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Cultural change through the implementation of an enterprise system: a UK university case study

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Dear Professor Bytheway and the review team,

We wish to thank you for the opportunity to revise our manuscript. We also thank the review team for all the constructive comments and suggestions. Your feedback has been most helpful in revising the paper and in offering a stronger contribution.

In the main, we have made the following changes in this revised version.

(1) We updated our Introduction as suggested.
(2) We improved the literature review section.
(3) We provided more information regarding our methodology.
(4) We explained our analysis in greater detail and made some aspects of our discussion clearer.

We list the changes that we have made in greater detail in the following table. We hope that you like the revised version.

Sincerely,
Authors

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Comment	Reviewer's 1 Comments	Authors' Response
R1.1	The authors explored the organizational cultural changes from the perspectives of integration, differentiation, and fragmentation during the implementation process of SITS. The topic is interesting. However, there are some aspects needing to be strengthened.	Thank you very much for your support and feedback. We hope that the changes we made meet your approval and that you will see a more improved manuscript now.
R1.2	The Introduction section needs to be more focused on the research gap identified by the authors. Especially, the authors should describe why the research is important, but not only expressed "do not provide sufficient rich insight……"	Thank you for your feedback. We have made our introduction clearer by justifying more strongly the importance of our research. We have highlighted in yellow the sections added. We hope this is OK.
R1.3	The authors described the theoretical background from three aspects. However, in my opinion, the section of Enterprise Systems (ES) and the Higher Education Sector wasn't closely relevant to the research question, because the focus of this paper is to explore the cultural changes during the implementation process. Compared with the other more relevant sections (Culture and ES, Three perspectives of organisational culture and ES), the authors put more effort into the section.	Thank you for your feedback. You are right the "ES and HE sector" section was rather longwinded and in parts not relevant and therefore we have trimmed it down. We feel that this part is important in order to establish the importance of ES in the HE sector however, we have now edited it and cut it down while we enriched the Culture and ES section which is of a more importance to our study. Please see text highlighted in yellow. We feel that our literature review is now sharper and more focused. We hope you agree.
R1.4	The research is well designed. It will be much better if the authors introduce the detail profiles of interviews using tables.	Thank you for your comment. You are right the information is presented clearer in a table. We added a table with the interviewees profile.
R1.5	Compared with the sections of differentiation and fragmentation, case evidence in the Integration section is few. The authors should show sufficient case evidence to validate the argument.	Thank you for your feedback. Can we please take this opportunity to explain that the reason that the integration section is shorter than the others is because the impact of the new system was greater from a differentiation and fragmentation perspective than from an integration perspective. In order to make our argument stronger we added a summary paragraph at the end of the integration section in page 14. We hope it shows in a clearer manner the integration perceptive.
R1.6	More importantly, the authors should analysis	Thank you for your feedback. We

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	the cultural changes in depth. Organizational culture has three levels: artefacts, espoused values, and basic assumptions. The cultural changes should be described from the deep level of culture, like values and assumptions, but not only visual organizational structures and processes.	have added some more details regarding our analysis. Please see at the end of page 11 and the start of page 12 highlighted in yellow. Also, please see the new paragraph in page 22 that summarises the main points of our research. We hope these meet your approval.
	Reviewer's 2 Comments	**Authors' Response**
R2.1	The paper makes quite an interesting reading and a great deal of work is seen to have been done by the author(s). A few referencing works however need to be done in terms of in-text citation, which I believe can be corrected. I recommend a minor revision for its acceptance.	Thank you very much for your support and feedback. We hope that the changes we made meet your approval and that you will see a more improved manuscript now.
R2.2	Originality: Does the paper contain new and significant information adequate to justify publication?: Yes; especially in the area of ES in HEI	Thank you very much for your support.
R2.3	Relationship to Literature: Does the paper demonstrate an adequate understanding of the relevant literature in the field and cite an appropriate range of literature sources? Is any significant work ignored: I believe the literature covers major aspects in the field especially on ES implementation in HEI. However, a second look at recent ERP work by Seo (2013) at MIT can be of significance.	Thank you for your feedback. We have now reviewed the work by Seo (2013) and we have discussed this research in our "Enterprise Systems (ES) and the Higher Education Sector" section. We hope this is OK.
R2.4	Methodology: Is the paper's argument built on an appropriate base of theory, concepts, or other ideas? Has the research or equivalent intellectual work on which the paper is based been well designed? Are the methods employed appropriate?: Very well appropriate methodology but a little concern about biases and how it was dealt with. I believe the author(s) could alley the fears of readers in that direction	Thank you for your feedback. Please see in our methodology part highlighted in yellow an explanation regarding biases and how we dealt with them. We have also added a table in that effect. We hope this is OK.
R2.5	Results: Are results presented clearly and analysed appropriately? Do the conclusions adequately tie together the other elements of the paper: Quite adequately presented and appropriately analysed. There seems to be a great deal of work done by author(s) in this direction	Thank you very much once again for your support.
R2.6	Practicality and/or Research implications: Does the paper identify clearly any implications for practice and/or further research? Are these implications consistent with the findings and conclusions of the paper?: Absolute implications for practice has been captured and consistent with the findings	Thank you.
R2.7	Quality of Communication: Does the	Thank you for your kind words.

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	paper clearly express its case, measured against the technical language of the field and the expected knowledge of the journal's readership? Has attention been paid to the clarity of expression and readability, such as sentence structure, jargon use, acronyms, etc.: Clear and simple English expression of clarity, making reading pleasurable.	Your feedback have been very helpful and we sincerely hope that the changes that we made have now improved the quality of our paper and they meet your approval.

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Cultural change through the implementation of an enterprise system: a UK university case study

Abstract

Purpose – Organisations spend a lot of money, time and resources on Enterprise System (ES) implementation and often they do not realise the expected benefits from these complex systems. There is a gap in the literature in providing sufficient insight into the implementation process or how an ES might influence or contribute to a culture change. The aim of this article is to address the gap in the ES literature around culture by exploring the implementation that was undertaken within a large UK university.

Design/methodology/approach – This paper contributes to the Higher Education (HE) and enterprise systems literature through an in-depth study of an enterprise system, SITS, implementation within a university in the UK. The study was undertaken over a three-year period where one of the authors was embedded within the organisation.

Findings – Using a cultural analysis framework the extensive rich data was analysed and the outcomes indicate that SITS has had a huge influence on the culture of the university; the technology's rigid structure has imposed many changes that had not been anticipated.

Originality – ES have recently emerged in the higher education sector where they are intended to support the management of student data and provide strategic management information. Although there are many studies which have explored important aspects of the implementation of enterprise systems, one area that appears to have been under-researched is how these systems are implicated in culture change within organisations. The results of this study will enable managers as well as IT specialists to gain rich insights into an ES implementation in the HE sector and to use this knowledge for future implementations.

Keywords Enterprise Systems, Organisational Culture, Higher Education

Paper Type Research paper

Introduction

The UK Higher Education (HE) sector is a global leader and it generates over £30 billion of revenue for the UK economy (Delloite, 2015). As a result, HE institutions need to operate in an efficient and effective way as well as respond timely to a number of challenges. A major challenge for universities is to develop the ability to utilise technology in integrating and improving the administration of their operations; introducing enterprise wide information systems (ES) is seen as essential to the conduct of 21st century business. Although many organisations are now in the process of implementing these complex systems there are still

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challenges that have not been fully understood and addressed (Chofreh et al, 2014; Bryant et al, 2013; Shaul and Tauber, 2013; Brooks et al, 2012; Gajendran and Brewer, 2012).

To date much of the ES research has focused on generic implementation issues such as technical approaches (Holland et al., 1999), Critical Success Factors (Bingi et al, 1999; Somers and Nelson, 2001; Sharif et al., 2005; Woo, 2007; Shaul and Tauber, 2013); strategy (Fowler and Gilfillan, 2003; Umble et al., 2003) organizational change (Yusufa et al, 2004; Lowe and Locke, 2008), and failures of ES (Trunick, 1999; Vogt, 2002; Elbanna, 2007). Although very well researched much of this literature fails to acknowledge that enterprise systems are complex systems with pre-determined and embedded structures and processes. They are often implemented within a highly political environment where individuals, groups and other stakeholders have agendas which, when afforded by new technological opportunity, can influence the nature of the system or organisation in unanticipated ways (Alvarez, 2008; Coombs, Knights and Willmott 1992; Parker 2000; Robey et al., 2002; Dezdan and Ainin, 2011). Garg et al (2015) report that one of the factors that hinder the success of IS implementations in the HE sector is the culture of the institution. However, it is not clear how or why culture is so important during ES implementations in academia. There is very limited research (Jackson, 2011; Kayas et al, 2008; Leidner and Kayworth, 2006) that attempts to understand the impact that organisational culture has on ES implementations as well as to explore how the introduction of an ES can alter/influence the culture of an organisation.

Therefore, one area of research into ES which is increasingly becoming important relates to cultural change in organisations both during and after an ES implementation. Literature reviews conducted by Gallivan and Srite (2005), Leidner and Kayworth (2006), Kappos and Rivard (2008) and Shaul and Tauber (2013) show that despite this interest in organizational culture there is little empirical research and that which is available tends to be quantitative in nature. This, they argue, is a gap in the literature as the studies explored in their work do not provide sufficient rich insight into the implementation process or how an ES might influence or contribute to a culture change. More specifically, Abugabah et al (2015) claim that little research has been conducted on ES implementations in universities compared to other sectors. Despite huge amounts being invested on ES, current studies indicate that adopting organizations do not realise the expected benefits from the deployments of such systems and these complex systems do not seem to be as effective as anticipated (Ifinedo, 2011). To summarise, uncertainties still exists regarding the actual contributions of ES in academia, in particular at the user level, where the core values of ES are represented and the actual benefits and impacts are created (Abugabah et al, 2015).

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It would therefore be worthwhile for studies to research the actual impact of these complex and expensive systems. Our study is thus attempting to shed light in the area of ES implementations as well as evaluate the impacts that these systems have on the culture of HE institutions.

The aim of this article is to address the gap in the ES literature around culture by exploring the implementation that was undertaken within a large UK university. The research had two main research questions:

- How does culture change during an implementation of an ES?
- How is the ES implicated in the changing culture of the Higher Education?

In order to begin to address these questions the following section explores the literature on ES implementation in the HE sector and the pertinent areas of culture relevant to this study. This is followed by a methodological section which outlines the ethnographic approach taken over the three years of the study. Using an analytical framework first articulated by Meyerson and Martin (1987) the rich data from the primary research is then presented followed by a discussion section. The discussion reflects on the research questions and provides rich insights into the cultural dimension of the ES implementation process. Finally, the conclusion draws together the salient contributions of this study and considers where future research might be conducted.

Enterprise Systems (ES) and the Higher Education Sector

Enterprise wide systems are increasingly being deployed throughout business and industry with the promise of seamless information flows and ultimately competitive advantage for the implementing organization. The premise behind the design and development of enterprise wide packages is that it is possible to define an industry 'best practice' that can be applied across organisations within that industry, no matter where located in order to improve the efficiency of processes (Wagner and Newell, 2004; Tai et al. 2014). Nevertheless, ES have often failed to deliver the promised integration and for many organizations the difficulty in adjusting to the requirements of ES implementation has led to the technology being abandoned (Elbanna, 2007).

Dery et al. (2006) found that although there has been an increase of important research themes in ES which examine organizational related issues, they are still significantly under-represented. A theme that is of interest within this article relates to the difficulties in adopting ES technology where they are replacing in-house developed information systems: the in-

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house developed information systems are designed specifically to meet the needs of the organization but configuring ES software surfaces the tensions that can exist between organizational business processes and the technological constraints of the system (Walsham, 2001; Hanseth and Braa, 1998; Leonardi and Barley, 2008; Dezdan and Ainin, 2011). Organizations are then faced with a range of choices from modifying working practices to suit the ES technology or customising the ES software to meet the organizational needs (Markus et al., 2000).

One growing area of ES research is in the area of Higher Education (HE) (Trowler, 1998; Becher and Trowler, 2001; Cornford and Pollock, 2003; Pollock and Cornford, 2004; Cramer, 2006; Mutch, 2008; Fowler and Gilfillan, 2003; Gemmell and Pagano, 2003; Wagner et al., 2006; Sabau et al., 2009; Pollock and Williams, 2009; Wagner et al., 2010). Although many of these studies are interesting Alt and Auth (2010) argue that research and theory building in the area of implementation of ES in HE institutions is still in its infancy and needs to be further developed.

Lechtchinskaia, Uffen and Breitner (2011) identified a number of CSF for the implementation of ES which are specific to the HE sector. Through a comprehensive literature review they found that change management and organizational culture were two factors that draw most attention and they suggest that due to the fragmented organizational nature of HE institutions a different approach is needed to research compared to ES implementations in private companies and cultural issues should be at the forefront of this.

Within the UK HE sector there have been two major studies on organisational issues linked to enterprise systems implementations (Pollock and Cornford, 2004 and Fowler and Gilfillan, 2003). Both studies were undertaken in pre-1992 institutions and focused upon management and administrative stakeholders. Although recognising that stakeholders must be more involved in these projects (Fowler and Gilfillan, 2003) and that each university is unique and not suited to the standardised or ‘vanilla’ approach to implementation (Pollock and Cornford, 2004) neither study paid much attention to the effect the system had on staff or the nature of culture change within their case studies.

In addition, Wagner et al.’s (2006) study illustrates how a best practice ERP system was actually created for the HE sector in the USA. Their research reveals that although the creation of new software-based best practices is assumed to be a thorough, exhaustive, investigative process they may have been determined by a relatively small interest group and when considering the early progress of ES for HE this was surrounded by controversy. Sabau et al. (2009) who conducted their research in the Romania HE sector concluded that

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at the end of the day an ES does not provide an institution with a competitive advantage. Instead this comes from the type of services it provides to its students with an ES being a facilitator and not a driver in a university's processes. However, this integrated, whole institution approach is intended to require all parts of a university to use a standardised format and moves it towards a highly coupled centralised organisation no matter how decentralised it is and how autonomous are its faculties (Pollock and Williams 2009). This, they note, can lead to even more cultural tensions between these faculties and the embedded 'best practice' within the ES.

This section highlighted the complexity of ES implementations in a HE setting and identified the need for further empirical research in order to gain a deeper understanding of these complex systems. It also signposted the important role of culture during the implementation of these multifaceted systems and thus, it is to studies of culture within the ES implementation environment that we now turn.

Culture and ES

The incidence of culture as an organizational issue in information systems implementations initiatives is evidenced by the diversity of themes covered in major literature reviews (Gallivan and Srite, 2005; Leidner and Kayworth, 2006; Kappos and Rivard, 2008; Shaul and Tauber, 2013). From these literature reviews it appears that knowledge about culture within information systems research is fragmented and this is further amplified by the fact that conceptualisations of organizational culture also differ among the wider management research community (e.g. Knights and Willmott, 2007; Huczynski and Buchanan, 2007; Schein, 1985, 1996; Ouchi, 1981; Peters and Waterman, 1982; Deal and Kennedy, 1982). Nevertheless, what researchers generally do agree upon is that organizational culture consists of patterns of meaning underlying a variety of manifestations; some of these manifestations are visible and include artefacts such as physical arrangements, clothes, stories and rituals as well as practices such as structure, technology and procedures. Other manifestations are ideational and include values, beliefs and assumptions held by the members of an organization (Martin, 1992, 2002; Pettigrew, 1979; Sackmann, 1997; Schein, 2010). However, it is not the manifestations themselves that are of interest within this article but rather the interpretations that are made by the organizational actors of these manifestations and in the resulting meanings that they attribute to them. Nevertheless, there is still ambivalence about the extent to which most members of a particular organization share the interpretations of the cultural manifestations.

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Jackson (2011) argues that the concept of culture in the IS area to date has been used rather restrictively and he identifies three main reasons for this occurrence. First he claims that IS studies have tended to consider culture holistically rather than ambiguous in nature; second many studies underestimate the dynamics of culture and fail to recognise that culture is something that is in constant flux. Finally, Jackson (2011), suggests that many researchers treat culture as something that an organisation "has" which can be explored through quantitative approaches rather than something that an organisation "is" (Smircich, 1983) and which should be researched through the use of in-depth interpretive methods. Therefore, this paper will attempt to gain a deeper understanding on how an ES implementation can contribute in a change on a university's culture by conducting an ethnographic research.

There are a number of IS studies that have explored the importance of culture within implementation (Pliskin et al., 1993; Krumbholz et al., 2000, Boersma and Kingma, 2005; Leidner and Kayworth, 2006 and Martin and Huq, 2007). However, most of these studies focus on the impact that culture has on IS implementation and very few discuss the influence that IS have on organisational culture. In fact, Leidner and Kayworth, (2006) suggest that although the influence of complex IS on organisational culture is apparent, there is lack of in depth research reporting the nature of this influence. Thus, the main focus of this research is to further explore the influence that an ES has on an organisation's culture and more specifically on how things are done in a HE environment.

Seo (2013) points out that research on ES in HE is still in its infancy with the subsequent research interests focussing mainly on understanding the failure factors at the organization and system levels. Seo's research did argue that there is a link between the implementation of ES and organisational culture while it highlighted the importance of change management during ES implementations in a university setting. Consequently, this study focusses on the impact of ES in HE institutions with a view to better understand and evaluate the ES phenomenon on an institution's culture and determine whether or not these multifaceted, highly expensive and highly demanding systems can deliver the outcomes that they promise.

However, studying culture within organisations over a long period of time has proven difficult for researchers and many studies have used survey instruments to collect data on culture (Kayas et al. 2008; Møller et al. 2004; Boersma and Kingma, 2005). From the perspective of ES all of these three studies appear to contradict the dominant view that ES are a rational technology that can be managed to manipulate an organisation's social

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context and instead they suggest that the cultural environment of an organisation can influence how the ES technology is used and vice versa. From an even more critical perspective Kallunki, Laitinen and Silvola (2011) argue that ES systems can be seen as an umbrella which management use in order to gain a wider control across an organisation. Thus an ES system can be used either to centralise control of top management or to decentralise power in order to establish more visible management control throughout the organisation.

Two studies that have explored culture and integrated systems but not specifically ES are those by Doherty and Perry (2001) and Doherty and Doig (2003). Here the research focused on the influence of workflow management systems and data warehouse systems respectively on organisational culture. Using a multiple case study approach Doherty and Perry (2001) investigated the nature of cultural change that emerged in the participant companies when a workflow management system was introduced. Their conclusions, suggest that the culture change was very positive and brought about customer focus, flexibility, empowerment, team-working, integration and innovation. The second study (Doherty and Doig, 2003) considered the anticipated cultural impacts of implementing data warehouses. Once again using a multiple case approach from a sample of large UK enterprises they conclude that these new systems have the potential to deliver important cultural changes but this may take time and cannot be seen as a short term fix. Although these studies have provided insight into how culture may be studied within the context of an IS and IT implementation the researchers recognise that they are limited as they do not follow the cultural change over an extensive period of time and they have tended to focus only upon a single perspective.

From the HE sector viewpoint, a recent study by Abugabah et al (2015) suggested that the usage and impacts of ES might depend more on how useful these systems are perceived by users, than how easy it will be to use the systems. Their study was quantitative and although it did examine the impacts that ES have from a user perspective however it did not explore the views of various stakeholders neither it considered the cultural environment of a university. This research will focus in gathering rich qualitative data from various stakeholders in a HE institution and the main emphasis will be to gain an in-depth understanding on how ES impact on an institution's culture.

In order to expand our understanding of culture within ES and move away from the dominant instrumental approaches Avison and Myers (1995) suggest that the IS area should focus more on a contemporary anthropological view of culture. They claim that in-depth research

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that concentrates on culture related issues in the IS field would enable researchers and practitioners to gain a better understanding into how an IS implementation affects or mediates organisational and national cultures, as well as how culture affects the adoption and use of IS.

Recognising the gap around ES and culture this study aims to address it by undertaking an ethnographic study in order to gain a better understanding of how an ES can influence organisational culture in a higher education context. One challenge for this type of research is how cultural change may be analysed and explored over time. One approach suggested in the literature is to use the framework developed by Meyerson and Martin (1987) which has been used to a limited extent in IT studies (e.g. Dubé and Robey,1999; Jackson, 2011). This framework was enhanced by Martin (1992, 2002) and is discussed in more detail in the next section.

Three perspectives of organisational culture and ES

According to Meyerson and Martin (1987:623-647) there are three perspectives that dominate research on organisational culture: integration, differentiation and fragmentation. Culture from an 'integration' perspective is an integrating mechanism, it is the shared patterns of meaning of a given group or organisation. The term 'shared' helps identify relevant manifestations of a culture – a common language, shared values or an agreed set of appropriate behaviours.

Instead of a focus on homogeneity the 'differentiation' perspective of culture is characterised by diversity. Researchers studying culture from this perspective pay attention to inconsistencies, lack of consensus and non-leader centric sources of cultural content. This approach emphasises the importance of sub-cultures including groups and individuals who may represent constituencies based within and outside the organisation. It tends to emphasise disagreement rather than consensus and acknowledges that complex organisations reflect broader societal cultures and contain elements of occupational, hierarchical, class, racial, ethnic and gender-based identifications.

Rather than denying ambiguity (integration) or channelling it (differentiation) the 'fragmentation' perspective accepts it. Complexity and lack of clarity are seen as normal and made the focus of attention. From a fragmentation perspective irreconcilable interpretations are simultaneously entertained; paradoxes embraced. A fragmentation perspective would have no shared, integrated set of values – except an awareness of ambiguity itself. Ambiguity is thought of as the way things are, as the 'truth' not as a temporary state awaiting the discovery of 'truth' – Integration is viewed as over-

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simplification. Consistency and consensus are considered abstract illusions created by management for the purposes of control. A fragmentation portrayal of culture cannot be characterised as generally harmonious or full of conflict. Instead individuals share some viewpoints, disagree about some and are ignorant of or indifferent to others. Consensus, dissensus and confusion co-exist, making it difficult to draw cultural and sub-cultural boundaries

Nevertheless, conceptualisation of culture change is made even more complex when considering the additional process of adopting and extensively using an ES system across an organization. It is here we contend that the 'social' and 'material' aspects of ES adoption need to be explored in order to understand the process of cultural change. Lee (2010) argues that information systems consist of three interacting subsystems, the data, the technology and the organization. Yet in the case of ES although the data, organization and technical systems are present they are highly entangled and as has already been discussed can be seen as 'communities of software companies, customers, professional associations, different kinds of hardware and software, implementation procedures, practices and rhetoric spanning time and space' (Koch, 2005: 43-44). Thus when this industry or sector 'best practice' is adopted and the ES is diffused throughout the organization the socio-technical accommodation which Lee (2010) argues should take place is inhibited as the organization subsystem finds itself constrained by the legacy and history of the technology and data subsystems much of which may have been developed within another context and for another sector (Pollock and Williams, 2009; Robey et al., 2002).

Recognising that acquiring an ES does lead to change in many organizations what is of interest here is the process of cultural change that evolves over time when these systems are implemented and how this can be better understood. In order to explore the dynamic, complex and entangled nature of cultural change within an organization introducing a new ES this article proposes that the three perspectives of integration, differentiation and fragmentation will provide lenses through which cultural change can be viewed (Meyerson and Martin, 1987). Finally, instead of focussing on one of the perspectives of Meyerson and Martin (1987) we intend to illustrate how all three may be used to offer insight into how IT, people and organization are entangled and how this influences culture over time. To do this we explore a three-year ethnographic study of an ES implementation in a university in the UK.

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Methodology

The research described here is part of a three-year ethnographic study of a Strategic Information Technology Services (SITS) implementation in a UK university, EducationCom (pseudonym) which started in 2007. Ethnography can be defined as a '*style of social science writing which draws upon the writer's close observation of and involvement with people in a particular social setting and relates the words spoken and the practices observed to the overall cultural framework within which they occurred*' (Watson, 2010:205). Schein (2010) argues that ethnography should involve participant observation, content analysis of documents, stories, myths, rituals, symbols and other artefacts. This may be supplemented and strengthened by interviews, statistical analysis and even small surveys (Watson, 2010). Regardless of how ethnographic research is defined it must have at its heart participant observation. The case study was chosen because many universities and Further Education colleges were beginning to use it and longitudinal access was key to the study in order to explore the cultural dimension of the implementation.

The research began with an in-depth analysis of the documentation leading up to the SITS implementation. This was followed by 22 interviews (averaging one hour each) with university staff who had been in the university for a no less than five years (Table 1). Interviewees included both academic and administrative staff from the five largest faculties (Business, Arts and Humanities, Health and Education, Computing and Engineering and Design where student business was more complex. We also interviewed staff from the postgraduate research department, the SITS implementation team, the SITS project manager and the university Registrar. Recruitment of interviewees was not an easy task as the SITS project was a very sensitive endeavour and even today raises mixed feelings within EducationCom. From an ethical perspective it is important that individual identities are protected and therefore reference to the home faculties of participants has not been highlighted as was agreed with those individuals.

Please insert here Table 1

A non-directive interviewing technique was used which allowed respondents to express their own views about organizational life in their own words rather than force them into predetermined categories (Hirschheim and Newman 1991). The interviews involved a discussion of issues surrounding the participants' prior experience of student information systems, the implementation of SITS, life in the organization and change during and after SITS went live. Interviews were taped with permission, transcribed and returned to the

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interviewees for verification. Anything that was felt by the participants to be problematic was removed from the transcript and after one interview a respondent decided to wholly withdraw her transcript.

Participant observation took place throughout the research study and was recorded using a diary. As a member of staff one of the authors was able to participate in the activities which contributed to the academic role in providing student data. Working alongside other colleagues she was able to observe the action of various individuals and interpret them in order to gain insight into the cultural manifestations of the organization (Bryman 2004). Burgess (1984) also argues that participant observation can increase the richness of the research and Waddington (2004) suggests that being part of day to day activities or important events can provide valuable understanding of organizational practice which can become ritualised over time. In order to understand administrative life, the same author spent a number of periods of observation during peak times in the academic calendar: student enrolment in October, marks recording after assessment in February and examination board preparation time in June.

Klein and Meyers (1999) explored seven principles relevant for interpretive field research which can help researchers to reduce biases in interpretive studies and explore the validity for their research. In Table 2 an explanation for these principles is given based on Klein and Meyers (1999) definitions and an effort is made to apply these principles in relation to the data analysis of this research.

Please insert here Table 2

Using a general inductive approach (Crabtree and Miller 1999; King 2004) the interviews, documentation and diary data was coded according to theoretical concepts suggested by the data rather than imposed by the researcher. The approach used involved a process of developing initial categories, grouping data, identifying patterns and then making comparisons to uncover shared elements and properties (Barley 1990; Van Maanen 1979). The documentation and transcripts were also read to identify statements which reflected values, beliefs and assumptions about SITS as well as for evidence of organizational stories, myths and rituals which may have arisen over the period of the research.

More specifically once the transcripts were available for analysis, the authors summarised the main themes that appeared in each interview, according to cultural manifestations such as formal and informal practices, artefacts (physical, verbal and behavioural

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manifestations) as well as values, beliefs and assumptions. Although a great deal of rich data was collected it is not possible to discuss the full research outcomes here. Our study explored the data that emerged from the cultural manifestations and linked it back to Meyerson's and Martin's (1987) framework which allowed the authors to look into the impact that SITS had on EducationCom through different lenses. Therefore, the following account focuses upon how SITS has been implemented within EducationCom and the nature of the organizational culture change.

SITS and the emergent culture change: A three perspective approach

This section provides insight into the case study and how culture changed over the three years. It begins with an overview of the information systems and organizational culture prior to the adoption of SITS. It then moves on to view the emergent cultural change through the lenses of integration, differentiation and fragmentation as the components of the ES are implemented, determine patterns of organizational behaviour and influence life in the university.

The information systems environment and culture pre implementation

EducationCom is a large city based university with over 3000 employees and nine academic faculties. It had many long serving staff who had committed their working lives to the university and who were very focused on the student experience both in and out of the lecture room. For example, within the Business School it was also a time when there was a team-ethos between the academics and their administrative colleagues. There were regular nights out together and at times of stress i.e. exam marking periods all staff appeared to pull together – '*it was a fun time to come to work'* (Senior Administrator 3).

Prior to the new system implementation faculties were responsible for their own management of student data, including enrolment, marks recording, timetabling and exam boards. This decentralised approach to data management allowed each faculty to determine its own organizational structure, information priorities and those of its academic staff. In fact, academic staff were at the heart of the data management and many took pride in their work:

> *"We wrote a lot of the faculty systems in-house. We wrote our own timetabling system. We wrote all sorts of systems that took central information and put it in around the university. It was localised and decisions were made by faculties." (Academic 5)*

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Although this method of data management suited the individual faculties the university was facing external pressure from the UK Government to provide standardised data that could be used to support the allocation of university funding across the country (Briefing paper from SITS Project Manager). It was at this point senior management in EducationCom began to look for a system to deliver the requisite data and turned to SITS (SITS project strategy).

SITS is marketed by the vendors as a system to provide total student data management. It has been designed based on an 'ideal' model of how a university should operate (Wagner et al., 2006; Pollock and Williams, 2009) and consists of various modules that support different university processes such as student admission, program management student enrolment, student fees, student progression throughout the various degrees and tools to 'enable' users to analyse, process and extract data. With other similar universities beginning to introduce it and at meetings with the vendor's senior university managers were given assurances that the system could provide the solution to their data problem.

EducationCom took a decision to purchase SITS (Minutes of EducationCom Senior Management Meeting). A 'hand picked' team of administrative staff and managers were assembled to visit other universities that had adopted SITS and internal consultation was restricted to a minimum (see Volkoff and Sawyer, 2001; Cornford and Pollock, 2003; Leonardi and Barley, 2008).

Integration

An integration lens is now applied within this section to illustrate how shared cultural values began to emerge around the SITS implementation effort and how certain groups and individuals used their position to influence them.

The key users and stakeholders, chosen to be part of the SITS project team, were mainly administrators taken from each faculty (SITS project plan). The discourse within the numerous documents produced at that time highlighted the need for a rigid management of the project and is similar to what was found in the US ES study (Wagner et al., 2010). The technology was to be centralised and run over the university intranet. Nevertheless, although the technology and data subsystems requirements (Lee, 2010) were considered in detail there was little attention paid to the organizational subsystem or its data needs which is seen as essential by Hanseth and Braa (1998) and Walsham (2001).

The senior management in EducationCom relied heavily on the vendor consultants to facilitate the adoption of SITS (Westrup and Knight, 2000; Leonardi and Barley, 2008). One

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consultant intervention resulted in the formation of two new project groups, the SITS implementation team (technically skilled staff) and the SITS user group (consisting of senior administrative staff from the various faculties). Although these groups were intended to be temporary organisations in order to speed up the implementation process they still exist today, five years after the system went live.

The vendor consultants provided the SITS implementation team with standard technical training (Leonardi and Barley, 2008) in order to support the new SITS system. The team were then given a great deal of resources including their own secure offices. The SITS user group had responsibility for the data subsystem: supporting the faculties in the SITS data entry process and extracting any necessary information. After examining minutes of group meetings it became apparent that the focus prior to the new system going live was on technical issues with little evidence of concern about the effect these changes would have on academic life (Soh et al., 2000). Consultation on who would manage SITS and how it would be used should have also been important (Volkoff and Sawyer, 2001) but was not a priority in the early stage of implementation.

Academics on the whole were unaware to what was going on and they were not appropriately informed:

> *"... It [not being involved] was slightly surprising in so far as I was a relative expert from an academic and user point of view... That is the problem here they don't realise that they have a huge resource of academic expertise. There are lots of people who teach this stuff... but they never refer to or use them. ...There is absolutely no feedback mechanism where I can feedback to them the issues." (Academic 7)*

The SITS implementation group and the SITS user group worked together until the system went live and it is apparent from the project documentation that they developed an excellent working relationship with each other and consultants from the SITS vendor.

One significant task that they worked on together was student data migration from all of the faculty systems to the new SITS system. SITS, like other ES systems, has a very inflexible set of structures which cannot easily be altered (Markus et al., 2000). This was very challenging since each faculty had their student records in different formats according to their needs and their own processes. The Director of Finance and his senior team anticipated this would be a simple transfer of common data into structures congruent with university requirements and facilitated by the SITS vendor consultants (Minutes of senior management meeting). They did not consider that the data structure for various undergraduate or postgraduate programmes was completely different in some departments/schools and therefore the data migration was not such a straight forward task

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as they initially anticipated. However, it was so important to get the system 'up and running' that the needs of individual faculties/departments were ignored or disregarded which caused major problems once the system was in use. Nevertheless, it did lead to an integrated view of the data.

The university did achieve a degree of integration of its systems but not full integration since SITS is not fully integrated with a number of other systems that exist in the institution such as the timetabling system for example. From both the administrators' and the academics' point of view, processes are now more formalised and things have to be done according to the requirements of the system and therefore it seems that the implementation of SITS has brought more integration since everything is controlled centrally. This integration though has also brought a lot of inflexibility as we can from a differentiation and fragmentation perspective.

Differentiation

This lens provides insight into individual sub-cultures present in the organization and for the purpose of this article we consider the administrators who interact with SITS and academics who use student data. It is important at this point to emphasise that prior to SITS all academics and administrators had access to the faculty student administration systems and the usability of these systems was such that little training was needed to access student data. Once again the focus is on some key activities or events which have helped shape the culture over the last five years.

Prior to 'going live' there was a need to train staff across the university on the SITS system. Faculties clearly wanted all of their staff trained on the new system. Nevertheless, there were insufficient funds available at that time for everyone to be trained so priorities had to be set. A decision was taken that precedence should be given to administrative staff as they would need to enter student data at the start of the new academic year. However, even then not all administrative staff would be trained. The SITS implementation group and the vendor consultants devised the official training programme and only those trained on this programme were given a password and access to the system. The view of administrative staff who did the SITS training was that it was inadequate for a system which was so complex (Interviews with administrators).

Academic staff had been excluded from SITS training and knew nothing of the changes to student admissions and enrolment processes until they returned in September from their vacation period:

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> *"At enrolment we found problems with the modules. Students were attached to the wrong modules.... This was due to misunderstanding about codes... I spent so much time correcting data, checking... It then impacted on Blackboard… students going to the wrong lectures." (Administrator 4)*

When the heads of faculty approached the SITS implementation group they were told it was 'teething problems' or that they were the only faculty with that particular problem. The SITS user group were overworked trying to sort out problems within the faculties, problems that had not been anticipated. Much of the problem related to the lack of planning of the business processes within the organizational subsystem as well as the complexity of the SITS technical and data subsystems:

> *"You've to go through a whole procedure to put an error right because simply there is no backwards tab which is crazy! you have to get in, come out, get in and come out again there is no backwards tab … if you've to adjust a piece of information you need to un-process them and re-process ..." (Administrator, 6)*

Also, a new group of SITS administrators the 'Good Housekeepers' emerged in the faculties. These individuals were SITS experts in data entry and information retrieval and because of the complexity of the system they became very powerful. This phenomenon has been observed on other ES implementations where organizations struggle with the difficulty of integration (Leonardi and Barley, 2008).

It is clear through our participant observation and interviews that new sub-groups have emerged around SITS – 'SITS administrators', 'non- SITS administrators' and 'good housekeepers'. SITS appears to have facilitated an administrative hierarchy where IT skills are prized more than other skills and financially better rewarded. Also the implementation of SITS has led, in some faculties, to a more formal culture where computers are central to work practices and communications.

From an academic perspective SITS has led to the exclusion of many staff from student-related business. Instead of leading the SITS implementation and determining the information required to support academic work they have found themselves following the administrative data requirements of the new system:

> *"we've been assured that it is not SITS fault is the way it is operating is the way you put exam marks into it for example, I would say that in fact if you had an assignment that has 3 separate parts what I tend to do is to say ok each part take 20, 30 and 50% and then mark it out of 20, 30 and 50. But for some reason SITS has to have each mark out of 100 and then do its calculations by itself. So you have to mark it out of 20 convert it into 100 and then SITS re-scale it and quite often you realise it is a bit different mark at the end with all the calculations. But we have been assured that, that has nothing to do with SITS. That SITS can cope with whatever we want to put in, it is just that the people who operate it just don't know how to do it." (Academic 6)*

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Academics find it difficult to understand the logic of SITS and they feel frustrated because now there are also penalties for not following the SITS rules.

Fragmentation

The differentiation perspective illustrates how the relationship between academics and administrators has been significantly altered and highlights the tensions that have risen between them since the introduction of SITS. The fragmentation perspective explores the irreconcilable interpretations of meaning where the same technology can be interpreted differently by organizational subcultures or individuals and in this case surfaces the power and political tensions therein (Martin, 1992, 2002). The focus of this section is on some of the key themes which emerged after SITS went live and which have diverse significance for a number of the research participants. These themes include informal practices, trust, new power and politics and professional/work identity.

One of the most pertinent findings of Fowler and Gilfillan (2003) which was also apparent in EducationCom is that informal networks often evolve to *'get things done'* outside of the formal role and responsibility structure in institutions where an ES system was implemented. Formal and Informal practices are often the primary focus of attention in organizational research because they can provide the researcher rich insights on the culture of an organization (Martin, 2002). Informal practices in EducationCom were driven by the fact that SITS was deemed inflexible and it often forced members of staff to find ways "around" the system in order to complete their tasks.

One story about the inflexibility of SITS came from an academic who explains:

> *"…you cannot innovate! For example, for one of my modules I decided that rather than writing a report I would ask the students to do a poster because writing a report was boring stuff! They had to do a group poster instead of group report and I had to peer assess it as well as staff access it … because it was peer assess I decided to weight it a bit differently but then of course to put the marks into SITS you've got to trick it … you need to use your own spreadsheet to get it back to the proportions that was before, before you can put it in the system." (Academic 1)*

This inflexibility and lack of integration with internal faculty processes has resulted in other user led innovations that can 'work around' SITS. For example, faculties keep their own databases that they run in parallel with SITS in order to deal with student work placements, external partners, nursing and education students etc. This type of 'shadow system' is not unusual and was also evident in Cramer's (2006) study.

A theme which emerged and was frequently discussed during the research period was 'trust'. Prior to the new system implementation, the recollections of many of the interviewees

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was that academic and administrative staff 'got on well' and were supportive of each other. Now within the professional environment of the university trust appears to have been lost in relation to SITS. For example, a senior administrator suggested that the SITS team does not seem to communicate very effectively with the faculties and finds it difficult to trust any information which they send to their section:

> *"Sometimes when you are downloading information, or recording lots of students you can find that the codes have changed and that is quite annoying ... they don't tell us why that problem has occurred and it is only the second or third or fourth time that we realise or they decide to tell us that they have changed the codes..." (Administrator 9)*

From an academic perspective the senior management of the university excluded them from the initial SITS implementation discussions; they were not allowed and are still not allowed access to the system and they have seen some of their roles and responsibilities taken over by administrative colleagues. An academic reflecting on his perceptions of new but now embedded processes around SITS stated:

> *"..it is particularly idiotic if you think of the marks recording process you would think if academics were trusted to give marks they would be trusted with the electronic system to enter the marks ... but presumably that isn't the case". (Academic 9)*

From an administrative perspective they do not believe that academics should be allowed access to SITS because if they were given access to enter their marks they would *'mess things up… academics take a lot of chasing…. the responsibility would lie on our shoulders'* (Administrator 2). This issue of 'trust' is symptomatic of the misfit between the technology and the organization as the stakeholders struggle to understand the complexity of the system (Soh et al., 2000).

The organization subsystem of SITS has facilitated new power bases and different political control. The centralization of the SITS technology and data subsystems has led to a much more centralized university at EducationCom. It is apparent that academics have little power around SITS and in many situations must defer to their administrative colleagues on a number of academic matters. Central administrators determine the academic calendar (to fit with SITS data entry schedules), student recruitment criteria (now an automated points based system), examination boards and quality audits to name but a few. Another new power base which has been facilitated to some extent but not exclusively by SITS is that of the 'student/customer'. Along with enrolling online students now have access to their own personal SITS data as well as their course/module marks. A recent development expedited by the SITS implementation group has caused some difficulties and tensions:

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> *"I came back to my room after submitting marks to the administrator for my module and was greeted by some students who wanted to know why they hadn't got the mark they thought they should have been awarded. I was shocked as no one had told me the students could see their marks on SITS. "(Academic 4)*

Unlike their administrative colleagues' academics do not see this as progress but view it much more suspiciously (Gemmell and Pagano, 2003). The SITS technology and data subsystems can provide this data to students but the organization subsystem has yet to be addressed. Culturally academics have had control over marks release but this is changing in EducationCom.

Professional identity is often highlighted as being important when exploring organizational culture (Knights and Willmott, 2007). If the individual professional identity of academic staff and administrators is explored, then it is clear that SITS has led to some change. The original SITS implementation group is still in place today and has become an essential group for ensuring that the technology subsystem is functioning. However, their role has expanded to include the development of reports from SITS for the academic faculties. These reports require skilled programming techniques. Thus they have also acquired some of the data subsystem responsibilities as well as developing organizational processes around access to these SITS reports. From the perspective of faculty administrators some staff feel that they have been downgraded and become data entry clerks whereas others who have excellent IT skills have moved on to become good housekeepers, thus moving from a supporting role to a leading role in the SITS organization subsystem. Academics see the introduction of SITS differently: they have seen their academic role change substantially and some argued not for the better. Once again the sentiment is that of deskilling in that the technology has removed some of the more enjoyable aspects of the role i.e. involvement in the whole student life cycle from enrolment to graduation.

Research Synthesis

The aim of this article is to explore how culture changes during an ES implementation and how the ES is implicated in the changing culture of the organisation. Using the three perspectives framework of Meyerson and Martin (1987) and building upon the work of Dubé and Robey (1999) and Jackson (2011) who used this framework to explore culture change within much smaller IS and IT implementations our intention is to add insight to ES implementations within the HE sector. By subjecting the data to multiple interpretations the tendency to privilege a single dominant explanation of the entangled nature of ES induced change is reduced. Through the use of Meyerson's and Martin's

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framework it is possible to gain a multifaceted view of EducationCom's culture and Table 3 shows the situation in the institution before and after the implementation of SITS.

Please insert here Table 3

Through the ***integration*** lens it can be seen that the senior management at EducationCom had a vision of a centralised approach to data management and this determined how SITS was implemented. In consultation with the vendors they chose to limit stakeholder involvement, did no business process change prior to the system going live and no customisation of the software. Thus the university adopted the values and assumptions of the developers, consultants and interest groups that contributed to this HE ES model of 'best practice' (Wagner et al., 2006; Koch, 2005; Pollock and Williams, 2009). By recruiting internal groups of staff to carry out the work the centralised vision was cascaded down and was enacted through the actions of the groups and their behaviour over the months leading up to 'going live'. The result of this is an inflexible approach to data management with formal centralized processes around the SITS system. All staff involved in the management of student data have had to adapt to this. Since the system went live the centralized approach to SITS data has been re-enforced and many more rules and processes developed around it. Becher and Trowler (2001) argue that this type of inflexibility can impact upon team-work and this has been the case in EducationCom. It is clear that there is now a SITS organizational hierarchy and less collegiality. The SITS implementation team are a permanent group in the university determining all data management around SITS. Within the faculties 'good housekeepers' are also a recognised formal group with responsibility for data there. Academics, on the other hand, continue to have little to do with SITS.

A managerialist culture and its related discourse is increasingly evident within the university and its growth appears to have been legitimised through the SITS adoption. Looking back over the six years since SITS was introduced there have been subtle yet noticeable changes in cultures across the university. Administrative management now appear to have increasing power within the university and from many academic staff perspective resistance appears futile. This power is evident as managers introduce new information technology applications to monitor and manage academic funding applications, supervision of doctoral students and research plans. The university is also piloting the use of an information technology system to manage academic research outputs. Little consultation has taken place with academic staff and once again the rhetoric is around efficiency and effectiveness.

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In terms of the ***differentiation*** perspective the focus is on describing the cultural changes in the sub-cultures and the conflicts and contradictions across sub-cultural boundaries. Although the introduction of SITS has brought centralized control of student data it has also been divisive within groups of staff and across those groups. Within the administrative staff skills sets have changed. Pre-SITS staff were employed because of their good interpersonal skills and ability to work with students. Today administrative staff require excellent IT skills especially if they are working on SITS. These individuals, such as the good housekeepers, are better paid together with a higher status. Nevertheless, the university has lost many good staff because of this change in work focus.

This growth in highly technical administrators may also be seen as a contradictory cultural consequence as academics appear to have been deskilled. From an academic perspective SITS has heralded a new world for many staff whose raison d'etre was 'the student' from enrolment to graduation. Volkoff and Sawyer (2001) argue that when change is introduced into an organization it is important to recognise that there may be some staff whose job is badly impacted by that change and whose morale may dip badly. SITS has improved the working lives of some but not others and consequently the academic staff are becoming even more disengaged from the university body reflecting what Knights and Willmott (2007) describes as 'organizational fragmentation'. With the introduction of the new United Kingdom student fees regime in 2012 this disengagement may be counterproductive when students begin to assert their 'consumer rights'. How the university rectifies this will be challenging.

From a ***fragmentation*** perspective ambiguity and contradiction is seen as the pervasive and inevitable essence of culture. In this study a number of themes emerged over the research period that illustrated the nature of this ambiguity. The fact that SITS cannot handle all student data in a useful format for a number of academic faculties has led to the running of parallel systems to support their needs. It is not politic to discuss any 'work arounds' or 'shadow systems' within faculties as those that are doing so could be viewed as dissenters departing from the required university norms (Cramer, 2006). Regardless of the local practice all relevant data still has to be entered on SITS and this can mean many long hours for those tasked with making the adjustments. Thus stress is evident at peak points in the academic year especially where deadlines are set and staff suspect they are being monitored through the SITS system.

Trust between staff in the faculties has almost disappeared around the SITS system. Academics dislike the rigid SITS processes and cannot fully understand the logic of some of them. Administrators, on the other hand, have their own data deadlines to meet and find

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academic attitudes to the procedures difficult to accept. Thus there is tension at exam marking times each year as the two groups come into conflict. This tension was manifest in our research, has not improved over time and appears to have become worse. Soh et al. (2000) would argue that this is a 'misfit' issue between the technology and the organisation. However, when new staff start in post many of the SITS stories are passed on and this may compound the lack of trust.

To summarise, the integration perspective portrays culture predominantly in terms of consistency where organisational members agree about what they are to do and why it is worthwhile to do it. In our case study this perspective was the weakest. Although SITS provided a centralised system it also introduced a lot of inflexibilities due to standardised procedures that did not fit in the working model of many departments. In contrast to the integration perspective, the differentiation perspective portrays the inconsistencies in an organisation where consensus exists only within the boundaries of a subculture. This was very strong in our case study especially between academics and administrators who appeared to lack consensus on how things should be done. No clear organisation-wide or sub cultural consensus emerges when a culture is viewed from a fragmentation perspective. Although SITS was brought in to achieve greater integration, effectiveness and efficiency in EducationCom, the new system however created tension, power games and the rise of sub groups that were trying to satisfy their own agendas and plans.

Conclusion

This study building upon the previous work of Dubé and Robey (1999) and Jackson (2011) illustrates the advantages of using multiple perspectives to understand organizational culture and practices. The integration, differentiation and fragmentation perspectives (Meyerson and Martin, 1987; Martin, 1992, 2002) each offers something additional and no single perspective enables a full interpretation of the culture change under study. While highlighting the new centralized approach to SITS and the shared values of the teams involved in the implementation and delivery of the SITS data and information, the integration perspective overlooks the organizational difficulties that have arisen through the implementation and have been divisive. In our study the differentiation perspective surfaces the lack of cohesion between groups and enables a deeper understanding of the problems of implementing a large ES such as SITS. The fragmentation perspective acknowledges that the study of culture is about paradoxes and ambiguity and enables the analysis of contradictory themes. Clearly EducationCom would not have anticipated the deterioration in the working relationships of many of its key staff and the change in the power relations between

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academic and administrative staff. Thus the fragmentation perspective adds such insights to the cultural analyst's other means of understanding organizations.

SITS technology and its 'best practice' embedded templates have been implemented in a standardised manner within EducationCom with no customisation. Thus what has emerged over time is an organisation compelled to working in a rigid manner with little opportunity for innovation. Degree programmes must be designed to be congruent with SITS internal data structures. The centralisation agenda has been expanded across the university to include other areas of business and academics have even less control of the academy. The SITS system itself cannot be implicated in all of the new centralised business systems but for a number of organisational actors its implementation has illustrated how a 'one university' can be established with shared values and culture. This does not mean that dissent has disappeared; it has just gone underground temporarily where the sub-cultural dissidents continue to thrive.

Our study contributes in the organisational culture, information systems and higher education research area by showing how an institution's culture changed after the implementation of an ES. More specifically we found that EducationCom's culture, the way that things are done around the institution, changed in a number of ways after the implementation of the new system:

- Internal data and structures are now kept centrally and power has shifted from the various departments or faculties to a central department.
- Academics are no longer the main stakeholders of the university; they have become just another university actor with a focus in teaching and research with very little decision making input.
- The new system dictates how degree programmes are to be designed and any opportunity for innovation and change needs to be first and foremost complying with the new system's structure and embedded capabilities.
- The new system caused a deterioration of employee relationships and in particular created a rival culture between academics and administrators.

Although more research is needed in order to explore the impact that ESs have on an organisation's culture, it is evident that the use of ES in the HE sector can change the way universities operate. Due to the diversity of the education environment it is essential to gain a better understanding of the various stakeholders' involvement. Future research can look

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further into the impact of ES on a university's culture by expanding the research to other institutions in the UK and beyond. Finally, it is clear that the education environment has been revolutionised over the last 20 years and that this transformation has come predominantly from the amazing technological advancements of our time. The question perhaps remains what does the future hold for universities?

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Interviewee Code	Gender	Interviewee Role
Academic 1	Female	Senior Academic
Administrator 1	Female	Senior Administrator
Administrator 2	Female	Senior Administrator
Administrator 3	Female	Principal Administrator
Academic 2	Male	Senior Academic
Academic 3	Male	Senior Academic
Administrator 4	Female	Principal Administrator
Academic 4	Female	Senior Academic
Administrator 5	Female	Senior Administrator
Academic 5	Male	Associate Dean
Academic 6	Male	Principal Academic
Academic 7	Male	Principal Academic
Academic 8	Male	University Registrar
Administrator 6	Female	Senior Administrator
Administrator 7	Female	Principal Administrator
Administrator 8	Female	Principal Administrator
Administrator 9	Female	Principal Administrator
Administrator 10	Female	Senior Administrator
Administrator 11	Female	Senior Administrator
Administrator 12	Male	Senior Administrator
Administrator 13	Female	SITS Team
Administrator 14	Female	Project Manager

Table 1 Interviewees Profiles

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Klein and Meyers (1999) principle explanation	Application of these principles in this thesis
1. The Fundamental Principle of the Hermeneutic Circle This principle suggests that all human understanding is achieved by iterating between considering the interdependent meaning of parts and the whole that they form. This principle of human understanding is fundamental to all the other principles.	**This study explores the impact that an ES implementation has on an organisation's culture in a HE context. It attempts to identify changes on the individual participants which then will determine the changes that took place in the organisation as a whole.**
2. The Principle of Contextualization Requires critical reflection of the social and historical background of the research setting, so that the intended audience can see how the current situation under investigation emerged.	**The contextual setting was dealt in the literature section when the background of this research was discussed.**
3. The Principle of Interaction Between the Researchers and the Subjects Requires critical reflection on how the research materials (or "data") were socially constructed through the interaction between the researchers and participants.	**The researchers reflected at the end of the research on their methodological process in order to reduce biases while questioning their own assumptions. Also after completing the interview transcripts the authors returned them to the participants in order to make sure that they agreed with it.**
4. The Principle of Abstraction and Generalization Requires relating the idiographic details revealed by the data interpretation through the application of principles one and two to theoretical, general concepts that describe the nature of human understanding and social action.	**The findings of this research are presented and discussed in relation to Martins and Meyers (1987) cultural model. The intention of this research is not to generalise from the findings but rather to understand the impact that ES have on an organisation's culture.**
5. The Principle of Dialogical Reasoning Requires sensitivity to possible contradictions between the theoretical preconceptions guiding the research design and actual findings ("the story which the data tell") with subsequent cycles of revision.	**The authors have exposed the data to other researchers (3 in total) in order to validate their understanding of the data.**
6. The Principle of Multiple Interpretations Requires sensitivity to possible differences in interpretations among the participants as are typically expressed in multiple narratives or stories of the same sequence of events under study. Similar to multiple witness accounts even if all tell it as they saw it.	**This research identifies differences in views, values and beliefs regarding SITS from various stakeholders (i.e. administrators, academics, SITS team, central department). This research does not intend to present one 'reality'.**
7. The Principle of Suspicion Requires sensitivity to possible "biases" and systematic "distortions" in the narratives collected from the participants.	**The researchers recognised the highly political nature of the research environment and was aware of various agendas.**

Table 2 Seven Principles for Interpretive Field Research (adapted from Klein and Meyers, 1999 and applied in this research)

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	Integration	Differentiation	Fragmentation
Before SITS	• Working together as a team for the benefit of students. • Shared knowledge of roles and responsibilities. Administrators used to support academic staff.	• Academics and administrators work is different and each is having their own values. • Sub-cultures existed at school level or academic groups or administrator groups.	• Decentralised organisation. • Complexity around type of delivery and degree courses.
After SITS	• Centralised student administration system. • Conformity around usage of SITS. • Common SITS language, data entry, processes around marks recording, exam boards etc.	• Academics are isolated. • Sub-cultures exist between academics and administrators based on their grade and role. New sub-cultures of Good Housekeepers and Academic Teams • Administrators support SITS not the academics.	• Academics have no access to important information - rely heavily on administrators • Administrators have solely access to information. Academics and administrators do not work as a team but there is a battle of who is better than the other. • Entrepreneurial Academics set their own systems outside SITS.

Table 3 Before and After SITS – culture from different view points

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