Addressing the Dichotomy of Theory and Practice in Design Science Research Methodologies

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Abstract. Design Science Research (DSR) has emerged as a methodological approach for conducting research whose overarching goal is to develop new means, referred to as artifacts, in the form of constructs, models, methods, and instantiations to improve reality. Due to their context dependent nature and the growing interest in the rapid development of new technical solutions, DSR approaches have increased in diversity, leading to different specific methodologies. In this paper, a dichotomous view of theory and practice in DSR projects is taken to categorize individual research activities from a range of six methodologies into these two areas. A

al. [1] H [S O L F L W O \ Q R W H W K D W W K H *development of the artifact should be a search process that draws from existing theories and knowledge to come up with a solution to a defined problem´* $ Q G W though it can be argued whether preparatory work (e.g., the examination of literature to identify a problem) is part of the *build* activity, it seems undisputable that DSR projects encompass, to a certain degree, a dichotomy between a theorical part and a practical development.

In this paper, first, DSR activities from several methodological guidelines, inspired by the DSR comparison framework by Venable et al. [5], are abstracted as rather theoretical or practical parts of the research process. The former includes a spectrum of activities ranging from problem identification and design thinking, while the latter encompasses activities such as artifact building and evaluation. Secondly, a structuring proposal for selecting appropriate methods for both comprising parts and the communication of DSR outputs is provided based on the DSR methodology of Peffers et al. [1] with the potential of being extended to other DSR guidelines. The decision to start with this particular methodology is based on its popularity: A search for

in titles in the database *Scopus*, which claims to be the largest database of abstracts and citations [7], shows that the article by Peffers et al. [1] is ranked first, with more than 3200 references at the time of writing, when sorted by the num-

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The (4) a*ction design research* (ADR) approach consists of four stages, whereby only the (4.a) *problem formulation* has a clear theory focus. Sein et al. [10] state the SULQFLSOH WKDW *research activity initially involves the theoretical elements in the ensemble artifact*

3 Framework Proposal for Structuring DSR Projects

By its very nature, research consists of two fundamental elements: its objectives or desired results, and the methods necessary to achieve them [8]. In this section, a reusable structure proposal for DSR projects following the DSRM of Peffers et al. [1] is presented, which aligns the respective research activities with appropriate methods and a selection of common results. As mentioned in the introduction, the DSRM was selected for study due to its popularity for this type of research.

Fig. 2 divides the DSRM as well as the assigned methods for each activity into a theory and a practice segment with an additional post-research segment. Regarding theory building, common methods for sound identification of a problem and important features of a possible solution that can be derived from existing literature [6] include systematic literature reviews (SLRs), document analysis, surveys, expert interviews, focus groups, observations, and logical reasoning based on these. For the practical application of the collected theoretical knowledge, in turn, methods such as prototypical implementations, experiments, simulations in artificial or real-world scenarios, case studies, benchmarking, and accurate measurements of the artifact's properties are typically used [6]. For the purpose of increasing the scientific rigor when following this approach, we highly recommend to adopt specific guidelines for the respective methods such as established works on SLRs (e.g., Kitchenham and Charters [7], Okoli