Abstract

This paper describes the adoption, implementation and empirical evaluation of Action Design Research (ADR) during an 18-month Industry-Academic research partnership. It details the theoretical basis for our research and the selection of ADR as the overarching approach. It describes our adoption of an explicitly interpretivist perspective to answer a broad research question which necessitate up-front exploratory research. It then traces the efficacy-in-use of the ADR approach for supporting our project, with its emphasis on interpretivist theory and research.

The key contribution of this paper is an ADR variant suitable to projects of a similar nature to ours. Our findings are relevant to any discipline that engages in Industry-Academic collaboration, particularly with regard to socio-technical problems, including, for example, Information Systems (IS), Management and Organization Studies.

Keywords: action design research, organizational change, industry-academic research, interpretive research, sociomateriality, capability improvement
Introduction

This paper describes the adoption, implementation and refinement-in-use of Action Design Research (ADR) during an 18-month Industry-Academic research partnership between the IT department of a global financial organization and a research institute. The research project aimed to evaluate a change and improvement programme that had been underway in the organization for two years, and then to develop research interventions, in the form of insights and artifacts, to support the programme, as well as make a more general contribution to both practice and theory.

ADR is a research method that aims to reconcile traditional Design Research with a more interpretive approach that recognizes IT artifacts as shaped by individual’s interests, values and assumptions (Sein et al. 2011). However, the authors of the ADR approach that we use have stated that it “is still an open endeavor” (Purao et al. 2013, p.79) and should be evaluated in different empirical organizational settings. Although we initially adopted the approach unproblematically, in practice we encountered a number of challenges that required us to make adjustments to the approach to respond to the emerging needs of the project. This reflects similar challenges encountered by other IS researchers (for example Mullarkey and Hevner 2015).

In this paper we describe the theoretical basis for our research and the selection of ADR as the overarching approach. It describes our adoption of an explicitly interpretivist perspective to answer our research question for the overall project; it is a question which is broad and necessitates up-front exploratory research. We then trace the efficacy-in-use of the ADR approach for supporting our project, with its emphasis on interpretivist theory and research. The specific research question for this paper is therefore: How might ADR be used to support exploratory research and design? The key contribution of this paper is an ADR variant, explicitly rooted in an interpretivist paradigm, that we feel may offer an alternative way of reconciling Design Research and interpretivist perspectives for research projects of a similar nature. Our findings are relevant to any discipline that engages in Industry-Academic collaboration, particularly with regard to socio-technical problems, including, for example, Information Systems (IS), Management and Organization Studies.

The essay proceeds as follows. In the next section we describe the organizational context which provided the impetus for our research project. This is followed by an overview of the theoretical context of our research and its methodological implications. This provides the basis for the next section, which outlines our adoption of ADR as the research approach for our project. We then describe in detail our empirical evaluation of ADR in use throughout the 18-month project, outlining which elements of the original ADR approach worked for our project, and which needed adjustment. Next, we summarize our evaluation using ‘value grounding’ and ‘conceptual grounding’ perspectives. The paper concludes with a presentation of our ADR variant.

Problem Context

The research project was carried out in the technology division of a global financial organization that specializes in investment and wealth management services. In its long history, stretching back over 200 years, the organization has expanded and prospered, and grown significantly as a result of mergers and acquisitions. In 2012, a new Chief Information Officer (CIO) was appointed to lead the 13,000 strong technology division. The new CIO’s strategy was to reorient the technology division of the bank to meet the challenges of the digital era, including adopting technical and social innovations such as cloud computing, service-oriented approaches, customer experience and open-source solutions. The new CIO initiated a number of programmes with the goals of transforming how the technology groups supported the various businesses, to be more efficient and effective, and to promote innovation and collaboration in how they identified, adopted and developed new technology solutions.

When our research project started in late 2014, a number of change programmes were underway to guide the digital transformation of the technology division. Our project specifically focused on a change programme called ‘Capability Excellence’, which aimed to understand the technology organization in terms of its IT capabilities and then to improve them. The organization adopted the IT-Capability Maturity Framework, or IT-CMF (Curley et al. 2015), to support a structured and measurable approach to capability improvement. A series of IT-CMF ‘Executive Assessments’ had been carried out annually since
2012, which had charted progress and guided the capability improvement strategy. A centralized team had been established to create a formal structure to drive the initiative throughout the IT organization. This had involved making specific executive personnel accountable for the delivery of capability improvement goals and establishing local teams to drive improvement initiatives. A schedule of meetings was established and a centralized suite of artifacts to support local improvement efforts were created. A large number of employees involved in the programme were given IT-CMF training. Over successive assessments, a number of capabilities had shown improvements across a diverse span of IT functions. However, the extent and pace of improvements had fallen short of expectations.

Our project was a funded research collaboration between the financial organization and the Innovation Value Institute (IVI), the research institute behind IT-CMF. The research team was made up of both researchers from IVI and representatives from the financial organization, including a leading member of the Capability Excellence team. The goal of the project was to capture insights from the ‘Capability Excellence’ programme, explicitly identifying the enablers and barriers of the capability improvement efforts, and to design supportive artifacts. The research question we asked in the wider project was thus: What are the enablers and barriers of change in large global organizations? This broad research question necessitated the use of up-front exploratory research. The insights garnered from this research could then be used to design and evaluate artifacts on site with three distinct but complementary outcomes: to increase the success of the specific programme, to contribute to organizational improvement efforts generally, as well as making a contribution to academic knowledge.

The first step of the project was to select a suitable approach to frame the research, which would support the multi-faceted nature of the project. The following sections chart the theoretical justification, the selection and the evaluation-in-use of Action Design Research (ADR) as the overarching research approach for this project.

**Theoretical Context**

Based on the problem context identified above, that of identifying the barriers and enablers of Organizational Change and designing artifacts to support it, the team conducted a review of the literature to ensure a solid conceptual and theoretical foundation for the research. The literature review encompassed Organization Studies, Organizational Change and Design Research. The first subsection ‘Organizations, Practice and Change’ details a selection of the Organization Studies and Organizational Change literature. This is followed by a subsection describing the review of the Design Research literature and the implication for the project’s research methodology. Both of these then provide the criteria for the basis for selecting ADR as our research approach, which is detailed in the next section.

**Organizations, Practice and Change**

Our research question was broad, encompassing diverse elements of the organization, including the organizational structure, people and technologies, and the complex interactions between them. This situated our research in the area of Organization Studies. Contemporary approaches focus on how people construct organizational structures, processes, and practices, and how these structures, in turn shape people’s actions in the organization (Clegg and Bailey 2007). Traditionally, the discipline has been dominated by positivist accounts, which emphasize quantitative methods and hypothesis testing. However, more recently, alternative perspectives have gained some ground, reflecting new ways of understanding organizations, such as phenomenological and social constructivist accounts. Interpretivism is one such perspective that emphasizes human agency, enactment, and the emergent nature of organizational phenomena (Orlikowski and Baroudi 1991).

In an interpretivist view of human action, acting on technology, is “situated” and “shaped by organizational context” (Orlikowski 1992, p. 18). This means that the interaction between the technology and the organization, both in its development and its use, is a function of both the various actors involved and the socio-historical context (Orlikowski 1992). In order to theoretically account for this perspective, a number of scholars, notably Wanda Orlikowski, propose a number of lenses, including a “Structurational Model of Technology” (Orlikowski 1992), a ‘practice lens’ (Orlikowski 2000) and the concept of ‘sociomateriality’ (Orlikowski 2007). Instead of understanding human agency as essentially “shaped by macroinstitutional forces” (Feldman and Orlikowski 2011, p. 1243), a practice view sees organizational
Embodying Practice in Action Design Research

reality as ‘enacted’ by individual practices. Practice Theory builds on the belief that “phenomena such as knowledge, meaning, human activity, science, power, language, social institutions and historical transformation occur within and are aspects or components of the field of practices” (Schatzki 2001, p. 11) rather than existing externally as a feature of macro-organizational, or indeed theoretical, structures.

These interpretivist themes can also be seen in the Organizational Change literature. As far back as 1947, an approach to change was articulated that recognizes the complexity of organizational contexts and change, and of human agency, including the importance of context and conformity in shaping human behaviour and therefore its centrality to organizational change efforts (Lewin 1947, 1951). Action Research, involving in-depth social research, is proposed as a process to achieve change (Lewin 1946). The practice lens is also applied to Organizational Change, showing how change is enacted through individual’s situated practices (Orlikowski 1996) and is the result of “a pattern of endless modifications in work processes and social practice” (Weick and Quinn 1999, p. 366). Change is therefore an inherent part of organizational practices, and practices are fundamental to organizational change (Nicolini 2012).

Design Research and Methodological Implications

The interpretivist and practice-based theories articulated above have a number of significant epistemological and methodological implications. Although the trend in Design Research tends towards hypothesis testing (Goldkuhl and Lind 2010), other scholars have shown that new design theories and principles are emerging, moving from traditional views to incorporate human-centredness (Jrad et al. 2014). In design practice, these include User Experience (UX) and Design Thinking (Veling et al. 2015).

In keeping with interpretivist and practice-based approaches, a ‘phronetic’ approach to social research is proposed (Flyvbjerg 2001), which recognizes that there is a need for “a knowledge of context that is simply not accessible through theory alone” (Flyvbjerg et al. 2012, p. 2). This view argues against the conventional view “that theory precedes action in a top-down movement where one arrives at the right action by first choosing the right theory and then applying that theory properly to the practical question at hand, for example, like engineers applying the laws of physics to construct a bridge” (Flyvbjerg et al. 2012, p. 2). Instead of theory or hypothesis testing, then, alternative methods are needed.

Qualitative research methods offer a solution. However, while interviews and stakeholder collaboration are important methods, gaining an in-depth understanding of this socio-material context ‘in practice' means going beyond people’s representations of their own practice and “requires a deep engagement with the field, observing and working with practitioners as they go about their work” (Feldman and Orlikowski 2011, p. 1249). This is not because people are irrational or flawed, but because practitioners “systematically disregard the work they do not see or that they take for granted... tapping into their expertise through their accounts means contemplating a specific practice of selection and deletion” (Nicolini 2012, p. 14). In the practice-view human knowledge is not just rational and conscious, it may also ‘sensible’ and ‘embodied’ (Strati 2007). In other words, “we know more than we can tell” (Polanyi, as cited in Gherardi 2009, p 124). Many scholars in Organizational Studies and related fields, such as Science and Technology Studies (STS), rely on ethnographic methods to access data (for example, see Latour and Woolgar 2013; Orlikowski 1992; Suchman 2011). Indeed, ethnography is currently the dominant method in Organizations Studies (Czarniawska 2012, p. 127). The embeddedness of ethnographic research sharpens the need for reflexivity. The researcher is not just observing events as they unfold, but also enacting them (Law and Urry 2004). This means that as researchers we are studying two practices at the same time: those of the participants, as well as our own by taking “a coherent and vigilant reflexive stance” (Nicolini 2009, p 197).

This strong emphasis on social context does not mean neglecting the tangible and material elements of the project. The research must recognize the sociomaterial nature of the organizational context, ensuring that “objects, materials, and technology” are “studied ‘in practice’ and with reference to the practices in which they are involved” (Nicolini 2012, p 171). The ethnographic methods used in our project include immersion in the field through observation and interviews, as well as a survey of the material infrastructure and relevant organizational documents.
Selecting the Approach

As well as understanding the sociomaterial nature of the context, the requirement of the project is also to use these insights to design and develop practical, material outcomes. Having developed a deeper understanding of the problem context, both as initially articulated by the organization and as described in the literature, we began to examine a number of different approaches to determine their suitability for this project.

As described above, the understanding of organizational contexts and individual practices involves a complex combination of social and technological elements and the relations between them; of concrete infrastructural realities as well as situated actions and participant perspectives. Gaining a sufficiently nuanced understanding of the problem for our project necessitated an interpretivist approach, allowing for deep engagement with the field through ethnographic research.

As well as ensuring an accurate diagnosis of the problem context, there were a number of other research needs. The methodology should support the design, development and evaluation of artifacts. In our case, the artifacts were not required to be highly innovative in a technical sense. Instead, the artifacts should be innovative from a social perspective, allowing practitioners to impact the improvement of their IT capability through its use, for example taking the form of a framework, guidelines or online tools. The approach should therefore also support user-centred development methods. As well as practical outcomes, the research should contribute to theoretical knowledge.

There was therefore a need to ensure that appropriate attention is given both to the immediacy of the organizational-driven, practical imperative to develop solutions, and to the methodical reflection and learning required for both reflection and theoretical innovation. Finally, the methodology should support the potentially fraught processes of navigation and negotiation needed to ensure that the project takes into account and interweaves various stakeholder expectations, assumptions and expertise. A list of the research needs is presented in the table below.

<table>
<thead>
<tr>
<th>Research Needs</th>
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<tr>
<td>Practical and theoretical outcomes</td>
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<tr>
<td>Interpretivist Approach (including Social &amp; Qualitative Research)</td>
</tr>
<tr>
<td>Reflection and learning</td>
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<tr>
<td>User-centred artifact design, development and evaluation</td>
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<tr>
<td>Stakeholder negotiation</td>
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Table 1. Summary of the Research Needs for the Project

The Decision-Making Process

In selecting the approach, the research team assessed a number of research and design approaches using the criteria defined in the research needs table above. The approaches selected to examine in more detail were Action Research, Canonical Action Research (CAR), Design Science Research (DSR), Design Thinking/User Experience (UX) and Action Design Research (ADR). The process for selecting the methodology is described in detail by (Veling et al. 2015) and summarised briefly below.

Kurt Lewin (1946) devised Action Research as a way to enact change through cooperation between practitioners and social scientists. The objective of an Action Research project is social action and change (Lewin 1946). In the context of Action Research, an ‘intervention’ is an action taken within the organization, rather than the introduction of a technical object or artifact. More recently, Davison et al. (Davison et al. 2004) propose a methodology for Canonical Action Research (CAR), which consists of five principles and a five-stage process. CAR is explicitly rooted in qualitative, case and interpretive research. CAR also expressly identifies the importance of building trust among stakeholders. Design Science Research (DSR) is an approach that “creates and evaluates IT artifacts intended to solve organizational problems” (Hevner et al. 2004, p. 77). Design Science emphasises the application of explanatory and
predictive models to the problem situation rather than taking an interpretivist approach. A number of approaches from design practice, including Design Thinking and User Experience (UX), incorporate social research and user-centred design methods. However, they are focused solely at the practice level, and do not take account of academic theory.

The final approach that we reviewed for this project was Action Design Research (ADR). 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, p. 40). ADR draws on both DSR, in its focus on designing and building IT artifacts, and Action Research, to focus on the organizational context, intervention and use. The table below shows a summary comparison of research approaches against research needs.

<table>
<thead>
<tr>
<th>Research Need</th>
<th>Action Research</th>
<th>Canonical Action Research (CAR)</th>
<th>Design Science Research (DSR)</th>
<th>Design Thinking/UX</th>
<th>Action Design Research (ADR)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Practical and Theoretical Outcomes</td>
<td>S</td>
<td>Y</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
</tr>
<tr>
<td>Interpretivist Approach (including Social &amp; Qualitative Research)</td>
<td>Y</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
<td>S</td>
</tr>
<tr>
<td>Reflection &amp; Learning</td>
<td>Y</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>User-centred Artifact Design, Development and Evaluation</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>Y</td>
<td>S</td>
</tr>
<tr>
<td>Stakeholder Negotiation</td>
<td>Y</td>
<td>Y</td>
<td>N</td>
<td>N</td>
<td>Y</td>
</tr>
</tbody>
</table>

Key: Y = Does meet criteria  N = Does not meet criteria  S = Somewhat meets criteria

Table 2. Comparison of Research Needs in Relation to Approaches (Veling et al. 2015)

As can be seen from the table above, ADR was the only approach that met, or somewhat met, all of the required research criteria. Therefore, ADR was selected as the most appropriate method for the project.

Evaluating ADR

Evaluation Approach

Our initial intention had been to adopt ADR unproblematically. However, as we started to use it in practice, we encountered a number of challenges that required us to make adjustments to the approach to support us in answering our research question and to reflect the emerging data resulting from our exploratory research. This is consistent with the intent of the original authors, who maintain that ADR “is still an open endeavour” (Purao et al. 2013, p. 79) and call for the exploration of ADR in different empirical settings. Our evaluation methods, echoing those of the research project in general, are empirically grounded, using techniques of observation, reflection and documentation, which is described in the following subsection.

As well as empirically grounding our evaluation, two other evaluation strategies were used: ‘value grounding’ and ‘conceptual grounding’ (Goldkuhl 2004). Respectively these asked, firstly, did the content of the ADR approach support the needs, both planned and emergent, of the research project? Secondly, did the conceptual structure of the approach reflect and support the interpretive orientation of our theoretical context? The results of our evaluation of ADR are presented below.
A Study of ADR in Use

In the following section we detail our empirical evaluation of ADR. We describe how we moved through the various phases of the ADR approach, articulating how first ADR supported our research and second, where we found limitations in the existing approach in achieving our research outcomes. The ADR cycle described by Sein et al. (2011) follows four main research stages: (1) Problem Formulation, (2) Building Intervention and Evaluation, (3) Reflection and Learning, and (4) Formalization of Learning, see Figure 1, and we have structured the following sections to reflect these stages. However, they did not necessarily occur sequentially.

![Figure 1. Action Design Research (Sein et al. 2011)](image-url)

Problem Formulation

The first stage, **Problem Formulation**, consists of six tasks and two principles. The tasks include: formulating the research opportunity, the research questions, the theoretical context, gaining organizational commitment and roles and responsibilities. Emphasis is put on the need to develop trust and commitment between disparate stakeholders. The authors highlight the importance of a researcher-client agreement which can become the basis for mutual understanding of the scope, focus and mode of enquiry. Apart from an initial agreement establishing scope and roles, we also agreed to develop a quarterly research report, which allowed us to communicate changes and emergent understandings with regard to project scope, concepts, theories and artifacts. Additionally, weekly meetings were established as a way of ensuring effective communication and ongoing commitment, as well as providing an additional opportunity for gathering field data. The ethnographic nature of the fieldwork, and the corresponding user-centred focus of the design, also facilitated the development of a close working relationship between the research team, their corresponding counterparts in the organization and the wider network of participants and users.

The two principles associated with this stage are ’Practice-Inspired Research’ and ‘Theory-Ingained Artifact’. ’Practice-Inspired Research’ reflects the fact that the research impetus, or ’trigger’, may come or be inspired by practice. In our case, as described above, the trigger for formulating our research effort was “a problem perceived in practice” (2011, p.40), that of carrying out capability improvement in a large organization. ’Theory-Ingained Artifact’ refers to the fact that artifacts are informed by theory. However,
the concept of theory is not necessarily straightforward, and “differences in views of theory depend to some degree on philosophical and disciplinary orientations” (Gregor 2006, p. 615). Sein et al. (2011), suggest that Gregor’s Type IV (explanation and prediction theories) or Type V (design theories) are the two likely candidates for ADR. While Type V, design theories, are relevant for our project, we find the possibilities for explanation and prediction (Type IV theories) limited. Instead, Gregor’s Type II theories, or ‘explanation’ theories, which provide explanations of organizational phenomena but do not aim to predict with precision and do not provide testable propositions, a more appropriate theoretical classification for our use of ADR. For Sein et al., the theory is inscribed into the initial design, which is then further developed by organizational practice. Our approach to theory was more iterative, as we continued to return to theory throughout the conceptualization phase as the problem context emerged. In this sense we would consider our research, including our artifact, to be ‘theory-informed’ rather than ‘theory-ingrained’. For our project, once our initial problem was identified, it was situated in a wider conceptual and theoretical context. This was done by conducting a literature review in the areas of Organization Studies, Organizational Change and Design Research.

For Sein et al. (2011), an initial empirical investigation of the problem is presented as an optional input to this stage. However, as discussed, answering our research question necessitated up-front empirical research, capturing participants’ perspectives and existing work practices, as well as their artifact requirements as an input to design. We therefore supplemented this stage with methods that allowed for both a deep engagement with the field and a user-centred approach taken from fields such as Anthropology and User Experience. We will refer to this approach hereafter as ‘embedded research’. Once the initial literature review was complete, the research team conducted ethnographic research to develop an empirical understanding of the problem context, including observation, semi-structured interviews, informal conversations, workshops and feedback sessions, as well as a review of structural hierarchies, organizational documents and existing technologies and artifacts. One of the key findings was that positive change was evident in parts of the organization that resulted from practices rooted in people’s intuitive engagement and previous experience, but not necessarily driven centrally, nor formally recognised. These findings were validated by participating practitioners and provided more additional feedback for the organization not captured by other methods and metrics. This also allowed the research team to start to conceptualise solutions based on a more detailed diagnosis of the problem.

The artifacts were informed by both theory and practice, and emerged from interaction with practitioners throughout both the Problem Formulation and Build, Intervention and Evaluation stages. The Problem Formulation stage therefore also encompassed the first stage of our design conceptualization. As the barriers to effective organizational change were becoming clearer, ideas for possible solutions started to emerge. The research team held a number of ideation workshops with organizational participants to present both our representations of the problem context and initial solution conceptualization. Although Sein et al. specify that the Build, Intervention and Evaluation stage is an iterative process that takes place in authentic settings, they did not specify this for the Problem Formulation stage. Also, for either stage, there is little guidance in terms of how this iterative and authentic process should be carried out. Therefore, to support our initial conceptualization activities, the team incorporated a number of techniques from the D:School Design Thinking method (Plattner 2010) and User Experience (UX) to try to ensure that the ideation process was exploratory, collaborative and practice-based.

In summary, at a practical level, the Problem Formulation phase provided good support for our project, however, we found the scope of the Problem Formulation stage as defined in ADR narrower than the breadth of activities we found to be a necessary part of this stage for our project. We also had to borrow methods from other domains in order to conduct some of the activities that were necessary for our project at this stage. Finally, we found it difficult to define a clear boundary between the activities of this stage and the following Building, Intervention, and Evaluation stage.

**Building, Intervention and Evaluation (BIE)**

The Building, Intervention, and Evaluation (BIE) stage builds on the “problem framing and theoretical premises” of stage one (Sein et al. 2011, p. 41). This stage includes identifying the ‘knowledge-creation target’, selecting whether the innovation will be technological or organizational, and executing iterative cycles of building the artifact, intervention in the organization and evaluation.
The principles for this stage, those of ‘Reciprocal Shaping’, ‘Mutually Influential Roles’ and ‘Authentic and Concurrent Evaluation’, ensure that emphasis remains on both the social and the technical influences that shape the artifact, including the organizational and researcher roles, and that evaluation happens concurrently. However, as mentioned above, there is little guidance as to how the interactions with the organizations will occur. We found that by taking an interpretivist approach, our design process was inherently ‘organization-dominant’ and ‘practice-led’, meaning that the principles were necessarily an integral part of this stage.

During this stage, the initial designs of the artifacts were generated, in some cases by adapting existing artifacts, and further shaped by organizational use and subsequent design cycles. As described in the Problem Formulation stage, the team immediately found it difficult to distinguish a clear demarcation between the Problem Formulation and the Build, Intervention and Evaluation (BIE) stages. Our research outputs were evaluated by participants in the Problem Formulation stage and, simultaneously, a number of feedback sessions formed a key part of our design conceptualization, which, though part of the Problem Formulation stage, could also be seen as as an early step of the BIE stage.

According to Sein et al. (2011, p. 44) “controlled evaluation can be difficult to achieve” due to the emergent nature of the artifact, and the “authenticity” is considered more important. We found this to be true for our project. Although Sein et al. point to Lee (1989), we found it challenging to find suitable methods for conducting this kind of evaluation. This may be due to the fact that interpretivist theory is more often applied to research than to design practice. While general feedback on the design concepts presented to participants yielded useful data, we could not derive a clear indication on how to proceed with artifact development or on how to answer our research question: which artifacts would enable change across the organization? To overcome this, a decision was made to extend ‘embedded research’ approach to the early design phase. This involved a researcher and a practitioner (whom we later called a Dedicated Practitioner) working together, in a highly participative way, to apply design concepts to the practitioner’s existing work practice in the emerging organizational context. This allowed the researcher to gain a lived understanding of the practitioner everyday practice. These initial concepts could then be evaluated by their immediate relevance, which informed subsequent development. This also allowed for subsequent iterative building, evaluation and refinement in use. This process ensured that the artifacts gained sufficient traction to make them the focal point of the study and development efforts. For our purposes, the Building part of the BIE stage was considered to have started once the research was no longer exploratory. This was marked by an organizational commitment to the development of specific artifacts.

This, we feel, has major implications for the Intervention and Evaluation stage. The artifact ideas that were selected as most relevant for further development using ‘embedded research’ method had not been identified as a priority artifact in any of the feedback evaluation sessions. This revealed a qualitative distinction between the abstract evaluation of an artifact ‘in reflection’ and the practical evaluation of the artifact ‘in use’. This finding supports the conceptualization sensible and embodied knowledge as, as identified in the theoretical context section above and we believe, further validated our embedded, observational approach.

The first artifact which was selected for development using the embedded approach, was the ‘Rapid Maturity Check’, or RMC, which allowed an individual to connect their local practice to the wider organizational IT capability, and therefore provided meaningful feedback for practitioners. Exploring the use in practice of RMC resulted, in subsequent iterations, in a suite of artifacts that presented as an end-to-end model, which we called the ‘Practice Improvement Model’, or PIM, see Figure 2 below. PIM was designed to provide support for individuals to contribute meaningfully to organizational change efforts. The model was progressively developed where new iterations were released immediately, and validated on-site.
At the time of finishing this project, PIM was a validated prototype. Further commercialization work will be necessary to finalize the product. However, even as a prototype, the model has had some impact on the ground. Evaluating the impact of specific technologies or interventions in a complex organizational context is not straightforward (Datta and Petticrew 2013). Any impact in the organization will be the result of numerous explicit and implicit factors, from macro-economic factors such as competitive landscape, through to organization strategy and policies, to individual practices and motivations. Therefore, it is not possible to show definitive causal relations between the use of PIM and any subsequent organizational impact. However, there are a number of local impacts that use of PIM has contributed to, including the expansion of the change programme to a regional office, resulting in increased visibility and recognition. These effects were validated by organizational participants.

PIM was also presented to groups outside of the technology division within the organization, as well as to practitioners outside of the organization representing a variety of sectors, and their feedback sought. Although, as we identified, this method of evaluation is limited, initial feedback was that it could be usefully applied to other organizational contexts. This will need to be further validated in use, but suggests that the model is generalizable.

To summarise, while we found the principles of ‘Reciprocal Shaping’, ‘Mutually Influential Roles’ and ‘Authentic and Concurrent Evaluation’ in keeping with our ‘embedded research’, the principle of ‘Reciprocal Shaping’ did not offer explicit guidance as to organizational interaction. While we agreed that ‘authentic’ evaluation was important, we found it difficult to find methods that could support it. We trialed a number of methods, including eliciting feedback and extending our embedded approach, and found the latter to be more impactful. We also found it difficult to define a clear boundary between the activities of this stage and the following Building, Intervention, and Evaluation stage.

**Reflection and Learning**

*Reflection and Learning* is “a continuous stage and parallels the first two stages”, allowing for a “conscious reflection on the problem framing, the theories chosen, and the emerging ensemble”, which are “critical to ensure that contributions to knowledge are identified” (Sein et al. 2011, p. 44). This stage has been hugely beneficial to our project, ensuring sufficient time was allocated for continuous reflection.
and ongoing formalization of knowledge. Working in an embedded way, we were exposed to continually changing organizational events and immediate practitioner needs. It can be difficult to step back from this in order to reflect and analyse. There is a distinct temporal variance between the response times expected in an organizational context, and the time required for deeper reflection, more rigorous analysis and ongoing formalization of knowledge and it can be difficult for researchers to navigate between the two spaces. The Reflection and Learning stage of ADR provides a conceptual space to remind researchers to ensure that they take necessary time to dis-embed from the ongoing situation for this activity. Although for Sein et al., once the theory is inscribed in the artifacts, further iterations are shaped by practice without further recourse to the literature. We found that a more iterative approach to theory was required, as we continued to return to theory throughout the conceptualization phase as the problem context emerged.

The single principle of the Reflection and Learning stage is ‘Guided Emergence’, which states that the ensemble artifact reflects the preliminary design but also its ongoing shaping through use. As we have illustrated in describing our experience in each stage, we feel this is supported by the interpretivist approach that we took to the overall project.

Formalization of Learning

The final stage of ADR is the Formalization of Learning, with the single principle of ‘Generalized Outcomes’. Once again, this stage provides additional support to ensure that theoretical outcomes remain a central goal of the project. Sein et al. (2011) contend that the problem, the solution and the design principles may be generalised and thereby usefully identify potential for knowledge contributions to design theory. To date our project has produced two academic publications in this area. The solutions, expressed as artifacts, will primarily have a practical impact in the short term and could provide the basis for empirically-grounded theoretical insights in the longer term.

Sein et al. (2011) describe that there is a challenge in reconciling the situated nature of the research and generalization. However, our interpretivist perspective, which views theory as corresponding to Gregor’s Type II theory, does not perceive the situated nature of the research as a barrier to generalization. While we agree that it is problematic to develop explanatory or predictive theories, by viewing theoretical contributions as Type II ‘explanatory’ theories, we believe that a useful contribution may potentially be made to theory in a number of domains, including Information Systems, Organization Studies and Organization Change.

Evaluation Findings

We had intended to adopt ADR as our overarching Design Research approach unproblematically to support us in answering our research question. However, in practice, we encountered a number of challenges that required us to make adjustments to the approach to respond to the emergent needs of the research. On encountering these limitations, in line with our approach to Reflection and Learning, we went back to the ADR literature to understand if these limitations had been identified elsewhere. A paper by Mullarkey and Hevner (2015) described the execution of an ADR project and some of the challenges they encountered. While not reflecting our challenges exactly, in the case of their research, as with ours, the complex social organizational context represents a ‘wicked’ problem (Mullarkey and Hevner 2015). For Mullarkey and Hevner, there were no pre-existing artifacts. In our case, although a number of artifacts existed to support the improvement efforts, there was no imperative to retain them should improved supports be needed. Their solution was to replace the Problem Formulation stage with two discrete stages: Problem Diagnosing and Concept Design. We adopted this refinement midway through our project believing it more accurately represented the activities that we were conducting on the ground. However, we found that this refinement was not by itself sufficient to support the type of research that we were engaged in.

The following table summarises the findings of our empirical evaluation of the ADR approach based on whether it supported the needs, both planned and emergent, of the research project, corresponding to the grounding strategy referred to by Goldkuhl (2004) as ‘value grounding’.

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<th>Research Needs</th>
<th>Project Outcomes</th>
<th>Findings in relation to ADR</th>
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| Practical outcomes     | • Accurate diagnosis of problem context, based on an empirical understanding of problem context  
• Validated and generalizable ‘Practice Improvement Model’  
• Generalizable Practitioner Insights  
• Trust and commitment between stakeholders | • ADR was selected for its focus on the design of tangible artifacts and we found its structure and principles to be valuable guides  
• ADR’s focus on stakeholder negotiation was useful  
• However, ADR did not emphasise the importance of empirical research that we believe was central to the specific needs of our project |
| Theoretical outcomes   | • Contributions to Design Theory  
• Potential contributions to Information Systems (IS), Organization and Practice-Based Theories | • ADR focused strongly on the need for reflection and learning, and in ensuring that contributions to knowledge are identified  
• ADR usefully identifies potential for knowledge contributions to design theory  
• However, the conception of ‘theory’ differed for our project and theories are more likely to be ‘explanatory’ than ‘predictive’ |
| Interpretivist methods | • Empirical data validated by practitioners  
• Successful adoption of PIM and local impact validated interpretivist design approach | • ADR offer limited guidance as to how to conduct research in authentic settings  
• Although ADR does allow for interpretivist methods, they are presented as optional. We believe empirical research was central to the specific needs of our project |
| Reflection and learning | • Contributions to design theory, gathered and developed iteratively  
• Iterative development of artifact | • ADRs strong focus on reflection and learning was hugely beneficial to our project which was otherwise strongly influenced by the immediacy of practice  
• However, ADR does not prescribe an iterative approach to theory, which we found necessary for a project such as ours |
| User-centred artifact design, development and evaluation | • Diagnosis of problem context validated by practitioners  
• Successful adoption of ‘Practice Improvement Model’  
• Local Impact of PIM validated user-centred approach | • ADR was selected for its emphasis on organizational context and practice  
• ADR offer limited guidance as to how to conduct research in authentic settings  
• We found methods that allowed for deep engagement with users at all stages of research, from data gathering, to conceptualization, design and development to be essential for our project |
| Stakeholder negotiation | • Successful maintenance of relations throughout project  
• Stakeholders’ satisfaction with outcomes | • ADRs strong focus on stakeholder negotiation was beneficial to our project |

Table 3. Value Grounding Evaluation of ADR Based on Empirical Insights
Additionally, we evaluated whether the conceptual structure of the approach could reflect and support the interpretive orientation of our approach. This corresponds to Goldkuhl’s ‘conceptual grounding’ strategy (Goldkuhl 2004) and is detailed below.

1. We found the scope of the Problem Formulation stage as defined by Sein et al. in ADR narrower than breadth of activities that was a necessary part of our project
2. We found it difficult to define a clear boundary between the activities of the Problem Formulation stage and the Building, Intervention, and Evaluation stages
3. While we found the principles of ‘Reciprocal Shaping’, ‘Mutually Influential Roles’ and ‘Authentic and Concurrent Evaluation’ of the Building, Intervention, and Evaluation stage in keeping with our ‘embedded research’, there was little explicit guidance as to organizational interaction. We found methods that allowed for deep engagement at all stages of research were necessary for our project, from data gathering, to conceptualization, design and development reflected in the principles
4. The Reflection and Learning stage has been beneficial to our project, ensuring sufficient time was allocated for reflection and ongoing formalization of knowledge. However, we extended the iterative interaction with this stage to include returning to theory.
5. Formalization of Learning has a single principle of ‘Generalized Outcomes’. Sein et al. (2011) contend that the problem, the solution and the design principles may be generalised. Once again, this stage provides additional support to ensure that theoretical outcomes remain a central goal of the project. Although our concept of theory is somewhat different from that of the original paper, that does not affect the ‘conceptual’ basis for this stage

Proposed ADR Variant

Although ADR was the most suitable approach for our project, our use of ADR in practice revealed a number of differences between some of the theoretical bases for ADR and those of our project. ADR is an approach that seeks to reconcile technological rigor and organizational relevance to create IT artifacts, while also contributing to academic knowledge. To do this, the authors attempt to reconcile interpretivist approaches, such as the view of artifacts that are “dynamic and emerge from their contexts” (Sein et al. 2011, p52), with approaches from the natural sciences, such as the possibility of generating explanatory and predictive theories. In keeping with the invitation extended by Purao et al. (2013) to evolve ADR through its use in research practice, we have suggested a variant ADR which we believe will be useful for other projects like ours. By viewing ADR through an interpretive lens, which views technology and organizational domains as being related in complex ways, both of which may be subject to academic rigor and practical relevance.

Our evaluation of ADR conformed to our interpretivist approach, being empirically grounded and the result of reflections on its use in practice. This section describes an ADR variant with an explicitly interpretivist lens that was developed as a result of the application of Action Design Research (ADR) in use, see Figure 3 below.
We integrated Mullarkey and Hevner’s (2015) refinement of the Problem Formulation stage to include Problem Diagnosing and Concept Design, represented as stage 1a and 1b in the Figure 3. Otherwise, we have stayed faithful to the original ADR categories. However, we have reconfigured the relations between the stages, reflecting the fact that we found it difficult to define a clear boundary between the activities of the Problem Formulation and the Building, Intervention, and Evaluation (BIE) stages. In the extended approach, Problem Diagnosing, Concept Design and Building are represented as a seamless process of iterative and increasing organizational understanding and artifact fidelity, from interpretivist research to user-centred design. Therefore, we have extended Intervention and Evaluation, which in the ADR variant is an iterative and continuous phase throughout the project. This issue was also encountered by Mullarkey and Hevner (2015, p. 123), who found that “intervention and evaluation occurs at every stage in a robust ADR method”. This means that we have split Building, Intervention, and Evaluation (BIE) into 2a Building and 2b Intervention and Evaluation, as in Figure 3 above.

In the Problem Formulation stage, we have retained the ‘Practice-Inspired Research’ principle, and amended ‘Theory-Ingrained Artifact’ to ‘Theory-Informed Artifact’. We have retained the principles associated with the Building, Intervention, and Evaluation (BIE) stage, that of ‘Reciprocal Shaping’, ‘Mutually Influential Roles’ and ‘Authentic and Concurrent Evaluation’ and applied them to a continuous Intervention and Evaluation stage. To reflect our commitment to ‘embedded research’, we suggest adding an ‘Embedded Research’ principle to this stage as well.

We found the stages of Reflection and Learning and Formalization of Learning to be hugely important for a research project such as ours that is deeply embedded in practice, ensuring that sufficient time is allocated for ongoing reflection and formalization of theoretical knowledge. Although not represented in Figure 3, we emphasise the iterative approach to theory throughout this project. We have retained the principles of ‘Guided Emergence’ and ‘Generalized Outcomes’.

Figure 3. ADR variant with an explicitly interpretivist lens
Conclusion

This paper has described the adoption, implementation and refinement-in-use of Action Design Research (ADR) during an 18-month Industry-Academic research partnership between the IT department of a global financial organization and a research institute. We have outlined our theoretical approach, based in an interpretivist paradigm, which informed our selection and evaluation of ADR. We have described an variant of ADR which incorporates three major adjustments: first, we adopt Mullarkey and Hevner’s (2015) refinement, splitting Problem Formulation into Problem Diagnosis and Concept Design. Second, we reconfigured the relations between stage one and two, whereby Problem Diagnosing, Concept Design and Building are represented as a seamless process of increasing organizational understanding and artifact fidelity. Third, Intervention and Evaluation is described as a continuous phase to which has been added a new principle of ‘Embedded Research’, which ensures that the research remains embedded in the ongoing practice of the organizational environment. To ensure that the research remains relevant to theoretical outcomes, the stages of Reflection and Learning and Formalization of Learning are retained.

The key contribution of this paper is a variant of ADR suitable for projects of a similar nature, which aim to investigate complex, organizational problems and produce outcomes of practical and theoretical value. Our findings are relevant to any discipline that engages in Industry-Academic collaboration, particularly with regard to socio-technical problems, including, for example, Information Systems (IS), Management and Organization Studies.

This ADR variant was effective for this particular research project. However, it would need to be applied in different contexts and sectors in order to validate its usefulness in a more general sense. We hope to continue to assess the efficacy and limitations of the ADR variant in other empirical settings in future Industry-Academic research collaborations.

References


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