ACTION RESEARCH VS. DESIGN RESEARCH: USING PRACTICE RESEARCH AS A LENS FOR COMPARISON AND INTEGRATION

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Accepted to the SIG Prag Workshop on IT Artefact Design & Workpractice Improvement, 5 June, 2013, Tilburg, the Netherlands

Abstract

Action research and design research are two prominent research approaches in information systems. These two research approach have been claimed to be similar according to several conducted comparisons. There are, however, other claims that they are decisively dissimilar. Some scholars have proposed integrations of these two research approaches, which however show great diversity. These diversities in views of similarities, differences and integration possibilities are the main impetus for this work. This conceptual inquiry takes a new angle in comparing and integrating action research and design research. It uses a third position, the research approach of practice research as a yardstick and integration instrument. Action research and design research are studied and compared using practice research. This comparison has been driven further to a proposed integration within the conceptualisation of practice research. An integrated model of action research and design research is presented and given the label practice research through intervention and design (PR-ID).

Keywords: Information systems, action research, design research, practice research, research approach, pragmatism.

1 Introduction

Action research (AR) and design research (DR) are two research approaches in information systems (IS) with a great interest from scholars in the field. AR has had a growing interest for many years and it has gained more legitimacy within IS based on important compilations (Kock & Lau, 2001; Baskerville & Myers, 2004; Kock, 2006). However, the articulations of design research in IS (e.g. March & Smith, 1995; Hevner et al, 2004) has brought another research approach of similar character to IS scholars' research tool box. In one sense, AR has obtained a competitor in DR. There is a growing interest in DR now and perhaps a declining one in AR.

There are many scholars who acknowledge similarities but also differences between AR and DR. IS researchers who are interested to work with improvement and change may be confronted with a choice situation: To choose between AR and DR or perhaps to choose to use them in some combination. There has been a discourse within IS about similarities and differences between AR and DR for quite some time. Parts of this discourse will be referenced in section 3 below. Just a few remarks will be made here in the introduction. There are papers which acknowledge a great resemblance between AR and DR (e.g. Cole et al, 2005; Järvinen, 2007). There are other opinions stating that the approaches are decisively dissimilar (Iivari & Venable, 2009). There exist also contributions where the two research approaches have been integrated into one single coherent approach (Lee, 2007; Baskerville et al, 2009; Sein et al, 2011; Wieringa & Morali, 2012). These integrations show however great diversity. The different comparisons and integrations have brought important light to the AR vs. DR discourse. Is there really more to say? Yes, there is! The contradictory views are in themselves an argument for further discourse. There are also room for new angles in these kinds of comparisons and integrations.

There exist paradigmatic comparisons between the two (e.g. Cole et al, 2005; Iivari & Venable, 2009). There are also comparisons made based on process descriptions of the two approaches (e.g Järvinen, 2007). There seems, however, to be something problematic in such process analyses, since there exist many different process descriptions of the two approaches. There are abstract comparisons made (e.g. Järvinen, 2007; Iivari & Venable, 2009) and there are comparisons that are based on empirical examples (e.g. Cole et al, 2005; Papas et al, 2012). An interesting comparative review is made by Cole et al (2005). They make a cross-criteria analysis of the two research approaches. This means that they have used criteria from DR to look on a typical AR case and AR criteria to look on a typical DR case. It is obvious that this task of comparing AR and DR is challenging. There exist many different descriptions of the approaches and also many different interpretations of them. There is more to say and also a need for a new angle in this comparative endeavour.

The angle taken in this paper is to use a third research approach as a fixed basis for comparing them. Such a third position may contribute to clearer views of each approach and also how they relate to each other. The third position chosen is practice research (PR) as this approach is described by Goldkuhl (2011; 2012a). PR is described as an encompassing research approach that may comprise AR and DR and possibly also other approaches. This makes it an appropriate candidate. PR will be described in section 2 below. A comparison will then be conducted in three steps. First, AR will be analysed from a PR position (section 4). Then, DR will be analysed from a PR position (section 5). Last, the two approaches will be put alongside and looked upon from the perspective of PR (section 6). This will also lead to a proposed integrative approach. The paper does not explicitly use empirical cases as examples of AR and DR. The author has extensive experiences from both approaches and there are cases described elsewhere (Goldkuhl, 2011; 2012b; Goldkuhl & Lind, 2010). These methodological experiences function as a backdrop for the presented analysis. This limitation, to not include empirical examples, is made due to the scope and extent of the paper.

The purpose of this paper is thus to contribute to further investigation of similarities and differences between AR and DR as research approaches in IS. In order to reveal and clarify similarities and differences a common yardstick is adopted for this knowledge creation. Practice research is used as such a common yardstick, which means that more knowledge is created on AR and DR as examples of PR. The paper also produces a new integration of AR and DR based on PR. Sub-purposes are thus to clarify properties of AR and DR in relation PR as a means to bring further light to the comparative review of these approaches. The paper contributes thus with new knowledge on these three research approaches and relations between them. Such contributions are not made for the single sake of comparative knowledge. The ultimate aim is rather to contribute to sharpening the features of these different research approaches in IS research. This can especially be found in the concluding sections (6-7) of the paper.

The rationale for this study is that IS scholars need guidance in choosing between AR and DR and also possible combinations of them. With better comparative knowledge about AR, DR and also PR, scholars can make more informed choices concerning research approaches and thus make their research designs more deliberate.

A terminological note should be made here. Design research has been used as label for this kind of approach. Alternative labels are design science and design science research. The first task in making these two approaches comparable is the use of labels that are equivalent. If we compare a design oriented research approach with action *research*, then the label design *research* should be used. This follows also what was done by Cole et al (2005).

This paper is based on the fundamental assumption that these are two comparable research approaches. There exist arguments that AR and DR are of diverse kinds; that AR is a research method and DR (design science) is a research paradigm (Baskerville, 2008) or a research orientation (Iivari & Venable, 2009). If these two were of diverse kinds and thus not directly comparable, then one can wonder why so much work has been devoted to comparative reviews. I would say that this on-going

discourse shows the importance, adequacy and meaningfulness of such comparative reviews. The discourse will be continued in this paper.

2 Practice research

In several disciplines there is growing interest for practice oriented research approaches with labels such as practice research (Pain 2010; Uggerhøj, 2011; Goldkuhl, 2011), collaborative practice research (Mathiassen, 2002), practice-based research (Epstein, 2002) and practical inquiry (Stevenson, 2005). This can be seen in disciplines such as social work (Pain 2010; Salisbury Forum Group, 2011; Uggerhøj, 2011), nursing (Stevenson, 2005), strategizing (Whittington, 2006) and information systems (Mathiassen, 2002; Goldkuhl, 2011). Different important traits can be found in these practice research approaches. One important claim is that "research also needs to be practice-minded in order to better study and develop knowledge which emerges directly from the complex practices themselves" (Salisbury Forum Group, 2011). The importance of *developing knowledge* firmly *from practice* settings is emphasised by several scholars (e.g. Epstein, 2002; Fook, 2002; Julkunen, 2011; Uggerhøj, 2011). This is also connected to letting the *research interest* be framed by *practical problems*. Uggerhøj (2011 p 8) states that "the research question cannot be generated without connecting it to actual problems in practice". The main purpose of practice research is the *improvement of practice* (Pain 2010; Salisbury Forum Group, 2011). The inquiry and generation of knowledge is usually conducted through a close *collaboration between researchers and practitioners* (Julkunen, 2011; Salisbury Forum Group, 2011). Practice research also means that the empirical field is conceived as practices. This is part of a "practice turn" in science that is advocated for by several scholars; e.g. Schatzki et al, (2001), Pickering (1995), Reckwitz (2002), Miettinen et al (2009), Simpson (2009), and Feldman & Orlikowski (2011). A practice is conceived to be a meaningful whole consisting of human actors (and their shared understanding), purposeful and value-ingrained activities conducted through the use of a practiced language and material objects. The relations between these different practice elements are entangled in complicated ways. To say that the relations are entangled should not be confused with letting such entanglements be a definitive obstacle for a disclosure of logic and meanings of the practice.

Goldkuhl (2011; 2012a) has developed a practice research approach that is claimed to encompass both action research and design research, as well as other related research approaches such as evaluation research. This makes it an appropriate yardstick to use for comparing AR and DR. Practice research consists of several important concepts that will be used below in the analysis and comparison of AR and DR.

The main concepts of PR are described in a structural model (figure 1). PR is divided into two sub-activities: theorizing and situational inquiry. PR has interactive relations with three target practices/communities: General practice, local (operational) practice and research community. The distinction between general practice and local practice is important in practice research. A local practice is addressed (through a situational inquiry) in PR. General practice is not one single practice; it is defined as "a set of different practices with relevant similarities" (Goldkuhl, 2011 p 10).

In PR, knowledge is developed through inquiries into local practices. Problematic situations in local practices drive situational inquiries. Researchers (R) and practitioners (P) collaborate in situational inquiries, which are empirical work (from a research perspective) and developmental work (from a local practice perspective). In PR there is distinction between local practice contributions and general practice contributions. A local practice contribution (LPC) is something that is produced, through a situational inquiry, and is of potential or real value for the local practice. This can be a diagnosis, a design proposal or some implemented change in the local operational practice.

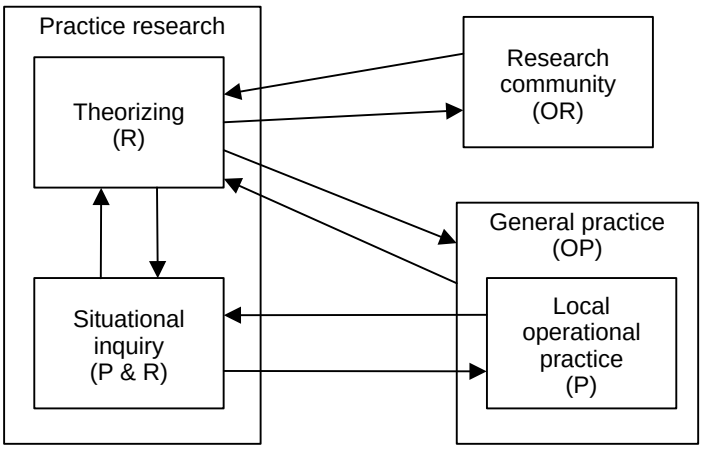

Figure 1. A structural model of practice research (from Goldkuhl, 2011)

The main target group in PR is seen as general practice, i.e. practice communities. The target group is both the practitioners (P) that are members in the addressed local practice and other practitioners (OP) outside this local practice. The main purpose of PR is hence the creation of *abstract* and *useful knowledge* for general practice (Goldkuhl, 2011; Pain, 2010). This knowledge contribution is called general practice contribution (GPC). It is founded on a basic attitude from pragmatism to improve existence through knowledge (Dewey, 1938).

The produced abstract knowledge from theorizing is of course also aimed for research community (i.e. other researchers = OR) as possible additions to the scientific body of knowledge. The research community role has important quality assurance functions through review, dialogue and critique. The research community has also a responsibility for accumulation and dissemination of knowledge.

The sub-activities of practice research (situational inquiry and theorizing) and the three target practices/communities (local practice, general practice and research community) will be used in the analysis of action research and design research below.

More detailed descriptions of this practice research approach can be found in Goldkuhl (2011; 2012a) also including empirical cases of PR. Other applications of this PR approach can be found in Cronholm et al (2011), Nordström & Axelsson (2011), Christiansson & Granström (2012) and Jonsson & Levén (2012).

3 The action research vs. design research discourse

Action research and design research emanate from different scientific traditions. AR emanates from social science. The name and origin are from the social scientist Kurt Lewin (1947), but the main ideas seem to originate from the pragmatists, especially from the notion of inquiry by Dewey (1938). DR emanates from engineering science. Simon (1996) is seen as the main scholar articulating the basic ideas of design research, based on the idea of sciences of the artificial. Both traditions have found their ways into the information systems discipline. As Cole et al (2005) observe, it is notable that important articulations within IS of each approach (e.g. Baskerville, 2001; Hevner et al, 2004) are done without taking into account criteria and models from the other approach. However, since this was written much work has been done to understand the properties of each approach in relation to the other. There exist many publications that try to understand the relations between AR and DR, as Järvinen (2007), Iivari & Venable (2009), Cole et al (2005), Papas et al (2012), Burstein & Gregor (1999), Sein et al (2011), Baskerville et al (2009), Wieringa & Morali (2012), Lee (2007), Alturki et al (2012), Andriessen (2007), van Aken (2004) and Figueiredo & Cunha (2007).

The focus here is on AR and DR in information systems, which mean that I leave out studies of AR and DR in other disciplines, e.g. such studies in management research (van Aken, 2004; Andriessen, 2007). There are actually long traditions in IS research to use AR or DR in studies of information systems development (ISD); Nunamaker et al (1991), Lau (1997), Baskerville & Wood-Harper (1998).

3.1 Comparing action research and design research

There are many scholars who have identified similarities between AR and DR, but there are also examples of the opposite, i.e. identification of decisive differences. Järvinen (2007) finds that AR and DR are similar as research approaches. The analysis is conceptual and he uses no empirical cases as basis for conclusions. The comparison is based on some main sources; for AR it seems to be Susman & Evered (1978) and for DR it seems to be Nunamaker et al (1991), March & Smith (1995) and van Aken (2004). Järvinen has obviously been searching for similarities and he has found several similar traits. Seven fundamental similarities are found. These similar characteristics are described but not explicitly labelled by Järvinen (2007). They are labelled by this author here: 1) striving for utility, 2) production of useful knowledge, 3) combination of building/acting and evaluation, 4) collaboration between researchers and practitioners, 5) aiming for development and improvement, 6) intervention in a local practice and 7) knowledge creation and testing during the process.

Iivari & Venable (2009) are also finding some similarities, but their main message is that these similarities are "superficial" and the two approaches are "decisively dissimilar". They conduct a paradigm analysis of the two research approaches, comparing ontological, epistemological, methodological and ethical assumptions and they find both resemblances and differences. Iivari & Venable (2009) have identified some situations where there is no overlap between an AR endeavour and a DR endeavour: 1) an AR case without any technical design, 2) a DR case with pure technical problem solving and 3) a DR case without any local practice intervention. There are some important assumptions concerning DR which leads to certain differences. DR is assumed, as its major research contribution, to aim for "new means for achieving some general (unsituated) goal". To put it in PR terms, this means to strive for a general practice contribution and not for any local practice contribution. They also assume that DR demands innovation and novel technology, where AR should go more in the direction of "normal design practice". This may imply practical problems to combine AR and DR according to their views. DR is aiming for cutting-edge technology, while a typical AR intervention would rather demand safe solutions based on robust technology.

The comparison study by Cole et al (2005) is quite a contrast to Iivari & Venable (2009). The main message of Cole et al (2005) is that there are great similarities and that there are good reasons for combining the two approaches. They base this conclusion on a cross-criteria analysis. They have adopted DR criteria (from Hevner et al, 2004) on an AR case and AR criteria (from Davison et al, 2004) on a DR case. A main conclusion is that the cases fulfil criteria from the other research approach. The authors further ground their analysis in a paradigmatic analysis, which also shows differences in relation to the study by Iivari & Venable (2009). Cole et al (2009) posit both AR and DR clearly within pragmatism. They outline also an integrated research approach, since "the process models of both approaches are similar to a degree that we can form a common process model for them" (ibid). This integrated process will be treated together with other AR/DR integrations below (section 3.2).

Papas et al (2012) have made a comparison of AR and DR based on an analysis of an own conducted case study. This case study has been assessed through both AR and DR criteria. They have also conducted a paradigm analysis of the approaches revealing many similarities, but also some differences. Their main conclusion is that it is possible to combine the two approaches and then apply both AR and DR criteria. The authors have also produced a set of reflective questions to ask when considering whether to apply AR and/or DR.

An early study of AR and DR is done by Burstein & Gregor (1999). This is not a proper comparison, but rather an analysis of the two approaches in relation to each other. They have also studied a conducted case that seems to be both AR and DR. They do not apply AR or DR criteria, but rather general scientific criteria. They discuss DR, or in their terms system development (SD) research (based on the terminology from Nunamaker et al, 1991), in information systems in relation to such an approach in computer science. Their conclusions are important for the further discussion: "The iterative nature of SD research, with the intention of generating new knowledge and improving social acceptance of the system under construction, makes it also quite distinct from computer science research where the main purpose is the creation of new methods or programs – not the application of the methods in real-life." (ibid p 127). In PR terms, a DR approach in IS demands a local practice connection.

3.2 Integrating action research and design research

As stated above, several scholars have found important similarities between AR and DR. Based on such conclusions, several integrative approaches combining AR and DR have been created. Already mentioned above (section 3.1), Cole et al (2005) have outlined a combined AR/DR research process. This process consists of four stages: 1) problem identification, 2) intervention, 3) evaluation and 4) reflection and learning. The second stage (intervention) is a combination of action planning and action taking (from AR) and building (from DR).

Three of the authors (Purao, Rossi and Sein) from Cole et al (2005) have taken this provisional approach further together with two other scholars (Henfridsson and Lindgren) and created the Action Design Research (ADR) approach (Sein et al, 2011). The integration of intervention and building is taken further in the ADR approach: Building, intervention and evaluation are treated as integrated in "BIE cycles". This is based on their view of the strong link between the IT artefact and its social context founded in the ensemble view of IT artefacts (Orlikowski & Iacono, 2001). Such a view emphasises that IT artefacts are contextually embedded and emerges through a continual interaction between the artefact and its context. The ADR process starts with problem formulation and it is clear from the description that specific organisational problems are addressed. However, the authors claim the importance of reflection and abstraction through two such stages (reflection and learning; formalization of learning). In an ADR case, there needs to be a move from specific problems and solutions to classes of problems and solutions and further to generation of design principles.

Another integration of AR and DR is made by Baskerville et al (2009) in their "Soft design science methodology". They integrate AR and DR through the use of a well-known AR approach; Soft Systems Methodology – SSM (Checkland, 1981). They adapt here SSM to a DR context. Within this integrated approach, they combine working 1) with specific problems and solutions and 2) with generalized problems and solutions. The problem solving logic is from 1) specific problem via 2) generalized problem and 3) general design requirements and solutions to 4) adaptation of specific solution.

Wieringa & Morali (2012) have presented a combined AR and DR approach called Technical Action Research (TAR). This is defined as a researcher-driven approach based on ideas of idealized design contrary to problem-driven design. TAR is working with two related "engineering cycles" and a complementary empirical research cycle. One engineering cycle is the artefact cycle where a researcher aims at improving a class of problems through artefact design. The other engineering cycle is helping a client improving a particular problem. The empirical research cycle aims at answering research questions through making investigations. Wieringa & Morali (2012) explicitly contrast their approach to ADR, which is labelled as "problem-driven". TAR does not start with particular problems. Its start is rather that "the researcher has identified a *class* of problems, and aims to develop an artefact to mitigate those problems" (ibid p 234).

Another integrated approach is presented by Lee (2007). The motivation for this approach is that "action research and design science have the potential to bring about greater rigor and greater relevance by acting together than by acting alone" (ibid p 45). Lee starts by using the framework from March & Smith (1995) with the four activities (build, evaluate, theorize, justify) and the four artefact types (construct, model, method, instantiation). He then uses a specific AR model, dialogical action research (Mårtensson & Lee, 2004), to map on this DR framework. Lee (2007) actually extends the scope of DR by including theorize and justify in DR, which is not done by March & Smith (1995) and neither by the follower Hevner et al (2004). As will be shown in section 5 below, such an expansion of DR is made by several other scholars. Lee (2007) defines, following the ideas of dialogical action research, what activities will be conducted by the researcher and what activities will be conducted by the practitioner. It is notable that the researcher is not participating in the building of the instantiation. This is due to the researcher role of being an "expert advisor" … [taking] the scientific attitude" (ibid p 53).

3.3 Some conclusions

This literature review is concluded here with some reflections from a practice research perspective. Practice research is sub-divided into a researcher-driven theorizing part and a situational inquiry which is conducted usually through collaboration between researchers and practitioners. The reviewed publications are not always explicit about who conducts what, but there are some exceptions. Lee (2007) explicitly states that the practitioner should be the one that builds the instantiation (the IT artefact) and not the researcher. Another position is taken by e.g. Wieringa & Morali (2012), who points out the artefact design to be researcher-driven. A third position is taken by Sein et al (2011), who talk about design teams consisting of researchers and practitioners. This collaborative view comes closest to the PR view. However, I would not take a prescriptive position on who should build the IT artefact, since it seems unnecessary restricted to exclude any part from the building process. My understanding of DR is that a researcher should at least have some kind involvement in the building process.

There are different positions in the literature on the problem bases for the artefact design. Some scholars claim the importance to address a class of problems (general problems). There seems to be positions that DR is actually design of general solutions based on general problems. Alturki et al (2012 p 317) give this view of DR that it "addresses an abstract or a class of problems for a class of organizations and stakeholders". Even if the level of specific problems is acknowledged, the view that DR (as artefact design) mainly operates on a general level is expressed by e.g. Baskerville et al (2009) and Wieringa & Morali (2012). Sein et al (2011) are very clear that the artefact design is pursued on specific problems, but later abstracted to a class of problems.

The dichotomy of specific vs. general problems is inherent in practice research. The two-level architecture of theorizing and situational inquiry corresponds to this. In the PR approach there is a continual alternation during research between 1) theorizing and abstraction (generalizing problems and other elements from the local practice) and 2) the situational inquiry into local practice specifics (addressing particular problems through adapted designs).

Some of diversities accounted for above may depend on different views of design research. Some scholars may see the artefact design as mainly driven by researcher comprehensions of general practice problems and needs. Such positions can be seen in views taken by e.g. Iivari & Venable (2009) and Wieringa & Morali (2012). An approach that is only working on a general practice level and has no interference with local practice (problem bases and/or testing/evaluating) is not an example of practice research. Such a techno-centric view is perhaps more of a computer science oriented approach to design research than what is argued for in information systems (Burstein & Gregor, 1999). It can also be seen as close to models of industrial product development of software where no distinct local practices are used as test sites. Anyhow, this kind of DR approach that has no connection to local

practice is excluded from further analysis in this paper. It seems that some of the AR and DR differences argued for by Iivari & Venable (2009) fall into this kind of DR category.

4 Action research from a practice research view

Action research is aiming to contribute both to a research community and to practitioners in a specific problematic situation. This is expressed in classical definition by Rapoport (1970): "Action research aims to contribute both to the practical concerns of people in an immediate problematic situation and to the goals of social science by joint collaboration within a mutually acceptable ethical framework". Hult & Lennung (1980) have elaborated this definition, but still there are these two target groups identified. It is notable that Rapoport talks about "an *immediate* problematic situation", which means that general practical relevance is not explicitly considered. In the definition by Hult & Lennung (1980) the practical goals and procedures in action research are elaborated, but not those concerning scientific knowledge. The authors emphasise collaboration, mutual learning and local understanding; these are goals often referred to in AR. The goals of scientific results (i.e. the contribution to the scientific body of knowledge) are not elaborated, but simply taken for granted. From the perspective of practice research, this means that two target groups are identified in AR: The research community and the local practice. The distinction between local and general practice is not acknowledged. The formulation of general knowledge from an AR study is considered to be done with the research community as the target group. The two main results from AR, as specified in the definitions, are additions to the scientific body of knowledge and interventions in local practice in order to improve (as a local practice contribution). The translation of these AR outcomes to PR concepts is summarised in table 1.

Table 1. AR outcomes mapped on PR

Target practices/communities	**AR outcomes**
Research community	Additions to scientific body of knowledge
General practice	Not specified
Local operational practice	Intervention (=LPC)

Action research is not an unequivocal research approach. Within this research approach, there exists a great diversity with many variants (Cassell & Johnsson, 2006; Chandler & Torbert, 2003). There are also many similar approaches which have been giving labels distinct to AR, but have many traits in common; examples of such similar approaches are "collaborative practice research" (Mathiassen, 2002) and "clinical inquiry" (Schein, 2001). Goldkuhl (2012a) have identified 15 such approaches with different labels but with great affinity to AR. The AR diversity within IS has been identified and investigated by Baskerville & Wood-Harper (1998) and Lau (1997). Davison et al (2004) have identified one kind of AR approach that they label as "canonical" due to its widespread recognition and use. The main origination of this canonical action research is from Susman & Evered (1978) who defined five-stage cyclical model (figure 2). It seems to be appropriate to take this canonical AR model here as a starting point for the analysis.

The five stages are: Diagnosis, action planning, action taking, evaluation and specifying learning. The four first stages are directly concerned with practical problem solving. The fifth one (specifying learning) is oriented towards "general findings". This stage is not very clear in the original text of Susman & Evered (1978). However, Davison et al (2004) have contributed with more substance to this phase. Following their description it is obvious that this activity contains theorizing parts as "informing/re-informing theory" (ibid p 77).

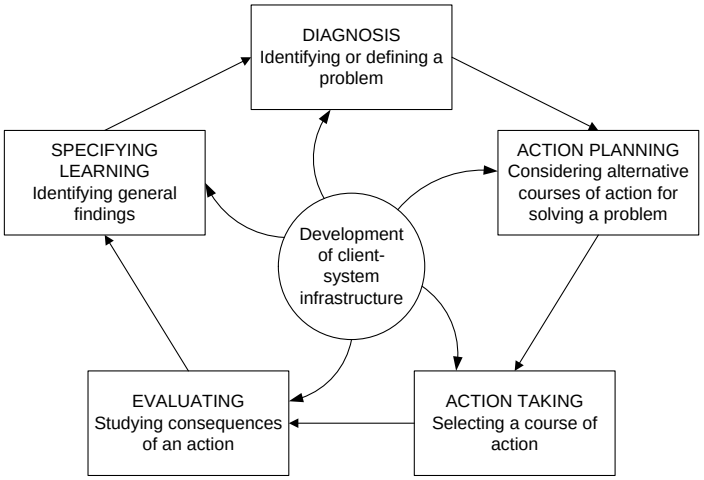

Figure 2. The cyclical process of Canonical Action Research (from Susman & Evered, 1978)

The four first stages fit well into situational inquiry of PR (Goldkuhl, 2012a). They constitute well together an inquiry approach to knowledge development, starting from a diagnosis of a problematic situation through action planning to intervention and evaluation. The last stage (specifying learning) corresponds mainly to theorizing (in PR) based on its orientation towards general findings and informing theory. However, when reading Davison et al (2004) there seem to be activities of specifying learning that directly relate to the local practice intervention. This is labelled "local learning" in table 2, where these AR stages are mapped on the PR activities. The theorizing part of specifying learning is labelled abstraction in table 2. An interesting observation from this comparison between AR and PR is the location of the theorizing/abstraction activity (parts of specifying learning) as the last activity following after the four other problem solving activities. One main idea of practice research (Goldkuhl, 2011; 2012a) is the continual interplay between the concrete problem solving in situational inquiry and the abstraction in theorizing. In PR, theorizing is not something that is done only after a situational inquiry walk-through. AR scholars might object to this categorisation to place theorizing after problem solving; that this is not how AR is conducted in real. There are also descriptions in Susman & Evered (1978) and Davison et al (2004) that emphasise that the AR problem solving should be theory-informed. However, the illustration of the stage "specifying learning", as coming after the four problem solving stages, points to this interpretation.

Table 2. AR activities mapped on PR

PR activities	**AR activities**
Theorizing	Specifying learning as abstraction
Situational inquiry	Diagnosis, action planning, action taking, evaluation; specifying learning as local learning.

In table 1 above, the local practice contribution is stated as intervention. This AR intervention may, however, take different forms. Actually, each AR stage will contribute with some kind of intervention. Usually, AR is associated with implemented changes. For example, Davison et al (2004) state demands for the performance of full AR cycles. However, Susman & Evered (1978) acknowledge that not all process stages need to be conducted in an AR endeavour. They refer to an early AR paper (Chein et al, 1948) where different types of AR projects are described. Chein et al (1948) describe four types of action research, which consist of different degrees of intervention and collaboration. One of these types of action research is diagnostic action research, where no specific actions are taken within the research process. Following these ideas, means that presenting a diagnosis is a special kind of intervention; this can be called diagnosis intervention. Action planning means that a proposed change is presented. This can be called design intervention. Action taking means that something is actually changed in the local practice. This can be called implementation intervention. Evaluation means an assessment of the implemented change. The presentation of an evaluation can be called evaluation

intervention. It should however be noted that this is analogous to diagnosis intervention (of the first stage). What is called diagnosis in AR is an evaluation of status quo. What is called evaluation is an evaluation of changed state. These both interventions are thus diagnosis aiming to contribute with evaluative knowledge about some state of affairs. It should be noted here that the concept intervention is used with a meaning of bringing something to a local practice that can be of value for that local practice.

What can be learned from this attempt to translate AR concepts to practice research? The main conclusions are:

- Adaptation and dissemination of knowledge to general practice is not explicitly recognized in AR.
- The AR process has a main focus on "problem solving & change" (situational inquiry); theorizing is down-played.
- Theorizing activities in AR are seen as taking place after problem solving; not as a continual interplay with or support to a situational inquiry.
- AR intervention can be of diverse kinds following the four problem solving stages (diagnosis intervention, design intervention, implementation intervention and evaluation intervention).

5 Design research from a practice research view

There is not one canonical model of design research as is claimed for AR. Many scholars refer to Hevner et al (2004) as a prominent DR model. It seems appropriate to start the analysis with this DR model although there exist many objections and additions to this model. I will address some of the criticism and alternatives below. Hevner et al (2004) base their work extensively on the fore-runner March & Smith (1995) so I will treat these two articles together. DR is contrasted to behavioural science by Hevner et al (2004). Behavioural science is defined as explanatory research investigating already existing phenomena. The contrasting view of design research is that it "creates and evaluates IT artifacts intended to solve identified organizational problems" (ibid p 77). The essence of DR is the iteration of build and evaluate activities (ibid; March & Smith, 1995). This corresponds well to situational inquiry in practice research. Build and evaluate form together a design oriented situational inquiry (table 3). It is also important here to note (with reference to the discussion on general problems vs. situational problems in section 3.3 above), that Hevner et al explicitly state "identified organizational problems".

Behavioural science consists of development and justification of theories. Theorizing is actually not part of design research according to March & Smith (1995) and Hevner et al (2004). The main result from design research is the artefacts designed. However, there are many scholars who argue for theorizing as an important part for DR; some of them will be referenced below. It seems that the reluctance to include theorizing in DR as it appears in Hevner et al (2004) has softened, and in Hevner & Chatterjee (2010) theorizing and design theory are included as possible elements of DR. Hevner has called this position as "agnostic to the need for design theory" (Gregor & Hevner, 2011 p 4).

Table 3. DR activities (based on Hevner model) mapped on PR

PR activities	**DR activities**
Theorizing	Theorize, justify (disputable if part of DR)
Situational inquiry	Design practice: Build and evaluate

As said above, the design process is by Hevner et al (2004) considered to consist of the activities build and evaluate. There are several other scholars who have unfolded the design (research) process in more detailed ways. Peffers et al (2008) describe the DR process to consist of the following six activities: 1) problem identification and motivation, 2) define the objectives for a solution, 3) design and development, 4) demonstration, 5) evaluation and 6) communication. The emphasis in this six-step process is around the design of the artefact. It is actually only the last activity that seems to correspond to theorizing in PR. The first stage in Peffers' model is problem identification. There are

several other DR models that emphasise such an initial problem understanding; e.g. Offerman et al (2009) as “identify problems” and Kuechler & Vaishnavi (2012) as “problem awareness”. This is also made by Sein et al (2011) in their Action Design Research method, there labelled “problem formulation”. This initial problem investigation corresponds well to the first stage of defining a problematic situation in the concept of inquiry (Dewey, 1938).

The design process is often described as creation of artefacts in different stages of maturity. The use of prototypes is acknowledged by several scholars, e.g. Nunamaker et al (1991). Peffers et al (2008) have a special phase called demonstration including experimentation and proof-of-concept. Sein et al (2011) differentiate between alpha and beta versions of the emerging artefact.

Design research has, in the writings of e.g. Hevner et al (2004) and Peffers et al (2008), 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), Winter (2008), Goldkuhl & Lind (2010), Lee et al (2011) and Kuechler & Vaishnavi (2012). This is also fully in line with the suggestions made by advocates for the concept of design theory, e.g. Walls et al (1992), Gregor & Jones (2007) and Baskerville & Pries-Heje (2010). In the ADR model of Sein et al (2011) the generalized outcomes from DR in terms of design principles are emphasized. In contrast to linear DR models (e.g. Peffers et al, 2008), two-layered frameworks have been presented by Winter (2008), Goldkuhl & Lind (2010) and Lee et al (2011) distinguishing the concrete design process from theorizing activities. Such a two-layered framework corresponds directly to this distinction made in practice research between theorizing and situational inquiry. In table 4 these more elaborated notions within DR have been mapped on the two sub-activities of PR.

Table 4. DR activities mapped on PR

PR activities	**DR activities**
Theorizing	Abstract, generalize, theorize
Situational inquiry	Design practice: Problem analyse, build (including demonstrate) and evaluate

Hevner et al (2004) base their conceptualisations of design research on a contextual model of IS research. A simplified version of this model is presented in figure 3. Three areas and their relations are depicted. IS research is surrounded by the business environment and the knowledge base. The business environment (relevant to IS research) consists of people, organisations and technologies. IS research interacts with the business environment through perception of business needs and the contribution of theories and artefacts. IS research utilises relevant and useful knowledge from the knowledge base and adds more knowledge to it. There is no clear distinction between local practice and general practice in this conceptualisation as it is in the practice research approach. The influence of business needs can possibly be from both local practice and general practice. A close reading of March & Smith (1995) and Hevner et al (2004) reveals that IT artefacts (in the context of DR) are considered to be used in specific organisational settings (local practices). As discussed above in section 3, there are other possible interpretations (going in the direction of industrial software development for general practice) but this was excluded from further analysis in this paper. We conclude that DR results should be seen as local practice contributions. Developed IT artefacts for specific local practices may of course be possible, immediately or through some software generalisation, to direct to other potential users, i.e. to general practice. Hevner et al (2004) describe communication of DR results to technology-oriented and management-oriented practitioner audiences. This seems to correspond well to the notion of general practice in practice research.

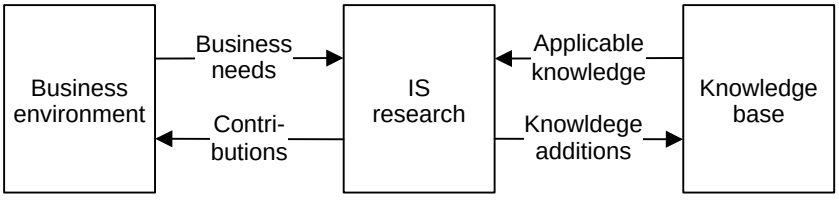

Figure 3. The context of IS research (with inspiration from Hevner et al, 2004)

In section 4 above, there was a translation of AR outcomes in relation to the three target practices defined within the PR conceptualisation. An attempt will be done here to do similar with DR outcomes. March & Smith (1995) have introduced four types of artefacts in DR: Constructs, models, methods and instantiations. They do not give any clear motivation why these four artefacts have been selected to be the core DR artefacts. Hevner et al (2004) and many others use these artefact types for characterisation of DR and they seem to have been a kind of taken-for-granted knowledge in DR. These artefact types are questionable as a dominating classification of DR outcomes, which will be discussed below. Some of the confusion and controversy in the DR discourse seems to arise from the selection and demarcation of these artefacts/results. However, as these artefact types seem to be recognised as core DR results, it is appropriate to use them as a starting point for the discussion.

Constructs, models, methods and instantiations are defined as artefacts resulting from DR (March & Smith, 1995; Hevner et al, 2004). The lumping together of these artefacts has been criticised by several scholars for failing to distinguish between material and abstract artefacts (Gregor & Jones, 2007; Aier & Fischer, 2011). When reading the description of these types of artefacts made by March & Storey (2008) it becomes very clear that the first three are seen as instruments for the generation of instantiations, which are "computer-based systems implemented within an organization" (ibid p 726). Even more important is the recognition of these three artefacts as belonging to different abstract spheres. When reading March & Smith (1995), Hevner et al (2004) and March & Storey (2008) it seems clear that constructs and methods are re-usable abstract instruments intended for use in different ISD/DR endeavours, while models are seen as situational artefacts describing important domain issues in the design situation: "Models use constructs to represent a real world situation – the design problem and its solution space…" (March & Smith, 1995 p 256). Goldkuhl & Lind (2010) have classified the four artefact types in an abstract vs. concrete/situational dichotomy based on a close reading of March & Smith (1995) and Hevner et al (2004). They classify constructs and methods as abstract objects that are not only intended for a specific situational design. They categorise these as abstract design knowledge. Models and instantiations (systems) are classified as situational artefacts. This means also that the abstract design knowledge is generated in the theorizing part of DR and that it is used in the situational design inquiry for the production of situational artefacts. Abstract design knowledge (constructs, methods and also design theories) are aimed for audiences (also) outside local practice, i.e. for general practice and research community. This classification is documented in table 5.

Table 5. DR outcomes mapped on PR

Target practices/communities	**DR outcomes**
Research community	Abstract design knowledge (constructs, methods, design theory)
General practice	Abstract design knowledge (constructs, methods, design theory)
Local operational practice	Situational artefacts (models, systems)

As described above, there are several controversies within DR. This influences the comparison between design research and practice research. How DR is interpreted, as a kind of practice research, depends on which variant of DR is used. The conclusions below (on what can be learned from translating DR to PR) are influenced by this moving target of DR:

- The notions of local practice and general practice are not explicitly acknowledged, although this distinction can be traced implicitly.
- There is no clear differentiation of artefacts as situational or abstract, but it possible to classify the artefacts into these two categories. Models and systems (instantiations) can be seen as situational artefacts and constructs and methods as abstract artefacts.
- The main focus in DR is on the design process. The role of theorizing is unclear in DR; some scholars down-play it, others emphasize it.
- Design practice (of DR) should be seen as a kind of design oriented situational inquiry. Different DR models have differing scope and content of the design practice.

6 A practice research based comparison of action research and design research

In section 4 and 5, each of action research and design research has been analysed from the perspective of practice research. It is now time to use these two analyses to make a comparison of AR and DR. This comparison need to be divided into different areas. First a situational inquiry (SI) oriented comparison is made. This means that a comparison is made between an intervention oriented situational inquiry (of AR) and a design oriented situational inquiry (of DR). In this analysis it is also necessary to investigate the outcomes intended for local practice. The comparison will be driven to an integrated and synthesised AR/DR model of situational inquiry. After this comparison, a brief analysis of different types of theorizing will be pursued.

6.1 Situational inquiry of action research and design research

6.1.1 Initiating the comparison

This comparison starts with the already made descriptions above in table 1 and 4. The situational inquiry of action research (AR-SI) is said to consist of diagnosis, action planning, action taking, evaluation and local learning. The situational inquiry of design research (DR-SI) is said to consist of problem analysis, building (including demonstration) and evaluation. These two SI processes are depicted in figure 4 as a first step of comparison.

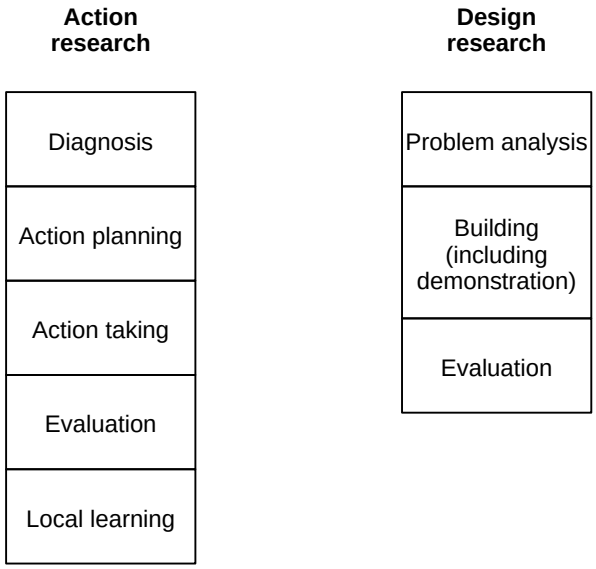

Figure 4. First step comparison of AR-SI and DR-SI

6.1.2 Making action research comparable

There are important resemblances between AR and DR already here. Both SI processes involve evaluation, but in the AR process local learning is followed after evaluation. There is no such activity in the DR process. In the ADR approach (Sein et al, 2011), which is DR flavoured with AR, there is actually a learning stage included, but this seems to be mainly oriented towards the researchers' learning, reflection and abstraction. This kind of learning is rather associated with theorizing, which is discussed below (section 6.2). The approach taken here, in this synthesis process, is to let the local

learning be part of evaluation. “What can we learn from this intervention and change?” seems to be part of a typical evaluative attitude.

These adjustments mean that the first and last phases (of AR-SI and DR-SI) are considered equivalent. It is more problematic to see clear relations between the “inner” phases. It is necessary to unfold action taking/intervention in AR (and below build/design of DR). Action taking of AR is addressed here in this section. This is the actual implementation of attempted changes in the organisational setting. Baskerville (1999 p 15) describes it in a succinct way: “Action taking then implements the planned action. The researchers and practitioners collaborate in the active intervention into the client organization, causing certain changes to be made”. This is actually why we call it *action* research; meaning that action is intended to contribute to change. AR has a long tradition within IS and there are many reported IS interventions under the label of AR, that nowadays perhaps would have been framed as design research instead. One example is the competence system study by Lindgren (2002), which originally was described as action research (and with no reference to design research), but later was re-framed to be an example of action design research (Sein et al, 2011). Is it so that action taking and intervention can be equated with an instantiation produced through DR? I would say definitely no to this question. AR builds on the idea of combined inner and outer change (e.g. Hult & Lennung, 1980). The evolution of organisational participants’ knowledge, competence and attitudes is a fundamental constituent of the change process. There are views from IS scholars that “action is an artefact” (Lee, 2007), but I think this is misleading. First of all it is necessary to distinguish between 1) actions and processes and 2) the results and effects of such actions. People act in AR and in other situations of organisational development in order to create changes. There will be both internal changes of actors (such as new knowledge and competencies) and external changes. Such external changes can consist of implemented IT artefacts and changed work processes. IT artefacts are thus one example of change, but in an AR perspective, organisational change cannot be reduced to just a technical implementation. An installed IT artefact will be accompanied by changes made by organisational participants in their way of knowing and working. Such a work process change can be anticipated through the design of a business process model, which is an example of an artefact in the context of DR. However, I would not say that a process model and a designed IT artefact (as two artefacts) fully correspond to an AR intervention. They may definitely be part of such an intervention, but they will not encompass fully an ordinary AR intervention. Fundamental in an AR view is the organisational participants’ change of their working procedures. This can be done following the prescribed descriptions in process models. But there may be other types of work changes performed which might depend on limitations in process models and/or designed IT artefact. Such models/artefacts haven’t perhaps captured all complexity of the addressed workpractices. There might be important workpractice values held by the practitioners, which are not included in the new design due to their tacit character or that they have been explicitly disregarded. Dependant on these possible misfits between new designs and established ways of working, the practitioners need to develop ways of working differing from the prescribed ones. These adjusted work procedures might be an amalgamation of old ways of working and the prescribed ways (according to process models). There will be a re-arranging of work processes which hence might not been fully prescribed in design models and IT artefacts.

In the ADR approach by Sein et al (2011) it is emphasised that building (of artefacts) goes hand in hand with (organisational) intervention. As mentioned above (section 3.2), they base their ideas on an ensemble view of the IT artefact (Orlikowski & Iacono, 2001), which emphasises that the artefact is contextually embedded and is continually re-shaped through an interplay between the artefact and the organisational context. Based on these views, we can divide action taking in one more technically oriented part and one more organisationally oriented part. The technical part is here called technical preparation and can contain the construction of IT artefacts as well as the acquisition of other technical artefacts. The other part is called practice re-arranging in order to emphasise that organisational actors make adjustments of their work dependant on the prescribed process models and implemented technical artefacts. The result of unfolding action taking/intervention in AR is described in figure 5, where the move from the original AR-SI structure to the adapted one is depicted.

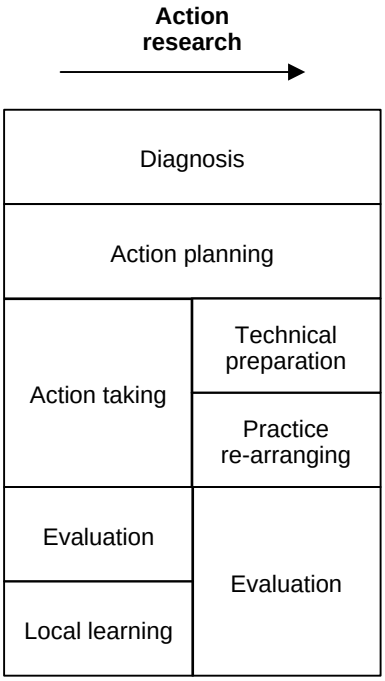

Figure 5. Transformation of AR-SI to a comparable form

6.1.3 Making design research comparable

It is now time to turn to the DR-SI process. Both the AR and DR processes start with an initial analysis of the problematic situation clarifying problems and needs. The first adjustment here is to rename problem analysis of DR to be called diagnosis as the same in AR. Diagnosis is a more encompassing notion covering more issues than only problems.

The analysis will proceed with unfolding the build activity. In table 4 "demonstration" was severed as a separate stage within build. Build will consist of different types of activities, where demonstration/prototyping seems to be one important one. What other activities/stages can be found? An appropriate way forward seems to be to utilise the outcomes from DR-SI: Models and instantiations. The instantiation is the built IT system. However, we have already made a separation between prototype versions of the system and the final version to be used (Nunamaker et al, 1991). This means that the direct generation of the IT system can be divided into 1) prototyping and 2) construction of system to be used. This means 1) a prototype version of the system and 2) the final system as a product for use. The other artefact of DR-SI is models. Models can be used in the first stage of diagnosis in order to model problems in the current situation. This means the production of so-called "as-is models". ISD involves also the generation of "to-be models" that describe possible solution proposals; e.g. process models and conceptual models. The generation of as-is models can be called diagnosis-modelling, and is part of the diagnosis phase. The generation of to-be models could be called design-modelling. Build has thus been unfolded into three sub-activities: design-modelling, prototyping and construction (figure 6).

The relation between what is called design-modelling and prototyping needs, however, to be elaborated further. Although a prototype is considered a simplified version of the system to be developed, it is also seen as a model (Naumann & Jenkins, 1982). There seems to be some important differences between typical models in ISD, as e.g. process models and conceptual models, and prototype models. Prototyping can be done in different ways and can have different functions in the development process. There is often a distinction made between lo-fi and hi-fi prototypes (e.g. Walker et al, 2002). Lo-fi prototypes can be seen to be a kind of simple iconic (paper) model of a proposed IT

artefact; an example is a sketch of a user interface screen. The generation and assessment of lo-fi prototypes is definitely part of a design and proposal activity of ISD. Hi-fi prototypes use software and they are often executable (or at least clickable). Such prototypes resemble the final system and their generation involves usually some software generation. An important distinction between lo-fi and hi-fi prototypes is that lo-fi prototypes are "passive" models while hi-fi prototypes are dynamic models with the purpose to expose some kind of behaviour of the future system.

To clarify the differences between these different types of models, I will use a classification from learning theory with three kinds of representations: enactive, iconic and symbolic representations (Bruner, 1964). The hi-fi prototypes can be seen to have an enactive (and iconic) representation. It is enactive since it has a capacity of exhibiting some behaviour of the system. A lo-fi prototype does not have such a dynamic capacity. It is typically an iconic model, since it based on a direct resemblance with parts of the future system. Other types of models, like process models and conceptual models, are typical examples of symbolic models while using abstract notions for describing the system. This analysis means that the two earlier mentioned activities of design-modelling and prototyping have been transformed into three renamed activities: Design-modelling of symbolic models, lo-fi prototyping (creating iconic models) and hi-fi prototyping (creating enactive models); see figure 6 for this transformation.

To push this DR-SI conceptualisation further I will use concepts from AR-SI: Action planning and technical preparation. Action planning involves the description of possible future states. Already in Kurt Lewin's initial description of action research, the importance of planning before action was stated (Lewin, 1947). Action planning can be seen as proposing changes. This means that ideas and descriptions of a future artefact/change are put forth. This corresponds well to design-modelling of symbolic models, but also to lo-fi prototyping. These two activities can be put together under the label proposing. Thereby, I avoid the use of the concept "design-modelling" since it can be considered to be equivocal. What kinds of models are included in design-models? Both symbolic, iconic and enactive models? Proposing includes modelling with design intent and can consist of symbolic and iconic models.

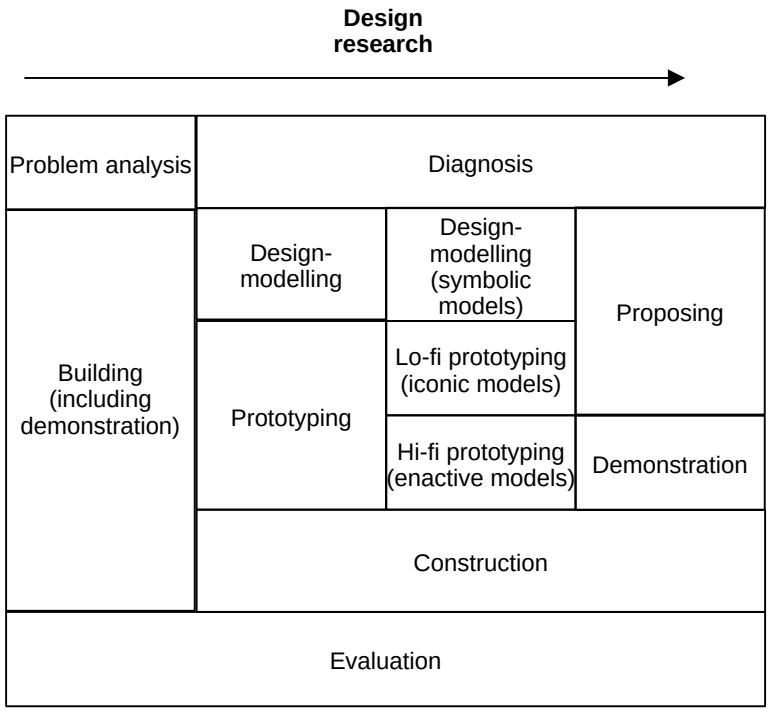

Figure 6. Transformation of DR-SI (in three steps) to a comparable form

Technical preparation (of AR-SI) is one kind of realisation of those plans/models. Since hi-fi prototyping includes some software generation, this activity is differentiated from the proposing phase and instead associated with technical preparation. I return to the notion of demonstration that was used above to label this type of activity. The purpose of this activity is to demonstrate a future system through a software-based dynamic model of that system.

The last step of this DR-SI transformation is shown in figure 6. DR-SI is conceived to consist of the following activities: Diagnosis, proposing, demonstration, construction and evaluation. This means that build is subdivided into proposing, demonstration and construction.

6.1.4 A synthesis of action research and design research processes

After having made the two processes of AR-SI and DR-SI comparable (figure 5 and 6), these process descriptions can be put together side by side. This is done in figure 7. The next step is to integrate these two processes into one encompassing approach. The first and last phases were easily equated above. Action planning (AR) corresponds to proposing (DR). Technical preparation (AR) corresponds to demonstration and construction (DR). There is no activity in DR corresponding to practice re-arranging (AR). This means that there is a "hole" in the DR process compared with the AR process.

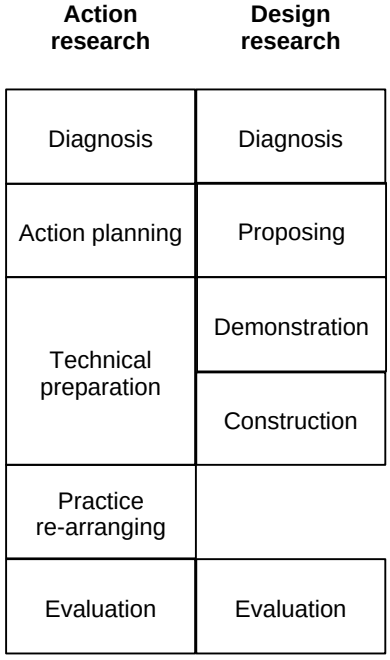

Figure 7. Second step comparison of AR-SI and DR-SI

In this synthesising process, there are three more decisions to make: 1) What should we call the second phase? Action planning or proposing? 2) Should we have the integrated activity technical preparation or the two unfolded activities demonstration and construction? 3) Should we include the AR activity practice re-arranging into the synthesised process?

I start with the third question. Since the synthesised PR process should *cover* both AR and DR, the activity of practice re-arranging needs to be included. The answer to the second question is that the two (DR) activities of demonstration and construction should be chosen. It is important to have process that is *detailed* enough. The two DR activities demonstration and construction should not be obscured. When this alternative has been chosen, it follows naturally to choose proposing as the label for the second phase.

The synthesis of these two processes into one process is shown in figure 8. This means a situational inquiry process of practice research that *in detail and scope covers* both AR and DR. This process may

have technically orientated activities (as demonstration and construction) that are not pursued in an AR process, which does not have any production of technical artefacts. In a regular DR process, the practice re-arranging will not be pursued, at least not according to DR standard models (e.g. Hevner et al, 2004; Peffers et al, 2008). In the DR process according to the ADR approach (Sein et al, 2011), which is adapted to AR, there is already an inclusion of such an activity according to my interpretation. This synthesis of AR and DR is here made within the frame of practice research. This means a model of integrated AR and DR that will pursued as practice research. This elaborated research approach can be labelled *practice research through intervention and design* (PR-ID).

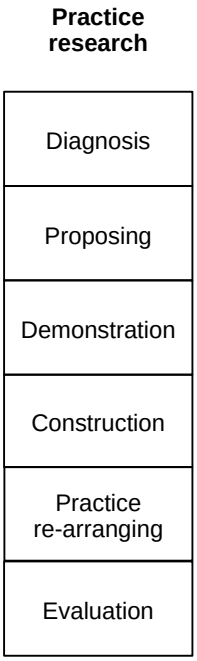

Figure 8. The situational inquiry of practice research as a synthesis of action research and design research

It is important to comment that this process is outlined as a sequential process. The activities are put in a logical order meaning that each phase creates results that are essential for the subsequent phases. In reality, the sub-activities of a situational inquiry will be performed with iterations and alternations and sometimes in concurrency.

6.1.5 Different roles of evaluation

In the proposed PR-ID model above, there are two evaluation activities included: 1) The initial *diagnosis* is an evaluation of the current situation. 2) The final *evaluation* deals with implemented artefacts and changes. These two evaluation activities follow from the established models of AR (Susman & Evered, 1978) and DR (Peffers et al, 2007). This means evaluation "before" and "after", but not in between. There are proposals within DR that evaluation should be conducted not only in these ways, but also in other "places" (Venable et al, 2012; Sonnenberg & vom Brocke, 2012), and I fully agree. Actually, there might be evaluations in each of the suggested stages. There can be evaluations related to proposals, demonstrators and constructed systems before use. Such embedded evaluations are thus not explicitly stated in the PR-ID model. However, they should be assumed.

6.2 Theorizing of action research and design research

The theorizing parts of AR and DR are not outlined with any process descriptions. As been observed in section 4 and 5 above, these parts are given much less attention (in AR and DR) than problem

solving and design. This means that we do not have so much material as a basis for comparison. The outcome from DR theorizing was described above (table 5) as constructs, methods and theories. The outcome from AR theorizing was not characterized in any way. In practice research, Goldkuhl (2011; 2012a) suggests that the results from theorizing should be useful abstract knowledge which besides methods and generic models can take the shape of practical theories (Cronen, 2001; Goldkuhl 2008). A practical theory can consist of conceptualisations, explanatory patterns, values, design principles and generic models (Goldkuhl 2008). This notion of practical theory can of course be compared with different variants of design theories (Walls et al, 1992; Gregor & Jones, 2007; Baskerville & Pries-Heje, 2010; Kuechler & Vaishnavi, 2012). It is beyond the scope and ambition of this paper to make any such comparison; that would be a paper of its own. The conclusion drawn here is that the theoretical results from DR and AR should be stated in more detail and that these results should be made as abstract and useful knowledge aimed for general practice and for the scientific community.

7 Conclusions

This conceptual inquiry has been driven by controversies, different interpretations, differing proposals and potentials for integration concerning the two research approaches action research and design research. The way to conduct this conceptual inquiry has been through the use of a third position: the research approach of practice research. This inquiry has generated contributions in four areas:

- Knowledge about action research
- Knowledge about design research
- Knowledge about practice research
- Knowledge about the landscape of pragmatic research approaches such as action research, design research and practice research

These conclusions, which are based on the conducted comparative and integrative inquiry, should be seen as helpful for scholars who are in the position to choose an appropriate approach a specific research task. The unfolding and comparing of different activities (section 6 above) should guide the scholar to design a proper research process and not only chose a trendy method label for the research. In a pragmatic vein, it is necessary to focus the needed activities of a research endeavour.

I will start summarizing the conclusions with the last issue, the landscape of pragmatic research approaches (figure 9). Practice research has been claimed to be an encompassing research approach covering both action research and design research (Goldkuhl, 2011). This is valid, but there are exceptions. If AR is conducted with no orientation towards general practice, then this should not be seen as practice research. On the other side, if DR is conducted (as in a computer science manner) with no reference to any local practice, then this cannot be considered to be practice research. This means that cases can be identified where AR and DR falls outside the scope of PR.

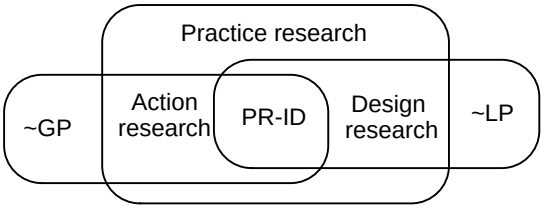

Figure 9. The landscape of pragmatic research approaches (practice research, action research, design research)

As been shown prior by several scholars, it is possible to combine AR and DR. Such a combined approach will fall within practice research. A combined AR/DR approach within PR has been described above in section 6. Further comments will be done below of what has been called practice research through intervention and design (PR-ID). There might be cases where there is no overlap between AR and DR within PR. An action research without any design of technical artefacts will not

be seen as DR. This means that there is no technical preparation in action taking, following the conceptual analysis in section 6.1.2 above. A DR case without any consideration of organisational implementation will not be seen as AR. This means that there is no practice re-arranging (following the terminology in section 6.1.2 above).

Some conclusions concerning action research:

- It is important that AR also contributes to general practice. It is too limited to view the practical relevance of AR to be just local practice contribution.
- Models of AR should be clear concerning the division between practical problem solving (situational inquiry) and theorizing. The theorizing part should not be seen as something that only takes place after problem solving. There should be a continual interplay between theorizing and practical problem solving.
- Action taking of AR be can sub-divided into technical preparation and practice re-arranging. The organisational adaptation of changes (conducted through practice re-arranging) is a distinct trait of AR compared with design research.

Some conclusions concerning design research:

- Within IS research, it is important that DR has a clear connection to local practices; both through an origin in specific problems and through testing and evaluation in local operational practices.
- Models of DR should be clear concerning the division between design practice (situational inquiry) and theorizing. The theorizing part should not be seen as something that only takes place after design. There should be a continual interplay between theorizing and design.
- The main artefact outcomes from the design process are different kinds of models and IT artefacts (called instantiations in traditional DR terminology). Models from the design process can be divided into diagnosis-models (as-is) and design-models (to be). Design-models can be divided into symbolic models, iconic models (e.g. lo-fi prototypes) and enactive models (hi-fi prototypes).
- The build process of DR can be sub-divided into proposing, demonstration and construction. It should be preceded by a diagnosis of practice problems, objectives and needs.

Some conclusions concerning practice research:

- Practice research can be conducted through integration of action research and design research. In such integration (PR-ID), situational inquiry can be conducted through the following phases: Diagnosis, proposing, demonstration, construction, practice re-arranging and evaluation.
- Possible local practice contributions are diagnosis of current state, proposals, demonstrators, technical products for use, adapted work-processes and evaluation of any object.

In this paper, there have not been any empirical cases used for illustration and validation due to purpose and scope. The study has been conducted as a conceptual inquiry. Further research should involve the study of empirical cases of action research, design research and practice research.

References

Aier S, Fischer C (2011) Criteria of progress for information systems design, *Journal of Information Systems and e-Business Management*, Vol 9, p 133–172

Alturki A, BandaraW, Gable G (2012) Design science research and the core of information systems, *DESRIST 2012*, LNCS 7286, Springer, Berlin

Andriessen D (2007) Combining design-based research and action research to test management solutions, *the 7th World Congress Action Learning, Action Research and process Management*, Groningen

Baskerville R (1999) Investigating information systems with action research, *Communication of AIS*, Vol 2

Baskerville R (2001) Conducting action research: High risk and high reward in theory and practice, in Trauth E M (ed, 2001) *Qualitative research in IS: Issues and trends*, Idea Group, Hershey

Baskerville R (2008) What design science is not, *European Journal of Information Systems*, Vol 17, p 441–443
Baskerville R, Myers M (2004) Special issue on action research in information systems: making IS research relevant to practice – foreword, *MIS Quarterly*, Vol 28 (3), p 329-335
Baskerville R, Pries-Heje J (2010) Explanatory Design Theory, *Business & Information Systems Engineering*, Vol 5, p 271-282
Baskerville R, Pries-Heje J, Venable J (2009) Soft design science methodology, in *Proceedings of DESRIST '09*, Malvern
Baskerville R, Wood-Harper T (1998) Diversity in information systems action research methods, *European Journal of Information Systems*, Vol 7, p 90–107
Bruner J (1964) The course of cognitive growth, *American Psychologist*, Vol 19, p 1-15
Burstein F, Gregor S (1999) The systems development or engineering approach to research in information systems: An action research perspective, *Proc. 10th Australasian Conference on Information Systems*
Cassell C, Johnson P (2006) Action research: Explaining the diversity, *Human Relations*, Vol 59 (6), p 783–814
Chandler D, Torbert B (2003) Transforming inquiry and action. Interweaving 27 flavors of action research, *Action Research*, Vol 1 (2), p 133–152
Checkland P (1981) *Systems thinking, Systems practice*, John Wiley, Chichester
Chein I, Cook S W, Harding J (1948) The field of action research, *American Psychologist*, Vol 3, p 43-50
Christiansson M-T, Granström K (2012) Sharpening the knowledge domain transfer in practice research design: The BPM assessment, *Systems, Signs & Actions*, Vol 6 (1), p 22–45
Cole R, Purao S, Rossi M, Sein M (2005) Being Proactive: Where Action Research meets Design Research, *Proceedings of the Twenty-Sixth International Conference on Information Systems*, Las Vegas, p 325-336
Cronen V (2001) Practical theory, practical art, and the pragmatic-systemic account of inquiry, *Communication theory*, Vol 11 (1), p 14-35
Cronholm S, Göbel H, Haraldson H, Lind M, Salomonson N, Seigerroth U (2011) Collaborative practice - an action research approach to efficient ITSM, *The Practice Research Workshop*, Helsinki
Davison R M, Martinsons M G, Kock N (2004) Principles of canonical action research, *Information Systems Journal*, Vol 14, p 65–86
Dewey J (1938) *Logic: The theory of inquiry*, Henry Holt, New York
Epstein I (2002) Using available clinical information in practice-based research, *Social Work in Health Care*, Vol 33 (3-4), p 15-32
Feldman M, Orlikowski W (2011) Theorizing practice and practicing theory, *Organization Science*, Vol 22, p 1240-1253
Figueiredo A, Cunha P (2007) Action research and design in information systems: Two faces of a single coin, in Kock N, (Ed. 2007) *Information Systems Action Research. An Applied View of Emerging Concepts and Methods*, Springer
Fook J (2002) Theorizing from practice: towards an inclusive approach for social work research, *Qualitative Social Work*, Vol 1 (1), p 79–95
Goldkuhl G (2008) Practical inquiry as action research and beyond, in *Proceedings of the 16th European Conference on Information Systems*, Galway
Goldkuhl G (2011) The research practice of practice research: theorizing and situational inquiry, *Systems, Signs & Actions*, Vol 5 (1), p 7-29
Goldkuhl G (2012a) From action research to practice research, *Australasian Journal of Information Systems*, Vol 17 (2), p 57-78
Goldkuhl G (2012b) Pragmatism vs. interpretivism in qualitative information systems research, *European Journal of Information Systems*, Vol 21 (2), p 135-146
Goldkuhl G, Lind M (2010) A multi-grounded design research process, in *DESRIST-2010 Proceedings*, LNCS 6105, Springer, Berlin

Gregor S, Hevner A (2011) Introduction to the special issue on design science, *Journal of Information Systems and e-Business Management*, Vol 9, p 1–9
Gregor S, Jones D (2007) The Anatomy of a Design Theory, *Journal of AIS*, Vol 8 (5), p 312-335
Hevner A, Chatterjee S (2010) *Design research in information systems. Theory and practice*, Springer, New York
Hevner A R, March S T, Park J, Ram S (2004) Design science in information systems research, *MIS Quarterly*, Vol 28 (1), p 75-115
Hult M, Lennung S-Å (1980) Towards a definition of action research: a note and bibliography, *Journal of Management Studies*, Vol 17, p 241-250
Iivari J, Venable J (2009) Action research and design science research – Seemingly similar but decisively dissimilar, *Proc of 17th European Conference on Information Systems*, Verona
Jonsson K, Levén P (2012) A relevant issue: Establishing collaborations with multiple practitioners, *Systems, Signs & Actions*, Vol 6 (1) p 6–21
Julkunen I (2011) Knowledge-Production Processes in Practice Research - Outcomes and Critical Elements, *Social Work & Society*, Vol 9
Järvinen P (2007) Action research is similar to design science, *Quality & Quantity*, Vol 41, p 37–54
Kock N, (Ed. 2007) *Information Systems Action Research. An Applied View of Emerging Concepts and Methods*, Springer
Kock N, Lau F (2001) Information Systems Action Research: Serving Two Demanding Masters, *Information Technology & People*, Vol 14 (1), p 6-11
Kuechler B, Vaishnavi V (2012) A Framework for Theory Development in Design Science Research: Multiple Perspectives, *Journal of AIS*, Vol 13 (6), pp 395-423
Lau F (1997) A review on the use of action research in information systems studies, In Lee A, Liebenau J, DeGross J (Eds, 1997), *Information Systems and Qualitative Research*, Chapman & Hall, London
Lee A (2007) Action is an artifact: What action research and design science offers each other, in Kock N, (Ed. 2007) *Information Systems Action Research. An Applied View of Emerging Concepts and Methods*, Springer
Lee J S, Pries-Heje J, Baskerville R (2011) Theorizing in Design Science Research, in *DESRIST 2011*, LNCS 6629, Berlin
Lewin K (1947) Frontiers in Group Dynamics II. Channels of group life; social planning and action research, *Human Relations*, Vol 1 (2), pp. 143-153
Lindgren R (2002) *Competence systems*, PhD diss, Gothenburg Studies in Informatics 23, Gothenburg University
March S T, Smith G F (1995) Design and natural science research in information technology, *Decision Support Systems*, Vol 15 (4), pp 251-266
March S, Storey V (2008) Design science in the information systems discipline: An introduction to the special issue on design science research, *MIS Quarterly*, Vol 32 (4), p 725-730
Mathiassen L (2002) Collaborative practice research, *Information Technology & People*, Vol 15 (4), p 321-345
Miettinen R, Samra-Fredericks D, Yanow D (2009) Re-Turn to Practice: An Introductory Essay, *Organization Studies*, Vol 30 (12), p 1309–1327
Mårtensson P, Lee A (2004) Dialogical action research at Omega corporation, *MIS Quarterly*, Vol 28 (3), p 507-536
Naumann J, Jenkins M (1982) Prototyping: The new paradigm for systems development, *MIS Quarterly*, Vol 6 (3), p 29-44
Nordström M, Axelsson K (2011) Practitioners' motives as a key issue in organizing practice research collaboration, *Systems, Signs & Actions*, Vol 5 (1), p 133–146
Nunamaker J, Chen M, Purdin T (1991) Systems Development in Information Systems Research, *Journal of Management Information Systems*, Vol 7 (3), p 89-106
Offerman P, Levina O, Schönherr M, Bub U (2009) Outline of a Design Science Research Process, *DESRIST'09 Proceedings*, Malvern

Orlikowski W J, Iacono C S (2001) Desperately seeking the "IT" in IT research – a call to theorizing the IT artifact, *Information Systems Research*, Vol 12 (2), pp 121-134
Pain H (2011) Practice research: what it is and its place in the social work profession, *European Journal of Social Work*, Vol 14 (4), p 545-562
Papas N, O'Keefe R, Seltsikas P (2012) The action research vs design science debate: reflections from an intervention in eGovernment, *European Journal of Information Systems*, Vol 21 (2), p 147–159
Peffers K, Tuunanen T, Rothenberger M A, Chatterjee S (2007) A design science research methodology for information systems research, *Journal of Management Information Systems*, Vol 24 (3), p 45–77
Pickering A (1995) *The mangle of practice. Time, agency & science*, University of Chicago Press, Chicago
Rapoport R N (1970) Three dilemmas in action research, *Human Relations*, Vol 23 (6), p 499-513
Reckwitz A (2002) Toward a Theory of Social Practices. A Development in Culturalist Theorizing, *European Journal of Social Theory*, Vol 5 (2), p 243–263
Salisbury Forum Group (2011) The Salisbury Statement, *Social Work & Society*, Vol 9
Schatzki T R, Knorr Cetina K, von Savigny E (Eds, 2001) *The practice turn in contemporary theory*, Routledge, London
Schein E (2001) Clinical inquiry/research, in Reason P, Bradbury H (Eds, 2001) *Handbook of action research*, Sage, London
Sein M, Henfridsson O, Purao S, Rossi M, Lindgren R (2011) Action design research, *MIS Quarterly*, Vol 35 (1), p 37-56
Simon H A (1996) *The sciences of the artificial*, MIT Press, Cambridge
Simpson B (2009) Pragmatism, Mead and the Practice Turn, *Organization Studies*, Vol 30 (12), p 1329–1347
Sonnenberg C, vom Brocke J (2012) Evaluation patterns for design science research artefacts, in Helfert M, Donnellan B (Eds, 2012) *EDSS 2011*, CCIS-286, Springer, Berlin
Stevenson C (2005) Practical inquiry/theory in nursing, *Journal of Advanced Nursing*, Vol 50 (2), 196–203
Susman G I, Evered R D (1978) An assessment of the scientific merits of action research, *Administrative Science Quarterly*, Vol 23 (4) p 582-603
Uggerhøj L (2011) What is Practice Research in Social Work - Definitions, Barriers and Possibilities, *Social Work & Society*, Vol 9
van Aken J (2004) Management research based on the paradigm of the design sciences: The quest for field-tested and grounded technological rules, *Journal of Management Studies*, Vol 41 (2) p 221-246
Venable J (2006) The role of theory and theorising in design science research, in *Proc of DESRIST 2006*, Claremont
Venable J, Pries-Heje J, Baskerville R (2012) A comprehensive framework for evaluation in design science research, in *DESRIST 2012*, LNCS 7286, Springer, Berlin
Walker M, Takayama L, Landay J (2002) High-fidelity or low-fidelity, paper or computer? Choosing attributes when testing web prototypes, *Proc. Human factors and ergonomics society 46th annual meeting*
Walls J G, Widmeyer G R, El Sawy O A (1992) Building an information systems design theory for vigilant EIS, *Information Systems Research*, Vol 3 (1), pp 36-59
Wieringa R, Morali A (2012) Technical action research as a validation method in information systems design science, *Proceedings DESRIST 2012*, LNCS 7286, Springer, Berlin
Winter R (2008) Design science research in Europe, *European Journal of Information Systems*, Vol 17, p 470–475
Whittington R (2006) Completing the practice turn in strategy research, *Organization Studies*, Vol 27 (5), p 613–634