very large user and building could fit in with the ethos of the master plan. As the largest tenant and user of the prospective building the University College was granted representation in the jury board and its workshops.

CASE ANALYSIS

First act: Setting up the stage - organizing for competition

The team experience tensions around addressing the competition brief, dealing with the competition and setting up the organisation and team working. The workshop starts with the team visualizing how its members are sitting around a table in an office at one of the architect firms. The team members tells that the picture on the power point is taken the evening before the workshop, and that the team proceeded with their work the entire night. The team members consists of representatives from five architectural firms. They point out that this competition confronts them with a novel situation. Despite that several of the firms has been around for many years and have accumulated experiences from numerous architectural competitions, none of the five firms has ever participated in this new dialogue-based form of competition. This new and largely unknown condition prompts the team to visualize their organization with the help of digital images embedded into their power point presentation.

The team links the picture of their organization with a metaphor. The five "farms" (architectural firms) have all produced some products that they have developed on their own, and now the farms have teamed up to deliver this bigger project (the building). Therefore the team have established a co-operative dairy (the producers own the production facilities). The team tell the jury board that they have yet to decide how to divide the design task; whether in 5 parts according to the number of

firms/farms, or if it is more appropriate to divide the design of the building into 12 or only 3 parts, according to the overall design task. As Rittel and Webbers argue the criteria for finding the solution on the wicked problem depend on how to solve it. In practice the team approach the brief to re-construct the problem. The team also tell the jury that their challenge is to secure diversity, i.e. to take due account of the overall design task, when they organize their team as a 'collective' drawing office. The team does not know if they need a 'filter' or a design steering committee. Last but not least, the team supplement their visual presentation and story with questions addressed to the jury board, such as:

“What will be the most productive for this process?”

One of the architects in the team point out that it is important that one can see the diversity in the design of the building and that it is designed by different architectural firms. The overall design task and challenge is that some functions and spaces in the building are very large. The building program - another visual representation that supplements the master plan and the Nolli map - stipulates for the University College, that this functional space (education facilities) alone will it take up 54,000 square metres. It is a particular design specification that is being mentioned by the team members as part of the overall design task and it becomes a challenge in the context of a master plan and its design concept of a 'Carlsberg city' as a town with small-scale houses. The team thinks that both their organization and the architectural strategy have to be dynamic. The team want to match the dynamic of the design problem by organizing in a dynamic way. One architect says:

We don't know where this ends. Therefore we decided that we need to have an organization that is just as dynamic as the process that we are in

The team tells the jury board that they are in a phase were they have to “think before they draw”. They call this phase were they are right now up to and into the workshop as an "analytical phase". The analytical phase is not only about understanding the essence and substance of the overall design problem, as well as the vision and background for the development of the Carlsberg City District, but also about probing and adjusting values with the jury board. Therefore the team explore potential resolutions on the wicked problem and develop their team organization to do that. The team also point out that the five firms in the team each have some significant attitudes, and that they used the first week from the kick-off day until the first workshop to adjust design attitudes and values internally in the team. Now, the team is working on understanding the vision for the Carlsberg City District, and the total of 80.000 square metre in relation to the overall building program and the functions. The team tells the jury that they think that the master plan and vision for the Carlsberg City District is fantastic because it puts the lives between the buildings – the humans in the fore. The team's interpretation of the problem is focused on integrating the two visions and their tensions: The large scale University College and the small scale Carlsberg vision.

Second act: The team's use of visualization devices

The team use visualization devices as addressing but also reproducing and contributing to the wicked problem. To bring the two visions together the team use the Nolli map as a device. But the team explain that they will use the Nolli map in another way than it is used in the master plan. While the Nolli map in the master plan is used to project a view of the contours of the basements and the 7 km long corridors below ground, the team instead use the Nolli map to project a view above ground. It is a 3D visualization and design of the zones were the building meets the squares and

spaces around the building above the ground. In effect the new use of the Nolli map reconstruct the problem boundary from a focus on the building and what is going on below ground, to a more complex design problem taking into account the spaces for social interaction above ground and between the building and the surrounding city. The team is now talking about the challenge of establishing an inner flow in the large building and connecting this flow with the rest of the Carlsberg City District. To do this the zone where the building meets the space around the building is important. One of the architects is also referring approvingly to the power point and film presentation made by the representatives from the University College at the “kick off” day where one of the user representatives presented the life of the students while explaining that the University College wanted to be a part of the new city. In association with visual devices such as power points and film, the architects' novel use of the Nolli map afforded this more complex view and reconstruction of the overall design task and challenge.

Some aspects of the master plan are easier to translate into to the design of the building than others. When the different functions for the large building have to be translated into a coherent design for the entire building a number of concerns, conflicts and contradictions emerge. These tensions between the large building and the master plan concept of a small scale village emerge due to the use of the Nolli map. The "world views" of the master plan and the University College campus are conflicting in terms of scale and constitute new and more specific design problems. For example, the jury board and the team discussed how the many future students were supposed to move around and use functions and spaces inside and outside the building.

During the dialogue the team and the jury board touch upon several connected problems. During the first act the team raises questions at the workshop, but the following dialogues with the jury board also raises new questions. Intervening in this process of dialogue and problem definition are devices for visualization that affords new views and perspectives on the design problem. When the team presents their ideas and visualizations of the building it became clear how some aspects and concerns such as the building's scale and use in the context of the surrounding city reconstruct the boundary of the wicked problem in new and conflicting ways. The new knowledge produced does not tame the wicked problem. Rather it reveals new uncertainties and makes participants more knowledgeable about what they do not know or have not yet considered and thought about. The design problem being (re) constructed appears as Heracles' fight with Hydra: Every time Heracles cut of a head, two new heads grow back. The problem remains wicked, although it has changed by considering the challenges in the spaces above ground and in between buildings. Yet, the inputs that the team get out of the dialogues cannot be easily integrated into one consistent solution. The team leaves the room and the jury board discuss the presentation for about ten minutes.

Third Act: The jury board's response

When the jury board discuss and evaluate the team's organization and their visualizations the tensions between the building and the public spaces are still present. Different views emerge in connection to the Nolli map. One member of the jury board thinks that the idea about using the Nolli map in this new way is interesting. Another member of the jury board point out that they have to be careful that the building is being designed in a way so that the 10,000 students are just staying inside the building. The jury board is talking about how they have to be careful not to design

a new Field's (a shopping mall in another part of Copenhagen) – not with stores but with an educational institution, that will not add value to the city life with the potential that the 10,000 students have. This shopping mall leaves the streets around the building empty. Such a design of the building is not directly in conflict with the ambitions of the new University College, but the central idea in the master plan is that the spaces in between the houses have to be designed before the buildings, because the ambition of the master plan is to connect the common spaces and squares. The building that is being designed and developed is different from the buildings that were defined in the master plan, visualized as smaller traditional city houses, because it is so large.

When the team is back the jury board tell them about their concerns about the students that arrive at the building in the morning and leave it in the evening without getting out of the building during the day and without having contact with the city. One member of the jury board tells the team that the University College needs the process to facilitate the organizational change to become University College Central and that it is not a bad thing with the inner flow in relation to this development process, but it is also a good thing if there is a vibrant exchange - a dialogue - between the University College and the city spaces. It is important for the University College that it is possible to read in the façade what is going on behind the walls. One should be able to see its function; a classroom, a library, a canteen or another common room. From the University College perspective the building is seen and understood from inside out in relation to educational functions – even though that the city space is also important. It is being discussed that the students might be willing to go outside if there are attractions outside. The team is also discussing the other future users with the jury board. Many people, not only students and faculty, will arrive with the train and walk into the future city. But other people will also dwell and live inside the tower in the building. The way the multifunctional building is being perceived by the different members in the jury board differs. One of the jury members asks the team about their thoughts about the area around the train station and the parking facilities in the basement of the future building. The team haven't thought about this yet. This further consideration of infrastructures in the vicinity of the large multifunctional building, such as train stations and transportation of different users, adds new elements to the wickedness of the problem.

It is clear already in the team's presentation that it is challenging to integrate the vision for the University College together with the vision for the Carlsberg City District as it is formulated in the master plan. The tension between the large building and the small scale city spaces becomes explicit during the team's discussion with the jury board. The integration of the large building in the master plan creates dilemmas and conflicts in the discussion between the team and the jury board, but also internally in the jury board. The contradictory elements of use to be integrated in the future building, such as campus building, dwelling and shopping, can be handled in different ways. Because the problem is not tamed but becomes wicked in new ways the team does not know how the tensions between inside and outside will be reconstructed and resolved through the final jury decision.

These new elements of the wicked problem emerge during the dialogue and direct the attention of the team and jury board towards certain design challenges. Yet, these design challenges cannot be solved through consensus at the workshop. When the team is visualizing their design solutions they can see and know more about how the problem is wicked. The new knowledge does not solve the design problem and

challenge. Instead, it adds to the wickedness of the problem by opening up for new and more complex relations between the building and its users and the surrounding city spaces and functions. The team has to take these new elements and relations into account when developing their design for the next workshop. There is no optimal and final solution. The wicked problem is an evolving one and compromises must be found between elements and related problems. How to find these compromises is the design challenge that the team is confronting. The dialogue-based competition is not a means for solving the wicked problem, but a mechanism that makes it possible to (re)construct it through the simultaneous use of different forms of visualizations and the new views and knowledge that is produced.

CONCLUSIONS

As Rittel and Webber (1973) argue there is not a well-defined or optimal solution to a wicked problem, eventually its resolution depends upon peoples' world views. Our case analysis shows how such "world views" about the task and challenge of building design, construction and city development are (re)constructed through the dialogue-based architectural competition. Integral to this design problem are dialogues within a setup consisting of visual devices such as power point presentations, text, still images, film, physical models and sketches. During the first act the competition brief outlines the contours and boundary for the design problem with a focus on the large building. This problem definition is challenged through the team's novel use of the Nolli map, which forge a connection to the overall masterplan and spaces between buildings. The team's presentation of their visualizations produced new knowledge about the wicked problem. On the one hand the team's use of the Nolli map is loyal to the master plan, yet it also created tensions between the design of the large multifunctional building and the master plan vision of a small scale Carlsberg City District.

The wicked problem is not solved, only (re) constructed. During the dialogue-based competition the visualizations of the building is opening and closing opportunities for accessing new knowledge about the design problem. Another kind of complexity and uncertainty comes from the competition. Criteria for what counts as winning approach to the design problem, such as the novel use of the Nolli map, is not specified up front in the design brief. When the jury board finally selects a winning design approach, the teams do not know what criteria count most. Instead, such criteria emerge only to be known at the end of the competition (Kreiner, 2012). The teams are confronted with two kinds of uncertainty with respect to the phenomena of the wicked problem: 1) the teams do not know what problems will emerge at the workshops; 2) it is uncertain what aspects count most in the final jury decision. When the jury board finally selects a winner they have to evaluate the architectural quality of the proposals, how the teams organized as a team, and how they reacted when fighting with Hydra at the workshops.

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