VALUE EXPRESSION IN DESIGN SCIENCE RESEARCH

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Abstract

Design science research has grown into a major research approach in Information System (IS), but there is a need for more fundamental thinking about what designing actually is and about the informational and communicative aspects of design.This paper explores an alternative framework called transformational design research (TDR), inspired by Rosenstock-Huessy's view on language. The focus is on the modelling of values, with a particular interst in values that are embedded in the technology, in line with the value-sensitive design approach. We argue that current stakeholder analysis models are too much influenced by traditional Requirements Engineerg methods, and propose a new value expression approach that builds on and extends traditional value modelling.

Keywords: Design science, value modelling, value-sensitive design

1 Introduction

In their seminal article, Hevner et al (2004) argued for a full recognition of "design science research" (DSR) in IS. In their view, the goal of behavioral science research is truth, while the goal of design science research is utility, so, although they are related, one cannot be reduced to the other. The core of DSR is summarized as "build and evaluate" a well-described artifact. In my view, the discussion about design science research in IS so far has two major shortcomings. First of all, the DSR formulations such as Hevner (2004), but also more elaborate ones such as Wieringa (2014) suffer from a positivist "Cartesian" world view. There is an urgent need to enrich the DSR discussion with alternative world views, such as pragmatism (Goldkuhl, 2004), Heidegger's phenomenology and sociomateriality The approach that I am developing is called Transformational Design Research.This paper provides a brief introduction into TDR and then focuses on the value modelling component. After a comparison between traditional stakeholder analysis approaches on the one hand and value-sensitive design methods on the other, a proposal is made for a *value expression model,* that builds on value modelling

2 Transformational Design Science Research

In (Rosenstock-Huessy, 1970), essential language is positioned in the "cross of reality", consisting of an axis of time (from past to future) and an axis of space (from inner world to outer world):

- When we speak we are connected to the past and the history of mankind because we try to use the *right* words
- At the same time, we look forward to the future by giving a *creative response* to the legacy of the past

- We *express* our inner world - not just putting thoughts into words, but expressing and completing our inner world as we talk
- We *clarify* the outer world as it appears to our senses

On the basis of the linguistic character of design (Weigand, 2010), it makes sense to see design as a special case of speech in the Rosenstock sense. Designing is then something that stands at the center of a cross of reality and inherits the creative and dynamic character of speech. Fig. 2 puts design in the center of the cross of reality. Because of our focus on technical design in a social context, the inner world takes the form here of the tacit social world (rather than the individual subject world), and the outer world takes the form of the technical world (rather than the physical object world).

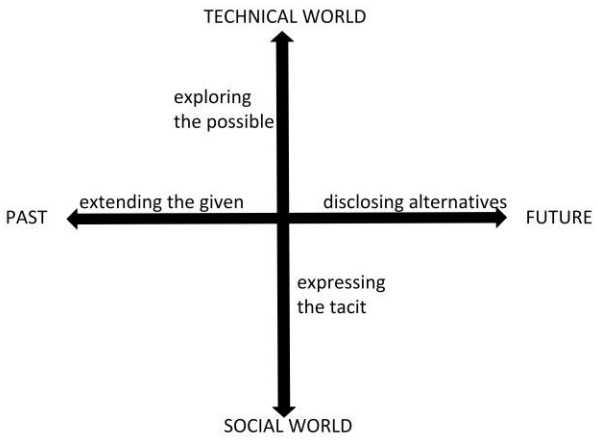

Fig 1 Transformational design research (TDR) – a four world perspective

Designing from a transformational point of view means:

- **Extending the given**. Design typically (not always) starts in a problem situation, with its legacy, running practices etc. and with users and designers all bound by prejudices; also with a time pressure. The given cannot be simply replaced, but it can be transformed. It is important to point out that design is positioned *in time* and that in the concrete historical reality, the subject and the object, or the social and the material, do not exist independently, but are interwoven in many ways.
- **Disclosing alternatives**. The result of a transformation of the current situation (the past) is a new situation, the ”to be” state. Designing implies looking forward and therefore disclosing a new world, or, better said, new worlds, because the future is not fixed and there are always alternatives from which a choice has to be made. Disclosure of new possibilities that contrast with actual conditions is, according to Dewey, the most penetrating ”criticism” that can be made (Dewey, 1987:349). This makes design more than ”solving a problem”. At this point, the TDR approach sides with the pragmatist concern with social progress and distances itself from the extremely past-oriented view of Heidegger.
- **Exploring the possible**. Designing not only transforms the current situation, but also the available technology in the current situation. The designer eagerly wants to *find out what is possible* (but not yet realized). The available technology is optimized, combined, translated from one field to another, specialized etc, to arrive at something that was not possible before.
- **Expressing the tacit**. An often neglected dimension is the transformation of the social world. Designing involves expressing the tacit/implicit, from the personal but more

in general, from the social life. This transformation implies a growth in self-understanding, but also a rationalization (Habermas, 1984). Implicit norms become explicit rules. Values get embodied in tools (Friedman, 2008).

The TDR model in Fig. 1 depicts the four dimensions of design. What does that mean for the actual design activities? Fig. 2 depicts a micro-perspective with four concrete activities. First of all, *formulating* the problem. Behind the manifest problem, usually two root problematics can be distinguished: technical (the technology is not performing as it should) and social (e.g. established interests). These root problematics are often unaddressed in the designing sec, but do constitute the background – together with the given constraints, such as legal and economic constraints. Secondly, *setting* an objective, which is not about what is built, but addresses the ”why?” or ”what for” question in terms of effects. At design time, these are intended effects. At evaluation time, these become hypotheses to be tested. It may include describing alternative ”to be states”, identifying criteria for evaluation and comparison and selecting. The artefact embodies values. *Expressing* the values, of various stakeholders, is therefore a necessary step. Of course, the problem situation will already include explicit norms and values, but these are never completely fixed and always need to be reconfirmed. Expressing the stakes is not easy; there may be resistance: powers may want to hide themselves, rationalization may be felt as dehumanizing. We recall that expression is more than translating thinking into words. Rosenstock talks about expressing *and completing*. The explicit rule differs from the implicit norm, even if their propositional content is the same.

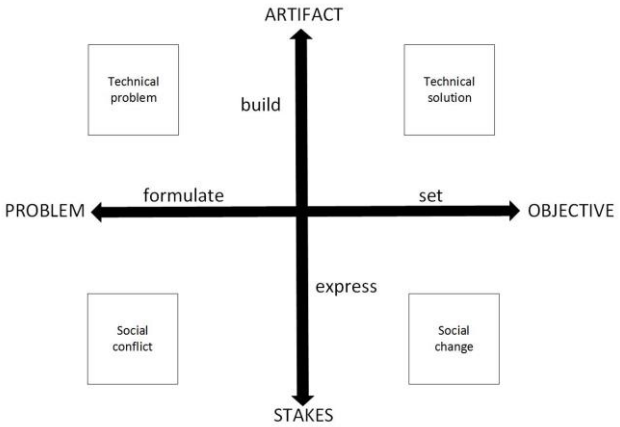

Fig. 2 – Transformational Design Science Research – micro perspective

3 Literature review

The social aspect of Design Science Research is typically couched in terms of stakeholder analysis. In this literature review, we first consider the traditional IS development approach and then the value-sensititve design tradition in the philosophy of technology that so far has not received much attention in the DSR field.

3.1 Stakeholders Analysis in IS development literature

In the traditional Software Engineering literature, stakeholder identification is typically included in the requirements engineering phase. For instance, the Sommerville (2007) handbook describes stakeholders as “a person or group who will be affected by the system, diretly or indirectly”. It immediately adds that eliciting stakeholder requirements is

difficult, for various reasons, the first one being that "stakeholders often don't know what they want from the computer system", and another one conflicting requirements from different stakeholders. Both are not surprising in the TDR famework that, in contrast to the positivist worldview, makes a distinction between the implicit and the explicit, and that views conflicts in the social world as the rule rather than the exeption. Alexander (ref) provided a checklist for stakeholder identification, including direct ones, like end users and support staff, but also indirect ones, who can be both positively and negatively involved, and agents that are involved in the development process.

In the IS Design Theory of Walls et al (1992), a design science research project is similar to a normal software development project, but focused on a group of problems or cases, rather than one particular case or company, and requirement collection becomes meta-requirement collection. This kind of stakeholder analysis has found its way into the DSR literature, such as Wieringa (2013). It does not make the Walls distinction between requirements and meta-requirements and allows a stakeholder to be an individual company.

The goal of stakeholder analysis, in this field, is to collect requirements in order to, in the end, produce useful knowledge. The artefact that is built should meet the *interests* of individuals or groups. Another closely related but distinct goal is stakeholder *participation*.

3.2 Value-sensitive design

In the field of technology research, the role of values has received a lot of attention. In engineering, there is always the hope that when the product is used it will benefit some stakeholders in the domain. A more difficult question is whether these values do exist only in the application context and play a role in the evaluation of the artefact, or whether they also play a role in the design. Are technological objects neutral in themselves, or can artefacts embody values? Friedman (2008), Van den Hoven (2007) among others, have argued for value-sensitive design that aims at integrating (ethical) values in a systematic way into the design of technical artefacts. Flanegan (2008), for instance, described a case of game design based on the value of gender equity. Latour makes the point, on a more philosophical level, that "technology is society made durable": we delegate ethical rules to objects, for instance, with speed bumps that make cars drive slowly in living areas. Although it is too strong a statement that technology always incorporates values, it has been argued convincingly that in many cases it does (Van der Poel & Kroes, 2014). Several tools have been developed to support value-sensitive design, such as value hierarchies (Van der Poel, 2013) that roughly distinguish a top level of values, a bottom level of design requirements, and an intermediate level of norms (in the sense of rules for action, that may include goals and constraints). The relationship between the levels is not one of deduction or specialization, but a "for the sake of" relationship.

One value-sensitive design approach that needs to be mentioned in particular is based on the capability approach (CA) developed by Amartya Sen and Martha Nussbaum. Human capabilities are described as the real opportunities or positive freedoms for a person to do and be what he/she has reason to value. It makes sense to suppose that there is a close link between the nature of technical artifacts and their capabilities, as this is what technical artefacts do: enable people to do things that they could not do or less well without the artefact, whether it is traveling by plane, processing information, heart surgery, or whatever. So a CA perspective on DSR in general and the value modeling in particular, is interesting (Oosterlaken, 2009), and urges the designer/researcher to not only list ethical values but to relate these to the concrete increase in capabilities of the users, and so to identify these capabilities to be expanded in the first place.

4 Value Expression in TDR - a proposal

How can we express values in TDR? By that we mean modelling values as part of a process by which stakeholder (implicit) aspired values and societal values in general are identified, analysed and translated into design requirements. We want to include ethical values, as in value-sensitive design, but also the instrumental value, in an integrated framework.

Value modelling, such as Value Encounter Modeling, can be a useful tool. The advantage of value modelling is that it views users aspired values not in isolation ("I want anonymity"), but as part of an social-economic context. Important elements of the model are:

- *Agents* – TDR (like pragmatism in general) states that human agency is key. Artefacts are used by agents in order to bring about changes. Agency is assumed in design of tools and in the use of tools, both having a transforming effect (on a different scale). Values are realized in actions.
- *Capabilities* – Aspired user values must be linked to capabilities and resources that these users/agents have. Cf. the definition of value objects in e3value and c3value (Weigand et al, 2018; Weigand et al, 2006; Weigand et al, 2007).
- *Value objects* - Design artefacts correspond to value objects. Artefacts are provided by agents and have impact on capabilities of other agents. Often the value realization is a form of co-creation. For instance, a television is an artefact whose value realization depends on the consumer/TV watcher, the television manufacturer, the network provider and media companies. An important distinction must be made between first-order and second-order values or qualities (Weigand et al, 2007).
- *Reciprocity* – taking a social and economic perspective, rather than an individual focus, also recognizes that value exchanges require a certain level of reciprocity. The market *price* is almost always relevant for an artefact, but the value exchanges and their network are usually much more complex than product for price.
- *Fairness*- the value network is only sustainable when all agents can survive. In addition, fairness in the distribution of the benefits is a key social value. Conflicts that often exist between stakeholder goals, according to the Requirement Engineering literature, must be traced back to social conflicts, which are typically a problem of fairness.

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