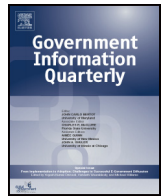




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E-government design research: Towards the policy-ingrained IT artifact

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ABSTRACT

This paper investigates whether design research in e-government should be conducted in some special way compared with standard models for design research. It reviews literature in e-government and design research in order to generate an answer to this research question. The result of this review affirms that the policy character of e-government should determine the way that such design research is conducted. A tentative e-government design research model, consisting of different activities is formulated. This model consists of the following activities: theorizing, policy analysis, workpractice analysis, co-design and co-evaluation of IT artifact and workpractice. Three specific e-government design research principles are formulated: The policy principle, the co-design principle and the theorizing principle. One important result from this paper is the formulation of the concept of the policy-ingrained artifact as an important empirical outcome from e-government design research. A design research case study on social welfare allowances has been used for the generation as well as the validation of the proposed e-government design research model.

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1. Introduction: background, purpose and procedure

Design research has gained a great popularity in many fields of information system (IS). This kind of research is distinguished from classical research of descriptive and explanatory character. Design research is featured by its orientation to the design and creation of new artifacts (Simon, 1996; Hevner, March, Park, & Ram, 2004). E-government (public sector ICT) is one field with a growing interest for design research. However, most research in e-government seems to be about “what is”, i.e. studies of existing states of IS in public administration. Examples of this are broad comparative studies; evaluations of e-government systems; evaluations of e-government programs and also analyses of regulations and policies. There does not yet seem to exist a large body of research in e-government with a distinct design orientation. There may be obstacles from public administrations to let researchers participate in design processes of egov systems. There might also be the case that egov researchers have little knowledge about and experience from design research. General introductions to DR (e.g. Hevner et al., 2004; Peffers, Tuunanen, Rothenberger, & Chatterjee, 2007) do not state anything specific about how to apply DR in e-government.

This paper is based on the interest to enhance design research in e-government. A key assumption is that there is a great potential of design research in e-government just as it is in other IS fields of application. The initial inquiry stance was that there might be a knowledge need to promote DR in e-government. Hence, the main purpose of this paper is to

investigate design research in e-government. A number of closely related research questions follow from this purpose: Should e-government design research be conducted in some special way or can it apply to general models of IS design research? Are there certain reasons for a special way to conduct DR in egov research? In what ways can e-government DR be said to differ from general IS DR?

These questions have been addressed through a *design oriented approach*. A model of e-government design research will be presented (below in Section 4) as a response to the stated research questions. The creation of this model is based on the following activities:

- An investigation of models and concepts in general design research (Section 2.1)
- A clarification of distinctive features of egov research (Section 2.2)
- A review of extant egov design research (Section 2.3)
- An investigation of a conducted egov design research case (Section 3)

The e-government design research model, which is presented in this paper, is thus based on 1) knowledge about DR, 2) knowledge about egov and 3) knowledge about the intersection of DR and egov. This last issue is addressed through both theoretical studies (literature review) and the author's own empirical work. The author has extensive experiences of egov DR. One case is brought into this paper as an empirical example of egov DR (a case concerning social welfare allowances). This case has the double functions of being 1) an inspirational and generative base and 2) a validation example for the egov DR model. As a complement to this, an investigation of four published egov DR case

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studies have been conducted in order to assess the EgovDR model's usefulness.

The main idea of this paper is therefore to investigate e-government design research as a sub-class of the general class design research. The attempt to clarify features of this sub-class will lead to a specification of those features that are distinctive in relation to the super-class and other sub-classes. However, this inquiry might also lead to an articulation of features that are valid for the super-class (general DR) and possibly also for other sub-classes. A clarification of features that are seen as valid for the super-class design research is a by-product of this inquiry and it is beyond the scope of this paper to make a sharp differentiation between the distinctive and the general features of e-government design research. The message of the paper is that there are some distinct features that call for a special treatment of design research in e-government.

2. Prior research - overview

2.1. Design research

Design research has been contrasted to behavioral research (Hevner et al., 2004). Behavioral research is explanation-oriented research aiming to describe “what is”. This can include predictions, but these are purely based on explanations about what is. Predictions are about “what will be” based on what we know about the circumstances at state. Behavioral research has its roots in traditional natural and social science, while design research has its roots in engineering research and is based on the dichotomy of the science of the natural vs. the science of the artificial (Simon, 1996). Design research is concerned with the creation of something possible; “what might be” or “what ought to be”. It investigates and creates new artifacts. This is done in order to explore and demonstrate the *possibilities of new artifacts*.

During the last two decades there has been an articulation and application of a design-oriented research paradigm for IS research under labels such as development research, design research, design science and design science research (e.g. Nunamaker, Chen, & Purdin, 1991; March & Smith, 1995; Hevner et al., 2004; Hevner & Chatterjee, 2010). Even if this way of researching has a long tradition in IS, there seems to be a shift in acceptance and legitimacy after the articulation of the design research foundations mentioned above (ibid). Design research means research through design. It is not only research about design. DR means scholarly work through the conduct of design. New knowledge is created through designing new artifacts. This includes the generation of *prescriptive knowledge* for how to design something. Such knowledge is sometimes given the label design theory (Gregor & Jones, 2007). As indicated above, there is some confusion and controversy how to label this kind of design oriented research. I will use the term design research throughout this paper.

In the seminal work of Hevner et al. (2004) a framework for design research in IS has been presented that also includes seven guidelines. DR is meant to contribute to both practical needs and to the knowledge base of science. The design of a new artifact through DR is made as a response to business needs in the practice environment and it is also based on the application of knowledge derived from the scientific knowledge base. The core of design research is described as a *build – evaluate cycle*. An artifact is designed through a series of build and evaluate iterations.

Peffer et al. (2008) have presented a process model for design research. This model is based on a synthesis of several other process proposals. The suggested DR process consists of six subsequent activities: 1) problem identification and motivation, 2) define the objectives for a solution, 3) design and development, 4) demonstration, 5) evaluation and 6) communication. This six-stage process model expands the build – evaluate cycle of Hevner et al. (2004). Two initial activities are placed before any build/design occurs; the identification of problems in practice and the definition of objectives for the solution. Demonstration

means to test the proposed artifact in some setting and this activity is inserted between build/develop and evaluate. A final activity consisting of communication to researchers and other audiences has also been added.

Another DR process model has been suggested by Sein, Henfridsson, Puro, Rossi, and Lindgren (2011). They have developed an approach that integrates design research and action research under the label of action design research (ADR). Their purpose has been to broaden DR from narrow techno-centric views. They present a four stage model: 1) problem formulation, 2) building, intervention and evaluation, 3) reflection and learning and 4) formalization of learning. This process model can thus be seen as a synthesis of DR models and action research models (as e.g. Susman & Evered, 1978; Davison, Martinsons, & Kock, 2004). One key principle in ADR is the “*theory-ingrained artifact*”. Sein et al. (2011) emphasize that DR should be theory-informed. This means that the built artifact should incorporate certain characteristics that are based on theories, which have informed the design process. One important influence from action research is the emphasis on reflection and learning. Sein et al. (2011) also stress the importance of generalized outcomes in terms of design principles. This is done in contrast to the work of Hevner et al. (2004) who are somewhat reluctant to include theoretical results from DR. In the view of Hevner et al., the main outcome from design research is the IT artifact; “the result of design-science research in IS is, by definition, a purposeful IT artifact created to address an important organizational problem” (ibid p 82). This can also be said to be one way to follow the call for more emphasis on the IT artifact as expressed by Orlikowski and Iacono (2001). As described by these authors (ibid), there can be different views of the IT artifact; more narrow techno-centric views (like a computational view) and broader, more socially sensitive views (like the “ensemble view”). More will be said on these issues below.

In the writings of e.g. Hevner et al. (2004) and Peffer et al. (2008), design research has an emphasis on the concrete design process. There are several scholars who have argued for a more explicit *theorizing* activity within DR; e.g. Venable (2006); Goldkuhl and Lind (2010); Lee, Pries-Heje, Baskerville, and Jain (2011); Kuechler and Vaishnavi (2012) and Winter (2014). It is, however, not only the case that the *design process* should be *theory-informed*. The DR process should include theorizing in order to create *theoretical outcomes*. In the ADR process model (Sein et al., 2011), the activities of reflection and learning indicate the importance of abstraction and theorizing. In the model of Peffer et al. (2008) it is only “communication” that indicates this kind of abstraction. In contrast to these more linear models, two-layered frameworks have been presented by Goldkuhl and Lind (2010) and Lee et al. (2011), distinguishing the concrete design process from theorizing activities. Inspired by these scholars such a two-layered design research model is depicted in Fig. 1.

In the ADR approach to design research, Sein et al. (2011) argue for a broader perspective on the IT artifact based on the *ensemble view* of Orlikowski and Iacono (2001). In such a view, the IT artifact is seen as 1) embedded in a social context and 2) as a carrier of its social context (ibid; Goldkuhl, 2013). The artifact is seen as a carrier of institutional elements derived from its social context.

2.2. Salient features of e-government

In order to investigate the grounds for a specific e-government design research approach it is necessary to identify salient features of e-government. The research area of e-government is here conceived of as an intersection of information systems and public administration (Heeks & Bailur, 2007; Scholl, 2006).

I will take the e-government evolution model of Janowski (2015) as a vantage point for this discussion. This is not primarily for its discussion of different evolutionary levels, but rather its attempt to identify key characteristics of egov as driving forces for the evolution; cf. also similar discussions in Belanger and Hiller (2006) and Beynon-Davies (2007).

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