Towards a holistic Approach for Service Management in the Technical Customer Service Domain

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Abstract: The Technical Customer Service (TCS) represents an essential part of the so-called Product-Service System (PSS) and requires intelligent support in its product-related operations with technical goods and knowledge intensive activities. This makes information to a fundamental contribution for a qualitative service delivery. Therefor, IT-based mobile service support systems are seen as a necessity for faster and better information attainment in service operations. Until now, studies exist investigating the usage and development of mobile service support systems but not specifically targeting the field of the Technical Customer Service. Due to this lack, this paper purposes to fill the gap by providing a holistic approach for an IT-based mobile service management in the TCS domain.

1 Introduction

Customers are increasingly demanding integrated solutions to meet their individual needs. For this purpose, manufacturing industry involves services, products and systems to respond to customer demands through product extension services [HLBT14]. Also known as Product-Service Systems (PSS) the combined provision of goods and services offers advantages and potentials for providing companies, like monetary benefits [BeBK09], a clear distinction from competitors and the enhancement of customer satisfaction [KuWD09]. The machinery and plant engineering and it's accompanying Technical Customer Service (TCS) represent such a PSS provider that is characterized by the development, production and provision of products and services to customers. The TCS operates at customers' site with the aim to handle product-specific requirements [Vdma08]. The quality of services is mainly influenced by the TCS what makes the support of the service technician essential for service delivery [ÖNFM13]. Hence, mobile assistance systems are currently used by the TCS to enhance and improve service processes and to increase the autonomy and flexibility of the service technician. In order to allow the efficient operation of the TCS, it is important to identify requirements of a mobile technical assistance system [MFÖK13]. Studies exist considering the usage of mobile assistance systems in business but to date, a systematic approach for the development of mobile service support systems for the TCS is still missing. The underlying research question in this paper is: How can a mobile service support system for the TCS be developed? The research question is adressed by

providing fundamental concepts for IT-supported TCS processes as a signpost for the specification of mobile TCS support systems.

2 Related Work and Research Approach

Most studies considering mobile assistance systems topical focus the healthcare and education sector. Only few studies examine the use of mobile devices and the generated advantages in operational procedures. Major trends have been found in the field service to gain improvements in productivity and response time by mobile devices [Dutt12] but not specifically in the TCS domain. This paper purposes to provide a holistic approach for an integrated service management in the domain of the IT-supported TCS. Thereby, prior research has been done in the underlying dissertation proposal. For the development of a mobile service support system for the TCS it is essential to identify existing requirements from relevant actors. To this end, Requirements Engineering (RE) was conducted using a multi-method approach comprising shadowing of real TCS-processes and semi-structured interviews within a company of the machinery and plant engineering industry [MFÖK13]. The results of the RE process are used as foundation for the use case derivation. Applying the use case concept according to Cockburn [Cock99] a use case-driven approach to the design of service support systems was evolved [ÖNFM13]. All together 16 use cases have been identified within a group of researchers and practitioners that have been also transferred to a DIN specification of the German Institute for Standardization (DIN) [NDMP14]. In the following, substantial results of the preliminary work are presented.

3 Technical Customer Service Processes

A service process involves activities undertaken to realize and deliver the service [BoYa05] accomplished by the service technicians in the field or back office (Figure 1).

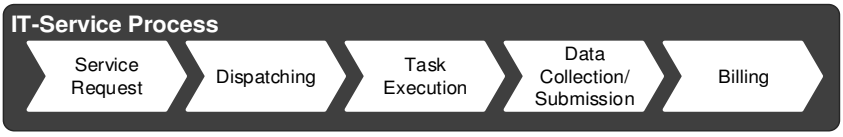

Figure 1: Technical Customer Service Process (referring to [BrTW08])

In a typical IT-service process the customer initiates the service order by contacting the TCS. The TCS is called either periodically (e.g. continous maintenance) or on-demand if an unexpected event occurs (e.g. machine breakdown). After the service request is received the service process passes the stage of dispatching where the service technicians are coordinated for the service delivery. Within the task execution the actual performance of the service, such as maintenance, repair or installation, takes place [BrTW08]. The data collection/submission comprises the acquisition of generated data and its feedback in a timely manner. The service process ends with the billing of the service order. The IT-service process can pass through different departments that operate

on the service process. Each department may require a slightly different view of the service processes where different requirements for the service management solution emerge. Stakeholders of those departments can be for example employees of the helpdesk, customer service employees, service field worker or accountants. Additionally, within the IT-service process a number of functions and sub-processes arise, e.g. installation administration or complaint management, which can vary depending on the service order [Vdma08]. Partially at the operator of the machine or at the machinery itself the service technicians dispose of current information about the state of the system, documentation and order data for their work [Walt09]. The generic TCS process can be seen as point of origin to identify determinants of mobile solutions that can be used to support TCS processes.

4 Requirements Engineering

4.1 Requirements Engineering Conception

RE is widely recognized as crucial part of Software Engineering (SE) and has established itself as a distinct research area [GrYu01]. Modelling of organisational goals constitutes a central activity of the RE process. Three main tasks are identified as integral part of requirements investigation: (1) elicitation, (2) specification and (3) validation. While requirements elicitation focusses on the comprehension of the organisational situation that the considered system aims to improve, requirements specification maps real-world needs onto a requirements model. Finally, the validation task intends to ensure that the derived specification corresponds to the original stakeholder needs [Kava02]. Considering RE in the field of PSS it is apparent that approaches for an integrated and cross-domain RE for PSS are almost completely missing but within the software and product development, RE is already prevalent.

4.2 Use Cases

Use case modelling is a common technique within SE describing functional requirements of systems [Cock99]. Therefor, the considered system is decomposed into different interaction scenarios that combined resemble a systems functionality [Lübk06]. Through use cases a complete course of interaction between an actor and the appropriate system can be constituted [CoLo01]. Depending on what special kind of request occurs and under which conditions this happens, different scenarios arise. For a structured description of use cases a template can be helpful [Cock99]. For the representation of the use cases the template by Cockburn is extended in a domain-specific way in order to capture the relevant aspects of TCS use cases (cf. Table 1). Besides the basic elements (number, name and description of the use case), especially the identification of actors and stakeholders is relevant. The primary actor is the actor, whose aims should be reached by the use case. The stakeholder has a personal interest in the use case, even if he never directly interacts with the system. Examples for a stakeholder can be companies, regulation authorities or the administrative board [Cock99].

Table 1: Use Case Template [ÖFMD13]

Title	Description
Number	Running number of the use case
Name	Title of the use case
Short Description	Brief explanation of the use case
Primary Actor	Name or description of the primary actor
Stakeholder	Name or description of the stakeholder
Precondition	Conditions that have to be satisfied in order to start the execution of the use case
Trigger	Reason to start the use case execution
Postcondition	Conditions that have to be satisfied after proper execution of the use case
Subfunction	Functions that are part of the use case
Input Data	Data relevant or needed for execution
Output Data	Data produced by the use case execution
Data Source	Origin of the data used by the use case

Further important information are the pre- and post-conditions as well as the respective triggers of the use case. Compared with the template suggested by Cockburn, this template is expanded by the following elements in order to meet the specific requirements for the illustration of IT-based processes in the TCS field: subfunctions describing functions that are part of the use case, input data which are necessary for the execution as well as the resulting output data. Moreover, for the illustration of the information flow the respective data source is described.

4.3 Specification of Use Cases for mobile Service Support Systems

In order to reduce the complexity of the system design task, 16 use cases have been specified (Figure 2).

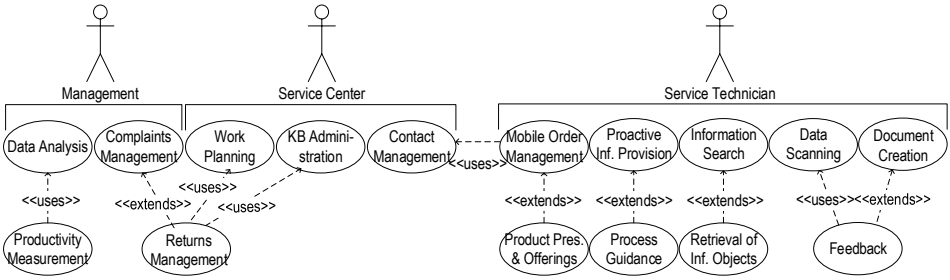

Figure 2: Use Cases [FÖMD13]

The use cases have been identified (a) by observing the daily work of service technicians and their usage of mobile TCS support systems during 77 complete service process executions and semi-structured interviews as well as (b) by examining the results of a structured literature review on requirements for and applications of mobile systems in the TCS domain. The use cases have been documented using the template provided by Cockburn (c.f. section 4.2). The system has to serve three distinct TCS stakeholders: the

management, service center and service technician. Some of the use cases make use of other use cases indicated by an <<uses>>-relation, whereas others are specialized variants indicated by <<extends>> [FÖMD13]. The management is the primary actor in the use cases data analysis and complaints management where the analysis of the operative data and the processing of warranties take place. Data and functionalities from these use cases are used further from the use cases productivity measurement (which provides analytical methods for the study of profitability and performance) and returns management (comprising the handling of complaints and returns processes). The service center represents the back office that undertakes the use cases work planning, knowledge database administration and contact management, which triggers the service order. Here again the returns management uses data resulting from activities within these use cases. The service technician at the customers' site operates through the use cases mobile order management, proactive information provision, information search, data scanning and document creation that are used or extended by product presentation & offerings, process guidance, retrieval of information objects and feedback [ÖFMD13]. These specified use cases describe IT-based TCS processes from a technical and operational term considering the user interaction. According to the template, the elementary content for each use case was derived which serves as nodal point for system specification.

5 Conclusion and Outlook

The TCS represents an important branch of the industry and is characterized by the need of product-related and customer information at the point of service. For ensuring the competitiveness and quality of TCS processes it is important to support the service technician by mobile assistance systems. With this contribution a starting point for the specification of mobile TCS support systems is provided by merging different research fields and their established methodologies. Drawing on RE concepts a consolidated list of requirements and the identification of information needs was worked out in former contributions (c.f. [MFÖK13][MDFÖ14]). Part of my future research is a prototypical implementation of the specified use cases into a mobile service support system and the empirical evaluation of the usability and productivity to prove the effectiveness of the approach. After all a holistic approach for the development of an IT-based mobile support system in the TCS domain is going to be employed beginning with requirements analysis and ending with the implementation and evaluation of a mobile service support system for the TCS.

References

[BeBK09] Becker, J.; Beverungen, D.F.; Knackstedt, R.: The challenge of conceptual modeling for product-service systems: status-quo and perspectives for reference models and modeling languages. In: Information Systems and e-Business Management 8(1), pp. 33–66.

[BoYa05] Boughnim, N.; Yannou, B.: Using Blueprinting Method for Developing Product-Service Systems. In: International Conference on Engineering Design, 2005.

[BrTW08] Brocke, J.; Thurnher, B.; Winkler, D.: Improving IT-Service Business Processes by Integrating Mobility: The Role of User Participation – Results from Five Case Studies. In: Proceedings of the International Conference on e-Learning, e-Business, Enterprise Information Systems, and e-Government (EEE'08), 2008.

[Cock99] Cockburn, A.: Writing Effective Use Cases. Addison-Wesley, Boston 1999.

[CoLo01] Constantine, L.L.; Lockwood, L.A.D.: Structure and Style in Use Cases for User Interface Design. In (van Harmelan, M. Ed.): Object Modeling and User Interface Design. Addison-Wesley, Boston 2001, pp. 245–280.

[Dutt12] Dutta, S.: Field Service: Themes in Automation and Empowerment, April. 2012.

[FÖMD13] Fellmann, M.; Özcan, D.; Matijacic, M.; Däuble, G.; Schlicker, M.; Thomas, O.; Nüttgens, M.: Towards a Mobile Technical Customer Service Support Platform. In: MobiWIS, 2013, pp. 296–299.

[GrYu01] Gross, D.; Yu, E.: From Non-Functional Requirements to Design through Patterns. In: Requirements Engineering 6 (1), pp. 18–36.

[HLBT14] Hsu, M.W.; Lo, T.Y.; Bien, S.; Tsai, J.; Yang, W.H.: On the Product Development Model of Service Innovation in Manufacturing Industry. In: Anthropologist 17 (3), pp. 713–724.

[Kava02] Kavakli, E.: Goal-Oriented Requirements Engineering: A Unifying Framework. In: Requirements Engineering 6 (4), pp. 237–251.

[KuWD09] Kuo, Y.F.; Wu, C.M.; Deng, W.J: The relationship among service quality, perceived value, customer satisfaction, and post-purchase intention in mobile value-added services. In: Computers in Human Behaviour 25 (4), pp. 887–896.

[Lübk06] Lübke, D.: Transformation of Use Cases to EPC Models. In: 5. Workshop der Gesellschaft für Informatik e.V. (GI) und Treffen ihres Arbeitskreises "Geschäftsprozessmanagement mit Ereignisgesteuerten Prozessketten (WI-EPK)," 2006, pp. 137–156.

[MDFÖ14] Matijacic, M.; Däuble, G.; Fellmann, M.; Özcan, D.; Nüttgens, M.; Thomas, O.: Informationsbedarfe und -bereitstellung in technischen Serviceprozessen: Eine Bestandsaufnahme unterstützender IT-Systeme am Point of Service. In: Proceedings Multikonferenz der Wirtschaftsinformatik, 2014, pp. 2034–2046.

[MFÖK13] Matijacic, M.; Fellmann, M.; Özcan, D.; Kammler, F.; Nüttgens, M.; Thomas, O.: Elicitation and Consolidation of Requirements for Mobile Technical Customer Services Support Systems – A Multi-Method Approach. In: Proceedings of the International Conference on Information Systems ICIS 2013.

[NDMP14] Nüttgens, M.; Däuble, G.; Matijacic, M.; Peris, M.; Thomas, O.; Fellmann, M.; Kammler, F.; Özcan, D.; Balzert, S.; Koch, M.; Ahrens, D.; Friedrich, A.; Rosenkranz, N.; Böse, L.; Schlicker, M.: Use cases for mobile assistance systems in the field of technical customer service. In (DIN Ed.): DIN SPEC 91294. Beuth Verlag, Berlin 2014.

[ÖFMD13] Özcan, D.; Fellmann, M.; Matijacic, M.; Däuble, G.; Nüttgens, M.; Thomas, O.: Use Case based description of IT-supported customer service processes. In: Proceedings of XXII. International RESER Conference, 2013.

[ÖNFM13] Özcan, D.; Niemöller, C.; Fellmann, M.; Matijacic, M.; Däuble, G.; Schlicker, M.; Thomas, O.; Nüttgens, M.: A Use Case-driven Approach to the Design of Service Support Systems: Making Use of Semantic Technologies. In: Proceedings of the 5th International Symposium on Services Science (ISSS), 2013, pp. 105–116.

[Vdma08] VDMA: Entscheidungshilfe zur Einführung von Servicemanagementsystemen. VDMA Verlag, Frankfurt am Main 2008.

[Walt09] Walter, P.: Modellierung technischer Kundendienstprozesse des Maschinen- und Anlagenbaus als Bestandteil hybrider Produkte. In (Thomas, O.; Nüttgens, M. Eds.): Dienstleistungsmodellierung: Methoden, Werkzeuge und Branchenlösungen. Physica, Heidelberg 2009, pp. 129–145.