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EDITORIAL

From the Faculty Editor

I was pleased to be asked to step in for Will Venters and become the Faculty Editor of iCHANNEL. Will has done a fantastic job working with students to establish this journal and to see it grow from strength to strength over the years. I believe that the journal is an exciting project that reflects the creativity, academic potential and dedication of our MSc and PhD students. Without them the journal would not exist. It requires hard work from a team of writers, reviewers and proofreaders especially the Editor-In-Chief Nuno Oliveira and his editorial team. I would like to thank them for work well done. I hope you will enjoy reading the fruits of this work - 6 interesting articles on various subjects concerning information systems; chosen for their quality and for diversity of topics.

The journal is growing and we are thinking of ways of expanding the output – perhaps introducing another issue and/or producing the journal in a different format. This issue is the first to be available on EBSCO databases. Watch this space for future developments and enjoy the read!

Best wishes,

Dr. Ela Klecun

Faculty Editor

EDITORIAL – Looking Back and Forward in Information Systems Research

On the behalf of the editorial team, I am delighted to introduce you to Vol. 7 of the iSCHANNEL. We are proud that we gathered a selection of articles that deals with established and emerging topics in information systems research. This creates the opportunity of ‘looking back and forward’ in the field.

In the past years, we went a long way to develop theoretical frameworks deployed as analytical artefacts to understand the intersection between society and information systems. The accumulated knowledge is being revised to reflect novel insights, but also changes in the empirical scene. The current call for research requires the mobilisation of the multidisciplinary legacy of research in information systems to examine emerging themes in the everyday life. By leveraging a student’s perspective, this issue aims to inspire a wider research agenda.

The first article ‘Joe Blogg’s Hacking Supercomputer’, Abhishek Sanyal tackles the timely topic of cloud computing. The author deploys the ISACA’s Business Model for Information Security and Backhouse’s Structures of Responsibility to address the causes of malicious attacks, for example, on Wireless Encrypted Networks. This article provides a critical evaluation of how these attacks are shaping information systems security. The author concludes with mitigating measures and directions for further research on cloud computing.

The focus on timely topics in information systems is also pursued in the second article, ‘Green Information Systems – What can we contribute?’ Florian Allwein challenges in the deterministic view of information systems in addressing the novel topic of ‘green information systems’. This deals with the role of information systems in the context of environmental sustainability – e.g. greenhouse gas emissions. The socio-technical tradition of IS research is proven appropriate – for instance, Ciborra’s concept of bricolage (2004) – to develop a comprehensive research agenda of ‘green information systems’.

In the third article, Ivan Landabaso presents a critical review about ‘Perspectives on e-Government project implementations and impacts’. This is a mature topic in information systems research. The author explores how divergent views of development – from emphasis on the political control to human capabilities and aspirations – populate the field of information systems. Furthermore, the author explores some of the dialectical tensions in prior research and how further research in information systems can benefit marginalized groups in society.

In the fourth article ‘Perspectives On Knowledge Management – A socio-technical view’, Apoorva Varma and Claus Heintzeler synthesize the extensive literature on information systems and knowledge management. The authors develop an integrative framework on how technology can mingle with existing organisational context in order for individuals to use it effectively. This article provides a repertoire of avenues for further research about long-lasting questions in the knowledge management literature.

The topic of Web 2.0 is inevitable. The fifth article is about ‘Web 2.0 - New Perspectives: Social, Political and Economic Impact’. In her article, Yin Qian discusses the implications of the interactive platform of Web 2.0 for research on information systems that ventures into ideas of technology as an extension of human beings. The author takes a ‘fresh’ direction to the debate by studying the societal, political and commercial aspects in a demarcation from the ‘technology’ itself.

The last article is a case-study of a mobile digital service through smartphones. Heintzeler, et. al. present ‘The Value-add of Mobile Technology on Established Value Chains: A case Study in the Charity Service’. The findings from interviews and secondary data lead to a discussion about the design of mobile digital services. The authors tackle aspects of users’ privacy and security settings to add value in the broader context of established service value chains.

The contributions vary from knowledge management to cloud computing and ‘green information systems’. Such combination of topics is matched with the diversity of theoretical lenses and the nature of the articles (e.g. theoretical and empirical) that characterises the field of information systems. Nevertheless, one aspect binds these 6 articles together: intellectual rigor and curiosity. We hope you enjoy reading this issue.

Nuno Oliveira

Editor-in-Chief

Joe Blogg's Hacking Supercomputer

A discussion on how the inexpensive and pervasive availability of Cloud Computing to the Common Man is forcing the metamorphosis of Information Systems Security

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KEYWORDS

Responsibility Modeling
Mechanism Cracking
Business Model for Information Security
Structures of Responsibility

ABSTRACT

The inexpensive and pervasive availability of Cloud Computing to the Common Man is leading to an increase in malicious attacks such as SIP Brute Force Attacks on Wireless Encrypted Networks, also widely known as Mechanism Cracking. In such attacks, the Common Man has the ability to harness the power of Cloud Computing equivalent to a Supercomputer, at a fraction of the cost and with added nefarious benefits. In this paper, the metamorphosis of the field of Information Systems Security (ISS) due to this specific type of cloud-based mechanism-compromising attack is explored. Siponen's proposed model built upon interactions amongst ISS research communities is taken as the Conceptual Model throughout the study undertaken in this paper so as to maintain a single theoretical lens even while making use of multi-dimensional views of the same problem. ISACA's Business Model for Information Security is utilized for Causal Analysis to arrive at potential causes, and Backhouse's Structures of Responsibility (as a part of Responsibility Modeling from Siponen's proposed model) is adopted as a specific ISS approach to explore potential Mitigating Measures. The paper is careful to only descriptively discuss potential causes and mitigations, and not concretely prescribe them. It is envisaged that the paper will give further impetus to research in the domain of ISS related to cloud-based mechanism-compromising attacks, especially in the area of people-centric ISS with a focus on the definition and interaction of roles and responsibilities of organizational actors.

INTRODUCTION

The paper starts off with a brief description of some relevant information security incidents and explores their importance to Information Systems Security (ISS). Progressing further on the same lines, the paper codifies these security incidents to represent unambiguously their validity to ISS. Keeping in view the importance of a conceptual model to look for "a theory which can support the multiple images of a problem and at the same time bring in consistence" (Backhouse et al, 1996) and "in order to review the vast literature in ISS through a conceptual framework that helps us not only to classify the works but also to trace their intellectual origins" (Dhillon et al, 2001), the paper makes use of a Conceptual Model put forward by Siponen (2005) as the generic lens for discussion. Focusing on the human element of ISS, and to maintain a combinatory approach between

interpretivism and positivism, the paper elects to use Responsibility Modeling (Backhouse, 1996) as the specific angle for discussion of a people-centric ISS. The factors obtained from the Root Cause analysis of the problem statement being studied in this paper, identified primarily by using a prevalent industry-wide framework known as ISACA's Business Model for Information Security, are studied through the specific lens of Responsibility Modeling. As the focus of the Paper is on people-centric ISS, the Paper puts forward a dual analysis of the factors based on an application of Responsibility Modeling to Risk Analysis & Security Policy and Monitoring of IT Assets & Secure Service Provisioning. Interestingly, this analysis poses a conundrum involving questions related to a trade-off scenario between innovation and privacy, which provide further scope for research.

The Incidents and their Importance to Information Systems Security (ISS)

In an article that appeared on www.infoworld.com, "a German white-hat hacker named Thomas

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Roth claimed that he had found a way to use Amazon's EC2 cloud and some custom software to crack the password of WPA-PSK-protected networks in around 20 minutes. With some tweaks to his software, which tests 400,000 passwords per second using the EC2 cloud's compute power, Roth said that he could reduce that cracking time to 06 minutes, about 1.68 USD worth of time on Amazon's EC2 cloud (Amazon's EC2 cloud is priced at 0.28 USD per minute for use of its services). GPU-assisted servers were previously available only in supercomputers and not to the public at large, according to Roth; that's changed with Amazon's EC2" (Samson, 2011).

Using Cloud Computing for hacking is increasing at a very fast pace as reported in an article on www.voiptechchat.com. "Complaints of rampant SIP Brute Force Attacks coming from servers with Amazon EC2 IP addresses are causing many administrators to simply drop all Amazon EC2 traffic" (Posner, 2010).

In an article on www.theregister.co.uk, David Campbell, a security consultant has sounded an ominous warning for the ISS community – "As it becomes possible now for the black-hat hacker community to get their hands on large amounts of computing power, we as security professionals are going to need to re-assess threat models that we thought previously were not a factor. Using stolen credit cards, they could create a Supercomputer that would be faster potentially than what the three-letter agencies have and they wouldn't be paying for the CPU cycles" (Goodin, 2009).

"The promise of Cloud Computing to eliminate the costs of deploying and maintaining large numbers of servers is no doubt a boon to businesses looking for inexpensive ways to tackle special computing chores. However, some who stand to benefit the most may not be the most savory of enterprises" (Goodin, 2009).

The series of events related to hacking by the use of Cloud Computing in an easily available and highly cost-effective mode represent the requirement for a metamorphosis in Information Systems Security (ISS). Such a metamorphosis of ISS is needed in order to address the issues raised by the access to and utilization of computing power akin to a Supercomputer for hacking by the common man (Joe Bloggs). This paper discusses this metamorphosis from the specific angle of Responsibility Modeling while maintaining a generic, single lens (i.e., a conceptual model) throughout the discussion.

Codification of the incident as a representation of its importance to ISS

In a special publication of the National Institute of Standards and Technology called "Guidelines on Security and Privacy in Public Cloud Computing" (Jansen et al, 2011), the incidents being cited by this paper have already been codified representing the importance of such incidents to ISS.

"As with any technology, Cloud Computing services can be turned towards improper or illicit activities. A couple of noteworthy instances have already occurred that give a sense of what might be expected in the future: (i) Botnets - In many ways, Botnets assembled and controlled by hackers are an early form of Cloud Computing. Cost reduction, dynamic provisioning, redundancy, security, and many other characteristics of Cloud Computing apply. Botnets have been used for sending spam, harvesting login credentials, and launching injection attacks against websites. Botnets could be used to launch a denial of service attack against the infrastructure of a cloud provider. The possibility that a cloud service could become infiltrated by a Botnet has already occurred; in 2009, a command-and-control node was discovered operating from within an IaaS-Cloud. Spammers have also purchased cloud services directly and launched phishing campaigns, ensnaring recipients with malware via social engineering techniques, and (ii) Mechanism Cracking - WiFi Protected Access (WPA) Cracker, a Cloud Computing service ostensibly for penetration testers, is an example of harnessing cloud resources on demand to determine the encrypted password used to protect a wireless network. With Cloud Computing, a task that would take five days to run on a single computer takes only 20 minutes to accomplish on a cluster of 400 virtual machines. Because cryptography is used widely in authentication, data confidentiality and integrity, and other security mechanisms, these mechanisms become, in effect, less effective with the availability of cryptographic key-cracking cloud services. Both cloud-based and traditional types of systems are possible targets. CAPTCHA cracking is another area where cloud services could be applied to bypass verification meant to thwart abusive use of Internet services by automated software" (Jansen et al, 2011).

This paper will focus only on the aspect of Mechanism Cracking i.e., using Cloud Computing to hack into the encrypted passwords used to protect wireless networks as it is pertinent to the incidents being cited in this paper. The other aspect involving the use of Cloud Computing for Botnets will not be discussed in this paper as it is not relevant to the incidents being cited in this paper.

THE GENERIC LENS FOR DISCUSSION

Requirement of a conceptual model

“As researchers, we are faced with a major question: what sort of conceptual approach do we need in security research? The answer is indeed not an easy one. Growing interest in security demands a broader perspective but concrete alternatives have not been provided. Problems are to be viewed in a multidimensional manner. What is needed is a theory which can support the multiple images of a problem and at the same time brings in consistency” (Backhouse et al, 1996).

“In order to review the vast literature in ISS, we need a conceptual framework that helps us not only to classify the works but also to trace their intellectual origins. It is important to understand the theoretical concepts that form the basis of methodological approach. Such understanding allows researchers to cut through the surface details that overlays different approaches and hence indicate the philosophical assumptions of the approaches” (Dhillon et al, 2001).

The model proposed by Siponen depicting the backgrounds and influences of different ISS approaches in terms of interaction amongst (i) Disciplines, (ii) Research Communities of ISS, and (iii) Modern ISS approaches provides such a conceptual model and therefore, has been taken as the Generic Lens for discussion in this paper (Siponen, 2005).

Description of the conceptual model

The model proposed by Siponen starts off from the IS/MIS Security community and takes an interpretivist approach at analyzing whether today’s systems would be more resilient and secure from a survivability (Karya et al, 2001) or, viability (Hutchison et al, 2000) point of view. Inside the same research community and using the interpretivist approach, Siponen makes use of the angle of Security-modified Systems Development to look at the utility of methods such as (i) ISS Planning (Straub et al, 1998), (ii) Logical Control Specification (Baskerville, 1989), and (iii) ISS Spiral Model (Booyesen et al, 1995).

Next, the model proposed by Siponen moves on to the discipline of Software Engineering and looks at ISS from the angle of Semantic Responsibility Analysis (Backhouse et al, 1996) while maintaining a combinatory approach between interpretivism and positivism. This angle lets Siponen explore the efficacy of ISS based on the people aspect and especially related to the importance of roles and responsibilities of organizational actors.

Should ISS be customized or localized in terms of business and information needs or, is there a need to have a standardized or, global ISS solution design and deployment? This is the question, which is probed by Siponen when he looks at two positivist modern ISS approaches coming from the research communities of Computer Security and Database Security viz. (i) Business Process Modelling (Rohm et al, 2000), and (ii) Information Modelling (Smith, 1989). As the last endogenous factor from the model proposed by Siponen, a positivist approach of Cryptology from the discipline of Mathematics is taken by Siponen to look at ISS. This angle allows him to evaluate whether it can be possible to achieve robust ISS on the basis of encryption algorithms alone?

THE SPECIFIC ANGLE FOR DISCUSSION

The Human Element of ISS

“Notable among the earlier work on Risk Analysis in ISS is Parker’s Program (Parker, 1981), Fisher’s Methodology (Fisher, 1984) and Warman’s Framework (Warman, 1993). All three approaches use risk analysis as a means to design controls for ISS keeping in view the various threat categories but giving primacy to the social aspects in establishing security. Risk analysis prompted yet another stream of thought, espoused by Lane (Lane, 1985) that behaviour of people is a major and a central factor in security and should be the first factor to receive attention” (Backhouse et al, 1996). “Lane proposes that in an organization, staff with special responsibility should be designated. This, he feels, is an effective way of reducing risks in computer based systems. He also proposes the division of responsibility and the division of knowledge about the system amongst many personnel” (Backhouse et al, 1996).

It can be seen from the work done by Lane, Parker, Fisher and Warman that people are a major and central factor in ISS, and arguably, should be the first factor to receive attention. At this point, the paper anchors the notion of people-centric ISS, which is built further upon in the next section.

‘Who Is Expected and Allowed To Do What’

“Information security is important in proportion to an organization’s dependence on information technology. When an organization’s information is exposed to risk, the use of information security technology is obviously appropriate. Current information security technology, however, deals with only a small fraction of the problem of information risk. In fact, the evidence increasingly suggests that information security technology does not reduce information risk very effectively” (Blakley et al, 2002). Blakley goes on to argue further that “we must re-

consider our approach to information security from the ground up if we are to deal effectively with the problem of information risk” (Blakley et al, 2002).

“Where information risk is well enough understood and at least in broad terms stable, information security starts with policies. These policies describe ‘who should be allowed to do what’ to sensitive information” (Blakley et al, 2002).

Continuing further with the same line of reasoning as Blakley, it is obvious that organizational policies can only be defined as ‘who is allowed to do what’ if it is known that ‘who is expected to do what’, and this knowledge comes from modeling the importance of roles and responsibilities of organizational actors. At this point, the paper anchors the notion of business process modeling for ISS, which is built further upon in the next section in conjunction with the notion of people-centric ISS.

Responsibility Modeling

Synthesizing the notions of people-centric ISS and business process modeling for ISS, the paper chooses Responsibility Modeling as the specific angle / specific ISS approach for discussion. From the discipline of Software Engineering (in the proposed model by Siponen), Responsibility Modeling allows a specific angle of discussion while maintaining a combinatory approach between interpretivism and positivism.

The use of the specific angle of Responsibility Modeling in this paper will facilitate the discussion of the efficacy of ISS for Cloud Computing related malicious activities based on the people aspect and the importance of roles and responsibilities of organizational actors.

CAUSAL ANALYSIS OF JOE BLOGG’S HACKING SUPERCOMPUTER: A PERSPECTIVE FROM THE BUSINESS MODEL FOR INFORMATION SECURITY

The Information Systems Audit and Control Association (ISACA) proposes a Business Model for Information Security for Causal Analysis, which is made up of Preventive, Corrective and Detective Controls (ISACA, 2009).

“The Business Model for Information Security (BMIS) presents a holistic, dynamic solution for designing, implementing and managing information security. As an alternative to applying controls to apparent security symptoms in a cause-and-effect pattern, BMIS examines the entire enterprise system, allowing management to address the true source(s) of problems while maximising elements of the system that can most benefit the enterprise. By studying

all factors that introduce uncertainty and correlating all factors for understanding actual organisational needs, BMIS complements any framework or, standard already in place. It will assist enterprises in effectively managing information risk to minimise threats and ensure confidentiality, integrity and availability of information assets while harnessing enterprise information assets to create value” (ISACA, 2009).

This paper will use ISACA’s Business Model for Information Security to attempt a Causal Analysis of Joe Blogg’s Hacking Supercomputer based on available information in the public domain only (Samson, 2011 ; Posner, 2010 and Goodin, 2009).

Failure of Preventive Controls

On one hand, Amazon has a Security Policy in place for the Cloud Computing services it offers to clients. However, the percolation and enforcement of the Security Policy may not be adequate as the series of incidents have shown in which Amazon personnel failed to show or, act according to any standard guidance. This representative behaviour by Amazon can also be extrapolated to the possibility of a weak Risk Analysis, which traditionally is supposed to underpin the Security Policy.

On the other hand, the organizations being affected by Joe Blogg’s Hacking Supercomputer have also showed some of the inertia such as associated with personnel from Amazon: inability to act in a coherent manner, unavailable and inadequate guidance and a Risk Analysis that did not cater for such attacks.

This paper will consider inadequate Risk Analysis and weak enforcement and percolation of Security Policy as failure of Preventive Controls in the case of Joe Blogg’s Hacking Supercomputer.

Failure of Detective Controls

Multiple incidents have shown over time that Amazon has failed to detect and act on suspiciously malicious activities being carried out through IT assets under direct management and control of Amazon itself. Granted that ownership of public IP addresses hosting the Amazon EC2 cloud change frequently but monitoring of use during the tenancy term by different tenants can still be carried out by Amazon by logging simple parameters such as: “(i) Source and Destination IPs, (ii) Destination Port and Protocol, (iii) Accurate Date, Time and Time Zone of malicious activity, and (iv) Intensity and frequency of malicious activity in appropriate logs” (Posner, 2010). Similar lacunae exist on the side of the victim organizations also as even when system administra-

tors could detect the SIP Brute Force Attacks on their Wireless Encrypted Network, they could do so more in a post-mortem manner rather than in a proactive manner; an example of this is system administrators dropping traffic from all Amazon EC2 cloud IP addresses and recommending the same radical approach both upstream and downstream (Posner, 2010).

This paper will consider inadequate monitoring of IT assets for malicious activity as failure of Detective Controls in the case of Joe Blogg's Hacking Supercomputer.

Failure of Corrective Controls

Once the SIP Brute Force Attacks have taken place, Amazon was left stranded with poor customer relationship management and an inability to commit that such attacks would not take place from Amazon's infrastructure in the future. This attitude from Amazon has actually resulted in a conundrum for Amazon's clients represented by two sides: (i) "Although Amazon takes pains to ration resources it makes available to single customers, it was possible to get around such limitations using a single credit card. Presumably, it would be even easier to bypass those controls using hundreds or thousands of stolen credit cards, something that is trivial for criminals to get a hold of" (Goodin, 2009), and (ii) "what role should Amazon and other public-cloud service providers play in preventing customers from using their services to commit crimes? Clearly, these services are being exploited to commit crimes. Yet is it reasonable to expect a provider to scrutinize and monitor all of its customers' activities in a Big Brother-like manner, in the name of preventing potential crimes from being committed? Few customers would likely accept that sort of invasiveness" (Samson, 2011).

This paper will consider inability to commit to secure service provisioning as failure of Corrective Controls in the case of Joe Blogg's Hacking Supercomputer.

From the Causal Analysis, the paper identifies the primary causes of Joe Blogg's Supercomputer (for the sake of discussion in this paper) as: (i) Inadequate Risk Analysis and weakly enforced and percolated Security Policy, (ii) Inadequate monitoring of IT assets, and (iii) Inability to commit to secure service provisioning.

It is pertinent to note here that all the causes can be thought to be underpinned by weak people-centric ISS and inadequate mapping of expected business & security processes to actual roles and responsibilities of organizational actors. In such a scenario,

Responsibility Modeling will facilitate further discussion on the Mitigating Measures for Joe Blogg's Hacking Supercomputer.

MITIGATING MEASURES FOR JOE BLOGG'S HACKING SUPERCOMPUTER: APPLICATION OF RESPONSIBILITY MODELING

Structures of Responsibility (Backhouse et al, 1996)

Brief Description

"In analysing organisations as patterns of behaviour, one very important aspect of social causality becomes evident: that is responsibility" (Backhouse et al, 1996). The framework proposed by Backhouse endeavours to analyze the various aspects related to responsibility, in the form of Structures of Responsibility.

"These structures provide a means to understand the manner in which responsible agents are identified; the formal and informal environments in which they exist; the influences they are subjected to; the range of conduct open to them; the manner in which they signify the occurrence of events; the communications they enter into and above all the underlying patterns of behaviour. The framework assumes reality to be the outcome of human interactions which generate shared norms and experiences. Through the responsible agents identified we can relate the norms, patterns of behaviour, and experiences to their referents, which are actions effected in the real world. In preparing a schema, it is important to identify the agents who determine what takes place, and what behaviour is realised. Every agent in the organisation under consideration has a determinate range of possible conduct. This range aggregates to the behaviours that are afforded by that environment. Having defined the enterprise in terms of patterns, of actions, of behaviours and of responsible agents, a semantic schema is prepared by arranging them in a sequence of existence dependency. In preparing a schema, it is important to identify the agents who determine what takes place, and what behaviour is realised. Every agent in the organisation under consideration has a determinate range of possible conduct. This range aggregates to the behaviours that are afforded by that environment" (Backhouse et al, 1996).

"Such dependency forms the fundamental principle in developing a semantic schema showing ontological dependencies and its representation takes the form of an Ontology Chart. An Ontology Chart represents the invariants in any domain as patterns of behaviour to be realised by agents acting therein. Those invariants on the right of the chart can only be realised when those on their left have been realised.

The chart is a way of modeling what behaviour can be realised in any domain, but where the restrictions are only existential and not given by rules or conventions. Each invariant pattern is shown as a node in the chart and the analysis task is to elicit for each node the responsible agents and the norms used by the organisation in practice when the patterns of actions represented are actually instantiated. Where a node has two antecedents, then both these must be realised if the invariant is to be realised. The chart is used to provide a very stable model for analysing the domain, since it contains little that will change over time. It is a useful platform from which we can study the norms and structure of an organisation. In most cases the responsible agents will make their decisions in the line with prevailing norms, rather than arbitrarily" (Backhouse et al, 1996).

Application – Risk Analysis and Security Policy

"The security functions of most organisations have formal mechanisms for designing and maintaining secure systems. Such approaches may suffice in cases where the norms are very strong, and it is relatively easy to identify responsible agents in a conventional manner. However, if the norms are not strong and the environment is informal, it can be quite difficult to attribute responsibility and identify key decision makers" (Backhouse et al, 1996).

For Risk Analysis, it is not only important to identify, evaluate and manage the risks an organization faces but also make sure that the people conducting the exercise are making use of formal mechanisms. In the scenario where formal mechanisms for Risk Analysis are being used, it is relatively easy to attribute responsibility and identify key people with discretionary powers, which in turn leads to better Risk Analysis. A practical manifestation of this phenomenon is the much required ability of a Risk Analysis to remain current with changes in the organizational landscape, which would not be possible if key decision makers could not be identified and responsibility could not be explicitly attributed. In the case of Amazon and the victim organizations, the organizational landscape has evolved to either provide or, use cloud-based services respectively but, their Risk Analysis has most probably lagged behind.

With Cloud Computing being considered as a disruptive innovation, it is only more necessary that organizations adopting Cloud Computing on either the buy-side or the sell-side keep their Risk Analysis contemporary.

The definition of a Security Policy generally takes off from where Risk Analysis concludes as a Security Policy can be seen as a representation of the Risk Analysis that is now being made public, at least to

all employees of the organization, and has visible commitment and approval of the organization's top management. However, the enforcement and percolation effects of the Security Policy are a different story altogether. The enforcement of a Security Policy is easier in a situation where "norms are strong and it is relatively easy to identify responsible agents in a conventional manner" (Backhouse et al, 1996); The same situational context would also hold true for percolation of a Security Policy i.e., framing and deploying the low-level guidelines / standard operating procedures. In case the Risk Analysis (taken to be placed on the left hand side of an Ontology Chart) is inadequate, the Security Policy would be inadequate too (taken to be placed on the right hand side of an Ontology Chart) keeping in mind that an Ontology Chart is a semantic schema in which existence dependency is modelled in the form of organizational patterns. Following on, with a weak Security Policy, it is only natural that its enforcement and percolation would be weak too. In the case of Amazon and other victim organizations, the action of personnel responsible were characterized by a lack of coherence or, direction and therefore point towards a high probability having an underlying weak or, inadequate Security Policy.

Thus, for organizations on either side of cloud-based services, the definition, enforcement and percolation of a Security Policy is, perhaps arguably, of paramount importance.

Application – Monitoring of IT Assets and Secure Service Provisioning

"In identifying the responsible agents and capturing the norms associated with each action, we are in a position to understand the underlying repertoires of behaviour. By looking at the informal environment, the semantic schema is able to capture the structures in their cultural context. This enables the analyst to understand the object system better. In managing and developing information systems security in an organisation, such an approach can aid in illuminating concepts such as attribution of blame, responsibility, accountability and authority." (Backhouse et al, 1996).

One of the basic tenets of ISS, and also widely known as Detective / Monitoring Controls, is the requirement of monitoring IT infrastructure / IT assets underpinning IT services that are being either provided or, consumed. On the same lines, UK's Office of Government Commerce (OGC) also recommends monitoring and control of IT assets that underpin IT services from a security perspective in their publication: IT Infrastructure Library (ITIL). Continuing further on the same lines, USA's IT Governance Institute (ITGI) also recommends monitoring and con-

trol of IT assets as they believe that ‘what cannot be measured, cannot be controlled’. Monitoring of IT assets gives an organization the ability to act proactively rather than conduct mitigation post-mortem. The paper considers an organization with an inadequate Risk Analysis and weak Security Policy as ‘informal’ in the context of ISS and so an Ontology Chart of the informal controls environment in an organization would place monitoring of IT assets on the left hand side while proactive action by the organization would be placed on the right hand side. It is easily discernible here, keeping in mind the existence dependency, that inadequate monitoring of IT assets underpinning IT services will lead to weak or, total lack of proactive actions from organizations. The paper also observes that the semantic schema of these responsibility structures points towards a cultural laxity, which in turn is a manifestation of inadequate Risk Analysis and Security Policy. For Amazon and other victim organizations, monitoring of IT assets was observed as an area lacking proper focus and therefore both parties could take action only in a post-mortem manner.

Hence, the requirement of monitoring of IT assets cannot be underscored further for organizations on either side of Cloud Computing.

Cloud Computing is neither the only nor the first innovation that has fallen prey to the conundrum of provisioning secure services but still not impinging on privacy. One of the most pertinent examples of this conundrum is illustrated by the problem faced by Banks in monitoring and taking action on Credit Card fraud: Banks can monitor and take action on ‘suspicious activity’ on Credit Cards only if the Bank has collected sufficient customer information related to spending behaviour to define ‘normal activity’. The paper observes here that the best way to manoeuvre this conundrum is through a balancing act, which is not biased towards either side. As an illustration of this balancing act, the solution adopted by Banks on the ground can be explored further: On one hand, Banks collect information on spending behaviour and prepare a schema of ‘normal activity’ only by an opt-in feature that customers have to subscribe to in order for Banks to take proactive action on ‘suspicious behaviour’; On the other hand, for customer who have not opted-in, Banks tend to adopt a de facto approach and set ‘spend limits’ per type of Credit Card beyond which all activity is considered suspicious and tackled accordingly.

A similar kind of conundrum is observed for Joe Blogg’s Hacking Supercomputer: “Using stolen credit cards, they (i.e., hackers) could create a Supercomputer that would be faster potentially than what the three-letter agencies have and they wouldn’t be paying for the CPU cycles” (Goodin, 2009). The pa-

per notes here that this specific failure of Corrective Controls is manifested only on the sell-side of Cloud Computing and not on the buy-side i.e., providers of cloud-based services such as Amazon and not consumers of cloud-based services should be evaluating this Corrective Control. In the series of incidents mentioned in this paper, Amazon could have adopted a more people-centric ISS and monitored patterns in service payments (i.e., rents) correlated to patterns of service usage to identify abuse / use for malicious intent and still be able to take proactive action, rather than relying on building up patterns of consumer behaviour and relying on technological solutions for post-mortem action.

It is thus abundantly obvious that providers of cloud-based services have to explore secure provisioning of services as a part of not only their business model but also as an integral part of their ISS, and that the measures adopted would have to rely on people-centric ISS rather than technology in order to satisfy privacy requirements of consumers.

CONCLUSION

The use of Cloud Computing by hackers to simulate the computing power of a Supercomputer is definitely changing the way traditional ISS has been defined and maintained. Even though the solution to this new challenge to ISS will most probably come as an amalgamation from multiple ISS approaches, this paper only focussed on the study of underlying causes and potential mitigating measures from a people-centric ISS and Responsibility Modeling viewpoint. Such a perspective adopted in this paper enabled the contextually situated study of ISS for Mechanism Cracking, keeping the people aspect of ISS in the centre with a portrayal of its interaction with roles and responsibilities of organizational actors in the foreground through the ISS approach of Responsibility Modeling.

The paper made use of the Business Model for Information Security and identified (i) Inadequate Risk Analysis, and weakly enforced and percolated Security Policy, (ii) Inadequate monitoring of IT assets, and (iii) Inability to commit to secure service provisioning as the primary potential causes allowing the use of Cloud Computing for Mechanism Cracking.

Further study regarding potential mitigating measures was done through Structures of Responsibility (as a part of Responsibility Modeling). The paper benefitted from the use of an Ontology Chart to map organizational patterns and define situation specific potential mitigating measures, which were logical resultants from existence dependencies / ontological dependencies from the semantic schema. In short: (i) Contemporary Risk Analysis, (ii) Enforced and

percolated Security Policy, and (iii) Monitoring of IT assets underpinning IT services (for proactive action), were taken as potential mitigating measures for both, buy-side and sell-side of Cloud Computing, while commitment to secure service provisioning (without impinging on privacy), was taken to be a potential mitigating measure for only the sell-side of Cloud Computing.

The paper will provide further impetus to research in the domain of ISS related to cloud-based mechanism-compromising attacks, especially in the area of people-centric ISS with a focus on the definition and interaction of roles and responsibilities of organizational actors. Such a focus is required in the metamorphosis of ISS in the face of Joe Blogg's Hacking Supercomputer as once again it has been proved that, arguably, the weakest link in security is most often the human.

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Green Information Systems

What can we contribute?

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ABSTRACT

As mankind faces a number of environmental crises, green information systems is becoming an established research area. This essay looks at the existing green information systems literature, distinguishing between green IT (reducing the impact of IT on the environment) and green IS (information systems that have an impact on environmental issues beyond the area of IT). A large part of the existing research is found to take an uncritical, deterministic view. There is also, however, some research that follows the socio-technical tradition of IS research, which is particularly helpful for this topic. The essay shows how elements of socio-technical research have been successfully applied to the area of green IS, and develops ideas for further research.

INTRODUCTION

There is little doubt that mankind is heading towards a number of environmental crises. Issues like peak oil, global warming and the increasing strain on finite natural resources by a growing world population make it clear that we need to change our relationship with nature. There is mounting evidence for the impact mankind has on the environment. For example, Oreskes (2004) points out that there is scientific consensus that man's activities are affecting the earth's climate. As Melville (2010) puts it, "anthropogenic climate change is a reality" (p. 14).

Consequently, an increasing number of information systems (IS) researchers are starting to think about what our field can contribute to solve these issues. Green IS is a fairly new area of IS research, nevertheless it can be considered established as it has had conference tracks (aisnet lists 77 papers at IS conferences between 2009 and 2011) and journal issues (e.g. Journal of Strategic Information Systems 1/2011) dedicated to it. The question is how researchers go about their research and to what degree they reflect on and utilise the critical tradition of IS research.

Most authors distinguish between green IT and green IS. The former refers to the research of the environmental impacts of information technology (IT), the latter to applications of information systems that have an impact on environmental issues beyond the

area of IT. This distinction goes back to Watson et al. (2008). The examples they give for green IS include fleet management systems to cut the costs of transport and systems to inform consumers about the environmental impact of products, thus enabling them to make more informed choices.

"Sustainability" is another term that should be defined. Following the triple bottom line approach (Elkington 1998), some authors (DesAutels & Berthon 2011) distinguish between economic, ecological, and social sustainability. Usually, however, authors take a narrower view on sustainability and take it to mean ecological sustainability only (Melville 2010). Thus they follow the definition given by the Brundtland Commission of the United Nations (WCED 1987), which defines sustainability as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs".

This essay will show that green IS research can benefit from a socio-technical research approach. For this, some perspectives on green IS will be presented, divided into approaches following the "green IT" and "green IS" paradigm. These will be followed by papers that go beyond this and use approaches from the tradition of socio-technical IS research. Finally, some opportunities for further research will be developed.

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GREEN IT

As Dedrick (2010) points out, the design, use and disposal of IT accounts for “2 percent of the total CO2 emissions in the U.S., similar to the emissions created by the entire airline industry” (p.175). This number is probably higher than most people would have guessed, so researching ways to reduce it – what we call “green IT” – is a worthwhile activity. There is a large body of research in this area, mainly from IT and management literature.

One example for an IS paper in the green IT tradition is Bodenstein et al. (2011), who analyse energy usage in data centres. Using mathematical cost models on simulated data centres, they find that data centres used by small and medium businesses in particular have great inefficiencies and thus a high potential for cost and energy savings. This is an interesting approach, but although this paper was presented at the European Conference on Information Systems (ECIS), its methodology is quite traditional, focusing on technical and business aspects. This reflects the fact that IS as a discipline does not exist in Germany – its closest equivalent is Wirtschaftsinformatik, a discipline that combines economics and informatics. We will see that the area of green IS can benefit from broader research perspectives.

A technology that is often associated with possible green side-effects is cloud computing. It has the potential to reduce the amount of hardware used as organisations are moving their systems into the cloud, i.e. onto shared servers run by a cloud provider. IS researchers (Willcocks et al. 2011) have not focused on the environmental aspects of cloud computing, but there are some contributions from practitioners and general publications. Heimbuch (2011) quotes research that says “cloud computing could be responsible for cutting [greenhouse gases] by as much as 38%” but points out that this depends on a lot of conditions, for example the data centres would have to run on renewable energy and the added energy used to access data in the cloud is not usually included. He ends by quoting a report that says “it seems that whether computing goes green depends less on the cloud than all of the people standing beneath it”. This is an important point because in cloud computing, just like with all technologies, the technology will not have an impact on its own, it also has to be used in the right way.

People and their conflicting interests also influence the question of how to price IT. DesAutels & Berthon (2011) compare the prices of conventional notebooks to sustainable notebooks that were awarded the EPEAT Gold label, the highest award for sustainably produced electronics. Based on a review of green IT literature, they point out that notebooks are

amongst the products with the highest associated environmental costs. “the cost of a notebook to the consumer represents a fraction of its total wider environmental and social cost – by a multiple of 10” (p. 114). Despite this, they find no significant price differences between conventional and sustainable notebooks, and conclude that the costs to the environment and society are not included in the notebooks’ market price. This may mean that the costs of sustainable notebooks are offloaded on society, the “commons” – although they point out their research is not sufficient to answer this question. It does reflect the fact that price is the most important factor for consumers buying electronics, and that charging the real costs to individuals rather than society will meet with big market and political resistance.

We can see that the impact of IT on the environment and its use of limited resources are considerable, so research on how to reduce them is required. Information systems have, however, the potential to enable far greater savings, as we will see in the next section.

GREEN IS

Since IT is causing 2% of the CO2 emissions in the U.S., it may be worth going beyond IT use and thinking about what information systems can contribute to help reduce the remaining 98% of emissions. This is what green IS research is trying to achieve. As information systems are used in all parts of life, it is easy to come up with examples for their use in this area. One interesting practical example is United Parcel Service, which has employed a software to improve the routes of its delivery vans in order to eliminate left turns (which, in the US, mean waiting at red traffic lights). Over one year, this has cut routes short by 28.5 million miles and reduced CO2 emissions by 31,000 tons (Lovell 2007). This shows how IS can be used to achieve significant energy savings.

Not all cases are as clear-cut though. Looking at green IS research, we find that researchers are concerned with the impact new technologies can have on environmental issues, but tend to take these effects for granted. A relevant example is Pitt et al. (2011), who introduce smartphones as “both green technologies and (...) integral parts of green information systems” (p. 27) before looking at “green” iPhone apps. The examples they give include an app to visualize a car’s energy usage and give advice on how to lower it and a “smart home” app that allows users to turn the lights, heating etc. on and off from wherever they are. It is obvious, however, that they take the desired effect of the technology for granted

without reflecting on how it will be achieved when technology is part of a social context. Rather than assuming that technology will have the desired effect, it would be interesting to look at such apps from a social shaping of technology perspective (see Howcroft et al 2004). This could include asking questions about how these apps are shaped by society, and also how they are enacted by users.

Watson et al. (2008) add a psychological element to their studies by noting that “we are addicted to information” (p. 3). Considering how IS can contribute to sustainable business processes, they propose some potential frameworks to identify green IS opportunities. One is based on the theory of information drives where they identify four information drives - ubiquity, uniqueness, unison and universality - noting that any efforts to change industry or society must make sure these drives are satisfied in a physical and informational sense – otherwise people will not accept new solutions. In the case of ubiquity, users expect ubiquitous internet access and, similarly, they will expect ubiquitous availability of transport options (e.g. bus frequency, number of bus stops). The authors describe the Paris bike rental system, Vélib, as a successful example that fulfils the four needs both from an information and a physical perspective.

They then discuss further “frameworks for promoting thinking about organisational sustainability” (p. 11). For example, they try to relate Ghemawat’s (2007) AAA triangle to sustainability, arguing that the elements of Ghemawat’s framework (Aggregation, Adaptation, Arbitrage) can not only be combined with the goals of organisational sustainability such by using green initiatives as a way to distinguish from competitors – arbitrage, but can also be used as a starting point to identify opportunities for green initiatives.

The finding that organisations will only carry out sustainability initiatives if they do not hurt their profits is not new, and the use of Ghemawat’s framework here seems far-fetched and not very convincing.

Not surprising for a new research area, there have been a number of other attempts to define frameworks to guide the future directions of green IS research. One of the most exhaustive ones is Jenkin et al. (2011). They explain the lack of research on green IS with the fact that green IT/IS is a new topic and with the “general lack of awareness of the impacts of IT/S on organizations’ environmental footprints” (p. 34). They propose a framework for future research, based on existing frameworks (e.g. from the management and psychology literature). The levels of their framework are:

- environmental sustainability motivating forces
- environmental sustainability initiatives
- overall environmental orientation, both of organisations and employees
- environmental impacts

They especially point out the importance of alignment – environmental orientation will be higher when there is alignment within and between levels, for example initiatives should align with employees’ environmental orientation, and employees’ environmental orientation should align with the organisation’s environmental orientation. This focus on the individual is an important point, it should not be ignored in these highly emotional issues. Nevertheless, as Jenkin et al. (2011) point out, most research on green IS is focused on the organisational level only.

The psychological point of view is taken up by Melville (2010), who gives a solid overview of potential research areas from a US perspective. He finds that “Information systems are an important but inadequately understood weapon in the arsenal of organizations in their quest for environmental sustainability” (p. 14) and that IS researchers are “uniquely equipped to analyze issues at the intersection of information, organizations, and the natural environment” (p. 2). He defines a number of possible research issues in the areas of

- philosophical perspective and theory
- research methodology and data sources
- sustainability phenomena
- IS and individual sustainability actions.

The paper provides a good starting point for researchers planning to undertake green IS research. It is also interesting to see that Melville points out the heterogeneity of the IS field and its variety of research methods and world views as one of its strengths in dealing with new challenges.

This heterogeneity was described by Avgerou (2000). IS is a field shaped by a variety of thematic areas and theoretical approaches, which is also reflected in its geographical scope and institutional arrangements. As a research discipline, it is strongly influenced by North American business schools, which leads to a research focus on business studies and could suggest, as Avgerou warns, that “the mission of IS research is to produce knowledge on IT which is useful for business management” (p. 574).

The focus on North America is also reflected in the fact that all the research papers presented in this section come from the US or Canada. Moreover, with the exception of Melville, they tend to take a hands-on, positivist approach to these issues. This can be a legitimate approach, but papers in the socio-technical tradition of IS show that there is much to be gained by applying these perspectives.

SOCIO-TECHNICAL PERSPECTIVES

The European socio-technical tradition of IS research looks at the network of organizations, people, cultures, and processes that form the IS system. As it is based in the social sciences, research methods are usually interpretive or critical (Avgerou 2000). It has a tradition of reflecting on the assumptions of technology use and illuminating the interplay between people and technology.

The interplay between people, technology and society in green IT/IS looks to be a promising area for socio-technical research. So far, however, much research is stuck describing single technologies (green IT) or the use of IS in society without critical reflection (green IS). In this section, I am going to present some ideas from papers that go beyond this.

The need for clear definitions is made obvious by Ali & Bailur (2007). They start out by trying to define sustainability, finding that in the ICT for development literature, there are five types of sustainability - financial, social, institutional, technological, environmental - with the last one actually being used least. They go on to question if sustainability is at all possible, offering Ciborra's (2004) concept of bricolage as an alternative - "Nothing has ever been sustainable, and nothing will ever be. Change is inevitable", p. 12. While this may be debatable (most proponents of sustainability would argue that it is not the same as stasis), it is a great idea to introduce Ciborra's idea of bricolage into the green IS debate. Ciborra presents tinkering as an alternative to top-down planning of IS innovation, arguing that in the messy reality of organisations, innovation can seldom be easily implemented, but must be negotiated through deals and on-the-spot changes. He recommends organisations to use tinkering strategically, arguing that distributed, improvised approaches to innovation can be more successful than traditional top-down ones. Clearly, these ideas could be relevant in the specific case of green IS innovation.

The same idea is voiced by Hasan (2010), who compares the political efforts to reduce greenhouse gas emissions (e.g. the 2009 Copenhagen summit on climate change) to a top-down IS development project

and argues that, like in IS development, bottom-up approaches could be more successful. As IS research has a tradition of researching failures of (usually) top-down projects, it has "credentials in the space for understanding the pitfalls of top-down design" (p. 2). She points out that "wicked" or complex problems may not be amenable to top-down solutions. She sees climate change as a wicked problem as it is full of inherent contradictions, for example the fact that a transition to electric cars could increase CO2 emissions as most electricity in the US comes from coal.

Hasan is arguing for a multi-faceted approach using both bottom-up and top-down approaches. In order "to influence behaviour in complex socio-technical systems" associated with climate change (p. 5), she mentions socio-technical systems theory as a method to be used. The point she is making is a very valid one - certainly IS can contribute valuable insights here. The methodology of this article is a bit weak, as it only relies on two small studies conducted by Hasan and her associates.

The most coherent effort to combine green IS with the European tradition of IS research is the article by Berthon et al. (2011), who argue for a third level of analysis beside green IT and green IS, which they call "green information views", these are ways of thinking about our relationship to technology and nature. What sets this paper apart from most literature on the topic is that they use one of the elements of critical IS research - Heidegger's theory of technology as *gestell* - in order to arrive at new insights. The authors argue, as we have seen, that existing literature takes an instrumental view on technology, and attribute some of the failures of IT (see the productivity paradox) to this. Following Heidegger, they point out that, while technology is commonly viewed as instrumental, it should also be seen as revealing. The way a compass reveals a world of magnetic fields, technology can become a way of seeing the world (what Heidegger calls *gestell*) and thus shapes the observers in the process. It is this conceptual dimension of technology that makes it "an active subject, shaper of people and revealer of new worlds" (p. 592). The view of the environment is changing as well. Berthon et al. describe four paradigms of human-nature interaction - naive, efficiency, romantic and transformative. The latest one of these, "transformative", assumes that after centuries of human exploitation, "what we think of as the 'natural' world is a myth" (p. 595) - it sees nature as a human product that is shaped by technology.

In my opinion, this is an important insight. Technology is shaping our view of nature, and it can make us see or ignore parts of the world. An example of this is given in the documentary film "The end of

suburbia”, where energy expert Matthew Simmons says (The End of Suburbia 2004):

The only scientists that seem to have taken [peak oil] very seriously are the old-timers, whereas the young guys are mesmerized by the technology. We created a generation and a half of Nintendo geologists that sit at their workstations and basically move around images until they say “wow – look at that bright spot!”

ANALYSIS / CONCLUSION

Even this limited review of literature shows the breadth of the topic, the different focus areas (green IT vs. green IS) and the different approaches taken by researchers trying to define the future research areas. The papers summarised under “green IT” show approaches that are highly relevant from a practical perspective but have little theoretical depth. The “green IS” papers represent solid IS research shaped by their national/ cultural background, for example, following the North American research tradition. These include cross-disciplinary approaches, like the psychological elements in the frameworks by Watson et al. (2008) and Jenkin et al. (2011) as well as the broad approach by Melville (2010), who asks how to apply different philosophies and methodologies to green IS research.

The possibilities of applying socio-technical research practices to the area of green IS are touched upon by the approaches in the third group, “socio-technical perspectives” here. Both the idea of applying bottom-up approaches (Ali & Bailur 2007, Hasan 2010) and the critical reflections on our relationship to nature and technology as outlined by Berthon et al. (2011) show that these approaches can provide valuable insights.

There is a wide scope for future research outlined in many of the theoretical articles. This shows that there are many good areas for research in this field. The relationship between people and technology is certainly an important area for future research. IS has a tradition of researching the relationship between IT and people – this could possibly be extended to technology and people.

We have also seen that there is a shortage of practical research, such as researching actual cases of information systems and finding out how, for example, bottom-up approaches or bricolage, work in practice. With the growing environmental issues outlined in the beginning, it is safe to assume that the field of green IS can only grow in importance. And if doing research in this area can help to mitigate the

effects of climate change, there is also a moral motivation to do it.

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Perspectives on e-Government Project Implementations and Impacts

A Critical Literature Review

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ABSTRACT

There is little doubt that e-Government initiatives are becoming increasingly important, especially in developing countries where many believe these could help in reducing the gap between the rich and the poor, as well as between central and peripheral regions. This essay draws on some of the most relevant literature in this field to assess the different perspectives through which scholars understand the implementation and impact of these projects. This work, based on the literature reviewed, reveals how different scholars have very particular understandings of development. Some view e-Government as an opportunity for development in terms of the general upgrading of technological infrastructure, human capital, transparency in the public sector and so on, while others regard these initiatives as a form of developing political control over the masses. Conversely, others adopt a more human point of view, regarding development as a way of fulfilling human capabilities and aspirations. It is suggested that future research in this field should focus on the extent to which e-Government initiatives can benefit marginalized groups in society.

INTRODUCTION

E-government is the delivery of government information and services by means of Information and Communication Technologies (Gronlund et al., 2006). It is seen as a powerful means of modernizing the government by making it more efficient, facilitating communication and increasing interaction with its citizens. According to Yildiz (2007), e-Government could help create a networked structure of interconnectivity, service delivery, efficiency and effectiveness, interactivity, decentralization, transparency and accountability. Over the past two decades, many developing countries have been engaging in such projects with the hope of providing better public services and increasing government transparency by better informing the public in a cost-efficient fashion.

In this essay different scholarly perspectives are assessed regarding e-government project implementation. There seems to be general agreement on the potential of e-Governance to be an efficient tool for tackling underdevelopment. Nevertheless, as discussed later in this paper, there are also concerns associated with the implementation of e-Government projects failing. The World Bank estimates that 85%

of these projects result in failure. Furthermore, there are also apprehensions about the way e-Government projects are being implemented, such as in Ciborra (2002), where the current pressure to push developing countries to develop electronic governments is seen as being driven by a hidden agenda from the Western World.

This essay starts by focusing on the implications of these projects by studying e-Government as a form of administrative reform. The following two sections discuss e-Government implementation: firstly, by examining literature that establishes criteria for successful e-Government development initiatives; and secondly, by assessing the literature which focuses on contextual factors that affect these initiatives. This essay also tries to identify the different ways in which development is understood in the e-Government literature so far. Concluding remarks are then presented along with suggestions for future research.

LITERATURE FOCUSING ON E-GOVERNMENT AS A FORM OF ADMINISTRATIVE REFORM

As a starting point, this section discusses an important body of literature which sees e-Government as a means to achieve broader goals of administrative

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reform in terms of increasing accountability, transparency and good governance (Ciborra, 2002). It is important to note that this perspective on e-Government projects is present in both developed and developing countries.

Osborne & Gaebler (1992) talked about 'reinventing government' in the early 1990's to explain the long-term processes of public sector reform. This was a response to a sense of crisis in the public sector prevalent since the 1970's, which was fuelled by the emergence of the 'New Right' and supported by political will and power to enact those responses (Heeks, 1999). Neoliberalism was emerging as the new driving force behind this response to a sense of crisis in the public sector and it contained several components that continue to shape e-Government initiatives today. These include a need to increase efficiency, decentralization, accountability, improving resource management and promoting marketization. Nevertheless, as will be discussed in the following sections of this essay, this perspective overlooks the importance of looking beyond the technological artefact to account for broader social dynamics, institutional arrangements and organizational forms that have an important role in the implementation of e-Government projects.

Cordella (2007) argues that recent e-Government approaches overlook the fact that bureaucratic institutions not only provide mechanisms to harmonize work activities in the public sector, but also serve to implement the most basic democratic principles of impartiality and equality. He argues that by promoting the New Public Management (NPM) agenda, which emanates from Neoliberal ideology, we will not be offering equal and impartial services to citizens. According to Aberbach and Christensen (2005), talking about how the NPM agenda's results are questionable, "the customer service concept tends to ignore that some citizens have more influence than others in any political system and they are the ones who tend to receive the best treatment".

Cordella (2007) posits that when e-Government initiatives follow the NPM ideology, the impacts not only involve the improvement of transparency, speed and accountability of actions in the public sector, but also have an impact on the nature of the services provided. By focusing on the impacts that promoting NPM could have on democratic values for the citizens, Cordella (2007) as well as Aberbach and Christensen (2005), advocate for a "people focused" approach to development. They argue that information and communication technologies (ICTs) can be used to support the bureaucracy in service delivery and information processing more than transforming it into a customer-oriented organization, thereby promoting the use of ICTs to enhance

human capabilities in terms of access and usability of e-services. This body of literature provides an important view of development, emphasizing the promotion and maintenance of basic human rights such as the values of equality and impartiality in public service delivery. We now move away from examining e-Government initiative links to administrative reforms to assess a body of literature which identifies criteria for the successful development of these projects.

LITERATURE FOCUSING ON ESTABLISHING CRITERIA FOR SUCCESSFUL E-GOVERNMENT DEVELOPMENT INITIATIVES

According to Gronlund et al. (2006), "definitions of e-Government are unanimously socio-technical: organizational change, skills and technology are together the key to success". Gronlund et al. (2006) understand the potential that e-government initiatives have to achieve socio-economic development in many countries and, in this regard, they take a socio-technical stance in looking beyond the construction of the technical artefact to capture the environment surrounding it. A checklist is therefore provided which looks for factors critical to the success or failure of the project such as strategy and political foundations, organizational preconditions and the technical environment. Subsequently, they complement this with a Maturity Model, which aims to help visualize the path of a particular country towards administrative maturity. These tools are aimed at practitioners in order for them to identify whether the conditions required for the successful implementation of an e-Government project are fulfilled or not, and aim at decreasing failure rates in the future.

Following this line of thinking, Heeks (2001) also believes that information and communication technologies can make a significant contribution to the achievement of good governance by improving government processes, connecting citizens and building external interactions. Like Gronlund et al. (2006), Heeks (2001) believes that developing countries face risks when implementing an e-Government project. He also establishes some guidelines of good practice to be followed, identifying 6 pre-conditions for e-governance which he believes are essential for e-Readiness. Furthermore he proposes an e-Governance Design-Reality Gap model to explain and predict e-governance success and failure by identifying the difference between design ideas and organisational realities.

Both Gronlund et al. (2006) and Heeks (2001) firmly believe that once the pre-conditions needed to

implement such a project are fulfilled, there will be benefits from adopting e-Governance initiatives. Similarly, Haldenwang (2004) sees e-Government as a means of improving public service delivery, strengthening the openness and transparency of political processes and making public administration more efficient once certain conditions are met. In his analysis, it is suggested that, for e-Government projects to succeed, first there has to be a group of reformers with considerable political power to get things started and then the public needs to be involved to build up pressure. He emphasises the fact that internal administrative reforms are crucial for better service delivery.

In Jaeger and Thompson (2003), a set of policy issues which are considered important for the success of e-Government project implementation are also addressed. These include the education of citizens about the value of e-Government, the coordination of local, regional and national e-Government initiatives, the development of methods and performance indicators to assess the services and standards of e-Government and the provision of consistent and reliable electricity, telecommunications and Internet access. Interestingly, when taking a more people focused approach to development, some of the policy issues addressed relate to tackling the issues of language, communication and including individuals with disabilities in e-government initiatives.

Ndou (2004) reveals some insights on e-Government project implementation based on an empirical web-based research of 15 case studies in developing countries. She sees vast potential in e-Government. She even goes as far as stating that “the organizations, public or private, which ignore the potential value and use of ICT’s may suffer pivotal competitive disadvantages”. Following the same line of reasoning as Heeks (2001), Gronlund (2006), Haldenwang (2004) and Jaeger and Thompson (2003), she believes that developing countries will only be able to exploit and appropriate the potential benefits of implementing e-Government projects once a set of conditions and needs are fulfilled. As presented in Heeks (2001), an e-Readiness assessment which would take into account the level of infrastructure, legal frameworks and human resources is suggested. Furthermore, she proposes to raise awareness among the public and private organizations by organizing workshops and events, and places emphasis on investing in human development. Like Allen et al (2001), she believes that “the adaptive challenges of e-Government go far beyond technology; they call for organizational structures and skills, new forms of leadership and transformation of public-private partnerships”.

Other scholars, such as Schware and Deane (2003)

and Basu (2004), also believe in the potential benefits from adopting e-Government initiatives in developing countries. In contrast to the literature reviewed so far, they consider that the main factors behind the success or failure of these projects are the way in which governments address technological infrastructure and the legal frameworks that are required for projects to be successful. While still considering the social environment surrounding the technical artefact, more emphasis is put on these two issues. According to Schware and Dean (2003) “governments should promote strategies that focus on ICT infrastructure development as a prerequisite to e-Government- “I” (infrastructure) before “E” (strategy)”.

From the literature reviewed so far, we can identify that the views regarding development from these scholars converge. There seems to be a consensus on the potential of e-Government initiatives for driving development, which is seen as a mixture of upgrading technological infrastructure, the acquisition of skills by the public and the increase in transparency and better service delivery by the public sector. This view of development considers both the technical artefact and how people are involved in the process of implementing it, and is associated with the general improvement of social and economic conditions of a country. The suggested rules-of-thumb and pre-conditions or criteria by these scholars for measuring success can be referred to as following a technical-rational perspective. We now turn to look at how alternative perspectives are used to look at e-Government initiatives, and what is here understood by development.

LITERATURE FOCUSING ON CONTEXTUAL FACTORS THAT AFFECT E-GOVERNMENT FOR DEVELOPMENT INITIATIVES

In the previous section we have revealed a particular perspective which is supported by strong believers in e-Governance who offer guidelines and rules-of-thumb that involve technical factors and public capabilities which are supposed to facilitate socio-economic development. Other scholars such as Ciborra (2002) and Rose and Miller (2010) argue that these projects might not solely be driven by this aim. In this section I will assess studies that emphasize how the social context and institutional arrangements of a particular country can influence an e-Government project’s implementation and outcomes.

In Ciborra (2002), a case study in Jordan regarding the implementation of ICT’s is used to demonstrate that e-government projects often fail because it is difficult to implement them given the characteristics of the local administration, the socio-economic con-

text and the dynamics of the technical infrastructure. Ciborra (2002) adopts an Institutional stance. The institutions here are seen as influencing the design, the use and the impact of e-Government technologies on the country. He places emphasis on participation, and argues that for a successful implementation of an e-Government project, there is a need to align the actors (such as users, vendors, ministries and foreign states) and to re-construct these projects by observing the interplay between the actors involved. He believes that e-government projects are a way for the Western World to remotely control potentially dangerous states. It is perhaps this “below the surface” motive that hinders the process of e-government implementation by focusing more on the supply-side of the project than on the actual impacts it might have for its most important users, the citizens.

Similarly, Rose and Miller (2010) consider that “governmental technologies are the complex of mundane programmes, calculations, techniques, apparatuses, documents and procedures through which authorities seek to embody and give effect to governmental ambitions”. In their study, they suggest that there are many political alliances which seek to influence and drive social life and economic activity to manipulate people’s behaviour through the use of governmental technologies. As in Ciborra (2002), this suggests that e-Government strategies could potentially be used to drive particular interests of powerful groups forward. Development here is seen by those who govern as a way of “controlling the masses” and spreading their area of control.

In the same way as Ciborra (2002) and Rose and Miller (2010), the study of Cordella and Iannacci (2010) looks at the logic behind the design of new technologies and how political values and interests are inscribed in e-Government strategies. They look at the social, political and institutional dimensions of e-Government projects building upon the technology enactment framework (Fountain, 2001), which looks at the influence of organisational structures and institutional arrangements on ICT implementation in the public sector (Yildiz, 2007). Here, e-Government initiatives are seen as being used in favour of preceding institutional arrangements, such as legal and cultural aspects, which strengthen the consistency of the existing organisational forms. They use a case study of England and Wales criminal justice reforms to demonstrate that e-government initiatives shape the decisions and design of technologies and its features, which they believe are not impartial but rather carriers of the ambitions and objectives of particular reforms. In this case, these reform ambitions are based on the NPM paradigm, following the principles of efficiency, marketization, accountability, improved resource allocation and decentralization.

According to Cordella and Iannacci (2010), the “design of technology is infused with shifting political logics”.

Somewhat differing from Ciborra (2002), Rose and Miller (2010) and Cordella and Iannacci’s (2010) views on the intentions of e-Government initiatives in developing countries, Stanforth (2007) uses Actor Network Theory (ANT) to understand the trajectory of ICTs for development. She sees the potential of e-Government initiatives for driving improvements in transparency and accountability for the public sector. In this paper, ANT is seen as contributing to answering questions about the relationships between the technical and the social, and about how to build networks around the implementation of e-Government projects in less developed countries. According to Stanforth (2007), “Technology is just one of a number of sociotechnical elements that must be considered and managed in the design and implementation of a successful information systems project”. Stanforth (2007) uses ANT to understand the dynamics of how people make sense of the new technology being implemented through socially-embedded reasoning and applies it to a longitudinal study of the public expenditure management information systems supporting the fiscal reform program in Sri Lanka. ANT here is seen as a difficult theory to apply, but nevertheless useful in understanding the relationships between groups, people and the technology. It is claimed that, by identifying technology itself as an actor that stands in alliance or conflict with varied human groups, ANT grants a unique potential in e-Government initiatives research.

Madon (2004) provides a helpful insight on the demand-side of e-Government projects focusing on the impacts they have on people, based on Amartya Sen’s capabilities and freedom approach. Similar to Stanforth (2007), Madon (2004) takes a socially-embedded perspective on the implementation of e-Government projects, concerned with how people make sense of the new technologies being implemented. She explains that there is a gap in the study of e-Government initiatives with regard to how they affect the lives of people in less developed countries, and proposes a framework based on Sen’s capabilities approach to human development. It is argued in this paper that the capabilities framework allows us to take into account the developmental impact of e-Government projects by assessing what people in practice can or cannot do with the applications offered and the benefits they can get from them. She bases her evaluation on the FRIENDS (Fast, Reliable, Instant, Effective network for disbursement of services) and the AKSHAYA (conceived to bridge the digital divide and act as a catalyst for socio-economics development) projects in the South Indian state of Kerala. According to Madon (2004), the

framework proposed in this paper goes beyond earlier e-Governance evaluation principles by trying to comprehend the way e-Government projects, once executed, are used to attain the fulfilment of human capabilities.

Madon (2004), and to a lesser extent Stanforth (2007), hold views on an approach to development that clashes significantly with the literature previously reviewed. While the different scholarly views on development through e-Government initiatives focus on access to technology, the establishment of infrastructure, the importance of expenditure, transparency and so on, Madon (2004) takes a more "people centred" approach understanding development as the fulfilment of human capabilities. This clash could be understood as the difference between views of development from a top-down versus bottom-up perspective.

CONCLUSION

Based on the literature reviewed we can conclude that there is a general consensus on the fact that e-Government projects have great potential in driving forward socio-economic development. Nevertheless, there are risks associated with its implementation and guidelines, along with good practice models prescribed by some to deal with these issues. Furthermore, some of the literature reviewed raises issues associated with the double intentionality of implementing such projects. There are also concerns about the fact that the promotion of New Public Management agenda might hinder the democratic values which some bureaucratic institutions efficiently apply.

Within the literature, we can identify different perspectives from which the implementation and the impacts of e-Government projects are assessed. From these perspectives, it is possible to identify the different interpretations of development that are inscribed. While some view development as the improvement in accessibility to services, infrastructure, ICT skills and other factors directly linked to the technical artefact, others take a more human-centred approach in identifying how this technology is going to change their lives in practice and what advantages they could benefit from. Others understand development as the promotion and maintenance of basic human rights such as the values of equality and impartiality in public service delivery.

Based on this analysis, further research on the impacts of e-Government initiatives on the most deprived section of the population in developing countries (in terms of marginalization, access to in-

frastructure, education and so on) would be enlightening for this field. Many questions remain which should be looked into, such as how to include the most deprived in such projects and what the short-term benefits that can be drawn from these initiatives are. Moreover, future research should study whether these projects help people grow out of poverty independently and without constant support of the state.

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Perspectives On Knowledge Management

A Socio-Technical View

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ABSTRACT

The current literature on knowledge management (KM) presents KM as a broad field that encompasses many perspectives. This paper reviews these perspectives with the aim of offering a socio-technical view. KM has emerged with strong links to the multidisciplinary field of information systems (IS) where technology has been seen as a relevant enabler of change within organisations. Yet these organisational changes have also been emergent in the practices of people according to the social setting in which they are embedded. The process of knowledge will be reviewed as well as its enhancement through Knowledge Management Systems (KMS) and how this technology needs to be integrated into an existing organisational context for people to use it effectively. The resource-based view and practice-based view are considered to form a socio-technical view in order to analyse the complexity of KM and why people may share or retain their knowledge. A framework is also proposed to present the literature reviewed from a socio-technical perspective. For further studies, this paper aims to facilitate research into how organisations can encourage knowledge processes through the right incentives and effective technology.

INTRODUCTION

The knowledge society has emerged from a societal transformation whereby highly-skilled specialised workers have surfaced as those who add value (Drucker 1968) to organisations and the economy as a whole. This trend has also been identified as “The Weightless Economy” (Quah 1999) where value increasingly lies in intangible assets such as Intellectual Property Rights, software and leveraging organisational knowledge. Knowledge emerges from data which is contextualised into information which is then processed by individuals and framed around their own perceptions, values and experiences (Grover and Davenport 2001). Knowledge exists as tacit and explicit whereby tacit knowledge is rooted in action and experience making it difficult to codify and explicit knowledge can be explained and communicated easily making it simpler to codify (Nonaka 1994).

With the increasing development and use of Information Technology (IT), organisations have invested in creating repositories for the abundant data and

information they produce (Davenport et al 1998) in order to foster knowledge as a competitive advantage. Thus in order to expeditiously adapt to a constantly changing global business environment (Stark 2000) the process of knowledge creation, storage/retrieval, transfer and application needs to be managed (Alavi and Leidner 2001). Organisations have therefore adopted KMS in order to facilitate, conceptualise and integrate knowledge into organisational processes and learning (Alavi and Leidner 1999, Böhm and Krcmar 2002, Goel et al 2009). Hence, the field of KM can be viewed from a socio-technical perspective where the development of KMS facilitates the management of knowledge (Bhatt 2001).

This paper is presented as follows; firstly, the reasonings that help explain information systems from a socio-technical perspective are presented followed by an analysis of these reasonings around the existing literature on KM. A framework is then proposed which presents the resource-based view and practice-based view of KM as part of the socio-technical perspective. Finally, the concluding points of this paper consider the complexity of managing knowledge and therefore explain how a socio-technical perspective encompasses existing literature and facilitates understanding of the topic for further research.

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INFORMATION SYSTEMS AS A SOCIO-TECHNICAL FIELD

A multidisciplinary field such as information systems (IS) can be structured around both technical-rational reasoning and socially embedded reasoning to form a socio-technical perspective as illustrated in Figure 1 below. Within the technical-rational, IS can be viewed from three rationalities which are engineering, economic and administrative. However, in practice, the application of these rationalities shows that they are bounded due to the complexity of embedding IS in the existing context of an organisation. The bounded rationality is therefore a pragmatic adaption of the technical-rational reasoning with the aim of providing explanations, when observed behaviour of individuals and organisations seems irrational, regarding rational theories. The socially embedded reasoning addresses how people perceive and accept IT innovations and thus considers broader social contexts that influence IS implementation in organisations. This reasoning can be divided into the institutional and emergence perspectives where different structures can be viewed as institutions that affect IS development (Meyer and Rowan 1991; Swanson and Ramiller 1997) and emergence explains how organisational change is grounded in the ongoing practices of actors within an organisation (Orlikowski 1996).

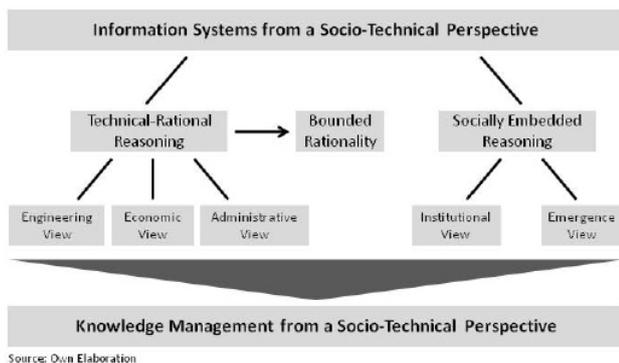


Figure 1: Information Systems from a Socio-Technical Perspective

By applying the above IS reasoning to KM, the following literature review aims to view KM from a socio-technical perspective by considering the resource-based view and practice-based view as part of this socio-technical perspective.

SOCIO-TECHNICAL ASPECTS OF KNOWLEDGE MANAGEMENT

The process of leveraging knowledge

The literature on KM offers many steps to explain the process of leveraging knowledge. Overall the main steps can be seen as knowledge creation, codification, storage, retrieval and application (Alavi and Leidner 2001, Grover and Davenport 2001). Rehäuser and Krcmar (1996) suggest a similar process but propose KM as a lifecycle that requires harnessing, adjusting and delivering the information resources depending on its usage. In contrast to scholars such as Brown and Duguid (1991) and Alavi and Leidner (1999), Rehäuser and Krcmar (1996) consider information equivalent to explicit knowledge. They conclude that KM can enhance the management of explicit knowledge but only create tacit knowledge to a very limited extent.

Knowledge Management Systems

In a descriptive study of 50 organisations with emerging or operating KMS, Alavi and Leidner (1999) describe emerging issues and practices of KMS. Their analysis from a technical perspective results in specifying the characteristics, concerns and capabilities needed to implement KMS. They suggest that KMS involve not only a solid technological base, but also require effective alignment of cultural and managerial elements to successfully manage and leverage knowledge as a source of competitive advantage. Therefore KM can be seen from a socio-technical perspective since from a technical-rational view, KMS is engineered to leverage the knowledge process but requires alignment with organisational culture in order to integrate these systems into the daily routine of the organisation. Thus, the implementation of KMS is bounded by the complexity of the social settings in which it emerges (Alavi et al. 2006). From a technical-rational view, KMS aim to facilitate the capturing and sharing of knowledge (Alavi and Leidner 1999). On the contrary, Brown and Duguid (1991) emphasise that the existence of such systems does not guarantee effective integration and circulation of knowledge. However, Alavi and Leidner (1999) do state that at the time, the concept was relatively new and thus did not provide enough ground for research into the potential benefits of KMS.

Bhatt (2001) also emphasises a socio-technical perspective on KM because its effectiveness is dependent on the coordination of social relations and technology. This is because IT can be used as an enabler to turn data into information yet it is only through people that this stored information can be retrieved

and interpreted as knowledge (Bhatt 2001). This again shows KMS as a bounded rationality as its implementation relies on a change in organisational culture that embeds the use of such systems into daily organisational routines. Therefore in terms of the socially embedded reasoning, KMS development has to be emergent as knowledge is an invisible resource created in the human mind (Davenport et al 1998) and only the right organisational culture can encourage people to use KMS to share their knowledge. This is because people contribute when they are structurally embedded in a network (Wasko and Faraj 2005). Davenport et al (1998) also take a socio-technical perspective as their study shows that successful KM projects are dependent on the alignment of technical and organisational infrastructure.

An example of the need to align KM projects with information systems has been prevalent in the case of consultancy companies where the role of technology varies according to whether firms choose a codification or personalisation strategy (Hansen et al 1999). Companies that chose a codification strategy to manage their knowledge invest heavily in IT in order to store codified knowledge (Grover and Davenport 2001) to reuse it to offer fast solutions. On the contrary, personalisation firms invested moderately in IT with the intention of facilitating the exchange of tacit knowledge in order to provide creative and unique expertise (Hansen et al 1999). Both the codification and personalisation strategies are embedded in organisational culture as they are consistent with their respective economic models as well as their IT and human resources (Hansen et al 1999).

Organisational Culture

Considering the socially embedded reasoning, organisational culture can be seen as an institution that has its own values and rules that enhances the development of KMS according to its own context (Becerra-Fernandez and Sabherwal 2001). Studies show that certain organisational settings increase the effectiveness of KM. In their paper, Chen and Huang (2007) present their research on how organisational climate and structure enhance the effectiveness of KM. Viewed as an institution, organisational culture that fosters social interactions has values that are less formalised alongside a decentralised structure where a cooperative climate encourages people to communicate and share knowledge (Chen and Huang 2007). Davenport et al (1998) also consider organisational culture as an institution where its values and rules are based on flexible structures that have an orientation towards nurturing KM projects. Thus knowledge can be considered an important organisational resource that requires leveraging through information systems that are integrated

with organisational culture and social settings (Alavi and Leidner 2001).

RESOURCE-BASED AND PRACTICE-BASED VIEWS OF KNOWLEDGE MANAGEMENT

This paper emphasises the socio-technical perspective of KM. The framework proposed in Figure 2 below categorises the remaining reviewed literature into the resource-based and practice-based view of KM where both views form a socio-technical perspective of KM. This section discusses the use of these prevalent views within the IS literature and their applicability in the field of KM.

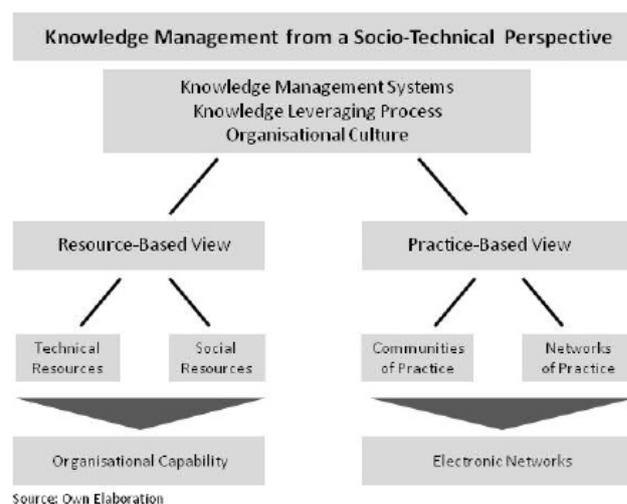


Figure 2: Knowledge Management from a Socio-Technical Perspective

Resource-Based view

The resource-based view stems from the technical-rational reasoning in focusing on how resources and their combination within a firm can lead to a competitive advantage (Mahoney et al 1992). The entire literature on KM considers knowledge a valuable resource that requires fostering since it represents intellectual assets (Grover and Davenport 2001), operational routines and creative processes (Grant 1996). The view postulates knowledge and the ability of its effective treatment as a long-term resource to create a competitive advantage (Grover and Davenport 2001, Alavi and Leidner 2001, Rehäuser and Krcmar 1996). According to the resource-based view, many authors such as Grant (1996), Alavi and Leidner (2001) and Brown and Duguid (1998) assume that knowledge-based resources are rare and difficult to imitate making them valuable intangible assets that can enhance sustained competitive advantage. This

assumption draws upon a combination of the economic and the administrative rationalities within technical-rational reasoning. In terms of economic rationality, evaluation of the value of intangible resources such as knowledge is required to assess productivity and financial gains from KMS. Administratively, knowledge-based resources need to be organised and aligned for effective management supported by a relevant IT infrastructure. KMS as a repository for knowledge to store and retrieve it are generally enabled through IT, adding an engineering aspect to the resource-based view of KM.

However, much of the literature on KM considers the technical-rational aspects of the resource-based view as bounded due to the subjective nature of knowledge (Grover and Davenport 2001) and its inherent complexity of existing invisibly in the mind (Davenport 1998). Consequently, there is no clear measure of the productivity or quality of knowledge work (Davenport 2004). This particularly refers to tacit knowledge as it is not documented or is difficult to codify (Nonaka 1994, Brown and Duguid 1998) and put into KMS. As a result, knowledge as an intangible resource is bounded in reasoning since there is no standardised way of measuring its financial value. Due to this uncertainty of giving knowledge capital a value, current accounting systems are unable to incorporate intangible assets in their balance sheet (Grover and Davenport 2001). The increasing value placed on knowledge by organisations suggests that it is in the interest of individuals to sometimes retain their knowledge. This creates further measurement difficulties as knowledge may exist, but may not have been leveraged as a resource if people are unwilling to share their experiences. Knowledge exchanges can come in many forms such as money, respect, promotion or other knowledge (Grover and Davenport 2001). Based upon the idea of these exchanges and tangible and intangible resources, Grover and Davenport (2001) describe organisations as a marketplace for dynamic knowledge exchanges. Organisational buyers search for knowledge either to solve an issue or to realise knowledge into a valuable product. Sellers with tacit knowledge link the organisational marketplace to the traditional theory of efficiency of markets which offers concrete problems of the knowledge market, as information asymmetry, and how they could be resolved by, for example, IS (Cordella 2006). The market perspective assumes that a greater liquidity of the flow of knowledge enhances a firm's efficiency. From this viewpoint, KM can be described as "the problem of creating an effective and efficient knowledge marketplace in the organisation" (Grover and Davenport 2001, pp. 15) and thereby trying to cope with the measurement issues of knowledge.

Other than measurement uncertainty, another aspect

that makes the resource-based view of knowledge bounded is that although knowledge is an intangible resource, what makes it valuable to an organisation is how it leveraged alongside effective management practices that allow an organisational capability to emerge (Chuang 2004). An empirical study by Chuang (2004) examines the link between KM capability and competitive advantage in 540 manufacturing firms. The paper can be viewed from a socio-technical perspective as it differentiates knowledge-based assets as either technical KM resources or social KM resources. The results of the study showed that there is a strong positive correlation between social KM resources and competitive advantage where organisational culture had a significant influence. However, the findings for technical KM resources were inconsistent (Chuang 2004). This may be attributed to the fact that methodologically, only a relatively homogenous sample of large manufacturing firms were chosen for the study as opposed to knowledge-based firms that have implemented systems that enable knowledge processes such as software or automotive companies.

Chuang (2004) does identify that despite investing heavily in IT, not all firms are able to combine this asset with other resources to form organisational capabilities. This shows that within the technical-rational reasoning, the engineering rationality is bounded as technical resources need to be combined with social resources to facilitate the emergence of potential organisational capabilities as shown in Figure 2.

Practice-Based view

The practice-based view of organisational knowledge focuses on the role of human action within organisations, given the assumption that tacit knowledge is basis of all knowledge (Orlikowski 2002). This means that tacit knowledge is only constituted through action and therefore inseparable from explicit knowledge (Brown and Duguid 1998, Orlikowski 2002).

Brown and Duguid (1998) as well as Orlikowski (2002) share a similar practice-based perspective on KM. In terms of types of knowledge, Brown and Duguid (1998) present the distinction between tacit and explicit knowledge stating that tacit knowledge, which is "know-how", is the ability to put the explicit knowledge, "know-what", into practice. Orlikowski (2002) takes this view into consideration and puts forward a perspective on knowing in practice stating that knowing is what people put into action. Therefore tacit knowledge is a form of knowing and is inseparable from action since it is generated through this particular action (Orlikowski 2002). In contrast to Orlikowski, Brown and Duguid (1998)

focus more on the idea of knowledge, in particular, tacit knowledge, being held collectively in communities of practice. These are groups of people that come together informally due to a common work purpose and form a social network of cultivating and sharing knowledge (Wenger 1998) where members are bound together by a sense of joint enterprise and a developed understanding of the community (Wenger 2000). Yet know-how can 'stick' if it is too embedded in the actions of a community and can therefore be difficult to move across communities (Brown and Duguid 1998). Thus cross-community knowledge transfer needs to be fostered so that communities remain effective and open to new ideas (Wenger 2000). This boundary spanning can take place through activities such as translating, knowledge brokering and boundary objects (Brown and Duguid 1998).

Orlikowski (2002) agrees that boundary spanning could prevent knowledge from getting 'stuck' in particular communities. However, stickiness applies less to know-how because it is embedded in practice and cannot get 'stuck' since it is constituted in actions (Orlikowski 2002). Consequently, know-how is not a discrete object that can be moved from one community to another. It can be shared to enable others to learn how to embed the know-how into their practice and "develop the ability to enact" (Orlikowski 2002 pg. 271). In terms of development and implementation of KMS, the socially embedded reasoning proposes that IS changes within an organisation are grounded in the ongoing practices of people and emerge from the way in which people use these practices in their everyday routine (Orlikowski 2000).

Like Orlikowski (2002), Levina and Vaast (2005) extend the practice-based view of KM by presenting a case study on two professional services firms where boundary spanning has emerged as an organisational competence through being embedded in the practice of organisational members. Organisational culture as an institution also enhances boundary spanning as it encourages individuals to share their knowledge. This collaboration has increasingly been fostered through IT artefacts which have been viewed as boundary objects that can be emergently implemented and integrated as boundary objects-in-use in order to prevent possible resistance (Levina and Vaast 2005).

The development of such IT infrastructures has mediated greater communication which has led to the expansion of networks of practice which, in contrast to communities of practice, consist of weaker ties where geographically distributed people that engage in a shared practice with a common willingness to collaborate (Brown and Duguid 2001). Thus,

knowledge-based resources can be acquired across organisations. This has particularly been the case with an increasing move towards open innovation whereby competing firms support knowledge exchange amongst individuals (Chesbrough 2003).

With the availability of IT, electronic networks have emerged as structures that "make it possible to share information quickly, globally, and with large numbers of individuals" (Wasko and Faraj 2005 pp.36). Within the technical-rational reasoning, the engineering rationality supports how electronic networks of practice have developed. However, this rationality is bounded since communicating tacit knowledge requires complex interactions that are difficult to sustain through IT (Nonaka 1994). This highlights the socio-technical aspects of KM as, in reality, organisations struggle to turn electronic networks into active discussion forums (Orlikowski 1996) due to the lack of personal relationship and the issue of free-riding (Wasko and Faraj 2005). The challenge remains to cope with social complexity of networks of practice based on their different actors with different needs and goals. In relation to the organisational culture, actors need to be embedded into the networks, to be incentivised to share their knowledge.

CONCLUSION

By taking all the reviewed literature into account, it can be concluded that KM can, to a large extent, be viewed from a socio-technical perspective. In terms of developing and implementing KMS, technology can be seen as an enabler for change but the effective usage of these systems and the main cause of change lies deeper within an organisation and relies on the willingness to share knowledge that emerges amongst members within and across organisations. Therefore the success of an organisation depends on its ability to design itself as a social learning system (Wenger 2000) through social networks that are supported by the alignment of a strong and embedded IT infrastructure and a flexible organisational culture. KM and more specifically KMS, are still evolving concepts (Davenport et al 1998) making them hard to measure in terms of success. Additionally, knowledge is an intangible resource embedded in practice resulting in further difficulties of measuring its financial value. Overall, managing knowledge is a challenge itself as the inherent subjectivity of knowledge and its nature of existing invisibly in the minds of individuals results in the extent to which knowledge can be managed being uncertain.

Although the literature proposes many different views on KM, a socio-technical perspective considers the technical-rational aspects in creating KMS as well

as explaining how these developments are bounded in complexity and how they are emergent in a socially embedded context. The proposed framework of this paper emphasises the socio-technical characteristics of knowledge as a process, with its systems and the importance of organisational culture. The framework categorises the literature by either viewing knowledge as a resource or as embedded within the practices of communities and networks.

For further research, the socio-technical aspects of KM can be considered in order to assess the extent to which an organisation is successful in managing knowledge, in particular, with the use of technology. A socio-technical view will facilitate identifying why KM systems may or may not be effective by considering the complexity of transferring tacit knowledge, the need for incentives for individuals to leverage the knowledge process, an organisational culture that enhances learning and technology that supports electronic networks.

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Web 2.0 - New Perspectives

Social, Political and Economic Impacts of Emerging Web 2.0 Platform

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ABSTRACT

The technological advancements in the late twentieth and early twenty first centuries have given online media, in the first instance, an enormous advantage over other mediums such as the printing press, the radio and TV. To date, with the media technology transferring to the stage of a participative, interactive Web 2.0 platform, the causes and effects of this new media technology have aroused many researches and discussions in the field. Some take the new media technology as an extension of human beings, as a commercial product, or as a business model whereas others argue that it is another form of political force. This literature review attempts to gather the latest discussion on Web 2.0 in order to have a general idea of its nature, the influencing factors and the controlling forces. No definite answers are put forward. However, a better understanding of various effective factors positioned to the new media technology, be they societal, political or commercial, are critically demonstrated.

INTRODUCTION

Prior to the advent of Web 2.0, the World Wide Web was, more or less, of the same organisational structure as the traditional media in terms of authors, editors etc. who are in charge of delivering the media content. Some scholars thus argue that the change associated with the new technology of the internet is simply a shift in platform from the real world to the hypertext domain (Kolbitsch & Maurer, 2006). However, this is no longer true when the technology runs into the time of “Web 2.0”, the term put forward by Tim O’Reilly in 2004 which refers to the transformation of the World Wide Web to be interactive, enabling users to have a chance to participate (see Harison & Barthel 2009; Kolbitch & Maurer, 2006; OECD, 2007).

O’Reilly (2005) defines Web 2.0 as the “architecture of participation”. Web 2.0 applications enable users to utilize technologies in a more active way – even those users with little technical knowledge can “construct and share their own media and information products on social networking websites and to pool the collaborative efforts of potentially millions of users” (Harison & Barthel, 2009, p. 159). Examples of Web 2.0 technologies include wikis, blogs, podcasts, file sharing tools, social networking sites etc. (O’Reilly, 2005; Kolbitsch & Maurer, 2006; Harison & Barthel, 2009).

It is true that the development of Web 2.0 is still ongoing and the technological revolution is dramati-

cally penetrating. Examples of the recent boom of social networking sites include Facebook and Twitter. Discussions of Web 2.0 have centered on its features, as well as its socio-political and economic impact (OECD, 2007; Harison & Barthel, 2009; Benkler, 2006;). Based on the fundamental understanding of the nature of this “new media technology” (Harison & Barthel, 2009, p.157), this literature review analyses the arguments on factors that shape and, further, control the Web 2.0 platform. Social, political and economic factors need to be considered in selecting appropriate literature.

WHAT SHAPES WEB 2.0: FACTORS OF THE ORIGIN AND DEVELOPMENT

There are some scholars who challenge whether Web 2.0 is fundamentally different from previous Internet technologies. World Wide Web inventor Tim Berners-Lee has said in an interview that he had intended the Web to be “a collaborative authoring tool” enabling people to “edit in this space, or different people would have access rights to different spaces” (Berners-Lee, 2006). Meanwhile, Kolbitsch and Maurer (2006) claim that it is “a fundamental mind shift that encourages individuals to take part in developing new structures and content” (p.187), rather than the driving of new technologies that is subject to the transformation of the Web.

Similarly, Tim O’Reilly (2005) observes that the central principle behind the Web 1.0 giants’ successful transfer to the Web 2.0 era is the power of harnessing

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collective intelligence. There is an interesting point of view from McLuhan's understanding of media as "the extension of man". Harrison and Barthel (2009) further explain that it is natural for users to create media products as active and creative human beings, for whom media is an "extension of our senses". This answers the question of why media development happened, from the telegraph, radio and television to today's computer-mediated interactive platform.

The virtual world as a platform for communication is still new and the research is at an embryonic stage. Nevertheless, scholars have tried to explain the participation in the virtual platform at both individual and community levels (Wasco & Samer, 2005; Goel, Junglas & Ives, 2009).

Applying the theories of collective action, Wasco and Samer (2005) examine individual motivations and social capital that could influence knowledge contribution in online communities. Their empirical study suggests that people contribute their knowledge in electronic networks when they recognize an approval and enhancement of their professional reputations, "when they have experience to share with others", and "when they are structurally embedded in the network" (Wasco & Samer, 2005, p.53).

Goel, Junglas and Ives (2009) discuss effective ways of transferring tacit knowledge, and they propose virtual worlds as "platforms for communities of practice". The four affordances attributed to are "self-expression", "co-creation", "co-experience" and "crowd sourcing" (pp.186-188). Certainly, technology, like those life entities on the earth, does not exist in a vacuum - it is applied and situated in a socio-political and economic context.

Harrison and Barthel (2009) explain that the term Web 2.0 "is associated with a set of motivations for business advantage" (p.173) and this is largely related to the creative idea of user-generated content. Similarly, as earlier, users participate in the technology of electronic mail with their own purpose, "Web 2.0 users have seized on the opportunities presented by new media technologies to create media content for their own purposes, producing an array of evocative projects and new media forms" (Harrison & Barthel, 2009, p.174). This is convincing when the authors refer to the Pew data on content construction. A more substantial amount of Web 2.0 content participative activities are created with users having more artistic and personal purposes (Harrison & Barthel, 2009).

Although Castells (2000) accepts this 'open' communication system with a flexible and adaptive networking logic, he makes a convincing argument for political pressure in a network society. In Castells' opinion, media space is "largely shaped by business

and governments" (Castells, 2007, p.246). Similarly, Williams and Delli Carpini (2004) also examine the new media environment and highlight the impact of the more fundamental structures of economic and political power.

In general, the literature has so far demonstrated psychological factors in both individual and group levels, together with the fundamental socio-economic and political power that shape the new media technology (Castells, 2007; Goel, Junglas & Ives, 2009; Harrison & Barthel, 2009; Wasco & Samer, 2005; Williams and Delli Carpini, 2004).

WHO CONTROLS WEB 2.0: QUESTIONING THE OPENNESS OF THE 'OPEN' TECHNOLOGY

Many influencing factors are present, but who is, in fact, taking charge of Web 2.0? Many scholars agree that the Internet, especially the Web 2.0 platform, provides an open platform for political, commercial and social engagement (Berners-Lee, 2006; De Backer, López-Bassols & Martinez, 2008; Harison & Barthel, 2009). Some scholars have argued that the platform of the internet is the "democratization of access to media outlets", which enables the diversity of public opinions, political discourse, freedom and justice (Balkin, 2004; Lessig, 2004). However, Harison and Barthel's observation suggests that the introduction of any new major media technology, associated with the rise of corresponding movements, is "aimed at using the new medium in the service of personal, artistic, political and community objectives" (p.161).

Castells (2007) observes a new round of power making in the network society. His assumption is based on the fact that "power holders have understood the need to enter the battle in the horizontal communication networks" (p.259), as he suggests:

This means surveilling the Internet as in the U.S., using manual control of email messages when robots cannot do the job, as in the latest developments in China, treating Internet users as pirates and cheaters, as in much of the legislation of the European Union, buying social networking web sites to tame their communities, owning the network infrastructure to differentiate access rights, and endless other means of policing and framing the newest form of communication space. (Castells, 2007, p.259)

Consequently, Castells (2007) indicates a double process of convergence: technological and political. In his view, the contours and effects of new media reality "will ultimately be decided through a series of political and business power struggles", where the owners of the telecommunication networks "are already positioning themselves to control access and traffic in

favour of their business partners, and preferred customers" (p.241). He also proposes that the interplay amongst business, political actors and grassroots activists will continue to exist.

Hutchins and Mikosza's (2010) article illustrates an interesting case study on the impact of Web 2.0 on the 2008 Beijing Olympic Games. By examining the restriction of athlete blogging and social networking, the literature reveals some policy contradictions. In advance of new media technology, the counter-mediatization, footage and discussion of Olympic events and experiences existing beyond the control of the official broadcasters were widely spread (Hutchins & Mikosza, 2010). Hutchins and Mikosza discuss the "market-based policy control mechanism" applied to "an open-access, participation-based publishing platform" (p.281). In practice, Olympic organizations and sports officials established guidelines to regulate the athletes' personal blogs, accredited "a market-based logic", which is also called "ambush marketing and broadcast media rights infringement", and a socio-political safeguard, to prevent athletes from posting unexpected scandals or political comments (Hutchins and Mikosza, 2010).

The organizational ways of controlling online interaction are also revealed in the literature in detail. Based on the International Olympic Committee (IOC) guidelines and regulations, media managers focused on prevention, by educating athletes and keeping an eye on any risk factors (Hutchins & Mikosza, 2010). The combination of prevention and identifying risk factors worked out in Beijing, in terms of limiting open-ended dialogue in online spaces; the measures protected the brands, images and reputations of sports and sportspeople (Hutchins & Mikosza, 2010). As a result, the authors argue that these measures become "a potential part of the Olympic media sport content economy" (p.291). The strategic policies at international and national levels (the IOC and National Olympic Committees), and the media management techniques at the team and individual athletes' levels together, leverage "the radical mediatization of Olympic sport", thus "limiting the impact of networked digital communications to an evolutionary, not revolutionary effect" (p.292). In this sense, it is evident that the new platform can hardly be immune from traditional, hierarchical models of media technology.

Another angle of the controlling force is discussed in Lessig's Code Version 2.0 (2006). He takes one chapter to explore the "architecture of control" and concludes that "the nature of Internet is the product of its design", which is "to reveal who someone is, where they are, and what they are doing" (p. 38). As the product of the contrived design, the net could be pushed to change from unregulable space to "the perfectly regu-

lable space" (Lessig, 2006, p. 38). Interestingly, Lessig thinks that the changes "are not being architected by government", but "demanded by users and deployed by commerce" (p. 38).

Other literature has perceived Web 2.0 as a business model from an economic perspective (OECD, 2007; Harison and Barthel, 2009). OECD's (2007) report on Participative Web and User-Created Content indicates that commercial firms begin to play a very active role in "supporting, hosting, searching, aggregating, filtering and diffusing" the User-Created Content (UCC) online. This is evident because "an increased number of established media and Internet businesses have acquired UCC platforms for commercial purposes" (OECD, 2007).

Turning the initially non-commercial platform into a business tool, the OECD's report points out the benefits UCC bring to business, and when the Web 2.0 applications expand, new use of participative web technologies that meet the market's need will be developed (OECD, 2007). This could be a positive advantage for both the business industry and the development of future technology.

There are also other angles of analyzing the forces positioned to the new media technology. For example, Napoli (2008) examines the forces of "massification" when exploring the relationship between old and new media, indicating that any new medium could be constrained by "a set of stable and influential social and institutional forces" (Napoli, 2008, p. 33).

In the book *The Wealth of Networks*, Benkler (2006) puts forward the "networked information economy" but thinks that the "networked public sphere" cannot be controlled by mass media owners. His main argument is that many clusters online are based on mutual interest, not on capital investment, thus, "it is more difficult to buy attention on the Internet than it is in the mass media outlets, and harder still to use money to squelch an opposing view" (Benkler, 2006, p. 11).

To sum up, the literature has revealed that some political and economic forces have positioned the initially "innocent" Web 2.0 platform. However, to some extent, this can be counter argued by the fact that it is hard for any power to manipulate the interactive platform.

WHICH WAY IS THE FUTURE: LIMITATIONS AND FUTURE RESEARCH

Researches of the new media platform of Web 2.0 have yet to keep up with the rapid developments in the new technology (OECD, 2007; Castells, 2007; Harison & Barthel, 2009). It is too soon to make any

confident predictions about any likely developments in the future.

However, some inherent features of certain media technologies are valuable to investigate in order to have a coherent understanding of the future. Legislative approaches and censorship issues at national and global levels require further exploration and analysis.

Practical questions related to the internet governance for a nation, such as “Do you really think we need a government agency regulating software code?” “How can you argue for an architecture of cyberspace that disables the government’s ability to do good?”, put forward by Lawrence Lessig are also expected to be answered in the near future. The complex relationship between different interest groups emerged in the Web 2.0 platform will also be an interesting area to explore.

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Mobile Value Chain and Services

The Case of Mobile Donations for Charities

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KEYWORDS	ABSTRACT
Mobile Technology Charity Value Chain Value Added Location Services Mobile Design	This case study presents how the use of mobile digital services through smart-phones can enhance known value chains of services by increasing the lateral margin value. The particular case discussed relates to a mobile application for charity organisations, i.e. non-profit organisations with the intention to provide help and raise money for those in need. The paper is of relevance for researchers and practitioners, as it demonstrates how computer and business science can be linked to analyse human computer interactions, which may help to solve problems in existing business processes through the use of mobile technology. Based on empirical data gathered from research and interviews during the case, the paper identifies the most prevalent problems of charity organizations, such as lack of awareness and information, trust, transparency and convenience, and demonstrates how mobile technology can support these deficits in business processes and service value chains.

INTRODUCTION

Mobile technologies have been widely studied by both academics and specialists in terms of how their use has changed everyday life in today's society, and also the enterprise relationships between companies and their employees (Sørensen, 2011). In recent days, the increase in the availability and popularity of smartphones, like the iPhone (2007) and Android devices (2008) has raised new attention to re-evaluating the role mobile devices can play in the delivery of digital services. In this context, mobile devices have changed established value chains and are able to co-create or add value to them.

This paper focuses on analysing the use of mobile technology of smartphones and its ability to add value to the known value chain of charity services. The paper will first review some of the fundamental theoretical and practical aspects of the general value chains for organisations, the value chain for service industries and the value-added possibilities of mobile devices. Next, these established concepts will be customised for the charity service industry on the basis of research and an empirical project, the development of a smartphone application called 'LocAid', which exploits the corners of the charity value chain and creates added value to charities' services.

Finally, the paper will analyse such enhancements in terms of design, provide a set of recommenda-

tions that can be used for both defining what value is added to a known value chain when releasing smartphone applications and for the design principles that are required for such development. The paper will end with limitations and research directions for further investigation.

THEORETICAL BACKGROUND: VALUE CHAIN AND MOBILE TECHNOLOGY

The general concept of the value chain serves as the theoretical model of this paper. In the following, the basic concept will be introduced, its adaptations in the service sector described and the effects of mobile technology identified.

The Value Chain

model of the 'value chain' was first mentioned by Michael Porter (1985) in the discipline of strategic management, linking innovation to corporate strategy (Martin and Nightingale, 2000). It describes how internal activities are developed inside a firm through different steps that form an economic process, from manufacturing and raw materials to distribution of the built product.

Porter (1985) proposes that a firm can create a cost advantage by reducing the cost of individual value chain activities or by reconfiguring the value chain itself. The concept distinguishes between primary activities and support activities. Primary activities refer to the physical creation of the product, through de-

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sign, construction, sale and post-sales services such as inbound logistics, operations, outbound logistics, marketing and sales, and service. The secondary or support activities help to improve the effectiveness of the primary activities and Porter identifies four main types: procurement, technology development, human resource management, and infrastructure (Balton, 2009).

Porter's concept of a value chain is used to model the full range of activities that are required to bring a product or service from conception, through the different phases of production, delivery to final consumers, and final disposal after use (Kaplinsky and Morris, 2001). The importance of the concept derives from the fact that it draws attention towards activities that 'add value' to the final product or service (Kaplinsky and Morris, 2001). It is considered relevant for seeking competitive advantage, reducing costs and identifying ways for differentiation.

Some authors such as Altenburg (2006) argue that the strongest advantage of Porter's model is that it takes into account differences across organisations, suits multifaceted, multidivisional firms and provides information on a firm's strengths and weaknesses. On the other hand, its main limitation is that Porter focuses mainly on products thereby neglecting services and only takes into account the internal strategic analysis of an organisation, not the external one (industry, customers, etc.), leading to an incomplete analysis of competitive advantage.

Value Chain for Services

One limitation of Porter's value chain, as mentioned, highlights the importance of exploring new dimensions of the concept, focusing on services, in particular digital services, rather than products. A service approach would give an insight into the flows and transformations by which value is added and might be of high relevance when analysing service organisations.

One of the main characteristics of services is that their production and consumption happen at the same time. Hence, the service production process itself is the product and due to the contribution of consumer value, it is more or less co-created. A further characteristic of most services is that unlike products, services are activities, which are abstract rather than physical and therefore are often intangible and impossible to stock. In addition, they are perceived subjectively, making them difficult to evaluate and factors such as experience, trust, feeling and security play an important role (Nooteboom, 2006). Based on these characteristics Gabriel (2006) proposed a value chain framework customised for services as illustrated in Figure 1.

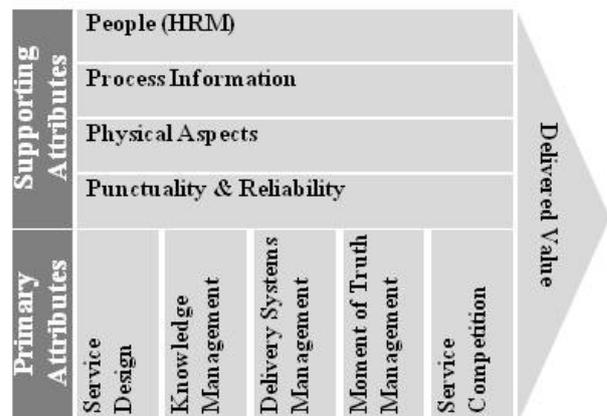
Primary attributes

Service design:

The value of the service needs to be incorporated into the service design. Service designers need to conduct market research and try to be as innovative as possible.

Knowledge management:

Knowledge management refers to the service provider's knowledge about the needs and dynamics of the decision-making process of customers as well as the customers' knowledge about the service.



Source: Adapted from Gabriel (2006)

Figure 1: Service value chain

Delivery systems management:

Services cannot be stored for future use or separated from the provider; this means that services are perishable and inseparable from delivery. Good management of delivery systems increases the convenience for customers and thus improves their perceived value.

Moment of Truth management:

The encounter between service provider and customer in the actual moment of delivery of the service can leave a positive or negative impression in the customer's mind. It can build or destroy trust and confidence and can dictate buying decisions for the future.

Service competition management:

Customers have a choice amongst different competitors. Therefore, providers need to stimulate their clients even after the service delivery. Efficient after-sales management and a high quality of service can increase the perceived value of the service.

Supporting attributes

People:

People are important in the co-creation of value due to the simultaneous use and production of services.

Customer expectations need to be matched with offered service to prevent a perception gap.

Process Information:

The service provider and their employees need to be aware of their service processes and the generation and delivery of the service value. Transparency and the availability of information, through e.g. IT, are of high importance within this step.

Physical Aspects:

The physical aspects refer mainly to the customer service and also include tangible aspects like the office appearance. Accompanying the customer in his preferred way throughout the whole primary activities and signalling the value of the service throughout this process is therefore crucial.

Punctuality and Reliability:

The time aspect is significant in the service industry and relates directly to the service quality. Reliability implies a level of consistency and assurance for the customer.

In a similar framework, Nooteboom (2006) attempts to develop a generalisation of Porter's framework, corresponding to different types of service industry. This industry differentiation, based on central features of the value adding process, is believed to enable easier identification of sources of inefficiency, to detect opportunities for value added and to be crucial for increasing transparency.

The research question this paper seeks to answer is; how can mobile applications, through carefully crafted feature design, enhance different steps within the service value chain? The model described above is used as a theoretical framework for the purpose of this study, since it offers a more viable perspective than Porter's original framework.

Value-Added Through Mobile Technology

Mobile technologies, and more specific mobile applications, have unique attributes that can add significant value to a company's service value chain. The literature identifies, in particular, three features as fundamental supporters in today's business:

Connectivity

Connectivity or mobility refers to the interdependence of time and place. A wireless infrastructure offers 'anytime, anywhere' communication and information exchange (Coursaris et al., 2008). It is especially valuable for time-critical or spontaneous needs (Kuo et al., 2009) and it is useful to employees and customers alike in that mobile services provide both user groups with easy access to the most up-to-date information (Barnes, 2002; Kleijnen et al., 2007).

Personalisation

Mobile devices are typically assigned to single users, who can then personalise the interface and application settings of the devices (Coursaris et al., 2008). Especially for interactive and dynamic mobile services, personalisation or customisation is fundamental to support user satisfaction and efficiency of a system, according to Barnes (2002) and Coursaris et al. (2008). Moreover, mobile technologies support an easy modification of content, repetitive and simultaneous consumption of information by different users and fast and cheap reproduction (Barnes, 2002).

Localisation

The Internet has the ability to localise specific places (e.g. IP address). Mobile technologies can extend this localisation feature by also localising users (e.g. a mobile worker) and items (e.g. tracking a shipment) (Coursaris et al., 2008). Especially in today's development of mobile applications, this feature is strongly demanded.

The identified attributes can be highly valuable throughout different stages of the service value chain. They can play a significant role in service design, knowledge management and delivery systems management. Moreover, mobile technologies are able to assist all supporting attributes (people, process information, physical aspects, punctuality and reliability) of the value chain.

However, besides improving the connection between the customer and the company, some problem areas may arise. As Gabriel (2006) argues "the more convenient the system, the better the perceived value by customers". This points towards the need to give crucial attention to ease of use and perceived usefulness of the mobile device in order to ensure customers to actually use the device, that is to engage in the "cognitive effort" (Kleijnen et al., 2007; Coursaris et al., 2008). Moreover, privacy and safety in information exchange are often perceived as risks in mobile services (Coursaris et al., 2008). Especially monetary transactions in mobile commerce can lack customer trust and therefore should be given special focus in the service value chain.

MOBILE VALUE SERVICE FOR CHARITIES: 'LOCAID'

In order to illustrate and understand how innovative mobile services might add value to established value chains, this chapter studies the case of the mobile application 'LocAid' in the context of the charity industry. It shows how LocAid's specific design features, identified in market research and interviews with charities and the charitable society, can add value to the value chain of charity services. First, the general

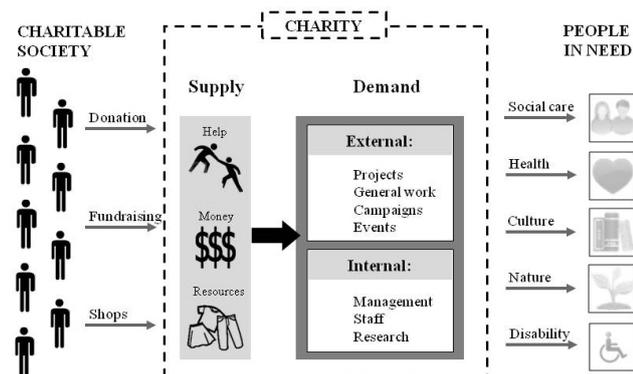
process and work of charities will be described and a framework for a charity value chain proposed. Following that, the LocAid project itself will be introduced and its effects on the value chain illustrated.

Charities and Their Value Chain

A charity organisation can be defined as a non-profit organisation with the intention to provide help and raise money for those in need. According to the UK Charities Act (2006), charitable activities include, among others, the support for health care, poverty prevention, community development and environmental issues. These activities range from a local to an international scale. To finance their work, charities mostly rely on external funding. Individual donors constitute the main source of income, followed by charitable trust grants, fundraising initiatives, asset investments, trading subsidiaries and charity shops (UK Charity Commission, 2006).

The general relationship between charities and the beneficent public, and the basic charity operations to pass public resources to those in need is illustrated in Figure 2.

This shows that charities may receive financial, human or physical resources from charitable citizens through a range of activities. These activities can be broadly categorised into donating, fundraising and giving to/buying from charity shops. The overall supply of resources is then used to support external and internal demands of charities, such as the funding of specific campaigns and the management of the organisation, in order eventually to help people in need.



Source: Own Elaboration
Figure 2: Charity Process, Source: own illustration

The activities of donation, fundraising and charity shop use, with which people can engage, are rather diverse. Figure 3 depicts the different ways of contributing within each category.

The first activity, donating, is the process of giving money to a specific need. While charitable people can donate on a one-time or regular basis (single/regular

donation), they can also conduct donations on behalf of somebody else (gift donation) or based on their own will (legacy).

The research for the LocAid project revealed that most charities do not specifically state to whom/which organisation their donations will be given. Many charity websites did not show which particular projects they operated and remained relatively superficial about the general work they do. This lack in transparency might discourage donors to become involved in charitable giving and reduce the trust in charity organisations.

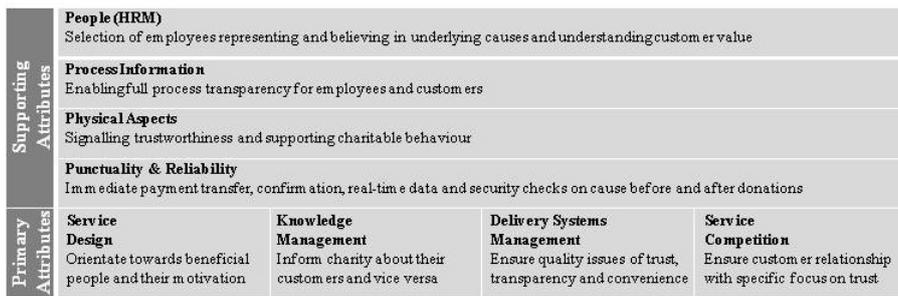
Donating	<ul style="list-style-type: none"> • Single donation • Gift donation • Regular donation • Legacy 		<ul style="list-style-type: none"> • Community and Children • Health and Medical
Fundraising	<ul style="list-style-type: none"> • Gather information • Register • Pay fee • Get sponsorship 	<ul style="list-style-type: none"> • Turn up • Buy • Donate • Participate 	<ul style="list-style-type: none"> • Culture and Education
Charity Shop	<ul style="list-style-type: none"> • Give & buy: • Textiles • Furnishing • Equipment • Accessories 		<ul style="list-style-type: none"> • Nature and Animals • Disability and Elderly

Source: Own Elaboration
Figure 3: Activities charitable people can engage with

The second activity, fundraising, can be defined as the process of giving time and effort to a specific need. Potential participants may need to gather information on event details, register for an event, pay a participation fee and collect sponsorships from other people. Moreover, the nature of the event and the degree of involvement influence the fundraiser's activity. Fundraisers may just turn up to support others mentally (e.g. cheering at a marathon), buy an event ticket or items at the event (e.g. registering for party, buying cake), donate at an event (e.g. donating at a gala dinner) or actively take part in the event (e.g. running a marathon).

Internet research for fundraising events showed that charities do list their own events on their websites. However, there are only a few websites which list collectively the events from various charities in a specific area. Hence, higher participation might be achieved with a clear overview of such events.

Finally, people can donate their resources or money



Delivered Value

Source: Own Elaboration
Figure 4: The charity value chain

to charity shops by bringing their own goods or purchasing second-hand items. The traded items can be textiles (e.g. clothes, shoes), furniture (e.g. mirrors, photo frames), equipment (e.g. sport equipment, books, CDs) or accessories (e.g. bags, jewellery).

The project’s research revealed that charity shops are growing, especially in Western countries. This might be due to the throwaway culture, which has emerged over the last decades, but also to the current recession, which makes people feel less able to give money yet perhaps still able to donate unused items. Moreover, a social trend was observed, where people would like to do something “good” while buying something. Campaigns such as fair-trades, might confirm this trend.

Charity Value Chain

In contrast to services in commercial sectors, the charity sector is strongly driven by beliefs of people who want to support a specific cause (Lee, 1993; Saxton, 1994). It is crucial that charities understand why people give to causes and communicate their service accordingly to achieve a long-term commitment (Guy and Patton, 1989). Based on LocAid’s market research and interviews, the most prevalent challenges for charities are the lack of information made available, and their trust and transparency, both of which are instrumental in holding people back from giving more to charities. Additionally, some charity services, especially through the Internet, are not convenient to use. Hence, this paper will draw attention to the information, linked to a general charity awareness, trust, transparency and convenience and how these issues could be mitigated through any kind of value added within the value chain.

According to Saxton (1994), people can be motivated for charitable giving on different levels, starting at a shared identity (“I share their vision”) down to the effects on their local environment (“It makes a difference to me”). Other scholars identify therefore the distinct importance of brand management for charities in order to communicate and symbolise the specific beliefs of charitable people, motivate them and facilitate the process (Hibbert and Horne, 1996; Ha-

kinson, 2000). Hakinson (2000) divides a brand into functional attributes (the cause) and symbolic values (brand values) like humanity, impartiality, neutrality or independence. Her research shows that charity managers use brands to fulfil a range of organisational objectives such as raising awareness, building trust, fundraising, educating or lobbying. The small amount of existing research on charity organisations and their processes shows that in order to create value, a distinct focus on the cause and its symbolic values is required.

The following framework (Figure 4) is an attempt to identify potential aspects of a charity value chain as a service. It is based upon the service framework of Gabriel (2006) with some adjustments taken from market research and interviews of the LocAid project.

Primary attributes

Service design: The design of a charity service would be oriented towards beneficial people and their specific motivations for a cause. Marketing might play an important role in incorporating the cause, the charity value and the resource provision into the service design or even in building a specific charity brand. Customer segments and specifically their intrinsic motivations might be identified through market research to enable an effective service design.

Knowledge management: The knowledge management phase could be a potential step to enable an effective information provision about donators and their profiles. Customer data would need to be stored intelligently in order to match specific needs of customers with identified relevant causes and projects. The organisation would also need to ensure that beneficent people are aware and sufficiently informed about the charity and its service value. Communication and feedback processes through customer service might strongly support the effectiveness of the knowledge management phase.

Delivery systems management: The delivery phase of a charity service would aim to ensure the most prevalent challenges of trust, transparency and convenience. Specific focus might be given to the conve-

nience of the search, selection, payment and registration processes for a cause. This might count equally for all service channels, regardless of whether that is on the web, via mobile, a call-centre or by personal interaction. Trust and transparency might be enhanced within this step through e.g. successful fundraising events, a strong focus on payment security, trust seals or an immediate donation confirmation.

Service competition management: Strong competition for donations has been observed during LocAid's market research. The service competition management phase would be a potential value chain step to signal the difference of the charity to the market. As charities try to incentivise customers to donate on a regular basis, long-term satisfaction would be crucial for charities. A focus on trust, individual needs and the visible effects of donations might be supportive to build strong customer relationships. Communication after donations might be targeted e.g. through regular updates on a cause.

Supporting attributes

People: The project's research also revealed that the value of charity services was extremely dependent on the value co-creation with customers since without the support of charitable people through help, money or resources, a charity itself would be meaningless. Hence, donators should feel their importance throughout the whole value chain. People might also refer to the employees of the charity who should represent and believe in underlying causes. They should signal seriousness, generosity, sensitivity, and customer-friendliness and try to build trust in order to match the offered service with the donator's expectations.

Process Information: Throughout the value chain, the charity process would need to be as transparent as possible. Charitable people should be able to know the destination of their contribution and its effects on a specific cause. It is proposed that employees should be able to access this information and provide it, if appropriate, to customers. An optimised information technology might help within this step to ensure data quality, tracking and provision.

Physical Aspects: The physical aspects of charities would signal the service value with an emphasis on trustworthiness and the charitable behaviour of giving people. The aspects might be divided into "Marketing", online (e.g. website, Application) or offline (e.g. catalogue, flyer), and "Facilities" (e.g. office, furnishings, charity shop).

Punctuality and Reliability: Reliability, and closely related to that, punctuality, would be crucial for charities to build trust. Customers would need to be as-

ured that the charity service is serious and reliable in providing e.g. the donated money to the corresponding cause efficiently. Immediate payment transfer and confirmations, real-time data, regular data check-ups and security check-ups on causes before and after donations might be able to support this value chain step.

The Local Aid Project

The mobile application LocAid (i.e. "Local Aid") was developed in the context of a university project at the London School of Economics and Political Science. It was designed according to findings of market research, interviews with charities and charitable people and the value chain identified above. In the following, the application itself and a brief overview of the project are presented.

The application LocAid is a mobile application that allows users to find, support and connect to local charity organisations. The application offers the three main functionalities of donating to local charity projects, registering for local fundraising events and finding local charity shops. The innovations put forth through LocAid are driven primarily by the three distinct characteristics of high transparency, local applicability and mobility. The idea is based on the concept of offering value added for users and charities through enhanced information provision and local charity awareness to increase local charitable giving. The project of the application development was organised into two interrelated, parallel work streams: one focusing on the foundation, justification and evaluation, and one on the development of the application.

In the first stream, a market analysis, surveys and interviews with charitable people and charity organisations were performed to get an understanding of the charity market, its processes and needs and to identify the concrete definition of the application and its required functionalities and design. The surveys were also used to justify different aspects of the initial requirements. The participants were selected as a potential user audience, in order to evaluate the importance of different features of the application from their perspective. The survey feedback was found to be relatively positive with 96 per cent of people, who considered the application to be useful and more than 60 per cent strongly agreed that it would encourage them to engage more in charitable activities. Users also indicated great interest in additional functionalities such as a map, calendar and news feature. The most prevalent issue for participants, with more than 70 per cent, was the security of the payment method, which was viewed as critical in building trust before using the application. Two focus groups were conducted to evaluate the grade of innovation, its usefulness, and potential, additional functional re-

quirements. To evaluate LocAid from a business perspective, a business model was created with a specific focus on user development, revenue model and cost structure.

The second stream, the development process, consisted of four main steps. It was based on the waterfall development model (Royce, 1970), allowing iterations between all process steps, and using the unified modelling language (UML) to complement the design process. The implementation was carried out in two steps: first, a functioning GUI prototype was created and feedback was received through the focus groups for further improvements; second, the development of a rudimentary real prototype was started in XCode. Issues during implementation were mostly related to the availability of data for charity projects. Most data available were only for the charity itself, but not for specific projects, as the application requires. Future steps, therefore, were considering direct cooperation with a larger charity with strong local involvement and high accessibility of project data. This paper focuses mainly on the computer:human interaction, rather than the implementation issues.

Value Added Mobile Application

As described in the chapter entitled “Charities and Their Value Chain”, the literature has identified brand and belief creation as two ways to support charities and their value creation. Mobile technology might be another recent way to add value to the charity value chain. Through its distinct characteristics, localisation, personalisation and connectivity, it might be able to tackle the most prevailing problems of charities that hold people back from engaging more with them, in particular the lack of awareness and information, trust, transparency and convenience. The mobile application LocAid was designed to address these prevalent problems and is an exemplary case of an innovative mobile technology with great potential to add value to the value chain of charity services.

Awareness & Information

During the “service design” and “knowledge management” phases, sufficient awareness and information was observed as fundamental to market charities’ projects, events and general work. Commonly, charities sent street volunteers to inform people, start campaigns to increase awareness for specific projects, and show website presence to keep users up to date about events and their work. However, these activities show difficulties in targeting explicitly the charitable people and in addressing their individual information needs.

Mobile technologies might be able to address these difficulties through their localisation, personalisation and connectivity characteristics. In the case of LocAid,

functionalities were incorporated to locate charitable individuals and to show specific donation projects, fundraising events and charity shops “around” them, thus customising the application to individual needs. Moreover, the application was designed in a way to offer personal accounts in order to tailor content to the specific user (e.g. users get an overview of their past donations or events and receive updates on ongoing projects). Finally, LocAid was provided with a feature to give users information when and where needed, making charitable giving a real-time activity and keeping the individual user informed at any time about the current status of their beneficial actions.

Trust

Trust was identified as a critical concern throughout the whole charity value chain and generally as a complex, prevalent factor for every financial transaction. Charities should build relationships with the charitable society and increase their involvement to gain and sustain the public’s trust. Traditional advertising channels such as physically approaching people attempt to develop trust and customer relationship through personal contact. However, many people feel pressured and hence refuse this direct approach.

Mobile technologies might create a two-way connection between the charity organisations and the users without urging them. Moreover, customer relationship might be built through personalisation. LocAid, for example, includes features to display updates of projects, to which users have donated and the most favourable projects of other users. In addition, the local focus of the application was chosen to address the trust issue as local charities might often be better known and their projects can be visited in person. Finally, during the development of LocAid, a networking functionality was considered, connecting charitable people through the application, creating a community and thus eventually developing a lock-in effect.

Transparency

Transparency was found to strongly influence trust and was seen as crucial for support activities in the value chain such as “process information” and “systems delivery management”. The surveys and interviews showed that not only the process of money transaction should be transparent, but also the money’s destination and effect. Charitable people were critical of the fact that they do not know where their money goes and their perception of charities’ transparency was very often low. Almost all reported that their most important concern was to see the actual result of their charitable actions, leaving them with the desired satisfactory feeling of having done something good.

Mobile technologies might increase transparency through local applicability and customised content.

LocAid was designed to give attention to local projects and events in order to increase the perceived visibility of donated money and its effect on local causes. Accordingly, beneficent people can help where they see the actual results, in contrast to foreign aid support, where users often feel wary about the destination and use of their money. In addition, personalised features, such as receiving feedback and updates on projects, to which a user has donated money were chosen to foster customer relation management and therefore to increase transparency.

Convenience

Convenience is a factor that has received more attention in recent years due to the time constraints in today's society. As market research and surveys show, it has developed to a core focus in the charity value chain process, especially during the "service delivery" phase. Users engage with a service, if it is simple, convenient and efficient. Conventional efforts to offer convenience to charitable people such as actively approaching people on the street instead of asking them to go on websites and visit charity offices, or sending forms for event registration via email, cannot meet individual needs to engage in charitable activities at the right time and in the right place.

Contrary to this, mobile technology can offer service 'around the clock', giving the advantage to serve customers whenever and wherever it is convenient for them.

Furthermore, as indicated before, LocAid's functionality design was focused on personalisation and localisation (e.g. giving reminders for upcoming events for which users have registered or simple directions to charity shops near the user), linking charitable giving with a comfortable service provision. Related to this, simplicity in design was seen as fundamental to provide convenience, leading to strict guidelines during the development (e.g. the steps to carry out a donation or fundraising registration should not exceed 3-4 clicks).

The above customer-focused discussion demonstrates the potential ability of LocAid to add value to the existing value chain of charities. Aside from acquiring, serving and satisfying charitable people in a more efficient and effective way, the application may also support charities in their information management and operational efficiency. For example, donations and fundraising registrations can be tracked in real time, new information can be communicated instantaneously, marketing can be conducted through a more targeted approach – all offering potential for competitive advantages in services and processes. Accordingly, LocAid might not only support charities to deliver a better service, but offer simultaneously benefits to charities, the benevolent society and the

people in need, hence acting as an intermediary co-creating value between three interrelated parties.

Overall, the case of the development of LocAid demonstrates how the effective design of mobile technologies might be able to approach prevalent problems and add value in established value chains. The characteristics of localisation, customisation and mobility were systematically applied to the design of the application in order to fulfil its value added need.

DISCUSSION

The LocAid case shows how the characteristics of mobile technology can add value within an established industry, more specifically within the charity value chain. However, some limitations of the framework and the mobile technology effects need to be considered. Firstly, the relation of the charity value framework to the literature will be discussed and secondly, the issues of the mobile technology effects are described.

The framework has a strong relation to Gabriel's (2006) proposed service chain framework but, as opposed to the original model, the activities of "moment of truth" and "delivery system management" are combined. For charities, these two activities cannot be differentiated as the actual "service moment" of a charity often cannot be defined due to its subjective character. People will define their service moment differently: for some, the payment process to a cause will be the main service moment, while for others, it will be the actual resource provision or positive effect in the future. The main relation to Porter's original model is the differentiation between primary and supporting activities and the fundamental idea of how value is created within a "chain". The charity value chain is, in contrast to Porter's original model, a service value chain, which emphasises not the creation of a product but the co-creation of value with its customer.

The charity value described in this paper is mainly formed from market research work (interviews). The academic literature was not found to be detailed enough and was too generic in some cases to be logically conclusive. This is a shortcoming of this work, as the model might require further testing. Additionally, the model framework proposed for the charity value chain is only validated for the case of London, or the UK at most, hence attempts to extend the results to other contexts would require a reassessment of the assumptions for calibration.

The positive effects of the mobile technology on the charity value chain have certain problematic characteristics, which will be critically discussed for each attribute. An issue for all attributes is that the value

added can mostly only be leveraged if the charity fulfils certain prerequisites (e.g. transparency can hardly be enhanced in case the charity does not provide sufficient data on its processes). The issue is strongly related to the prevalent implementation issue of available data.

Considering the supporting attributes of the value chain framework, people and physical attributes are unlikely to be influenced by the mobile technology. Process transparency and increasing trust through punctuality and reliability attributes can be improved but only if the mentioned complementary standards are given (e.g. the charity needs to be reliable before a mobile technology can add value). Regarding primary attributes, mobile applications add value to the service design and specifically to general charity awareness. Charities need to be aware that in the case of LocAid, these positive effects can occur for all cooperating partners of the mobile application service provider similarly. Subsequently, the service could be used, more out of necessity through competition than out of the idea, to gain any value added. The knowledge management, delivery systems management and service competition can be affected very positively through the distinct characteristics of personalisation, localisation and connectivity of a mobile application. Similarly to the supporting attributes, much value added can only be fostered if required conditions are fulfilled.

Further limitations of a mobile technology value added arise from the effects on trust and transparency, in combination with conducting payments through a mobile application. Trust is a complex concept and a prevalent important factor for every financial transaction. The limitation of measuring trust is based on the fact that it is a multidimensional socio-technical factor that may be differently interpreted by every individual and which has received numerous different definitions (Dahlberg et al., 2003; Pavlou, 2003; Cyril et al., 2008). Most scholars agree that trust is a belief in "favourable expectations" (Cyril et al., 2008) based on previous interaction. The problem is that a mobile intermediary increases the number of parties that need to be trusted, in this case not only the charity itself but also the mobile service, leading very often to a so far unaddressed problem of perceived security. Trust and security, if not perceived by a user, have been identified as major inhibiting factors of user acceptance towards payments through a mobile application (Mallat, 2006; Cyril et al., 2008). Security can generally be divided into objective and subjective security. Objective security denotes the concrete technical details that are unlikely to be perceived by the consumer. Subjective security is the perception of a user that the mobile payment procedure is secure and can be seen as the opposition to the perceived risk (Dahlberg et al., 2007; Pousttchi and Wiedemann, 2007; Cyril et al.,

2008; Schierz et al., 2010). Consumers often perceive payment solutions as insecure, thus do not trust them and are therefore unwilling to use them.

The positive mobile technology effects could be further mitigated by the willingness of charitable people, due to their age, beliefs or values. Mobile technology and especially payments through mobile applications are mostly used by younger generations. Because the most charitable group of people is aged between 45 and 64 years (UK Charity Commission, 2006), the general willingness to have, or even knowledge of, mobile technology could often be limited. Furthermore, the local aspect of LocAid, mainly based upon the localisation feature, could be against the belief of many charitable people who generally come from developed countries and often see no reason to donate or support local charities but want to help foreign poorer developing countries. Ultimately, the idea of an additional service fee due to an additional intermediary could put many people off because firstly, the donated money could be reduced and secondly, some believe a charitable intermediary should not aim for any benefits at all. This concern should be taken into account for any business-model development for a mobile value service within a charity value chain by, for example, not charging donors at all and charities only to an extent that the value added exceeds the additional service charge.

Finally, the effects of the LocAid case need to be critically debated from the overall charity industry perspective. Firstly, even though the localisation feature indeed can add great value if a charity supports local projects, charities with non-local projects or no possibility to provide local individual information only have limited or no use for the mobile value service. The distinct localisation feature therefore only applies to charities with local projects. Secondly, the application itself is limited within the charity industry because it does not consider volunteering services, which usually are of high importance for many charities. The volunteering process often involves higher commitment, specific skills and training and differentiates itself from donations, fundraising and shops functionalities for any application development.

The LocAid case shows how design specifications can be derived by analysing the specific value added of the application in relation to the industry, into which it is introduced. Alongside innovation, the application was designed in order to signal quality and generosity to overcome trust constraints but also incentivise users (e.g. the colour green was chosen as the main colour due to its signalling of generosity, support and money). Developers and graphic designers should work hand in hand to enable a coherent design that suits the specific requirements within an industry.

The discussion shows that the proposed charity value chain and the effects of the mobile technology and its value service can generally lead to a value added but both the framework and the value added are limited due to the framework uncertainty, the intermediary character of the mobile technology and the general trust issue within the charity industry.

CONCLUSION

The approach of understanding the role mobile applications, such as LocAid, can have in value chains is an area that has not been researched in depth and companies have been slow to understand and plan for future implementations. The waterfall model for the design of mobile applications, when used with adequate care and vision, is still adequate to provide solutions when required.

The proposed charity value chain framework shows how value is co-created with the customer and which specific attributes can add value to this service. The specific issues of trust, transparency and convenience in the charity sector offer a basis to analyse positive effects of mobile technology. The distinct mobile technology features of localisation, connectivity and personalisation can be related to each value chain attribute and offer overall a strong value added.

In terms of design, the carefully crafted attention to detail, in terms of application design, services, trust, etc. allows the provision of an integral solution for the delivery of this type of service that has been positively embraced by practitioners in interviews with charities in London and there is interest in releasing the application and its future enhancements in the real life market.

This research paper contributes by presenting a new, business-oriented direction of research in computer science. By focusing on human computer interactions in relation to specific value chains, it encourages academics and practitioners to work together in order to achieve mutual benefits. Additionally, the very practical findings of this paper can help established services to understand the value that new technologies, in particular mobile technology, can give to their businesses and to create an interest in new innovations and developments in the future.

Future research should further assess the proposed value chain framework but also try to identify more specific features of mobile technology, which can create value added, and show how practitioners in related industries and developers can use these opportunities and devise practical guidelines, like design specifications, for it.

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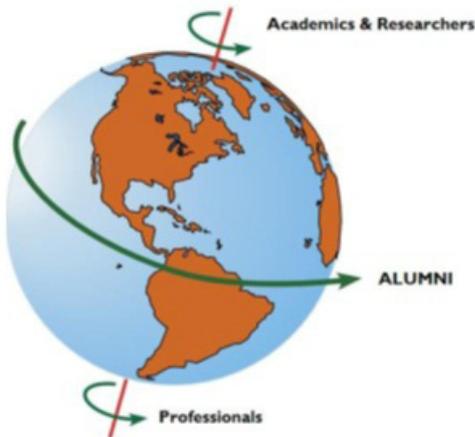
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