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End User Participation in Information Systems Development: Why does Collaboration Remain Elusive?

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ABSTRACT

This research in progress proposes to look at end user participation (EUP) in the system development life cycle (SDLC) through the dual lenses of Representation Theory and shared affordances. It is known that EUP results in increased end user satisfaction of the information system (IS), yet using EUP during the SDLC remains uncommon. Should EUP occur throughout the SDLC an IS may be developed that converges on a faithful representation of the shared affordances required for all stakeholders, specifically the end user. Effective use is understudied, and this research further delineates between use and effective use. With a better understanding of the impediments to EUP during the SDLC it may be possible to develop antidotes to increase participation and hence success rate.

KEYWORDS

System implementation, affordances, Representation Theory, effective use, end user participation

INTRODUCTION

It has become common knowledge in the field of Information Systems (IS) that end user participation (EUP) in the development of an IS significantly increases post implementation involvement (He & King, 2008; McGill & Klobas, 2008) yet EUP remains elusive. This disconnect may be one cause of failed product implementation. With the ubiquity of IS's throughout the workplace, it is essential to understand the reasons effective collaboration with end users does not occur at higher rates. Additionally, with the move in the United States toward Electronic Medical Records this research may assist in increasing the implementation success rates of those systems.

The purpose of this research is to help gain a deeper understanding of the methods that impede and enhance EUP throughout the entire system development life cycle (SDLC); in the traditional watershed model end users would be included from the planning phase through to completion in the maintenance phase. As we move further into the information age, for businesses to create or maintain a competitive advantage, the ability to successfully implement increasingly complex IS's may provide the competitive edge required to maintain economic viability.

The remainder of this paper is as follows: first we will provide our motivation for the study with the general focus on what we know so far about what impedes EUP. We will then provide our literature review and theoretical development followed by our research model and proposed methodology. We will conclude with a few briefs remarks regarding the implications of this research for both the practitioner and academic communities.

MOTIVATION

It is now known that collaboration among different user types is essential for IS success (He & King, 2008; McGill & Klobas, 2008), and there is a substantial stream of literature in this regard. Even with this knowledge it is not common in the IS field to include EUP while developing an IS. In fact, Abelein, Sharp, and Paech (2013) state that "it's not a common practice in today's IT projects to involve users to a large extent – in particular, large scale projects that follow traditional software development methods involve users only to a limited degree" (Abelein, Sharp, & Paech, 2013). Stewart (2001), in the context of knowledge management stated that "companies waste billions on knowledge management because they fail to figure out what knowledge they need, or how to manage it" (Stewart, 2001).

Designers often believe they know what is best and fail to utilize the knowledge and expertise of the end users in the development process (Abelein et al., 2013; Ackoff, 1967; Ardito, Buono, Costabile, Lanzilotti, & Piccinno, 2012; Arduin, Grundstein, Negre, & Rosenthal-Sabroux, 2013; Dean, Lee, Pendergast, Hickey, & Nunamaker, 1997; Ferreira, Sharp, & Robinson, 2012; Hope & Amdahl, 2011; Stewart, 2001). One of the most recent iterations of collaborative development is the Agile model. While this model focuses mainly on code creation (Ferreira et al., 2012) it does attempt to bring in "user experience" though not necessarily user input into the process. The major goal of Agile development is to stay a step or two ahead of the end users and hence the system tends to remain in a perpetual "beta" state (Ardito et al., 2012; Ferreira et al.,

2012). In this development paradigm the end user tends to be involved only at "use" time (Ardito et al., 2012). Hence even newer methodologies fail to incorporate EUP throughout the entire development process. While there are clearly substantial methodological differences between the Watershed and Agile models, space limitations prevent a fuller discussion on this topic. The focus of this research is the Watershed model, but we felt the paper would be incomplete without at least mention of Agile methodology. Additionally, it should be noted the focus of this research is on large complex systems utilizing the Watershed model as the development methodology.

Hope and Amdahl (2011) state that one reason for communication failures may be the difficulty in design that comes from interacting with users who may not know exactly what they want (Hope & Amdahl, 2011). In other words, to interact with the end users may make the design job more difficult. Pankowska (2012) claims that one reason may be that end users and designers do not "speak the same language" (Pankowska, 2012) and Arduin (2013) states that the "socio-technical and IT worlds usually do not understand each other" (Arduin et al., 2013).

In conclusion of this brief section, the major underlying motivation is to gain a deeper understanding of what the impediments are to including the end user throughout the development process. We seek to determine what types of organizational, personal, communication, or other barriers to (or enhancers of) participation may be contributing to implementation success and failures. By understanding the impediments, and by understanding ways to overcome those impediments, it may be possible to develop antidotes to increase IS implementation success rates.

LITERATURE REVIEW AND THEORETICAL DEVELOPMENT

Although it is well known that users are familiar with their work and how the IS should support them, actual and meaningful collaboration remains elusive in the development process (Abelein et al., 2013; Ardito et al., 2012; Barki & Hartwick, 1994; Dean et al., 1997; Hope & Amdahl, 2011; McGill & Klobas, 2008). Users who feel involved in the development process are more likely to take ownership of the IS and be more satisfied with the system leading to higher system usage (Abelein et al., 2013; Barki & Jon, 1989; Dean et al., 1997; Hope & Amdahl, 2011; Pankowska, 2012). It is important to delineate between user involvement and user participation as per the argument of Barki and Hartwick (1989) that these are two distinct constructs (Barki & Jon, 1989). User involvement is defined as "a subjective psychological state reflecting the importance and personal relevance that a user attaches to a given system" (Barki & Jon, 1989). This paper will focus on EUP, which is defined as "assignments, activities, and behaviors that users or their representatives perform during the systems development process" (Barki & Jon, 1989). The meta-analysis of He and King (2008) found this distinction to be generally accepted within the IS community (He & King, 2008). In other words user involvement is more likely to have a salient impact post-implementation while user participation is specified to occur during the development process.

It is also important to distinguish between users and end users. As defined by Ardito (2012) users are all people who interact with the software system (Ardito et al., 2012). This would include designers, software engineers, end users, network, and system administrators, and any others who interact with the system in some way; in other words all stakeholders of the IS. End users are defined as "people who are not experts in computer science, nor willing to be, but who use the computer system for their daily activities" (Ardito et al., 2012). In other words, these are the individuals utilizing the system in the performance of their daily duties. Their participation in the development process would require no special technical skills, but rather an in depth knowledge of their daily responsibilities and how an IS could help them better carry out these responsibilities. As previously mentioned, communication barriers may be an impediment, hence a person in a "boundary spanning" role (a person with the ability to translate technical language into laymen's terms and vice versa) would be vital for EUP. This research is focused on end users who are not computer experts, so a system being developed for "computer experts" is beyond the boundary conditions of this research. As Barki and Hartwick (1994) state that end users who participate in the development process may develop a sense of ownership and better understanding of the system (Barki & Hartwick, 1994) this research focuses on EUP, or lack thereof, throughout the SDLC. McGill and Klobas (2008) found that EUP throughout the development process significantly increased user involvement post implementation (McGill & Klobas, 2008).

Not only are there differences between user involvement/user participation, user/end user, but the literature also delineates between use and effective use. Burton-Jones and Grange (2013) recently performed a literature review which concluded that effective use has been "extremely under researched" as they were able to identify only seven studies that explicitly dealt with effective use in the IS context (Burton-Jones & Grange, 2013). As Seddon (1997) states, use of a system does not mean it is used effectively. A heavily used system can be a failure if no net benefits are derived from its use (Seddon, 1997). Based on this, use is defined as the extent to which an IS is being utilized (Seddon, 1997). Effective use is defined as per Burton-Jones and Grange (2013) as "using the system in a way which helps attain the goals for using the system" (Burton-Jones & Grange, 2013). They base the theoretical development of their model regarding effective use on Representation Theory, and this paper borrows heavily from their view of Representation Theory in the context of IS. The reasoning behind utilization of this theory

is that it can be used to look at system development from the view of multiple stakeholders (Burton-Jones & Grange, 2013). For example, in a conceptual research model the construct could be "type of user" while in the actual research model, by use of Representation Theory, we can study multiple user types. The "type of user" in this research model is the "end user."

Representation Theory

Burton-Jones and Grange (2013) go into great depth to apply Representation Theory to IS. As this research is narrower in scope, the discussion will focus only on how it can be applied to IS development via collaboration between different stakeholders, from the end user perspective. Individuals act to develop an IS that is faithful to the needs of achieving their goals. However, the goals of different user types may be vastly different. For example, a designer may have the goal of designing a very basic IS that minimally meets the needs which the designer feels is representative of the end user requirements. The end user may have a completely different set of requirements that they feel will be faithfully represent their needs. In this situation, the faithful representation of the designer is at odds with that of the end users. However, if collaboration, via EUP were to occur throughout the SDLC, stakeholders may be more likely to converge on a faithful representation of the IS to them. Using the deep and surface structure concepts of representation theory this research will examine EUP throughout the SDLC and its effect on end user satisfaction and effective use through collaboration and convergence. In other words, how can both the domain and interactive features of an IS better represent the requirements of different types of users, specifically, the end user?

This convergence of ideas to a faithful representation could also be considered a convergence of ideas for shared affordances of the IS among stakeholders. Leonardi (2013) states that "users must converge on a shared appropriation of the technologies features such that the affordances the technology provides are jointly realized (Leonardi, 2013). He also states that "convergence toward a shared structure of feature use allows group members to enact a shared affordance." It may be possible to achieve this convergence through collaboration, and design an IS that is a faithful representation for all stakeholders.

According to Weber (1997) the basic premise of the theory is that IS's exist because it is "the human condition to seek better ways to understand and to represent the world" (Weber, 1997). This is compelling argument for use of Representation Theory for this research, as different types of users will see the IS from different viewpoints (i.e., worlds) and hence understand it from different perspectives. In the context of IS, Representation Theory consists of three structures; deep, surface, and physical (Burton-Jones & Grange, 2013; Weber, 1997). Deep structure is defined as the "specification of a domain offered by an IS" (Burton-Jones & Grange, 2013). For example, the domain of an IS could be the specification that a customer data base contains customers and specific information about those customers. Surface structure is defined as "the facilities that allow users to interact with the representation in the domain" (Burton-Jones & Grange, 2013). For example the user interfaces, such as menus, reports and screen layouts. Physical structure is defined as "the machinery that supports the other structures" (Burton-Jones & Grange, 2013). For example, keyboards, monitors, storage devices, and networks, among others. According to Weber (1997), what makes Representation Theory unique is that it focuses on "faithful representations" (Weber, 1997). A major assumption of the theory is that people interact with the representations in an IS and that the three structures are merely a means to an end (Burton-Jones & Grange, 2013). For example, people interact with a customer data base with the "faithful" assumption that it contains accurate information regarding customers.

Faithful representations are part of the deep structure and the information that populates it (Burton-Jones & Grange, 2013). For example, if a customer data base did not contain a field deemed important to an individual, for them the IS would not be a faithful representation. In contrast, if that field was not deemed important by a different individual, the IS would then provide them a faithful representation. Again, this provides for a compelling argument for use of Representation Theory for this research, as different types of users may have different views on what is a faithful representation. Collaboration between different user types may contribute to the design of a system with enhanced faithful representation for all users. Additionally, Representation Theory makes the assumption that people interact with IS's to obtain representations and what they do with the representations is likely to be more successful if the representation is faithful (Burton-Jones & Grange, 2013). For example if a customer data base contains accurate information regarding the customers, a decision maker will be able to make better decisions regarding how to interact with that customer (i.e. customer has indicated they want to be contacted via telephone and the customer data base accurately reflects this).

RESEARCH MODEL

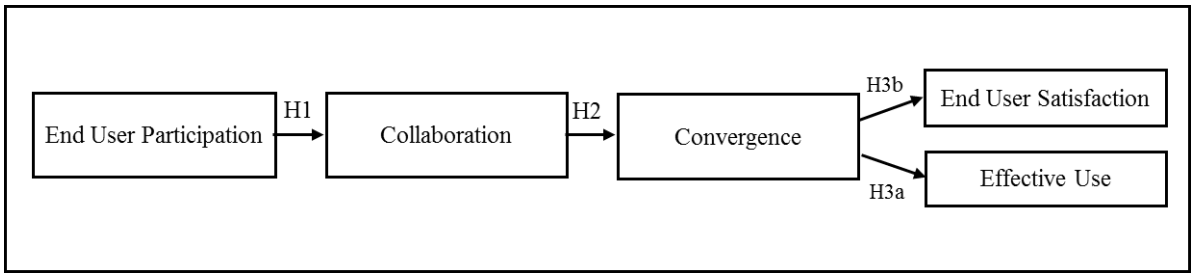

Figure 1: Model of End User Participation for Effective Use and Implementation Success of an IS System

In brief, increased collaboration among stakeholders of the IS (specifically EUP) should result in both increased end user satisfaction (the most common measure of implementation success) and increased effective use through the mechanism of convergence of the shared affordances the IS should faithfully represent.

Many studies have shown that increased collaboration, via user participation, increases the implementation success rate (Abelein et al., 2013; Barki & Hartwick, 1994; Burton-Jones & Grange, 2013; Hope & Amdahl, 2011; Pankowska, 2012), with the most common measure of implementation success being that of user satisfaction (Abelein et al., 2013). In the context of this research, collaboration is defined as the degree of communication between end users and other stakeholders of an IS. Yet the traditional SDLC, still widely in use, and taught in introductory MIS courses (Bidgoli, 2014) tend to elicit information from the end user only at the very beginning and end of the life cycle (Dean et al., 1997). This lack of collaboration appears to mainly be the result of different types of users "not speaking the same language" (Arduin et al., 2013; Dean et al., 1997; Pankowska, 2012). Additionally, Representation Theory tells us that each user is going to have their own individual perception of what faithfully represents them (Burton-Jones & Grange, 2013). This postulate of representation theory, in context of this research leads to the logic that increased EUP will result in increased collaboration between the end user and other users of the IS. Hence:

> Hypothesis 1: Increased end user participation will result in increased collaboration between the end users and other stakeholders of the information system.

Through the mechanism of collaboration there should be a convergence of ideas. The definition of convergence is adapted from Lind and Zmud to fit the context of this research and is defined as "the degree of mutual understanding between the technology providers, other stakeholders, and the end users regarding the importance of the technology to support business activities and the shared affordances that should be provided"(Lind & Zmud, 1991). From the perspective of Representation Theory this would mean that initial different representations of the IS would converge into a single representation that has an increased level of faithful representation for all users. Furthermore, Lind and Zmud (1991) propose two mechanisms for increased convergence with the first being increased communication and the second being richer communication channels. Their research also showed that increased communication richness and frequency was a predictor of convergence (Lind & Zmud, 1991). As collaboration involves the degree of communication among stakeholders, this increase in communication, via collaboration, should result in a mutual understanding among stakeholders of the shared affordances and faithful representations required of the IS. Hence,

> Hypothesis 2: Increased collaboration among different stakeholders will result in an increased convergence of an information system that is faithfully representative of all user types.

End user participation has been clearly established and widely accepted as a distinct construct from end user involvement (Abelein et al., 2013; Barki & Jon, 1989; Barki & Hartwick, 1994). As per Barki and Hartwick (1989) user involvement is defined as a "subjective psychological state reflecting the importance and personal relevance that a user attaches to a particular system" (Barki & Jon, 1989). This definition does not imply any active participation in system development. The construct of user participation is defined as "assignments, activities, and behaviors that users or their representatives perform during the systems development process" (Barki & Jon, 1989). This construct is very explicit regarding the inclusion of users during all phases of the SDLC.

It has been shown that EUP has many positive outcomes such as "feelings of ownership" (Barki & Hartwick, 1994; Hope & Amdahl, 2011), higher system satisfaction (Abelein et al., 2013), feelings that the system is more relevant and useful (Barki

& Hartwick, 1994), better system development (Hope & Amdahl, 2011), more positive attitudes toward the system (Jackson, Chow, & Leitch, 1997), and increased system usage (Baroudi, Olson, & Ives, 1986), just to name a few. From the perspective of representation theory it could be posited that EUP throughout the SDLC has so many positive associations because the end users feel that their view of the domain (the IS) is being faithfully represented via their input into the process.

As discussed previously, Burton-Jones and Grange (2013) make a distinction between use and effective use. As per Seddon (1997) use is simply "the extent to which an IS is being utilized" (Seddon, 1997) while effective use is "using the system in a way which helps attain the goals for using the system" (Burton-Jones & Grange, 2013). Drawing on representation theory and that it is a representation of how the domain (the IS) is perceived by the user (Wand & Wang, 1996) the inherent logic is that an end user who feels they participated throughout the SDLC through collaboration and convergence may view the system as faithfully representative of their needs and be able to interact with the system at an effective level (goal oriented) and have increased satisfaction with the IS. As previously stated end user satisfaction is the most common measure of implementation success (Abelein et al., 2013). Hence:

> Hypothesis 3A: End user participation, throughout the information systems development life cycle will result in increased effective use of that system.
>
> Hypothesis 3B: End user participation, throughout the information systems development life cycle will result in increased end user satisfaction.

METHODOLOGY

This research will be mixed method conducted via both a survey and qualitative interviews of end users at two as yet determined locations utilizing the Watershed model to develop a complex IS. One location will have utilized EUP throughout the entire SDLC and the other location will have utilized EUP either minimally or not at all. Interview questions will be designed to elicit responses regarding how the end users felt they participated, if they felt their input was valued, and to gain a more in depth view of how the end user felt the collaboration and convergence processes worked. These interviews may also help to shed light one of the major goals of this research; to determine what types of organizational, personal, communication, or other barriers (or enhancers of) participation may be contributing to implementation success and failures.

Items for EUP will be adapted from the validated scales of McKeen, Guimaraes and Wetherbe (1994) and Olsen and Ives (1980) (McKeen, Guimaraes, & Wetherbe, 1994; Olson & Ives, 1980). An extensive literature review found no measures for collaboration or communication that fit the context of this study, nor were measures found for convergence in IS development. Measures for end user satisfaction will be modified from Wixom and Todd (2005) to fit the context of this study (Wixom & Todd, 2005). As was noted by Burton-Jones and Grange (2013) effective use is extremely understudied in the IS literature, as such, no measures were found to fit the context of this study. For the constructs indicated for which measures do not exist, the methodology of Moore and Benbasat (1991) will be followed in development of those measures (Moore & Benbasat, 1991).

CONCLUSIONS AND IMPLICATIONS

As IS's are now a common part of everyday life, both personally and professionally, it is imperative that we gain a fuller understanding of why implementation success remains an unguaranteed variable at the end of the expensive development process. This study could help the IS research community gain a fuller, more comprehensive understanding of why end users are not participating throughout the entire SDLC, even though it has been established that their participation increases implementation success. This keener understanding could lead to new systems development techniques that include EUP throughout the entire process. This knowledge could increase system implementation success rates resulting in savings of potentially millions of dollars that are currently being "wasted" on faulty systems.

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