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BOUNDARY OBJECTS AS MEANS FOR KNOWLEDGE GENERATION IN DESIGN EDUCATION

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ABSTRACT
Design spans a range of disciplines and stakeholders and communication between them can be hampered by various misunderstandings. Moreover, professional knowledge in design and architecture is often difficult to mediate because it is tacit, embedded in practice and dependent on situated contexts. Boundary objects (BOs) have the potential to connect diverging views of professionals and stakeholders by providing a common ground for discussion. This paper discusses the concept of boundary objects and analyses a workshop with university teachers from design and architecture, where the double diamond model (DDM) was used as BO. The results of this workshop illustrate that BOs facilitate understanding of design concepts and processes, and their use create an arena for professional and social interaction. Further, BOs might be a good tool for design curriculum however they come with different challenges. The results of the workshop are presented, and BOs for design education are evaluated. Finally, the paper will outline possibilities and challenges to include BOs in design communication and curricula.

Keywords: Communication, boundary objects, communities of practice, BOs in design teaching.

1 INTRODUCTION

In design and architecture, areas of research, practice and education often struggle to generate mutual understanding [1] due to different agendas and needs. Since objects in the widest sense (things, articles, concepts, toolkits, models) provides a common topic of interest for these areas, the concept and methodology of boundary objects was found to be a suitable means to stimulate discussion and understanding. Boundary objects facilitate the coordination of work because they can be interpreted in a tightly focused way by specialists, while being simultaneously readable by generalists [2]. They might also create an arena for social interaction: the design process can be shared, at different points in time, by different members of a community.
This article discusses how boundary objects were applied in a workshop with design and architecture teachers from different colleges in Nepal. The three hours boundary object workshop took place in the Himalaya College of Engineering in Kathmandu in December 2014. It comprised twenty participants and three facilitators and had a twofold goal: To explore whether boundary objects can contribute to improved communication between different design areas and to discuss whether and how this kind of workshop can be applied for design education. The hypothesis was that exploring types of objects and how they are regarded and interpreted may facilitate communication and knowledge sharing. The author has conducted two boundary object workshops earlier, in Oslo and Chiba 2013 [3] lessons learned from those have been taken into account when conducting the boundary object workshop in Kathmandu.

2 THE CONCEPT OF BOUNDARY OBJECTS

2.1 Theory

A boundary objects can be described as "...an object that lives in several social worlds and which has different identities in each" [4]. Kimble et al points to an additional feature: "Boundary objects are artefacts that link sets of diverse interests; they are the physical or virtual entities that allow groups to coalesce and form a stable, if transitory, working relationships" [5].
One way of categorizing BOs are: repositories, ideal types, coincident boundaries and standardized forms [4]. Carlile gives characteristics of effective boundary objects:

- "An effective boundary object at a semantic boundary provides a concrete means for individuals to specify and learn about their differences and dependencies across a given boundary.
- At a pragmatic level boundary an effective boundary object facilitates a process where individuals can jointly transform their knowledge" [6].

Boundary objects can be made part of communities of practices as Kimble explains: "When different groups collaborate on a common task, some form of local agreement is necessary for the work to proceed. As the work progresses these temporary local arrangements are subject to negotiation and renegotiation; new understandings are forged, new ideas generated and new accommodations made as the groups interact with each other"[5]. Boundary objects are means of a common discourse among disciplines and models represent one category of BOs [5]. The advantage of BOs as mediators between design areas is that BOs are flexible and plastic enough to represent specific needs and constraints of one area, while their use allows developing and maintaining coherence across intersecting areas. To test this hypothesis in practice, we used a generic model for a BO workshop, the double-diamond model (DDM) being the BO. The DDM is familiar to both architects and designers, simultaneously allowing diverging views and interpretations. It consists of divergence and convergence stages, which are related to the iterative design steps of observation, ideation, prototyping, and testing. These stages can also be related to the iterative design steps of observation, ideation, prototyping, and testing. The double-diamond model was used because most teachers can identify standard teaching with the stages of the model.

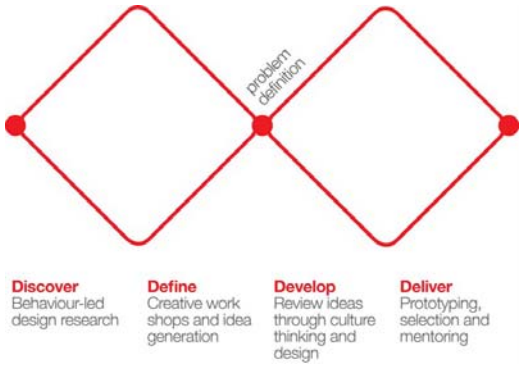

Figure 1. Double diamond model [7]

The double-diamond model was considered an appropriate BO for the workshop, because many design and architecture teachers can relate standard teaching process to the stages of the model. The goal of the workshop was a) to test the BO character of the double-diamond model, and b) to test the value of boundary objects as mediator in deign and architecture education. For the workshop, four sets of 25 similar photo cards were designed and subsumed under three main design notions: Problem-solving, Semantic interpretation and Practitioner reflection. The task of the boundary object workshop participants was to relate 3-4 cards out of 25 for each group to the stages in the DDM. Further, they had to reflect on the cards' selection and on the decision-making process. Finally, they had to reply to a questionnaire and evaluate the DDM's usability as a BO, the workshop conduction, and the overall use of boundary objects for communication among professionals and for design education.

The design notions above are borrowed from Simon, Schön and Krippendorff's concepts [8]. The problem-solving notion refers to Simon's assertion that design has to solve 'ill-structured problems' and that time and money is often lacking. Because of time-money constrains, design processes are always concerned with "resource allocation". Simon's theory of design as problem solving is centrally concerned with how people handle complexity by reducing the (design) problem and selecting a solution from a set of alternatives. Simon claims that a large part of design problems can be solved by heuristics belonging to bounded decision-making. Simon's approach is cognitive and instrumental and the cards were design with rational decision-making, order, structure and traditional approaches in mind.

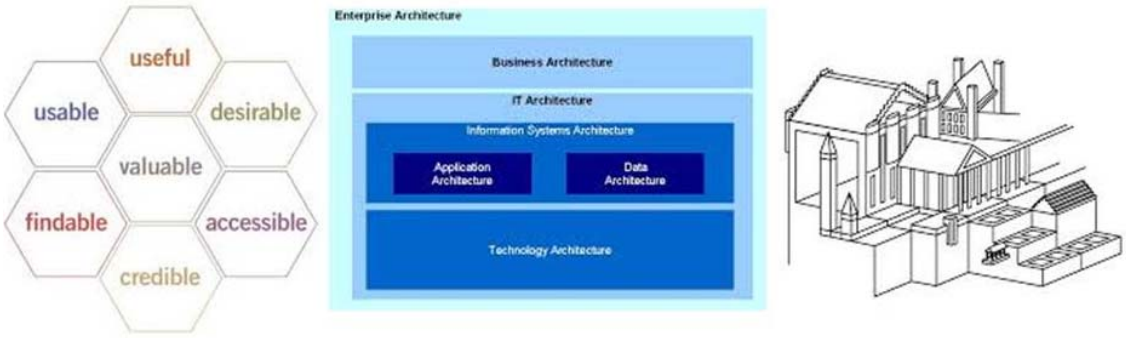

Figure 2. Problem-solving notion cards

Semantic interpretation is a term which characterizes Krippendorff's concept, which puts a lot of emphasis on what artefacts mean to the people affected by them. For him, design "…brings forth what would not come naturally (...); proposes realizable artefacts to others (...) must support the lives of ideally large communities (...) and must make sense to most, ideally to all who have a stake on them." These cards were design relating to expressions, cultural understanding and diversity of explanation.

Figure 3. Semantic interpretation cards

Practitioner reflection: Donald Schön's crucial argument is that 'reflection-in-action' can contribute to a new understanding of the problem and change a situation. By becoming aware of former tacit frames, the practitioner sees new links and relationships to the situation. Schön asserts that the cultivation of the capacity to reflect in action as well as the ability to engage in a process of continuous learning is defining professional practice [9]. The practitioner reflection cards were design with heuristics, individual development and group processes.

Figure 4. Practitioner reflection cards

2.2 Organization of the workshop

The workshop duration was three hours in total, 20 teachers from architecture and design for undergraduate and graduate studies participated. The participants got information in form of articles on

boundary objects by forehand but this was alas not evenly distributed. The following schedule and content was used:

1. **Introduction (20 min):**
   Explaining boundary objects, their role and relevance for cooperation and the goal of the workshop: to explore whether boundary objects can contribute to improved communication between design professionals as well as to education.
2. **Description of task (10 min):**
   The participants were divided into groups divided into groups of 5 persons. Each group got a set of 25 cards. They had to choose representative pictures related to the DDM phases, 3-4 for each phase and discuss in the group how the pictures represent their understanding of the design process. The cards had to be presented in plenum. The following questions were asked as starting guidelines:
   - In which phase does card represent and relate to the DDM?
   - What are the qualities/aspects it represents?
   - Which card does not fit at all to the DDM?
3. **Exchange (60 min):**
   The groups chose representative pictures related to the DDM phases, and discussed how the pictures represent their understanding of the design process related to the questions above. The group also wrote notes on:
   - how the choices were made
   - how negotiations took place
   - what pictures were finally selected
   - why the selected pictures were presented as important representation of this DDM phase.
4. **Presentations (60 min/10 min each)**: Each group presented their DDM cards by addressing the questions from 2 and 3.
5. **Common discussion (30 min):** Discussion of the relevance of the DDM and BOs with the groups attending the workshop relating to their importance for professional communication and as possible tool for students. At the end of the workshop the participants got a questionnaire which all participants filled in.

Figure 4. Selection of cards and process

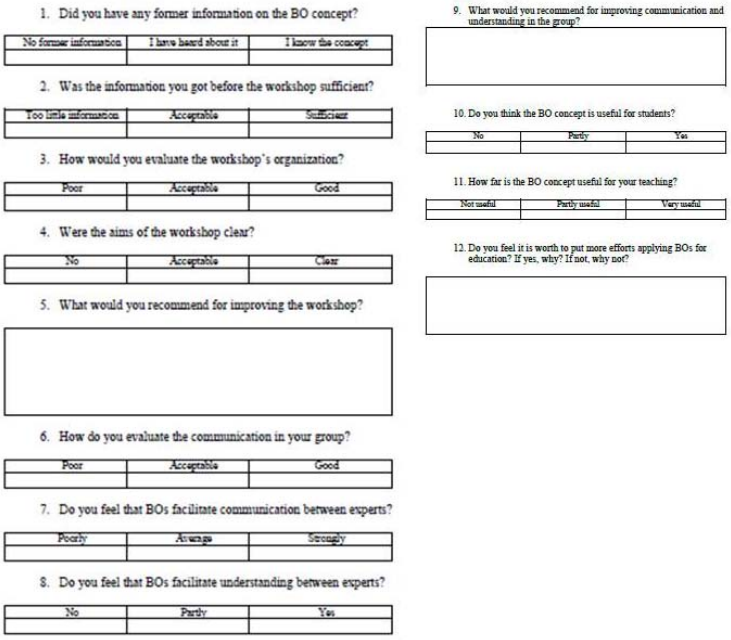

Figure 5. Questionnaire for BO workshop Kathmandu

3 RESULTS

95% of the workshop participants had no former knowledge of BOs and 53 % would like to have more and detailed information before the workshops starts. One participant also suggested that the DDM model should be discussed more thoroughly by forehand. Another said that the selection of the BO should be decided by the participants and that the DDM was too 'design-oriented'. The idea of the BO, besides the DDM being appropriate or not, was that BOs facilitate common understanding and professional interaction (63% average, 37% strongly). As to the choice of cards based on notions, the problem solving was slightly dominating as choice in the groups, followed by the reflective practice and the semantic notion. One participant emphasized that "…BOs give the opportunity to see things in a different way and allow presenting a concept in a logical way." Communication within the groups was considered good (84%, acceptable 16%); however, Nepalis are thought of as shy in expressing controversial views in a group, which can hamper a lively discussion: "…they don't express themselves." Some required a more structured discussion: "People can have their say one after another on each card and afterwards the group makes a common decision." And: "Shys should be given the possibility to express themselves by the dominant ones." The participants see the usability for a BOs workshop for students especially in developing group work: "… it develop habits to work in groups and take things analytically". They also mentioned that the BOs might contribute to increase creativity among the students: "The process of BO would be useful to help students to solve their assignments in a creative way", and that the students will be motivated to take active part in the education. The participants found the cards useful for their own teaching (32% partly, 68% very useful) and for explaining assignments and students projects. Finally, one participant suggested that physical models would be even better than cards, which was supported in the discussion and led to the plan to arrange a hands-on boundary workshop at the Himalaya College of Engineering in May 2015.

4 CONCLUSION

Findings from the workshop, the answers from the participants' questionnaire and a brief literature review indicate that professional knowledge is embedded across functional boundaries and that sharing knowledge is possible but also that it comes with some challenges [5]. For a BO workshop it seems essential to distribute detailed information about the process and the background before the workshop starts to create a common ground and basis for discussion. This seems even more important when organizing BO workshops for students, who have less conceptual knowledge and practical experience.
One can also chose models that are closer to the participants daily teaching practice in the studio than the DDM, or let them suggest ideas for BOs. This has to be tested out in the future.

It is likely that BOs can bridge gaps between different concepts, views and practices [6] and work as channels through which distinct individuals and groups can communicate and collaborate [5]. However, they are also oversimplifications of rather complex concepts and relationships. In a social and discursive context, facilitators have to be aware of group hierarchies and discourse development, possibility introducing routines to make all voices heard. One should also consider if it facilitates the discussion if participants/students are provided with /or design themselves tangible objects – also this has to be tested. Further, it can be questioned whether boundary objects is the right term for the DDM and the cards used in this workshop. Lee states e.g.: "I would argue that objects that are used and adjusted through simultaneous group interaction are not a new type of boundary object, rather, while similar and related, they are not actually boundary objects at all [10]. Despite these criticisms, BOs contribute to facilitate co-activities and to establish communities of practices, as the three workshops conducted so far have shown [3]. The choice of the BO and the practical arrangements of the workshops are improvable. From my point of view, BOs get their significance through being a designerly way of knowledge generation by combining a visual and an analytic way of understanding, which is beneficial for design students, who often struggle with theory comprehension.

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