Introducing PADRE: Participatory Action Design Research

Amir Haj-Bolouri a, Lennarth Bernhardsson b and Matti Rossi c

a University West, Sweden
b University West, Sweden
c Aalto University, Finland

Abstract

Action Design Research (ADR) is a Design Research (DR) method that enriches the Design Science Research (DSR) paradigm, by providing stages and principles for designing IT-artifacts and allowing for their emergence in an organizational context. The method has been used and elaborated by scholars, extending the mode of the method and its stages, incorporating and adopting knowledge from related approaches such as Participatory Action Research (PAR) and Participatory Design (PD). In this paper, we have adopted principles and philosophy from PAR and PD to extend and elaborate the ADR method, by providing a front-end of Action Research (AR) that emphasizes learning through incremental iteration. We will introduce our elaborated method as Participatory Action Design Research (PADRE) and demonstrate how we have used it in our own research. We argue that the ADR method can benefit from incorporating learning within and across each and every stage iteratively. We also argue that learning can be used as a repository of knowledge, which informs and gets accumulated for formalization of learning that can be re-used within different cycles of ADR. Hence, we introduce PADRE and provide a model that consists of a set of key-components, which extends and elaborates the ADR method.

Keywords: Action Design Research, Participatory Action Design Research, Design Science Research

1 Introduction

Action Design Research (ADR) is a research method for generating prescriptive design knowledge through building and evaluating ensemble IT artifacts in an organizational setting (Sein et al., 2011). The DSR paradigm has flourished since Hevner et al’s (2004) seminal paper as an approach, establishing a comprehensive arena for IS-research and increased volume of publications (Indulska & Recker, 2008). As a research approach, DSR provides and enables researchers to develop a body of knowledge based on technology invention (Venable, 2006), which practitioners (e.g. software engineers) can use as technology application (Alturki & Gable, 2014). DSR-outcomes are then divided into abstract and practical knowledge, where the first-mentioned deals with development of design principles and design theories (Gregor & Jones, 2007; Venable, 2006; Walls et al., 1992), and where the latter-mentioned emphasize building and evaluating IT-artifacts to address a general class of problems (March & Smith, 1995; Hevner et al., 2004).
As a further development to the DSR approach, the ADR method deals with two major challenges: (1) addressing a problem situation encountered in a certain organizational setting by intervening and evaluating; and (2) constructing and evaluating an IT-artifact, which addresses the class of problems typified by an encountered situation. Sein et al (2011, p. 4) state that: “A new research method is needed to conduct Design Research that recognizes that the artifact emerges from interaction with the organizational context even when its initial design is guided by the researchers’ intent. We propose ADR as such a method”. In other words, Sein et al (2011) proposes that new information systems are or should not be designed and developed in isolation from the organizational environment(s) that they would be used in. Instead, they propose that there should be a tight relation between the research activities of building, intervention, and evaluation (BIE) in a cycle, together with extensive participation by key stakeholders such as researchers, practitioners and end-users. Hence, they provide a research model emphasizing four different stages incorporated with guiding principles for problem formulation, BIE, reflection and learning, and formalization of learning shown in Figure 1.

Figure 1: ADR Method: Stages and Principles (Sein et al., 2011)

In the course of our own research project, we have conducted our research activities according to the stages and principles of the ADR method (shown in Figure 1). The project was conducted at a municipality in Sweden, emphasizing building, intervening and evaluating an IT-artifact for conducting and distributing civic orientation through E-Learning. Several papers have, during the course of our research activities and their outcomes, been written reporting our findings in terms of: early design implications for online-distributed civic orientation (Haj-Bolouri et al., 2014), tentative design principles for an open digital experience of civic orientation (Haj-Bolouri & Svensson, 2014), the nature of our intervention in terms of introduced and utilized technology for civic orientation (Haj-Bolouri et al., 2015) and a design theory for adaptable E-Learning (Haj-Bolouri et al., in press).

The project has worked in close cooperation with practitioners and end-users involved in the project, conducting our research activities both on a conceptual and practical level, designing and evaluating the IT-artifact tightly together with stakeholders in the project. After conducting our first ADR-cycle, we discovered that we had applied the ADR method incorporating activities for reflection and learning from the beginning to the end. Doing so, we had involved the stakeholders from day one through participatory workshops, design workshops, and collaborative activities em-
phasizing reflection and learning upon collective decision-makings affecting the design and development of the IT-artifact. We also realized that we had applied ADR to a complex, “wicked” problem, where no explicit artifact exists to address the problem of replicating the distribution of civic orientation through E-Learning. Thus, we were forced to re-examine how the ADR method provides necessary means for encapsulating and distributing early learning outcomes, which can incrementally and iteratively be formalized and used to resolve emerging challenges throughout the process of one to many cycles.

We studied how the ADR method emphasizes reflection and learning in terms of guided emergence, where researchers “move conceptually from building a solution for a particular instance, to actually applying that learning to a broader class of problems” (Sein et al., 2011 p. 8). Such guidance is incorporated throughout the third stage of ADR. Although the third stage is interconnected with the first and the second stage in the ADR-method, ADR doesn’t explicitly provide reflection and learning as an integrated component within each and every stage. Instead, reflection and learning is regarded as a separate stage, where researchers and practitioners dedicate separate activities that comprise reflection upon learning, which in the end (the fourth stage) gets formalized into general principles (e.g. design principles). However, our learning outcomes from the first ADR cycle provided us insights for how to conduct the second cycle by establishing an early space for reciprocal reflection and learning for everyone involved in the project. We implemented our idea throughout the second cycle, and wondered: how the ADR method can be elaborated to incorporate reflection and learning through early-embedded cycles of iteration, providing actively involved stakeholders and researchers continuous space for reflection, learning and action iteratively? In other words, we started asking ourselves if the ADR method could be elaborated and extended as a research method, providing researchers early stages of reflection and learning for collective decision takings in an ADR project. Thus, we started reading literature about how participatory research approaches, such as Participatory Action Research (PAR) and Participatory Design (PD), advocate solving problems and encapsulating learning outcomes during early stages of research activities (Swantz, 2008; Rahman, 2008; Pretty et al., 1995). We also found out how other scholars have approached extending the ADR method into flexible modes of elaboration (Mullarkey & Hevner, 2015), imposing participatory action research as a complementary for ADR (Blindzic & Venable, 2011). Hence, the purpose with this paper is to present our findings as an elaborated version of the ADR method, and advocate how embedded reflection and learning can be integrated into each and every stage of the model. We will introduce our elaborated version as PADRE (Participatory Action Design Research). But before doing so, we will present related research emphasizing Mullarkey & Hevner’s (2015) and Blindzic & Venable’s (2011) contributions. We urge that their contributions are of crucial character in terms of elaborating the ADR method. They have not only proven that the method can be complemented through different facets of change, but they have also shown that the ADR method has potential for further refinement and expansion through inspiration from other research approaches. The rest of this paper is structured as following: (1) we present related research, (2) we introduce PADRE, (3) we frame PADRE by describing how we have applied it in our own research, and finally (4) we will discuss PADRE through an concluding discussion.
2 Related Research

Several scholars have either cited, used and/or suggested to extend the ADR method. ADR as a method has been used to build and intervene ensemble artifacts within a wide range of application areas stretching from museums (Coenen et al., 2013), to service development (Tate & Furtmueller, 2012), to end-user development (Rosson & Carroll, 2013; Lempinen & Tuunainen, 2011) and other interconnected areas, which justifies ADR in practice and theory (Maccani et al., 2014; Sjöström, 2010). But more relevantly, scholars have also suggested extending the ADR method through various forms of elaboration (Bilandzic & Venable, 2011; Mullarkey & Hevner, 2015). We will in the upcoming sub-sections present and discuss two relevant elaborations. Our choice with presenting the following two elaborations is based upon their conceptual relevance to our own conducted research, but also because of their significance in terms of inspiration, rigor and research within the frame of DSR in general, and ADR in particular.

2.1 Developing Action Design Research Further

Recently, Mullarkey & Hevner (2015) presented an extended model of the ADR method, by expanding the method with two up-front activities and multiple entry points for entering the ADR method. They discovered a disconnection in the fundamental assumptions and definitions of the ADR method, arguing that: “ADR tends to suggest a single design science research entry point focused on an existing information system using an action research cycle from problem formulation to build, intervention and evaluation” (Mullarkey & Hevner, 2015 p.133). To fill their discovered gap, they extended the original ADR model by introducing a problem diagnosing and concept design stage, together with the possibility of multiple DSR entry points shown in Figure 2. Figure 2 depicts for an ADR-process that provides multiple entry points for researchers to flexibly facilitate their research contributions, often required to obtain publication in top tier journals. They incorporated the DSR model presented by Peffers et al (2007) and elaborated the ADR method to be effective at the earliest possible entry point in Peffers et al’s (2007) model, by proving its value to an iterative, practice-inspired, theory-ingrained artifact with research contributions at every stage in the process of the model (Mullarkey & Hevner, 2015).

![Figure 2: ADR Continuum with Stages and Entry Points (Mullarkey & Hevner, 2015)](image)

Figure 2 also suggest that the activities of intervention, evaluation and reflection on learning cycles, can exist across stages as well as at each stage in the artefact development. The triangles in the model, indicates a modification of Sein et al’s (2011) original BIE-triangle, offering to describe the activity at each stage of the fully elaborated ADR together with each entry point. Mullarkey and Hevner’s (2015) contribu-
tion with extending the ADR model provides researchers flexible ways of entering ADR at multiple points, without necessarily being bound to the first stage of Sein et al’s (2011) original model. However, Mullarkey & Hevner’s (2015) model puts less focus on how to actually involve stakeholders and engage them early on throughout the ADR cycle. The model does not explicitly emphasize any methodological constraints in terms of incorporating other relevant research approaches (e.g. PAR) as an extended component for the ADR method. The model is an excellent contribution in terms of facilitating flexible entry points for conducting ADR at various levels of engagement (e.g. objective centred, development centred). But could the model benefit from incorporating guidelines and principles on how to actually establish embodied cycles of iteration throughout the process of intervention, evaluation and reflection on learning? Would it be beneficial to incorporate reflection and learning early on in an ADR project, partly due to the varieties of ADR projects, but also due to the idea of shaping and re-shaping the ensemble IT-artifact in interaction with key stakeholders? In order to answer such types of questions, we look further on how Bilandzic and Venable (2011) have elaborated the ADR method by working towards a participatory action design research method for urban informatics.

2.2 Towards Participatory Action Design Research for Urban Informatics

Bilandzic and Venable (2011) propose a new research method for studies in the urban informatics domain. They introduce their research method as PADR (Participatory Action Design Research) for urban informatics. Their research method supports urban informatics research in developing new “technological means” to resolve contemporary issues, to support everyday life in urban environments (Bilandzic & Venable, 2011). The need for PADR as a research method derives from the nature of urban informatics, which is situated in a socio-technical context. Therefore, PADR combines Action Research (AR) and DSR by adapting them to the cross-disciplinary needs and research context of urban informatics.

PADR incorporates different aspects of AR and DSR, and is constituted through five phases or activities: diagnosing, action planning, action taking design intervention(s), impact evaluation and learning and creation of actionable knowledge for the client, which in the context of urban informatics is the same as city planners, government, developers, local organizations and the public in general. Figure 3 depicts each and every phase in PADR, by presenting the foundation of PADR as a nexus between DSR, AR and ADR.

Figure 3: Participatory Action Design Research - a research method for Urban Informatics (Blindzic & Venable, 2011)
PADR initiates through activities for diagnosing and problem formulation. The first phase suggests that: “Urban Informatics researcher together with the clients and other stakeholders need to make use of ways to organise and facilitate participation, ethnographic means to investigate the diversity of needs from the variety of stakeholders in the community/public…” (Blindzic & Venable, 2011 p. 10).

In the second phase, the authors state that it is important that the participants are involved as co-planners for taking action (e.g. the design of new technology). Activities such as design, development and evaluation of new technology shall be planned through increased participation for a realistic evaluation.

During the third phase, PADR is concerned with the actual design and development of the technology, as well as early testing. The phase involves participative design, prototyping and usability evaluation (Kensing, 2003; Schuler & Namioka, 1993). However, Blindzic & Venable (2011) distanciate themselves from using ADR for prototype evaluation. Instead, they advocate for DSR-recommendations deriving from Baskerville et al (2011), who identify evaluation goals and how to achieve them using a combination of ex ante and ex post evaluations.

In the fourth phase of impact and evaluation, the overall goal is constituted through a collection of researchers, clients, and stakeholders collaboratively work on defining and any actions or design interventions taken are evaluated according to the early results from the initial setting. Usability evaluation methods are borrowed from Human Computer Interaction (HCI) to provide insights to the HCI community about new artifacts and methods being used in the real world instead of an isolated laboratory.

In the fifth and final phase, participants are encouraged to collaboratively enable clients and stakeholders to carefully reflect upon valuable insights and learning from previous activities and phases. The authors stress that it is important that reflection and learning gets communicated to those involved in a PADR research project. They also suggest that such knowledge gets formulated and communicated as Urban Informatics Design Theories, as opposed to design theories in DSR (Gregor & Jones, 2007; Venable, 2006; Walls et al., 1992).

In summary, Bilandzic & Venable (2011) propose a comprehensive and substantial model for conducting participatory ADR in urban informatics. Their method incorporates principles and concepts from a wide range of different research approaches such as Action Research, Design Science Research, Human Computer Interaction, Participatory Design and many more. The essence of PADR lies in adapting and offering an aggregated model, which applies streams of participatory action oriented methods for urban informatics. The method emphasizes the importance of involving and engaging relevant stakeholders through a participatory approach, where activities for design, development and evaluation is conducted collaboratively. However, reflection and learning is formalized as a last phase in the method, and not iteratively throughout the whole process of a PADR project. And even though the authors stress for a new method that suits the needs of urban informatics, they haven’t used and evaluated their method in practice. Therefore, the validity of their method in practice is still a question for practitioners applying their method to answer.
3 Participatory Action Design Research (PADRE)

Inspired by works of Mullarkey & Hevner (2015) and Blindzic & Venable (2011), insights gathered from our own research project (Haj-Bolouri et al., 2014; Haj-Bolouri & Svensson, 2015; Haj-Bolouri et al., 2015), and literature on PAR and PD (Swantz, 2008; Rahman, 2008; Kensig, 2003; Pretty et al., 1995; Schuler & Namoka, 1993), we will in this section briefly introduce our elaborated version of Sein et al.’s (2011) ADR method. We will present our elaboration as PADRE, an extended method, incorporating principles and philosophy deriving from PAR and PD. Finally, we will present the constitution of PADRE and describe each and every component of PADRE separately.

3.1 The Basic Idea of PADRE

PADRE stands for Participatory Action Design Research. The basic idea of PADRE is to elaborate Sein et al.’s (2011) ADR method, and provide IS-researchers a reciprocal space for early iterations of reflection and learning. PADRE stresses that reflection and learning can occur early on throughout the stages of problem formulation and building, intervention and evaluation. Mullarkey & Hevner’s (2015) flexible model for entering action design research, also points at similar directions, incorporating reflection and learning at different levels of ADR activities (see Figure 2). In line with Mullarkey & Hevner (2015), we suggest that reflection and learning can be established early in an ADR project, providing the ADR-team (e.g. researchers and stakeholders) iterative cycles of activities for planning, implementing, evaluating and reflecting for learning. PADRE is therefore inspired by principles deriving from PAR and PD, advocating for tight interaction between stakeholders and researchers, including and engaging the stakeholders throughout each and every stage in an ADR cycle. Such philosophical underpinning is already informed and reported through the stages and principles of ADR. But the method doesn’t provide any explicit notion on how to establish iterative cycles of reflection and learning, without loosing momentum in the stages of problem formulation and BIE. We suggest resolving such issues by incorporating principles from PAR and PD, which informs how to engage stakeholders and researchers into a reciprocal space for iterative cycles of continuous reflection and learning.

3.2 The Relation Between PADRE, PAR and PD

PADRE adopts, and is inspired by informing principles deriving from PAR and PD. The participatory nature of PADRE, suggests that it is important to build effective relations between stakeholders and researchers in an ADR project. Such relations shall be initially established through mutual understanding of the stakeholders’ goals and motivations with solving crucial problems through technology intervention. Early needs and requirements shall govern reciprocal dialogues between stakeholders and researchers. The dialogues are crucial for establishing mutual understanding towards activities for problem formulation and BIE. For establishing such mutual understanding between researchers and stakeholders, PAR suggests to involve practitioners as both subjects and co-researchers (Argyris & Schon, 1989), through extensive forms of active participation throughout the whole process of formulating problems, to actually presenting and discussing action implications (Rahman, 2008; Whyte et al., 1989).
We suggest that PAR is relevant and sufficient in terms of establishing a “community perspective” between stakeholders and researchers, rather than a simple dichotomy that distinguishes them in terms of their specific roles in an ADR project. But in terms of accomplishing specific tasks in a project, it is inevitable to not have specific roles attached to the stakeholders and researchers. At the same time, we don’t find such notion crucial in order to establish continuous reflection and learning; stakeholders and researchers co-create and share learned outcomes in their community. They iterate back and forth through mutual dialogues (e.g. participative workshops), generating incremental suggestions for early prototyping and usability evaluation (Kensing, 2003; Schuler & Namioka, 1993). Hence, inspired by the philosophy of PAR and PD, PADRE comprises the four following components: (1) **Plan** – a plan based on early identified needs and requirements. (2) **Implement** – an early prototype implementation based on the plan. (3) **Evaluate** – evaluating observations and usability testing. (4) **Reflect** – reflections towards the next iteration cycle. The reflections can be preliminary towards a new cycle, or definitive towards the formalization process.

We will in the next section, describe and explain the structure of PADRE together with its key-components.

### 3.3 The Structure of PADRE

PADRE consists of four key-components together with comprising activities that inform each and every component (shown in Figure 4). The first key-component is the component **Plan**. A PADRE project is initiated through planning activities where identifying needs and requirements are crucial for addressing knowledge requirement and need of artefact intervention. This initial stage is similar to the problem diagnosing and concept design stages in Mullarkey & Hevner’s (2015) extended ADR model, where planning to implement an early prototype of the artefact is possible for further decision-making. During the planning stage, stakeholders are extensively encouraged to participate and contribute with representative input towards requirements and needs in terms of artefact features. It is during this early stage, which the researchers in the project, establishes a reciprocal space for continuous reflection and learning. Such space gets established through early workshops and training sessions together with the stakeholders, providing mutual prerequisites for reflection and learning (e.g. participative workshops). It is also during this stage, which a tight connection for co-creating an evolving research environment (Argyris & Schön, 1989) is established. Reflection and learning from the first stage results into early formulated needs, which are addressed through implementation of an early prototype and system features.

The second key-component is the **Implement** component. Based on initial reflection and learning outcomes from previous activities, the second component encapsulates activities for implementing an early prototype together with prototype features that address formulated needs and requirements. The prototype is, through the original ADR manner, implemented in the actual organization that it is going to be used in (Sein et al., 2011). Stakeholders such as end-users and practitioners are, through guidance by the researchers, provided with early increments of the artefact for enhanced usability evaluation (Schuler & Namioka, 1993). The implementation phase results into learning outcomes about the quality and usability of the early prototype features, together with how well they address stakeholders’ early needs and requirements. Stakeholders establish an experience through interacting and testing the early
prototype, which generates learning about the different functions of the prototype. The learning gets transformed into insights about experienced moments with the prototype, which provides stakeholders more knowledge towards coordinating artefact roles (e.g. which stakeholder does what with the artefact) and revised functionality specification.

The third key-component is the **Evaluate** component. Learning outcomes from the implementation component are evaluated continuously through participative observation and usability testing by researchers and stakeholders. Stakeholders are encouraged to learn how prototype features are used through observation and interaction. They interact with the features through participative activities such as regular meetings, workshops and training sessions, where they report what they want to refine in terms of prototype design and functionality. The stakeholders’ and researchers’ observations, lead to a mutual form of guided emergence, where participants of the workshop/session collaborate towards a refined version of the preliminary plan. But before revising the plan, a final stage of reflection is conducted reciprocally between the researchers and stakeholders.

The fourth and final key-component is the **Reflection** component. During the reflection stage, researchers and stakeholders present results and discuss proposed decisions for further action implications (Rahman, 2008; Whyte et al., 1989). Reflection is based on concrete experiences from the previous phases, emphasizing stakeholders’ and researchers’ learning outcomes from conducted workshops and training sessions. Each and every involved stakeholder is, together with the researchers, involved in a collaborative activity, providing each other general and specific input on how to proceed with the artefact BIE-activities. Thus, in the end of the first iteration cycle, experienced knowledge is formulated into efficient learning outcomes for the second planned iteration cycle. Hence, the preliminary plan gets revised and a new cycle of implementation, evaluation and reflection gets initiated.

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**Figure 4: The Structure of PADRE**

Figure 4 depicts interrelated activities and how they work together toward a tighter notion of providing reflection upon learning through each and every phase of PADRE. The activities (e.g. plan, evaluate etc.) are embedded into a cycle of iteration together with learning as an integrated nexus between the activities. Learning gets established as an activity outcome and has the role of serving participants (e.g. researchers and stakeholders) necessary insights for their upcoming activities (e.g. build, intervene and evaluation) but also formalization of learning. Guiding principles...
are adopted from PAR and PD to incorporate a front-end of action research through participatory principles and philosophy. Thus, reflection upon learning is not regarded as separate as in the third stage of ADR method. Instead, similar to Mullarkey & Hevner’s (2015) flexible model for entering ADR, the idea is to elaborate the ADR method by operationalizing an iterative cycle of planning, evaluating, implementing and reflection. But in the end, the phases shall constitute learning outcomes that can be formalized into a contribution (e.g. design principles, design theories). Hence, the phases of PADRE addresses ADR as not only an research method for: (1) addressing a problem situation encountered in a certain organizational setting by intervening and evaluating; and (2) constructing and evaluating an IT-artifact, which addresses the class of problems typified by an encountered situation. Instead, PADRE suggest to elaborate and extend ADR with embedded and interrelated phases that extends the engagement of participants by studying their community needs, using activities for planning, implementation, evaluation and reflection as necessary means for understanding and helping the community to develop their own network of activities for reflection, learning and action taking. Such notion is strongly adopted and adapted from PAR (Swantz, 2008; Rahman, 2008; Pretty et al., 1995) and PD (Kensing, 2003; Schuler & Namioka, 1993), where research goals evolves through communities of inquiry that address questions and issues, which are significant for those who participate as co-researchers such as the practitioners, end-users and researchers in an ADR project. Thus, activities such as planning, early implementation of goals (e.g. early prototyping), evaluation (e.g. participative observation), and reflection are sufficient activities for conducting PADRE. We will in the next section demonstrate how PADRE has been used in the course of our own research.

4 Demonstrating PADRE

In this section, we demonstrate how we have used PADRE in a recent research project. The research project was initiated in December 2013 and was accomplished in mid 2015. A comprehensive project description has already been reported (Haj-Bolouri et al., 2014), but overall, the project has comprised activities for digitalizing civic orientation through E-Learning. Civic orientation consists of learning how the society works in terms of laws and regulation, democracy, societal norms and values etc. The target group for learning civic orientation is immigrants entering Sweden (newcomers). Therefore, the courses are implemented and provided through basic learning material, which enhances teachers informing different themes of the society. Our roles as researchers have been to build, intervene, and introduce technology, which expands the method of distributing civic orientation throughout different counties in Sweden. We will therefore for the sake of reliability and validity of PADRE, demonstrate how we have implemented PADRE during the second ADR cycle of the project. Thus, relevant stakeholders such as teachers, administrators and members of the projects’ steering committee, have all been included as participants throughout the cycles of our research. We will now step for step demonstrate how we have utilized PADRE throughout the course of our second cycle of ADR.

In the planning stage, we used learning outcomes in terms of early-defined design implications (Haj-Bolouri et al., 2014) and tentative design principles (Haj-Bolouri & Svensson, 2014) from the previous stage to formulate a plan for a revised implementation of the early prototype. We involved teachers and administrators, to-
gether with members from the projects’ steering committee as co-researchers, by involving them in supplementary courses in how to use the early prototype for distributing civic orientation through E-Learning. We introduced the concept of E-Learning together with affording technologies that opened up for dialogues among the participants, encouraging them to express an initial problem/solution-awareness together with further artifact-requirements. During the phase of discussing and identifying new artifact-requirements, we conducted participant observations, workshop sessions and semi-structured interviews with the participants, to adapt the original needs and requirements into new ones. Literature on how to involve stakeholders as co-researchers (Rahman, 2008; Argyris & Schön, 1989) reduced the level of ambiguity, by informing us guiding principles on how to engage stakeholders and let them create their own added value into the project through democratic PD workshops (Kensing, 2003; Schuler & Namioka, 1993). The PD workshops engaged stakeholders to vote for their top five most-wanted features, by writing them down on post-its and then presenting them one by one for every workshop participant. The workshops resulted into a democratic decision, where the participants had to choose collectively which features they thought were most appropriate for further implementation.

Based on the results from the planning stage, we decided to explore a new direction by initiating a second phase of implementation. This time, the implementation phase was initiated by envisioning the stakeholders’ collective decisions towards a revised plan for implementation. New system features for distributing online-courses in civic orientation were implemented, together with general system features and roles for administration. System features addressing administrative activities such as producing, maintaining, updating and distributing learning material, were implemented for the administrators. New technology was introduced and a new cycle of learning the new technology (e.g. interface features) was initiated. We also implemented embedded versions of power point material for the teachers, which they use throughout the course of their teachings. Each and every power point represents a certain theme within the civic orientation program (e.g. democracy, norms and values). Each theme is distributed online, and informed to the students collectively (e.g. classroom teachings) and individually (e.g. E-Learning). The new prototype featured as both being a tool for teachings in the classroom, and a tool for distributing teaching online through E-Learning.

After implementing a new version of our prototype, we evaluated the outcomes through usability testing and observation. We arranged a participative workshop together with the administrators, teachers and members of the projects’ steering committee. The theme for the workshop was to enhance the stakeholders’ awareness towards becoming independent of us as researchers. In other words, we conducted the workshop through a set of learning modules, providing them basic know-how towards how to use the different set of artefact features according to their revised needs and requirements (e.g. the revised plan). We introduced the revised prototype by arranging a set of tasks for each and every participant. They got the chance to learn relevant aspects of the prototype, according to their roles as stakeholders. Administrators were provided with tasks relevant to their activities with producing, maintaining, updating and distributing learning material. Teachers were provided tasks relevant to their activities with informing civic orientation through E-Learning and classroom-teachings. Thus, the evaluation stage was concluded through an immersed session of reflection,
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capsulating and translating our collective experience into explicitly defined learning outcomes, which we formalized into a design theory with a new design principles for adaptable E-Learning (Haj-Bolouri et al., in press).

5 Concluding Discussion

Our paper is built upon the notion of how the ADR method can be elaborated to incorporate reflection and learning through early-embedded cycles of iteration, providing involved stakeholders and researchers continuous space for reflection, learning and action. We adopted inspiration from participatory research approaches such as PAR (Rahman, 2008; Argyris & Schön, 1989) and PD (Kensing, 2003; Schuler & Namioka, 1993), together with scholars that have elaborated and extended the ADR method (Mullarkey & Hevner, 2015; Bilandzic & Venable, 2011). Our contribution in terms of elaborating and extending the ADR method resulted into an empirically grounded method by the name PADRE. We are fully aware of the similarities by name between our method and Bilandzic & Venable’s (2011) proposed PADR-method. There are also similarities in terms of our underlying participatory philosophy, where researchers and stakeholders interact as co-researchers for solving problems, creating added knowledge and sustaining a community of learners through mutual understanding towards goals and vision. The big distinction between PADRE and PADR is addressed through the context of their applicability. PADR is suggested a method for Urban Informatics, while PADRE is proposed as an extended version of ADR for IS-research. Therefore, we cannot put a mark of equivalence between PADRE and PADR. But we suggest that an actual implementation of PADR could open up for discussion about similarities and distinctions through practice. But until then, we stress PADRE as method inspired by PADR in terms its imposing philosophy and comprehensiveness.

Our research suggests that IS-research can benefit from the possibilities of elaborating the ADR method. Although we haven’t analysed any greater amount of conducted cases using the ADR method, we have demonstrated how our elaborated PADRE-method works in practice. Using our extended version of the ADR-method, researchers and practitioners may conduct IS-research together with stakeholders through iterative cycles of activities, generating early reflection and learning outcomes through incremental participatory work. The incremental work is initiated through a logical stream of activities involving planning, implementing, evaluating and reflecting learning outcomes for upcoming cycles of iteration within an ADR-stage. The iterations are embedded into each and every stage of the ADR-method (shown in Figure 5), extending the idea of continuous learning. Similar to Mullarkey & Hevner’s (2015) elaborated ADR-method, our method suggests that stages of ADR can be conducted separately and/or parallel to each other. But our main concern deals with how to establish early learning outcomes through planning, implementing, evaluating and reflecting within each and every ADR-stage. Therefore, our purpose is to provide a method that not only addresses the ADR-principles within every stage, but also extends the stages with iteration cycles that incorporates learning as a nexus between PADRE’s key-components. Such notion does not only elaborate the ADR-method, but it also serves an complementary ingredient to Mullarkey & Hevner’s (2015) model, providing a set of embedded activities that are iterated into cycles of learning outcomes and artefact refinement through adoption of PAR and PD.
Figure 5: An Elaborated Version of ADR using PADRE.

Figure 5 depicts and illustrates how ADR can be elaborated through embedded versions of iteration cycles. The key-components plan, evaluate, implement and reflect adopts and provides ADR complementary activities, which emphasizes learning as an integrated nexus within each and every iteration cycle. Learning is integrated and established through an iterative interaction between PADRE’s key-components. The nexus operates like a repository for learning, which can be used within and across the ADR-stages. The repositories are located within each iteration cycle, and encapsulate knowledge that derives from both relevant literature used to address early findings, but also the actual outcomes from each increment (e.g. knowledge deriving from early prototyping and implementing). PADRE does not isolate learning and reflection as a separate stage in the ADR-method. Instead, PADRE highlights learning through early, incremental and iterative steps of activities for refining the outcomes from each and every ADR-stage. Therefore, a rationale for PADRE’s structure within and across the ADR-stages is formulated as following: (1) Plan is designed for problem formulation, BIE-activities and formalization of learning by adopting PAR through collective processes of self-investigation within the context of research and intervention (Rahman, 2008). A first plan can be revised depending on the level of satisfaction among researchers and stakeholders. The plan gets revised through iteration and collected knowledge within and across the ADR-stages. For example, an early designed prototype of the IT-artifact is implemented and evaluated in its actual context of use. Reflection and learning gathered from BIE-activities, is encapsulated in the learning repository, and used as insights for the new revised plan. Planning is iterated within and across the ADR-stages. (2) Implement is designed for presenting a structured problem formulation, implementing an early designed prototype or encapsulating design knowledge through design principles in a design theory. A first version of implementation guides the PADRE-team to work
actively together. Throughout this activity, researchers are encouraged to increase the level of stakeholder empowerment and democratization through direct participation of stakeholders in system analysis and design work (Kensing, 2003). Outcomes from implementing a reciprocally shaped result (e.g. problem formulation, early prototype) are managed iteratively within and across each and every ADR-stage. (3) **Evaluating** is designed based on the outcomes from ADR-stages, providing the reflecting phase input on lessons-learned and learning outcomes in general. Learning about how to revise an initial problem formulation or designed prototype, is established through the involvement of a broad set of sources for input (e.g. focus groups), rather than a small number of stakeholder representatives. Evaluation outcomes serve as means for reflection upon previous key-components (e.g. planning and implementing). (4) **Reflection** is the key-activity that creates transparency for initiating a new round of iteration by settling accomplished tasks into relation with newly identified challenges and issues, which derive from previous key-components (planning, implementing and evaluating). Such insights can be early established through the first iteration cycle, but also flourish into more profound forms of reflection that emphasize outcomes from several cycles of iteration. Reflection fulfils the iteration cycle, but also initiates a new cycle of iteration depending on the level satisfaction with accomplishing tasks within and across the ADR-stages. Finally, the learning outcomes from the two first ADR-stages can be backtracked between stage 1 and 2, but also be used for formalizing learning into general principles in stage 3. The original ADR-stage for reflection and learning is excluded, and instead incorporated into the embedded iteration cycles provided through PADRE, which adopts PAR and PD as a front-end of action research for ADR. PAR-principles guide the co-creation of a reciprocal space of interaction towards mutual forms of understanding between researchers and stakeholders (Rahman, 2008; Swantz, 2008). Flexibility is provided in terms of incremental deliveries of early requirements and needs, together with mapping prototype features that are evaluated through early observation and reflection together with involved stakeholders. PADRE’s notion of providing early results for further refinement is a notion borrowed from PD (Kensing, 2003; Schuler & Namioka, 1993), where participants are, mutually together with researchers, involved in knowledge sharing activities such as participative workshops and regular meetings. In our case, we briefly demonstrated how we involved our stakeholders throughout the process of conducting training sessions, which resulted into early insights towards revised versions of needs and requirements. Learning outcomes from stages of problem formulation and BIE is encapsulated into design principles and theories, which are through the same manner as previous stages, planed, implemented, evaluated and reflected upon for further learning. For example, we derived our revised plan from formalized learning outcomes such as our early-formulated design implications (Haj-Bolouri et al., 2014) and tentative design principles (Haj-Bolouri & Svensson, 2014). We then revised our revised plan for problem formulation based on our formalized learning outcomes from the previous cycle, by implementing our suggested needs and requirements through participative workshops and evaluated them by invoking a democratic voting session for the most-wanted features for further prototype building and evaluation.

Although we have demonstrated the reliability and validity of our suggested elaboration on the ADR-method, PADRE is still a work-in-progress. In order to prove the full potential of PADRE, we need to test it on a class of problems (Hevner et al.,
2004), which we haven’t addressed in this paper. Therefore, a next stage in the development of PADRE would be to do so, and provide a revised version of PADRE. Doing so, we would actually follow our own suggested principles of generating learning outcomes through iterated forms of cycles. Therefore, the constitution of PADRE is a result of gathered knowledge from research and practice.

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