

The Development of a Practitioner Design Science Research Canvas

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Abstract

Whether justified or not there is a disconnect between practice and research within the IS domain. For most that have commented on this disconnect, they have done so in the context of it being a limitation and while it has long been identified it has been very difficult to overcome. This has ultimately resulted in a very noticeable lack of engagement from practitioners in IS research, reinforcing the divide. One key factor that has been attributed to causing this disconnect has been the lack of clear and detailed guidelines for practitioners. With the objective of tackling this problem the article outlines the development of a Practitioner Design Science Research Canvas that aims to facilitate practitioners in becoming Practitioner-Researchers by guiding them through a Design Science Research project. The canvas itself has evolved through DSR over 3 iterations and has contributed to highly successful DSR projects from both a practice and research perspective.

Keywords: Practitioner Research, Design Science Research

1 Introduction

According to Swanson (2014) “academic research in the information systems (IS) field is presently under institutional pressure to justify its value by speaking to its actual, not just intended or imagined, impacts on professional practice”. Unfortunately, this is not a new phenomenon as in 2006 there was a call to action by a number of IS senior scholars to understand “how to more effectively structure and shape the way that practitioners participate in IS research” (Desouza et al., 2006, p.343). But why is this so problematic. One reason noted by Avison *et al.* (1999, p.96) when commenting on Action Research (which associates research and practice) is that “there is a lack of detailed guidelines for novice researchers and practitioners to understand and engage in action research studies in terms of design, process, presentation, and criteria for evaluation”. Almost 10 years later, Baskerville (2008) in his editorial for the 2008 EJIS special issue on Design Science Research reiterates a similar theme as he states DSR “is engaged in a discourse of discovery” and void of any “broad agreement on terminology, methodology, evaluation criteria, etc.” (p.441). Some 8 years on (and almost two decades from Avison *et al.*) we are still repeating that same sentiment for DSR, which detailed by Iivari (2015, p.107) notes that “the scientific discourse on DSR is still in a state of conceptual confusion”.

In support of this commentary, it has been the direct experience of the authors (of enabling over 50 executives in becoming Practitioner-Researchers), that this identified

gap in the IS domain does not make it easy for practitioners to consume IS research literature, engage in relevant research, and publish additions to the IS body of knowledge. With the objective of filling this gap the primary motivation and key focus of the paper is to detail the development of the Practitioner Design Science Research Canvas. The canvas was built using Design Science Research over 3 iterations involving 3 versions that were designed, built and evaluated over the course of 30 months (see Table 1). The output of the last iteration is a canvas that acts as a blueprint for Practitioner Design Science Research, but more importantly acts as a discursive template in enabling practitioners: (i) understand the role of research and its relationship with practice, (ii) internalise the steps in completing Practitioner DSR, (iii) communicate with all stakeholders during a DSR project, (iv) deliver strong IS research with clear impacts on both the academic and practice communities (iv) provide a visual representation/summary of their DSR project which can be converted into an academic publication. It is also hoped that the canvas may help in the judging of DSR papers by appropriate criteria (Goes, 2014) and be used to guide academics in facilitating or otherwise engaging in Practitioner DSR.

2 Problem Exploration

Providing a clear and consumable guide to facilitate practitioners in becoming Practitioner-Researchers is a worthwhile objective, as practitioners are in a better position to identify relevant problems that are difficult to solve and have real organisational impact. In contrast, academic researchers are primarily abstracted from the real world and as a result have been advised they qualify their research objectives with practitioners to ensure relevance (Rosemann and Vessey, 2008). Moreover, as highlighted by Davison *et al.* (2004, p.68) “the researcher seldom has complete control over interventions”. In comparison, practitioners will always have areas where they possess a certain degree of control to dictate the course of a project and guide its implementation to completion. This is a major advantage as it provides bounded areas that are a rich bed for conducting research with full direct access. These bounded areas also provide protection from the risk of losing control over the environment underpinning the research (Davison *et al.*, 2004). In addition, immersed in the realities of their work, practitioners experience relevant and wicked problems that need to be solved. Due to their stubborn nature, these wicked problems are a rich source for valuable research for both the academic and research community (Buchanan, 1992).

However, the problem of confusion and lack of guidelines does not make it easy to engage practitioners. In particular, the manifestation of this problem arises in the delivery of an Executive Masters programme that focuses on facilitating the development of Practitioner-Researchers as they complete a DSR project and deliver real value to their organisation through a data artefact. Examples of the type of artefacts would include: data models, analytical models, dashboards, frameworks and methodologies. Being directors of this programme the authors of the paper have experienced at first hand the challenge practitioners’ face in implementing DSR, which in turn became the key motivation for developing a tool to facilitate the journey to becoming a Practitioner-Researcher. While the programme started in May 2013 the DSR focused component of the programme started in May 2014 and ran on a 12-month cycle. Currently there have been 2 completed cycles (May 2014 to April 2015 and

May 2015 to April 2016) with the third cycle currently in progress. In essence the 2014/2015 cycle marked the start of the development of the canvas as the authors were responsible with the role of supervising and supporting 18 practitioners in completing a DSR project.

3 Artefact Development

Describing the development of the canvas this section details the three iterations (see Table 1 for summary) under the headings of: (i) problem, (ii) design and build, (iii) and evaluation. This will track the progress of the artefact as well as outline the rigour involved in its development. Once this is complete the contributions are outlined.

3.1 Iteration 1

Problem

During the initial stages of the programme the key focus was on communicating the relationship between research and practice and how it was possible to conduct research that also directly impacted on the work of the practitioners. In doing so one of the first conceptual stumbling blocks was the dual role of the researcher and practitioner. In addition, as well as the dual imperative the participants had a number of very practical questions around aspects, such as: the sequencing of research tasks, expected output of research tasks, linkage of research and practitioner tasks, and the composition of an iteration.

Design and Build

The structure of the first canvas was built from a synthesis of DSR methodology papers (Hevner et al., 2004, Sein et al., 2011, Peffers et al., 2006). In addition, the canvas was also influenced by McKay and Marshall (2001) in splitting the canvas in half and highlighting key aspects to focus on in each stage both from a practitioner and researcher perspective (see Figure 2). Finally, questions were placed in each segment of the canvas, which were derived from: (i) a mix of the frequently asked questions by the cohort, and (ii) the advice the authors had given in response to those questions and other difficulties they faced during the DSR process.

Evaluation

While the first version of the canvas was built from exploring the problems encountered by the first cohort of the programme its usefulness was evaluated with the second cohort as they completed their individual DSR projects. In addition, after that initial evaluation a paper was submitted to an international conference, which received feedback in the form of reviews. Finally, visiting academics that had published on DSR were asked to comment on the artefact and its potential.

Table 1: Summary of the DSR project that developed the Practitioner Design Science Research Canvas.

	Iteration 1 (May 2014 - Jan 2016: 21 months)	Iteration 2 (Feb 2016 - July 2016: 6 months)	Iteration 3 (Aug 2016 - to-date)
Problem Definition	Date: May 2014 - Dec 2014	Date: Feb 2016 - Mar 2016	Date: July 2016 - Aug 2016
	Description: Need to aid practitioners in understanding the dual role (of researcher and practitioner) within DSR projects.	Description: After the first iteration, the need was widened to focus on supporting practitioners in conducting DSR projects	Description: Need to support general IS practitioners in conducting DSR projects
Design and Build	Date: Jan 2015 - Aug 2015	Date: April 2016 - May 2016	Date: Aug 2016 - Sept 2016
	Description: Built version 1 (see Figure 2) of the canvas with a focus of enabling practitioners to conduct DSR projects. Key emphasis was to get the practitioners to be mindful the dual role (researcher and practitioner) in DSR and to do more than just routine design.	Description: Version 2 (see Figure 3) of the canvas included a modified structure of that aimed to make it more intuitive to use and aid practitioners to implement the key aspects of DSR.	Description: Version 3 (see Figure 4) of the canvas was designed to align more with the language of DSR in literature and to link to previous research for clear guidelines on how to complete the sections on the canvas (see Table 2). The link to literature was also to make the canvas itself more robust and potentially more consumable by practitioners outside of the reach of the authors.
Evaluation	Date: Sept 2015 - Jan 2016	Date: June 2016 - July 2016	Date: Oct 2016
	Data sources: (i) request for comment, (ii) conference paper review, (iii) use in DSR project documentation, (iv) use in DSR presentation.	Data sources: (i) request for comment, (ii) conference presentations, (iii) simulation	Data sources: (i) use in DSR project engagements and documentation
	Analysis: User evaluation highlighted good usability and impact results. Had issues with the structure and ability of the canvas to represent the iterative nature of design rather than being a waterfall approach ending with contributions as the last phase.	Analysis: Expert evaluation highlighted a need for more depth and rigour to verify the emergent structure of the canvas and provide more guidance in utilising the canvas.	Analysis: To commence early 2017.

Utilisation of the canvas was through a printed A1 version, which enabled collaboration with supervisors and peers (see Figure 1). Results from the utilisation highlighted an explicit awareness in linking both research and practice as the practitioners started to focus on the research aspects of their projects much earlier than the previous cohort. It was also used as a presentation tool in accurately describing projects and discussing potential strategies in completing projects. However, there were a number of issues with the usability of the canvas and alignment with DSR. In a very basic sense, the canvas was hard to present on a powerpoint. While this is not a major issue it does restrict the ability to communicate to mid-to-large groups. A more pressing issue highlighted the iterative nature of DSR was not fully realised in the artefact. This was particularly evident in the waterfall nature of how the canvas was structured which prompted a waterfall interpretation of DSR execution. The evaluation also showed that while the concept of the dual role of a Practitioner-Researcher was successfully communicated (eg see Figure 1) the guidance on completing a DSR project could be improved. Finally, results from the comments from members of the DSR community highlighted the need to be consistent with the terminology used in the DSR domain. In addition, one of the authors of a seminal DSR paper highlighted that a contribution can come from any stage of the DSR process, rather than directly after evaluation. This correlated with the waterfall interpretation that was demonstrated during the utilisations.

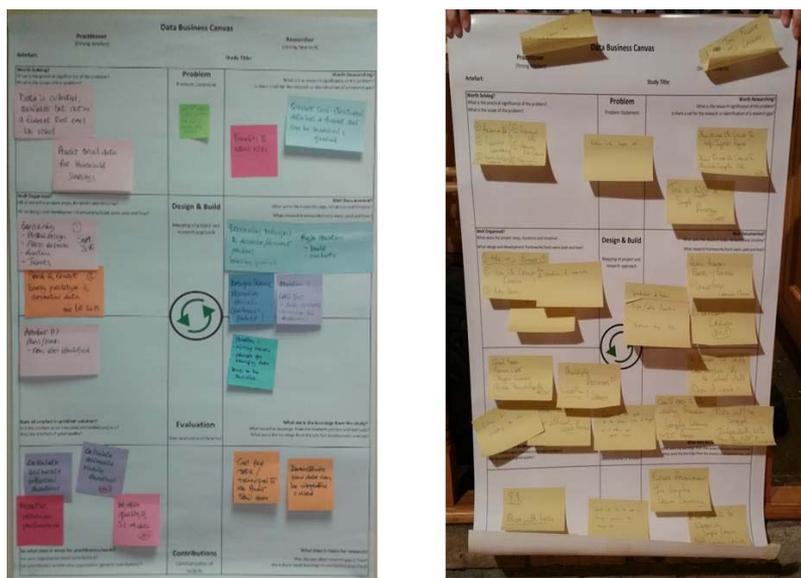


Figure 1: Examples of the canvas being utilised during the evaluation of version 1

3.2 Iteration 2

Problem

Having completed the first iteration of the artefact the problem scope shifted focus to providing a stronger guide for Practitioners in completing DSR. While still in line with

the overall objective of facilitating Practitioner-Researchers, the focus moved beyond just communicating the dual role imperative.

Design and Build

Taking into account the results from the evaluation in the first iteration a key focus was to improve the canvas to make it better reflect the iterative nature of a DSR project. With this in mind, a new level 1 heading “no. of iterations” was placed at the very top. In addition, to break the waterfall type interpretation of the first version, the contributions section was placed at either side of the canvas. The aim of this modification was to show that contributions can come from any stage of a DSR project. Furthermore, the contribution headings were modified to better reflect the academic/practice aspect of contributions (see Figure 3).

Evaluation

This evaluation phase was very short in comparison to the first evaluation and focused primarily on expert evaluation which was gained from requesting comments from several established academics in the DSR community. This was achieved on a face-to-face basis using the canvas as recording device with any comments directly applied on a canvas printout. Request for comment was also applied during the presentation of the canvas at two international conferences (IFIP 8.3 and ECIS). Finally, the canvas was also evaluated using simulation. This entailed representing (through reverse engineering) a paper published in an A+ journal that detailed a DSR implementation. While this was not specifically a Practitioner DSR implementation it did provide some interesting insights.

The key output from the evaluation derived from the established academics highlighted the need to provide more rigour and support to the questions being asked within the canvas. In addition, feedback from the ‘request to comment’ format resulted in very valuable additions to the canvas itself (eg key questions that were not asked). For instance, a visiting academic highlighted a research contribution taxonomy (he co-authored) that makes detailing the research impact of a DSR more structured (Mathiassen et al., 2012). During the conference presentations feedback was positive into the utility of the artefact and a number of academics specifically highlighted its potential in working with practitioners. Finally, the simulation highlighted the increased rigour of a DSR project that can be achieved in communicating a project through the artefact. In particular, for the A+ publication that was visualised through the canvas a number of areas were difficult to complete, highlighting gaps in description of the study in the article. While interpreted as a positive evaluation for the artefact, it does point to the prevalence of the original issue of confusion around DSR and the potential for the artefact to provide a standard template for practitioners to utilise when completing a DSR project.

3.3 Iteration 3

Problem

Again with the previous evaluation taken into account, the focus of the problem shifted towards supporting general IS practitioners in completing a DSR project. Up until this stage the focus was primarily on the cohort within the executive programme.

Design and Build

The key process behind the design and build of version 3 (see Figure 4) of the artefact was to do a rigorous literature review to support/improve all questions being asked on the canvas (see Table 2). In addition, some of the direct comments from the evaluation were taken into account. As an output, terminology further aligned with the DSR domain and in particular more explicit references were made to existing DSR research. For instance, this can be seen in the addition of the section headings (i) Practitioner (Relevance), (ii) Researcher (Rigour), and (iii) Design Cycle to the top of the canvas.

Evaluation

Evaluation of this version has yet to take place.

4 Contributions

The canvas has delivered a number of contributions: (i) enables Practitioners to become more engaged in IS research and in the last cohort has been an input into DSR projects that have generated an estimated value over €40 million from solving real data problem incurred by the practitioners, (ii) academic outputs of several conference publications, (iii) the artefact itself is a discursive template as described by (Tsoukas and Chia, 2002) that tackles the ambiguity and confusion around DSR, (iv) the artefact has also been built through DSR and serves as an exemplar on how to complete a Practitioner DSR project, and (v) it provides guidance for academics in engaging with practitioners and how they both can cross the practice-research divide. Moreover, the biggest success has been the fact that 2 practitioners have joined our PhD programme for January 2017 with a further 5 showing strong commitment to join later in the year.

Table 2: Literature supporting the questions in the canvas.

Problem	Worth Solving	
	What is the practical of the problem?	Guideline 2: Problem Relevance – “The objective of design-science research is to develop technology-based solutions to important and relevant business problems” (Hevner et al., 2004, p. 83).
	What is the scope of the problem?	Problem needs to be described in a ‘holistic fashion’ (Baskerville, 1999 , p. 15).
	Worth Researching?	
	What is the research significance of the problem?	“When is something really novel or a significant advance on prior work? A DSR project has the potential to make different types and levels of research contributions depending on its starting points in terms of <i>problem maturity</i> and <i>solution maturity</i> ”(Gregor and Hevner, 2013, p. 344).
	Is there a call for the research o identification of a research gap?	In Myers (2013) the link between research gap and resulting contribution is made.
Design and Build	Well Organised?	
	What were the project steps, iterations and time-line?	Mathiassen et al. (2012) highlight the element of “the methods guiding the problem-solving cycle” or M _{PS} .
	What design and development frameworks/tools were used and how?	The rigor in design science research must be pursued in the methods employed in the development of the artifact (Goes, 2014).
	Well Documented?	
	Adherence to research methods and alignment with project plan	Mathiassen et al. (2012) highlight the element of “the methods guiding the research cycle” or M _R .
	Use of theories/existing research in the artefact development?	“Needs to be informed by principles that both embody a sound theoretical base and are accepted by a research community that supports their reflective and appropriate application in problem contexts” (Davison et al., 2004, p. 66).

Evaluation	What Results?	
	Evaluation criteria?	“The artifact is evaluated to demonstrate its worth with evidence addressing criteria such as validity, utility, quality, and efficacy” (Gregor and Hevner, 2013, p. 350).
	Performance of artefact?	“The main objective is to create knowledge through meaningful solutions that survive rigorous validations through proof of concept, proof of use, and proof of value” (Goes, 2014).
	What findings?	
	Learning from reflection?	Ability to explore through design (Holmström et al., 2009, Simon, 1973) from which reflection-in-action is key (Weick et al., 1999).
	Evaluation strategy?	Venable et al. (2012) outline a comprehensive framework for developing an evaluation strategy.
Impact	So what (for business)?	
	Local and/or general practice impact?	Goldkuhl (2012) differentiates between local and general practice impact.
	Explicitness of impact?	Impact can be detailed with four levels of explicitness from observable to financial (Ward et al., 2008).
	So what (for research)?	
	Contribution to the body of knowledge?	“The main objective is to create knowledge through meaningful solutions that survive rigorous validations through proof of concept, proof of use, and proof of value. Therefore, it is absolutely not a requirement of successful design science manuscripts to have an explicit tie to theory” (Goes, 2014, p. 6)
	Format of contribution?	Mathiassen et al. (2012) outlined five contribution formats: (i) experience report, (ii) field study, (iii) theoretical development, (iv) problem-solving method, and (v) research method.

Practitioner Research Canvas

Practitioner			Researcher
Artefact:	Study:		
<p>Worth Solving? What is the practical significance of the problem? What is the scope of the problem?</p>	<p>Problem Problem Statement</p>	<p>Worth Researching? What is the research significance of the problem? Is there a call for the research or a research gap?</p>	
<p>Well Organised? What were the project steps, iterations and timeline? What design and development tools were used and how?</p>	<p>Design and Build Mapping of project and research approach</p>	<p>Well Documented? What were the research steps, iterations and timeline? What research frameworks were used and how?</p>	
<p>Role of artefact in problem solution? Did the artefact solve intended/unintended problem? Was the artefact of good quality?</p>	<p>Evaluation Demonstration of artefact</p>	<p>Interesting learnings from the study? What were the learnings from the research process? What were the learnings from the artefact development process?</p>	
<p>What does it mean for practitioners? For internal practitioners (local contribution)? For external practitioners (general contribution)?</p>	<p>Contributions Communication of outputs</p>	<p>What does it mean for researchers? Was the identified research gap(s) filled? Were there novel learnings or unintended gaps filled?</p>	



Figure 2: Version one of the canvas

Practitioner Design Research Canvas

Practitioner			Researcher	
Artefact:		No of Iterations:	Study Title:	
Business Impact So What (for business)? Local impact? Industry impact?	Worth Solving? What is the practical significance of the problem? What is the scope of the problem?	Problem Problem Statement	Worth Researching? What is the research significance of the problem? Is there a call for research or identification of a research gap?	Academic Impact So What (for research)? Contribution to theory? Intended and unintended contributions?
	Well Organised? What are the project steps, iterations and timeline? What design and development frameworks/tools were used and how?	Design & Build Mapping of research and project approach?	Well Documented? Adherence to research methodology? Use of theories/existing research in the artefact development?	
	Role of Artefact in Problem Solution? What is the validity and usability of the artefact? What is the quality and efficacy of the artefact?	Evaluation Demonstration of Artefact	Learnings From the Study? What were the learnings from the research process and methods? What were the learnings from the artefact development and use?	

Figure 3: Version 2 of the canvas

Practitioner Design Science Research Canvas

Practitioner (Relevance)		Iteration:	Researcher (Rigour)	
Artefact:		Study Title:		
Business Impact So What (for business)? Local and/or general practice impact? Explicitness of impact?	Worth Solving? What is the practical significance of the problem? What is the scope of the problem?	Problem Definition Problem Statement	Worth Researching? What is the research significance of the problem? Is there a call for research or identification of a research gap?	Academic Impact So What (for research)? Contribution to the body of knowledge? Format of contribution?
	Well Organised? What are the project steps, iterations and timeline? What design and development frameworks/tools were used and how?	Design & Build Artefact description	Well Documented? Mapping of research and project approach? Use of theories/existing research in the artefact development?	
	What Results? Evaluation criteria? Performance of the artefact?	Evaluation Demonstration of Artefact	What Findings? Learnings from reflection? Evaluation strategy/design?	

Figure 4: Version 3 of the canvas

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