Dec 11th, 12:00 AM

How do Organizations react to Unintended Affordances? An Ethnography in Healthcare

Carolin Vollenberg
South Westphalia University of Applied Sciences, vollenberg.carolin@fh-swf.de

Ralf Plattfaut
Fachhochschule Südwestfalen, plattfaut.ralf@fh-swf.de

André Coners
South Westphalia University of Applied Sciences, coners.andre@fh-swf.de

How do Organizations react to Unintended Affordances? An Ethnography in Healthcare

Short Paper

Carolin Vollenberg
South Westphalia University of Applied Sciences
Haldener Str. 182, 58095 Hagen, Germany
Vollenberg.Carolin@fh-swf.de

Ralf Plattfaut
University Duisburg-Essen
Universitätsstraße 12, 45141 Essen, Germany
Ralf.Plattfaut@icb.uni-due.de

André Coners
South Westphalia University of Applied Sciences
Haldener Str. 182, 58095 Hagen, Germany
Coners.Andre@fh-swf.de

Abstract

When organizations implement information technology (IT) artifacts, they focus on intended functionalities. Misalignment between processes and organizational or individual goals can lead to unintended work practices. Users may actualize affordances that the artifact designer did not intend. As such, there is a potential tension between the goals users must achieve, the technology's features and the organization's policies. Organizations must respond to unintended affordances in regulated industries such as healthcare to ensure compliance. Understanding how organizations react to unintended affordances provides insights into individual and organizational behavior concerning the adoption and assimilation of IT artifacts. Organizations need guidance on responding to unintended affordances in specific situations. Therefore, this real-world ethnographical study seeks to identify organizational reactions to unintended affordances.

Keywords: Unintended Affordances, Organizational Outcome, Organizational Reaction

Introduction

When organizations introduce new information technology (IT) artifacts, they focus on intended functionalities. However, users do not stick to these intentions (i.e., actualizing intended affordances); they also explore unintended ways to achieve their goals. Users perceive and actualize affordances arising from the technology's features in relationship with the user (Strong et al., 2014). Affordances depend on the individual users, their goals, and the features the artifact offers. However, users might deviate from existing organizational policies if they use technologies unintendedly (i.e., actualize unintended affordances). As such, there is a potential tension between the users goals, the technology's features, and the organization's policies (Soffer et al., 2023). This is especially critical in highly regulated sectors like healthcare, where deviations from organizational policies raise risks of regulatory action and potentially endanger the patient's well-being.

Current literature in this field primarily focuses on intended affordances (Grgecic et al., 2015; Ostern & Rosemann, 2021; Schultze, 2010; Seidel et al., 2013; Strong et al., 2014): The topic of unintended affordances remains under-researched. For example, Haag et al. (2022) focus on unintended affordances that are not in line with existing policies. These deviant affordances "are affordances whose actualization existing organizational IT policies specify as undesired" (Haag et al. 2022, p. 2112). However, unintended affordances cover not only deviant affordances but also affordances that are not at all covered by

organizational policies or affordances that users actualize when using systems provided by the organization in an unintended way. This situation is studied in the workaround literature (e.g., Alter, 2014), but often with a clear focus on the effect on organizational routines without an affordance perspective.

Moreover, organizational reactions to deviant affordances require further research. Individuals actualize unintended affordances to achieve their individual goals. However, this actualization might be constructive or destructive to overarching organizational goals. As such, organizations need to react to unintended affordances, especially in regulated industries. Recent studies on unintended affordances call for corresponding research on organizational reactions to those affordances (e.g., Haag et al., 2022). From a theoretical perspective, such insight into organizational reactions allows us to understand better the behavior of individuals and organizations regarding new technology artifacts. From a practical perspective, organizations need guidance on reacting to unintended affordances in specific situations. *Therefore, our research objective is to identify organizational reactions toward unintended affordances.*

In this short paper, we will focus on describing these reactions. To this end, we present the results of an ethnographic study in a hospital and derive descriptive knowledge using grounded theory. We will outline future research directions and derive prescriptive guidance for organizations.

(Unintended) Affordances in IS Research

In 1979, Gibson introduced the concept of affordances and defined them as the opportunities an environment offers an animal (Gibson, 1979). IS research has taken over the concept (e.g., Leonardi, 2013; Mettler et al., 2017). Markus and Silver (2008) describe IT-related affordances as "the possibilities for goal-oriented action afforded to specified user groups by technical objects" (Markus & Silver, 2008, p. 622). In contrast, Zammuto et al. (2007) state that "affordances emerge from the intersection of IT and organizational systems" (Zammuto et al., 2007, p. 752). This implies a relational view on affordances: We can only analyze affordances when looking at the relationship between artifact and actor. Volkoff and Strong (2018) build on this relational view and further describe affordances as "the potential for behaviors associated with achieving an immediate concrete outcome and arising from the relation between an artifact and a goal-oriented actor or actors" (Volkoff & Strong, 2018, p. 823). As such, affordances arise from the relationship between the artifact, particular users, and their ability to achieve certain outcomes (Hutchby, 2001). Therefore, affordances are not features; they result from a technology's feature in relation to the user. In line with Strong et al. (2014), we define *affordances as the possibility of action to achieve direct, concrete results arising from the relationship between artifacts and goal-directed users* (Strong et al., 2014). Following this definition, users can actualize affordances intended by the designer or the organizational owner (e.g., the IT department). With this, affordances are deliberately considered in system design (Stendal et al.). *Intended affordances* work so that, for example, a feature is visible and self-explanatory based on a concise button. A user then (potentially) perceives and actualizes this affordance.

However, existing literature has pointed out that the misalignment between target processes, organizational goals, and individual goals leads to finding unintended work practices (Soffer et al., 2023). These can be actualized in different systems or within one internal system (provided by the organization) but are not intended by the system designer or owner. We call those affordances *unintended affordances*. An unintended affordance can be explained as the user using the artifact (or a certain feature) for a different purpose or in another way than originally intended by the designer or owner. This concept is often discussed as a workaround (Haag et al., 2022). Some of these affordances can completely align with organizational policies (including IT policies and the defined target process), while others can be deviant regarding them. Deviant affordances "are commonly defined as non-compliant user behaviors vis-a-vis the intended system design" (Azad & King, 2008, p. 264). We define unintended affordances that conform with existing organizational policies as ***unintended conforming affordances***. On the other hand, we define unintended affordances that deviate from organizational policies as ***unintended deviant affordances***. Unintended affordances can be further distinguished into being constructive or destructive about organizational outcomes. We define unintended affordances as constructive when the associated outcome primarily supports organizational goals and destructive when the associated outcome harms organizational goals (see Haag et al., 2022). Figure 1 shows our conceptualization.

Within existing research on deviant affordances, Haag et al. (2022) defined future research directions and called for expanding research on outcome levels of unintended affordances (Haag et al. 2022, p. 2130).

Moreover, prior research on unintended affordances has mostly "focused on [...] deviant affordances whose actualization organizational IT policies specify as undesired" (Haag et al., 2022, p. 2130), concentrating on technology the organization did not provide. In contrast, in our study within a German hospital, we address using an artifact provided by the organization (the internal hospital information system, HIS).

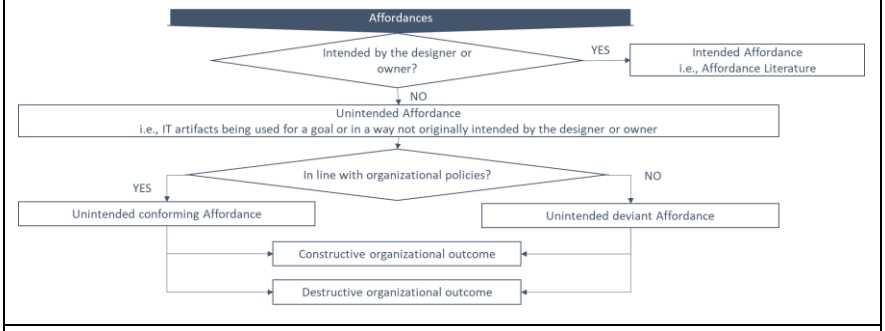

Figure 1. Classification of Unintended Affordances

Methodology

Our research aims to explore which organizational reactions to unintended affordances exist. Thus, it seeks to contribute to a better understanding of social reality, which refers to the complex and dynamic interplay of various factors that influence the behavior, beliefs, interactions and practices of individuals and groups within a specific context (Gioia et al., 2013; Yin, 2009, 2016). As such, we adopt a qualitative research approach (Yin, 2016). Specifically, we ethnographically study unintended affordances and organizational reactions in a German hospital as within this interpretative field study, an interplay between participants and researchers exists (Klein and Myers, 1999). The collected data is analyzed using grounded theory (Glaser et al., 1968; Wiesche et al., 2017), which allowed us to build theoretical insights while collecting more data iteratively. Figure 2 depicts our overall research approach.

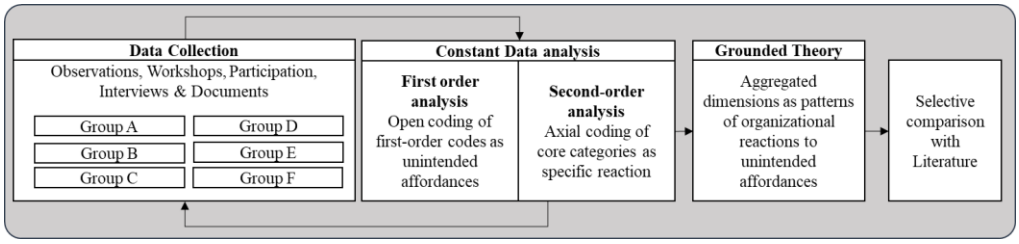

Figure 2. Ethnographical Research Design

Our case organization is a German hospital with around 3,500 employees. The hospital serves approximately 100,000 patients annually. We focused on several outpatient departments (e.g., surgery, otorhinolaryngology, ophthalmology, and neurophysiology) operating around ¾ of the overall patients. The core IS used in the hospital is HIS CGM MEDICO (hereafter referred to as HIS), which is a standard solution used in over 250 German hospitals. The HIS offers individually customized department workplaces (i.e., outpatient department, station, or administration). Permissions were restricted and customized for individual staff (e.g., differences in the workplace between nurses and doctors). The customization was primarily done in the case of several optimization projects. As such, users from various departments or groups can access different software features.

One author was embedded as an ethnographic researcher in a digitization project in the hospital between September 2020 and November 2022. The project aimed to discover how digital solutions are used and how socio-technical systems must be designed to relieve and support hospital staff (and simultaneously help patients). We collected data from multiple sources (e.g., participant observation, interviews,

documents, and informal social contact with the participants) to get the best insights and results (see Table 1) (Geertz, 1973; Sandberg & Tsoukas, 2011; Spradley, 1979; van Maanen, 2011). At the beginning of our study, we developed a data collection strategy, which was discussed and committed with all authors involved. Data collection training took place at the beginning of the study, and data quality was ensured by addressing several validation methods (cf. Appendix 2). Primary data for this study includes 12 months of ethnographical participant observations (Sandberg & Tsoukas, 2011; van Maanen, 2011; Willis & Trondman, 2000). The data collection took place in the different outpatient departments under study involving job shadowing, unstructured interviews during job shadowing with 14 Employees (cf. Appendix 1; Employee A-N), and documents. The embedded author took daily diary notes to structure her knowledge and comparatively analyze her insights. All data together are referred to as "case data."

As the main focus of our data analysis was on the reactions of the organization to unintended affordances and the embeddedness of the one author caused handwritten notes, manual coding and constant comparison of emerging unintended affordances as well as categories of reaction across ongoing data collection within the hospital were included in data analysis: First, case data were analyzed using grounded theory techniques (Strauss & Corbin, 1990). Memoranda were written throughout the analysis process by the embedded author. Then, the analytical approach of Gioia (2013) was consulted to generate appropriate categories and derive a theory. Here, the analysis is divided into the first-order analysis (open coding), second-order analysis (axial coding), and bundling in the aggregated dimension for a more structured view (selective coding) (Gioia et al., 2013). During first-order analysis, case data were open coded. Here, the analysis followed the inductive approach and focused on the terms (e.g., observations or statements) used in the case data, which produced a large set of codes that identified unintended affordances. The second-order analysis focused more on saturating the categories, leading to core second-order concepts. Efforts were made to group the first-order codes into broader categories by identifying similarities and differences and grouping them into more generic categories. These categories signify the specific reaction to the identified unintended affordance. Finally, using the grounded theory approach, theory development was conducted in the last phase by generating aggregated dimensions, which determine the outline of the results as organizational reactions toward unintended affordances (Chun Tie et al., 2019). The coding procedure has been a continuous and recurring interplay of coding, data collection, and rehearsal following a hermeneutic circle approach to ensure methodological rigor (Klein & Myers, 1999). The codes were systematically compared with the ethnographical participation of one author. Continuous comparison of her findings with the organizational statements and discussion of her coding with the participants followed. Additionally, discussions about category development evolution were done with one organization member (Charmaz, 2014). We reached theoretical saturation in late summer 2022. Nevertheless, the cooperation was agreed to run until November 2022, so we collected more data on adjacent themes. Finally, a selective comparison with existing literature (on affordances and workarounds) was included after the four concepts on organizational reactions emerged from the data.

Preliminary Findings

During our ethnographic study, we identified several unintended affordances that were actualized using the HIS. These unintended affordances were both deviant and conforming. For example, we observed a nurse registering a patient with the sub-system of the doctor. She actualized an affordance that did not align with organizational policies (i.e., deviant). However, through actualization, she achieved her personal goals and saved overall time for the organization.

Regarding our research objective, we identified four organizational reactions toward unintended affordances: Non-intervention, conscious allowance, sanctioning, and compensation. For several of the unintended affordances actualized by hospital employees, the organizational reaction was "**Non-Intervention**." One example is complete print affordance. The standard printing function of the HIS has several disadvantages for the hospital. On the one hand, too much patient data is released on the printed document. On the other hand, the printed documents' layout did not fit the standard of the internal corporate identity. As such, when the hospital introduced the system, the IT department tried to hide this standard printing function and customized a new print button that was prominently placed in the user interface. This new print button circumvented the disadvantages and ensured the organization's data security and corporate identity standards. Nevertheless, users also saw that the customized print button had disadvantages. Printing via the customized button was too complicated for the users, as different

configurations must be selected in the input mask, and decisions must be made repeatedly for each patient. Moreover, data must be manually transferred. Hence, employees experimented with the system to circumvent these disadvantages of the customized print function: *"I think we are not supposed to do so, but I found this possibility of printing when I was searching for a different solution regarding documentation of the patient's records. Now I use this way to print because it works without an error on the printer and the system"* (Employee G). As such, individual efficiency was increased by actualizing the unintended affordance, leading to faster organizational processes. However, the unintended affordance deviated from organizational standards and policies, leading to data privacy risks. Here, a staff member from the IT department mentioned, *"[…] printing data is always bad. Therefore, this is not wanted by our IT and the management."* Nevertheless, neither the IT department nor the management team reacted to this actualization of unintended affordances leading to no intervention from the organization. This organizational reaction of "**Non-Intervention**" was found regarding both constructive and destructive outcomes on the organizational level.

Example Quote, Note	**Unintended Affordance**	**1st Order-Code**	**2nd Order-Code**
"Some use the calendar […], some don't, in 4-5 outpatient department no appointments are entered at all […]. We don't have any fixed guidelines, […], we change some things […], but how this is done by the individual users is up to them, […] if they want to do it differently, they can" (Staff member of IT)	Appointment organization	Independent user decisions on system use	Non Intervention
"Over time we got more authorizations […], e.g., we can book a case via the doctor's workplace, which is much quicker because it automatically takes over the data from the insurance card […]" (Employee K)	Creating and booking a new case	Access extension	Conscious Allowance
"[We see] an error message, which asks […] why one […] accesses […] patient data of another department [and] is automatically registered that one accessed data. [We] must justify why, as you get questioned by the data protection officer […]" (Employee M)	Consultation of patient information from other departments	Modifying and adjusting system	Sanctioning
Double Booking of patients causes problems with billing: "Double booking in different departments and missing case connection forces us to employ new staff" (Employee of Patient Management)	Double Booking of Patients	Resource increase	Compensate

Table 1. Excerpt of Coding Structure and Key Findings

Another reaction toward actualized unintended affordances is "**Conscious Allowance**." One specific example was the affordance of customizing own workplace to schedule patients. When a patient arrives too late for an appointment, the patient's status in the system cannot be changed, which is needed in case of communication between doctors and nurses. Therefore, the appointment needs to be adjusted: the patient case must be edited, and the appointment time must be changed, which is time-consuming for the user. Also, this led to different error messages on the screen, as the real-time of arrival did not conform with the schedule. *"This error kept coming up - we tried to solve it […] and we found a way to fix it, and so we made our own column, where we put the appointment"* (Employee F). Regarding this, the nurses implemented a new column within the HIS resource calendar to schedule a patient twice, which led to decreasing errors and more efficient work practices. An employee from the IT department mentioned: *"We do not have any fixed guidelines regarding the use of the calendar, Medico provides different ways, but how the individual users do it is up to them, they are free."* Further, she stated: *"The project to set up the calendars from the project management office included the set-up within the outpatient department, but whether and how intensively it is used was not prescribed and part of the project."* Hence, conscious allowance leads to new policies or system adaption based on unintended affordance. Additional, workarounds were officially propagated by management and the IT department. As a result, the authorizations in the HIS are formally extended. For example, a nurse got access to the doctor's workplace officially and was permitted formally. The actualization of certain unintended affordances that lead to positive outcomes can be promoted, e.g., by including them in training. In particular, since the training was

not individualized for the individual departments in the hospital, the users were almost "pushed" to try things out. This reaction was found regarding constructive and destructive organizational outcomes.

The hospital reacted to other unintended affordances with "**Sanctioning,**" which includes changes in IT infrastructure and the internal HIS by aiming to eliminate unintended affordances. A referring doctor's information must be entered when creating a new patient. The standard process provides a referring doctor tab, but some users find it easier to add the referring doctor under the "Edit patient" mask option in the first tab of the patient creation mask. However, this stores the information only locally and is, therefore, unintended. The information is not transferred to the entire system and cannot be accessed by other departments. One trainee from the outpatient department of Otorhinolaryngology stated: *"At first, I entered the referring doctor [...] via a separate tab in the patient mask, but then I learned in neurology and surgery outpatient department that the doctor can also be entered on the first tab of the patient mask."* The trainee believes *"*[...] *that this [information] is not stored in the entire system [...], but only if you use the separate mask for the doctor"* (Employee E). As this unintended affordance was communicated to the organization's IT department, the action possibility was customized away so that no entry was possible in the first tab. A greyed-out field was displayed with "referring doctor." A second example in the central emergency department was the actualization of the affordance booking of patients despite missing mandated information. The central emergency room reported cases to patients for the outpatient department who did not have a referral. This actualization violated existing organizational policies. This case occurs not only in the central emergency department but also in cases where patients come to the outpatient department without a referral. If no referral is brought along when the patient comes to the appointment, no billing can occur, and the service must be booked free of charge. The hospital reacted by restricting the authorization for the central emergency room to book cases for the outpatient departments. The reaction of sanctioning was mainly found with destructive outcomes on the organizational level. Existing permission within the systems are restricted even more, or additional permissions are created. Finally, the management or the IT department officially prohibits actualizing the unintended affordances.

The last identified organizational reaction is "**Compensate**." With this reaction, the organization avoids changes in the system and at the process level. We found that the organization under study reacted with an increase in personnel resources or created re-workarounds to compensate for the (destructive) outcomes of the actualization of unintended affordances. One specific example from the hospital under study: A patient must be connected to a case when they are booked in the HIS. If a patient is double booked, it means that they are scheduled as a new patient in the HIS, even though their information already exists in the system. However, the patient is not automatically linked to previous cases or current admission during their stay. Double booking is not intended, but the employees actualized this affordance and did not merge the booked patient to a case. To bill the treatment of a patient, every existing case of their treatment is needed. Actualizing double booking of patients is, therefore, deviant to the organizational policies because it is no longer possible to track which cases are already billed or not (as a patient appears twice in the system and is only booked for one case in the HIS). We found this within the Otorhinolaryngology department. The patient was first treated in the central emergency room before he got delivered to the Otorhinolaryngology. In both departments, they booked the patient. However, e.g., within the emergency room, they did not connect the booked patient to a case. As a result, the patient was only found double booked in the system but without a specific case linked to it. Therefore, the treatments within the emergency room got not billed. As a reaction, new resources in the patient management department were hired to ensure follow-up work, manually correct and merge double-booked patients, and connect all cases to the patients. Previously, patient cases were dropped if they could not be assigned.

Concluding Discussion and Next Steps

We analyzed how organizations respond to unintended affordances, identifying four reactions. This addresses the gap noted by Haag et al. (2022). Considering workarounds as unintended affordances, we agree that workarounds play an important role in the case of process innovation and can lead to a better outcome in the organization. Local advantages, such as "[...] eliminating temporary obstacles or creating improved workflows [...]" (Alter, 2014, p.1057), can be gained from using workarounds. Yet, unintended affordances can harm organizational goals. Their actualization can lead to failures or new problems, e.g., distorted information. These problems are critical in highly regulated industries such as healthcare where they may lead to regulatory interventions or even endanger the life and health of patients.

Our grounded theory study identifies four organizational reactions to unintended affordances. Comparing these findings to prior research, we need to acknowledge that three of those reactions have already been identified (e.g., Alter, 2014; Beerepoot & van de Weerd, 2018; Beerepoot et al., 2019; Ferneley & Sobreperez, 2006). Regarding the first reaction of non-intervention to unintended affordances, previous studies suggest that organizations may simply ignore them (Alter, 2015; Röder et al., 2014). However, in some cases, this lack of action can result in long-term organizational changes that lead to the informal development of new routines (Alter, 2014). Regarding the second reaction, the literature on workarounds alternatively suggests informal improvement projects (Alter 2014), including adopting workarounds into existing systems as formal processes (Cresswell et al., 2017; Nadhrah & Michell, 2013) and institutionalization (Azad & King, 2008; Cabitza & Simone, 2013) as well as redesigning processes (Dumas et al., 2018). We support these findings and relate them to the affordance perspective. Finally, scientific literature also suggests that organizations may take steps to prevent workarounds, which we refer to as the organizational reaction of sanctioning. As the prevention of workarounds can be defined as "developing countermeasures to prevent a workaround from happening" (Beerepoot & van de Weerd, 2018, p. 3), we extend this a priori prevention to an a posteriori reaction to unintended affordances. In this regard, existing literature also proposes several organizational actions, such as elimination (Vogelsmeier et al., 2008) and demonization (Cresswell et al., 2017), as well as modifying IT (McGann & Lyytinen, 2008). These aspects fit well into our understanding of sanctioning.

To conclude, these three organizational reactions are mostly in line with prior findings from the scientific literature. However, the fourth organizational reaction of "Compensate" extends the existing literature on organizational reactions. We observed situations where the organization noticed the actualization of unintended affordances, saw that this actualization solved local problems, but also identified a negative effect on organizational goals. Still, the organization allowed this actualization of unintended affordances to continue and (to differentiate from the reaction of "conscious allowance") invested additional resources to compensate for the negative effects on organizational goals. As such, we extend existing theory on organizational reactions to unintended affordances (and, potentially, workarounds).

We will continue our ongoing research to further explore organizational reactions, drawing from empirical data and literature, especially in adjacent fields. Moreover, we will expand our analysis to uncover causal relationships between influencing factors and organizational responses. With this, we aim to understand when the organization chooses which reaction. As this interconnectedness of different unintended affordances and the resulting outcomes collectively contribute to achieving larger organizational goals, we believe there is value in deriving corresponding theories. Developing prescriptive implications is a further step of our study to identify when organizations should react and how. With this, we hope to support IT managers in the healthcare sector to increase technology adoption (e.g., HIS) in compliance with required regulations. We are aware that our ongoing research has several limitations. First, due to the nature of early research findings, there could be interpretations that might change with the remaining work. Second, given the timeline of our ethnographical research, we see limitations regarding full data access, as Covid-19 and corresponding regulations in healthcare have restricted full access in all departments and stations. Third, the study's reliance on a single case organization could impede the applicability and generalizability of our findings across different organizational contexts, information systems, and industries.

References

Alter, S. (2014). Theory of Workarounds. *Communications of the Association for Information Systems*, *34*(55), 1041–1066.

Alter, S. (2015). A Workaround Design System for Anticipating, Designing, and/or Preventing Workarounds. In *Conference on Advanced Information Systems Engineering* (pp. 489–498).

Azad, B., & King, N. (2008). Enacting computer workaround practices within a medication dispensing system. *European Journal of Information Systems*, *17*, 264–278.

Beerepoot, I., & van de Weerd, I. (2018). Prevent, Redesign, Adopt or Ignore: Improving Healthcare Using Knowledge of Workarounds. *Research Papers*, *120*.

Beerepoot, I., Weerd, I. D., & Reijers, H. (2019). The Potential of Workarounds for Improving Processes. *Business Process Management Workshops*.

Cabitza, F., & Simone, C. (2013). Drops Hollowing the Stone: Workarounds as Resources for Better Task-Artifact Fit. In Bertelsen, O., Ciolfi, L., Grasso, M., Papadopoulos, G. (Ed.), *13th European Conference on Computer Supported Cooperative Work* (pp. 103–122). Springer.

Charmaz, K. (2014). Grounded Theory in Global Perspective. *Qualitative Inquiry*, *20*(9), 1074–1084.

Chun Tie, Y., Birks, M., & Francis, K. (2019). Grounded theory research: A design framework for novice researchers. *SAGE Open Medicine*, *7*, 1-8.

Cresswell, K. M., Mozaffar, H., Lee, L., Williams, R., & Sheikh, A. (2017). Workarounds to hospital electronic prescribing systems: a qualitative study in English hospitals. *BMJ Quality & Safety*, *26*(7), 542–551.

Dumas, M., La Rosa, M., Mendling, J., & Reijers, H. A. (2018). *Fundamentals of Business Process Management*. Springer.

Ferneley, E. H., & Sobreperez, P. (2006). Resist, comply or workaround? An examination of different facets of user engagement with information systems. *European Journal of Information Systems*, *15*(4), 345–356.

Geertz, C. (1973). *The interpretation of cultures: Selected essays*. Basic Books.

Gibson, J. J. (1979). *The Ecological Approach to Visual Perception*. Houghton-Mifflin.

Gioia, D. A., Corley, K. G., & Hamilton, A. L. (2013). Seeking Qualitative Rigor in Inductive Research. *Organizational Research Methods*, *16*(1), 15–31.

Glaser, B. G., Strauss, A. L., & Strutzel, E. (1968). The Discovery of Grounded Theory; Strategies for Qualitative Research. *Nursing Research*, *17*(4), 364.

Grgecic, D., Holten, R., & Rosenkranz, C. (2015). The Impact of Functional Affordances and Symbolic Expressions on the Formation of Beliefs. *Journal of the Association for Information Systems*, *16*(7), 580–607.

Haag, S., Eckhardt, A., & Venkatesh, V. (2022). Deviant Affordances: When Tensions, Deadlocks, and Nonconformance Generate Performance (Open Access). *MIS Quarterly*, *46*(4), 2111–2162.

Hutchby, I. (2001). Technologies, Texts and Affordances. *Sociology*, *35*(2), 441–456.

Klein, H. K., & Myers, M. D. (1999). A Set of Principles for Conducting and Evaluating Interpretive Field Studies in Information Systems. *MIS Quarterly*, *23*(1), 67–94.

Leonardi, P. M. (2013). When Does Technology Use Enable Network Change in Organizations? A Comparative Study of Feature Use and Shared Affordances. *MIS Quarterly*, *37*(3), 749–775.

Markus, M. L., & Silver, M. (2008). A Foundation for the Study of IT Effects: A New Look at DeSanctis and Poole's Concepts of Structural Features and Spirit. *Journal of the Association for Information Systems*, *9*(10), 609–632.

McGann, S., & Lyytinen, K. J. (2008). The Improvisation Effect: A Case Study of User Improvisation and Its Effects on Information System Evolution. *International Conference on Interaction Science*.

Mettler, T., Sprenger, M., & Winter, R. (2017). Service robots in hospitals: new perspectives on niche evolution and technology affordances. *European Journal of Information Systems*(26), 451–468.

Nadhrah, N., & Michell, V. (2013). A normative method to analyse workarounds in a healthcare environment: motivations, consequences, and constraints. In *14th International Conference on Informatics and Semiotics in Organisation (ICISO)*.

Ostern, N., & Rosemann, M. (2021). A Framework for Digital Affordances. In *29th European Conference in Information Systems* (Vol. 145).

Röder, N., Wiesche, M., Schermann, M., & Krcmar, H. (2014). Why Managers Tolerate Workarounds - The Role of Information Systems. *Americas Conference on Information Systems*.

Sandberg, J., & Tsoukas, H. (2011). Grasping the logic of Practice: Theorizing Trough Practical Rationality. *The Academy of Management Review*, *36*(2), 338–360.

Schultze, U. (2010). Embodiment and Presence in Virtual Worlds: A Review. *Journal of Information Technology*, *25*(4), 434–449.

Seidel, S., Recker, J., & vom Brocke, J. (2013). Sensemaking and Sustainable Practicing: Functional Affordances of Information Systems in Green Transformations. *MIS Quarterly*, *37*(4), 1275–1299.

Soffer, P., Outmazgin, N., Hadar, I., & Tzafrir, S. (2023). Why Work Around the Process? Analyzing Workarounds Through the Lens of the Theory of Planned Behavior. *Business and Information Systems Engineering*, *65*, 369–389.

Spradley, J. (1979). *The Ethnographic Interview*. Holt Rinehart & Winston.

Stendal, K., Thapa, D., & Lanamäki, A. Analyzing the Concept of Affordances in Information Systems. *49th Hawaii International Conference on System Sciences*, *2016*, 5270–5277.

Strauss, A., & Corbin, J. M. (1990). *Basics of qualitative research: Grounded theory procedures and techniques*. SAGE Publications.
Strong, D. M., Volkoff, O., Johnson, S. A., Pelletier, L., Tulu, B., Bar-On, I., Trudel, J., & Garber, L. (2014). A Theory of Organization-EHR Affordance Actualization. *Journal of the Association for Information Systems*, *15*(2), 53–85.
van Maanen, J. (2011). *Tales of the field: On writing ethnography*. University of Chicago Press.
Vogelsmeier, A. A., Halbesleben, J. R. B., & Scott-Cawiezell, J. R. (2008). Technology implementation and workarounds in the nursing home. *Journal of the American Medical Informatics Association*, *15*(1), 114–119.
Volkoff, O., & Strong, D. M. (2018). Affordance theory and how to use it in IS research. In R. Galliers & M.-K. Stein (Eds.), *The Routledge Companion to Management Information Systems* (pp. 232–245).
Wiesche, M., Jurisch, M., Yetton, P., & Krcmar, H. (2017). Grounded Theory Methodology in Information Systems Research. *MIS Quarterly*, *41*(3), 685–701.
Willis, P., & Trondman, M. (2000). Manifesto for Ethnography. *Ethnography*, *1*(1), 5–16.
Yin, R. K. (2009). *Case study research: Design and methods*. SAGE.
Yin, R. K. (2016). *Qualitative research from start to finish*. Guilford Press.
Zammuto, R. F., Griffith, T. L., Majchrzak, A., Dougherty, D. J., & Faraj, S. (2007). Information Technology and the Changing Fabric of Organization. *Organization Science*, *18*(5), 749–762.

Appendix

Within the ethnographical research, we observed four outpatient departments with several employees. We conducted unstructured interviews with the head of the outpatient department surgery (Employee A) as well as three medical nurses (Employee B-D) and a trainee (Employee E) of the outpatient department surgery. Within the outpatient department of Otorhinolaryngology, we interviewed three medical nurses (Employee F-H) and one trainee (Employee I). Three medical nurses (Employee J-L) participated from the Ophthalmology outpatient department. One medical nurse (Employee M) and one Trainee (Employee N) from the Outpatient department Neurophysiological also participated in our study.
Appendix 1. Observed Groups and included Participants

Data Quality Validation Method	**Con-struct Validity**	**Internal Validity**	**Reli-ability**	**Details**
Use of multiple sources of evidence to allow for cross-triangulation	X			We used several sources, including 28 unstructured interviews with system users (employees during job shadowing), 9 unstructured interviews with IT department employees, 62 pages of typed diary notes (every evening of involvement, at least one page), 673 pages of handwritten notes (e.g., during participation and interviews), 1 user training, 3 user workshops, 19 days of operative job shadowing observing user interaction with the HIS, 33 Project documentation files, and system documentation
Validation of case data writeup by hermeneutic circles			X	During the embeddedness, we ensured continuous interplay of coding, data collection and rehearsal following the hermeneutic circle approach
Examining change over time		X		Data were elicited over an extended period from September 2020 to November 2022 with 52.5 weeks of embedded participation. This led to ~ 462 hours of participation in hospital and on-site observations,
Use of archival documents			X	A number of archival documents was referenced during this research, including 5 Excel files including the HIS modules per outpatient department, 13 standard operating procedures, and 9 User survey result documents
Appendix 2. Selected Data Quality Validation Measures				