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EDITORIAL – From the Faculty Editor

Welcome to iSCHANNEL, produced by MSc and PhD students from the Information Systems and Innovation Group, Department of Management. The journal's content provides an indication of the range of topics our students study, and of different theoretical perspectives that inform their work. I hope you will enjoy reading it. A lot of hard work is involved in producing an issue of the journal. Authors have to write and revise the articles when requested. The editorial team needs to carefully choose an interesting mix of high quality papers and to guide authors through the revision process. Articles have to be proof read and edited before being printed. All this is done by students. I would like to thank the team of writers, reviewers, proof readers and all those who supported the production for their effort. Well done! Special thanks go to the Editor-In-Chief Silvia Masiero. She has worked tirelessly this year to ensure a high quality edition.

We are keen to expand the variety of publications and to include more empirical papers, in addition to welcoming interesting position papers and literature reviews. This journal cannot exist without support of our students. If you are a current or an alumni student I encourage you to get involved, to submit papers and to join the editorial team. You can find out more about the journal, including how to submit a paper, and to access past issues on our website.

Let's make iSCHANNEL better than ever.

Best wishes,

Dr. Ela Klecun

Faculty Editor

EDITORIAL – Unpacking the Social in the Information Systems Domain

In one of the first programmatic pieces on the nature of the IS field, Land and Hirschheim (1983) put forward the idea that information systems are to be conceived, in the first place, as social systems that use technology. This vision, whose sociotechnical nature constituted *per se* a significant theoretical innovation, gave birth, with its application over time, to a profoundly novel way of reading the relation between technology and society. Its originality, with respect to existing visions of technology, consisted in putting forward a view that, in opposition to a sheer technical-rational focus, transcended the boundaries of the artefact, and focused on the multiple consequences of technology on the social systems in which it is immersed. In this approach, therefore, the unit of analysis at the core of thought is not anymore the artefact *per se*, but the ensemble constituted by technology and the social environment surrounding it.

In this issue of the iSCHANNEL, we present five articles that, albeit through different theories and diverse empirical contents, all represent substantial embodiments of the vision stated above. These papers, while preserving the thematic diversity that has characterized our journal since its first issue, are unified by a common denominator: technology, within them, is not conceptualized as a self-standing unit, but as the centre of a field of social, cultural, and cognitive forces (Avgerou 2001). The ensemble view of technology, as it is detailed by Orlikowski and Iacono (2001), is strongly reminded here: the relation between technology and society, as it features within these articles, is one of mutual shaping and interaction, which makes it difficult to disentangle the elements that relate to each other in its constitution. Thirty years after its theorization, the vision by Land and Hirschheim is now interpreted and embodied by the pieces presented here, which make it come alive in the current context of our research domain.

In "The Organizing Vision of Patient Access: Reflections on the New NHS Information Strategy by Healthcare Professionals", Gizdem Akdur focuses on a patient-centric innovation in healthcare technologies, constituted by online patient access to medical records. This innovation is studied with reference to its polymorphous perceptions by healthcare professionals, in the light of its social consequences and of the objectives of patient empowerment that it is aimed to reach. As she looks at this, the author proposes a methodological innovation in the analysis, which consists in observing her empirical data from the lens of the organizing vision of patient access: this theory, applied to the object in point, offers a deeply novel way of conceptualizing the technology and its multiple interactions with the environment. As a result, the author depicts technological innovation

within the social system in which it is applied, illuminating the complex web of relations through which these domains are interlinked.

In "Perspectives on the Relationship between IT Investment and Economic Performance: A Firm-Level Critical Literature Review", Fuqiang Guan looks at the diverse ways in which the relation between IT and firm-level economic output has been studied in IS literature. Grounding on a wide set of theoretical sources, the author proposes a taxonomy of the literature that is articulated in three streams, centred respectively on the concept of productivity, complementary factors related to organizational changes, and the costs induced by IT in economic exchange. In the article, the author goes in depth into the assumptions and perspectives of each stream, examining how these are reflected in the study of the relationship between IT and firm-level performance. In this way, the author reads IS through the lens provided by the economics of innovation: this means, in fact, not only offering a powerful synthesis of existing literature, but providing a neat image of the complex interconnection between IT investment and economic output.

In "The Internet of Things: Research Discussions and Directions", Saidat Giwa-Osagie provides a classification of the multiple depictions of the Internet of Things in IS literature. Based on the traditional distinction between techno-rational and socio-technical approaches, the author applies it to the observed phenomenon, looking at the consequences that this has for the study of the theme in point. In this way, the author provides a strong embodiment of the vision of IS as social systems: indeed, as she reviews the literature, she firmly places technology in the field of social forces in which it is situated, looking at the ways in which it influences the diverse environments of reference, and is, in turn, modified by them. Furthermore, in this piece, the substance of a well-established theoretical division – that of technical-rational approaches vs. sociotechnical ones – finds application in a very practical domain, constituted by the Internet of Things and its multiple representations in the literature.

In "Knowledge Management: An Epistemological Perspective", Oxana Dubovik looks at how diverse epistemological approaches observe and conceive the domain of knowledge management. Through conceptualization of positivism, interpretivism and pluralism, the author explains the basis of each vision, observing how it is related to the study of knowledge management within the IS field. In this way, the author shows how the intrinsic abstraction of epistemology is, in fact, converted into very practical consequences

when applied to IS phenomena, and how this results in an illuminating reading key for our research domain. Also, with this piece, the author provides a deeply informative focus on knowledge management, a theme of highest relevance in the current historical phase, characterized by the overarching power of information in the economy and society.

In "Matchmaking by Machine: A Socio-Technical and Socio-Cultural Perspective to Online Dating", Linda Yang studies the online dating phenomenon through the social, political, and cultural nature of the technologies implicated in it. The article, starting from the notion of IS as inherently social systems, uses online dating as a paradigm of how digital business models tend to transcend economic objectives, producing changes in the wide sphere of societal behaviours, attitudes, and images connected to this. The inherent power relations, among the actors involved in the online dating phenomenon, are observed through a sociocultural perspective, which sheds light, once again, on the multiple interconnections between the technological and social domains. This article, for how it is constructed, constitutes another study of technology within the social reality in which it is immersed, where the mutual shaping between these elements constitutes the core of attention and analysis.

The vision of IS as inherently social systems, stated by Land and Hirschheim and profoundly rooted in the recent history of the field, is embodied clearly and strongly by the articles in this issue, illuminating different perspectives on the dynamics at the centre of analysis. The five articles contained here constitute, therefore, five diverse routes to unpacking the notion of the social in information systems, and to making the vision by Land and Hirschheim come alive in the dynamics that characterize the field. Theorizing the social, and seeing it in action in multiple ways and perspectives, is a key task in our research domain, and one that poses profoundly relevant questions as to how we conceptualize the social, and how we see it as related to the changes that technology brings into the systems that we observe. The articles in this issue, with their theoretical and practical attempts at unpacking the social in the IS domain, constitute a set of implicit answers to these questions.

Silvia Masiero

Editor-in-Chief

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The Organising Vision of Patient Access

Reflections on the New NHS Information Strategy by Healthcare Professionals

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KEYWORDS

Organising Vision

Patient Access

NHS Information Strategy

Healthcare Innovation

ABSTRACT

In the UK, patient-centred care and patient empowerment have attracted much attention in the last decade through the introduction of new government strategies and the global advancement of related healthcare technologies. One of the initiatives that emerged out of patient-centricity claims has been the online patient access to medical records. The latest IT strategy document of the Department of Health (2012) puts forward various legitimation claims about a future centralised database of patient records. Concerning this innovation, the study aims to explore the reflections of healthcare professionals on the IT vision of the government through the lens of the Organising Vision (OV) theory. Based on the analysis of the 7 interviews conducted, the author analyses the organising vision activities (interpretation and legitimation) of patient access with the use of the four success factors of OV (informativeness, plausibility, distinctiveness & sense of importance) with preliminary conclusions on the overall compellingness of the vision and the visibility of the innovation.

Introduction

The patient centricity in the UK's National Health Service (NHS) is gaining more legitimacy over the years due to various IT projects that have been materialised. NHS National Programme for IT (NPfIT), also known as the world's biggest civilian IT project (Takian & Cornford, 2012), introduced some elements of patient self-management through initiatives such as online access to summary care records. Department of Health later proclaimed in the white paper (DOH, 2010) that "patients will be at the heart of everything we do. So they will have more choice and control" (Klecun, 2011).

Patient access to medical records exists in the form of local initiatives in many parts of the UK. In most cases these systems only contain the records of the patients who are registered at a certain practice, and the transfer of data between different practices is not always instant. The latest IT strategy of the government serves an initiative to close the gap in the interoperability throughout the country by creating a single centralised patient record access database: 'The Health and Social Care Information Centre' (DOH, 2012). There are various legitimation claims made in the strategy document about why this in-

novation needs to be implemented and how it will benefit the healthcare professionals and the public in general.

In this study, the author will attempt to explore the different meanings attached to patient accessible online medical records from the perspectives of both policy and medical profession. The healthcare professionals' reflections on the current vision of this IT innovation can serve as valuable indicators in determining the future success of the adoption and the assimilation of these technologies.

Literature Review

Recent Policy and Strategy

With the introduction of a new information strategy document in May 2012, 'The power of Information' (DOH, 2012), the Department of Health sets out a vision to put "all of us" (citizens, members of the community, carers, patients or service users, healthcare professionals (HCPs), service providers, commissioners of healthcare services, IT specialists, system suppliers, information intermediaries) in control of health and social care information "we" need (DOH, 2012; E-Health Insider, 2012a). In the core of this strategy lies the introduction of 'The Health and Social Care Information Centre' – the online platform where all the NHS, social care and public health information will be kept (DOH, 2012). Prior to this, there has not been 'a single overall record'

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of people's healthcare history in the UK, which can be linked across organisations and are also consistent across the country. The Department of Health (DOH, 2012) expresses some of the main ambitions of the strategy, within a ten-year framework, as:

•"*Information recorded once, at our first contact with professional staff, and shared securely between those providig our care – supported by consistent use of information standards that enable data to flow (interoperability) between systems whilst keeping our confidential information safe and secure.*

•*An information-led culture where all health and care professionals (…) take responsibility for recording, sharing and using information to improve our care.*

•*An information system built on innovative and integrated solutions and local decision-making, within a framework of national standards that ensure information can move freely, safely, and securely around the system."*

Through this new centralised system, patient access to records is expected to bring significant benefits in the way patients manage their health, improve continuity and experience of care by sharing records with HCPs and carers, and identify mistakes in their records to avoid errors. Patients will also be able to book appointments and order repeat prescriptions, communicate with healthcare professionals using online communication channels, get in touch with support groups of choice, and see their full medical record including test results, letters, care plans, and needs assessments "by 2015 (by the end of this Parliament)" (DOH, 2012).

Success/Failure and Different Perceptions of Patient Access at NHS

The national programme (NPfIT) was ended by the current government in September 2010 (E-Health Insider, 2010), due to delays and the rising costs of the programme. The problems encountered during NPfIT implementation were always well-publicised; however NPfIT was also associated with some significant achievements (National Audit Office, 2011; Klecun, 2011). The Choose and Book referral system, GP2GP transfer, e-prescribing services and PACS have been noted as valuable elements of the NPfIT (E-Health Insider, 2012a; 2012b; Greenhalgh et al., 2008).

The same enthusiasm was not seen concerning the record access element of the programme, namely summary care records (SCR) which were planned to be operated under the HealthSpace website. Due to low uptake (E-Health Insider, 2011), 2 years after its launch, the government has announced that, which coincides with the publication of 'The power

of information' document, HealthSpace will be closing down in the next 12 months (E-Health Insider, 2012b), but the best features of it will be incorporated in the new portal of patients as proposed in the latest white paper.

The concerns over SCRs by the early adopter general practices were mainly related with workload and consent. GPs expressed concerns about increasing workload that results from adding information to records one by one, about the security of the system and the trust issues between patients and the practices, and about the patient understanding of the choices patients were given to make (Greenhalgh et al., 2008). In general, many healthcare professionals have expressed concerns about Record Access in the past, concerning the length of consultations, potential for litigation, the ways that the records are written and the potential of patients accessing irrelevant and inappropriate third-party information (The Royal College of General Practitioners, 2010).

In the light of this information, the author presents the research questions as follows: How do healthcare professionals reflect on the full patient access to data? How compelling is the organising vision of patient access and what are the explanations behind its level of visibility?

Theoretical Framework

The theoretical lens underpinned in this study is of organising vision (OV), coined by Swanson and Ramiller (1997). Organising Vision can provide important means to examine and explore various claims and meanings attached to an innovation, and what activities these meanings had emerged out of. The main concepts that the study will look into are the compellingness and the success of an organising vision.

This study adopts the notion of organising vision with an emphasis on the 2 functions served by the theory (Swanson & Ramiller, 1997): interpretation (a common story that describes the nature and the purpose of the innovation) (Klecun & Cornford, 2002), and legitimation (a shared rationale on why it should be adopted and used) (Greenhalgh et al., 2012). Since the study focuses on an innovation whose material realisation is still at a tentative state, the mobilisation function (activities that promote and materialise the innovation) will not be examined in the analysis.

For an organising vision to be successful, it should offer a novelty over existing practices or products (distinctiveness), be clear about why a specific technology is needed and what it can do (informativeness), be free of exaggerated statements about

the expected outcomes (plausibility) and attach a perceived practical value to the technology (sense of importance) (Swanson & Ramiller, 1997; Greenhalgh et al., 2012; Klecun & Cornford, 2002). These 4 elements constitute the factors of success of an organising vision.

Previously, the organising vision theory has been adopted and found to be useful by a number of researchers both in business and healthcare studies. To illustrate, Currie (2004) studies the process-oriented analysis of application services provisioning (ASP) in business and remarks how valuable the organising vision lens is in the understanding of the adoption and the diffusion of an emerging IS innovation. Reardon and Davidson (2007) explore the role of the OV of the electronic medical record (EMR) in small physician practices and how this vision shapes the perceptions of the physicians. It has been stated in the same study that the OV theory is shown to be applicable in healthcare IT innovations, and that analysing the perceptions of the organising vision can provide useful insights into the diffusion process of the healthcare technologies.

Methodology

In this study, semi-structured interviews with open-ended questions were conducted to explore the reflections by healthcare professionals about patient empowerment, perceived benefits and challenges of patient access to data, and general thoughts on the IT strategy of Department of Health. As the study deals with the visions set out by the government, several relevant policy and strategy documents were analysed by drawing some elements from the content analysis approach, which then led the author to divide meanings and claims mentioned in the documents under the 2 categories: interpretation and legitimation activities. These documents were gathered from the UK Department of Health website (DOH, 2012b).

Initially, seven semi-structured interviews were conducted over a period of two weeks in July 2012, including GPs, a nurse and an epidemiologist, who are actively engaged with NHS patients or with public health topics in general.

To analyse the interview data, the reflections of the HCPs were categorised under interpretation and legitimation activities and analysed through the 4 factors of OV success: plausibility, distinctiveness, sense of importance and informativeness. Based on the analysis, some preliminary conclusions about the level of compellingness and the visibility of the government's IT vision were made.

#	Position	Interview Type
1	Full-time General Practitioner at a hospital in Sussex who runs a part-time private clinic in London	In-Person
2	Full-time healthcare informatician at the NHS Connecting for Health and part-time nurse in London	Telephone
3	Retired GP who runs a private clinic in London	In-Person
4	Full-time GP at a hospital in London who runs a part-time private clinic	In-Person
5	Epidemiologist / healthcare researcher at the University of Sheffield	Telephone
6	3rd year Senior House Officer at a Yorkshire hospital	In-Person
7	Full-time GP at the University of Sheffield Health Service	Telephone

Table 1. Basic Anonymised Data about the Interviewees

Findings

The motivation for this chapter is to explore the meanings that have been attached to the online patient access. These findings include answers from healthcare professionals concerning their reflections on patient empowerment through the new IT strategy, perceived benefits and challenges of this innovation, general thoughts on the strategy, and some recommendations that have been vocalised.

Patient Empowerment

The interviewees expressed positive attitudes towards the idea of patient empowerment and saw it as a valuable asset in the continuity of care.

"*It is advantageous to have knowing patients on your side. There is a higher chance they will follow the treatment plan better and pay less frequent visits to the clinic for unnecessary questions.*" [Interviewee #4]

Even though the idea of patient centricity in healthcare received positive insights, the patient access to full medical record was not perceived as the best approach in empowering patients. Interviewees expressed reflections on what the white paper (DOH, 2012) expresses as "The more information the better":

"*More information is better on the doctor's side, not the patients'.*" [Interviewee #1]

"*Giving access to records does not necessarily empower patients. It's all about the patient interests. Only a really small number of people are interested in this. The rest prefers when doctors and nurses take control.*" [Interviewee #2]

Perceived Benefits and Concerns About Patient Access

As expressed in the 'Power of Information' document (DOH, 2012), the future centralised system will include the functions of online appointment booking, online repeat prescriptions, online communication with HCPs, access to support groups and patient access to full medical records.

Positive reflections have been noted concerning the appointment booking and online drug prescription services as all the interviewees believed that it could save time and money. They saw these functions to be valuable for both HCPs and the patients.

However, the reflections on patient accessible medical records were not as optimistic as the previously mentioned functions and many concerns were expressed in this topic. In general, the interviewees believed that the access to a full medical record should be limited to the healthcare professionals who diagnose/treat/care for the patient, and that the patient should only see a summary of their record which contains the most relevant data. One of the most vocalised concerns by the interviewees about patient access to data was the likelihood of confusion and increasing anxiety on the patient's side because of being overwhelmed by data.

"Doctors take notes and keep records about their patients using a special terminology which will not be comprehended fully by the patients when they access it from their homes." [Interviewee #5]

"It'd be quite worrying to deliver bad news over cyberspace rather than during face-to-face consultations." [Interviewee #2]

"The patients should not see everything but only a summary of the most relevant data. The big challenge is deciding what set of data it is going to be." [Interviewee #5]

Several interviewees also had concerns about the shifting focus of continuity of patient care. They stated that trusting an online account should not overcome the relationship between the healthcare professional and the patient. As the interviewees remarked:

"GPs should make a balanced judgement of what is on the screen and what they know about the patient. Therefore, the traditional patient-GP relationship cannot and should not be replaced by any sort of mechanical initiatives." [Interviewee #3]

"The data from the patient's online record can only be complementary." [Interviewee #1]

Shared EMRs between hospitals and the GP2GP transfer services were favoured as better ways of sharing data between healthcare professionals, over creating a central database in the cloud where patients can also see and edit their records. Security, confidentiality and litigation issues were vocalised under this topic.

"Data linkage between hospitals should be reinforced instead of centralising everything." [Interviewee #5]

"People appreciate the use of data as long as it is confidential. Ethics committees should govern the central database, but even this is not a guarantee that our information will be kept safe." [Interviewee #2]

Reflections on Value and Timing of the Strategy

During the interviews, the interviewees emphasised that the strategy was rushed due to political factors and government pressure, rather than having a driving need for implementing it coming from patients or healthcare professionals.

"This strategy is a non-starter: There should be changes at the policy level first. Patients and clinicians need to see the value in such systems and this will take time. At the moment, patient access should be low in priority and more attention should be paid to GP2GP services instead." [Interviewee #7]

"The motive behind standardisation is purely political. The government is aiming to create a 'McDonald's Healthcare Service'." [Interviewee #2]

Another area of criticism was related with the coherence of the document and its failure in explaining responsibilities of relevant stakeholders during the implementation period.

"The Power of Information document is clear about what exactly is desired, but very ambiguous about how to do it." [Interviewee #7]

The findings show that there are varied meanings that have been attached to the same system by healthcare professionals, but the main areas of shared criticism have been observed to be the timing and the origins of the government's IT strategy.

The next chapter will deal with the analysis of clashing and overlapping interpretations of the patient record access between the policy level (IT strategy documents) and the medical profession level (interview data).

Analysis and Discussion

The interpretation and legitimation activities set out by the government in the strategy documents will be compared and contrasted with the actual perceptions (actual interpretation/legitimation activities) of the healthcare professionals. At the end of each interpretation and legitimation activity described in the following sub-chapters, a statement about the relevant OV success factors - *informativeness, distinctiveness, plausibility, perceived practical value* - will be included to identify the success of the activity. The comparisons made between the interpretation and legitimation activities, and the categorisation of the OV success factors will then be used to draw conclusions on the current success and the compellingness of the vision.

Interpretation

Before the interviews, most of the professionals were not aware of the government's strategy on future centralisation of all records under the Health and Social Care Information Centre by 2015. This finding shows that the vision has not yet reached a high level of informativeness in the first few months after its publication, even though it has been explicitly stated on the first page of the document that healthcare professionals and the public are the target audience (DOH, 2012).

The strategy has been defined as *"a shared, coherent vision for information across healthcare (...) This is a collective strategy rather than a centrally driven programme"* in the white paper (DOH, 2012), whereas research findings collected through the interviews mainly show us that the biggest criticism about the strategy has been the isolation between the policy level and the healthcare professionals. Based on the reflections of HCPs, this particular interpretation by the policy makers is of low *plausibility* due to the exaggerated statement. Moreover, the main buzzword that has been used by healthcare professionals to interpret this IT innovation was 'government-imposed', which conflicts with the policy makers' interpretation of a 'ready culture' who will embrace innovations readily. The findings reflect that the coercive pressure will be a powerful element in the nation-wide implementation of this innovation. Without the political pressures concerning the legislation of the technology, the *plausibility* and the *perceived practical value* of the innovation might be seen as low by the HCPs.

All the interviewees showed good knowledge of the NPfIT programme or of the innovations that have been introduced within this programme. The concerns that the interviewees expressed about a possible failure of the new IT strategy were mainly based on the failure of NPfIT and the cost of this failure. Due to the trust issues that have been vocalised, the *perceived sense of importance* attached to this new IT innovation has been observed to be low.

The *distinctiveness* of the patient record access as a form of innovation was also challenged during the interviews. Some interviewees gave the example of EMIS-PAERS patient access system (EMIS Online, 2012) and stated that making such a system nation-wide would not make the new IT strategy *special*.

Legitimation

One legitimation claim put forward in the strategy document is that patient record access will benefit HCPs by making the length of consultations shorter and the patient visits less frequent, therefore it will improve the quality of their practice. However, all the interviewees expressed concerns about increasing patient demand due to confusion of the patients after seeing their own records. They also expressed a need for more pilot studies to see whether the expected benefits are being met. This legitimation claim by the policymakers could prove to be plausible in the future but the current findings show that the *plausibility* is low on this claim.

The legitimation claims made on the need for online appointment booking and ordering repeat prescriptions from the patient's side were observed to legitimise the innovation more than the mere claims made on the advantages of patient record access. The *plausibility* of reducing unnecessary patient visits to GPs or hospitals due to online booking and order prescriptions is high as well as the *perceived value* and *informativeness* attached to these systems.

The strategy document expresses a strong view on the idea that the more information healthcare professionals and patients can access, the better service patients will receive. This statement has been in conflict with the answers from all interviewees who expressed concerns about increasing levels of anxiety and confusion on the patient's side, but meanwhile this innovation was seen as a valuable asset if it is only accessible by the healthcare professionals, much resembling the system of shared EMRs. The general conclusion was that no data should be interpreted by patients in the absence of HCPs and that the continuity of care can be provided with the enhancement of the GP2GP services. This second legitimation claim of the policy makers has therefore been interpreted to be medium in its *distinctiveness* and in its *perceived practical value*, because HCPs believe that this technology can help them to easily access information about their patients, only not in a completely novel way.

The lack of publicly announced pilot studies is another factor that puts a restriction on the legitimation claims about patient empowerment. The study findings reflect that the *informativeness* of this vision can be increased by conducting more pilot studies and publishing reports on the benefits that patient access brings to patients.

The Compellingness of the Organising Vision of Patient Access

The analysis of the strategy documents and the interview data reveals that the organising vision of centralised patient record access has been shaped as a product of political pressures. Based on the perceptions of the sample interviewed in this study, it could be argued whether the adoption process of the organising vision of patient access is going to meet the expectations of the policy makers.

This organising vision is still in its early days of existence, but so far it seems to be struggling to convince the healthcare professionals with the messages it gives. This could be mainly because of lack of informativeness in the interpretations of technology and the meanings that policy makers have attached to it. The strategy document has been found to assign a "highly transformative meaning" (Klecun, 2011) to the IT innovation, especially with the legitimation claims based on the direct causal links between patient empowerment and online patient access to records.

The reasons why the plausibility of the centralised patient access has been undermined could be because the current organising vision does not fit the "pre-existing frames for thinking" (Swanson & Ramiller, 1997) in the domain of medical profession (due to different agendas compared to those of policy makers). The current perceived practical value of the centralised patient record access was found to be lower than the value attached to those of other IT services (online appointment booking, online repeat prescriptions) presented within the strategy document. This could be partly due to the lack of adequate interactions with that particular technology in its *social context* (the nation-wide system for patient access is still conceptual), and this perceived value could rise or fall further later "in the light of mobilisation activities" (Swanson & Ramiller, 1997).

"The ambition is bold, and it will take time." (DOH, 2012) is how the vision was defined in the strategy document. It can be interpreted that the legitimation activities of the Department of Health will be ongoing in order to increase the informativeness and the distinctiveness of the vision. Success factors may vary over time due to new mobilisation activities, and the compellingness of the organising vision

may fall or rise accordingly. The author believes that the organising vision of patient access could become more compelling over time if conflicts and tensions between the policy and the medical level are resolved on the way.

Conclusion

The organising vision of patient access is still under constant construction. The perceived practical value, informativeness, plausibility, and the distinctiveness of the government's patient record access strategy have been observed to be lower than the strategies concerning other online systems such as online appointment booking and ordering online repeat prescriptions. The interview data analysis, on the other hand, presented positive attitudes towards the patient empowerment movement, but only not through the patient access to full medical records.

The analysis of the documents and the interview data makes a point clear that the organising vision of patient access in the NHS, whether readily adopted by HCPs or not, will not easily come to its demise, due to political forces. The question that could be asked here is how to find an accommodating ground between the enthusiastic policymakers and the more realistic healthcare professionals to ensure a smoother implementation and assimilation in the future.

The author suggests that the competing discourses about patient access could be accommodated if a "more effective inter-stakeholder dialogue" and "cross-sector learning communities" (Greenhalgh et al., 2012) are created in the NHS. The vision can be embraced and owned by the stakeholders if they are more vocal in the process of formulation of the organising vision. By creating a broadly coherent organising vision, the sustainability of the technology could be guaranteed.

For the vision of patient access to be realised at a wider level, some recommendations can be put forward for consideration at the policy level. Informativeness as an OV success factor is a crucial element that can affect plausibility, distinctiveness and the perceived value of the organising vision at later stages. For greater informativeness, the legitimation claims made about patient access to data could be supported with more pilot studies particularly conducted on the patients by exploring their reflections on this IT innovation. Without a doubt, more research is also needed to explore the meanings attached to the innovation by different stakeholder groups.

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Perspectives on the Relationship between IT Investment and Economic Performance
A Firm-Level Critical Literature Review

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KEYWORDS	ABSTRACT
IT investment Firm Performance Productivity Organisational Change Transaction Cost Theory	As a result of competition becoming increasingly fierce, firms are challenged to seek effective ways to improve their performance. Investment in IT is considered as a feasible strategy to influence company performance and preserve competitive advantage. Based on the existing Information Systems literature in this field, this paper reviews the different perspectives on how researchers understand the relationship between IT investment and economic performance. On one hand, several authors view productivity as an indicator of the economic performance of firms, and explore the impacts of IT capital by examining the production process. On the other hand, other works take a more holistic view, highlighting the importance of complementary factors and organisational changes. Another perspective concentrates on researching firm performance, through studying the costs incurred in an economic exchange. They adopt Transaction Cost Theory to analyse the effects of IT on transaction costs, and to find the true costs of IT outsourcing. It is suggested that future research should consider identifying the relationship between IT investment and firm profitability, understanding the timing of payoff from IT investments, and analysing the effects of industry and country differences.

Introduction

Mahoney and Pandian (1992) propose the term Resource Based View, which recognises that IT is one of the firm's resources, and IT has a significant impact on firm performance. In order to keep competitive advantage, companies need to consider how to maximise the economic utility of their IT investment.

Investment in Information Technology (IT) has close relationships with economic performance. Dedrick et al. (2003) propose that firms usually take deliberate approaches to maximise the economic utility of their IT investments. In general, IT capital is defined as investing in hardware, software and services, computers and telecommunications, while various economic measures are analysed at different levels, such as GDP per capita at the macro-level, and labour productivity and intangible benefits at the micro-level.

The relationship between IT investment and economic performance can be understood from exploring the production process through which inputs are transformed into outputs. Dedrick et al. (2003) develop a conceptual framework to identify the input-output relationship, which is a mix of

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production factors to determine the various outcomes. More specifically, labour and capital investments are regarded as inputs, and economic growth and labour productivity increase are deemed as outcomes. The increases in levels, quality and productivity of inputs contribute to the growth in outputs (Bresnahan, 1999; Brynjolfsson & Hitt, 2000).

Brynjolfsson and Hitt (1998) bring forward that productivity growth can be gained from reducing the direct cost of IT capital such as plants and equipment, while Athey and Stern (1997) point out the complementary investments in organisations also have an impact on firm performance. The framework proposed by Dedrick et al. (2003) points out that there are various complementary factors that contribute to the outcomes of IT investments. Brynjolfsson (1996) and Brynjolfsson et al. (2000) indicate that the complementary factors at firm-level include organisation and management practices, and prove that the structure and business practices of the firms contribute to the returns of IT capital. Furthermore, Brynjolfsson et al. (2000) state that these organisational investments lead to productivity increases not only by reducing costs, but also by improving intangible aspects such as quality and variety.

Moreover, Transaction Cost Theory (TCT) is another perspective to understand the relationship between IT investments and economic performance. Ciborra

(1993) highlights the firm performance can be affected by the transaction costs, which are the consequence of incomplete distribution of information among the economic agents. Ciborra (1981) emphasises that TCT is a solution that can reduce transaction costs. IT realises the lower cost information communication to decrease transaction costs (Malone et al., 1987), and IT lowers coordination costs within the value chain to reduce transaction costs. However, Cordella (2006) argues that previous studies underestimate the impact of interdependence of factors, which could cause the negative effects of IT on transaction costs. Indeed, an assessment of interdependence can help practitioners to evaluate the real costs and make judgements on the feasibility of IT outsourcing.

This literature review is organised to discuss IT's influence on economic performance at firm-level. The emphasis on firm-level analysis has important measurement advantages for discussing the effects of intangible organisational investments (Dedrick et al., 2003). This paper begins by explaining the productivity paradox, and then discusses the arguments of IT investment impact from production process framework. Moreover, TCT as another perspective is used to examine the issues of IT capital and organisational performance. Finally, the concluding points of this review consider the limitations of restricting the analysis at the firm-level, and boost understanding of the topic for future research.

IT Investment, Productivity and Organisational Changes

Scholars have categorised extensive researches and addressed various aspects of IT's influence on economic performance, which is classified between process performance and company performance (Melville et al., 2004). Many researchers agree that process performance intermediates the impact that IT investment has on company performance (Kim et al., 2006; Mittal & Nault, 2009). Among many process measures, productivity estimates the rate of output per unit of input, and is perhaps the one that is discussed most frequently in the literature (Smith, 2008).

During the late 1980s and early 1990s, much literature indicated that IT investment had a limited impact on productivity at various levels (Baily, 1986; Berndt & Morrison, 1995; Loveman, 1994). Specifically, Brynjolfsson and Yang (1996) surveyed over 150 studies, and then stated that the relationship between IT investment and productivity is uncertain, while Dedrick et al. (2003) also failed to identify this relationship. The phenomenon that IT investment was unable to increase productivity leads to the term "productivity paradox". The paradox was supported by sufficient evidence that

labour productivity decreased with IT investment increasing (Strassmann, 1990; Mahmood & Mann, 2005). However, the paradox was overturned as productivity gains were observed in 1990s. As more research has been carried out, researchers have gradually found the positive relationship between IT capital and productivity growth. Even though the evidence implies that impacts of IT investment take time to exert an influence (Brynjolfsson & Hitt, 2000; Mahmood & Mann, 2005), growing investments in IT contributes to boosting the productivity (Smith, 2008; Colecchia & Schreyer, 2001). The labour productivity growth is an indicator of the economic performance of firms (Dedrick et al., 2003). However, the impact of IT investment is difficult to measure by labour productivity growth directly since IT enables complementary organisational investments. These investments, in turn, lead to improvement in intangible assets.

Costs of Direct Investment

The issue of how to measure the productivity growth from IT investment is controversial in academia nowadays. Previous researchers mainly examine the effects of direct investment by using quantitative analysis. Brynjolfsson and Hitt, (1998) and Brynjolfsson (2003) point that the labour productivity improvement from IT capital can be achieved by either decreasing IT expenditure or increasing business benefits. Del Gatto et al. (2009) demonstrate that quantifying IT contribution on organisational productivity growth is a requisite step for empirical analysis. Scholars use the statistical tools to estimate the average annual contribution of IT investment to total output in order to determine the significant factors in labour productivity growth (Brynjolfsson & Hitt, 1995; Lichtenberg, 1995).

Moreover, Brynjolfsson and Hitt (2000) find that returns of IT investment occur not only in labour productivity growth but also in Multifactor Productivity (MFP) increases. Gilchrist et al. (2001) prove that IT has a substantial influence on increasing labour productivity and MFP.

In addition, the influence of IT investments on productivity varies among different companies (Brynjolfsson & Hitt, 2000). At the firm level, the phenomenon can be explained by complementary investments in organisational capital such as the structure and business practices.

Costs of Complementary Investment

Brynjolfsson and Hitt (2000) conduct productivity studies to figure out that output elasticities of IT exceed the input shares. The result can be explained as previous quantitative research articles neglect the

importance of intangible complementary investments. The unmeasured assets such as decentralising decision making, improving business process or acquiring highly skilled staff are not recorded in a company's balance sheet, but they have significant effects on the payoff to IT investment (Brynjolfsson and Hitt, 1995).

Athey and Stern (1997) prove that complementarities are the most plausible explanation for the link between IT and economic performance after empirical evaluation, and Brynjolfsson and Hitt (1998) find that the greatest IT benefits appear to be realised when an IT investment depends mostly on complementary organisational investments. Even though Bertschek and Kaiser (2004) indicate that output elasticities of IT capital do not differ significantly whether the company reorganise its workplace, major authors claim IT intensive firms tend to be more productive, and the returns of IT investment vary among companies because of unique characteristic and special features (Brynjolfsson & Brown, 2005; Brynjolfsson & Hitt, 2000). Moreover, firms will gain higher organisational productivity if they use IT to decentralise decision making process (Smith, 2008). Decentralised decision making restructures the information flow of a firm, and it makes more employees working and less people managing, which empowers lower-level workers to take responsibilities (Brynjolfsson and Brown, 2005). Interestingly, Black and Lynch (2001) find that the importance of IT usage at high level is not significant, but increasing the percentage of non-managerial employees who use computers has a decisive effect on company performance. Melville et al., (2004) support this view that IT investment coupled with increased delegation authority realises productivity improvement. Moreover, Smith (2008)'s research indicates that business processes improvement could lead to productivity growth at firm-level. Generally, business process is the daily operation of a company and it is embedded into the company culture, so IT is used to solve difficulties of business process changes. In addition, Keller (2004) adds that productivity improvement comes from the existing business unit rather than from a new investment, and Kudyba (2004) puts forward that IT must be integrated into current business processes.

Furthermore, greater influence of IT is combined with decentralised company structure, more knowledge workers and comprehensive training programmes (Brynjolfsson and Hitt, 2000). Brynjolfsson (2003) reveal that organisational productivity growth is associated with not only decentralised decision making, restructured business process, highly skilled employees and greater emphasis on training, but also automated routine tasks and powerful performance-based incentives.

Beyond Productivity

IT is described as general purpose technology, which affects a number of sectors and economic activities. IT is not simply a tool for automating business processes, but is an enabler of organisational changes (Dedrick et al., 2003; Kretschmer, 2012). Smith (2008) asserts that firms change the way they conduct business due to the investment in IT, and managers search for new ways to measure economic performance beyond productivity.

According to Brynjolfsson and Hitt (2000), firms have transformed the organisation such as supplier relationship and customer services by combining with IT. To elaborate, computer-based information systems facilitate supply chain management. With the Internet, Lee (2002) proposes that firms in a supply chain can be connected in real time with information and knowledge shared continuously, new products and services can be designed to fit special market segments, and new supply chain structures can be developed to serve customers in a more direct manner. Additionally, the Internet offers more opportunities for companies to interact with customers. Different from traditional models, Dell has built a customer-driven order business model, which eliminates its distribution and retailing costs and attracts more customers on the website. Brynjolfsson and Hitt (1995) complement that firms should focus on how IT has the ability to address other strategic levers such as company reputation, product quality and position, so there are many dimensions to affect economic performance beyond productivity. Both intangible benefits and productivity are organisational performance measures and can be used to describe the relationship between IT investment and economic performance at firm-level.

Transaction Cost Theory

The Impact of IT on Transaction Costs

TCT has been used to analyse the potential of IT to reduce transaction costs, thereby improving organisational economic performance in markets and hierarchies (Islamoglu and Liebenau, 2007). Malone et al. (1987) define that demand and supply forces determine production in markets. The relationship is described as a single buyer can select from different possible suppliers and choose the one that provides the best portfolio of characteristics. Therefore, markets involve relatively high coordination cost such as gathering information and negotiating contracts, but low production cost due to economies of scale. In addition, hierarchies coordinate the flow of materials and services controlled at a higher level. Thus buyer's choice is restricted to a single predetermined supplier so that the production cost is higher than that in the market arrangement, but coordination cost is low in

the hierarchical structure because this arrangement eliminates the producer's need to analyse information.

However, many scholars have criticised the imperfections of TCT. Collin and Larsson (1993) review that the theory fails to take the power of stakeholders into consideration. Lacity and Willcocks (1995) argue that the definition of the factors that contribute to transaction cost is ambiguous. Additionally, several authors question that this theory does not take into account wider background issues that have effects on sourcing decisions (Collin, 1993; Dietrich, 1994).

Even though there are various criticisms of TCT, IT is considered as an effective approach to lower transaction costs. New information technologies have fundamentally reduced the time and cost of processing and communicating information in the past several decades, so organisations can decrease high coordination cost by enlarging investments in IT (Malone et al., 1987). Islamoglu and Liebenau (2007) support this general trend towards markets, and Ciborra (1993) proposes that IT capital is able to reduce information asymmetry, so IT enables an easier matching between suppliers and customers once products have been located, which reduce transaction costs.

IT has become the major enabler of the efficient information exchange in organisations, but conflicting approaches indicate that IT is either a powerful tool to support the economic system managing information or, conversely, to create a more complex system that is difficult to manage. Palme (1984) highlights the problem of information overload, which underlines the negative effects of IT.

Generally, there are four key reasons to explain why there are transaction costs being caused in the market. They are environmental factors (uncertainty and small numbers) and human factors (opportunism and bounded rationality) (Williamson, 1975; Moe, 1984). Cordella (2006) argues that previous research on examining the effects of IT on transaction costs underestimates the interdependences among these factors, and he insists that lower transaction costs can be achieved when the costs associated with IT adoption do not exceed the cost of the externalities that are affected by this adoption. Furthermore, the impact of adoption of IT is not always positive, and the interdependence of factors affects the increase of transaction costs. Thus the relationship between IT investment and economic performance of the firm is not certain.

IT Outsourcing

Many firms have adopted outsourcing in recent years as a means of supplementing in-house IT investments.

The main purpose of them choosing IT outsourcing is to decrease service and transaction costs and increase organisational value and performance (Ngwenyama and Bryson, 1999). TCT has been widely applied to explain outsourcing decisions and analyse the true costs of IT outsourcing (Karimi-Alaghehband et al., 2011). Based on transaction costs and incomplete contract theories, Aubert et al. (2004) test an explanatory model of IT outsourcing behaviour. The result shows that uncertainty and technical skills affect the outsourcing decision. Ngwenyama and Bryson (1999) indicate that firms suffer the risks of shirking and opportunistic bargaining, because the loss of control is associated with their outsourcing decisions. To combat the risks, Porter (1985) suggests that the vendors will bargain fairly with the buyers if they are suffering the threat of losing customers. Then Porter (1985) points out that outsourcing cost should include the costs of building relationships and coordinating with the vendors, in addition to the cost of information processing service. Ngwenyama and Bryson (1999) add the switching cost which is the cost to alter supplier in case of failure. Then they apply TCT to model single vendor and multi-vendor outsourcing strategies to examine which strategy maximise the buyer's objective function. Their model demonstrates the probability and the cost to the buyer of vendor shirking under the single vendor strategy.

Additionally, Karimi-Alaghehband et al. (2011) propose there are three key attributes (asset specificity, uncertainty and frequency) distinguishing transactions and find the empirical results of IT outsourcing research are mixed. For example, Poppo and Zenger (2002) demonstrate the effects of asset specificity on IT outsourcing is negative, which is opposite to Aubert et al.'s (2004) position. One explanation for this finding is that the contemporary models fail to comprise all the essential elements of TCT. Moreover, Lacity et al. (2011) complement Karimi-Alaghehband et al.'s (2011) contribution by arguing to build endogenous IT outsourcing theory. In summary, these researches are important to practitioners because they can evaluate the transaction elements and conduct cost analysis to make effective IT outsourcing decisions.

Conclusion

This review has discussed how IT investment contributes to economic performance growth at the firm-level. The positive relationship is explained by direct investments or complementary investments in organisational capital. IT is not a simple approach for automating current processes, but enables organisational changes to improve performance beyond productivity (Zuboff, 1988). Another perspective is to examine the impacts of IT on transaction cost and organisational performance

through TCT. IT capital could be effective to reduce transaction costs, but these costs emerge due to the interdependencies among various factors. In addition, practitioners can apply TCT to explore the true costs and make IT outsourcing decisions.

This paper only discusses the relationship between IT investment and organisational economic performance at firm-level, but in reality it is also meaningful to conduct studies at macro-level, because the research results might have considerable divergence in different industry sectors or countries. Dedrick et al. (2003) research the industry data and then prove IT capital contribute to labour productivity growth in both the manufacturing and services sectors. Moreover, due to innovation of technologies, MFP has increased in the service industries, but the measurement problem is difficult. Similarly, IT expenditure contributes to long-term productivity and economic growth at aggregated level, but Dedrick et al. (2003) argues that IT investment may not lead to productivity growth and states productivity paradox still exists in the developing countries. Authors traditionally use growth accounting to link the returns of IT capital to macroeconomic performance, but this approach neglect the intangible assets (Brynjolfsson and Hitt, 2000). Quah (1999) puts forward the weightless economy concept, which suggests the economic performance is measured in terms of information-based products. Quah (1999) also argues that economies will grow through trading intangible commodities such as design and software.

Firm-level studies fail, to some extent, to identify the relationship between IT investment and firm profitability, for example, Brynjolfsson and Hitt (1996) prove that IT investment does not improve profitability, so it should be considered to explore this relationship in future studies. Moreover, it is suggested to understand the timing of the returns from IT investments, because some systems will realise immediate payoffs, but others will realise the returns after a lag.

Furthermore, researchers should study whether intrinsic characteristics of various industries and countries can affect the returns of IT capital on economic performance at firm-level, and whether there is interaction across different levels.

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The Internet of Things
Research Discussions & Directions

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KEYWORDS	ABSTRACT
Internet of Things Internet Studies Ubiquitous Computing Socio-Technical Perspectives Technical-Rational Perspectives	As the Internet increasingly becomes connected to physical items beyond the computer and mobile devices, the notion of an 'Internet of Things' continues to gain prominence as a technology with unbridled, transformative potential. Due to the largely unexplored adoption of the Internet of Things, much of the information systems research surrounding the topic is prescriptive and points to how the Internet of Things should be used. Contrastingly, another main stream of information systems research in this area is derived from the socio-technical perspective, exploring the relationship between the social and technical aspects of the system. This article will argue that, due to the developing social and technical nature of the Internet of Things, the socio-technical approach is more applicable to the study of this new technology. In order to analyse these issues, this paper will explore and critically evaluate the current theoretical landscape of literature on the Internet of Things.

Introduction

The idea of an 'Internet of Things' has attracted growing attention over a number of years. Touted as the next frontier in the development of the Internet, the Internet of Things (IoT) is evolving into homes and businesses alike. However, defining the exact premise of the IoT is problematic, as it is often misunderstood (Ashton, 2009: 1) and it has no single definition (Bassi, 2011: 102). Some view it as the 'third wave of information technology' (Zhu et al, 2010: 347) after the Internet and mobile communication. Others maintain the vision that it will function as a 'dynamic global network infrastructure' (Vermesan et al, 2011: 10). What remains consistent is the pronounced excitement it generates because of the potential innovation it may bring (Lacuesta et al, 2012: 1). As the Internet has grown into a multi-purpose network, the expectation is that the IoT will do the same as a network 'that interconnects ordinary physical objects with identifiable addresses so that it provides intelligent services' (Ma, 2011: 920).

The advancement of the IoT has significant potential, both as hardware and through the development of applications (Zhou, 2012). Consequently, research carried out by academics in this area is very important given the juncture of its development. Therefore, it

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is essential to understand how research is conducted within this area, especially with an appreciation of the assumptions and philosophical grounding that inform the approaches to research. Furthermore, such appreciation enables greater understanding of what certain approaches can reveal about how information systems research relates to current developments in the field.

This critical literature review will argue that research on the IoT is primarily driven by divergent technical-rational and socio-technical approaches. However, research on this topic area would benefit more from a socio-technical approach. Atzori et al (2010) argue that the Internet of Things represents a singular paradigm with 'many visions' (p. 2788). A socio-technical approach allows researchers to use multiple frames of analysis, whereas a technical-rational approach limits such potential. Firstly, the technical-rational approach to research will be analysed and critiqued, highlighting its potentials and limitations. Secondly, the socio-technical approach to research on the IoT will be critically evaluated. Thereafter, the essay will conclude, highlighting the main arguments within the paper.

Technical-Rational Approach

The technical-rational approach is one way in which researchers have framed their analysis of the Internet of Things. This is broadly referred to as a 'phased and structured approach to problem solving' (Bruijn

and Herder, 2009: 901). Technical-rational reasoning assumes that information systems development is 'a controllable process to be engineered and managed' (McLeod and Doolin, 2012: 178). The rationale behind this approach is that 'form follows function' (Krippendorff, 2011: 411). Additionally, this approach can be further broken down into several different aspects.

Firstly, one aspect explores the 'factors affecting the adoption of Internet of Things' (Li et al, 2012: 206). For example, in a paper on the objectives and challenges for the Internet of Things, Ma (2011) proposes that further study and research is required to develop a greater understanding of what the IoT adoption would mean from multidimensional perspectives. The article discusses such perspectives including that of 'the user, the network provider and application developers' (p. 921). In this context, the technical-rational approach outlines a prescribed notion of how the IoT should develop to widen its use. Ma's paper is a discussion on the wider issues affecting IoT research from a technical-rational perspective, thus opening the floor to further analytical and problem-driven research. The driving purpose of this stream of research is to understand how the problems of adoption can be minimised through technical amendments.

Additionally, the technical-rational approach develops the notion of technical significance through a decidedly 'things-oriented' focus (Atzori et al, 2010: 2789). In particular, emphasis is placed on 'interoperability on a physical level' (Schumacher et al, 2011: 318). Atzori et al posit that a things-oriented approach is adopted because of the technical backgrounds and perspectives of researchers. Schumacher et al argue that the IoT is driven by a focus on 'technological developments' (2011: 317) and that without the physical infrastructure in place, the capacity of the IoT is hindered. However, from the things-oriented perspective of Patel et al. (2011) concern is given to how the physical elements of the IoT are designed and processed to work together. Gubbi et al. (2012) argue that smart objects are the most significant feature of a things-oriented approach. Primary attention is given to the technology, how it is created, and how it fits into the wider cohesiveness of the IoT. Here, the implications for IoT research are that it is the "thing" in the IoT that has utmost importance. However, by focusing on the "thing" alone, it is possible that other, important aspects of the IoT are neglected, such as its social impact within various contexts. Nonetheless, this research on the interoperability of the IoT is greatly important, especially within the realm of technical-rational research.

One of the main benefits of the technical-rational approach in IoT research is its focus on

interoperability. Interoperability discourse represents an evolution in the discussion of a 'things-oriented' approach, from being merely about the objects itself, to how the objects exist within the wider environment. In Zhou (2012), the technical-rational approach towards the Internet of Things suggests that a lack of interoperability is preventing wide-scale IoT adoption. Interoperability is viewed as the 'central' issue pertaining to the fulfilment of the Internet Of Things (Bandyopandhyay and Sen, 2011: 50). Discourse on interoperability assumes that if the technology is in place, adoption will follow. However, even with interoperability widening the scope of IoT discussion, the technical-rational positivism still ignores the various other factors that affect the adoption of information systems. For instance, Zhou (2012) argues that the Internet of Things should be based on current Internet architecture, in order to foster standardisation. This differs from the holistic information systems perspective of Tan and Wang (2010) which include factors such as government policy and security issues as impacting adoption. These issues that are not strictly technical, but still affect IoT adoption.

The dynamic and interactive nature of the IoT highlights the limitations of the technical-rational approach. These limitations become apparent when the IoT is singularly aligned with a technical-rational understanding. For instance, Tan and Wang (2010) describe the IoT as having overlapping and intertwining elements, whilst Boos et al agree that the IoT represents 'constitutive entanglement' (2012: 16). This means that the structure of the IoT may have important technical elements but the complex ways in which it functions is due to a mixture of technical, social and cognitive factors. Using only a technical-rational approach limits the depth of research that would be enhanced by these other factors. As the IoT is a developing system, it processes are emergent, synergistic practices (McLeod and Doolin, 2012: 181) with little or no predilection for a technical-rational approach. Thus, approaching information systems research on this area requires a variety of perspectives because by its nature the IoT is system of plural, intelligent technologies (Uckelmann et al, 2011).

The very nature of objects relating to humans in a network of things demands that research has to explore more than the technical aspects of this area. However, this creates a level of uncertainty that technical-rational researchers may find irreconcilable because it is without a clear-cut direction and prescription. Baxter & Sommerville (2011) argue that without appropriate standardization of the Internet of Things, there is danger of different standards being created for various contexts, therefore creating a fragmented IoT. From a technical-rational standpoint, such an occurrence would be problematic, and research in this area tends to offer pre-emptive

prescription for avoiding such a situation, rather than explore its wider impacts.

The lack of standardisation in the IoT means that within information systems research and the technical-rational approach in particular, a consensus has yet to be reached about the research direction of the Internet of Things (Zhou, 2012: 870). Additionally there is tension between the positivist epistemology of the technical-rational approach and the uncertainty that the Internet of Things represents. Primarily, this approach estimates how the technology will function and should function, based on previous observations. In circumstances of which a predictive projection can further illuminate the unknown aspects of a topic, this is useful. However, in the context of IoT research, there are limitations to this approach. For instance, Bruijn and Herder's (2009) paper discusses the difficulties associated with taking a technical-rational approach towards systems with a networked architecture. They argue that the positivist foundation of the technical-rational approach means that it is subject to the constraints of a bounded rationality. Similarly, in Nerur and Balijepally's (2007) analysis of traditional versus emergent design, they argue that this framework is more suitable for predictable contexts. In the case of the IoT, information systems research using this approach for analysis may produce unclear results because the method of analysis is incompatible, especially in regards to sufficiently addressing the issues of uncertainty associated with the IoT. Given the potential directions of research in this topic area, such an approach may at times lack depth because it is not exploratory enough, and is strongly based on what is already known, rather than what is yet to be uncovered.

Socio-Technical Approach

Alternatively, the socio-technical approach to research of the Internet of Things is advantageous in its recognition of the varied social implications of the technology. The socio-technical approach is described as a 'complex interaction between humans, machines and the environmental aspects of the work system' (Baxter and Sommerville, 2011: 5). The socio-technical approach merges the technical with social and cognitive factors within the system's environment. In his chapter, de Almeida Amazonas argues, the social, user-centric aspect needs to be balanced with the environmental context of the IoT (2011: 114), and a socio-technical approach offers insight into both. As the IoT combines 'digital information with real-world physical items' (Kranz et al, 2010: 2) it is a hybrid network of items with both technical and social meaning. Both the technical and social supplant one another's impact, so research takes this interrelationship into consideration. Information systems research using the socio-technical approach to IoT research takes two main forms.

Firstly, the socio-technical approach is exemplified through the adoption of actor-network theory (ANT). Theoretically, an actor-network theory (ANT) perspective aligns with Internet of Things, unlike the technical-rational approach. Actor-network theory provides a framework through which heterogeneous actors' interactions are understood in the context of their environment (Tinati et al, 2011: 1). Hemerly studies the advent of the Internet of Things through actor-network theory analysis, arguing that analysis from this viewpoint is useful for understanding 'the benefits of socialized objects' (2010: 9). Furthermore, Spiekermann successfully follow in this tradition, arguing that there are roles for computers and objects as social actors. She argues that there is an 'expectation' for objects in the IoT to act like humans (2011: 29). Knutsen et al (2011) argues this is due to ANT's acceptance of humans and non-humans as actors and things within the system. In the socio-technical approach, the things-oriented aspect is adapted to include human and non-human actors as things within the wider network (Knutsen et al 2011: 198). Through ANT, the IoT is understood as 'human, cultural and interactional' (p. 203). This perspective informs information systems research by using multi-layered concepts of understanding. The advantage of the socio-technical approach in this case is that the research is able to embrace a multidisciplinary grounding (Goldkuhl and Agerfalk, 2004: 4) which is suitably associated with both the technical and the social aspects of the IoT. As Avgerou and McGrath state (2007: 297), interpretative flexibility supports the view of the technical and social aspects as 'mutually constitutive.' Such interpretation enables analysis of technical aspects in relation to its social impact, which is fitting for the IoT.

In addition, the interpretative qualities of the socio-technical approach align with the research's current process of discovery within an uncertain context (Geels, 2010: 497). The socio-technical approach to researching the Internet of Things embraces the complex uncertainty of the IoT, and transforms it into an inductive process of discovery. For instance, Boos et al (2012) break down their research into sections of analysis for greater clarity. Their article demonstrates that the information systems research of the IoT requires comparative analysis of the familiar alongside the unfamiliar to gain deeper understanding. In the context of the Internet of Things, information systems research needs to be 'reconceptualised' as merging 'different layers/different domains' (Knutsen et al, 2011: 203). Through this method of comparison, the challenges of the IoT are made clearer and more understandable.

Another socio-technical approach to information systems research is the organisational perspective. This approach to the study of the IoT focuses on business processes (Schumacher et al, 2011: 318). In

Li et al (2012) the research is based upon the notion of organisational capability, which is how firms strategically choose the best ways to create value within their particular social and organisational context. In this type of research, the human actor within an organisation needs to know how their actions are monitored, how they contribute, the capacity in which they are able to act, predict how their actions will impact upon operation. These user needs are mediated through the use of technology. The adoption of the socio-technical approach conveys the ways in which individuals also contribute to the understanding and operation of how a system functions synergistically between the technical and social aspects (Boos et al, 2012).

Furthermore, the organisational approach suggests that the IoT has transformative and administrative potential in the form of altering 'business-engineering' (Boos et al, 2012: 7) dynamics. Through the socio-technical approach, the organisation perspective delves into the implications of technology within an organisation. For example, the IoT has potential to constrain human agency through its ability to automate organisational processes. The new organisational processes diminish human agency, and highlight the prevalence of the technology's ability to communicate without input of humans (Boos et al, 2012). For instance, numerous case studies have demonstrated the capacity for the IoT's organisationally automated role in logistics and supply chain operations (Schumacher et al, 2011; He et al, 2010). The IoT is used as a 'service enabler' (Bassi, 2011: 106), but this positioning also has wider socio-technical effects. Even with the prevalence of machine-to-machine communication, the social aspect is still considered relevant (Wu et al, 2010: 485), whereas in the technical-rational approach, the focus would be directed towards how the machines were communicating to one another and the ways in which that communication resolves problems.

Through the socio-technical approach, the notion of uncertainty is reframed as a discovery process, in what Guo et al describe as 'opportunistic Internet of Things' (2012: 925). The concept of opportunistic IoT is that it is meant to explore the 'interaction between humans and IoT and discussion of the social side of IoT'. Information systems research in this regard is a process of discovery in which serendipitous occurrences reveal insight into the potential ways the IoT could be used by individuals from a social perspective. (Atzori et al, 2011). Furthermore, this is an inductive process which advocates for discovery through the process, as opposed to having a prescriptive outline or plan. This research approach is highly suitable because the trajectory of which the IoT will adopt is yet to be known. By researching in this manner, information systems researchers are uncovering the likely and unlikely ways in which the

IoT will be adopted, especially from a user-centric position. Additionally, because of the adoption of this user-centric position, the research is able to address the wider implications of users as actors within the wider network of the Internet of Things.

Conclusion

In closing, this critical literature review has analysed both technical-rational and socio-technical approaches to IoT research. Although both approaches have varying merits, the socio-technical approach has wider applicability to the research and study of the Internet of Things.

The technical-rational approach is one way in which the IoT has been researched and analysed by academics. The several directions in which research is conducted reveal the strengths and limitations of adopting a technical-rational approach. The most recurrent technical-rational issue is interoperability within the IoT. In particular, the assumption made by researchers that appropriate standardisation is the main hindrance to wide-scale IoT adoption ignores the various other factors that may have a bigger impact on the adoption of IoT technologies. Furthermore, the positivist epistemology of the technical-rational approach means that the uncertainty of the IoT is not embraced. Instead, predictive prescriptions are made that may not actually reflect the reality of the IoT's development.

Conversely, the socio-technical approach to research of the Internet of Things is more widely applicable to the various challenges and opportunities the IoT unveils. The actor-network theory and organisation perspective convey the different ways in which a socio-technical perspective is more aligned to the IoT development. Furthermore, the socio-technical approach embraces uncertainty as an transformative process of discovery. The socio-technical approach to research stands out as being more suitable for researching the Internet of Things. The embracing of uncertainty should be encouraged in the research for the Internet of Things as it represents the intersection of potential with innovation, and therein lies great opportunity for the Internet of Things to develop in ways both imagined and unimaginable.

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Knowledge Management
An Epistemological Perspective

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KEYWORDS	ABSTRACT
Knowledge Management Epistemology Information Information Organization Philosophy of Information Systems	Over the last decades, the topic of knowledge management (KM) has gained considerable popularity in academic and industry research. This literature review will use an epistemological angle of observation, to identify and classify the main perspectives through which KM has been discussed in the literature to date. On the one hand, a positivist epistemology implies the treatment of knowledge as data, and focuses on codifying it inside the domain of machines. On the other hand, an interpretivist stance recognizes knowledge as a socially constructed element, which stems from the multiple ways in which individuals construct reality. Effective economic utilization of knowledge is, instead, the objective of the pluralist perspective, whose focus is on the praxis implicit in the utilization of KM. In the conclusion, it is suggested that technological innovation is paramount in creating new, relevant streams of discussion within KM literature.

Introduction

Epistemology can be regarded as the study of knowledge, and is concerned with its scope and nature. Even though epistemological debate has been prevalent since the classical era of Greek philosophy, it is only in the 20th century that knowledge emerged as an economic concept (Alavi & Leidner, 2001; Iqbal & Mahmood, 2012; Nodoushani, 1999). In 1959, Edith Penrose developed a concept of *"competitiveness based on competences"*, where organizations are perceived as collections of resources (resource based theory of the firm). The amalgamation of these resources can potentially lead to the development of capabilities, and over time to competitive advantage, which is essential for organizational prosperity (Bakhru, 2008; Choo & Bontis, 2002; Doris & Rune, 2011).

In a more modern context, forces such as globalization, changing customer requests, technological advancement, and fluctuating economic and political circumstances, pressured organizations to look for new sources of competitive advantage (Earl, 2001; Iqbal & Mahmood, 2012; Martensson, 2000). In order to prosper in this hyper competitive environment, knowledge gained economic importance (beyond land, labor and capital) when organizations evaluated it as a rare, valuable, inimitable and non-substitutable capability. It is this evaluation that lead organizations to attempt systematic management of knowledge (Earl, 2001; Martensson, 2000; Vo, 2012). The invention of the personal computer and, later, the Internet (amongst other technological advancements), propelled the epistemological debate into the technical sphere (Martensson, 2000). As the knowledge economy became an established concept, the process of efficiently and effectively *"creating, storing/retrieving, transferring and applying knowledge"* became known as knowledge management (Alavi & Leidner, 2001).

The aim of this research is to evaluate and synthesize appropriate literature, in order to identify relevant perspectives in the KM field with a postulation that KM can be viewed through an epistemological lens. In this literature review the taxonomy of KM perspectives will be based on the synthesis of knowledge definitions and organizational role of knowledge management, with critical outcomes of the specific stances discussed in the process.

The evolution of knowledge as a managerial concept will be addressed chronologically, with relevant definitions of knowledge, goals of KM and potential developments mentioned. The structure of perspectives and issues and KM are as follows:

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	Positivist Perspective	Interpretivist Perspective	Pluralistic Perspective
Knowledge is...	Explicit; data; power; justified true belief	Tacit; An organically evolved social phenomenon; highly-valuable information	Tacit & explicit; concepts are mutually convertible
KM Objective	Data codification; sourcing and describing information	Knowledge creation; efficient application; learning	Effective transfer of knowledge between employees
Basic Stance	Mainly empirical; main ideological construct in KM; ICT's are the source of knowledge	Socio-cultural view of knowledge; Knowledge is transferred from person to person	Pragmatic. Attempts to unite different views and apply them practically in organizations
Research Issues	Doesn't acknowledge importance of culture and social architecture	Ambiguous concept with no viable practical alternatives proposed	Right balance of tacit & explicit knowledge is hard to achieve and not always possible

Table 1. Literature Review Summary

The following section of the paper will discuss the perspectives in more detail.

Issues and Perspectives

The Positivist Perspective

The principal view in this perspective is that knowledge is universal, in other words knowledge is a *"justified true belief"*; an asset or value that people already possess that is believed to be true due to accumulation of information (Chiva & Alegre, 2005; Earl, 2001; Vo, 2012; Wallace *et al*, 2011). In this view knowledge, information and data can be interchangeable (data being defined an observation and/or a fact). Thus, knowledge can be characterized as information or access to information, an object or a process. The explicit nature of knowledge in this perspective that leads researchers and practitioners to believe that information can be extracted from professional individuals and stored or codified inside machines for other professional individuals to re-use (Alavi & Leidner, 2001; Chiva & Alegre, 2005; Kakabadze *et al*, 2003).

This approach to knowledge is deeply rooted in positivist science, but the origins of this view are not solely academic. First studied by economists and managerial scientists KM was influenced by the fields of psychology, computer science and systems theory. So whilst knowledge became established as an economic concept in academia, it did not gain wide spread industry acceptance straight away (Chiva & Alegre, 2005; Kakabadze *et al*, 2003). In the 1980's, corporate downsizing (*"dumbsizing"*) strategies lead to the loss of valuable specialist information and expertise that took years to accumulate. Henceforth, KM became a prevalent topic in the corporate world. It became strategically evident that a need existed for storing employee knowledge and making its usage more efficient (Martensson, 2000).

An efficient and modern way of codifying data at the time presented itself in the form of information and communication technologies (ICT) (without which the scientific perspective of KM would not be feasible). KM in this perspective is defined as the *"ability of organizations to store, value, and manage [...] knowledge"* (p. 79, Vo, 2012), typically using advanced technology to transfer knowledge between employees (Chiva & Alegre; 2005; Earl, 2010). Technology in this perspective is a day-to-day aid to the knowledge worker. Incrementally systems here are viewed as knowledge providers (instead of people) and the aim of KM here is utilization and re-cycling of explicit knowledge, encapsulation of information, efficient exploitation of knowledge and cognitive mapping (Alavi & Leidner, 1999; Earl, 2001; Martensson, 2000; Kakabadze *et al*, 2003).

The progression of the positivist perspective is embedded in technological development. A more modern influence in this technocratic view has arisen from progress in quantum computing and development of artificial intelligence. The underlying assumption here is that advance technology will be able to make rational assessments and synthesize knowledge in a way that can make sense to people (Kakabadze *et al*, 2003). In summary, the perception of knowledge in this paradigm is scientific, however (due to the nature of KM research) there is no unified term. In this research is it called the *"positivist"*, but other terms are also present in research, for example essentialist, cognitive and functionalist, to name a few (Blosch, 2001; Chiva & Alegre, 2005; Tsirakas *et al*, 2012; Vo, 2012).

The Interpretivist Perspective

Regardless of its popularity the logic of the positivist perspective has been criticized. This logic states that knowledge already exists in organizations and has to be systemized by the organization in order to be exploited (Martensson, 2000). Taking root in Foucauldian ideas of power and knowledge (*"exercise of power perpetually creates knowledge"*) (Foucault, 1980: 52), it is the negative connotation of this top-down approach that has encouraged the evolution of the

debate beyond positivism (Kakabadze *et al*, 2003). Alavi *et al* (2006) argue that individual power and competition within the firm can potentially lead to *"knowledge hoarding behaviors" (p. 197)* and that these kinds of behaviors can decrease the effectiveness of the economic utilization of knowledge.

Another critical examination of the positivist paradigm is that it does not recognize the importance of social architecture and culture inherent to knowledge. In other words the interpretivist perspective insinuates, that the KM process is also influenced by the social environment and communication within the organization. This contrasting perspective puts value on the social context of knowledge and stresses that information is embedded in the social environment. So the focus is shifted away from treatment of knowledge as a commodity and towards the study of knowledge in socially constructed organizations (Alavi *et al*, 2006; Vo, 2012).

Knowledge in this paradigm is mostly a tacit concept, tacit meaning private information that needs to be made public. Knowledge is further defined as a network of practices, an *"organically evolved social phenomenon"* that is acquired through participation and resides in variety of mediums and contexts (Day, 2005; Martensson, 2000; Vo, 2012). It is a *"state of knowing"*, a process of applying expertise or a capability to influence action (Alavi & Leidner, 2001). In contrast to the positivist view (which doesn't explain how data becomes knowledge), information in the interpretivist perspective is not equated to knowledge. Knowledge is more as high-value *"information possessed in the minds of individuals"*. This process only begins with data or facts, but the filtering of this information by a specific community of users gives it value. This process is affected by individual beliefs and attitudes in a greater context of corporate culture (Alavi *et al*, 2006; Martensson, 2000).

Information systems are an important component in this paradigm, but it is the quality of the individual and the level of the support organization provides that is a major factor in influencing KM (Blosch, 2001). As opposed to the positivist view, the people (*"knowers"*) are at center stage in this paradigm, with ICT becoming a back up function (the vision being that the use of technology will result in enhanced communication and participation between employees). ICT is simply used as a *"knowledge café"* or a *"water cooler"* meeting point that provides a pathway for knowledge transfer, sharing and creation within and outside of organizational boundaries (Alavi & Leidner, 2001; Earl, 2001; Kakabadze *et al*, 2003).

KM in this paradigm aims to create new types of knowledge and intellectual capital through learning, unlike the positivist perspective that focuses on finding, capturing and stockpiling the right type of content. The ultimate goal of the interpretivist view is to apply knowledge to the right context. KM practices aim to promote sociocultural networks within organizations, which help distribute knowledge amongst employees and thus increase economic productivity (Alavi & Leidner, 2001; Alavi *et al*, 2006; Earl, 2001).

Researchers, who explore social concepts in KM, just like the positivist colleagues, do not have a universally accepted term for their research; the terms include community and network model, socio-cultural perspective and behavioral school of KM (Alavi & Leidner, 2001; Earl, 2001; Kakabadze *et al*, 2003; Tsirakas *et al*, 2012). But the perspective itself is not without flaw, as cultural and social interactions can be hard to define rationally. Alavi *et al* (2006) and Blosch (2001) suggest that this paradigm lacks detailed practical analysis that knowledge managers need in organization to relate complex epistemological notions to reality.

As Earl (2001) noted that learning (or knowledge) can be intra-organizational as well. Although ambiguity is this paradigm is present, research is also evolving. In the 21st century knowledge has taken on a new context due to the recognition of globalization as an economic force (Mirghani, 2007). In this relatively new context, knowledge intensive companies must depend upon each in order to create value effectively and efficiently. Thus, in the context of the new millennium, globalization, interdependency, technological progress and hyper competition gave rise to the ecosystems business model. The idea of *"knowledge based ecosystems"* (p. 151, van der Borgh *et al*, 2012) defines knowledge as a communication pathway between ecosystem participants. This slightly altered definition of knowledge opens up prospects for potential research opportunities in the realm of the interpretivist paradigm.

In summary, the idea of a dichotomy between the positivist and interpretivist understanding of knowledge is an important concept in KM. It provides a theoretical base for future research, but unfortunately also results in a *"two-faced"*, black-boxed concept of knowledge (Day, 2005; Vo, 2012).

The Pluralistic Perspective

The logical stance of this perspective argues that 1) the dichotomy in the field is ineffective and 2) in practice organizations adopt combinations of perspectives, as the paradigms are not mutually exclusive (Tsirakas *et al*, 2012; Earl, 2001). Scholars in the pluralist paradigm attempt to strengthen KM research by uniting positivist and intepretivist ideas. Bridging the dichotomy between opposing views provides more balanced analysis. Knowledge is subjective and objective, it is integrated within organizational

culture and is waiting to be discovered and codified for other employees to re-use (Vo, 2012).

The proposition that organizations inherently possess different types of knowledge comes from research conducted by Nonaka (1994) and is based on Polanyi's idea (1960) of tacit and explicit knowledge (explicit knowledge is formal, whilst tacit knowledge has a social element). Explicit knowledge is public and can be documented, structured, internalized and shared through information technology. Tacit knowledge resides in the mind and can be based on behavior or perception. The chief difference between tacit and explicit knowledge is that tacit knowledge cannot be captured in systems (Martensson, 2000).

An important element in this pluralistic perspective is that tacit and explicit knowledge elements can be converted into one another and that it is the interaction of tacit and explicit elements that give information true value (Martensson, 2000; Nonaka & von Krough, 2009). Thus knowledge can be conscious, objectified, automatic and collective. In the first three types it is viewed as a commodity and in the collective understanding of knowledge - as a socially constructed process, where knowledge is held by both the individual and the community (Vo, 2012).

KM in the context of the pluralistic paradigm aims to effectively transfer knowledge between employees, whilst building an encouraging climate for effective knowledge creation and diffusion. So knowledge management strategy is two-fold: 1) focus on the codification of information and use of ICT and 2) manage people and the environment. The ultimate goal of KM in this paradigm is the coherent synthesis of different strategies (Tsirakas *et al*, 2012; Vo, 2012). The pluralistic perspective itself is not without critique, Nonaka and von Krough (2009) argue, that in reality the right balance of tacit and explicit knowledge in organizations is very hard to achieve.

Just like the positivist and interpretivist perspectives in KM, the research in the sphere of the pluralistic perspective is also evolving. An effort has been made to take the argument further by placing an emphasis on *"action, society and a concern that matters"* (p. 43, Blosch, 2001). This pragmatist approach calls organizations to adapt *"reflective knowledge management"*, which urges organizations to focus on meaningful application of knowledge, rather than its simple codification or creation (p. 83, Vo, 2012).

Discussion and Conclusion

This literature review discussed past and present developments in KM research. Focusing on the positivist, interpretivist and pluralistic perspectives the paper also discussed economic rationale behind KM, epistemological issues in the field and potential future development in the research.

Unfortunately, due to widespread criticism of the disparities in all three perspectives, the field (KM) hasn't yet become a mainstream commercial practice and research efforts since the year 2000 have been in gradual, statistical decline (Iqbal & Mahmoud, 2009; Tuzhilin, 2011). However, with technological advancements, KM research seems to be attracting fresh interest. With a more social and user-centric approach, a recent resurgence of interest in the topic has also been observed. The rise of content management, user-generated content, Web 2.0, new KM platforms (such as C2.0) and general advancement in KM technologies has inspired a second wave of KM research (KM 2.0) (Kelman, 2008).

These new techniques for the processing of unstructured content and content collected from the Internet (blogs, social media posts, documents, emails) and other data sources is expected to bridge the gap between different perspectives in KM and transform KM systems to become more active through mass user-engagement (Tuzhilin, 2011). Nevertheless, the debate between the different perspectives continues, because a lot of the questions are still not fully answered (Nonaka & von Krough, 2009). However, whilst scientists and philosophers might never reach an epistemological conclusion, it is evident that the growing complexity of the business environment and evolution of technology will ensure that KM will remain a popular research field for some time in the future.

Just as any research this article faced several challenges - breadth and complexity of the KM field goes far beyond the issues highlighted in this paper. Identifying and synthesizing philosophical perspectives with information systems literature was not always possible as a vast amount of research material was theoretically incompatible with the research objective. This issue was most likely experienced due to the limited academic research experience. Lack of previous socio-philosophical knowledge limited the ability to structure material coherently and provide an appropriate in-depth philosophical analysis of underlying issues in KM literature. It is recommended that future research in the field addresses fundamental discrepancies in the views, by reducing ambiguity of terminology and putting emphasis on the practical application of research concepts.

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Matchmaking by Machine
A Socio-Technical and Socio-Cultural Perspective to Online Dating

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KEYWORDS	ABSTRACT
Online Dating ICT Innovation Socio-Technical View Socio-Cultural View Techno-Economic View	This article uses online dating as an illustrative example of how digital business models transcend economic objectives to produce changes in societal behaviours and attitudes. Using a socio-technical perspective, this paper first examines how ICT innovations both shape and are shaped by their contexts. A socio-cultural lens is then applied to analyse the inherent power relations amongst ICT innovators, users, and the public at large as a result of ICT innovation. These two perspectives provide an alternative to the dominant technologically deterministic view that ICT innovations inevitably produce efficiencies and progress. The paper concludes that online dating, as a proxy for other digital businesses, was born because of certain technological and social developments. Through fulfilling its business goals, it also has the power to shape dating norms and recreate the dating pool – inequities and all – in a virtual world.

Introduction

Online dating, defined as "the practice of using dating sites to find a romantic partner" (Finkel et. al, 2012) is a booming digital business. In 2010, ICA, the digital media conglomerate that owns both Match.com and Chemistry.com, netted $401 million in revenue from the two dating sites (Gelles, 2011). In April 2011, 25 million unique users logged on to an online dating site (Finkel et. al, 2012). Widening social acceptance, coupled with an increasingly time-crunched populace, indicates virtual match-making has more potential to grow. Given the central role of social relationships in our lives (Finkel et. al, 2012) and the proliferation of new technology, it is appropriate to investigate how this digital business model affects individuals and society.

This paper seeks to do that by using a socio-cultural and socio-technical lens of Information and Communications Technology (ICT) innovation to analyse online dating. The socio-cultural view is concerned with "who is inside and outside, who may speak, who may not, and who has authority and may be believed" when negotiating with technology (Marvin, 1988). Thus, the socio-cultural view highlights the dynamic power relations within ICT innovation. The socio-technical view argues technology must be situated within social and cultural contexts (Kling, 1999; 2000). That is, it should be recognized that technological changes both shape and are shaped by the offline world.

By using a socio-cultural and socio-technical view, we can analyse the power and effects of online dating beyond the economic and managerial sphere to paint a more holistic picture of how digital businesses produce more than profit. In particular, this paper examines the power of online dating sites to determine courtship rituals and create Marvin's "inside and outside". It also examines how their rise in popularity may change the social and cultural milieu of the physical world. This article concludes online dating both shapes and is shaped by the contexts in which it is situated. It was born because of certain technological and social developments. Through fulfilling its business goals, online dating has developed the power to shape dating norms and recreate the dating pool – inequities and all – in a virtual world.

This paper is structured as follows: First I present a literature review summarizing various topics of research within online dating and technology, along with the prevailing perspectives in the field. I then analyse the environment that fostered the rise of online dating, followed by the way it may shape relationships in the physical world. Then I examine the inherent power of online dating sites, which often arise from business decisions. Afterwards I consider which lessons can be generalized from online dating to other technologically-centred businesses to examine their influence on society. Lastly, I highlight limitations of my analysis and directions for future research.

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Literature Review

ICT innovation has been an area of intense interest within the last 30 years as the spread of the computer, first in organisations and then in personal homes, brought rapid changes (Kling, 2000). ICT innovation attracts research from many disciplines such as information systems (Overby, Slaughter, & Konsynski, 2010) and communications (Walther, 1996).

Within online dating, a growing body of research has emerged encompassing technology, management, and sociology. Technologically, literature revolves around the use of Big Data, data mining techniques, and matching algorithms (Diaz, Metzler, & Amer-Yahia, 2010; Gelles, 2011). In the business realm, studies have examined how recommender systems can benefit both firms and customers (Ayres, 2007) and techniques for customer relations management (Smith, 2005). From a sociological standpoint, research has investigated the prevalence of deception in online dating (Lawson & Leck, 2006; Toma & Hancock, 2012), the conversion of information into "data tokens" reflecting society's valuation of the calculable over the perceptible (Kallinikos & Tempini, 2012), and the ways in which online dating help and harm society (Finkel et. al, 2012).

Content aside, there have been two prevalent perspectives of technology within the research. One is a techno-economic view, in which technological innovation begets economic benefit. Technology is characterized as something that changes individual and institutional life, leading to the obsolescence of skills, the migration of workers, and individual adjustments in everyday activities (Freeman, 2007 qtd. in Mansell, 2012). This view is highly deterministic and clearly demonstrated in the 1970s and 80s, when Kling noted "questions about computerization were phrased as deterministic impact questions, such as 'What will be the impact of computers on organization behaviour if we did X?'" (1999, p. 207). The techno-economic perspective is the prevailing view within technological research (Mansell, 2012). Through this lens, online dating is seen to improve the efficiency of marriage markets by increasing access to more actors and introducing a rational-choice element through algorithmic matching.

An alternative framework is the socio-cultural view. This perspective emphasises the actors, citizens, governments, and industries that negotiate how technology will be used (Marvin, 1988). It is useful to pair it with the socio-technical view, further elaborated upon in Kling's field of social informatics. This asserts researchers should change from "viewing ICT as 'having impacts' to an appreciation that 'the impacts' of ICTs were socially shaped" (2000, p. 248). Together, these two perspectives provide a critical alternative to

the traditional view of technological determinism and uncover new insights about technological innovation. Viewed through the socio-cultural and socio-technical lens, the improved efficiency of finding romantic relationships through online dating is by no means inevitable. Indeed, its efficacy is largely dependent on the social context in which it operates, and – because ICT innovation is not neutral – it stands to affect that context both positively and negatively.

Therefore, it is possible to argue online dating sites are redefining individuals and institutions. Because of its prevalence, it is more important than ever to reveal its power and subsequent outcomes to better understand how this seemingly straightforward process may impact society.

How ICT Innovation is Shaped by Its Context

A socio-technical view of ICT is useful to examine which factors contributed to the rise of online dating. The analysis points to two key mechanisms: technological developments and changing social norms.

The genesis of online dating required the development of electronic media, most crucially the Internet. As early as 1985, Meyrowitz noted electronic media disassociated time and place so that an individual's physical location no longer limited his or her social location. The advent of the Internet furthered this liberation. In the case of online dating, the Internet allowed sites to offer three "classes of services": access, communication, and matching (Finkel et. al, 2012). First, the global reach of the Internet enabled individuals to meet more potential mates than before. Second, the nearly-instantaneous connections on the Internet through voice calls, messaging, and other channels allowed daters to connect regardless of their physical proximity. Last, thanks to the advent of Big Data (discussed below), romance no longer had to rely on intuition – matching-making could truly become a science (Finkel et. al, 2012). Taken together, the development of electronic media in general and the Internet in particular was a driving technical force in the birth of online dating.

The second technological advance was an improvement in gathering, storing, and analysing data. This was possible through better software, more sophisticated analysis techniques, and faster computing capabilities (McKinsey Global Institute, 2012). Because online dating depends on user-generated content not only through the information users provide on profiles, but also through their behaviours on the site (Gelles, 2011), the effective corralling of and insight generation from data enabled online dating to fulfil its promise of "matching". This allowed dating to undergo process virtualization, or the transition from a physical process to an online

process (Overby, Slaughter, & Konsynski, 2010). Thanks to Big Data from online dating sites, romantic preferences were translated into "data tokens" which rendered finding partners online into "issues of information" (Kallinikos and Tempini, 2012, p. 16).

Besides technical developments, online dating grew out of changing social norms. The proliferation of process virtualization in many sectors including education, medicine, and the government (Overby, Slaughter, & Konsynski, 2010) reflects a cultural shift in society's estimation of the sensible, or what can be gained from sensory experience, and the intelligible, or what can be thought without "immediate access to tangible reality" (Kallinikos & Tempini, 2012, p. 4). Kallinikos and Tempini assert the latter is gaining prominence in modern society citing, among other pieces of evidence, articles from *Wired* magazine extolling how data will help address societal issues in healthcare and agriculture (2012). The prevailing social view that data can solve our problems (Ayres, 2007, in Kallinikos & Tempini, 2012) boosted the appeal of online dating as users believed matching algorithms were superior to human intuition in the case of mate selection.

Two other social changes helped popularize online dating. First, meeting partners online became less stigmatized. Popular media, with movies like *You've Got Mail* and success stories of online daters (e.g. Egan, 2003; Gelles, 2011), changed the perception online dating was only for the socially inept or undesirable (Finkel et. al, 2012). It became mainstream, with some (albeit biased) estimates asserting "1 in 5 relationships start online" (Match.com, qtd. in Finkel et. al, 2012, p. 12).

Second, there was a shift in dating and mating patterns. Studies show attitudes towards online dating become more positive as users' immediate environments offer fewer and fewer suitable partners (Finkel et. al, 2012). In 2009, the average UK woman married at the age of 30 (Wallop, 2011). Thus, it stands to reason more and more individuals left the traditional dating arenas (i.e. university) which limited their access to appropriate partners. Coupled with a more hectic work-life balance, modern daters needed a quick way to access many eligible partners in a manner that fit their schedules. Online dating, with its ability to free individuals from time and space, fit the bill.

To summarize, the development of the Internet and the improved handling of data were key technological advances that enabled the rise of online dating. At the same time, changing social norms – namely, the privileging of the intelligible over the sensible, positive depictions of online dating in mainstream media, and changes in dating and mating habits – increased demand for and acceptance of online dating.

How ICT Innovation Shapes its Context

Not only does the environment engender the rise of online dating – the phenomenon also has real potential to shape behaviours and attitudes in offline contexts. In the interest of space, here I will only focus on three potential effects. First, Finkel et. al have identified online daters – faced with an infinite amount of profiles – may adopt an "assessment mind-set, in which people rapidly evaluate another person's potential as a romantic partner…and may promote the tendency to commoditize other people" (2012, p. 50). This could lead to shallow interpersonal connections rather than the communal orientation necessary in successful relationships (Finkel et. al, 2012). This is problematic because online relationship formation may have a more transactional focus: daters do not see individuals so much as they see profiles that can be quickly interchanged with another. In offline dating, this may induce people to view potential mates as dispensable, leading them to prematurely discard good matches.

Second, online dating sites promote a "soulmate belief", reinforcing the idea users must find "The One" to have a successful relationship. eHarmony features "Tips for Finding Your Soulmate Online" and PlentyofFish urges users to "Signup now and find your soulmate!!" (Finkel et. al, 2012, p. 50). This could actually increase the number of break-ups on- and offline as research has found those with a "soulmate belief" are more likely to leave a relationship with times get rough. On the other hand, those with a "work-it-out" belief recognize all couples face challenges; perseverance and work are required to achieve a happy relationship (Finkel et. al, 2012). Thus, promoting a "soulmate belief" is a marketing decision that has the potential to change the social milieu: spreading it may harm offline relationships as it encourages individuals to leave an imperfect (but fulfilling) relationship. In a world where the divorce rate is as high as 50% in the US, any perspective that urges more breakups may be a major threat to public happiness (Marriage and Divorce, 2012).

Last, the spread of online dating and reliance on data, algorithms, and recommender systems will continue the debate around whether machines can and should replace humans in some aspects of our lives. There are already a range of views: some believe humans will always have an advantage in work that involves intuition, creativity, and uncertainty (Brynjolfsson & McAfee, 2012). Others predict "PC human surrogate machines" with advanced artificial intelligence that gives them "sufficient thinking, feeling, and acting capacity to mimic…an average human" (Mahfouz et. al, 2008, p. 3024).

This important debate will only intensify as more anecdotal and empirical evidence emerges from online dating. Indeed, research shows matching algorithms may not predict relationship duration or quality at all. A 2011 study found no significant correlation between users' judgments of their dates before and after their first face-to-face meeting with a potential partner. In contrast, judgments made after a first meeting significantly correlated with relationship duration (Fiore et. al., 2011). This shows meeting in person and relying on human intuition may be more important in dating. This is supported by another study by Frost and colleagues which classified humans as the ultimate "experiential good", or products that "are judged by the feelings they evoke, rather than the functions they perform," such as films or restaurant meals (2008, p. 52). Without actually experiencing their would-be partner, users were frequently disappointed when meeting their online match face-to-face for the first time. This strengthens the argument that computer-mediated systems may not be the entire solution to finding romance.

Power and Those "Inside and Outside" in ICT Innovation

Shifting from a socio-technical view of ICT innovation to a socio-cultural perspective, this section investigates power within online dating. The question of who has it, in this case, points to the keepers of online dating sites. On the outside, these designers and programmers seem like benign brokers. However, a closer look reveals how their business decisions create instances of power assertion.

For example, digital business models must tackle the question of how to generate revenue. An online dating site must consider this process extremely carefully as it has two conflicting goals: to make matches and retain traffic (Fiore & Donath, 2004). When deciding how to keep their subscribers, dating sites exert power over their users. For instance, Match.com relies on two mechanisms – the human capacity to fantasize and a prescribed communication method between daters. Its profile search engine, coupled with Venus alerts (notifications that highlight profiles most compatible with the dater's own), constantly reveal potential mates about whom to fantasize. The endless stream of new material keeps users engaged in the site (Arvidsson, 2006).

Furthermore, Match.com recommends taking time to get to know potential partners. It advises against interacting with users who want to meet face-to-face after one exchange of communications. The site suggests users wait to share personal or contact information until they feel comfortable. These "slow-and-steady" messages ostensibly promote safety for daters. However, this approach also maintains consistency with Match.com's brand and purpose (to provide "Quality Singles") and helps the site retain a subscribed member. By following these recommendations, users prolong their fantasizing process (Arvidsson, 2006).

These examples demonstrate how dating sites regulate the process of searching for and communicating with potential partners. Therefore, it must be recognized they exercise power by defining courtship rituals. While it could be argued the slow-and-steady method is a reflection of "real world" dating processes, we should not overlook the fact online dating sites pass value judgments. These judgments often arise because of business objectives. For instance, Match.com monitors and removes profiles that do not fit the "Quality Single" ideal through their "Quality Assurance Team". By reviewing each profile to filter out questionable users, the team maintains the brand image. By checking for "any direct contact" between would-be daters, they maintain their monopoly on communication, which helps retain subscribers (Arvidsson, 2006: 684). These examples are indicative of how business decisions dictate the implicit ways dating sites create prescriptive courtship rituals and norms. This places the power in the hands of dating site designers as users can only find their matches if they adhere to "the rules".

Online dating sites also empower site designers through forcing them to target a specific market. This places people firmly "inside and outside" of Marvin's socio-cultural view of technology (1988). In their qualitative research of online dating sites, Churchill and Goodman interviewed 22 online daters on aspects of self-presentation, among other topics. One interviewee, a self-professed dominatrix, lamented the inability to speak about sex on mainstream sites and pointed out drop-down menus with adjectives to describe herself made her feel "invisible" because "there is no category for me" (2008, p. 94).

While consumer segmentation – which by definition leads to groups of inclusion and exclusion – is used in every business, its effect in online dating is ironic. This is because one touted benefit of these sites is to make dating more accessible to everyone, including those who may struggle to find partners in the physical world. However, active filtering and designer and user norms mean those who need the most help finding a mate may also be the ones who are left out (Finkel et. al, 2012). While there are niche sites for specific purposes (e.g. sexually explicit Adult Friend Finder) and demographics (e.g. DatingforParents.com), mainstream dating sites mostly cater for single heterosexual daters seeking lifelong partners. Thus, the online dating scene mimics the one offline with a mainstream population and more marginalized groups. Again, this demonstrates online dating may not fully deliver the social benefits it is purported to do.

Applicability of Online Dating to Other Digital Business Models

After examining its power to reflect and shape societal norms, influence offline relationships, and reinforce the mainstream and the marginalized, it is worth asking whether other digital business models can learn from the characteristics and consequences of online dating. One major lesson is that business decisions have powerful outcomes – intended or otherwise – from a sociological standpoint. In marketing, whom digital businesses target may either ameliorate or exacerbate existing inequities in society. Furthermore, marketing communications (such as the promotion of a soulmate belief) could create new values or challenge existing ones, leading to unexpected consequences. In designing their business processes, firms may well be defining or redefining cultural norms. The implications of this re-rendering should not be ignored if we are to have a full understanding of how digital business impacts all facets of our world, not just the technological or the economic.

Limitations and Future Research

This paper has contributed to the understanding of online dating and digital business models by presenting an alternative view to ICT innovation. However, it has three main limitations. First, it does not delve into the technical aspects of recommender systems and algorithms. This allowed the paper to maintain its social and cultural level of analysis without getting mired in mathematical detail. However, it would be fruitful to examine the hidden biases of algorithms. This would deepen our understanding of technical sources of power in online dating.

Second, my conception of the consequences online dating may have on "offline relationships" solely considered relationships in Western society. This cultural focus may be warranted as internet usage is highest in the US at 78% (Finkel et. al, 2012) and many popular online dating sites are dominated by Western users. Indeed, Match.com claims seven million of its nine million users are in the US (Arvidsson, 2006). However, online dating is a worldwide phenomenon. Thus, further areas of study could include how online dating impacts physical relationships in non-Western countries, or cross-cultural comparisons of any observed behavioural changes. In particular, it would be interesting to examine cultures that already have a strong match-making tradition.

Last, future research may take a more philosophical approach to contextualize online dating in the larger sweep of posthumanist life. Although I touched upon the debate of whether humans can be replaced or supplemented by machines, space did not permit

me to discuss this in detail. This line of research could explore whether mainstream acceptance of online dating is a harbinger for more technologically enabled processes that blur the line between man and machine.

Conclusion

This paper presented a socio-technical and socio-cultural view of online dating. Specifically, it focused on how online dating is shaped by and shapes the context in which it is situated. It also analysed the power of online dating sites to reflect and redefine courtship norms and rituals, and to recreate social inequities from the physical world in the virtual world. Online dating sites exercise power in many ways, often in order to fulfil business needs. These needs include maintaining revenue streams and cultivating a brand image. This indicates digital business models and their related management decisions transcend the economic and managerial spheres to have wide-reaching influence on social psychology, sociology, and philosophical thought. If researchers keep in mind the interconnectedness of these fields, future studies can paint a more holistic picture of the impact of digital business.

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Profile of the Information Systems and Innovation Group

Within LSE's Department of Management, we form the leading European university-based Group focusing on Information Systems and Innovation, and are recognised widely as amongst the top ten such groups in the world. We have 16 full-time academics and also benefit from the contributions of our Centennial and Visiting Professors, all of whom are scholars of international repute and leaders in the field, from Visiting Fellows who are experts in their respective fields, and from project researchers. There are also PhD students undertaking research in any one year.

The Group is international in its reputation, its activity, its staff and its students. Members are active in the International Federation of Information Processing (IFIP), the Association for Information Systems (AIS), the UK Academy for Information Systems (UKAIS), the British Computer Society (BCS), and other national and international organisations including United Nations and European Union bodies. Academic staff are Editors-in-Chief of four major journals (JIT, ITP, JSIS, JISS) and variously serve as Senior and Associate Editors on most high quality refereed journals in the IS field (e.g. MISQ, MISQE, ISR, EJIS, ISJ plus over 20 others).

The Group's teaching has been rated as excellent by the UK's Quality Assurance Agency and its research is recognised as internationally excellent by the Higher Education Funding Council for England.

The Group has received from funding bodies and industry more than £2 million in research income in the last four years. Staff have made over 60 keynote addresses at major academic and practitioner conferences in the last five years, and have been very active in advisory and representational roles on panels and committees for governments, major corporations and institutions. Members have made major policy interventions in recent years, notably in the UK governments National Identity Card scheme 2005-07. Awards and recognition are extensive and include Frank Land's Leo award of the AIS for Lifetime Exceptional Achievement, Ciborra's AIS Distinguished Member award, and Willcocks's Price Waterhouse Coopers/Corbett Associates World Outsourcing Achievement award for academic contribution to this field.

The Group runs several high profile seminar programmes. These include the annual Social Study of ICTs seminar run over two days in March. This attracts over 200 international participants and has a related two day research workshop. We also host throughout the year a trans-disciplinary seminar series entitled ICTS in The Contemporary World.

We offer two degree programmes – a one-year MSc in the analysis, design and management of information systems (MISI) focusing on theory and practice, and a PhD in information systems.

The Group's research, teaching and dissemination strategies are closely interlinked and its distinctive focus on the social study of Information Communication Technologies (ICTs) and Innovation underlies a concern for policy and practice issues in six major fields. All research is subsumed into these centres with researchbased teaching aligned with their themes. Thus the MSc in Management, Information Systems and Innovation (MISI) draws on all items, while future MScs for example in Risk and Security and in Global Sourcing are more restricted. There is also strong overlap between these centres: for example, research on public sector ICTs might relate to research on globalisation and developing countries, or information risk and security. We also perform research-based teaching for other existing and planned LSE degrees in Management, Government and Media and Communication departments.

INFORMATION SYSTEMS
AND **INNOVATION** GROUP
Department of Management

LSE Information Systems Alumni Group (LISA)

The London School of Economics Information Systems and Innovation Group (ISIG) are helping to organize alumni from MISI, ADMIS, ISOR and PhD through LISA (LSE Information Systems Alumni Group). If you took any of the IS department courses in the last 30 years, we look forward to your involvement in connecting with fellow IS Alumni.

LISA regularly organises events for alumni and current students on a regular basis and provides several opportunities to network, socialise and learn. If you wish to contribute or participate in our activities, kindly get in touch with our representatives.

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To know more about latest events organised by LISA and connect with more than 700 LISA members all across the globe join us on Facebook and LinkedIn.

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More information about LISA is also available on our website **www.lisa-online.com** and the latest event info can be tracked by following us on Twitter **@lisanetwork**

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