Managing Conflicting Demands during an Action Design Research Project

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Abstract
We reflect on the conflicting demands that surfaced during an action design research project. The project was aimed at designing tools for managing procedural knowledge in process-intensive organizations. Over a period of three years, the emphasis gradually shifted from *context-driven realism* to *precision and rigor*, and eventually, to *generalized outcomes*. We outline events and anecdotes to explore how the practice and research interests were sometimes at odds during the project, to examine whether such trajectories are inevitable, and to describe how the research team balanced these demands.

Author Keywords
Design science; Action design research; Three-horned dilemma.

ACM Classification Keywords
H.5: Information interfaces and presentation: Miscellaneous; I.7: Document and Text Processing; J.4 Computer Applications: Social and Behavioral sciences; General and reference: Design

Introduction
Action design research (ADR) is a methodology that argues for and describes a research approach that combines an organizational intervention along with

Appreciating Conflicting Demands in the Research Trajectory

In retrospect, it was clear to the research team that a better recognition of these demands and how they could be managed as a part of the research effort would have helped this project, and that such an understanding could help future projects.

One specific approach to doing so could be to monitor and appreciate the notion of a research trajectory, where these demands are not necessarily seen as "conflicting demands" but rather, as demands from the different stakeholders (researchers, partner practitioners) that could be emphasized at different phases during the project. Such a shift in emphases across the phases may allow a more proactive stance to managing and meeting these demands.

design of a technology platform in response to an organizational problem (Sein et al. 2011). The publication served to legitimize technology-based intervention as a mode of research, and outlined how knowledge outcomes can be generated from such projects. The work extended earlier positions about design science research by Hevner et al (2001). Within the context of such projects, the paper implicitly outlined how the three-horned problem discussed elsewhere, as trade-offs between (a) precision and scientific rigor, (b) realism of the context being, and (c) generalizability of findings, may be addressed as a part of ADR projects.

The research project we reflect upon in this paper followed the tenets of the ADR methodology to design and develop tools to manage knowledge hidden in operating procedures and practice templates in two process intensive industries (He 2014; Karunakaran and Purao 2012). The work was carried out over three years, working with a consortium of petrochemical companies and with a set of partners in the consulting industry. The tools were designed and tested across multiple settings to assess their effectiveness – for extracting knowledge from operating procedures and for making knowledge chunks from practice templates available to future users.

In this extended abstract, we reflect on our experiences by identifying critical events and episodes that provided key transition points – where the emphasis shifted from one goal to another through the research lifecycle.

Events and Anecdotes

We could identify a number of pivotal events, in retrospect, which punctuated the project trajectory. These events shaped the project, which sometimes lurched forward, and at other times, moved sideways. Each is outlined below as a key event, followed by a brief description.

Key Event 1: First Informational Meeting.
At the first, informal interaction and meeting with the group of industry stakeholders, the lead researcher described current research on knowledge management, and cautioned the group about high expectations. As the project took off, with tempered expectations, the emphasis was on designing a situated implementation of an IT artifact that would analyze ill-structured operator procedures, stated in natural language with a view to extracting instruction clusters.

Key Event 2: First Reporting Meeting.
At the first reporting meeting, about six months into the project, the researcher described what had been learned so far, based on visits to several refineries. As it often happens, these visits revealed too many paths for intervention, including training for novice operators, organizational policies for knowledge management and tool building for extracting procedural knowledge (the original intent). The emphasis shifted during this meeting to exploring possible research streams and theoretical foundations, which may provide ways to address these problems.

Key Event 3: First Prototype Artifact.
After several additional meetings and multiple rounds of design and evaluation, a first prototype was built to analyze operator procedures (***Figure 1****: An Artifact for Analyzing Operator Procedures in the Petrochemical Refinery Industry.*). At this point, about 18 months in, the prototype served as a proof of concept. The

emphasis shifted to adding technological precision and ongoing evaluation to make the artifact more reliable and to derive research outcomes.

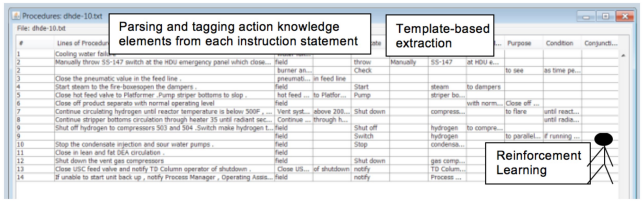

Figure 1: An Artifact for Analyzing Operator Procedures in the Petrochemical Refinery Industry.

Key Event 4: Adding a Second Domain.
The research team realized that examining the interplay between operator procedures and work practices represented a key opportunity. A second domain, consulting services, was added, and another IT artifact was constructed (**Figure 2**: An Artifact for Browsing Sections of Practice Templates in the IT Consulting Industry.). The new IT artifact examined templates that consulting organizations used, and broke these apart based on expert decisions, to allow construction of new templates based on project demands. The emphasis now shifted to greater reflection and theorizing using both artifacts.

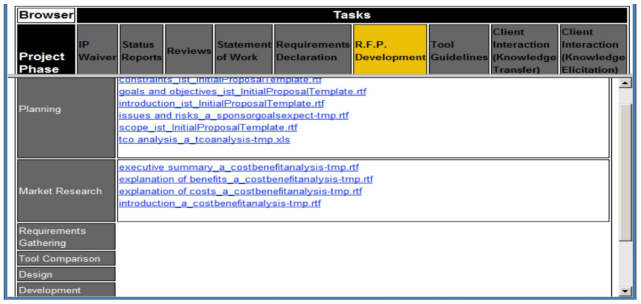

Figure 2: An Artifact for Browsing Sections of Practice Templates in the IT Consulting Industry.

The research team did not always think through these events in terms of bridging the HCI and the IS perspectives. However, in retrospect, it appears that the researchers did subscribe (implicitly) to either one set of norms or the other as they engaged with the research project. This back and forth between the two disciplinary stances directly contributed to the conflicting demands.

Conflicting Demands

The research team dealt with a number of conflicting demands throughout the project (see McGrath 1981). We briefly reflect on some of these for the key events described above.

Context-driven realism vs. Focus on Precision.
This conflict surfaced several times as the research team moved from understanding the context to using the right computational and representational techniques back to demonstrating the artifact under construction for the industry partners (See Key Events 1 and 3).

Context-driven realism vs. Generalized outcomes. This conflict was particularly acute as the research team added a second domain for investigation. The issues that came up for consideration provided the team a natural avenue for generalization. However, this also meant that the attention to context-specific detail needed to be sacrificed (See Key Event 4).

Focus on precision vs. Generalized Outcomes. This conflict was apparent through much of the project as the research team tried to balance the demands for situated implementation of the artifact against the desire to derive generalized outcomes such as design principles (See Key Event 2).

During the writing of this extended abstract, the research team was able to reflect more specifically on these conflicting demands to speculate about the possible trajectories of research projects of this nature. The questions we dealt with included transitions across these conflicts, e.g. do our projects often start with a focus on context-driven realism before moving to generalized outcomes, do our projects oscillate between these two demands, at what point, as the project matures, do we privilege precision as a key concern? These can be explored better to characterize the trajectory our research projects take. The sidebar reflects on this as 'research trajectory,' something we hope to discuss with the workshop participants.

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