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## **The Role of User Involvement: Relationship between Participatory Design and Design Science Research**

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# Abstract

An important factor for the success of design-oriented processes is the involvement of the future users. However, there is a dispersed knowledge about how Participatory Design can be used in connection with Design Science Research to assess user preferences. Aiming to synthesize the existent knowledge on these both design-oriented approaches, this IWI discussion paper provides an overview of the relationship, similarities and differences on diverse Participatory Design methods used in the extant scientific literature either separately or embedded in Design Science Research processes.

## Keywords

Design Science Research, Participatory Design, User Involvement, Research Design, Research Method

## 1 Introduction

The Digitization of the world of work plays a major role, especially in the Information Systems research area. Due to the unique nature of each design project and its requirements, it is crucial in each design process to carefully select the appropriate design approach as well as suitable methods, techniques, and tools (Sanders, Brandt & Binder, 2010).

To be able to adequately address the technical design on the one hand and the associated organizational change processes on the other hand, Participatory Design has been seen in recent years as a collection of approaches and tools that allow future users to collaborate continuously in the socio-technical development process, even after the implementation (Kohtala et al. 2020). Along this path, for about three decades, non-designers have been involved in an increasing number of Participatory Design projects in various design activities worldwide (Sanders, Brandt & Binder, 2010). However, while user involvement is seen as a key success factor in design processes (Macelli and Atwood, 2013), the choice of the design methodology has a distinctive influence on the extent of the user involvement. For example, Participatory Design gives a central role to the future users and involves them as equal members in the entire design process, whereas other widely applied design-oriented approaches such as Design Science Research involve the future user mainly for requirements analysis and evaluation. Therefore, in essence, the involvement of future users plays a fundamentally different role in diverse research approaches.

Recent research have targeted the role of the stakeholder in the research design and addresses the nature and importance of the involvement of the users in the design and development process by combining, for example, Participatory Design with research designs like Action Design Research (Haj-Bolouri et al. 2016). However, little similar efforts have been directed towards Participatory Design and Design Science Research.

In view of the above, the aim of this IWI Discussion Paper is to show the context and the importance of Participatory Design both separately and within Design Science Research. To accomplish this, the discussion paper is structured as follows. After the introduction, section 2 lays the theoretical foundations for the design methods of Design Science Research and Participatory Design. Subsequently, section 3 describes the procedure of the literature review as well as related literature to Participatory Design and Design Science Research to assess the manner in which both design approaches have been used in the scientific literature. Based on the results of the literature review, in section 4 an overview of the relationship, similarities and differences of both design methodologies is provided. This is followed by a discussion and the description of implications and limitations, before the article ends with the conclusion and future recommendations for research.

## **2 Theoretical Background**

### **2.1 Design Science Research**

Design Science is a problem-solving research paradigm, including the creation and analysis of information technology (IT) artefacts with the objective of solving difficulties within the organization (Hevner et al., 2004; Von Alan et al., 2004). Through building new artefacts, Design Science strives to expand the boundaries between the capacities of humans and organizations (Hevner et al., 2004). The construct-scientific paradigm Design Science aims at developing useful IT-solutions through creating and evaluating several artefacts (Wilde & Hess, 2007). These artefacts can arise in form of models methods as well as systems (Wilde & Hess, 2007). Three research cycles have been developed in the Design Science environment: "relevance cycle", "design cycle", which is embedded in Design Science Research (DSR) and "rigor cycle", which connects DSR with knowledge base (Hevner, 2007). Seven guidelines assist and help to use the approach in a research project correctly (Von Alan et al., 2004).

### **2.2 Participatory Design**

Participatory Design (PD) is an approach originated in Scandinavia, which gives the people that are destined to use the system a decisive role in designing it (Schuler &

Namioka, 1993; Sanders, Brandt & Binder, 2010). PD is an emerging design practice that aims to examine important assumptions about technologies at work, in the community, at home and in social institutions while involving non-designers from planning to prototyping (Muller & Kuhn, 1993; Sanders, Brandt & Binder, 2010; Sarmiento, Villarouco & Gomes, 2018). PD in IS research typically focuses on theories, practices and studies about involving non-designers as full participants in all activities along the development of computer-based products (Muller, 2003). Non-designers include prospective users, external stakeholders as well as members from further disciplines as controlling, or engineering (Sanders, Brandt & Binder, 2010). PD projects ideally consist of a heterogeneous team having people with different interests, habits, backgrounds and experiences (Sanders, Brandt & Binder, 2010). The empowerment of workers is the central issue (Loebbecke et al., 2007). In PD, scientists and practitioners are brought together, but this does not automatically mean that they are being brought into unity (Muller, 2003). This collaboration and co-interpretation in the research is a confirming and substantial part within the process (Spinuzzi, 2005). PD uses several methods to increase the reciprocal learning between researchers and practitioners (Zewge, Dittrich & Bekele, 2015) Artifacts and work environments are designed collaboratively through conceiving partnerships between future users and the researchers (Spinuzzi, 2005). This requires appropriate methods to bring all stakeholders into line with their different interests and levels of knowledge (Sanders, Brandt & Binder, 2010). PD uses organizational dynamics, such as language, routines and implicit knowledge, to generate practical knowledge (Loebbecke et al., 2007). A permanent learning is generated by the constant cooperation and interaction between scientists and practitioners (Loebbecke et al., 2007).

## **3 Research Design**

### **3.1 Literature Search**

We conducted a literature search according to Webster & Watson (2002) to obtain a picture of the current state of research. Five scientific databases containing Scopus, Google Scholar, ScienceDirect, IEEE and AiSel were used to find papers that are concerned with the queried keywords. The inserted search query contains the searched terms in full and abbreviated form to make sure to cover all elements of the area: ("design science" or "design science research" or DSR) and ("participatory design" or PD). As PD achieved popularity for the first time in the 1970s, articles were included from 1970 onwards. To achieve the highest possible quality and timeliness of results, the search was conducted specifically for journal and conference contributions. Manuscripts or other theses, such as bachelor- master or doctoral theses, were excluded from the search results. Both English and German terms were used for the search. The next step included a screening of the collected results. For this purpose, abstracts of conference papers and journals were read and articles were excluded if they were not considered relevant in the context of this analysis. In addition, a forward and backward search according to Webster & Watson (2002) was conducted to identify further relevant literature and to exclude that important cited or citing articles have been missed. All sources that were recognized as relevant in the first step were processed and subjected to closer examination.

### **3.2 Literature Analysis**

The literature search using the search term ("design science" or "design science research" or DSR) and ("participatory design" or PD) in the five databases mentioned above yielded an initial number of 195 search results (Scopus 41 articles, Google Scholar 96 articles, ScienceDirect 53 articles, IEEE 1 article, AiSel 4 articles). Reading abstract and title reduced the number of matching search results to 46 articles, which were reviewed in more detail. The results are described below.

Before examining the relationship between PD and DSR, the next section will first review the application of PD in the scientific literature. PD thrives on being open to many interpretations, which have established a variety of methods, all with a focus on participation (Muller & Kuhn, 1993).

***Table 1. Concept Matrix on Role of PD in Scientific Literature***

Literature	PD as a research design	PD as a research method	Combination of PD & further research design
Ågerfalk & Wiberg (2018)	x		
Berger (2014)	x		PD & AR
Bilandzic & Venable (2011)		x	
da Silva et al. (2017)		x	
Germonprez et al. (2011)		x	
Grobler & De Villiers (2017)		x	
Haj-Bolouri et al. (2015)	x		PD & ADR
Haj-Bolouri et al. (2016)	x		PD & ADR
Hansen & Pries-Heje (2017)		x	
Kautz (2011)	x		PD & agile software development
Loebbecke et al. (2007)	x		
Lu et al. (2018)	x		
Neuhauser et al. (2013)		x	PD & DSR
Otto & Osterle (2012)		x	PD & DSR
Park (2015)		x	
Patrício et al. (2018)		x	
Pries-Heje & Hansen (2017)		x	
Ruhi (2015)		x	
Sarmiento Villarouco & Gomes (2018)		x	
Venable (2009)	x		PD & DSR
Weaver (2016)	x		
Zewge et al. (2015)	x		PD & AR & DSR
Number of articles	10	12	8

The results of the literature review in table 1 show that PD is used either as a research design or as a method. In particular, 10 of the articles considered applied PD as a research design, while 12 articles adopted PD as a method to involve future users within the design process as an equal member (see Table 1). In terms of content, it became apparent that PD is more often used in the research field of human-computer interaction. It also appeared that some scientific articles combined different research designs with PD, such as Action Design (AR) (Berger, 2014), Action Design Research (ADR) (Haj-Bolouri et al., 2015; Haj-Bolouri et al., 2016), agile software development (Kautz, 2011) and DSR (Neuhauser et al., 2013; Otto & Osterle, 2012; Venable, 2009).

Table 2 shows that in addition to the two approaches of PD as research design and PD as method mentioned above, there is a further way in which it is combined in the scientific literature. Sporadically, there are scientific studies in which DSR is used in the context of an artifact development without paying attention to PD, but within the artifact the PD method is used (Hansen & Pries-Heje, 2017; Janssen et al., 2019). These three distinctions are considered in more detail in the next section.

**Table 2. Relationship of PD and DSR in Scientific Literature**

Approach	Literature
PD as a method for DSR	Neuhauser et al. (2013); Patrício et al. (2018); da Silva et al. (2017); Grobler & De Villiers, (2017); Berger (2014); Weaver (2016); Park & Boland, (2017); Ruhi (2015); Bilandzic & Venable (2011); Otto & Osterle (2012); Pries-Heje & Hansen (2017); Park (2015); Sarmiento, Villarouco & Gomes (2018), Janssen et al. (2019)
PD as methodology / approach	Agerfalk & Wiberg (2018); Haj-Bolouri (2016); Berger (2014); Kautz (2011); Loebbecke et al (2007); Venable (2009); Haj-Bolouri (2015); Weaver (2016); Zewge, Dittrich & Bekele (2015)
PD as a principle in the designed artifact through DSR	Hansen & Pries-Heje (2017), Janssen et al. (2019)

## 4 Relationship between PD and DSR

### 4.1 PD and DSR as separated methodologies/research designs

In recent decades, two widely used PD research design cycles (i.e. Spinuzzi, 2005; Rauterberg, 1995) have become established, which are explained in more detail below. A well-known model is the iterative three-step model according to Spinuzzi (2005), which consists of the steps investigation of first work areas, recognition process and prototyping. If necessary, it is possible to return to each phase.

In step one, designer and later user meet each other. The stakeholders familiarize themselves with the methods and technologies that will be used in the software. The aim is to bring all participants to the same level of knowledge. Procedures and processes are explained to the other party and common goals for further cooperation are defined (Spinuzzi, 2005). During the recognition processes, designers and users test already known approaches in order to understand all procedures and develop solutions. Together, the end users' goals and values are discussed and transformed into a common project goal. The intention here is to record important requirements for the software and thus set the basic conditions. Here a first artifact is developed. The last step is prototyping. In this step, designers and users iteratively shape the

artifact according to the ideas from the previous step, which is finally presented in the form of a prototype (Spinuzzi, 2005). If irregularities occur within a step or if one party is dissatisfied with the progress, it is always possible to return to the previous step and correct or avoid the errors (Spinuzzi, 2005).

A further well-known model of participatory design is the concept of Rauterberg (1995). This approach consists of four so-called quadrants: discussion, simulation, prototyping and versions (Rauterberg, 1995). These four quadrants or methods differ not only in the form of user participation, but also in the possible areas of application and results. Moreover, each takes a different amount of time until the cycle is complete. In the following, the four methods will be presented in more detail and explained fundamentally. The method discussion includes on the one hand the verbal communication between developer and user. On the other hand this method can be extended by using flip charts, meta-plan techniques or other visual working methods. The decisive advantage of the visual variants is that communication barriers are broken down and less weight is attached to the spoken word. However, misunderstandings still cannot be ruled out with either option (Rauterberg, 1995). The task of the simulation method is to achieve a visual result that represents the system to be developed/implemented in a suitable form. A distinction is made between two variants. When using the first variant, hand-drawn sketches or layouts of the program are presented to the users to make the user interface clear to them (Rauterberg, 1995). In the second variant, formal description techniques such as flow charts are used. However, a difficulty on the latter variant is the often-missing competence of the end users to infer their workflow from the formal techniques. Therefore, they can often only be insufficiently involved in the implementation process. An overview how the research design PD is applied in scientific articles can be seen in Table 3.

**Table 3. Application of Participatory Design**

Approach	Literature
Conceptual	Agerfalk & Wiberg (2018); da Silva et al. (2017); Haj-Bolouri (2016); Ruhi, (2015); Berger (2014); Kautz (2011); Loebbecke et al. (2007); Bilandzic & Venable (2011); Otto & Osterle (2012); Venable (2009); Haj-Bolouri et al (2015)
Discussion	Agerfalk & Wiberg (2018); Asaro (2000); Berger (2014); Haj-Bolouri et al. (2015); Haj-Bolouri et al. (2016); Loebbecke et al. (2007); Venable (2009)
Case Study	Da Silva et al. (2017); Germonprez et al. (2011); Grobler & De Villiers (2017); Haj-Bolouri et al. (2015); Kautz (2011); Lu et al. (2018); Neuhauser et al. (2013); Park (2015); Patrício et al. (2018); Pries-Heje & Hansen (2017); Ruhi (2015); Sarmiento et al. (2018).



On the other hand, DSR is a construction or design-oriented framework that is subordinate to the methodological area of Design Science in the research area of Information Systems (Hevner, 2007). It can be used to solve concrete problems from companies through the development and use of artifacts (Frauchiger, 2017). An artifact is described as an artificial or man-made object (Hevner & Chatterjee, 2010). The purpose of this object is to solve a be-determined problem (Hevner & Chatterjee, 2010). The goal of a DSR project can be an artifact in the form of constructs, models, methods, or instantiations (Hevner & Chatterjee, 2010).

In the context of the DSR, Hevner (2007) speaks of a model that explains the basis of the framework by means of three interdependent cycles. Components of this cycle can be among other things persons, organizations or technical systems (Hevner, 2007). Here both the identification of the requirements and the collection of opinions of individual to the investigation topic can be important parts of this cycle (Hevner, 2007). This cycle connects the DSR with the application context, which places beside the requirement admission following the development of the artifact the evaluation at this. The evaluation, among other things in the form of field tests, can give information about additional necessary iterations in the relevance cycle, to be able to offer an increase in value in practice (Hevner, 2007). The "rigor cycle" connects the field of design science with the previously existing knowledge base of scientific theories and methods (Hevner, 2007). This knowledge base forms the basis for the DSR. The scientific bases, experience and expertise define the current state of research in the respective application area (Hevner, 2007). The quality of the artifact to be created is significantly influenced by the selection of methods for the construction and evaluation of the artifact (Hevner, 2007). Here the focus lies on a scientific approach, in order to add the compiled findings into the knowledge basis existing so far and to extend these thereby (Hevner, 2007). The "central design cycle" is composed of the two main parts "Build and Evaluate" (Hevner, 2007; Frauchiger, 2017). From the first area "Build" emerges the development of an artifact for a specific task (Hevner 2007; Frauchiger, 2017). This domain gives rise to results such as constructs, models, methods, or implementations (Frauchiger, 2017). The second area serves to determine the performance of the created artifact (Hevner 2007; Frauchiger, 2017). In this context, the results produced in the "Build" domain are examined and evaluated for their usefulness (Hevner, 2007; Frauchiger, 2017).

Based on Hevner et al. (2004), Peffers et al. (2007) developed a framework for DSR in the form of a process model. This process model is divided into six steps (Peffers et al., 2007). In the following section, the individual steps are briefly explained.

The first step is problem identification and motivation. Here, the specific research problem is identified and defined and justifies the value of a possible solution (Peffer et al., 2007). Conceptual atomization, i.e., resolution and isolation of the research problem, may be necessary to fully grasp a complex problem (Peffer et al., 2007). In the second step of defining objects for a solution, one derives the quantitative or qualitative goals of a problem from the problem identification that took place before (Peffer et al., 2007). Subsequently, the design and development of the artifact takes place to implement the desired functionalities and architecture based on theoretical knowledge (Peffer et al., 2007). In the fourth step, the use of the artifact to solve the problem is demonstrated. This can take the form of experiments, simulations, case studies, proofs, or other appropriate activities (Peffer et al., 2007). This is followed by the evaluation of the artifact, where a comparison of the defined goals with the actual observed results can take place (Peffer et al., 2007). The last step is the communication of the problem and the artifact to relevant target groups. This presentation of the sequence of the individual steps by Peffer et al., (2007) is an ideal-typical way of implementing this process model (Peffer et al., 2007). The entry into this process model is situationally possible in different steps (Peffer et al., 2007).

Some articles deal with the comparison of PD and DSR in terms of research design. Both approaches are phased, iterative and have a continuous research process (Loebbecke & Powell, 2009). While in DSR the focus is on developing an artifact to serve people with it, in PD the focus is on participatory technology development by empowering the future users (Loebbecke & Powell, 2009). In DSR, the future users are also involved, but with the goal of artifact design by getting practical knowledge, the knowledge of how to do something, in the form of a skill or competence (Heron & Reason, 1997). Contrary to the specialist approach, in which only the views of experts are considered, PD aims to create a partnership between designers and users where both parties are responsible for the success of the project (Schuler & Namioka, 1993). The basic motivation is to give the people that are affected by a decision a voice to influence it (Schuler & Namioka, 1993). While DSR follows the double-loop learning approach, in PD the learning by doing is pursued (Loebbecke & Powell, 2009). Results in the study of Robey and Farrow (1982) have shown that participation only leads to a successful conflict resolution if there is also an influence of the future users on the development process. The building of tacit knowledge through involving people that are working in the environment is the essential object of PD (Spinuzzi, 2005). Overall, however, the literature review shows that which approach is the most appropriate is highly context dependent.

## 4.2 PD as a method within a DSR process

Neuhauser et al. (2013) are using PD methods embedded in DSR for understanding challenges in the usage of AI in eHealth and designing solutions simultaneously. Within the process, feedback from end-users is collected through conducting interviews, focus groups training observations as well as usability testing. End users have to role of getting direct feedback to the developers instead of designing by their own. Sarmiento, Villarouco & Gomez (2018) used participatory methods with the central issue of involving students and teachers to motivate them to be involved in the process of creating a future learning environment. The focus of her entire work was to involve future users comprehensively during problem observation, model development and model evaluation using various methods such as brainstorming, focus group discussions and panels (Sarmiento et al., 2018).

Patrício et al. (2018) set up a human-centered focus while designing a health platform for nurses and doctors. They embedded PD methods while applying the six steps of the DSRM model by Peffers (2007). The main emphasis was set on the design and development of the artifact in step 3 (See Table 4). Thereby, the findings by the researchers in the exploration step were presented to selected stakeholder groups doctors, nurses and citizens, to obtain feedback and service designs developed within every stakeholder group. These services designs were discussed within a multi-group discussion with all stakeholder groups in order to discuss their different goals, analyze potential conflicts and restructure them. Within the PD sessions, focus group discussions, in-depth interviews and interactive design sessions were used (Patrício et al., 2018). Grobler and De Villiers (2017) offer a way to surface information needs of female domestic workers in developing communities. Therefore, they consequently involved different stakeholders with participatory design techniques while following the DSR guidelines and processes by Hevner (2007) and Peffers (2007). Different stakeholders are involved in all six steps through conducting focus groups discussions, self-documentation and design thinking workshops under the principles of "Hear", "Create" and "Delicier" (Grobler & De Villiers, 2017). Da Silva, Berkenbrock & Berkenbrock (2017) used PD methods within a second design science cycle. Therefore, they involved people with disabilities into a cooperative workshop for requirements with the issue of validation and adjustments in the prototype developed in the first cycle (Da Silva et al., 2017).

Hansen & Pries-Heje (2017) developed five design principles for value creation in Knowledge Networks using DSR. The created design principle number 2 "*The principle of creating participatory value*" addresses the need of an active participation of all relevant stakeholders in order to create economic and social capital in knowledge network groups (Hansen & Pries-Heje, 2017). Especially the increase of joint social

value creation as well as the construction of mutually agreed norms and values is addressed within the principle (Hansen & Pries-Heje, 2017).

Ruhi (2015) presented a ontology based framework involving the end-users in the suggestion step through conducting case studies, cross case analysis, software shaping workshops and end-user development within organizations.

**Table 4. Application of PD methods according to the DSR process model of Peffers et al. (2007)**

Articles	1 Identify problem & motivate	2 Define objectives of a solution	3 Design & development	4 Demonstration	5 Evaluation	6 Communication
Asaro (2000)			x		x	x
Berger (2014)		x				x
Bilandzic & Venable (2011)				x		
Bratteteig et al. (2012)	x		x	x	x	x
Clemmensen et al. (2016)			x		x	
Damodaran (1996)			x	x	x	
Ehn (1993)		x	x	x	x	
Hartswood et al. (2002)	x	x	x		x	
Number of articles	2	3	6	4	6	3

Note: Table 4 lists eight articles, all of which use PD as a method within a design process. For classification purposes, the six steps of the DSR process model according to Peffers et al. (2007) are applied. Even though not all researchers did assign the activities to any DSR stages, it was possible to assign them from the context. The analyses show that PD is used most in step 3 "Design and Development" and step 5 "Evaluation", closely followed by 4 "Demonstration". In contrast, it is rarely applied in step 1 "Identify Problem and Motivation".

### 4.3 PD within a DSR artifact

As described in Section 3.2, there are only isolated scientific articles in which there are PD methods in the artifact that is developed within a DSR process. These will be presented in the following:

Hansen & Pries-Heje (2017) derive design principles for value creation in knowledge networks. With the aim of finding out how to improve knowledge networks using IT tools, the authors applied the DSR process according to Peffers et al. (2008) (Hansen & Pries-Heje, 2017). Instead of only supporting individual groups in value creation through IT tools, their claim is to create general and abstract design principles for

knowledge networks in general. Out of five design principles for network support value creation, principle 2 refers to PD: *"The principle of creating participatory value"* (Hansen & Pries-Heje, p. 70, 2017). Principle 2 aims to create participatory value by involving all stakeholders within the design process. This PD guiding principle allows all participants in a network to express their thoughts and engage in dialogue (Kensing et al., 1998; Hansen & Pries-Heje, 2017).

Within a DSR process, Janssen et al. (2019) develop a participatory design model for individual web traffic report development. This artifact contains the participatory design CARD method for key performance indicator (KPI) prioritization. Due to the strong involvement of the future users and the collaborative work with the developers, a high acceptance and high quality is expected (Janssen et al., 2019). In addition to the PD CARD method, the 3-stage model according to Spinuzzi (2005) is also used. Pictograms within the model show in each stage which stakeholders are involved in the respective step. A notable aspect is that multiple roles can also be filled by one person (Janssen et al., 2019). Within a case study with 14 interviewees, the card method is applied within the second step "discovery process" (Spinuzzi, 2005; Janssen et al., 2019). The authors conclude that Spinuzzi's (2005) three-step process is an ideal method to provide a clear orientation and structure for the individual steps within the process (Janssen et al., 2019).

## **5 Implications, Limitations and Conclusions**

Overall, it can be stated, that DSR focuses on creating an artifact, while PD focuses on equal collaboration between the designer and the artifact (Recker, 2012). By incorporating PD methods within the DSR process, future users are also granted some influence within the development of an artifact. However, our analysis suggests that when PD is used as a methodology, the future users are seen as an essential part within the overall design process, while PD methods within the DSR are mainly used in the design and development and in the evaluation of the artifact. This is also understandable, since in practice it is not always possible to include all future users. In the future, it would be interesting to develop guidelines on when it is more appropriate to use PD and when a combination of DSR and PD is the most suitable approach. While it is explained in detail which methods are used to gain implicit knowledge and acceptance, it has not yet been discussed how participants are selected and who is important. Particularly in the DSR, where a generally applicable artifact is to be developed, this is proving difficult.

The review of the literature shows that there are three distinct layers in the collaborative use of PD and DSR. While PD as methodology and PD as method are widely used within DSR, PD as method was shown to be rarely found within the final DSR artifact.

This infers that PD as part of the DSR result is currently a completely unexplored area which needs further investigation. It would be recommendable to investigate which design principles should be considered in the use of PD within the artifact.

The results of the analysis also indicated that PD is also used with other research designs, such as AR or ADR. However, although the literature review identified different approaches, they all have one thing in common, the importance of considering the future user. Involving various stakeholders as designers, producers and innovators encourages the active participation of the community. However, this in turn creates a gap between the participants and the rest of the community who have not been involved in the whole process. In the future, it would be valuable to analyze and map the research designs commonly used in IS and HCI in terms of user engagement.

The structural and content-related aspects of the present article are subject to limitations that need to be taken into account when generalizing the results. A literature-based approach to the topic consolidates already existing publications and opens up fewer opportunities to generate deductive findings as would be the case with an empirical approach. The conclusions of the purely theoretical approach are therefore based on theories. Consequently, this discussion paper has a more introductory character. As research in the Information Systems and Human Computer Interaction fields continues to evolve, further literature-based analyses should be conducted regularly in the future.

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