

Intermediate objects during research through design

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ABSTRACT

This is a brief version 1 of a position paper, serving as an expression of interest to participate in the workshop.

INTRODUCTION

This position paper addresses primary bullet point two in the call for the workshop on objects in research through design:

- *Process* – What role do material objects during the design the process? In what ways can material outcomes offer insight into the design process from which they emerged?

Rather than focusing on the final object presented in the lab, show room or the field [5], I will focus on intermediate object, and address how they emerge and dynamically are transformed during the design process in a complex field of research and design forces. The analysis is based on two media architecture projects our research lab has been involved in.

Below I first present the two cases and objects. Moreover I briefly summarize some of our previous work on research through design from a design process perspective.

ODENPLAN

Odenplan is a projected metro station in Stockholm, Sweden. The building was designed by 3XN Architects for the Odenplan plaza in Vasastan, in the centre of Stockholm [4]. For the exterior stairs of the metro, the proposal was to integrate bands of LEDs along each step. During the design process, three design concepts were created: *Contours*, *Playhead*, and *Traces*. *Contours* emphasizes the contours of stairs by drawing lines along their edges, followed by each step being lit slowly upward, together with other simple visual effects. *Playhead* turns the stairs into a musical score sheet. Each step represents a stave, and the position of a person sitting on the stairs represents a note, which is played when a virtual playhead moves across the stairs. *Traces* creates visual traces of the people sitting or moving

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about on the stairs

The *Traces* video object

One of the design object developed during the design process was a 3D visualization of the *Traces* concept which later was the starting point for the creation of another object, a virtual video prototype. Virtual video prototypes are videos produced using virtual studio technology that makes it possible to combine videos of physical objects, including people, with video images generated in real time from digital 3D models.



Figure 1 Producing the video object

EXPO

The façade of The Danish Pavilion at Expo 2010, designed by BIG Architects, was perforated with 3,600 holes of various sizes and configurations []. These holes were equipped with light fixtures hidden behind PVC tubes, diffusing light uniformly. The approximately 300-metre façade has a double-loop shape, and from some angles appears as two bands, one above the other. In daylight, the façade displayed flickering white animations consisting of white surfaces broken by lines, fades, or silhouettes of people walking or bicycling along the façade. In the evening, animations included shimmering, abstract graphics, sweeps, fades, and animations along the entire

length of the façade. Colours were mostly restricted to white and red.



Figure 2 The EXPO Pavilion – an object, which we are not able to bring to the workshop in San Jose

The 3D mixed reality object

Having a 3D model available, together with a physical scale model of the building, provides an exceptional opportunity to visualize the integration of a unique interface into the building. *3D projection mapping* is based on having an accurate 3D model of the physical part of the installation. In the digital 3D world, we can produce digital content corresponding to the shape of a physical object, which may be subsequently projected onto the physical model of the installation, thereby augmenting the physical object.

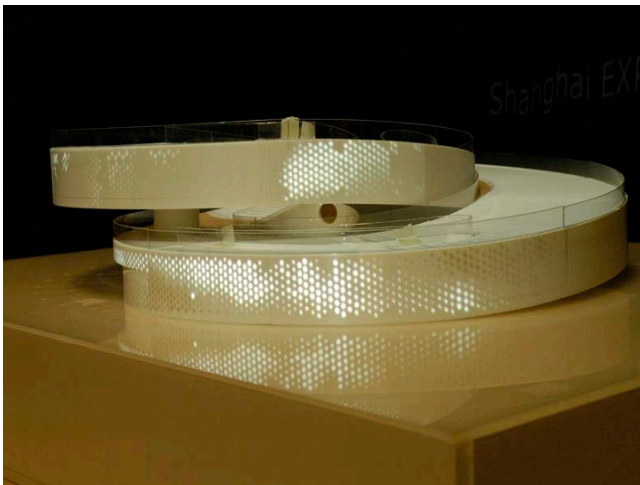


Figure 3 The Mixed reality object

One example of such a custom-made tool was a 1:100 scale physical model, onto which we were able to project the exact pixel configuration of the *Expo Pavilion* using three video projectors. Using virtual 3D technology, the model showed the holes as they would be illuminated on the pavilion and simulated the sunlight and cast shadows. This 3D Mixed Reality object was based on technology recently developed by our research laboratory, in order to match physical objects with their virtual 3D counterparts, and thereby add visual content to precise locations on the object [3].

THE DYNAMICS OF RESEARCH THROUGH DESIGN

We have previously, [1], investigated *Research through Design* at a micro-level, by addressing the dynamic interplay of research and design as they unfold throughout a design process. We have discussed how the interplay evolves in a complex structure, where the design and research interests continuously *couple, interweave, and decouple*.

Recently we have introduced the concepts of boundary zones and emergent boundary objects in order to support the articulation and analysis of the way design objects emerge and are shaped through ongoing negotiations and reifications during a design process [2].

BIOGRAPHY

Kim Halskov is professor in interaction design at Aarhus University, Denmark, where he in addition to being director of *Centre for Advanced Visualization and Interaction*, see www.CAVI.dk, also is co-director of the *Centre for Participatory IT*, www.PIT.au.dk. From a background in participatory design Kim Halskov's research area include design processes, participatory design, research through design, and mapping of design processes.

REFERENCES

1. Basballe, D. A., & Halskov, K. Dynamics of Research through Design. In *Proceedings of Designing Interactive Systems 2012*, 58-67.
2. Dalsgaard, P, Halskov, K. Basballe, D.: Emergent Boundary Objects and Boundary Zones in Collaborative Design Research Projects. In *Proceedings Designing Interactive Systems (DIS '14)*, 2014.
3. Halskov, K. & Ebsen, T.: A framework for designing complex media facades. *Design Studies* 34 (5), 2013, 663-679. Halskov, K.: CAVI - An interaction design research lab. *interactions*, 18(4) 2011, (92-95).
4. Korsgaard H., Hansen, N.B., Basballe, D., Dalsgaard, P. & Halskov, K.: Odenplan—a media façade design process. MAB 2012.
5. Koskinen, Ilpo, John Zimmerman, Thomas Binder, Johan Redstrom, Stephan Wensveen. 2011. *Design Research Through Practice: From the Lab, Field, and Showroom*.