From Big Data Communities to Enterprising Villagers

The Transformational Effect of a Designerly Approach Within a Research Project

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Abstract. Using a designerly approach in projects within a wide spectrum of disciplines is increasingly popular. This paper describes a case in where the 1:10:100 design approach is used in a social sciences project and explores the mutual learning that took place. It discusses the added value of using design artefacts (prototypes) in the process and to what level these can be seen as boundary objects. Among the project partners there are two teams of social scientists (German and Dutch) that were collecting data and worked with abstract thinking processes and a design team who concerned about usability and intervened with design tools. The prototypes in the project are reviewed as boundary objects on three levels: to create common ground, to sharpen focus and as window into the future. The learning mechanisms that occurred (reflection and transformation) shifted the focus in the project from mining data on behalf of a community database towards a tool in which enterprising villagers can show their qualities and entrepreneurship.

Keywords: Designerly approach · Boundary objects · 1:10:100 · Design thinking · Prototypes

1 Introduction

What does a designerly approach bring to an open-ended social sciences project and what role do design artifacts fulfill in this process? Can they function as boundary objects and bridge the cultural differences between the project partners with social sciences and design backgrounds?

This paper explores these questions through a case study around a German-Dutch project called KRAKE DNA. In this project, a team of both German and Dutch social scientists worked together to develop a (digital) tool that maps the DNA of villages in the border region between these two countries. The term DNA refers to the fundamental

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factors of success for the sustainability of a village [6], but it is at the start of the project not specified what these fundamental factors of success are or mean. In good cooperation the team of social scientists started the quest how to deal with this assignment. The 'comfortable' way of working for social scientists is to do in-depth research and explore possibilities from within the process. But the project is challenged by different levels of complexity, such as an ill-defined character of the goal, a fuzzy process and a bi-national approach. Witnessing these struggles as a design team, we felt a designerly approach might offer a way forward, although we weren't quite sure how and to what extend this could work.

The KRAKE DNA project offered us the opportunity to explore this approach in a social science research project. The typical project approach for designers is quite different from other disciplines [5]. The social scientists in this project tend to work top-down and are very good at organizing data collection, but new to working with prototypes and creative tools to explore the aspired outcomes of a project. For us as designers it is quite common to work cross-disciplinary, but it was new to look at the 'design artefacts' [1] created in the project as boundary objects that served as a catalyst on a process level. By using a design approach and boundary objects to stimulate conversation and book progress, the project shifted from a focus on datamining to a focus on the entrepreneurial villagers. In this paper we explore the mutual learning that took place and how prototypes as boundary objects supported this transformation.

2 1:10:100 Approach

The goal to develop a (digital) tool to map the DNA of villages in the border region, without having a clear definition of DNA, can be seen as fuzzy, as well as open-ended. We therefore considered KRAKE DNA to be an Opportunity Oriented Design [6] project, and as such we adopted the 1:10:100 approach [13]. The 1:10:100 approach uses traditional design phases, such as: research, specification, ideation, prototyping and evaluation, but it consists of three design cycles with an increasing time effort. The numbers in 1:10:100 suggest approximately the number of days one should take to go through a cycle.

During the 1-phase, you will have one day to deliver a design and prototype, the 10 phase takes 10 days and the 100 phase, about three months [5]. According to Van Turnhout et al. one can adapt the project phasing of 1:10:100 quite freely to ones needs: "In practice the actual number and length of iterations differs from project to project; the 1:10:100 ratio indicates planned upscaling of time and effort in three or more stages." [13]. Important to Van Turnhout's perception of 1:10:100 is the Quality Review Board (QRB). This QRB is an evaluation session, with (most of) the stakeholders, -led by a designer- that evaluates each time a new design proposition and sets a collective focus for the next iteration. When a QRB session is done in the right way, a lot of information has been revealed through and for the stakeholders, which lines them up (again).

2.1 1:10:100 Approach in KRAKE

In KRAKE the various project partners collaborated from different professional cultures, which brought an extra challenges to the project, because every partner tends to work preferably along work practices of its own profession. We, as designers, like to start a project with defining the goal and create a set of design guidelines that help us getting there. Due to the complexity of this specific project, and the ill-defined goal, the 1-phase with accompanying QRB session has been repeated for five times over the period of half a year. Each time new insights were discovered that sharpened the focus and created coherence in the project approach between the project partners. Initially this was a data-driven project, but during this phase we managed to shift to a focus on end users.

In the following 10-phase, the stakeholders were involved in the user centered design tools like cultural probes and co-creation to create engagement with the user's needs. In cooperation with the villagers the fundamental factors of success for a village became concrete, like for example, the organizing of a successful event or the need to share good ideas.

Finally, during the 100-phase, the product was developed on a detailed level in close cooperation with the project partners, working from the design guidelines as set during the first phases.

During the 1-phase, we used prototypes to define the goal and design guidelines. Each 1-phase with QRB session, a different prototype (design artefact) was delivered to make ideas tangible or to visualize the focus that had been set during the previous session. These prototypes fulfilled multiple roles, of which we see their function as boundary object [12] as the most important.

3 Boundary Objects

The term boundary objects was introduced in 1989 by Star and Giesemer, who described their findings about specific artifacts that serve as bridges between various cultures. According to Susan Leigh Star, boundary objects mediate between several (research) cultures, because of their 'interpretive flexibility'. The same object (that people can act toward and with) is flexible enough to be experienced and interpreted in different ways by different communities or persons, yet structured enough to maintain a common identity [11].

In addition, we use the study of Akkerman and Bakker [1], who look at the learning mechanisms that can take place at boundaries. Their study makes it explicit in what way boundary objects carry learning potentials and they reveal four mechanisms of learning (identification, coordination, reflection and transformation), in which we recognize reflection and transformation. Reflection enables the different cultures to look through each other's eyes and transformation can be found when the cultures 'clash' and recognize the shared problem space together. A new opportunity might arise from here [1].

The role of prototypes as a form of boundary objects in product development was explicitly studied by Carlile [3] and he defined their ability to 'represent, learn about,

and transform knowledge to resolve the consequences that exist at a given boundary'. He mentions three characteristics that identify a boundary object as useful in joint problem solving. First, the boundary object facilitates a shared language for each to represent their knowledge. Second, the boundary object offers a concrete means that can be used to reflect upon strengths and weaknesses. And thirdly, the boundary object facilitates common ground to individuals, so that they can 'jointly transform their knowledge' [3].

Considering the theory about boundary objects, we review our project and recognize the 'representation, learning and transformation' [3] by prototypes in the project, as well as the learning mechanisms [4] reflection and transformation. We describe our case study based on these observations and learnings.

4 Case Study KRAKE DNA

When we -as a design team- entered the KRAKE project, the social scientists were struggling in the project due to privacy and cooperation difficulties that arose when collecting data in the villages. The team had to deal with two cultures who brought different views on the use of data. The idea to work towards a big data community was an idea from the scientists and wasn't supported by the community itself. Also the scientists were confronted with a 'boundary' between the German and Dutch culture around privacy and legislation, which made it difficult to create a coherent goal for the project.

This was the situation when the design team stepped in. We proposed to use the 1:10:100 approach [13], in which we planned to do five 1-phases (of one day each) spread out over approximately 6 months. Since the project was complex and ill-defined, the 1-phase was used to set a clear goal that every partner could relate to. Because of the many difficulties and diverging opinions it was necessary to apply multiple cycles of proposing a design prototype and reflecting on it. There was a lot to learn and hear from each other, before the focus became coherent.

At first, the social scientists were somewhat surprised and skeptical about our proposed approach to repeat the 1-phase five times. For them it felt unnatural to start 'designing' before they had a firm hold on the project and our proposal to 'redo' the design several times felt inefficient and wasteful.

However, this feeling quickly disappeared when it turned out that discussing the prototypes had benefits for the internal discussion about the DNA project among the social scientists and created new 'playground' to work with. Reflecting on the process we took interviews with the project partners and distinguished three main advantages of using a provotyping [8] approach such as in 1:10:100, matching the three characteristics of boundary objects that Carlile described [3].

4.1 Boundary Objects to Create Common Ground

Common ground plays a central role in almost any conversation [4]. Being able to discuss about concrete prototypes provides such common ground. The five 1-phases that were carried out, all consisted of a QRB session in which we presented a new

prototype. This prototype fed the conversation and was discussed with social scientists of both sides of the border. Each paper prototype presents a design proposal, based on previous ideas and outcomes. And because the prototypes represent the DNA tool, it acted as shared reference point for the project partners to talk about. This caused cohesion and enabled them to talk and discuss starting on common ground. Even a plain prototype functions as a conversation piece by laying on the table as a tangible idea. As Koskinen et al., put it: "The props are simple, but they generate a genuine feeling of excitement when they are used" [9].

Before the 1-phase there was a boundary between the Dutch and German team and the designers. By using our ability to turn the research and ideas of the socials scientists into a prototype, we managed to create reference points that all project partners could relate to. Knowledge of the social scientists was combined with design skills and in this way a translation of both perspectives into a prototype created a common ground to build upon. It facilitated a joint focus that was strong enough to overcome difficulties that existed in the beginning of the project. At first, the discussion focused on the proposed product, but quickly shifted towards the underlying issues such as the purpose, vision and the goal of the project. In this way the design proposal as boundary object also created common ground for the project on a process level.

"The 1:10:100 approach added value. […] It provided structure and worked as professional counseling you could say." (Social scientist A)

4.2 Boundary Objects to Sharpen (Project) Focus

Secondly, prototypes forced the project partners to think beyond abstract ideas, because it is necessary to oversee concrete implications when discussing a project-outcome in a tangible form. This urged the project partners to explore their ideas and raise relevant questions about what they were doing. To enable this, the prototypes were designed for the purpose of conversation piece and as a means to reflect or provoke instead of functioning purely as a design proposal. This created a discussion that went beyond a product idea, but also sharpened the focus on a project and process level.

"The 1:10:100 approach sharpened our focus. Several possibilities became clear and it strengthened us in what we were doing. […] Also it became a necessity to communicate our message simple and explicit, because we saw the translation from the image in our head to the prototype that was shown. It appeared that we were not overthinking everything. The 1-phase showed us we needed a clear focus: what are we doing? For whom are we doing it?…the prototypes forced us to make choices and focus." (Social scientist B)

For example, during the first rounds of prototypes in the 1-phase, it was unclear where the project would head to. The goal was ill-defined and the general assumption was to use the data in the tool to create a database for the villagers. By creating prototypes relating to these ideas, the social scientists were urged to think about the true purpose and define the goal more focused. This led to a shifted focus from the data interest towards an interest in the users and creating a tool with added value for the villagers. It became a chance to highlight the entrepreneurship of the villagers and the valuable qualities and innovations in communities that truly formulated the fundamental factors of success for the sustainability of a village. Having a shared focus and

common goal bridged all gaps between professions and cultures and created an acceleration in the process and helped defining a clear goal.

4.3 Boundary Objects as Window into the Future

Koskinen et al. suggests that design artefacts can operate as window into the future: "Design things are colorful, playful, and usually projective: they illustrate future possibilities" [9]. This is a third role the prototypes performed.

> *"The five 1-phases were useful, because everyone showed new insights and discussed different functionalities. Potentials became clear." (Social scientist A)*

The reflective value of being confronted with a design that is created out of vague ideas brings a lot of knowledge and communication on the radar of the project partners. When confronted with a prototype, the social scientist Shifted from a research towards a user perspective. Would it be accepted? Resonate? What would be the experience of the user?

'Taking another perspective is a way to begin to see things in a different light' [1]. When this knowledge is shared in a safe atmosphere [13], this enables everyone to communicate freely about the project and it allows to exchange ideas and knowledge, strengths and weaknesses in the process instead of through negative or personal discussions in the 'abstract'.

By experiencing a 'future design' it is possible to "spot problems and identify opportunities" in shared understanding [9].

> *"The approach brought focus and raised new questions that we weren't aware of." (Social scientist A)*

5 Discussion

This case study focusses on to what level design artifacts (prototypes) can function as boundary objects to structure a process and align project partners in working towards a clear goal.

The first challenge at the start of the project was the ill-defined character and the diversity in project partners involved with different professional and cultural backgrounds. The fuzzy process made it hard to proceed and to formulate a clear goal that was supported by all project partners.

Furthermore, the villagers – and end users of the DNA tool- were not willing to provide the scientists with data, because they were concerned with privacy issues. For the scientists, who proceed in the project by collecting data, this caused the process to get stuck.

The design approach in this project was 'the social act of drawing things together' [8]. Although the 1:10:100 approach of the designers was received with some hesitation, it soon proved its qualities. The five 1-phase sessions brought new insights to the project for all partners, because the design proposals that were shown as paper prototypes were reflective and created common ground to talk from. The prototypes

bridged cultural and professional backgrounds, by showing a concrete proposal that was used as conversation piece. This led to a sharpened focus.

Furthermore the prototypes served as window to the future and created awareness for the needs of the users. With this insight the privacy issues that caused the research problems in the beginning, became irrelevant because the in-depth research of the social scientists shifted from data driven towards user centered; the user became the focus instead of the obstacle in the research. By triggering the users to share their successes and beliefs, concerns about privacy were replaced with proudness and willingness to share. The transformational process that took place as a learning mechanism [1] shifted the project focus towards an engaging community tool, that was supported by all project partners.

We found, when different cultures work together, prototypes can act as boundary objects and bridge cultural gaps by materializing and concretizing data in a way it is still open for interpretation, but also structured enough to provide a common identity [11].

For educators it might be interesting to introduce design methods into the world of social sciences to encourage cross-boundary working and learning. Turning data into valuable content is impossible without pushing boundaries and prototypes function as boundary objects that are perfect means to bridge gaps. This case study provides a good example of how to use boundary objects to do so and stresses the need for culture and discipline transcending projects and the need for a bridge to succeed a project. Design tools (such as prototypes) provide a good and useful basis for this.

The reflection made the project partners looking at the prototypes as users, which made the usability aspects and added value for the villagers much more obvious. In this way the project focus was sharpened further each iteration and whereby the assignment for a DNA tool initially was seen as a database, it finally became a useful instrument made by and for villagers to show their entrepreneurship with.

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