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# Paving the Way for Enriched Patient Experience - On the Development of a Process Architecture for a Hospital

*Emergent Research Forum (ERF)*

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## Abstract

In this emergent research forum (ERF) paper, we report on a project from a state-funded hospital located in one of Europe's microstates. The hospital is currently planning a new building site and, in addition, plans to adopt new information technologies (IT) to improve patient safety and enrich the patient journey. However, the hospital lacks a systematic overview of its processes and their interrelationships as a basis for further BPM initiatives and, most importantly, improving the patient experience from admission to discharge and beyond. By applying a design science research (DSR) approach, we develop the first draft of a process architecture by considering a patient's journey. We discuss this framework and present the next steps as part of our future research.

## Keywords

Journey modeling, process architecture, patient life cycle, business process management (BPM), design science research (DSR).

## Introduction

In light of the COVID-19 pandemic, healthcare organizations are confronted with both high expectations on behalf of society and ever more stringent regulatory requirements. In addition to new trends in digital transformation and the pressure to provide high-quality medical services, healthcare organizations such as state hospitals must operate more efficiently and under increasingly difficult conditions (McCarthy et al. 2016; Sakurai and Chughtai 2020). In this emergent research forum (ERF) paper, we report on the development of a patient-oriented process architecture of a state-funded hospital located in one of Europe's microstates. The main purpose is to develop and provide a systematic process landscape taking into account the customer's needs and requirements throughout their touchpoints with the hospital.

The hospital is currently planning a new building site. The entire information technology (IT) infrastructure will also be replaced and brought up to state the art during this planning phase. In this course, they need a systematic and structured overview of their processes to use IT in the best possible way, increase customer value and their experience as part and throughout the (medical) services they offer. Hence, providing society with high-quality medical treatments and ensuring patient safety requires efficient and structured business process management. To this end, process stakeholders within the state hospital must be aware of their processes within the organization and across organizational boundaries. Furthermore, the state hospital also intends to adopt modern IT such as the Internet of Things (IoT) to (i) optimize and analyze internal processes and (ii) improve core customer processes. This ERF paper reports on a design science research (DSR) project and the development of a high-level process landscape, serving as a starting point to align customer and process orientation in the context of BPM.

## Research Background

Within the existing body of knowledge, the patient-centered approach is reported to be essential for achieving efficient and high-quality healthcare processes. In addition, such a perspective increases the

alignment of all stakeholders. Literature also reports a positive contribution towards the enhancement of the patient experience (McCarthy et al. 2016; Meyer 2019). Incorporating a temporal perspective in the form of a patient life cycle and improving the patient experience can also lead to a better understanding of time and space dynamics in the management of hospital processes (Gualandi et al. 2019). Hence, including the patient journey can also positively contribute to numerous challenges such as data privacy protection or highly regulated standards (McCarthy et al. 2016). A systematic approach to improving the patient experience and their satisfaction, besides security-related issues, is important, especially for healthcare organizations (Simonse et al. 2019).

For a long time, practitioners and researchers alike have been looking for a systematic way to structure and model organizations' business processes (Barros and Julio 2011). Such (process-oriented) architectural frameworks help organizations manage their complex process portfolios and collections (Browning 2009). A high-level representation also enables managers to make better decisions and assess the impact on other processes (Koliadis et al. 2008). Process architectures serve as one means of representation to systematically manage and collect business processes in an organization. Several tools and applications exist to manage such visualizations structured and efficiently (Eid-Sabbagh et al. 2013). Besides, various methods exist to develop a process architecture (Barros and Julio 2011; Lapouchnian et al. 2015). Also, several dimensions, goals, and constraints exist on how to design such a process architecture (Lapouchnian et al. 2015). Contemporary literature has already embraced the topic of patient journey modeling and mapping (e.g., McCarthy et al. 2016) to improve the patient flow in the context of health organizations (Samaranayake et al. 2015). For example, such patient-oriented frameworks and architectures also allow managers to deploy process mining to better analyze temporal and multi-dimensional aspects (McGregor et al. 2011). In BPM research, there is also a call to better understand customers, their processes, and how they interact with the organization (Trkman et al. 2015). Finally, IS and BPM scholars refer to representation theory for motivating data, process or system modeling initiatives, including different categories, types, and forms (Recker et al. 2007).

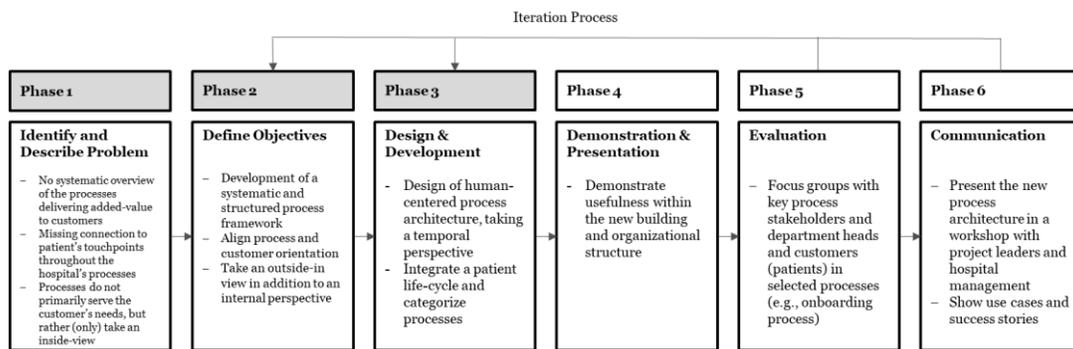
## Research Context and Case Description

In the following, we will refer to our case company as “House of Health (HoH)”. This healthcare organization is a state-funded hospital in one of Europe’s microstates. Hence, the offered services and hospital building itself are relatively small, compared to other hospitals in larger cities or countries – as the following figures illustrate for the year 2020: about 2000 inpatient discharges, 11'000 outpatient cases, 7000 treatments emergency cases, 200 employees, between 25-30 employed medical doctors. From a technological, medical, and architectural perspective, the current building no longer satisfies the stakeholders' needs and is no longer state of the art. Preceding a referendum and decision by the government in 2019, HoH plans to re-build the entire hospital at a nearby new location. The old building will be used otherwise by the government in the future. Put in numbers: the new building project will cost roughly between 60 and 70 million Euros. Therefore, the building project elicits a high political and social interest. Moreover, because the hospital is a state-funded institution, procurement procedures must by law be transparent, and tenders must be carried out following a true and fair principle. Generally, reporting efforts, transparency standards, and efficient use of resources are very high. HoH sees this pre-project phase as a chance to incorporate new trends in digitalization and automation of business processes, to prepare the organization for future challenges in cross-border cooperation, patient services, and safety. Most importantly, to the new building should enhance the (process) experience of their patients, from arrival at the hospital to medical treatment until discharge back home.

## Design Science Research Methodology

As part of this research endeavor, we collaborate with the practitioners of the HoH. To this end, the first author was invited to a physical workshop at the conference room of HoH. The overarching goal of this workshop was to discuss future information and communication technologies (ICTs) that will be used in the new building. During this workshop, the first author had no particular purpose in terms of intervention or agenda-setting, and hence, took handwritten notes and later transcribed them into MS Word on the same day. Besides two project managers of this construction project, four department heads and two external advisors were present to guide the hospital in the procurement and scoping. One of the central topics of discussion was that the project managers do not have a structured overview of their current processes.

Especially one project manager raised the demand for efficient and smooth processes, focusing on the patient (customer): *"In the future, we want to align the services and processes of the state hospital more closely with the needs and requirements of the stakeholders and our customers. The new building should be the first step in this direction to improve the customer experience (project leader 1)."* The following elaborations and design activities relate to the new building and organizational setting: We apply a design science research (DSR) approach to address this challenge and problem. DSR is a modern research approach and paradigm that has gained considerable momentum within the IS research community in recent years. Unlike behavioral research, it is not about testing or building theory but rather about finding innovative solutions to real-world problems. In concrete terms, it is about developing and evaluating design knowledge through design artifacts, which are useful to solve (design) problems (Baskerville 2008; Hevner et al. 2004). Therefore, we hypothesize that developing a process architecture, considering the patient's needs, requirements, and touchpoints with HoH over time, leads to an added value and enhanced patient experience. In the following, we illustrate the planned DSR process by referring to Peffers et al. (2007), who provide an intuitive and stage-gate procedure, for a transparent and guided DSR project between academics and practitioners. As illustrated in Figure 1, we are currently in phase 3, at the transition to phase 4.



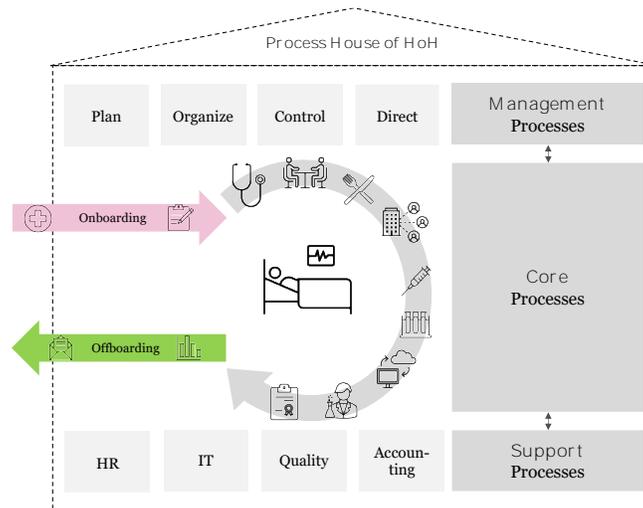
**Figure 1. Design Science Research Process Adapted From Peffers et al. (2007).**

Figure 2 represents the first attempt to integrate the patient life cycle into a generic process architecture. No claim is made to the completeness of the listed corporate functions and the symbolically depicted activities of the patient life cycle. In addition to the cyclical and temporal representation of the patient journey across the organizational boundary (dashed frame), the subdivision of management, core, and support processes (Porter and Millar 1985) is another feature of this process architecture. Pending the technical implementation of this framework in a process modeling application, Figure 2 can also be used as a visual inquiry tool (Avdiji et al. 2020) to enable process stakeholders to better coordinate and manage customer-related processes at the strategic level. So far, Figure 2 only represents the internal (inter-organizational) perspective. For the time being, Figure 2 also serves as a mockup illustrating the basic understanding of the hospital's customer (patient-) oriented processes. Therefore, what is still missing here is the process-related link to external partners, service providers such as rescue and ambulance organizations, or medical laboratories.

## Discussion and Next Steps

So far, we have only engaged with one case company (the HoH). Hence, the artifact's intermediate results and current state might bear a strong coloration of the idiosyncratic characteristics of this small hospital. Therefore, we plan to extend the number of case companies to further generalize our results. What is novel and innovative in this DSR project is the close collaboration with practitioners aiming to re-design their BPM approach and focus on the added value for customers, their experiences and the hospital's (medical) services. To the best of our knowledge, there is no reference framework in the literature available, which categorizes processes in this way and simultaneously considers the customer cycle as a temporal representation of customer touchpoints at the strategic level. In addition, our design artifact (see Figure 2) is kept very generic, which is why it can also be applied and evaluated in other contexts. Besides the differentiation between the value contribution of processes (management, core, and support) (Porter and Millar 1985) we plan to gain more insights into the nature, type, and contextual characteristics of HoH's processes by surveying the department heads of HoH. A further distinction can be made between

organizational processes (e.g., collaboration, communication, etc.) and business processes (e.g., medical treatment, patient grooming, etc.). In the next step, we must derive concrete guidelines that revolve around modeling a patient's journey. Also, we have to systematically collect the requirements and needs of process (internal and external) stakeholders to address and fully understand the problem setting and its facets (Maedche et al. 2019). During the workshop, we also experienced discussions regarding the spatial (physical) divisions, and separations that influence the positioning of ICT infrastructures such as client workstations. Therefore, as part of our future research, we will also consider the influence and interdependencies between the new emerging structures and processes (Jackel et al. 2004) impacting the design of the process architecture at the strategic and organizational level.



**Figure 2. Patient-Centered Process Architecture Based On Porter and Miller (1985).**

As part of our evaluation strategy (Venable et al. 2016), we aim to conduct focus groups to demonstrate the usefulness of our design artifact (*phase 5*). This method proves suitable for participatory and cooperative research studies between practitioners and researchers (Filipowska et al. 2009). The idea is to ensure a coherent evaluation procedure of this process architecture and each evaluation activity (Abraham et al. 2014). Next, to make the developed process architecture available to the practitioners of the HoH (and beyond), we are planning an on-site workshop and presentation of our design artifact (*phase 6*).

## Conclusion

In this paper, we report on this still ongoing development of an innovative process architecture for a hospital located in one of Europe's microstates. Motivated by the need to build a framework for systematically visualizing processes, categorizing their degree of added value to the organization's services and their touchpoints to customers, we sketch the first version of a patient-oriented process architecture. This high-level visualization serves process stakeholders to manage processes at the organization and strategic level. Moreover it provides guidance in the form of a preliminary implementation guide to model processes considering patients' temporally changing needs and requirements. We present this design artifact and discuss our next steps for future research.

## REFERENCES

- Abraham, R., Aier, S., and Winter, R. 2014. "Fail Early, Fail Often: Towards Coherent Feedback Loops in Design Science Research Evaluation," in *Proceedings of the International Conference on Information Systems - Building a Better World through Information Systems*, Auckland, New Zealand.
- Avdiji, H., Elikan, D., Missonier, S., and Pigneur, Y. 2020. "A Design Theory for Visual Inquiry Tools," *Journal of the Association for Information Systems* (21:3), p. 3.
- Barros, O., and Julio, C. 2011. "Enterprise and Process Architecture Patterns," *Business Process Management Journal* (17:4), Emerald Group Publishing Limited, pp. 598–618.

- Baskerville, R. 2008. "What Design Science Is Not," *European Journal of Information Systems* (17:5), pp. 441–443.
- Browning, T. R. 2009. "The Many Views of a Process: Toward a Process Architecture Framework for Product Development Processes," *Systems Engineering* (12:1), Wiley Online Library, pp. 69–90.
- Eid-Sabbagh, R.-H., Hewelt, M., and Weske, M. 2013. *A Tool for Business Process Architecture Analysis*, in (Vol. LNCS 8274), presented at the International Conference on Service-Oriented Computing, Berlin Heidelberg (Germany): Springer-Verlag, pp. 688–691.
- Filipowska, A., Kaczmarek, M., Kowalkiewicz, M., Zhou, X., and Born, M. 2009. "Procedure and Guidelines for Evaluation of BPM Methodologies," *Business Process Management Journal* (15:3), Emerald Group Publishing Limited, pp. 336–357.
- Gualandi, R., Masella, C., Viglione, D., and Tartaglino, D. 2019. "Exploring the Hospital Patient Journey: What Does the Patient Experience?," *PloS One* (14:12), Public Library of Science San Francisco, CA USA, pp. 1–15.
- Hevner, A., March, S., Park, J., and Ram, S. 2004. "Design Science in Information Systems Research," *MIS Quarterly* (28:1), p. 75.
- Jackel, M., Rovekamp, C., and Wurfel, A. M. 2004. "Structure Follows Process': Experiences with New Ways of Working and Communication Processes in Organizations," in *Work with Computing Systems 2004*, H. M. Khalid, M. G. Helander, and A. W. Yeo (eds.), Kuala Lumpur.
- Koliadis, G., Ghose, A. K., and Padmanabhuni, S. 2008. *Towards an Enterprise Business Process Architecture Standard*, presented at the 2008 IEEE Congress on Services-Part I, IEEE, pp. 239–246.
- Lapouchnian, A., Yu, E., and Sturm, A. 2015. *Design Dimensions for Business Process Architecture*, in (Vol. LNCS 9381), presented at the 34th International Conference on Conceptual Modeling, Berlin Heidelberg (Germany): Springer-Verlag, January 1, pp. 276–284.
- Maedche, A., Gregor, S., Morana, S., and Feine, J. 2019. "Conceptualization of the Problem Space in Design Science Research," in *Extending the Boundaries of Design Science Theory and Practice* (Vol. 11491), B. Tulu, S. Djamasbi, and G. Leroy (eds.), Cham: Springer International Publishing, pp. 18–31.
- McCarthy, S., O'Raghallaigh, P., Woodworth, S., Lim, Y. L., Kenny, L. C., and Adam, F. 2016. "An Integrated Patient Journey Mapping Tool for Embedding Quality in Healthcare Service Reform," *Journal of Decision Systems* (25:S1), Taylor & Francis, pp. 354–368.
- McGregor, C., Catley, C., and James, A. 2011. "A Process Mining Driven Framework for Clinical Guideline Improvement in Critical Care," in *Proceedings of the Learning from Medical Data Streams Workshop* (Vol. 765), P. Pereira Rodrigues, M. Pechenizkiy, M. Medhat Gaber, and J. Gama (eds.), Bled, Slovenia: CEUR Workshop Proceedings.
- Meyer, M. A. 2019. "Mapping the Patient Journey across the Continuum: Lessons Learned from One Patient's Experience," *Journal of Patient Experience* (6:2), SAGE Publications Sage CA: Los Angeles, CA, pp. 103–107.
- Peffers, K., Tuunanen, T., Rothenberger, M. A., and Chatterjee, S. 2007. "A Design Science Research Methodology for Information Systems Research," *Journal of Management Information Systems* (24:3), Taylor & Francis, Ltd., pp. 45–77.
- Porter, M. E., and Millar, V. E. 1985. "How Information Gives You Competitive Advantage," *Harvard Business Review* (63:4), Harvard Business Review Reprint Service.
- Recker, J., Rosemann, M., Green, P., and Indulska, M. 2007. *Extending the Scope of Representation Theory: A Review and a Proposed Research Model*, D. N. Hart and S. Gregor (eds.), presented at the 3rd Biennial ANU Workshop on Information Systems Foundations, Canberra, Australia, pp. 93–114.
- Sakurai, M., and Chughtai, H. 2020. "Resilience against Crises: COVID-19 and Lessons from Natural Disasters," *European Journal of Information Systems* (29), pp. 585–594.
- Samaranayake, P., Dadich, A., Hayes, K. J., and Sloan, T. 2015. "Patient-Journey Modelling and Simulation in Computed Tomography: An Integrated Framework," *Business Process Management Journal* (21:5), Emerald Group Publishing Limited, pp. 988–1014.
- Simons, L., Albayrak, A., and Starre, S. 2019. "Patient Journey Method for Integrated Service Design," *Design for Health* (3:1), Taylor & Francis, pp. 82–97.
- Trkman, P., Mertens, W., Viaene, S., and Gemmel, P. 2015. "From Business Process Management to Customer Process Management," *Business Process Management Journal* (21:2), Emerald Group Publishing Limited, pp. 250–266.
- Venable, J., Pries-Heje, J., and Baskerville, R. 2016. "FEDS: A Framework for Evaluation in Design Science Research," *European Journal of Information Systems* (25:1), Taylor & Francis, pp. 77–89.