Title	Action design research: a comparison with canonical action research and design science
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Publication date	2015-05
Original Citation	MACCANI, G., DONNELLAN, B., HELFERT, M. 2015. Action design research: a comparison with canonical action research and design science. In: DONNELLAN, B., GLEASURE, R., HELFERT, M., KENNEALLY, J., ROTHENBERGER, M., CHIARINI TREMBLAY, M., VANDERMEER, D. & WINTER, R. (eds.) At the Vanguard of Design Science: First Impressions and Early Findings from Ongoing Research Research-in-Progress Papers and Poster Presentations from the 10th International Conference, DESRIST 2015. Dublin, Ireland, 20-22 May. pp. 69-76.
Type of publication	Conference item
Link to publisher's version	http://desrist2015.computing.dcu.ie/
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Download date	2024-04-28 13:53:09
Item downloaded from	https://hdl.handle.net/10468/1809

Action Design Research: A Comparison with Canonical Action Research and Design Science

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Abstract.
This research in progress paper addresses the IS issue in relation to conducting relevant research while keeping academic rigor. In particular, it contributes to the ongoing academic conversation around the investigation on how to incorporate action in design science research. In this document the philosophical underpinnings of the recently proposed methodology called Action Design Research [1] are derived, outlined and integrated into Burrel and Morgan's Paradigmatic Framework (1979)[6]. The results so far show how Action Design Research can be considered as a particular case of Design Science Research (rather than a methodology closely related to Action Research) although they can assume two different epistemological positions. From these philosophical perspectives, future works will involve the inclusion of actual research projects using the three different methodologies. The final goal is to outline and structure the divergences and similarities of Action Design Research with Design Science Research and Canonical Action Research.

Keywords: *Action Design Research, Paradigmatic Framework, Design Science, Canonical Action Research.*

1   Introduction

This paper addresses the well acknowledged issue in Information System (IS) research about conducting relevant studies while keeping academic rigor. To date, several research streams and academic conversations have sought to address these problems. More specifically, this paper seeks to extend the debate around the philosophical differences between Design Science Research (DSR) [2] and Canonical Action Research (CAR) [3] by including a recently proposed methodology named Action Design Research [1]. Particularly, this paper shows how its introduction to the IS community can be seen as a fundamental step towards solving the relevant methodological issue on how to embed action components in design science projects [4]. In order to achieve this goal, this study aims at comparing these three methodologies at

both the philosophical and practical levels. This research in progress paper tackles the first perspective. In detail, with this document we aim at extending the work published in [5], in which Burrel and Morgan's Paradigmatic Framework (1979) [6] was adopted to analyze the differences and commonalities between DSR and CAR, by including Sein *et al.*'s (2011) methodology. Additionally, Action Design Research (ADR) will be positioned in relation to DSR and CAR.

After this brief introductory section, a review of relevant related works will be presented in section 2. Subsequently the main features of DSR and Action Research will be described. In section 4, which represents the core of this document, the philosophical underpinnings and assumptions upon which Action Design Research is situated will be investigated and interpreted. Finally, before some conclusions are drawn, a reflection and comparison with both DSR and CAR will be presented.

2   Related Works

The debate around the existing relationships and the comparison between DSR and Action Research has been relevant for at least the last two decades among IS researchers [7]. Different levels of analysis have been involved in such academic conversation. One of the most cited contributions in this way is represented by the work published in [8]. Here the author took into account the research activities that are typically implemented in these two approaches, concluding that DSR and Action Research are similar. His suggestion aimed at moving conceptually Action Research from a purely qualitative approach to a more Design Science-oriented one. Two years later, a relevant contribution to this conversation was added by Ivari and Venable (2009) [5]. In their study, in order to further compare the DSR and Action Research (in this work [3]'s Canonical Action Research paradigm was taken as reference), the authors went at a more abstract level by providing a structured philosophical analysis. In detail, they used [6]'s Paradigmatic Framework to highlight the different philosophical assumptions that underpin the two methodologies. Their conclusions strongly contradicted the claims made in [8]. In addition, Ivari and Venable (2009) tried to outline a range of possible situations in which the two approaches can overlap. They concluded by accepting that DSR and CAR are "*compatible with each other, (but) they may be difficult to combine for more practical reasons*" [5, pp.10]. In detail, CAR principles can be consistent within DSR projects especially in the evaluation stage of already developed artifacts. However, in their opinion, this match can happen only if the evaluation is of the type "natural", as opposed to the "artificial" one which should be prioritized in DSR projects [4].

Another contribution that is relevant to this discussion is ingrained in the basic forms of Engaged Scholarship outlined in [9] (see Figure 1). Particularly, DSR and Action Research are shown in relation to the scope of Engaged Scholarship. Here the two axis upon which the matrix is built are clearly referring to ontological and epistemological differences. Again, the similarity between DSR and Action Research proposed in [8] is contradicted.
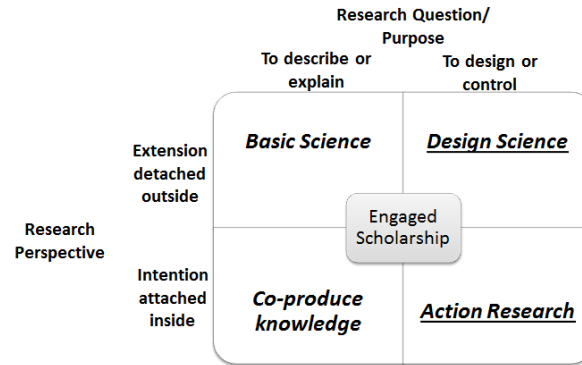
Figure 1.   Alternative Forms of Engaged Scholarship [9, pp.27].

More recently a new research methodology named Action Design Research [1] was introduced to the IS community. Its name suggests its suitability to solve these issues around "incorporating action" in DSR.

This paper aims at adding to the analysis published in [5] the philosophical underpinnings of this recently proposed methodology. An accurate look at the results will help us both in gaining insights about positioning Action Design Research in this conversation and in reflecting upon questions such as *"Is Action Design Research similar to CAR? Or is it a particular case of DSR? Or, finally, is it a completely new research perspective?"*

3   Design Science Research and Canonical Action Research

Design Science has its origins in the work of Herbert Simon [10] but entered mainstream IS academic literature following the seminal paper by Hevner *et al.* (2004) [2] which provided *"a concise conceptual framework and clear guidelines for understanding, executing and evaluating (design science) research"* (pp. 75). The authors state that design science is fundamentally a problem-solving paradigm that seeks to *"create innovations that define the ideas, practices, technical capabilities, and products through which the analysis, implementation, management and use of information systems can be effectively and efficiently accomplished"* (pp. 76). Hevner *et al.* describe the primary goal of their paper is *"to inform the community of IS researchers and practitioners of how to conduct, evaluate, and present design science research"* [2, pp. 77]. The research activities of design science within the IS discipline are described via a conceptual framework for understanding information systems research and a clear set of seven guidelines are proscribed for conducting and evaluating good design science research.

On the other hand, Action Research originated from the work of Kurt Lewin during the 1940s and has been summarized as an approach that *"combines theory and prac-*

tice (and researchers and practitioners) through change and reflection in an immediate problematic situation within a mutually acceptable ethical framework" [11]. This definition entails a view of the methodology as an approach aiming at contributing to both the existing knowledge base and practice in terms of providing a solution to a specific entity. As a consequence, Action Research *"is highly context dependent while attempting to address the specific client's concerns"* [5]. Despite the plethora of "versions" in which Action Research was formulated (e.g. [12], [13]), this study considers Canonical Action Research [3] as reference. In this seminal article, the authors defined the methodology through the formulation of five distinct principles, which are: (1) the principle of the researcher-client agreement, (2) the principle of the cyclical process model, (3) the principle of theory, (4) the principle of change through action, and (5) the principle of learning through reflection [3].

In reflecting upon philosophical assumptions of these two methodologies, Ivari and Venable (2009) contextualized Burrel and Morgan's Paradigmatic Framework to explore and understand similarities and differences of the two methodologies at the philosophical level. Their conclusions are summarized in Figure 2.

Paradigmatic dimension	Action Research	Design Science Research
Ontology	Anti-realism	Realism or anti-realism
Epistemology	Mainly anti-positivism	Mainly positivism, but also anti-positivism especially in evaluation
Methodology	Idiographic	Constructive (building) Nomothetic (evaluation) Idiographic (evaluation)
Ethics	Means-end Possibly interpretive Unlikely critical	Means-end Possibly interpretive Possibly critical

Figure 2.   Paradigmatic Assumptions of CAR and DSR [5, pp.8].

From this study it could be learnt how DSR can assume a variety of positions, while CAR is more limited in this way. Notwithstanding, Action Research can be applied (also consistently with [14]) as part of the evaluation stages of DSR projects, and so be considered as a "special case of DSR" [5].

4   Action Design Research

The Action Design Research (ADR) methodology is defined as "*research method for generating prescriptive design knowledge through building and evaluating ensemble IT artifacts in an organizational setting*" [1]. Its particular contribution was also described as the implementation of design science research to solve an organizational-related problem defined as an instance of a class of problems, in which the evaluation is conducted in a highly participatory process [15]. The ADR cycle is based on four main research stages: (1) Problem Formulation, (2) Building Intervention and Evaluation, (3) Reflection and Learning, and (4) Formalization of Learning. The first step involves the definition of the problem that is required to be solved.

Here, the problem has to be identified, articulated, and scoped. Particularly important at this stage, is to relate the organizational problem to a broader class of problems. This first stage of the methodology is drawn upon two principles: (1) *Practice Inspired Research* and (2) *Theory-Ingrained Artifact* [1]. The second stage of the ADR methodology is related to the process of building, intervention, and evaluation (BIE) of the artifact. Again a number of principles are proposed in this seminal article, and these are: (3) *Reciprocal Shaping,* (4) *Mutually Influential Roles*, and (5) *Authentic and Concurrent Evaluation*. After discovering initial theoretical contribution targets, the methodology also distinguishes between an IT-dominant-BIE (that is mainly focused on innovative technological design) and an organization-dominant-BIE (this format is related to the decision making processes within the organization). Both of these BIE types identify a highly participatory design process. The third step of ADR is crucial to ensure the contribution to knowledge of the research project. This stage is drawn on the principle (6) named *Guided Emergence*. Finally, the last stage proposed in [1] emphasizes once again the importance of having a (7) *Generalized Outcome* that can be further developed into general solution concepts for a class of field problems. The research outcome is then a theory-ingrained artifact, where theories allow the research team to both structure the organizational problem as an instance of a class of problems in literature, and guide the design [16]. The generalized outcome is achieved through the ongoing reflection and learning step, and the final formalization of learning one. In this way, the organizational related problem can be solved without precluding the creation of an original contribution to existing knowledge.

Based on this overview of the methodology, we will now attempt to derive some conclusions about the philosophical underpinnings and assumptions of such approach. Again, in order to be able to compare these with the ones of DSR and CAR [5], Burrel and Morgan's Paradigmatic Framework (1979) [6] will be adopted. Thus, starting from the ontological standpoint, we believe the ADR methodology sits in an Anti-Realistic position in the continuum between the two extremes, i.e. Nominalism and Realism. As a rationale for this statement we underline once again how ADR aims at the creation of a "theory ingrained artifact", which excludes the total nominalistic view of the world. On the other hand, the action design researcher actively inscribes theoretical elements in the ensemble artifacts thus manifesting theory in a *"socially recognizable form"* [17] (cited in [1]). As a consequence, we rationally conclude that ADR adopts an Anti-Realistic ontological position as reality is seen as something socially constructed that can be changed, as opposed to a view of the world made of immutable, hard and tangible structures (i.e. typical Realistic position).

Epistemologically, the assumptions behind ADR can be compared to the ones made in literature on DSR. Particularly, it has been discussed that in DSR both positivistic [2], [18] and anti-positivistic [19] positions can be relevant. In detail, the latter is considered as important especially in the evaluation stage of already developed artifacts. Similarly, we believe that ADR can assume both these positions too. However, the rationale behind this thought sees an anti-positivistic assumption regarding the problem formulation and the BIE stages, reflected in addressing a problem situation encountered in a specific organizational setting by an intervention and an evalua-

tion of the designed artifact. In other words, the world from this perspective can be understood from the point of view of the individuals that are directly involved in the activities to be studied. Notwithstanding, by implementing the ongoing Reflection and Learning stage, the researcher (or researchers) moves conceptually "*from building a solution to a particular instance to apply that learning to a broader class of problems*" [1]. This movement from the specific solution to the class of systems typified by the ensemble artifact seeks to provide an explanation and a prediction around what happens in the reality by defining regularities and causal relationships between its constituent elements (typical positivistic epistemological perspective). As a result, we can suggest that the contribution to knowledge of ADR can also have a strong positivistic nature.

Regarding instead the methodology dimension within Burrel and Morgan's Paradigmatic Framework (1979) [6], it is relevant to consider that the action design researcher "*should generate knowledge that can be applied to the class of problems that the specific problem identifies*", and the "*outcomes can be characterized as design principles and as refinements to theories that contributed to the initial design*" [1]. So, the aim of designing a "*Generalized Outcome*" (ADR, Principle 7) led us to conclude that the methodological approach is underlined by nomothetic concepts (as opposed to idiographic ones that are focused on a particular case and not on the formalization of general laws). Finally, regarding the ethical (or axiological) perspective, the prescriptive-knowledge-generation-oriented process of ADR makes it clear that its ethical philosophical underpinnings are far away from being Critical (in which critical research subjects goals to a critical analysis) and Interpretive (in which goal statements do not precede actions; rather they are re-constructed retrospectively to assign a meaning to these activities). Thus, we are confident in stating that ADR assumes a Means-End ethical position. Consistently, in ADR the research questions and the subsequent research goals (or ends) are defined within the problem formulation stage. Therefore they precede the BIE cycle (i.e. actions); finally it should be noted that the ADR artifact to be developed is assumed to have some purpose (this thought is ingrained in the artifact-oriented research).

5   Reflections, Conclusions, and Future Works

In this last section of the paper the preliminary findings achieved through the analysis previously presented will be highlighted and briefly discussed. In Table 3 the Paradigmatic Framework contextualized in [5] is expanded with the ADR philosophical assumptions previously derived. As shown in Table 2, ADR and DSR research cover the same philosophical underpinnings. This result suggests how, in first approximation, ADR can be considered as a particular case of DSR, rather than a methodology closer to Action Research. The reason of such interpretation is found mainly in the scope of ADR projects, i.e. "*building and evaluating ensemble IT artifacts*" [1].

DIMENSION	POSITION	CAR	DSR	ADR
ONTOLOGY	Realism			
	Nominalism	(non-realistic)	(non realistic)	(non realistic)
EPISTEM.	Positivism	●	●	Knowledge Contr.
	Anti-Positivism.		●	BIE Cycle
METHOD.	Nomothetic		●	Generalized Outcome
	Idiographic	●		
ETHICS	Means-end	●	●	Goals-driven
	Interpretive	(rarely)		

Table 2.   Paradigmatic Assumptions of DSR, CAR, and ADR.

However, some paradigmatic divergences are in place also between ADR and DSR. Specifically, while ontologically, methodologically, and ethically the two approaches are very similar, there is a substantial epistemological difference between the two methods. Particularly, DSR aims at the design of general solution concepts which are applicable not just to a specific organizational context. In other words, in the so called "*build and then evaluate*" path of DSR, the first stage involves a positivistic epistemology (especially in the engineering field), while anti-positivistic assumptions are likely to emerge when the artifact is instantiated. On the other hand, because of the nature of ADR, the design process within it is more likely to have as underlying assumptions anti-positivistic positions. In fact, in a typical ADR project the problem as well as the artifact are conceived from the point of view of the individuals who are directly involved in the activities which are to be studied. Thus, the design stage (or stages) is (unlike DSR) underpinned by anti-positivistic paradigmatic assumptions. The positivistic side of the methodology emerges in both the ongoing Reflection and Learning stage, and the Formalization of Learning one, when the specific organizational-related solution is related to a broader class of solutions, or, in other words, to a generalized outcome. We believe that an explanation for this epistemological difference that exists between ADR and DSR is given by the different role that the organizations play in the two approaches. In detail, while in DSR the organizational intervention is considered to be secondary [20], in ADR projects the organization is part of the ADR team since the beginning and the design process is highly participatory. As a result the ADR artifact is "socially constructed", thus not consistently with positivistic epistemology.

Overall the paper contributes to the IS literature by extending Ivari and Venable's study [5] towards including the ADR perspective into their contribution. Future works will ingrain in the analysis actual research projects to leverage this discussion and derive significant conclusions.

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