10-9-2023

Patient centricity in IS healthcare – a framework proposing enablement, empowerment, and engagement of patients as individual IS users

Jan Maschewski
Leuphana University Lüneburg, Germany, jan.maschewski@t-online.de

Kristina Lemmer
Leuphana University Lüneburg, Germany, kristina.lemmer@leuphana.de

Patient centricity in IS healthcare – a framework proposing enablement, empowerment, and engagement of patients as individual IS users

Research Paper

Jan Maschewski[1], Kristina Lemmer[1]

[1] Institute of Information Systems, Leuphana University Lüneburg, Germany
jan.maschewski@leuphana.de
kristina.lemmer@leuphana.de

Abstract. The core of medicine and care is assisting patients with their health-related problems achieving the best results possible. Yet, recent Information Systems (IS) literature describes patient centered IS healthcare as "supporting assistants with IS". In need of the patient in the center of the digital transformation process in healthcare, we focus our study on examining the IS scientific community's contribution to digital healthcare regarding patients in the digital transformation process. We conducted an explorative, systematic but selective review of journal articles published in the best Senior Scholar Journals of the Association of Information Systems. Our results reveal a) a framework for digital health research in IS indicating underrepresented research directions, and b) three propositions on patient centricity in IS healthcare focusing on patient enablement, empowerment, and engagement as central streams.

Keywords: Digital Healthcare, Patient-centricity, Literature Review, Framework

1 Introduction

The healthcare sector is facing tremendous challenges: an ageing population, an increase in diagnosed diseases and multimorbidity put enormous pressure on the providers of healthcare (Hickmann et al., 2022; OECD, 2021). Consequently, hopes are high for advancements in Information Systems (IS) to help increase efficiency and capacity while improving therapy results at the same time (Hibbard and Greene, 2013; Shortell et al., 2017). In the past, initiatives to increase efficiency and capacity through IS mostly focused on healthcare professionals (Currie and Guah, 2007; Klecun et al., 2019). This is due to the professional side's lower diversity and smaller number of individuals while accessibility was higher which fueled hopes for fast and effective progress (Currie and Guah, 2007; Klecun et al., 2019).

More recently however, the patient's role in successful health intervention received more attention (Hibbard and Greene, 2013; Hickmann et al., 2022; Shortell et al., 2017).

18th International Conference on Wirtschaftsinformatik,
September 2023, Paderborn, Germany

There might be several reasons for this recalibration in focus, e.g., more efficient potentials for improving therapeutic outcomes or overall greater availability and usage of digital products by the population (Hibbard and Greene, 2013; Hickmann et al., 2022; Shortell et al., 2017). However, the increased interest leads us to examine the IS scientific community's contribution to digital healthcare regarding patients in the digital transformation process.

This study is structured as follows. In the second section, we give a short background of IS in healthcare practice and science. Section 3 describes the research design of this study. In Section 4, findings of our research are presented. Section 5 conceptualizes a framework for IS healthcare resulting in three propositions regarding patient centricity in IS healthcare. Section 6 discusses implications of our research and outlines possible next steps to deepen the understanding in this field.

2 Background

The provision of healthcare is a complex field which requires multiple experts to effectively cooperate for the well-being of the patient (Gianchandani, 2011; Goh et al., 2011; Malm-Nicolaisen et al., 2023). Accordingly, the healthcare sector relies extensively on IS to organize the process and precision of care provision (Aanestad et al., 2017; Goh et al., 2011; Yaraghi et al., 2015). In the last 20 years a great deal of effort was invested by researchers, politicians, information technology (IT) and healthcare professionals to digitally transform and better integrate the existing support systems of the sector (Klecun et al., 2019; Mergel et al., 2019; Yaraghi et al., 2015). It seems, however, that the patient – focal point of healthcare – got neglected in process (Bombard et al., 2018; Klecun, 2016). As the primary users of these information systems are professionals it is only plausible for the IS discipline to focus its efforts on topics like successful implementation of new supporting systems or data exchange between applications and professional actors (Klecun et al., 2019; Yaraghi et al., 2015).

Reflecting the high effect of patient engagement for therapeutic success and the advancing digital transformation of the greater population's daily lives, it is worthwhile to reconsider this focus (Bombard et al., 2018; Hibbard and Greene, 2013; Shortell et al., 2017). After all, healthcare is about helping the patient and therapy outcome heavily relies on the patient's active participation during the screening, treatment, and recovery processes (Hibbard and Greene, 2013; Shortell et al., 2017). Given the improvements achieved in IS in general (e.g., Internet of Thing and digital platforms) and the field of professional healthcare IS in particular (e.g., electronic health records and information exchange), new opportunities for integrating the patient more closely into the healthcare process seem attainable, valuable, and desirable (Bombard et al., 2018; Hickmann et al., 2022). Utilizing these opportunities is even more important as IT enables patients to better inform, monitor and optimize themselves leading them to demand a more active role in healthcare (Dadgar and Joshi, 2018; Ghose et al., 2021; Karazivan et al., 2015). This process got further accelerated by the COVID -pandemic, which raised awareness for the potentials of digital health applications at the patient's side (Budd et al., 2020; Peek et al., 2020).

Looking at industries like mobility and hospitality offers an outlook at the potential that lays in integrating services and making them more accessible for customers. Mobility might be a prime example, where the integration of multiple services from independent providers (e.g., public transport, ride-sharing, and bike-rentals) creates an overall better experience for the user (Stopka et al., 2018). Another example for a meta-platform can be found in comparison portals, e.g., for hotel bookings or insurances (Abbas et al., 2022). Of course, IS integration brings additional challenges for practitioners and researchers in any sector it is coming to (Aanestad et al., 2017; Hanseth and Bygstad, 2015; Maruping and Matook, 2020).

Given the beforementioned neglection of the patient as a primary stakeholder in IS research in combination with the changing (self-)conception of the patient in healthcare, we ask as research question (RQ):

RQ: Which patient-centric research streams (e.g., based on stakeholder, technical applications and organizational themes) can be identified in IS healthcare literature?

3 Method

In our explorative systematic literature review, we applied the framework for reviewing literature as proposed by vom Brocke et al. (2009) consisting of 5 phases: (I) definition of review and scope, (II) conceptualization of topic, (III) literature search, (IV) literature analysis and synthesis and (V) research agenda. To define the focus for our review (phase I) we relied on Cooper's taxonomy for literature reviewing (Cooper, 1988) and additional suggestions by vom Brocke et al. (2015). Following these frameworks, we focus this review on research outcomes with special emphasis on its object of analysis and aim at a neutral representation of the central issues covered by existing IS literature. This review is conducted with an audience of general scholars in mind. We started our search with publications in the premier IS journals as proposed by the Association for Information Systems College of Senior Scholars (2023) and went forward and backward for central publications. Table 1 and Table 2 present the scope of our review.

Table 1**.** Taxonomy of literature review (following vom Brocke et al. (2009) and Cooper (1988)) aligned to our research

Focus	Research outcomes	Research methods	Theories	Applications
Goal	Integration	Criticism	Central issues	
Organisation	Historical	Conceptual	Methodological	
Perspective	Neutral representation		Espousal of position	
Audience	Specialised scholars	General scholars	Practioners / politicians	General public
Coverage	Exhaustive	Exhaustive and selective	Representative	Central / pivotal

Table 2. Search scope of literature review (following vom Brocke et al. (2015)) aligned for our research

Process	Sequential	Iterative	
Sources	Citation indexing services	Bibliographic databases	Publications
Coverage	Comprehensive	Representative	Seminal works
Techniques	Keyword search	Backward search	Forward search

In a subsequent step (phase II) we conceptualized our topic. Starting from our main interest – namely identifying patient-centric research streams in digital health IS research – we used patient-centric as our first search term in IS databases. The term patient-centric is a healthcare adapted variation of customer-centric, which describes the configuration of a business in such a way that it focusses on a customer's needs and establishes a mutually satisfactory relationship (Hickmann et al., 2022; Lamberti, 2013). As a result, we came across a variety of terms that describe the focus on patients. For example, patient-centered / patient-centred was a term more frequently used in the 2000s in the UK as politics initiated reforms in the healthcare sector to serve the citizens more efficiently and more suited towards their needs (Currie and Guah, 2007; McGrath et al., 2008; Klecun, 2016). Hence, following previous literature (Boell and Cecez-Kecmanovic, 2015; vom Brocke et al., 2015) to get a broad picture of the field and not overlook important publications, we included a variety of terms describing a focus on the patient for our further analysis (i.e., *patient-centric*, *patient-centered*, *patient-centred*, *patient-focus*, *patient-side* and *patient-led*). As we were particularly interested in the ways IS helps patients in an overarching manner, linking multiple health-related services, we included the terms *platform* and *guide* in our search. *Platform*s bring two or more groups of stakeholders together and enable interactions among them (Fürstenau et al., 2020; Hagiu and Wright, 2015), describing our research interest. Acknowledging digital healthcare as a complex field, stakeholders need orientation and help in using corresponding information technology (Ghose et al., 2021; Gianchandani, 2011; Karazivan et al., 2015). Thus, we included *guide* as an additional keyword. We used both terms *health* and *healthcare* to limit our search to publications from the domain of interest. To further specify the search, we included *digital* in the search string of our literature search, yielding us the following search string: *digital AND (health OR healthcare) AND (platform OR guide) AND (patient-centric OR patient-centered OR patient-centred OR patient-focus OR patient-side OR patient-led)*.

In phase III, literature search, we used the identified combination of terms for our actual literature search. As recommended by previous literature (Boell and Cecez-Kecmanovic, 2015; vom Brocke et al., 2009; Webster and Watson, 2002), we focused our review on high quality articles and included only journals, that were considered the best in Information Systems research by the Association for Information Systems' College of Senior Scholars (2023) (i.e., the European Journal of Information Systems, Information Systems Journal, Information Systems Research, Journal of AIS, Journal of Information Technology, Journal of MIS, Journal of Strategic Information Systems,

MIS Quarterly). We relied on the publishers' databases and entered the keywords according to the before mentioned logic, searching all field for the longest available timespan until 2022. Table 3 shows the structure and results of our review.

Table 3. Analyzed Journals

Journal	Database	Coverage	Hits	Reviewed
Decision Support Systems	Science Direct	1985-2022	57	12
European Journal of Information Systems	Taylor & Francis Online	1991-2022	59	12
Information & Management	Science Direct	1977-2022	41	15
Information and Organization	Science Direct	2001-2022	29	7
Information Systems Journal	Wiley Online Library	1991-2022	58	11
Information Systems Research	Informs PubsOnLine	1990-2022	94	19
Journal of AIS	AIS eLibrary	2000-2022	46	8
Journal of Information Technology	SAGE journals	1986-2022	42	6
Journal of MIS	Taylor & Francis Online	1984-2022	40	8
Journal of Strategic Information Systems	Science Direct	1991-2022	18	2
MIS Quartely	AIS eLibrary	1977-2022	60	10
			Σ544	**Σ110**

After we conducted the literature search, we analyzed and synthesized our literature (phase IV) as recommended by Webster and Watson (2002). We found 544 articles matching our search criteria, 110 of which were found relevant for our review. The filtering process included title and abstract screening of the search results on the publishers' archives according to our research subject (i.e. focus on social / behavioral analyzes (as opposed to technical or coding-centered articles) while also excluding research removed from the information system itself e.g., business models, financial performance analyzes or vendor strategies). Following our research questions, we analyzed the eligible papers and structured them in according to their stakeholders, type of technical applications used to assist their stakeholders, and emerging organizational themes.

The ultimate (phase V) purpose of a literature review is to present a research agenda for future analyses (vom Brocke et al., 2009; Webster and Watson, 2002; Section 5).

4 Findings

While analyzing and synthesizing the literature, we identified four groups of stakeholders represented in IS research, that are comparable to prior analysis (Klecun et al., 2019) and narrowed them down to our conceptualization from phase II: healthcare professionals (including physicians, nurses, care takers and other professions taking care of patients' health), patients (people with acute, chronic and / or age related health conditions), IT professionals (providers of IT-services spanning all phases from planning and project to implementation and operation) as well as politicians as decision makers with extensive influence on national healthcare sectors. Additionally, just like this literature review, some articles investigate the role of researchers or give advice for future research directions, so we included researchers as an additional stakeholder for IS research. While recording our findings in a matrix according to Webster and Watson (2002), it became apparent that some research articles addressed not one but multiple stakeholders. This underlines the central and connecting role of information systems and was reflected by us in capturing multiple stakeholders for one article. Table 4 shows the coverage of stakeholders within the reviewed literature.

Table 4. Stakeholders in patient-centric research streams on digital healthcare

Stakeholders	No of articles
Healthcare Professionals [HP]	59
Patients [PAT]	44
IT Professionals [IT]	25
Politicians [POL]	13
Researchers [R]	8

In line with previous research (Currie and Guah, 2007; Klecun et al., 2019), we found that healthcare professionals are the main stakeholders of interest in the IS research dealing with patient-centric healthcare. Patients are represented in IS research, but more in the role of a passive application partner on whom technology is used, instead of an active user of technology for whom it is designed (e.g. Ghose et al. (2021) or Jiang and Cameron (2020)). The patient in IS literature is present due to the role of healthcare serving patients in need. However, if patients are the primary stakeholder of the technical application used, this application frequently is detached from professional healthcare and more often is an online community or self-help service. Figure 1 gives an overview of the stakeholders and their dominant role in IS-healthcare.

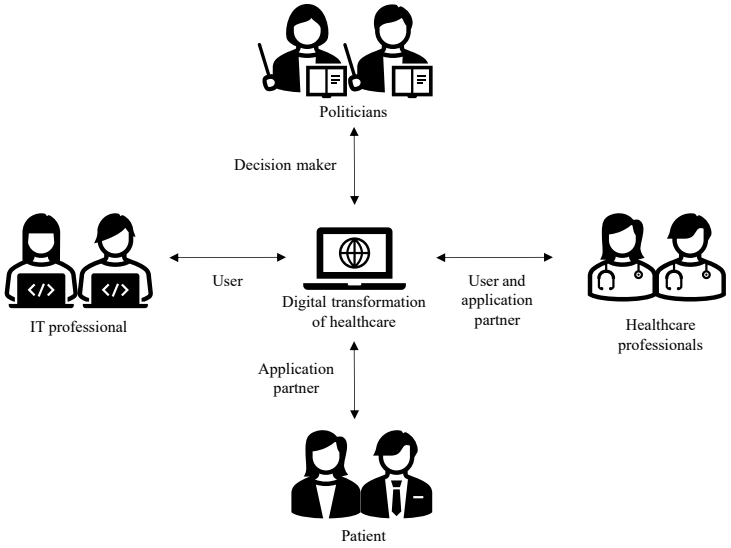


Figure 1. Overview of identified stakeholders and their role in patient-centric research streams on digital healthcare

Similarly, to stakeholders, we found a set of technical applications that are commonly investigated in healthcare related IS research. Some of our categories have clear demarcations and have been defined before, while other emerged during our review. We summarized one major category, which has been extensively researched under the term Electronic Health Records (EHR), which the ISO (2005) defines as a "*repository of information regarding the health status of a subject of care, in computer processable form, stored and transmitted securely and accessible by multiple authorized users, having a standardized or commonly agreed logical information model that is independent of EHR systems and whose primary purpose is the support of continuing, efficient and quality integrated health care*". Under this category we also subsumed the related concepts of electronic patient record (EPR) and electronic health information (EHI) systems including patient health history, prescriptions, medical examination results and its digital transmission between healthcare professionals (Health Information Exchange (HIE)). Another important IS application in healthcare is the software used by the organization (e.g., hospital or practice) itself. Applications in this category often include tools for communicating between professionals as well as basic communication from professionals to patients (e.g., appointment scheduling or secure channels for teleconsultations). Additionally, specialized healthcare applications dealing with one narrow use case are more extensively covered by IS researchers (e.g., diabetes tracking, stroke aftercare, ALS). For patient-facing applications, two categories where commonly present in IS literature. The first application can be described as online communities for patients with certain medical conditions, often in the form of self-help groups (e.g., Hur et al. (2019) or Kordzadeh and Warren (2017)). The second category includes different

applications offering health or treatment related information to patients like Q&A-portals (e.g., Chen et al. (2019) or Khurana et al. (2019)). Corresponding Information Architecture (IA) for providing the technical applications described before is another major subject of research. Table 5 shows technical applications in IS. Again, some articles covered multiple types of technical applications.

Table 5. Technical Applications in patient-centric research streams on digital healthcare

Technical Applications	No of articles
Hospital / Practice Software [HPS]	33
Electronic Health Record & Information Exchange [EHR]	28
Specialized health application [SHA]	25
Online Community [OC]	17
Search for health / treatment information [SMI]	18
Information Architecture [IA]	7

In line with our expectations after our initial conceptualization (phase II) we found that EHR and hospital / practice software are the two most investigated types of technical applications while information architecture was covered less extensive. Specialized health applications were a common research interest as well. For the patient-facing services we only found two types to be relevant in IS literature: 1) online communities (especially for patients and their relatives) to exchange experiences and give moral support and 2) the search for medical and health related information and suggestions on disease treatments.

Whilst reviewing the identified literature in phase IV, we recognized multiple themes, many of the articles shared. While inductively forming the themes and iterating with the reviewed body of literature as suggested by grounded theory (Gioia and Pitre, 1990) we sharpened the emerging organizational themes inspired by the Technology-Organization-Environment (TOE) Framework (Tornatzky and Fleischer, 1990). Accordingly, we assign one of our themes to each article whenever possible, yielding the results shown in Table 6.

The most common organizational theme is Electronic Health Records & Information Exchange, which is corresponding to its presence within the researched technical applications and references its broad use in organizational and inter-organizational settings. The patient-facing applications “Online Community” and “Search for health / treatment information” showed extensive overlaps and were combined to the organizational theme “Online community & information seeking”. Decoupled from previously described categories, two common themes in IS research on digital healthcare are a) the “Adoption & implementation of professional-side IT systems” presenting results from research about implementation projects of information systems aimed at healthcare professional (e.g., Goh et al. (2011) or Novak et al. (2012)) and b) the “Use of wearables, sensors, and telemedicine” for adding new data streams to treatments and detaching the provision of care from physical presence (e.g,. Chatterjee et al. (2018) or Thompson et al (2020)).

Table 6. Common organizational themes identified in patient-centric research streams on digital healthcare

Organizational Themes	No of articles
Electronic Health Records & Information Exchange [EHR]	20
Online community & information seeking [OCIS]	22
Adoption & implementation of professional side IT [AIPIT]	27
Use of wearables, sensors, and telemedicine [WST]	21

5 Conceptualizing patient-centricity in IS healthcare

In summary, current IS healthcare literature can be structured in the dimension's stakeholders, technical applications, and organizational themes. In terms of stakeholders, healthcare professionals are the group of stakeholders most investigated. Furthermore, we noticed, more than 20 years of research deal with technical applications, corresponding processes, and institutional logics. Hence, there is a dominance of literature covering the adoption and implementation of IS for the professional side of healthcare as well as electronic health records and information exchange. The patient, however, as an individual and user of IS, got increased attention due to the emergence of wearables, sensors, and telemedicine application (Table 7). As professional side IS is getting more mature considering the development of platform services and advancing internet availability, the trend towards a more prominent role of patients in IS is likely to continue.

Based on our results, indicating underrepresented research directions for digital health research in IS (framework, Table 7) we make three propositions as an agenda for future research: First, based on recent research, we found that patients only play a passive role as application partner in the use of IS for healthcare (e.g., Dadgar and Joshi (2018) or Klecun et al. (2019)). Understanding the emergence of customer IS, e.g., wearables, sensors, and telemedicine, the role of patients is developing more and more from a passive application partner towards an active user of IS healthcare. Based on our findings, we propose Proposition 1:

Proposition 1: Patient enablement is significant to enhance the usage of IS healthcare.

Proposition 1 describes patient enablement, as part of enhancing the usage of IS healthcare. As an important antecedent for enhancing the usage, digital competences on how to use IS healthcare is needed. Thus, health literacy, the competences on how patients can use IS healthcare technologies are important. Additional to patient enablement, we found in previous research, that patient enablement leads to empowerment of patients while using IS healthcare (Hickmann et al., 2022). Empowerment thereby describes “an enabling process or an outcome of a process involving a shift in the balance of power” (Cerezo et al., 2016). Especially using IS healthcare patients have the possibility to not only use given power by e.g., healthcare or IT professionals but instead

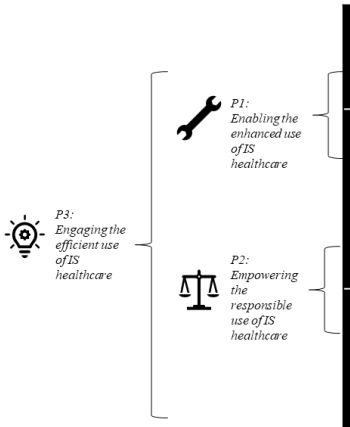
take power and design their own information process using IS healthcare. Thus, we propose:

Proposition 2: Patient empowerment will allow patients to interact with their own IS healthcare information transparently and responsibly.

Based on the idea of patients actively taking the power in the process of using IS healthcare, patients are not only able to make decisions about their own IS healthcare information further they are able to interact with stakeholders in the process efficiently through technology. Based on Proposition 2, we align with Hickmann et al. (2022), and propose that patient empowerment will lead to patient engagement supporting the interaction and decision-making process with stakeholders and further technical applications on an organizational level.

Proposition 3: Patient engagement will lead patients to interact with stakeholders and technical applications efficiently especially regarding emerging organizational themes such as the use of wearables, sensors, and telemedicine.

Table 7. Framework for patient-centric research streams on digital healthcare in IS [No of articles in parentheses] (underrepresented research directions highlighted)



Stakeholders	Healthcare Professionals [59]	Patients [44]	IT-Professionals [25]
	Politicians [13]	Researchers [8]	
Technical Applications	Hospital / Practice Software [33]	Electronic Health Record & Information Exchange [28]	Specialized health application [25]
	Online Community [17]	Search for medical / health information [18]	Information Architecture [7]
Organizational Themes	Electronic Health Records & Information Exchange [20]	Online community & information seeking [22]	
	Adoption & implementation of professional side IT [27]	Use of wearables, sensors, and telemedicine [21]	

6 Discussion

Initial, this study identifies research streams in IS healthcare literature on patient centricity. Analyzing IS healthcare literature based on patient centricity shows emerging types of stakeholders, technology applications and organizational themes evolving. Developing a framework structuring current literature gives rise to conceptualizing patient

centricity in IS healthcare literature. Aligned to our framework for patient-centric research streams on digital healthcare in IS, this study identifies three propositions showing how patient centricity can evolve in future research. Primary, patient enablement focuses on enhancing the use of IS healthcare and the competencies needed (1st proposition) for being empowered to use IS healthcare in their daily lives (2nd proposition). Following, patients will start to engage with different groups of stakeholders also connected to the IS healthcare infrastructure enabling new organizational themes to develop in the next years (3rd proposition).

With this literature review we make multiple contributions for both, theory, and practice. First for theory, we structure existing knowledge about digital health in IS publications. Inspired by the TOE-Framework (Technical, Organizational and Environmental-Framework), which focuses on the adoption of new technology, we found three categories for structuring IS healthcare literature adapting the perspective of patient-centricity (Kuan and Chau, 2001). In detail, we found the following categories stakeholders, technical applications, and organizational themes by which the current IS-healthcare literature can be structured. Stakeholders are inspired by the users' perspective on IS in healthcare and the environmental dimension of the TOE framework, as they have the possibility to influence emerging topics from societies point of view. Technical applications refer to the technology dimension of the TOE-framework defining technological trends in IS-healthcare literature. Organizational themes refer to the organizational dimension of the TOE framework, identifying organizational chances by adapting a patient-centric perspective in IS-healthcare services. Also, researchers might be interested in investigating how artificial intelligence affects those developments (Schaefer et al., 2021)

Second, by applying our framework and analyzing the existing body of IS research on digital health, we show the predominance of scientific interest in healthcare professionals and respective technical applications over other stakeholders and types of IS artifacts. Also, we show a high interest in two organizational themes that revolve around healthcare professionals. Future research may investigate what patient-facing service might be possible to offer, desired by users and how to design corresponding artifacts. Additionally, an even higher integration among professional care providers represents an opportunity to contribute to the IS body of knowledge.

Third, we provide the following research agenda: Understanding the role of patients and IT-professionals in the digital transformation of the healthcare sector has the potential to encourage enablement, empowerment, and engagement of patients. An especially promising way to do so is by studying these stakeholders in conjunction with information architecture and / or the use of wearables, sensors, and telemedicine. Also, investigating possible interdependencies between the identified stakeholders seems worthwhile. By providing this research agenda, we support avoiding the emergence of blank spots in IS literature and foster development of suitable IS artifacts, thereby fulfilling a literature reviews ultimate purpose (vom Brocke et al., 2009).

From our research some implications for practice emerge. First, drawing more attention on patients in IS research on digital health seems advisable given the dominance of articles dealing with healthcare professionals in the field. This is especially the case when considering the great potential for achieving better therapeutic results (Hibbard

and Greene, 2013; Hickmann et al., 2022; Shortell et al., 2017) and opportunities for a better orchestration of existing services or introduction of new services for the patient (e.g., meta-platforms (Abbas et al., 2022; Fürstenau et al., 2020; Maruping and Matook, 2020)). We also call for practitioners to explore these possibilities and develop corresponding artifacts and techniques for the greater good. We see opportunities to do so among others in services that integrate existing applications and make the patient journeys more seamless ("*one-stop-shop-solution*") or developing design processes that focus artifact design on usability and attractiveness for patients.

7 Limitations and Outlook

As with all literature reviews conducted, our study contains several methodological limitations based on the structural decisions of the literature review process. For example, one limitation of our work is the body of knowledge used. While large, it only stems from the eight most respected journals of the IS community. Extending the considered outlets offers potential for sharpening the view on the topic and extend our understanding of the digital health discipline. Particularly promising for this endeavor is the inclusion of journals recommended by the AIS Special Interest Group on Digital Health as well as proceedings of the top conferences on IS. Top outlets from the field of medicine and medical and health informatics also bear the potential to broaden our understanding of the scientific community's engagement in digital healthcare research. By integrating additional literature, it is possible that new and relevant stakeholders, applications, or themes will emerge. As the body of knowledge is ever expanding, we welcome those additions to our framework just as much as we recommend revisiting the framework at a later point in time to keep it up to date.

Overall, providing patients with good and affordable healthcare will remain an ongoing challenge. Turning more attention towards the patients both in science and practice, holds great opportunities to cope with these challenges. With the development of our framework for digital health research in IS, which we presented in this article, we shed a light on challenges, opportunities, and ways ahead. We would like to encourage researcher and developers to design more relevant technical applications in emerging organizational themes such as the use of wearables, sensors, and telemedicine. We like to invite to especially focus on the IT infrastructure from the users' point of view, namely the patient and IT professionals. For example, IT professionals could focus via methods of service design on the needs of patients using IS healthcare. This method would support the design of IS healthcare based on the users' needs, putting patients in the center of attention.

8 Acknowledgements

This work was supported by the Federal Ministry of Health within the project DIGITALIS for the digital transformation of the public health department in the county of Lueneburg (Project-ID: NI-P512MP10212). We thank the anonymous reviewers and our colleagues and friends for their constructive feedback on our manuscript.

References

Aanestad, M., Grisot, M., Hanseth, O., Vassilakopoulou, P., 2017. Information Infrastructures for eHealth, in: Aanestad, M., Grisot, M., Hanseth, O., Vassilakopoulou, P. (Eds.), Information Infrastructures within European Health Care, Health Informatics. Springer International Publishing, Cham, pp. 11–23. https://doi.org/10.1007/978-3-319-51020-0_2

Abbas, A., Ofe, H., Zuiderwijk-van Eijk, A., de Reuver, Mark, 2022. Research Data - Toward Business Models for a Meta Platform: Exploring Value Creation in the Case of Data Marketplaces. https://doi.org/10.4121/21103867

Association for Information Systems' College of Senior Scholars, 2023. Senior Scholars' List of Premier Journals [WWW Document]. URL https://aisnet.org/page/SeniorScholarListofPremierJournals

Boell, S.K., Cecez-Kecmanovic, D., 2015. On being 'Systematic' in Literature Reviews in IS. Journal of Information Technology 30, 161–173. https://doi.org/10.1057/jit.2014.26

Bombard, Y., Baker, G.R., Orlando, E., Fancott, C., Bhatia, P., Casalino, S., Onate, K., Denis, J.-L., Pomey, M.-P., 2018. Engaging patients to improve quality of care: a systematic review. Implementation Sci 13, 98. https://doi.org/10.1186/s13012-018-0784-z

Budd, J., Miller, B.S., Manning, E.M., Lampos, V., Zhuang, M., Edelstein, M., Rees, G., Emery, V.C., Stevens, M.M., Keegan, N., Short, M.J., Pillay, D., Manley, E., Cox, I.J., Heymann, D., Johnson, A.M., McKendry, R.A., 2020. Digital technologies in the public-health response to COVID-19. Nat Med 26, 1183–1192. https://doi.org/10.1038/s41591-020-1011-4

Cerezo, P.G., Juvé-Udina, M.-E., Delgado-Hito, P., 2016. Concepts and measures of patient empowerment: a comprehensive review. Rev. esc. enferm. USP 50, 667–674. https://doi.org/10.1590/S0080-623420160000500018

Chatterjee, S., Byun, J., Dutta, K., Pedersen, R.U., Pottathil, A., Xie, H. (Qi), 2018. Designing an Internet-of-Things (IoT) and sensor-based in-home monitoring system for assisting diabetes patients: iterative learning from two case studies. European Journal of Information Systems 27, 670–685. https://doi.org/10.1080/0960085X.2018.1485619

Chen, L., Baird, A., Straub, D., 2019. Fostering Participant Health Knowledge and Attitudes: An Econometric Study of a Chronic Disease-Focused Online Health Community. Journal of Management Information Systems 36, 194–229. https://doi.org/10.1080/07421222.2018.1550547

Cooper, H.M., 1988. Organizing knowledge syntheses: A taxonomy of literature reviews. Knowledge in Society 1, 104–126. https://doi.org/10.1007/BF03177550

Currie, W.L., Guah, M.W., 2007. Conflicting Institutional Logics: A National Programme for IT in the Organisational Field of Healthcare. Journal of Information Technology 22, 235–247. https://doi.org/10.1057/palgrave.jit.2000102

Dadgar, M., Joshi, K.D., 2018. The Role of Information and Communication Technology in Self-Management of Chronic Diseases: An Empirical Investigation through Value Sensitive Design. JAIS 86–112. https://doi.org/10.17705/1jais.00485

Fürstenau, D., Auschra, C., Klein, S., 2020. A Configuration Approach to Multi-Sided Platforms in Healthcare: An ALS Platform Case 18.

Ghose, A., Guo, X., Li, B., Dang, Y., 2021. Empowering Patients Using Smart Mobile Health Platforms: Evidence From A Randomized Field Experiment.

https://doi.org/10.48550/ARXIV.2102.05506

Gianchandani, E.P., 2011. Toward Smarter Health and Well-Being: An Implicit Role for Networking and Information Technology. Journal of Information Technology 26, 120–128. https://doi.org/10.1057/jit.2011.5

Gioia, D.A., Pitre, E., 1990. Multiparadigm Perspectives on Theory Building.

Goh, J.M., Gao, G. (Gordon), Agarwal, R., 2011. Evolving Work Routines: Adaptive Routinization of Information Technology in Healthcare. Information Systems Research 22, 565–585. https://doi.org/10.1287/isre.1110.0365

Hagiu, A., Wright, J., 2015. Multi-sided platforms. International Journal of Industrial Organization 43, 162–174. https://doi.org/10.1016/j.ijindorg.2015.03.003

Hibbard, J.H., Greene, J., 2013. What The Evidence Shows About Patient Activation: Better Health Outcomes And Care Experiences; Fewer Data On Costs. Health Affairs 32, 207–214. https://doi.org/10.1377/hlthaff.2012.1061

Hickmann, E., Richter, P., Schlieter, H., 2022. All together now – patient engagement, patient empowerment, and associated terms in personal healthcare. BMC Health Serv Res 22, 1116. https://doi.org/10.1186/s12913-022-08501-5

Hur, I., Cousins, K.C., Stahl, B.C., 2019. A critical perspective of engagement in online health communities. European Journal of Information Systems 28, 523–548. https://doi.org/10.1080/0960085X.2019.1620477

Jiang, J., Cameron, A.-F., 2020. IT-Enabled Self-Monitoring for Chronic Disease Self-Management: An Interdisciplinary Review. MISQ 44, 451–508. https://doi.org/10.25300/MISQ/2020/15108

Karazivan, P., Dumez, V., Flora, L., Pomey, M.-P., Del Grande, C., Ghadiri, D.P., Fernandez, N., Jouet, E., Las Vergnas, O., Lebel, P., 2015. The Patient-as-Partner Approach in Health Care: A Conceptual Framework for a Necessary Transition. Academic Medicine 90, 437–441. https://doi.org/10.1097/ACM.0000000000000603

Khurana, S., Qiu, L., Kumar, S., 2019. When a Doctor Knows, It Shows: An Empirical Analysis of Doctors' Responses in a Q&A Forum of an Online Healthcare Portal. Information Systems Research 30, 872–891. https://doi.org/10.1287/isre.2019.0836

Klecun, E., 2016. Transforming healthcare: policy discourses of IT and patient-centred care. European Journal of Information Systems 25, 64–76. https://doi.org/10.1057/ejis.2014.40

Klecun, E., Zhou, Y., Kankanhalli, A., Wee, Y.H., Hibberd, R., 2019. The dynamics of institutional pressures and stakeholder behavior in national electronic health record implementations: A tale of two countries. Journal of Information Technology 34, 292–332. https://doi.org/10.1177/0268396218822478

Kordzadeh, N., Warren, J., 2017. Communicating Personal Health Information in Virtual Health Communities: An Integration of Privacy Calculus Model and Affective Commitment. JAIS 18, 45–81. https://doi.org/10.17705/1jais.00446

Kuan, K.K.Y., Chau, P.Y.K., 2001. A perception-based model for EDI adoption in small businesses using a technology–organization–environment framework. Information & Management 38, 507–521. https://doi.org/10.1016/S0378-7206(01)00073-8

Lamberti, L., 2013. Customer centricity: the construct and the operational antecedents. Journal of Strategic Marketing 21, 588–612. https://doi.org/10.1080/0965254X.2013.817476

Malm-Nicolaisen, K., Pedersen, R., Fagerlund, A.J., 2023. Exploring the Emergence of Open

Platforms in Healthcare: Design Considerations and Experiences from an Initial Case in Norwegian Primary Care. Presented at the 56th Hawaii International Conference on System Sciences, Maui. https://hdl.handle.net/10125/102976

Maruping, L.M., Matook, S., 2020. The evolution of software development orchestration: current state and an agenda for future research. European Journal of Information Systems 29, 443–457. https://doi.org/10.1080/0960085X.2020.1831834

McGrath, K., Hendy, J., Klecun, E., Young, T., 2008. The Vision and Reality of 'Connecting For Health': Tensions, Opportunities, and Policy Implications of the UK National Programme. CAIS 23. https://doi.org/10.17705/1CAIS.02333

Mergel, I., Edelmann, N., Haug, N., 2019. Defining digital transformation: Results from expert interviews. Government Information Quarterly 36, 101385. https://doi.org/10.1016/j.giq.2019.06.002

Novak, L., Brooks, J., Gadd, C., Anders, S., Lorenzi, N., 2012. Mediating the intersections of organizational routines during the introduction of a health IT system. European Journal of Information Systems 21, 552–569. https://doi.org/10.1057/ejis.2012.2

OECD, 2021. Health at a Glance 2021: OECD Indicators, Health at a Glance. OECD. https://doi.org/10.1787/ae3016b9-en

Peek, N., Sujan, M., Scott, P., 2020. Digital health and care in pandemic times: impact of COVID-19. BMJ Health Care Inform 27, e100166. https://doi.org/10.1136/bmjhci-2020-100166

Schaefer, C., Lemmer, K., Kret, S.K., Ylinen, M., Mikalef, P., Niehaves, B., 2021. Truth or Dare? – How can we Influence the Adoption of Artificial Intelligence in Municipalities? Presented at the 54th Hawaii International Conference on System Sciences, Hawaii.

Shortell, S.M., Poon, B.Y., Ramsay, P.P., Rodriguez, H.P., Ivey, S.L., Huber, T., Rich, J., Summerfelt, T., 2017. A Multilevel Analysis of Patient Engagement and Patient-Reported Outcomes in Primary Care Practices of Accountable Care Organizations. J GEN INTERN MED 32, 640–647. https://doi.org/10.1007/s11606-016-3980-z

Stopka, U., Pessier, R., Günther, C., 2018. Mobility as a Service (MaaS) Based on Intermodal Electronic Platforms in Public Transport, in: Kurosu, M. (Ed.), Human-Computer Interaction. Interaction in Context, Lecture Notes in Computer Science. Springer International Publishing, Cham, pp. 419–439. https://doi.org/10.1007/978-3-319-91244-8_34

Technical Committee: ISO/TC 215 Health informatics, 2005. ISO/TR 20514:2005. Health informatics — Electronic health record — Definition, scope and context.

Thompson, S., Whitaker, J., Kohli, R., Jones, C., 2020. Chronic Disease Management: How IT and Analytics Create Healthcare Value Through the Temporal Displacement of Care. MISQ 44, 227–256. https://doi.org/10.25300/MISQ/2020/15085

Tornatzky, L.G., Fleischer, M., 1990. The processes of technological innovation, Issues in organization and management series. Lexington Books, Lexington, Mass.

vom Brocke, J., Simons, A., Niehaves, B., Reimer, K., Plattfaut, R., Cleven, A., 2009. RECONSTRUCTING THE GIANT: ON THE IMPORTANCE OF RIGOUR IN DOCUMENTING THE LITERATURE SEARCH PROCESS, in: ECIS 2009 Proceedings. Presented at the ECIS 2009, p. 14.

vom Brocke, J., Simons, A., Riemer, K., Niehaves, B., Plattfaut, R., Cleven, A., 2015. Standing on the Shoulders of Giants: Challenges and Recommendations of Literature Search in Information Systems Research. CAIS 37. https://doi.org/10.17705/1CAIS.03709

Webster, J., Watson, R.T., 2002. ANALYZING THE PAST TO PREPARE FOR THE FUTURE: WRITING A LITERATURE REVIEW. MIS Quarterly Vol. 26, 11.

Yaraghi, N., Du, A.Y., Sharman, R., Gopal, R.D., Ramesh, R., 2015. Health Information Exchange as a Multisided Platform: Adoption, Usage, and Practice Involvement in Service Co-Production. Information Systems Research 26, 1–18. https://doi.org/10.1287/isre.2014.0547