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Abstract

In the Information Systems discipline, there is growing recognition of enterprise systems' (ES) users. ES users have traditionally been categorized into operational, managerial, and strategic groups. However, organizational structures are beginning to transform, potentially resulting in changes to the demarcations between user groups. We performed a case study to examine users in a contemporary ES environment. The preliminary analysis provides support to indicate that the boundaries between user groups are changing. In addition, we created a preliminary typology, which resulted in the identification of eight different types of operational users. Therefore, this research challenges the current theoretical treatment of operational users.

Keywords Users, Enterprise Systems, Typology, Case study/studies, Task characteristics, Task complexity

1   Introduction

Enterprise Systems (ES) are ubiquitous, packaged software solutions that integrate core business processes (e.g. manufacturing, human resources, financials, etc.) (Strong and Volkoff 2010). They are associated with standardized practices (Ekman and Thilenius 2011), mandatory usage (Klaus and Blanton 2010) and are proffered to enhance the profitability and performance of organizations (Cottleleer and Bendoly 2006; Hendricks et al. 2007). While ES are the epitome of mandatory use settings, the individuals who interact with ES (i.e. users) can "*resent, under-utilise, or sabotage the IS*" (Brown et al. 2002). Moreover, users can use ES in a variety of ways, some more effective than others (Strong and Volkoff 2010). With effective use being imperative to attaining benefits (Burton-Jones and Grange 2013), it is surprising that users of ES post implementation are largely overlooked (Liu et al. 2011)

ES users are regularly classified as strategic, managerial and operational, where operational users are largely responsible for performing data entry tasks within ES on a day-to-day basis (Murphy 2014). The initial distinction of operational, managerial, and strategic users has provided a useful framework and facilitated cumulative agendas. This classification was largely derived from extensions to Anthony's (1988) Levels of Planning and Control Activities, which was grounded on Fordism' principles. However, environmental factors (e.g. hypercompetitive marketplaces, ubiquitous computing) are potentially transforming operational users (Belanger et al. 2013). Moreover Zuboff (1988) in her seminal work, highlighted that the operational tasks users perform are transforming with simple routine tasks becoming increasingly automated. Hence, concepts foundational to Anthony's classification may be less relevant to the contemporary organizational environment.

Therefore, the objectives of this research are as follows: The first objective is (i) to understand the types of ES users and ascertain the appropriateness of Anthony's (1988) Levels of Planning and Control Activities in the contemporary ES environment. The second objective is (ii) to identify whether operational ES users should be treated as a single group or decomposed into multiple groups. Therefore, this research seeks to provide insights into the research question, '*What are the typical enterprise systems' user groups in contemporary organizations?*' In answering this question, attention will be devoted to understanding operational users as they represent the group that typically routinely interact with ES.

We use a typology approach to understand the user environment and operational users. Different to a typology theory which attempts to predict causal relationships; a typology seeks to identify categories for the purpose of analysis by classifying "*specific dimensions or characteristics of individuals, groups, situations, or events, by summarizing the commonalities found in discrete observation*" (Gregor 2006 p. 623). A typology of users could provide insights into sample selection and necessary controls to use in quantitative research, which will assist researchers in understanding the research context, which in turn may provide more insights into the equivocal findings (e.g. Johns 2006) cited in the Information Systems discipline. This research-in-progress paper reports on the first phase of our case study where we explored the types of users and the tasks they perform within the ES.

The remainder of this paper is organized as follows: (i) Next, ES users are explored (ii) followed by the research design. Subsequently, (iii) initial insights are presented and (iv) a preliminary typology of operational users is developed. The paper (v) concludes with areas for future research.

2   Literature Review: Enterprise Systems' Users

In this section, we present a brief background of literature pertaining to how enterprise systems' (ES) users are typically classified in the Information Systems discipline and also briefly highlight the nature of ES.

Recent literature has regularly adapted Anthony's (1988) Levels of Planning and Control Activities to classify ES users as strategic, managerial, or operational (e.g. Murphy 2014; Sedera and Dey 2013; Wickramasinghe and Karunasekara 2012). Strategic users perform non-repetitive activities that require creative applications. Hence, they make decisions based upon data in both the ES and external environment (Gorry and Morton 1989). Alternatively, operational users are commonly referred to as data collectors as they regularly input data into ES when performing routine day-to-day tasks (Murphy 2014). Managerial users act as a bridge between strategic and operational levels and are responsible for the analysis and dissemination of data present in ES (Murphy 2014).

This operational viewpoint of users with its foundations in Anthony's (1988) framework is largely based on principles of Fordism, which characterized operational employees as low skilled individuals who

complete highly fragmented tasks under tight supervision (Belanger et al. 2013). Thus, operational users require low skills to complete narrow, routine tasks using ES in a highly controlled environment. However, these underlying principles are becoming less relevant to contemporary society (Belanger et al. 2013). Asides from studies adopting Anthony's (1988) typology when classifying users, limited research is dedicated to classifying ES users (Liu et al. 2011). Furthermore, while other disciplines have started highlighting the implications that workforce strategies have on operational employees (Belanger et al. 2013), limited research has been conducted in the Information Systems discipline into understanding how the contemporary environment may be changing the viewpoint of user groups.

ES are regularly considered to constrain users as they are "*notoriously inflexible once they are configured*" and seek to standardize business processes (Boudreau and Robey 2005, p. 5). However, "*even in the face of the most apparently constraining technologies, human agents can exercise their discretion to shape the effects those technologies have on their work*" (Leonardi 2011 p. 147). Put differently, even though ES constrain users, users still have control over the actions they perform (Ignatiadis and Nandhakumar 2006; Orlikowski 2000). As a result, extant research has been performed into understanding how to improve individuals' acceptance and use of ES (Eden et al. 2014). However use is not sufficient for benefit attainment rather that use must be effective (Burton-Jones and Grange 2013). Yet, the effective use of ES has seldom been explored (Bagayogo et al. 2014; Eden 2017; Gnewuch et al. 2016). Effective use pertains to "using a system in a way that helps attain the goals for using the system" (Burton-Jones and Grange 2013, p. 633). Different user groups would ultimately have different goals for using ES as the system affords different possibilities for action to different user groups (Markus and Silver 2008). Extant research has suggested that different user groups have varying perspectives on the characteristics and impact of ES (Elias and Cao 2009; Gable et al. 2008). However, the goals of different user groups and the implications of those goals on effective use is yet to be explored in an ES context.

To summarise, whilst ES constrain action they also afford different possibilities to different user groups. Consequently, it is imperative to classify users into appropriate groups. However existing classification principles, whilst providing a useful starting point may not be relevant to a contemporary ES environment. Thus highlighting a pertinent gap in the literature which this research seeks to address.

3   Research Design

To provide insights into the research question a case study approach was used. Several factors informed the selection of the method: (i) Firstly, case studies enable researchers to examine IS in their natural setting (Benbasat et al. 1987). Second, (ii) this study seeks to understand operational users in a contemporary setting, which is a key characteristic of the case study approach (Gable 1994). Third, (iii) whilst case studies are considered appropriate for informing 'how' and 'why' research questions, they are also applicable for questions pertaining to 'what' (Dube and Pare 2003; Yin 2009). We acknowledge, that quantitative methods (e.g. surveys) are typically used to answer 'what' research questions, however we opted to use a qualitative approach so that new theoretical insights could be obtained (Venkatesh et al. 2013).

The pilot organization, GovD [pseudonym], is a large Australian government department. GovD uses two SAP enterprise systems (ES) to support daily operations, both of which have reached stabilization. One was implemented nearly two decades ago, is heavily customized, providing financials, and materials management functionality (henceforth termed SAP_{Legacy} [pseudonym]). The second went live five years ago, contains minimal customization, and performs HR functionality (referred to as SAP_{HR}).

Semi-structured interviews were conducted, with questions designed to elicit discussions pertaining to users' interactions with ES and the tasks they perform. Initial meetings with senior management responsible for SAP_{Legacy} and $SAP_{HR,}$ resulted in the identification of key interview participants. Seven interviews were performed, two examined SAP_{HR} and the remainder pertained to $SAP_{Legacy.}$ The interviews were conducted with managers who possessed key knowledge of users and the tasks they perform within the ES. In the first phase of data collection, managers were determined to be appropriate participants to provide insights on the breadth of users and tasks, as they possess a broader perspective of the roles and tasks users perform within the ES. The insights from the managers will be used to develop a preliminary typology of user groups. However, future research will be conducted and involve directly interviewing the 'operational' users of the ES.

All interviews were voice recorded and transcribed. The preliminary analysis presented in this research-in-progress paper involved iteratively reviewing each interview transcript and applying techniques of memoing and marginal remarks (Miles and Huberman 1994). The memos and marginal remarks were

continuously cross compared and throughout the process literature was consistently consulted. Future research will involve the use of more sophisticated techniques informed by Strauss and Corbin (1988) and will also involve performing interviews with the users who routinely interact with the ES.

4   Initial Insights

This section presents the preliminary findings of the analysis of interview transcripts. The findings pertain to the: (i) nature of the Enterprise System (ES); (ii) applicability of current user classifications; and (iii) potential need for greater granularity when investigating operational users.

As previously discussed, scholars regularly highlight the constraining nature of ES (Boudreau and Robey 2005). This commonly held viewpoint is further substantiated by the interview participants in relation to whether users perform workarounds.

> *"It's one way to do it or it doesn't work, because even if they try to do that [manual work around]...they are blocked and it gets picked up invalidation, so they [users] have got to reverse it. You can't get away with it, because everything is double checked on what you do"* (Interviewee 3).

> *"I don't think the system would let you do too much damage without getting caught"* (Interviewee 4).

However, further analysis yielded contradictory perceptions in different areas and highlighted that whilst the ES can constrain some actions users can still perform workarounds.

> *"The system does have some limitations on some of the things we do, where it won't lock it down, so there are a couple of ways to do something, not that they're recommended ways"* (Interviewee 2).

The above insights highlight that whilst ES can constrain users, human agency plays an important role, which is in alignment with findings of Volkoff and Strong (2013). Therefore, the effectiveness of use and outcomes derived from such use could ultimately differ based on individual users.

The literature review outlined that ES users are typically classified as strategic, managerial, and operational. Where operational users were largely responsible for day-to-day data entry activities. However, the analysis of interviews identified that the level between operational and managerial users was more blurred than initially considered. In multiple areas we identified that middle management were also regularly performing data entry and transactional duties.

> *"We like them to manage the team more. But we need them to process still"* (Interviewee 2)

> *"It works and enables me to do my job on a day to day basis and to get the rest of the staff to do their jobs it works"* (Interviewee 3).

It also became apparent that a new user group was emerging resulting from employee and manager self-service. This notion of self-services introduces an entirely different cohort of users that previously did not interact directly with ES. Rather they would manually fill out forms or used functional information technology (e.g. spreadsheet application) to perform their tasks and provide that to operational ES users for data entry into the ES. The advent of self-services is further transforming operational users as these comparatively simple data entry tasks are being removed from the operational user cohort.

> *"Well we're moving into MSS [manager self-service] and ESS [Employee self-service] soon, so that's where we're heading. So right now we [HR team] get all of that by email we open it up and then we go into the system and process it. Every single one of those pieces of paper"* (Interviewee 2).

> *"So with (MSS) for line managers and HR areas they're able to go in and look online real time pretty much real time to be able to see who's in their establishment what their positions are, who's against what positions and they're able to do enquiry access to be able to look at all that stuff"* (Interviewee 1).

As a result, we propose that the current classification of strategic, managerial, and operational users demands further attention into the blurring of the demarcations between managerial and operational users, as well as the addition of the new user cohort. Figure 1 presents a preliminary illustration of the user groups that interact with an ES. This figure is only a preliminary model, which serves to highlight deviations from the original typology of ES users. These differences present opportunities for future research. For instance, how are employee/manager self-service users defined, what are their

characteristics, and how are they expected to use the ES. Moreover, future research could also seek to identify whether the operational and managerial user groups should be combined, and if so, under what contexts.
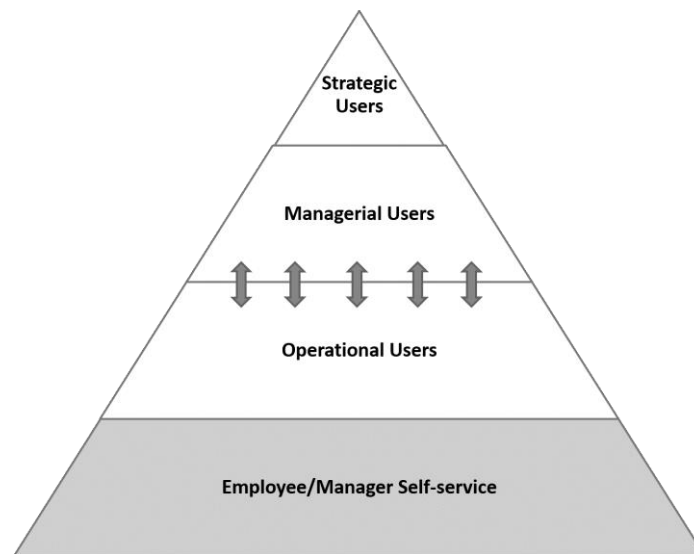

Figure 1: Preliminary Revised User Groups

The initial insights also provided partial support for the definition of the operational user which are typically considered to perform narrow and simple data entry duties.

> *"AP [Accounts Payable] is basic data entry, it is not a lot of anything else…It's pretty hard to challenge yourself everyday to find something to better yourself"* (Interviewee 3)

> *"We [AP] don't run reports, we don't manage stuff, we don't reconcile accounts, we just pay the bills"* (Interviewee 3)

However, further analysis clearly evidenced that operational users are changing. The traditional viewpoint of operational users clearly specified that they only performed narrowly defined tasks as opposed to a broad variety. The analysis of the interview transcripts identified that it was not uncommon for operational users to complete a broad range of tasks, albeit still data entry.

> *"So today I could be doing new starters today and tomorrow, and then I might move on to movements…We'll try to rotate people around…"* (Interviewee 2).

If all operational users completed the same broad tasks within a modular area of the ES a 'one size fits all' approach to analysing them may be appropriate. However, while interviewee 2 specified the majority of operational users complete a broad range of tasks, they also highlighted that other operational users within the same functional area completed distinct duties within the ES. This is more in line with the traditional perspective of operational users performing narrowly defined tasks. However, while they perform narrow tasks, the tasks are associated with a number of complexities, differing to the traditional viewpoint. In some areas, the operational users also required formal qualifications.

> *"We have a whole team who just does separations so that way no one else has to do it."* (Interviewee 2).

To summarize, the preliminary results highlight that the traditional demarcations between user groups may not be as applicable to a contemporary ES environment. Furthermore a 'one size fits all' approach to operational users does not take into account the distinct differences that occur within the cohort.

5 Preliminary Discussion

The previous section provided preliminary insights, which suggests that a 'one size fits all' approach to understanding operational users may not adequately reflect the contemporary ES environment. Further research needs to be performed to critically understand the different types of operational users. One potential approach to resolving these ambiguities is to formulate a typology of operational users. In creating the typology the characteristics that distinguish different users, and the unique combination of relevant characteristics were considered (e.g. Guillemette and Pare 2012).

Preliminary analysis of the interviews revealed key themes that suggested differences between operational users, including the (i) skills they possess to perform their tasks (i.e. skill requirements), (ii) diversity of tasks (i.e. task variety) they perform and (iii) level of complexity associated with those tasks (task complexity). Further exploration of literature based on the empirical findings indicated that task characteristics framework of Kim and Soergel (2005) could provide a theoretical foundation. In accordance with the task characteristics framework, task complexity and task variety are intrinsic task characteristics, whereas skill requirements are external to the task and focuses more on characteristics of the individual who performs the task (termed task performer). Our preliminary conceptual model (Figure 2) provides initial insights into user groups based on the relationships between the intrinsic task characteristics and task performer requirements.

Task related variables of complexity and variety have been examined across multiple disciplines (Liu and Li 2012). Task complexity is the "*difficulty, ambiguity, and lack of clarity involved in the task*" (Lankton et al. 2010 p. 302). Whereas, task variety is "*the variety of duties, tasks and activities for a job*" (Ang and Slaughter 2001 p. 337). In accordance with Liu and Li (2012), task characteristics influence an individual's behaviour. While task characteristics have been explored in the IS discipline (e.g. task-technology fit) they are not widely used to categorize user groups. However, Ang and Slaughter (2001) identified that characteristics of tasks completed by permanent IS personnel differed to IS contractors.

Skill requirements are imposed on individuals based on task characteristics (Liu and Li 2012). We acknowledge that although some overlap exists between task complexity and skill requirements, the relationship may be counter-intuitive. This was observed during analysis of the interviews, as one functional area required all operational users to have formal qualifications regardless that the tasks they completed in the ES ranged from simple to complex. In addition, there was a team within HR dedicated to performing a complex task however, formal qualifications were not mandatory.

Therefore drawing on these findings, we have conceptualized a preliminary three dimensional typology (Figure 2), which resulted in the identification of eight distinct user groups (Table 1).
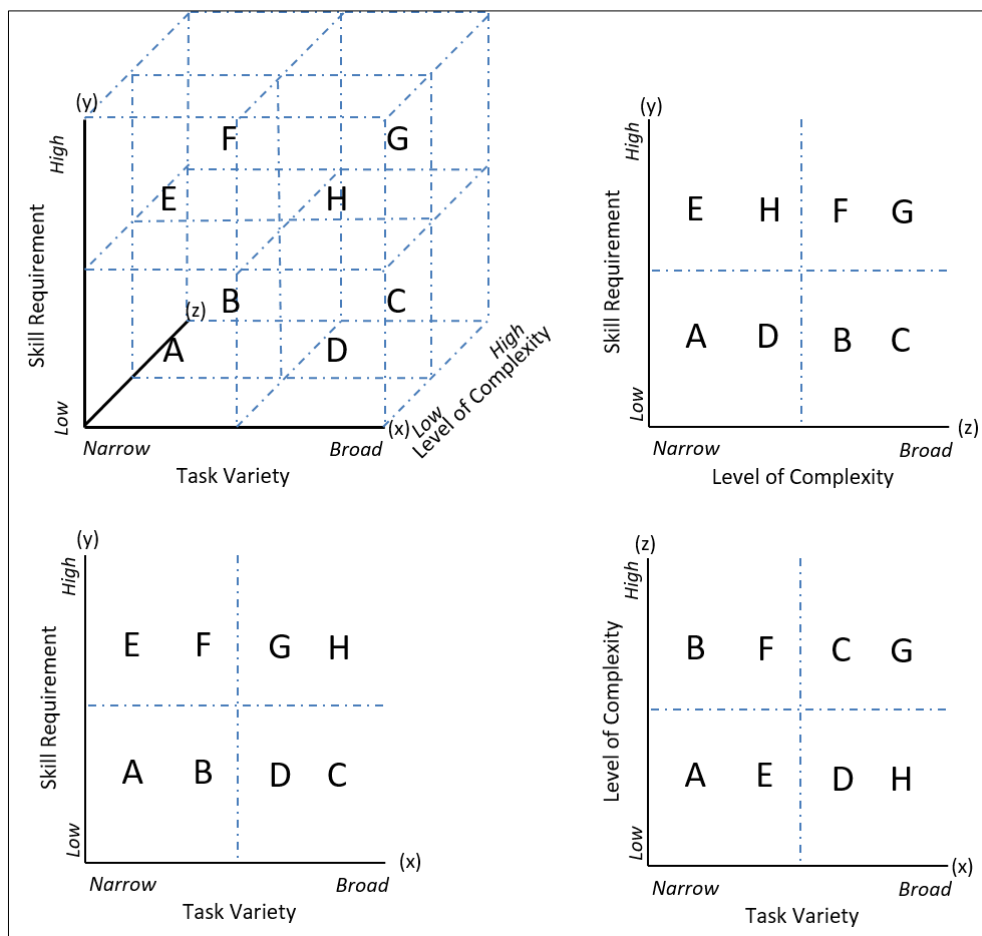

Figure 2: Typology of Operational Users

Referring to Table 1, 'user group A' would be indicative of traditional operational users, who complete narrow tasks, with low complexity, and a low skill requirement. Interestingly this was not a very common user group within the case organization and was only evident in the accounts payable area. From the analysis of interview transcripts 'user group D' appeared to be the most indicative of the operational user group within the case organization, and were categorized as broad tasks, low task complexity, and low skill requirement. However, all other user groups apparent in Table 1 were observed within the case organization, with the exception of 'user group F' and 'user group H'.

Table 1: Typology of Users and their Characteristics

User Group	Characteristics					
	Task Variety		Task Complexity		Skill Requirement	
	Narrow	Broad	Low	High	Low	High
A	X		X		X	
B	X		X			X
C		X	X			X
D		X	X		X	
E	X			X	X	
F	X			X		X
G		X		X		X
H		X		X	X	

6   Conclusion and Future Work

This research-in-progress paper presents preliminary findings from a pilot case investigating ES users. The initial insights highlights the need to reconsider traditional ES user groups. Specifically, this study identified the following: (i) firstly, the demarcations between operational and managerial users are becoming increasingly blurred. Future research should be conducted into exploring this finding, and identifying the applicability of keeping the operational and managerial users as distinct user groups. (ii) Secondly, employee/manager self-service offerings are available in contemporary ES, resulting in an entirely new user group who possess different requirements and expectations. While research has been conducted into self-service offerings (Saeed and Abdinnour 2013), more research is needed into understanding this user group and the implications for the traditional ES users. In addition, we also identified that (iii) the definition of an operational user is changing as they are no longer solely associated with low skills or performing narrow, simple tasks.

Upon identifying these transformations in operational users, we created a three dimensional typology, consisting of eight user groups. This research contributes to theory and practice as it explored the 'black box' of operational users. In addition, it highlights that a 'one size fits all' approach to operational users may not suffice. In accordance with MacKenzie et al. (2011) "*measurement properties may differ across sub-populations",* therefore this preliminary typology may assist quantitative researchers in identifying research participants, and the controls (e.g. complexity, variety, skill) that should be used in statistical analysis. Accounting for different user groups may resolve equivocal findings reported in other studies.

The findings of this research were based on an initial analysis of the first phase of interviews from one case study. Future research will involve performing a deeper analysis of the interview transcripts guided by methods informed by Strauss and Corbin (1988). For the next phase, interviews will be conducted within the same organization with operational users to further explore and deepen our preliminary typology. Subsequently, additional case studies can be performed to understand whether findings from the initial case are generalizable to other organizations that considerably differ to the case organization in this study. Future research could also be conducted into determining whether the typology is applicable to different types of Information Systems.

We plan to extend the findings from this preliminary analysis in two ways: (i) To consider whether other task or user related characteristics need to be examined in the classification of users; and (ii) Secondly, to consider the affordance lens to identify how affordances provided by ES influence different user groups in the preliminary typology. In addition, other future research areas include: (iii) identifying what effective use involves for each of these user groups; (iv) determining how training can be targeted to improve the outcomes of each of these user groups; and (v) examining what are the key individual characteristics needed for users within each group. After the preliminary typology is refined through conducting future research, it is envisioned that the typology will "allow researchers to move beyond the limitations of the current empirical world" (Doty and Glick 1994 p. 245) by recognising the context and exploring differences in impacts on pertinent IS outcomes.

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