

# **How do Affordances Spread and How does Networks Influence Affordances – Insights from an ongoing Ethnography**

## **Abstract**

The interaction of users with existing information systems (IS) is of growing interest in healthcare. The need to understand these user-system interactions to design health IS appropriately and generate effective outcomes in using the existing IS is always present. Within this, affordances are used to gain insights into the socio-technical mechanisms. To understand the actualization of affordances within a multimodal network (of different user groups and diverse users) inside organizations the identification of mechanisms of translation (from existence to perception to actualization) and mechanisms of spreading (from one group to another) of affordances needs to be examined. With this ethnographical research in a German hospital, we aim to identify and understand these mechanisms and further want to examine them to purposely explain them with existing theories in network research in this ongoing research.

## **Introduction**

In recent years, IS research has moved to a nuanced analysis of user-system interactions and the study of differences in actualizing affordances. Affordances can be understood as action possibilities that are provided by technology (i.e., they exist), can be perceived by the user, and are ultimately actualized (Bernhard et al. 2013; Ostern and Rosemann 2021). However, contemporary research mostly aims at identifying affordances for different technologies (e.g., Faik et al. 2020). In contrast, Karahanna et al. (2018) suggest a needs-affordances-features (NAF) view in the case of the psychological perspectives on using IS. Further, IS research typically examines the user-system relationship as an isolated dyad between a single user and a single IS, but this does not represent organizations in which multiple users interact with multiple IS within several user groups (Kane and Alavi 2008), like in healthcare organizations (e.g., different outpatient departments, or involved stakeholders like physicians, nurses, etc.). Therefore, a deeper understanding of how affordances (and with this, the user-system interactions) that are shared within one group (e.g., a department) spread to other groups (Karahanna et al. 2018; Leidner et al. 2018) is yet missing.

Additionally, the interplay within the multimodal network of systems and different users (and user groups) needs to be examined. Also, the translation between existing affordances to perceived affordances to actualized ones is still subject of contemporary research as the "link, and distinction, between perception [...] and actualization [...] of affordances, is still unclear in the IS literature" (Bernhard et al. 2013). Moreover, there is still a gap in the explanation of the spreading of affordances within or to other groups in organizations regarding their connection to existing multimodal networks established in organizations (Kane and Alavi 2008). As such, we aim to answer the following research questions:

*RQ1: How do technology affordances translate from existence to perception to actualization?*

*RQ2: How do technology affordances spread from one organizational unit to another, and how is this explainable with existing network theories?*

To this end, we conduct an ongoing ethnographical study of a hospital. Our preliminary insights reveal five mechanisms explaining the translation and spread of affordances.

## **Background**

The concept of affordances was coined by Gibson (1979) by describing what an environment offers, provides, or furnishes an animal. Building on this, Norman (1988) defined affordances as perceived action possibilities in the context of interactions between humans and computers. The term has also gained interest in IS research, due to its usefulness in understanding socio-technical mechanisms. Various definitions of affordances (e.g., Leonardi 2013; Markus and Silver 2008) exist, and often "affordances refer to possibilities for action offered to an individual by an object" (Leidner et al. 2018; Volkoff and Strong 2013). Building on this definition, we distinguish between existing, perceived, and actualized affordances. Existing affordances are the mere action possibilities an object offers to a user (Gibson 1979). Perceived affordances indicate that a user observes the object, interprets cues about it (Markus and Silver 2008), and thus deduces action possibilities (Bernhard et al. 2013). These can be put into action what we define as affordance actualization (Strong et al. 2014). With the research effort, we aim to close corresponding gaps - e.g., Leidner et al. (2018) suggest that "outcomes stemming from the actualization of an affordance depend not only on how one user group uses the affordance, but are also contingent on how another group does, or

does not, make use of the same or new affordance." They call for further research on the process of actualization and its co-dependencies between groups of actors regarding this. Also, Kane and Alavi (2008) explored the impact of user-system interactions within IS on organizational performance outcome and call for further research to "examine the wider multimodal network of multiple users and multiple systems to assess the role of IS in organizations more fully" (Kane and Alavi 2008). We empirically address the aforementioned research gaps and analyze affordance existence, perception, and actualization within different teams (Bernhard et al. 2013; Leidner et al. 2018) to understand the mechanisms of translation and spreading of these affordances within an organization. Our main goal is identifying how affordances move back and forth in organizations. To do this, we look at what affordances are in healthcare, want to identify in a next step how an affordance (exist, perceived or actualized) moves around in an organization with various user and user groups, and examine this concerning existing network theories.

## **Research Method**

We follow a qualitative ethnographical approach, which seeks to identify cultural behavior to get a rich description of a relatively small area of interest (Eriksson and Kovalainen 2008). Our ongoing ethnographical study will be conducted over 26 months in a hospital located in Southern Germany. The core IS used is the hospital information system (HIS) CGM MEDICO. During the last 24 months, we were able to gain insights into different teams within the hospital and to analyze their IS usage patterns. We use mixed methods of data collection from the different outpatient departments and with various user teams of the HIS. Primary data are participation, observation, and unstructured interviews. As unstructured interviews allow "free talk by interviewees about what they find important" (Recker 2021), participation and observation (e.g., job shadowing) allow us to get deep insights into the user interaction with the existing HIS. We conducted unstructured interviews with participants of six different departments – namely Outpatient department Surgery (Team A), Otorhinolaryngology (Team B), Ophthalmology (Team C), Neurophysiological (Team D), and the Patient Management (Team E) as well as the IT Department (Team

F). Participants were 10 Medical Nurses (MN), 3 Trainees (T), Head of Outpatient Department Surgery (HDS), Head of Patient Management (HPM) and 2 Employees (E).

## **Preliminary Findings**

Our preliminary findings suggest that 5 mechanisms are at play that facilitate the translation of affordances from existence to perception to actualization (i.e., mechanisms T.1 – T.3) or the spreading of affordances from one team to another (i.e., mechanisms S.1 and S.2).

### ***Mechanism T.1: Customization of standard system***

The first mechanism of translation is the customization of standard software. The hospital uses a standard HIS, which is customized for each individual team. These customizations are based on historical decisions and growth of the HIS provider (*HPM* and *E*, Team E; *EI*, Team F). Through customization, specific features and related existing affordances can be either hidden or highlighted. As an example, the option to double schedule appointments for one resource (e.g., a physician) is customized in the standard system (for Team B). Other teams do not have this option and do not perceive this affordance. As such, even when using standard software, customization of the system can impede or facilitate the translation of affordances.

### ***Mechanism T.2: Formal training and intra-team knowledge sharing***

The second mechanism of translation was formal training and intra-team knowledge sharing. Last empowers perception (and possibly also the actualization) of existing affordances; e.g., some *MN* gained knowledge from physicians and reduced efforts by getting affordances translated (into perceived and finally actualized them) (*MN3*, Team A). Therefore, affordances can be translated by intra-team knowledge sharing. However, through formal training, a central unit can also prevent the perception (and later actualization) of specific affordances. Here, the hospital organized training programs only for new employees and focused on very general features that supported the basics of the system. The training is not customized to the individualized circumstances of the particular teams (e.g., action possibility of double appointment scheduling) (*EI*, Team F).

### ***Mechanism T.3: Trial and Error***

The third mechanism of translation was the trial and error of employees. Apparently, team members experiment with the system to identify whether certain goals can be achieved. They want to achieve a specific result, believe that they can do so with the system (i.e., they are looking for an action possibility the system offers), and try to find a matching function (i.e., an existing affordance). Several employees at the hospital argued that they achieved a particular goal through experimentation (*MN2*, Team C and *T*, Team B) or workarounds (e.g., users miss features and try to achieve the same goal with a workaround).

### ***Mechanism S.1: Team rotation***

The first mechanism of spreading affordances from one team to another is team rotation. Several *MN* worked at a different health organizations (e.g., hospitals) or rotated through other departments of the case hospital before. They were able to capture various functions and perceived affordances needed in the particular context of their department. Also, *T* rotate between different departments and serve as spreaders of affordances between different teams. With this, they spread affordances from one team to the other.

### ***Mechanism S.2: Informal knowledge exchange across teams***

The second mechanism of affordance spreading is the ongoing informal knowledge exchange across teams. As team members work in different teams of the organization they gain knowledge about the functions and affordances of the HIS and transfer this knowledge between the different teams they were and are part of. Affordance actualization is promoted as informal knowledge of features spread through the organization.

## **Concluding Discussion and Next Steps**

We are interested in understanding how affordances are translated from existence to perception to actualization and how they spread within an organization. With our ethnographical research in progress and based on the rich data collected, we were already able to identify five mechanisms for translation and spreading of affordances. With this, we start to close the gap highlighted by Leidner et al. (2018) by explaining the intertwining between affordances, actors, and outcomes and, therefore, the actualization and its co-dependencies between groups of actors. We continue our research and aim to identify further

mechanisms. By revisiting the literature, we aim to identify potential mechanisms that have been discovered in adjacent fields without a clear affordance and network perspective. So far, we did not examine the linkage between the spreading of affordances and existing network theories (regarding RQ2) but intend to do so in the future. For example, the existing network theory of informal networks, according to Krackhardt and Hanson (1997), seems suitable as an explanation for linking (so far) identified mechanisms to the (informal) existing networks within an organization. Building on our preliminary findings, the categorization of mechanisms in organizational health contexts should be defined further regarding the affordance of existence, perception, and actualization and should be evaluated in more detail. Also, the network analysis of the studied hospital will take place in the remaining time of our study. The idea is to identify explanations of the mechanism of (translation and) spreading within the healthcare organization and link this to existing network theory.

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