Abstract

The affordances concept describes the possibilities for goal-oriented action that technical objects offer to specified users. This notion has received growing attention from IS researchers. However, few studies have gone beyond contextualizing parts of the concept to a specific setting – the tip of the iceberg. In this research-in-progress paper, we report on our efforts to further develop the IS discipline’s understanding of affordances from informational objects. Specifically, we seek to extend extant theory on the origin and actualization of affordances. We develop a model that describes the process by which affordances are perceived and actualized and their dependence on information and actualization effort. We illustrate our emergent theory in the context of conceptual process models used by analysts for purposes of information systems analysis and design. We offer suggestions for operationalizing and testing this model empirically, and provide details about our design of a mixed-methods study currently in progress.

Keywords: Affordances, Business process modeling, Theory building, Mixed methods, Business Process Management
Introduction

Research on affordances tells us that while artifacts have material properties that people can make use of, the existence of these properties alone does not determine their use or effect. Rather, such outcomes depend on how users perceive and use the object’s properties in the context of one or more goals (Gibson 1979). Many IS researchers have found the notion of affordances to be helpful in understanding the use and consequences of IS artifacts. Affordances are typically defined as possibilities for goal-oriented action that artifacts offer to specified user groups (Markus and Silver 2008). In recent years, IS researchers have made important advances in understanding affordances and their actualization. Nevertheless, key gaps remain, and the concept as used in the majority of studies is underdeveloped and does not fully capitalize on its capabilities in explaining the object-user relationship.

In particular, with few exceptions (e.g. Strong et al. forthcoming), IS research on affordances has assumed that an affordance simply exists and can be utilized, without justifying how and why it emerges and what influences its actualization by users of the object. To address this gap, the aim of this paper is to extend IS research on the origin and actualization of affordances. First, we will argue that emergence, perception, and actualization of affordances are distinct concepts. Second, affordance emergence depends on properties of the object and its user. Third, the perception of affordances is determined by information about affordance existence. Fourth, affordance actualization is influenced by its perceived difficulty.

To illustrate and support our arguments, we choose process modeling as an application area for our theory. Previous affordance studies often examined physical objects related to motor tasks such as climbing or grasping (e.g., Stoffregen et al. 1999; Warren 1984). Process models, however, are informational objects and their use is a cognitive instead of a motor task (Gemino and Wand 2003). They visually describe an organization’s business processes (Ould 1995) by specifying tasks, information, data, resources, actors and their relationships in a process (Curtis et al. 1992). Process models play a key role in IS development and organizational change projects (Fettke 2009) and are used for a variety of analysis and design tasks such as systems analysis (Dennis et al. 1999), software development (Ouyang et al. 2009), ERP implementations (Kosalge and Chatterjee 2011) and organizational re-design (Kock et al. 2009), all of which are vibrant streams of research in IS. Our approach is in line with the call from Benbasat and Zmud (2003), who argue that IS research should focus on the IT artifact (i.e., process models) in its immediate nomological net (i.e., their application to IS tasks). Thus, while maintaining the process model as IT artifact at the centre of our paper, we broaden the view of prior research and set out to examine the ‘system’ (Nunamaker and Briggs 2011) of process model use as enabled by the affordance lens.

Still, while we peruse the process model use context to illustrate our theory development and tailor our empirical study design to this specific context, our emergent theory can provide wider implications for IS research and related phenomena. For example, our model of affordance emergence and actualization, in theory, can also be used as a lens to examine technology use and appropriation processes (Leonardi 2011), the role of technology in enabling environmentally sustainable work practices (Seidel et al. 2013), the nature of work practices in social media networks (Majchrzak et al. forthcoming) or other phenomena related to how individuals peruse technologies and the consequences thereof.

This manuscript details our progress towards developing a formal theory of affordance perception and actualization. With empirical testing of that theory outstanding, we note that the theory as described in this paper remains in an emergent state and its key propositions are tentative in nature. In what follows, we first review the literature. Based on this, we develop a framework of process modeling affordances. We close with concluding remarks and a suggested strategy for empirical validation.

Related Literature

We have conducted a review of the use of the affordances lens in IS literature to build a foundation for the development of a model of affordance perception and actualization. We searched for papers addressing keywords such as affordance(s) in combination with IS, IT and technology. We selected only journal articles and limited our search to typical IS journals such as JAIS, MISQ, and ISR. We also included selected relevant publications from related fields, such as Management and HCI. A summary of the main findings from our literature review is presented in Table 1.
Table 1: Extant Information Systems Research on Affordances

<table>
<thead>
<tr>
<th>References</th>
<th>Key Findings</th>
<th>Methodology</th>
<th>Contributions to the Understanding of Affordances</th>
</tr>
</thead>
<tbody>
<tr>
<td>Markus, Silver (2008)</td>
<td>• Object’s properties are relevant (but insufficient) to explain uses and effects.</td>
<td>Conceptual work</td>
<td>Functional affordances and symbolic expressions as relational concepts describe IT artifacts.</td>
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<td></td>
<td>• Object’s properties can provide affordance information, but affordances are not object properties.</td>
<td></td>
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<tr>
<td>Leonardi, Barley (2010)</td>
<td>• Technology affords and constrains actions of its users.</td>
<td>Literature review</td>
<td>Users develop workarounds to address constraints.</td>
</tr>
<tr>
<td>Leonardi (2011)</td>
<td>• Technology either constrains or affords employee goal achievement.</td>
<td>Single case study</td>
<td>Change decisions are based on the imbrications of human and material agencies.</td>
</tr>
<tr>
<td></td>
<td>• Depending on the imbrications of human and material agencies, employees change routines or technologies when failing to achieve a goal.</td>
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<tr>
<td>Sutcliffe et al. (2011)</td>
<td>• Facebook, Wikipedia, Blacksburg Electronic Village, and World of Warcraft afford social behaviours.</td>
<td>IT evaluation; conceptual work</td>
<td>Affordance emergence from technology features.</td>
</tr>
<tr>
<td>Goh et al. (2011)</td>
<td>• Co-evolution of routines and technology: Affordances of new system change organizational routines; new system is routinized.</td>
<td>Single case study</td>
<td>Evolution of affordances through agentic action.</td>
</tr>
<tr>
<td>Anderson (2011)</td>
<td>• The properties of a health IS enable and constrain the work practices of clinicians.</td>
<td>Single (exploratory) case study</td>
<td>Actualizing IS affordances is influenced by the affordance range and threshold.</td>
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<tr>
<td></td>
<td>• IS afford social interaction.</td>
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<tr>
<td>Malhotra, Majchrzak (2012)</td>
<td>• Virtual workspaces afford knowledge evolution monitoring and virtual co-presence creation.</td>
<td>Interviews; Survey</td>
<td>Affordance emergence from technology features.</td>
</tr>
<tr>
<td>Seidel et al. (2013)</td>
<td>• Technology can contribute to environmental sustainability through affordances for sensemaking and sustainable work practices.</td>
<td>Single (interpretive) case study</td>
<td>Socio-technical conditions enable material properties of IS to create functional affordances.</td>
</tr>
<tr>
<td>Volkoff, Strong (2013)</td>
<td>• Affordance-based theories informed by critical realism enhance our ability to explain IT-associated organizational change.</td>
<td>Post-hoc analysis of two case studies</td>
<td>Affordances are generative mechanisms in organizational change processes.</td>
</tr>
<tr>
<td>Strong et al. (forthcoming)</td>
<td>• Research should address the IT artifact, the non-deterministic process of IT effects, the multi-level nature of IT-enabled change processes, and the intentionality of change agents.</td>
<td>Single case study</td>
<td>Replacement of appropriation concept with actualization.</td>
</tr>
<tr>
<td>Kane et al. (forthcoming)</td>
<td>• Social media technologies turn knowledge sharing from a centralized process into a continuous knowledge conversation.</td>
<td>Conceptual work</td>
<td>Identification of technology-specific affordances.</td>
</tr>
</tbody>
</table>

From this review, we reach a number of conclusions. **First**, even though psychology researchers have highlighted the role of a user’s affordance perception before being able to act on it, this conceptual separation has largely been ignored in existing studies in IS. **Second**, while the concept of affordances has experienced a wide uptake in several fields, especially in psychology, the proliferation of this concept in IS has emerged only recently – a review of IS affordances articles in the Senior Scholars’ Basket of Journals (Association for Information Systems 2011) prior to Markus and Silver’s (2008) influential work yields only one result mentioning “affordances” in title, abstract or keywords, compared to 6 results thereafter. The number of studies utilizing the affordances lens is still growing. An indicator for this is the large proportion of recently published and forthcoming papers, which also points out the lack of maturity of this area of research (e.g., 2 articles are published and 3 are forthcoming in MIS Quarterly). **Third**, in
terms of methodology, while there is some empirical IS affordances research, most examined one single case (5 papers in Table 1) or (re-)examined multiple cases (1 paper). Especially applications of quantitative methods such as experiments and field studies using the survey method, the most common methodological approaches in IS research (Palvia et al. 2004), are almost nonexistent to date (1 paper). In psychology, however, there has been a higher uptake of the experiment method (e.g., Stoffregen et al. 1999; Warren 1984) but a similar scarcity of survey research. A reason for this may be that the affordances concept naturally lends itself more to qualitative means of examination to avoid “impoverished descriptions” (Michaels and Carello 1981), and that survey methods might not be well suited to explore the mechanisms of affordance emergence and actualization. Fourth, the characteristics of the object’s user have not been addressed appropriately in prior IS research (Markus and Silver 2008). This has been an integral part of the affordances concept since its origination in psychology and focused on those (largely physical) attributes of the user that play an important role for a certain activity, such as leg length for stair climbing (Warren 1984) or body height for sitting on a chair (Stoffregen et al. 1999).

Theory Development

To address the shortcomings of prior research – principally, our lack of knowledge of the origin and actualization of affordances – and to advance the understanding of affordances in IS, we offer a general framework of affordances. The benefits of building such a framework to help shape a prior understanding of the variables and the theory building process are widely acknowledged (Eisenhardt 1989) and outweigh risks such as forcing theoretical constructs onto data obtained at a later stage (Ahrens and Dent 1998).

Figure 1 shows our view of the conceptual framework of affordance actualization from process models. Boxes show the constructs in our proposed model. Layered boxes represent multiple instances of a construct such as a range of existing affordances offered by an object to its user. The arrows indicate the temporal-causal logic relating these constructs to another – for example, effects are caused by and therefore subsequent to the actualization of a certain affordance.

The main proposition of the model is that effects from affordance actualization are determined primarily by the perception of affordances, but also influenced by the degree of effort involved in the actualization. Affordance perception is determined by the emergence of an affordance when a user interacts with an object. The available information about the emerged affordance additionally influences if and how a user perceives the affordance.

In describing the theory in what follows, we will first develop our arguments and then illustrate their relevance in the setting of the use of conceptual process models for systems analysis and design tasks.
**The Emergence of Affordances**

The affordances concept adopts teleology (the view that the behavior of individuals is goal-driven) as a philosophical underpinning. As affordances emerge in the interaction of an object and its user, research in this area must specify the user of the object (Turvey 1992). There is disagreement among researchers as to what the relevant user properties are (Chemero 2003); however, most recognize that the extent to which the user of an artifact has an individual capacity for activity, what we refer to as **expertise** in this paper, plays a vital role in affordance perception and actualization (Stoffregen 2000). The nature and influence of user expertise depend on the requirements of the affordances in a given situation. There is support in other areas of IS research for the importance of user expertise, as well. For instance, Goodhue (1995) found that individuals perform better in their tasks and are more likely to meet their job requirements when they are competent, experienced, and trained. The definition of affordances as “goal-oriented action possibilities” (Markus and Silver 2008) points to the importance of the goal that the user of an object pursues. This leads us to include a user's **goals** in a given task situation.

In our conceptualization of the object in use we follow Markus and Silver’s (2008) discussion of object properties. This includes material, arrangement and appearance, among others. The relevant properties from an affordance perspective are those that hold non-deterministic **causal potential** to lead to the occurrence of an outcome, by influencing how users interact with the object.

To illustrate this argument, consider a typical process modeling scenario: Anna, a process model user, has received training on process modeling and also gained experience in working with conceptual models. Now Anna is facing a work task: the specification of requirements for software development – a central model-related activity (Dawson and Swatman 1999). She is using the visual representation of the process in question for support. The process model depicts process details such as activities, events, roles, data inputs and outputs, and this information combined with her modeling expertise provides her with the possibility to identify relevant **procedural** requirements for the software to be developed.

Tom, though not as skilled as Anna, also has had some process modeling training and experience and is confronted with a similar task. He is, however, provided with a different type of conceptual model: a data model that specifies data entities and their associations – and thus has different properties (Chen 1976). Hence, despite his comparable skills, the possibility for specifying **procedural** requirements does not emerge for Tom – only a possibility to specify **structural** requirements for the software system.

**The Perception of Affordances**

The link, and distinction, between perception (being aware of the existence of an action possibility) and actualization (turning possibility into action) of affordances is still unclear in the IS literature. We differentiate **affordance perception** and **affordance actualization** as two distinct constructs in our model. Prior work showed that the perception of affordances is a key activity: “the question is not whether affordances exist, but whether information is available for perceiving them” (Gibson 1979). Similarly, Mcgrenere and Ho (2000) established the importance of information clarity that describes the usability of affordances. Extending this view, Gaver (1991) identified three categories (perceptible, hidden, false) of affordances based on existence and correctness of information. Shaw et al. (1982) argued that affordances can be misperceived and that users may not realize this until after an unsuccessful attempt of affordance actualization. Thus, our model suggests that affordance perception is influenced by **information about affordances**, that is, cues that signal to a user that an affordance exists.

One possible source of affordance-related information is the object itself, i.e., its **symbolic expressions**. Symbolic expressions are the messages that an artifact communicates to its users (Markus and Silver 2008). **External information** is another source of affordance information. We make this conceptual distinction as symbolic expressions originate from the object while external information does not require the object’s presence. Our approach here deviates from authors who subsumed both information sources under the symbolic expressions umbrella (e.g. Goh et al. 2011) as we feel this oversimplifies the expressive power of the affordances concept.

Importantly, perceived affordances are not the same as existing affordances. Perceived affordances can for example be a subset (i.e., not all existing affordances are perceived by the user) or a different set altogether (i.e., the user falsely perceives affordances which actually are not present). For a user,
perception is the means to action and entails an object’s properties, the user’s own characteristics, and the relation between the two as affordances (Stoffregen et al. 1999).

The actualization decision of a user may but does not necessarily correspond to the originally intended use of the object (Orlikowski 1992). For instance, we can characterize actualization by cognitive absorption and deep structure usage (Burton-Jones and Straub 2006). After actualizing it, the affordance leads to certain consequences. Analogous to the use of the object, this definition encompasses both effects that are intended by the user and/or those by the original creator of the artifact as well as unintended effects (Markus and Silver 2008).

Again, consider the process modeling context: Anna is still concerned with the software development task and the identification of relevant procedural requirements. The model she uses was designed for this purpose and as a result has clear labels and annotations that communicate its suitability for requirements specification. Anna perceives this affordance from the process model itself (i.e., its symbolic expression).

Imagine that Tom is now provided with the same model as Anna. Assume further that Tom is not as skilled as Anna in reading process models and thus he does not perceive that this model actually affords him to specify procedural requirements for his task. Instead, he is reminded of another task on his agenda – extraction of relevant data to be processed by the software system to be developed – and so he mistakenly believes that this model may be used as input for the generation of SQL queries. However, as Anna meets Tom, she informs him about the possibility to specify the requirements that his model offers (i.e., she provides external information). This information, in turn, now allows Tom to perceive the affordances of the model for procedural requirements specification.

The Role of Effort in Affordance Actualization

Several authors argue that the actualization of an affordance is influenced by the degree of effort the user of an object has to invest to act on it. McGrenere and Ho (2000) found that affordance actualization is not binary (i.e., possible or impossible) but instead a continuum with different degrees of difficulty. Similarly, Warren (1984) stated that affordances are positioned in a space framed by a critical point below which the actualization of an affordance is not possible anymore and an optimal point which marks the least amount of effort for actualizing an affordance. This latter point also represents the most efficient affordance fit between user and object. We thus posit that actualization of a perceived affordance is a function moderated by perceptions of the efforts that it takes to actualize the affordance. In simple terms, the question is “how hard would it be to execute the action that the object allows me to pursue?”

In the process modeling context, one established measure of effort is the cognitive load produced for the model reader by the task of interpreting a conceptual model (Burton-Jones and Meso 2008; Gemino and Wand 2003). Anna, for example, encounters no difficulties in actualizing the affordance of specifying the software requirements as her process model is well-designed to induce low levels of extraneous cognitive load (Chandler and Sweller 1991). Assume that Tom, on the other hand, uses a very complex model in addition to textual process descriptions and also technical requirements specification literature to actualize the same affordance (Cierniak et al. 2009). In comparison, this induces a higher cognitive load for Tom and he faces a more difficult actualization of the requirements specification affordance.

Summary of the Theory

We have presented the discrete concepts of emergence, perception and actualization of affordances as important elements to understanding the mechanisms by which affordances emerge and are enacted – or not. Furthermore, affordances emerge as a relation of the properties of an object in use and its user, and affordance perception is influenced by available information about affordance existence. Finally, we discussed how affordance actualization is influenced by the effort that a user expects to have to invest. Table 2 summarizes the key components of our theoretical framework, the chosen illustration of the concepts and the logic of the theory using the example of Tom and Anna’s use of process models for their requirements specification tasks.
Table 2: Framework Constructs and Definitions.

<table>
<thead>
<tr>
<th>Construct</th>
<th>Dimensions</th>
<th>Description</th>
<th>Relevant Literature</th>
<th>Illustration in the Process Modeling Context</th>
</tr>
</thead>
<tbody>
<tr>
<td>Object</td>
<td>• Properties with causal potential to incur effects</td>
<td>An object employed by an individual in a goal-directed activity.</td>
<td>Markus, Silver (2008)</td>
<td>Anna is provided with a process model that provides process details such as activities, events, roles, data inputs and outputs. Tom is provided with a data model that specifies data entities and associations. Both face a comparable procedural software requirement specification work task.</td>
</tr>
<tr>
<td>User</td>
<td>• Goal</td>
<td>An individual who employs an object to perform a goal-directed activity.</td>
<td>Markus, Silver (2008)</td>
<td></td>
</tr>
<tr>
<td>Information about Affordance</td>
<td>• Symbolic expressions</td>
<td>The communicative possibilities of an object for a user.</td>
<td>Markus, Silver (2008)</td>
<td>The model communicates its suitability for requirement specification through labeling and annotation. Anna informs Tom about the procedural requirement specification opportunity offered by his model.</td>
</tr>
<tr>
<td>Affordance Perception</td>
<td>• Degree of correct \ false perception</td>
<td>The perception of a possibility for goal-oriented action afforded by an object for a user.</td>
<td>Shaw et al. (1982)</td>
<td>Anna perceives the procedural requirement specification affordance using her model, while Tom falsely thinks he can produce SQL queries from his model.</td>
</tr>
<tr>
<td>Affordance Actualization</td>
<td>• Cognitive absorption</td>
<td>The actualization of a possibility for goal-oriented action afforded by an object for a user.</td>
<td>Markus, Silver (2008); Burton-Jones, Straub (2006)</td>
<td>Anna and Tom both start to specify the procedural requirements of the software using the process model.</td>
</tr>
<tr>
<td>Actualization Effort</td>
<td>• Cognitive load</td>
<td>The degree of difficulty related to actualizing an affordance.</td>
<td>McGrenere, Ho (2000)</td>
<td>Specifying the procedural software requirements using the model is easy for Anna, but difficult for Tom.</td>
</tr>
<tr>
<td>Effect</td>
<td>• Positive \ negative use effects</td>
<td>The outcomes attributed to the actualization of an affordance.</td>
<td>Seddon (1997)</td>
<td>The suggested specified procedural requirements for software development made by Anna and Tom based on the process model.</td>
</tr>
</tbody>
</table>

Examining the Conceptual Model through Empirical Research

Our developed framework of affordance emergence and actualization draws attention to three key attributes that impact choice of research design. First, the model distinguishes the emergence, perception and actualization of affordances as a process that occurs over time. A requirement to examine this aspect of the model is thus to employ a longitudinal research design. Second, the model suggests that material properties plus information about affordance existence will predict whether individuals are able to (a) perceive and subsequently (b) actualize affordances. To examine this logic, a research design must be chosen that allows manipulation and control. Third, the employed research method must be capable of examining, for instance, misperception or a lack of perception of affordances which is not possible when relying solely on perceptual data as reported by informants. This objectivity aspect is essential when studying affordances, as this concept requires a holistic view of the object-user relationship.

Prior studies using the affordances lens, if being empirical at all, have largely focused on qualitative research methods such as single case studies (see Table 1). This is a suitable method to closely examine the emergence, actualization and change of affordances over time. Other work outside of IS conducted experiments to assert control over a setting and find evidence for specific links, e.g. from an object’s properties to affordance actualization or the role of effort in affordance actualization (Warren 1984).

We argue that the model proposed here can best be examined through an iterative, full-cycle research approach on the basis of a mixed method design (Venkatesh et al. 2013) that combines quantitative data...
from experiments with qualitative case study insights. Specifically, we propose a four-step process: (1) observations of process model use and affordances in a realistic case setting as a starting point for our research to ensure relevance and natural proof, and informing the complexity of our constructs (such as affordance perception and actualization), (2) theorizing efforts around the constructs and their causes, (3) experimental examination of process modeling affordances to identify causal relationships and boundary conditions as well as ensure generalizability, and (4) additional observations in the field to increase our understanding and support further theorizing (Chatman and Flynn 2005). The benefits of such a design will include complementarity (i.e., gaining complementary views about how affordances from process modeling emerge, are perceived and actualized), completeness (i.e., making sure a complete picture of process modeling affordances is acquired), confirmation (i.e., evaluating the credibility of inferences gained from case study on the one hand and experiments on the other hand), and compensation (i.e., compensating for the limitations of the case study by using experiments). In our own ongoing work, we thus are designing two interlinked studies that we now describe briefly.

For the case study, semi-structured interviews with model users to capture perceptual data will be complemented with observations of process model use instances and document analysis (especially used process models) to collect objective data. The protocol to guide our interviews contains four main parts. The first part is about demographic information. Second, we ask questions relating to modeling experience and expertise and levels of exposure to and utilization of process models in the workplace. Third, we inquire about actions enabled by a certain process model as utilized in a work task, including detailed questions about the context and situation in which a process model supported a certain kind of behavior and what exactly the process model allowed the respondent to do. Fourth, we ask about the key details, such as properties of the process model mentioned before, to establish a link from model properties to affordances and their effects. The retrospective accounts given by interviewees will be challenged using other data collection means. For instance, statements by respondents relating to model properties will be compared to our own insights from analyzing the corresponding process model, and reported action-possibilities will be compared to observed actions and behaviors as enabled by a process model.

For the experiments we envisage to test one key link of the affordances concept: the perception and actualization of affordances. This focus is justified by the prominence of this logical chain to our extended model of the affordance actualization process. The experiments will be conducted as a between-subject design, with two groups. First, after introducing the study and its objectives, the participants will be asked to fill out a pre-test to capture moderating and control variables (e.g., demographic information, domain knowledge). Second, after having randomly assigned the participants to the experimental and control group, all participants will receive a real-life process model from the case study. By aligning the treatment material with the case study context, we can increase the ecological validity of our study. Participants in the experimental group will additionally receive information about the actors in the process as a treatment, which is argued to lead to the emergence of task allocation-related affordances. In a controlled setting, this allows the isolated examination of the treatment influence (information about task allocation affordance) on the dependent variables (affordance perception and actualization). Third, after familiarization with the provided materials, a questionnaire for affordance perception will be administered. Fourth, to assess the participant’s level of affordance actualization, they will be asked to conduct creative problem-solving exercises that detail the allocation of tasks to organizational resources (i.e., process participants). The materials are again designed against the background of the case study. Finally, the performance in the exercises will be assessed along the quality (affordance relatedness, appropriateness and specificity) of the proposed solution.

Expected Contributions

We contribute to research by proposing a novel way to theorize about affordances. Although empirical studies of the affordances concept in the IS discipline are growing, it is still under-researched, especially compared to its popularity in other fields (e.g., psychology). Our research is amongst the first to distinguish between affordance perception and actualization in IS as well as explain the role of object and user characteristics in the emergence of affordances. This is exemplified using process models as information objects (as opposed to processes) and the affordances for cognitive use tasks (as opposed to motor tasks).
For instance, our framework can offer a deeper understanding of how and why affordances for Green IS emerge, what information exactly determines their perception and what ultimately leads to their actualization – or potentially, lack thereof (Seidel et al. 2013).

Furthermore, we apply the affordances concept to the process modeling context. To the best of our knowledge, this study is the first attempt to theorize about and examine process modeling affordances. Our framework can help in the identification of relevant process model properties that possess causal potential for affordances to emerge for users of that model. We can further elucidate the role of the model user’s characteristics – such as modeling ability – in this affordance emergence process and thereby point to the importance of model user education and training. By examining the perception and actualization of process model-related affordances, we can further support organizations which strive to use process models to their full potential, i.e., to actualize perceptible affordances, avoid false affordances, and uncover hidden affordances.

As methodological contribution, we will be the first to conduct a full cycle, mixed method study in contrast to prior empirical affordances research that has largely focused on the examination of a single case.

**Expected Limitations**

With our research efforts still being in-progress, we caution the reader about the limitations that apply to the theory building process. Our proposed study also has several limitations. First, while we attempt to show that the affordances concept offers a suitable lens to examine how effects from process model use are created, at the same time it restricts the research model development. Other potentially relevant variables outside of the affordances theory may not be included in the model. Certainly, other theoretical perspectives could offer complementing, expanding, or (dis-)confirming perspectives on the topic we have pursued. Second, even though we deem our choice of applying the affordances concept to the process modeling context suitable, it may inhibit the generalizability of our arguments and findings to dissimilar classes of IT artifacts (e.g., ERP systems). Third, we aim to employ the case and experiment methods as main approaches to this study, which each entail method limitations. Case studies do not facilitate the manipulation of independent variables or the randomization of subjects to treatments (Kerlinger 1986). Observations and interviews can be artificial and intrusive situations in which the we may face a lack of trust and time (Myers and Newman 2007). Experiments are also designed as an artificial situation. This allows us to control for influencing factors besides the treatment. Thus, we gain high internal validity by reducing external validity. Despite the limitations, the combination of qualitative and quantitative research methods as intended in this study is regarded as appropriate and often very beneficial in IS research (Venkatesh et al. 2013).

**Conclusions**

This paper presents our efforts to date in developing a framework of affordance emergence, perception and actualization. We explain causality specific to the process modeling context, but at the same time we feel our proposed framework is sufficiently generalizable beyond this application area to be of value for other areas of IS research and potentially also for other fields that involve the use of objects. We believe that our work can contribute to advancing researchers’ understanding of affordances in IS research.

**References**


Montreal, pp. 179-186.