An Exploratory Survey of Design Science Research amongst South African Computing Scholars

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ABSTRACT

The debate ensues as to whether the traditional focus of computing research on theory development and verification and therefore has adequate immediate practical relevance. Despite increasing claims of the potential of design science research (DSR) to enhance the utility of the IT artifact and consequently practical relevance of research, many computing researchers seem to be reticent to accept this paradigm as a legitimate form of scholarly research. DSR is a relatively new paradigm in computing and little is known about its uptake in South Africa. In this paper, we investigate the opinions about DSR among South African computing scholars. Findings from a survey of 53 respondents indicate low adoption rates. The paper also investigates some of the key barriers preventing the uptake of DSR. The paper concludes with some implications as well as suggestions for building a local DSR community.

Categories and Subject Descriptors

K.0 [Computing Milieux]: Miscellaneous

General Terms

Design, Theory.

Keywords

Design Science, IT Artifact, Design Research.

1. INTRODUCTION

Design science research (DSR) has been prevalent as research paradigm in other disciplines such as engineering, but it is still fairly new in computing seeking to gain more legitimacy among computing scholars. Computing is defined here as "any goal-oriented activity requiring, benefiting from, or creating computers" [1] and computing thus includes Computer Engineering, Computer Science, Information Systems, Information Technology and Software Engineering.

Advancement of the DSR paradigm is highly relevant to computing and related research because it directly addresses two of the key current issues of the field namely: the role of the IT artifact in IS research [4] and secondly, the perceived lack of practical relevance of most IS research [18].

In addition to the support of research approaches that would enhance more relevant computing research, DSR could possibly be developed into an innovative pedagogical framework for teaching problem solving and design capabilities for students in general or in specific capstone projects, which have a design emphasis. Problem solving and the ability to design appropriate solutions are regarded, as much needed skills in South Africa to meet our developmental challenges. Furthermore, we believe that DSR has the potential to reduce the relevance gap between computing research and practical problems and thus foster stronger relationships between researchers and practitioners or even between academia and industry. At present very little is known about the adoption of DSR for computing in South Africa and the general opinions by local scholars about DSR at our academic institutions. Furthermore not much is known about the barriers to adoption of DRS in South Africa.

Design-oriented research in computing received significant attention in some countries in Europe as well as the US [27]. There have been a number of studies conducted to assess the state of DSR internationally [2, 3, 12, 25] These studies have confirmed concerns that there is a lack of consensus on what guideline areas should be used as criteria and standards for the evaluation of DSR. Furthermore, in some countries, design oriented computing research is lacking [27]. In addition, there is a lack of reporting on the status of DSR in a developing country context such as South Africa. It therefore remains unclear, what if any, the challenges are in adopting DSR in South Africa. In this paper the goal is firstly to provide an overview on the status of DSR in South Africa and secondly to foster debate on the need and feasibility of establishing DSR as a focus area for the design of computing artifacts.

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This paper reports on the findings of a survey about DSR, its adoption and the opinions of researchers in computing in South Africa. The paper is structured as follow: In the next section, section 2 we provide background on DSR and more specifically a bit of background on how it developed to be a topic of discussion in the field. In section 3 we discuss our research method and data collection that we used to survey the current status in South Africa. In section 4 we present and discuss the survey results, and in section 5 we discuss implications and propose some suggestions for building a local DSR research community in computing. In section 6 we conclude.

2. DESIGN SCIENCE RESEARCH BACKGROUND

In 1969, Herbert Simon in his seminal book, *The Sciences of the Artificial*, analyzed the fundamental differences between the study of *natural* systems and the creation of *artificial* one's [21]. Simon distinguished between the role of explanatory science which is to develop valid knowledge to understand the natural or social world, from design science which is to develop knowledge that can be used by professionals in their respective fields to design solutions to their field's problems [21]. Simon therefore believed that understanding the nature and causes of problems is pivotal to designing appropriate solutions [21].

Since the early 1990s, some members of the IS community in both Europe and the US have recognised the importance of design science research (DSR) to improve the effectiveness and utility of the IT artifact, specifically in the context of computing research solving real-world problems [10, 24, 27]. The 1991 formation of the Workshop on Information Technology and Systems (WITS - http://www.witsconference.org), with research by Nunamaker and his Electronic Group Decision Support Systems (GDSS) team at the University of Arizona, provides evidence of this initial awareness of DSR .[16].

During this time new thinking emerged on how design science should be defined, theorised, and executed in computing. The recent renewed recognition of DSR in computing has led to a number of important activities and research directions such as the multi-disciplinary research conference called Design Science Research in Information Systems & Technology (DESRIST). DESRIST is an annual conference that was organised since 2006 (http://www.desrist.org) [24]. In addition, leading research journals and conferences in computing are openly soliciting top-quality design science research contributions and are expanding their boards to include more senior editors and associate editors who have used and understand the design science approach[15, 27]. The advocates of DSR hope that this will ultimately pave the way for more design science research papers to be published and thus benefit the whole field by enhancing the relevance of computing research. In 2008, special issues on Design Science Research appeared in MISQ and the European Journal of Information Systems (both leading IS journals) [15, 27]. Furthermore, most international IS and computing doctoral programs at major universities now also provide a research seminar dedicated to design science research methods and projects [27].

As mentioned, there is a growing interest in design-oriented research in some countries in Europe as well as the US [15, 27]. Advocates of DSR argue that computing research communities in certain parts of the US and Europe have significantly contributed to their economy because of their long design science research tradition [27]. For instance, the world market leader in enterprise business software as well as the world market leader in enterprise modeling software have firm roots in a European country that supports this pragmatic approach [27]. These organisations foster close collaborations with the academic, design-oriented computing communities.

In South Africa, despite the potential of DSR to complement computing research and enhance the utility of the research artifact and thus research relevance, the growth of this paradigm appears to be negligible. A preliminary scan of South African computing journals and PhD topics at South African Universities appears to support the notion that DSR has still not gained significant acceptance among local researchers. Therefore it is plausible to argue that DSR has not yet been adopted as a prominent paradigm or approach in computing research. Research approaches in computing continues to be dominated by alternative research approaches, which, while relevant, often neglect a central aspect of computing artifacts namely the rigorous design thereof. Despite the increasing importance of understanding the status quo of DSR in South Africa, research on this topic is lacking. In the next sections a background on DSR is provided.

2.1 What is Design Science Research?

Design science research (DSR) is primarily concerned with research into design as science [7, 8, 10, 13, 15, 24]. In computing, the term DSR is also often used to mean a research paradigm, approach or methodology for the design of a computing artifact [9, 10]. In these cases it is often called design research (DR), although Vaishnavi et al. [14] make the statement that DR is a much broader concept than DSR, and that DR is research into or about design, whereas DSR includes using design as a research method or technique.

The intent of DSR is to create an artifact through a balanced process that combines the highest standards of rigour with a high level of relevance. One of the measures of DSR is therefore whether the research resulted in an artifact that is relevant, but also whether the process was rigorous. The definition of a rigorous DSR process or methodology is however still open to debate even though several suggestions were made by DSR advocates [7, 8, 11, 13, 15, 19].

Figure 1 depicts the Information Systems Research Framework that Hevner et al proposed [10]. Using this framework, design science research is described as research building and evaluating computing artifacts designed to meet identified needs. The goal of the artifact is the fulfillment of a specific need, or its utility. The description of the needs would provide the requirements for the artifact. In the building of the artifact, knowledge from the applicable knowledge base is used. During evaluation, the artifact is measured against the needs to evaluate its utility [10].

DSR is however not complete until the knowledge obtained from the DSR process is fed back into the knowledge base during the reporting phase.

Hevner et al. [10] introduced seven guidelines to assist researchers, reviewers and readers to understand what constitutes design science research. These guidelines are :

1. **Design as an Artifact:** the result of DSR is a purposeful IT artifact.
2. **Problem Relevance:** DSR should develop technology-based solutions to business problems

3. **Design Evaluation:** The DSR artifact should be evaluated with regards to utility, quality and efficacy.
4. **Research Contributions:** DSR should contribute in areas of the design artifact, design foundations and/or design methodologies.
5. **Research Rigour:** DSR should apply rigorous methods in both the construction and evaluation of the artifact.
6. **Design as Search Process:** An effective artifact requires the use of means to reach the desired ends whilst satisfying laws in the problem environment.
7. **Communication of Research:** DSR should be presented effectively to both technology-oriented and management-oriented audiences.

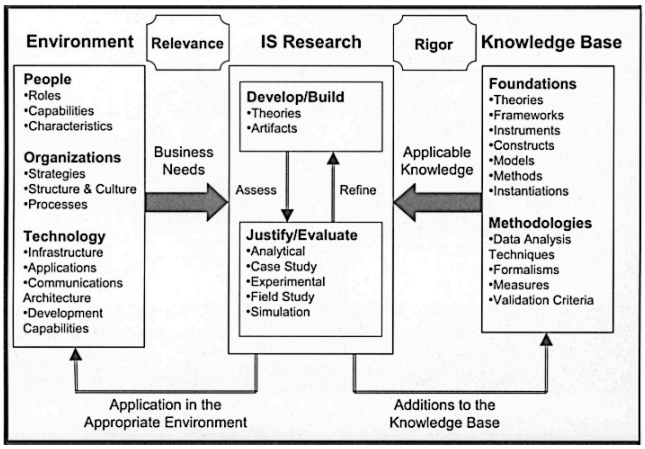

Figure 1: Information Systems Research Framework (from [10]**).**

Hevner et al.'s [10] guidelines emphasise that 1) the rigorous development of an acceptable artifact that fulfills a need, 2) meet quality standards, 3) contributes towards the body of knowledge and 4) could be suitably evaluated, form the core of DSR. However, Indulska and Recker [12] examination of DSR papers in the major IS conference literature since 2004 addressed found that only a minority of papers appear to adhere to the Hevner et al [10] guidelines. According to Indulska and Recker [12], 36.8% of the DSR papers merely stated that they followed DSR guidelines, 22.8% focused on only one guideline, 7.0% focused on some, but not all guidelines, and 19.3% elaborated on the research's implementation of all guidelines. However, only 14.0% of the papers did not mention or explicitly demonstrate the use of the guidelines, demonstrating a growing expectation that these guidelines are followed. In the next section the different opinions with regards to the acceptable DSR artifact, are discussed.

2.2 What is a DSR Artifact?

One of the central discussions within DSR is what is recognized as an artifact within the DSR paradigm. One of the reasons is that the artifact is not only tangible (as in a software system), but more often intangible (such as a model, framework or architecture).

Within DSR it is accepted that the artifact embodies or is part of the design theory [3, 10, 19, 23]. The following are three different discussions on a DSR artifact:

- Winter acknowledges constructs, models and methods as design science research artifacts [27], and Vaishnavi et al. list constructs, models, methods, instantiation and better theories as DSR outputs [24].
- Peffers et al. [20] analysed DSR outputs and recognized constructs, models, methods and instantiations, as well as social innovations or new properties of technical, social, or informational resources. They define an artifact as "any designed object with an embedded solution to an understood research problem".
- Offerman et al. [17] conducted a literature investigation into artifacts produced by DSR and their paper includes quite an exhaustive list of acceptable DSR artifacts that include software, algorithms, methods, models, frameworks and architecture. They grouped these artifacts into eight types namely system design, method, language/notation, algorithm, guideline, requirements, pattern and metric.

For the purpose of this paper, we note that the computing DSR artifact is anything delivered by a rigorous research and development process that can be shown to fulfill an identified need.

2.3 The DSR Methodology

One of the most cited methods accepted by DSR researchers, is that of Vaishnavi and Kuechler that is depicted in Figure 2 [24]. The method was derived from other DSR advocates such as Hevner et al. [10] and March and Smith[15].

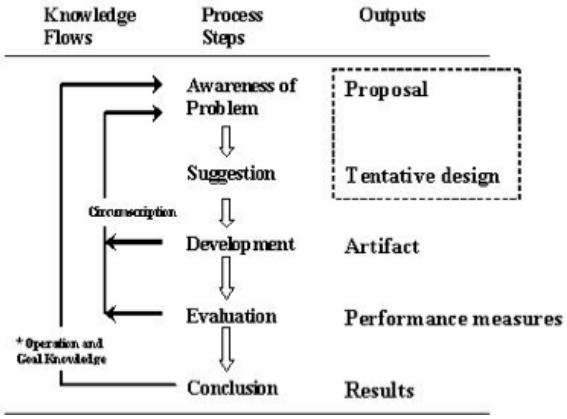

Figure 2: The General Methodology of DSR (from Vaishnavi and Kuechler [24]**).**

Vaishnavi and Kuechler recommend the following five phases for the execution of a typical DSR project [24]:

1) **Awareness of the Problem:** the awareness could be generated from practical experience or from related disciplines. The output from this phase is some kind of proposal.
2) **Suggestion**: the suggestion is closely related to the awareness of the problem (as indicated by the dotted line). Often the suggestion is included as a tentative design in the complete proposal as output, but often an approach to develop a suggestion might be included in the proposal if a possible solution is not immediately evident.
3) **Development:** the tentative design is implemented during this phase and the technique for implementation will differ depending on the artefact.

4) **Evaluation:** when the artefact has been developed, the evaluation of the artefact is mandatory in DSR, usually according to requirements and criteria specified during the suggestion phase (as part of the proposal). The result of the evaluation should be carefully noted and explained. This phase may result in refinement of a awareness, suggestion or development, especially if the result of the evaluation is not satisfactory.

5) **Conclusion:** this is the final phase when the research results and contribution is identified. This includes not only the artefact, but all additional knowledge with regards to the process, construction and evaluation that were acquired. The output of this phase is an acceptable research contribution.

Deeply embedded in the DSR methodology is the notion of *iteration* (indicated by the arrows on the left in Figure 1). It is possible to branch back to *awareness* during the execution of *development, evaluation and conclusion*, and often, several cycles of the abovementioned are executed during the construction of a DSR artifact. This is due to the fact that development, evaluation and conclusion in DSR often exposes new problems that could be entered into the DSR cycle at *awareness*.

The DSR methodology as suggested by Vaishnavi and Kuechler summarises the phases necessary to execute a DSR project [24]. This approach is often nowadays used by researchers and post-graduate students in computing as a repeatable process for the construction of a useful artifact, as well as a research contribution. When considering this approach, it is possible to argue that DSR could play a valuable role in making computing research more rigorous, repeatable and useful.

The next section describes the research approach adopted in this study where we investigated the adoption and awareness of DSR in South Africa.

3. RESEARCH METHODS

3.1 Survey

To address some of the key issues raised above and answer the research questions given in the introduction, the study adopted a largely quantitative, survey-based approach [5, 6]. More specifically, a web survey method was used since this data gathering technique lends itself especially well to exploratory issues, intending to provide a more lucid picture of DSR opinions among local computing scholars. This survey method was also selected because it would rapidly reach a wide audience and thus enable the prospect of collecting larger volumes of data. In addition, it is more cost effective compared to other methods.

The survey was divided into two parts. The first part focused on demographic questions about the respondent and the organisation. In the second part, questions endeavoured to assess the opinions of various aspects of DSR. Although all the questions were quantitative in nature, we did include one open-ended question on the perceived barriers to developing DSR for computing in South Africa.

3.2 Data Collection

A convenience sampling approach was used to target scholars. Respondents invited to participate included members on the SAICSIT list, Head of Departments at Computing departments in South Africa and the Meraka Institute, CSIR. The survey was emailed to all recipients in early May 2012 and a follow up was made about a week later. Answers to structured questions and open-response questions were imported into a spreadsheet and analysed by the authors using SPSS and Microsoft Pivot Tables.

4. RESULTS

4.1 Sample Profile

A total of 56 responses were collected over a period of two weeks, of which 3 were incomplete and were disregarded. The final sample consisted of 53 usable responses. The authors deem this response to be sufficient given the relatively small size of the local computing community. Characteristics of the sample are presented in Table 1 below.

Table 1. Respondent Profile

Characteristics		**n**	**%**
Primary Job role	Professor	13	24.5
	Senior Lecturer	10	18.9
	Associate Professor	9	17.0
	Researcher	8	15.1
	Lecturer	5	9.4
	Other	8	15.1
Experience	0-5 years	10	18.9
	6-10 years	12	22.6
	11-15 years	17	32.1
	15-20 years	4	7.6
	21 years +	10	18.9
Discipline	Information Systems	24	45.3
	Computer Science	12	22.7
	Information Technology	5	9.4.
	Engineering	4	7.6
	Informatics	4	7.6
	Other	4	7.6
Institution Type	University	31	58.5
	Research Institute	9	17.0
	Comprehensive University	8	15.1
	University of Technology	3	5.7
	Commercial	1	1.89
	Private	1	1.89
Province	Gauteng	32	60.4
	Western Cape	9	17.0
	Kwazulu-Natal	6	11.3
	Eastern Cape	5	9.4
	Free State	1	1.9
Gender	Female	31	58.5
	Male	22	41.5

The majority of the respondents were experienced academic staff in the role of Professor, Assistant Professor or Senior Lecturers (60.4%). More than 58% of the respondents were from Universities, with slightly more than 45% representing the Information Systems discipline. Of the total respondents, 58.5% were male and 41.5% female.

Over 60% of the respondents work at institutions in Gauteng. The University of South Africa accounted for 20.75% of the responses, CSIR (16.98%), University of Pretoria (13.21%), University of Kwazulu-Natal (9.43%), University of Cape Town (5.66%), Nelson Mandela Metropolitan University (5.66%), Cape Peninsula University of Technology (3.77%), University of Stellenbosch (3.77%), University of the Witwatersrand (3.77%), Durban University of Technology (1.89%), North-West University (1.89%), University of Fort Hare (1.89%), University of the Free State (1.89%), the University of the Western Cape (1.89%) and other (7.55%). Given the spread of the responses, the reported findings appear to be applicable to local IS community.

4.2 Perceptions of design science research

Respondents were asked to rate the relevance and rigour of research published in accredited journals in their discipline. These were measured using single item, seven point, Likert scales, ranging from "strongly disagree" to "strongly agree". Rigour had the highest performance score (mean=5.60, SD=1.08) (see Figure 3).

Relevance as depicted in Figure 4 (mean=4.42, SD=1.51) was also relatively high above the neutral point on the scale. However relevance showed the most amount of variability in responses.

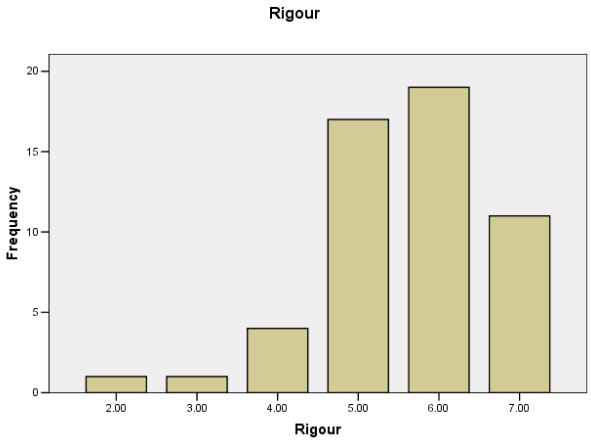

Figure 3: Research rigour

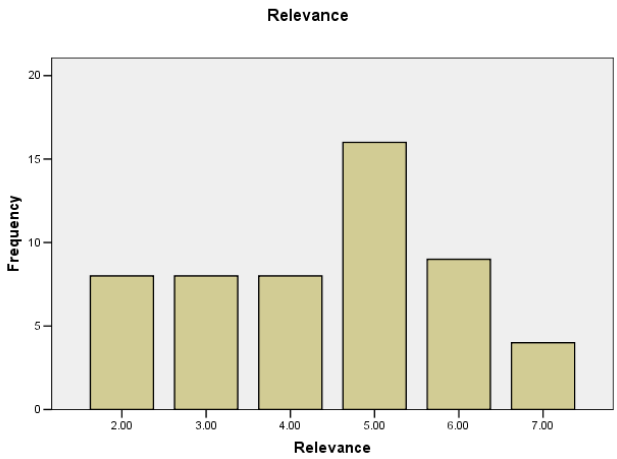

Figure 4: Research relevance

A majority (45.3%) of the respondents rated the IT artifact as highly important to their primary research area. Another 41.5% rated the IT artifact as being of medium importance. Only a minority reported that the IT artifact (11.3%) is of low importance, while 1.9% felt it was completely unimportant to their primary research area.

Almost half of the respondents (49.1%) reported that the design science research paradigm is most likely to make a contribution to the innovation economy

The remaining respondents reported that critical realism (22.6%), interpretivism (15.1%) or positivism (9.4%) would be able to make a similar contribution, while 4% chose to abstain from answering this question.

A large proportion, 39.6% of the respondents reported that they had noticed an increase in the level of DSR interest at their department over the last 8 years while the majority of respondents reported stability (13.2%), no interest (43.4%), or a decrease (3.8%) in the level of DSR interest. However 37.8% of the respondents felt that the level of DSR interest among postgraduate students over the last 8 years at most institutions had only experienced a minor increase. Only 11.3% of the respondents reported that they had noticed high levels of interest among their students, 15.1% reported medium levels of interest and 35.9% indicated no change in interest among postgraduate students. Similarly, only 18.9% of the respondents rate their level of awareness as high. The remaining respondents reported medium awareness (33.96%), low awareness (28.3%) and complete lack of awareness (18.9%) (see Figure 5).

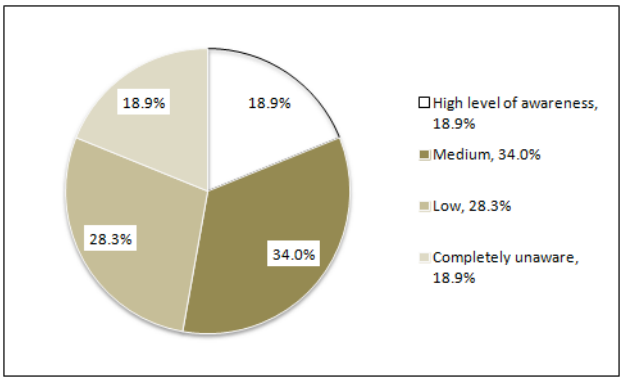

Figure 5: DSR awareness

When asked to rate their perception of the coverage of DSR paradigm in their department's postgraduate research methods programme relative to the mainstream approaches, only 11.5% of the respondents rated their department's coverage as high. The remaining respondents reported medium coverage (19.2%), low coverage (40.8%) and no coverage at all (28.9%). In contrast a majority (35.9%) of the respondents rated DSR as highly important. Another 33.9% rated DSR as at least of medium importance. Only a minority reported that DSR (24.5%) is of low importance, while 5.7% felt it was completely unimportant.

Of the 53 valid survey responses, only 3.8% had a DSR role at a journal and 17.4% had authored or co-authored a paper about DSR. Furthermore, only 3.8% reported they had a DSR teaching role, 24.5% reported having had a PhD or Masters supervision role, 15.1% had examined a DSR Dissertation/Thesis (Internal or External), and an overwhelming 64.2% reported that they had not been involved in any of the above roles.

Respondents were asked if they had read the following seminal DSR citations: Hevner et al. [10], Vashnaivi and Kuechler [24], March and Smith [15], and Walls et al. [26]. A 62.3% majority reported not reading any of the above DSR citations. Only 13.2% reported reading all four of these citations. 5.7% reported reading at least three of these citations, 7.8% read two of these citations and 11.3% read only one of these citations. 90.0% of the 37.7% that had read at least one of these seminal DSR articles reported reading Hevner et al. [10]. This demonstrates a growing interest among local scholars interested in DSR about some of the proposed guidelines be followed.

We believe that the infancy of DSR as a research approach was the reason for the low percentage of respondents (24.5%) that reported high levels of confidence in *supervising* a Masters/PhD work following a DSR paradigm. Similarly only some of the respondents (20.1%) reported high levels of confidence in *evaluating* a Masters/Phd work following a DSR paradigm.

4.3 The future of design science research

Respondents were also asked to briefly describe what they perceived to be the barriers to developing design science research for the computer science, information systems and related disciplines in South Africa. Many respondents supplied answers to this open comment question, totaling about 2 pages of text. There appears to be near consensus on a few areas.

Thematic content analysis confirms that knowledge, skills and awareness represent major challenges. Three other major barriers included the poor relationship with practice, the complexity of the DSR methodology, and DSR's prevailing lack of credibility among some researchers.

Table 2. Barriers to DSR

Theme	Content
Lack of knowledge, skills and awareness	".. lack of knowledge. "I know almost nothing about the topic". "It was not included as a research paradigm in the preparatory study I did prior to registering for PhD" "I do not think that there is currently sufficient awareness and understanding of the DSR paradigm"
Poor relationship with practice	"Poor communication to practitioners" "Requires more 'exposure' at non academic IT conferences in Southern Africa" "I have just lost three months interacting with a firm who promised to help with a questionnaire and told me only yesterday that what I was asking was beyond their scope of expertise." "Not enough focus on Research and Development within Corporates"
Complex methodology	"It is just very hard to know even how to start and it is a very time consuming process." "lack of awareness of the method and how to structure a research task when using DSR"
	"..methodology overload" "..how to structure a research task when using DSR"
Lack of credibility	"Not Mainstream" "Acceptance, especially by examiners, as a recognised paradigm for postgraduate studies" "Design Science is not viewed by peers as being scientific."

Meanwhile, the majority of respondents (53.9%) indicated that they would attend a research method course dedicated to design science research, 34.6% indicated that they may attend, while only 11.5% indicated no interest in such as course. Furthermore, the majority of respondents (59.6%) indicated that they would attend a stream dedicated to design science research at a major local conference. 26.9% indicated that they may attend, while only 13.5% indicated no interest in attending such a stream.

It was encouraging to observe that 30.2% of the respondents indicated that they will be interested in submitting papers to a stream dedicated to design science research at major local conferences. 45.3% indicated that they may submit, while only 24.5% indicated no interest in submitting at such a stream. When asked about being involved in a local DSR community, a number of respondents (39.6%) indicated they would interested in joining a local DSR community, 45.3% indicated that they may join, while only 15.1% indicated no interest in joining such a community.

5. DISCUSSION

In the discussion of the results, it is necessary to highlight a few limitations of the executed research. In the first place one could consider the validity of the survey items, however the responses in generable were indicative of certain trends. Furthermore, the numbers reflected should be considered as indicative rather than precise measurements. Lastly, generalizing the results of self-reporting data should always be undertaken with caution. One of the limitations of self-reported measures is that they are potentially imprecise reflections of what is actually happening at the site being surveyed.

These caveats notwithstanding, this study was useful in providing general DSR perceptions among South African computing scholars. It is clear that many local computing educators and researchers are reticent to accept the importance of solution-oriented knowledge creation as legitimate research. It is also appears that some of them simply lack awareness of the growing DSR approach. The findings furthermore suggest that some researchers are struggling to apply the fairly complex set of criteria for DSR. Here suggestions to simplify and clarify may be useful.

A number of respondents also acknowledged that they would experience difficulty in reviewing and evaluating DSR outputs. It is possible to argue that these problems are associated with the identifued *lack of knowledge* about DSR and suggestions to foster and grow DSR knowledge and experience could be made. This could include online fora and portals on DSR, as well as to present tutorials on DSR.

The research results also indicated a lack of credibility as an accepted research paradigm in computing. Since DSR is an accepted research paradigm in disciplines designing tangible artifacts and there is a growing acceptance internationationally of

DSR as a research paradigm in computing [3, 27], we need to grow awareness of the suitability of DSR in computing in South Africa.

DSR can also be hampered by the different cultures within the practitioner and academic community. Some academics believe that the different time frames and values concerning the contribution of the research may further diminish these relationships. As a counter argument, the fundamental viewpoint that a DSR artefact should be validated practically could help to bridge the divide between academia and practitioners, showing that research artifacts could solve practical problems.

5.1 The emergence of a new field: some suggestions

According to Stremersch [22] there are three key concerns during the establishment of a new research field, first the relevance of the field, second whether the field presents us with new questions that require new knowledge development, and third whether the field yields knowledge that can be generalized. Although these three issues can be explored further with regard to the maturity of a field, there are some evidence from this survey of the emergence of DSR as a legitimate field. DSR is relevant as it is creating much discussion and consequently creates new questions in the local computing community. In addition, according to literature, there are emerging methods underlying DSR, which may in future lead to knowledge that could be generalized [20].

In South Africa there is according to this survey a growing interest in DSR as a method to create different computing artifacts, being physical or conceptual (models/frameworks). There are also results indicating a lack of knowledge on the supervision of students interested in using DSR as a methodology and the desire to attend training programmes. Furthermore, several respondents indicated that they would be interested to submit papers to a dedicated DSR stream. Therefore, we believe that in investigating DSR as a field of interest we need more discourse to establish a DSR community in South Africa.

As authors we therefore call on editors of South African journals and organizers of conferences to discuss the inclusion of special calls and special tracks to enable ongoing discourse. Furthermore, we believe that interactive discussion within institutions could create more awareness and interest in the use of DSR as a preferred method during the creation of computing artifacts an increasing the relevance of computing research. Lastly, the establishment of a DSR community may also be a step towards establishing DSR as a more ideal method for doing research. For managing all of the above, there needs to be research leadership and interaction, which we believe resides within the computing academic community.

6. CONCLUSION

There is consensus among researchers internationally that DSR could contribute to innovation, as well as a more balanced approach towards the rigour and relevance of computing artifact`s. DSR specifically addresses the gap between computing research and practice because the computing DSR artifact is anything delivered by a rigorous research and development process that can be shown to fulfill an identified need. DSR emphasizes that the problem addressed by research should be identified from a real need, and the artifact developed, should be verified according to the identified need. However, the artifact must also be developed using existing theory from the applicable knowledge base and the development should also contribute to the knowledge base (see Figure 1). In spite of these advantages, DSR has not yet been accepted as a credible paradigm in computing research in South Africa.

In this paper we report on an exploratory survey about DSR awareness, knowledge and adoption in South Africa. The results indicate that the computing community needs to be made more aware of DSR. Collaboration with practitioners, perceptions of a stifling methodology, and the credibility gap are perceived to be major barriers to adopting DSR in computing.

So, where to from here? Given the potential of design science research to evolve in a way that could make a meaningful contribution to the South African innovation economy, there is an urgent need for interested scholars in the local computing community to engage in the ongoing debates about DSR. Ultimately, to move the computing discipline forward DSR should at least achieve the same renewed status locally it is increasingly receiving globally.

7. ACKNOWLEDGMENTS

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