

Successful Mobile Portal Application Development: Analysis and Specification

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1 Introduction: Building upon the Taxonomy of domain-specific process models and methodologies

The dynamic and highly competitive field of mobile applications has become not only a valuable business area but also a sphere, the majority of people worldwide interact with every day and develop personal bonds to the devices and the applications as daily companion (cf. Zeidler, Kittl & Petrovic 2007, p. 1). Being the foundation of the rapid update cycles of the 21st century, process models help developers build complex applications in large teams with innovative new technology in a short time frame (cf. Corral, Alberto & Succi 2013, p. 19). With billions of active mobile devices, the mobile innovation gets also more important in the professional work context, providing company related functionality, data and dashboarding all around the planet (cf. www.ioswelt.de). This work contributes to the growing complexity and requirements for developers in the mobile application development, using process models that were developed years before the first iPhone was launched, and therefore the context of decentralized mobile Appstore for a wide audience (cf. Wilson & Fenlon 2007, p. 2). The research delivers a variety of different approaches for software development, ranging from waterfall-oriented models with specification sheets and clearly structured phases, to agile methods that provide more of framework for stakeholder collaboration and can be adjusted for every new use case and team (cf. Royce 1970, p. 331ff.; Poppendieck & Poppendieck 2003, p. 12ff.).

1.1 Motivation and Relevance of the Topic

Modern mobile applications are designed more user centric and developers need to implement opportunities for different types of customers and users to individualize their unique User Experience (UX) (cf. Corral, Alberto & Succi 2013, p. 19). As companies also have realized the surplus of mobile application usage in the professional work context, process models have to be implemented in an even more complex environment between the development team, a plurality of project stakeholders, Information Technology (IT) ecosystems and required interfaces for outdated company software (cf. Damm, Ritz & Strauch 2010, p. 118ff.). The taxonomy by Werth, Guhr & Breitner (2019) has shown, that existing process models can be categorized by domain, phase orientation, customer integration and other dimensions, operating as an orientation point for practitioners to procure an overview of the versatile proceedings for software development discussed in the literature. The variety of process models, ambiguity of correlation to concrete use cases and the diverse domains of mobile applications raise the question which process models were implemented in practice, and what influences the selection of a process model for application development (cf. Moran 2018, p. 750).

Since mobile applications provide less functionality than traditional desktop class software, the market for those applications is more fragmented and the applications are more specialized on the concrete functionality the user wants in this situation (cf. Catolino 2018, p. 450). To picture relevant functionalities in the professional work context, communication and data access were identified as most used functionalities by employees via their mobile devices (cf. Ferguson 2000, p. 4f). Through the importance of communication, also in the personal life, communication applications for the public market are also used by companies, lowering the barrier between work and personal life (cf. Han, Park & Oh 2015, p. 13f). To provide company related data on mobile device, several requirements and guidelines have to be considered, so more companies might develop individual solutions for this problem, resulting in business to employee (B2E) portal applications, bringing search functionality and company information access to mobile devices (cf. Ferguson 2000, p. 8). Modern portal applications provide even more functionality, as simple search, they act as drop-down application into a variety of company related services, like directory, dashboarding or request processes (cf. Damm, Ritz & Strauch 2010, p. 117). Therefore, mobile portal applications were considered as relevant field of research for applying process models. To define a current state of the art in the field of mobile application development in the domain of portal application, a literature review of the top tier research journals systems showed, that the research gap can be identified clearly in this domain, as the following table exemplarily shows.

Journal Search	Rank	Web of Knowledge (2008 - 2019)									
		Strings (Title + Topic)									
Journal		Mobile Application*	Application Development*	Software Development*	Portal Application*	Process Model*					
Information Systems Research (ISR)	A+	0	5	0	9 (1)	8	52	0	1 (1)	0	71
Management Information Systems Quarterly (MISQ)	A+	1	5	2	21	10	45	0	0	2	85
Journal of Management Information Systems	A	0	2 (1)	1	9	5 (1)	42	0	0	2	70 (1)
Mathematical Programming	A	0	0	0	9	0	1	0	0	1	21
Journal of the Association for Information Systems (JAIS)	A	0	2	0	17 (2)	2 (1)	37 (5)	0	0	4	78
Journal of Information Technology	A	0	3 (1)	0	9 (2)	3	28 (1)	0	0	1	35
Information Systems Journal (ISJ)	A	2 (1)	6 (1)	15 (2)	15	8 (1)	49	0	1 (1)	4	49
The Journal of Strategic Information Systems	A	0	0	0	4	4	28 (1)	0	0	2	33 (1)
European Journal of Information Systems (EJIS)	A	1 (1)	6	1	10 (2)	4	41 (1)	0	0	5 (1)	66
INFORMS Journal on Computing (IOC)	A	0	1	0	3	0	3	0	0	1	57
SIAM Journal on Computing	A	0	2	0	0	0	0	0	0	1	30

Table 1: Journal Search Results for VHB ranked A+ and A papers in Information Technology.

This short overview indicates two things, first that the field of software development and process models in general is sufficient reviewed, but a lack in the fields of mobile application and portal applications exist.

Out of the displayed knowledge base and current stage of research, the following research question was derived:

Research Question: *What process models and methodologies are applied in practical use in the mobile application domain for portal applications, and which differences occur regarding the theoretical approaches?*

The following paragraph of the introduction provides an overview of the research design to answer this question, as well as a description of the structure of the remaining chapters.

1.2 Research Methodology Design Science Research

To answer the research question, the work orientates on the Design Science Research (DSR) approach, following Hevner et al. (2004). Consisting of six phases, beginning with the definition of the problem and motivation, which was already stated in the paragraph above and will partially be described in the second chapter (cf. Braga et al. 2015, p. 620). The second phase is the definition of possible objects for a solution, being represented by the process models provided by literature as theoretical explanation to the question of applied process models in practical application development (cf. Braga et al. 2015, p. 620). To tackle the third phase of designing artifacts for the specific problem, this work has developed an explorative questionnaire, used in expert interviews with specialists in the development of mobile applications, which will be the content of chapter three (cf. Braga et al. 2015, p. 621). The Grounded Theory by Corbin & Strauss (1994) is integrated into the data generation and analysis process to derive resilient results. The fourth phase, demonstration, will be described by the fourth chapter, providing the results and analysis of the interview data, including the specific context of the participants, and finally deriving design principles to solve the problem, indicated by the research question (cf. Braga et al. 2015, p. 621). The last two phases of the DSR, evaluation of the solution and communication are not pictured, because of the scope of the work question (cf. Braga et al. 2015, p. 621). The fifth and sixth chapter consist out of limitations, future research directions and conclusions, picturing the lessons learned in the development of this work. The whole DSR process is displayed below, and briefly addressed at the beginning of each chapter.

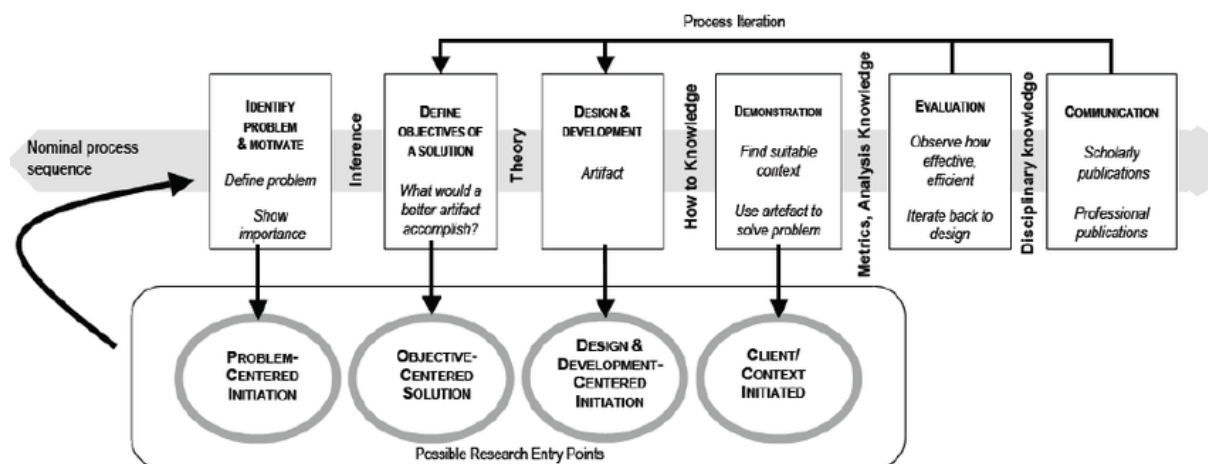


Figure 1: The DSR Process. By: Braga et al. 2015, p. 621.

6 Conclusion and Outlook

To bring this work to an appropriate end, the key highlights are illustrated in the following chapter. The expert interviews created deep insights into the practical proceedings in the field of mobile application development, and the special domain of mobile portal applications. Like expected from the literature, most of the companies, represented by the experts, decided for an agile development process, being Scrum in five of six interviews. The process itself is modified to the suitable needs of the company, but the adaptation is more influenced by the company related context, than by the domain of the developed application itself. Often the process of requirement analysis and customer integration are more plan oriented than the Scrum process suggests. It was shown, that the focus in the development process shifts, regarding the size and direction of the considered company. Startups are more focused on the immediate customer satisfaction, even adjusting their own process to their stakeholders' requirements, if necessary. The two half-inferior companies, both IT service provider, are way stricter with their own process of mobile application development than the startups, seeing it as their unique competitive advantage but are still aware of the fact, that they need to accomplish their customers order. The two large-scale enterprises struggle to adapt their general project management on agile principles, making the collaboration between agile IT department and classic business functions challenging and slowly. The greatest challenge, identified by the experts was not in the actual development process, but in the preceding transition from the previous process to an agile one. While conducting the interviews, it got obvious that a dimension, not integrated in the questionnaire design or the fundamental work before, is the customer focus of the company. It makes a difference in the process if the customer is the own company, internal customer, or an external customer. Interestingly the experts could not agree about a preferred platform to develop applications for. The opinions differ, regarding the pursued functionality of the application. Identified as one of the most driving forces in the current field of mobile application development processes is the topic of Progressive Web Application Development. One expert even described this form of web-based applications, as possible threat for native application developer, because those web applications can provide a new depth of functionality and system integration on the device, currently limiting the capabilities of web applications adverse native applications. A consensus was formed about the level of available theoretical work in the field of agile application development, but a lack of more industrial sector specific research was identified, the experts stated, that often their work context even influences the processes in the application development. Noted by almost all expert was the impact of personal attitude and acceptance for agile processes in mobile application development, the best integrated process fails if key stakeholder does not realize the benefits and chances for their companies provided by this approach, and therefore the need to abandon retrogressive conceptions and behavior. Consequently the overall results are in line

with the first value of the manifesto for agile software development: „ Individuals and interactions over processes and tools...” (Beck et al. 2001, p. 1).