Social Technology Affordances for Business Process Improvement

Paul Mathiesen(✉), Jason Watson(✉), and Wasana Bandara(✉)

Information Systems School, Queensland University of Technology, Brisbane, QLD 4000, Australia
p.mathiesen@connect.qut.edu.au,
{ja.watson,w.bandara}@qut.edu.au

Abstract. Organisations across diverse industries have started to embed Enterprise Social Technology (EST) to create collaborative, human-centric environments in their day-to-day operations. With this growing trend, the use of EST within process improvement initiatives is gaining popularity. While the potential that EST brings (in particular with better connecting and influencing people's participation) to process improvements is widely acknowledged, research providing insights into how this actually takes place and specifically contributes towards process improvement efforts is very limited. This study adopts a 'technology affordance' perspective to identify and conceptualise affordances of EST within the context of process improvement activities. Based on forming theory on this topic, a process improvement effort that applied EST was investigated through a series of interviews. The interviews were rigorously designed, and carefully executed and analyzed via a tool-supported data coding and analysis approach. The study outcomes resulted with a refined and partially validated 'EST affordances for process improvements' model with 9 EST affordances and 3 'contingency variables'.

Keywords: Business process improvement · Enterprise Social Technology · Qualitative research · Affordance · NVivo

1 Introduction and Background

Enterprise Social Technology (EST) can be positioned as "*software that supports the interaction of human beings and production of artefacts by combining the input from independent contributors*" (Schmidt and Nurcan 2009, p. 633). EST can be applied throughout a process improvement lifecycle (Becker et al. 2001; Mathiesen et al. 2011), mainly to support process stakeholder collaboration (Magdaleno et al. 2008). Increasingly, organizational approaches to process improvement is being enhanced by a range of social technology (Mathiesen et al. 2011). These approaches to crowd-sourcing and solving process improvement opportunities have been discussed by numerous researchers (Dollmann et al. 2009; Rossi and Vitali 2009; Silva et al. 2010)

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in support of collaborative process design (Erol et al. 2010) to support a more human – centric approach (Mathiesen et al. 2011).

It is recognised that social technology has the potential to "*extend the reach and impact of process improvement efforts*" (Gottanka and Meyer 2012, p. 94). This opportunity is best realized by conceptualizing how social technology and people can be "*woven together*" (Zammuto et al. 2007, p. 753). On this basis, a 'technology affordance' perspective has been applied in this study to uncover the affordances of Enterprise Social Technology within the context of process improvement activities. This research adopts the perspective of Volkoff and Strong (2013, p. 823) who describe affordances as "*the potential for behaviours associated with achieving an immediate concrete outcome and arising from the relation between an object (e.g., an IT artefact) and a goal-oriented actor or actors.*" As stated by Riemer (2010), there is some appreciation for the benefits of digital collaboration tools, but little understanding of this potential within an organization. Furthermore, academia lacks the theory, models and frameworks which describe this relationship (Niehaves and Plattfaut 2011; Walsh and Deery 2006). This study contributes towards addressing this knowledge gap and is driven by the research question: ***"what is the role of Enterprise Social Technology affordances in a business process improvement context?"***

The paper first introduces relevant literature (which informs the motivation for this research, and provides the theoretical foundations), next presents the research method followed by the findings, and concludes with a presentation of an empirically supported model of EST affordances in the context of business process improvement.

2 Literature Review and Theoretical Foundations

2.1 Social Technology for Process Improvements

Process management literature recognizes the importance of interactions between the various stakeholders involved in a process both within and outside of the organisation, and this remains a key challenge (Abbate and Coppolino 2010; Balzert et al. 2012; Martinho and Rito-Silva 2011; Niehaves and Henser 2011). There are numerous studies discussing the benefits of social technology to Business Process Management e.g. (Brambilla et al. 2011; Dengler et al. 2011; Erol et al. 2010). Early research was primarily focused on several distinct topics such as user collaboration (Schmidt and Nurcan 2009); model-reality divide (Schmidt and Nurcan 2009); trust (Koschmider et al. 2009); and bottom-up modelling (Neumann and Erol 2009; Schmidt and Nurcan 2009; Silva et al. 2010). Literature from the broader domain of Information Systems (e.g. Akkermans and van Helden 2002; Fiedler et al. 1995; Gasson 2006; Newman and Zhao 2008; Niehaves and Plattfaut 2011; Tarafdar and Gordon 2007) present how social technology can be used as an enabler for organizational transformations, especially addressing the opportunities that social technologies could bring to process improvement efforts (Mathiesen et al. 2013).

Social technology can support process improvement initiatives with its collaboration and communication benefits (Gottanka and Meyer 2012), and offer improved and adaptable business process design (Erol et al. 2010). A typical process improvement

lifecycle consists of process identification, discovery, analysis, re-design, implementation and continuous evaluation and control (Dumas et al. 2013). Social technology can be of use for process identification - to collect and collate insights on areas of issues and opportunities; in the discovery and analysis phases - to obtain input about the current as-is processes from multiple stakeholders; in the redesign phase - to obtain innovative ideas from multiple stakeholders; in the implementation phase - to communicate process changes, and for continuous evaluation and control - to receive input on the process's ongoing performance and ideas for continuous improvement.

2.2 The Affordance Concept

Gibson (1977) was the first scholar to present the concept of an 'affordance', and positioned affordances as relating to "*perceptual cues of an environment or object that indicate possibilities for action*" (Lübbe 2011, p. 2). This initial definition was adapted by McLoughlin and Lee (2007) in a social technology context who posit affordances as a 'can do' statement that does not pertain to specific functionality or platform. In recent years there has been robust discussion on using the affordance theory to develop theories pertaining to technology related organizational change (Volkoff and Strong 2013). Given that most technology implementations results in process changes and many process improvements deploy technology/automation for process enhancements and efficiency, the body of literature on technology affordances is also arguably relevant for the context of process improvement studies like this. Researchers purport that taking an affordance perspective enables one to build better theories on the effects of introducing new systems (and processes) into organizations (following Volkoff and Strong 2013).

2.3 The Selected Theoretical Base

A thorough literature review was conducted in search of theories or frameworks that described the role of EST for process improvement. There have been very limited attempts to conceptualize social technology for BPI. Many attempts investigate specific social technologies in the wider context of business process management and are not reusable or independent from those technologies. Recently a reusable meta-model for executing processes in a collaborative way was proposed by Ariouat et al. (2017) but this is not specific to BPI and focused on assisting rule-based-reasoning (computation). This study selects an EST affordance perspective that has potential to assist strategic alignment of BPI activities with organisational goals.

This review resulted in the adoption of the (literature derived) a-priori model of Mathiesen et al. (2013) as our a priori theoretical base. This is a thorough synthesis of reported EST affordances across the Information Systems domain and already positioned within a business process improvement context, and the most relevant work on this topic to date. They present the seven affordances of; (i) Participation, (ii) Collective Effort (iii) Transparency, (iv) Independence, (v) Persistence, (vi) Emergence, and (vii) Connectivity, and describe these with evidence from prior literature, but do not provide precise definitions nor progress any further in the conceptualization of these. Revisiting the cited literature by Mathiesen et al. (2013) and complimenting this with

new literature found; this study formed our own initial definitions (see in Table 1) for each affordance in order to derive a stronger a priori base for the planned empirical work (see Sects. 3 and 4).

Table 1. A priori EST affordances for process improvements (adopted from Mathiesen et al. 2013)

Affordances	Definition derived and used in this study
Participation	Participation increases the understanding and adoption of a process by the wider stakeholder community (Brambilla et al. 2012b)
Collective effort	"*Collaboration activities in a shared context*" (Abbate and Coppolino 2010, p. 5). This concept of "*collective creativity*" as put forward by Helms et al. (2012, p. 2), refers to the crowd-sourcing of solutions to specific problems or issues and capturing the collective intelligence (Lee and McLoughlin 2008) of the organisation (Erol et al. 2010)
Transparency	Brambilla et al. (2012a, p. 223) state the goal of transparency is to make the "*decision procedures internal to the process more visible to the affected stakeholders*"
Independence	The notion of egalitarian contributions so that participants can contribute without the coordination of other participants and regardless of physical location (Bradley 2009) or organisational boundaries (Lee and McLoughlin 2008)
Persistence	The capacity for social technology to retain, share and augment contextualised information is an affordance that BPI will benefit from as all historical process model changes are retained (Erol et al. 2010; Gottanka and Meyer 2012)
Emergence	Previously unidentified expertise, informal organisational structures or work processes (Bradley 2009)
Connectivity	This notion of connectivity may also "*supplement existing relationships, and help build a greater sense of community*" (Treem and Leonardi 2012, p. 31)

3 Method

A single process improvement case context, the 'Debtor-Finance customer on-boarding' initiative at the Bank of Queensland (BOQ), an Australian Financial Institution, was investigated to achieve the goals of the study. An Enterprise Social Technology; Microsoft Yammer[1], was used by geographically distributed business process professionals and key stakeholders to communicate and collaborate on this process improvement initiative. Overall 35 BOQ staff were involved, out of which 5 were selected for semi-structured interviews (namely; the Senior Manager - Business Excellence (P1), Business Excellence Analyst (P2), Client Manager (P3), Senior Client Manager (P4), and Senior Risk Manager (P5)). These 5 interview participants were chosen due to accessibility, availability and interest in the study. The team was

[1] See www.yammer.com for further details.

dispersed nationally and most unable to meet face to face. The semi-structured interviews were conducted in person, audio recorded (for transcription), supplemented by Researcher notes (to capture insights) and were on average 45 min in length. Only staff who used Yammer on a regular basis were included in this study.

The interview questions were partly based on the a-priori model adopted from Mathiesen et al. (2013) but also prompted participants to openly discuss their experiences and perspectives of using EST during the process improvement initiative. Process documentation and actual participant conversations maintained in Yammer (the Enterprise Social Technology) were used as other "*sources of evidence*" for triangulation purposes. Additional observations were recorded in field notes.

This study applied a hybrid approach to thematic analysis (mixing both deductive and inductive coding), similar to Fereday and Muir-Cochrane (2008). This approach allowed the validation of the a-priori model and refinement and extension through inductive reasoning. A guiding protocol [including a coding rule book following Saldaña (2012)] was derived, tested and used; and NVivo was applied throughout the analysis as a support tool to maintain rigor and transparency.

4 Findings

All 7 of the priori model constructs (See Table 1) were instantiated by the coding process through the identification of supportive themes. Four new constructs emerged inductively from the data. Initial themes were captured, first as 'free nodes' using the in-vivo[2] coding technique. These were then grouped to form coding families and then into higher level nodes forming the new constructs.

Coder notes in the form of annotations and memos were used at all times to assist with maintaining the trail-of-evidence. Inter-coder-comparison-queries were run and corroboration sessions [where approaches such as "*think out loud coding demonstrations*" (Saldaña 2012)] were undertaken to understand potential differences in interpretation and to sharpen and refine the constructs. Overlaps between the data constructs were analyzed and removed both through manual observations and through the support of a series of NVivo matrix intersection[3] 'AND' searches and several detailed corroboration sessions between the two coders. Removal or merger of constructs was achieved by following agreed protocols between the two coders. This resulted in two previously identified constructs, Participation and Independence (from the original a-priori model), being removed from the final list of constructs. This action was taken as the 'in-vivo' driven data codes were reallocated across other constructs, which demonstrated a better definitional alignment. A final inter-coder check of the coded data resulted in strong outcomes, with kappa scores between 0.75 and 0.99[4]. By the

[2] In-vivo coding: the coding technique of "*assigning a label to a section of data, such as an interview transcript, using a word or short phrase taken from that section of the data*" (King 2008, p. 3).

[3] A two dimensional Boolean search.

[4] It is generally considered (Fleiss et al. 1981; Seigel et al. 1992) that a Kappa score between 0.4 and 0.6 is accepted as 'fair', a score in the range of 0.6 and 0.8 is deemed 'good' and above 0.8 as excellent.

completion of the analysis, the 5 a-priori constructs were confirmed, 4 new affordances discovered and 3 contingency variables (variables that might have an influence on how the EST affordances behaved) discovered. These are presented with summary descriptions and their sub constructs in Table 2.

Table 2. The final model constructs and sub-constructs

Model constructs	Sub-constructs (total # of interviews, total # of citations)
Confirmed EST affordances	
Collective effort *Enables* ***collaboration*** *and* ***knowledge exchange*** *(group think)*	Knowledge sharing (2, 2)
	Request for input (2, 2)
	Breaking down (communication) silos (1, 1)
Transparency *Enables the ability to* ***see more about*** *the process*	Understand the current process (1, 1)
	Gives deeper insight of the stakeholder role in the process (1, 1)
	Understand the potential future state (1, 3)
Persistence *Enables the potential to* ***retain and reuse*** *the digital artefact*	Forms an evidence base (1, 1)
	Supports recollection (2, 3)
	Traceability of discussions (1, 1)
Emergence *Enables* ***new*** *ideas to surface*	Unique new ideas (3, 3)
	Feel more open with sharing ideas (1, 1)
	Volume of ideas (2, 3)
	Mature an idea (3, 3)
Connectivity *Enables better use of* ***current*** *relationships*	Build new relationships (3, 3)
	Better use of current relationships (2, 2)
Discovered EST affordances	
Agility *Enables the ability to* ***contribute beyond traditional means*** *(regardless of time zones, cycle time, physical locations etc.)*	Less dependency on face-2-face workshops (3, 4)
	Reduced cycle time by not having to wait (3, 4)
	Reduces impact on business due to virtual environment (3, 3)
	Removes geographic boundaries (2, 2)
Empowerment *Provides a* ***voice*** *to the people who would not normally contribute*	People having the chance to have a say (4, 7)
	Gives a new channel-mode to have a say (3, 4)
	Sense of belonging (4, 4)
	Enabling people who would normally not contribute (4, 9)

(*continued*)

Table 2. (*continued*)

Model constructs	Sub-constructs (total # of interviews, total # of citations)
Ownership *Provides the ability to **own contributions**, Ideas and Change*	Ownership of ideas (2, 2)
	Recognition (2, 2)
Visibility *Enables staff to see the **contribution of others***	See WHAT the varying contributions-perspectives (3, 9)
Discovered Contingency Variables (and # of citations)	
Stakeholder Authority (3) *The perceived authority of process stakeholders*	Their own status
	Reluctant to challenge
	Who they were and their status
Trust (3) *The status of relationships between process stakeholders*	Difficult relations between groups
	Safe environment
	Not a lot trust between teams
Voluntary Contribution (2) *The ability to contribute without coercion*	Choice to participate
	Contribute if they want to

5 The Revised Model and Discussion

This study builds on prior research (Mathiesen et al. 2013) and through a carefully designed and implemented case study approach; (1) re-specifies already discovered EST affordances to improve their conceptualization; (2) identifies new EST affordances and clearly defines these; and (3) identifies and conceptualizes contingency variables that influence the way EST affordances manifest in practice. The resulting conceptual model with nine (9) identified EST affordances, four (4) of which are new, and three (3) contingency variables, (observed to have a moderating or mediating impact) is presented in Fig. 1.

Future exploration of the potential relationships between the contingency variables and the affordances (and also between the different affordances) is planned as future research. The preliminary observations points to interesting interaction effects. For example, the contingency variable 'Stakeholder Authority', appears to have an impact upon the affordances of 'Agility', 'Collective Effort', and 'Visibility'. Also the data indicated that when stakeholders in a position of authority made a visible contribution, it appeared to hinder the collective effort of other participants; 'blocking' others from freely commenting and editing content. We acknowledge that the different EST affordances can have diverse implications within different organizational, process and process improvement contexts. For example, large, geographically dispersed organisations are likely to benefit most from the incorporation of ESTs. And ESTs are likely to be more useful where the process participants have some experience with ESTs, and there is more of a 'technology driven' and 'engagement friendly' culture (as observed within the case context of this study). An investigation of external environmental and contingency factors that can further impact the application of EST within process improvements initiatives is planned as future research.

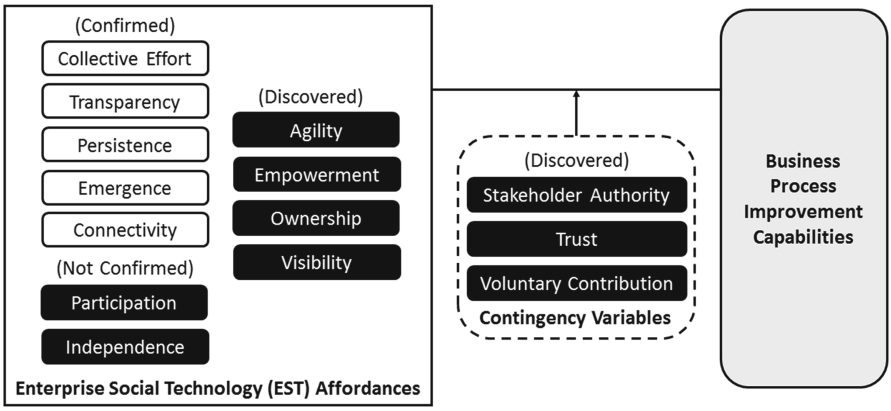

Fig. 1. Perceived EST affordances in the context of business process improvement

As discussed by Barki (2008, p. 9), researchers can make significant contributions to research and practice, by "*introducing new constructs*" and "*by better conceptualising existing constructs*". They position construct conceptualization as a very important contribution in theory development. Correctly conceptualized constructs are a prerequisite for 'good' theory building (Wacker 2004). Wacker (2004) explains how; conceptual definitions are needed for all theory-building empirical research and are necessary for content, criterion, convergent and discriminant validity and vehemently argue for construct definitions to take place 'before' any statistical tests are performed, as any statistical tests are meaningless until the concepts are formally defined.

This study did not only look at the construct definitions of EST affordances, but also looked at construct definitions of related contingency variables that could have a moderating/mediating effect on the EST affordances. (Frazier et al. 2004) strongly encourages the identification of such variables very early on, as the theories built in their absence can lead to weak results diminishing the impact of the specific research and impeding the progression of the research field as a whole.

Given stakeholders' engagement is key to the ultimate success of any BPM initiative (Hailemariam and vom Brocke 2011), a deeper understanding on how ESTs can assist to overcome this, is valuable to practitioners leading process changes. Study outcomes depicted how ESTs could involve diverse stakeholders (especially if geographically dispersed) through 'conversations', which supports the perceived degree of inclusion and participation; which are known key challenges with process improvement efforts. Conversations within ESTs can complement traditional workshops, as extended discussions post-workshops or as preparatory (or 'warm-up') work for upcoming workshop activities. They create a more social and casual environment which can enhance stakeholder responsiveness and openness to emergent ideas and contributions that surfaces through the EST communications. These conversations are also useful to discover the 'hidden networks' of individuals. Further, knowledge of the three contingency variables (Stakeholder Authority, Trust and Voluntary Contribution), can inform overarching management aspects. For instance, removing the impact (real or perceived) of any 'Stakeholder Authority' amongst workshop participants will allow

improved outcomes and remove possible restrictions on participation; establishing 'Trust' amongst process improvement participants will also foster better outcomes; and it is important to establish that the stakeholders had a choice ('Voluntary Contribution').

6 Conclusion

Organizations are increasingly adopting EST as an approach to crowd-source innovative solutions to organisational improvement opportunities. Additionally, process improvement practice is also leveraging these technologies to "*extend the reach and impact of process improvement efforts*" (Gottanka and Meyer 2012, p. 94). Recognizing that Academia (and industry) lack an understanding of the theory, models and frameworks (Niehaves and Plattfaut 2011; Walsh and Deery 2006), that explains the applicability of Enterprise Social Technology, especially in the context of process improvements, this study embarked to contribute towards addressing this gap. Applying the literature-based model of Mathiesen et al. (2013), this study investigates how EST affordances can contribute to process improvement initiatives. Through empirical data collected from well designed and executed interviews within a single case setting this study presents a further revised, empirically supported EST affordances model for process improvement contexts. Amongst the academic contributions of this study are the establishment of literature-based and empirically derived EST affordance constructs (both identification and operationalisation) that contribute towards building BPM capabilities. From an applied (practical) perspective, this study provides substantial contributions for both BPM practitioners (and other process stakeholders) and the software vendors who design and create ESTs.

The findings presented here is a preliminary step towards further empirical work in this direction. It was based on five interviews across one organization, and though the interviews were in-depth and well planned, and other supporting documentation was reviewed, the analysis was primarily based on interviews of five selected stakeholders. Other potential limitations of the study such as researcher bias in data collection and analysis have been mitigated with the coding procedures applied (i.e. coding guidelines and two coders working towards strong inter-coder reliability). Though we acknowledge these may impact the completeness and generalizability of the findings presented in this paper, this is a first empirical step towards identifying the affordances of EST for process improvements. Future research will be conducted to investigate the potential relationships between these identified EST affordances and contingency variables and expand the operationalization that this work provides a basis for.

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