

iSCHANNEL

Vol. 1, Issue 1 June 2006

From the Convener

iSChannel is an excellent student initiative that spotlights the academic work of members of the LSE-IS community. The editors have worked hard to prepare the inaugural issue, and its quality demonstrates the high-level of academic work to be found among IS students at the London School of Economics. It is important to raise the visibility of student work not only to understand IS issues more fully, but also to foster a culture of peer to peer information exchange -- students learning from students. The LSE-IS Department fully supports the *iSChannel* and is enthusiastic about the first edition. We hope that the journal will start a tradition in our department, and become a beacon for IS students worldwide. The students whose works have been published in this journal, by their willingness to submit their work to rigorous scrutiny, are certainly what I would label 'new barbarians'!

Professor Ian Angell
Convener, Department of Information Systems
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From the Faculty Editor

Welcome to the first issue of *iSChannel*, a journal on the social study of Information Systems, produced, edited and double-blind peer reviewed by the students of the Department of Information Systems at the LSE. The quality of this journal is testament to the quality of writing of students on our MSc and PhD programmes, and to the dedication of the two editors-in-chief who have worked tirelessly to turn an idea into reality.

As the faculty editor I want to set out the aim and scope of the journal for the future. *iSChannel* publishes original material concerned with all aspects of the social study of Information Systems. Submission is limited to MSc or Ph.D. students only. In addition to papers we accept shorter provocative opinion essays and book reviews of 500 words or less. The two editors-in-chief change every year and are selected from the ADMIS or ISOR MSc programmes at the LSE. As faculty editor my role is simply to appoint and advise these editors in creating the journal.

I also hope that current contributors will look at *iSChannel* and remember a year in which their ideas about the role of Information Systems in our lives changed through their study at the LSE, and that future contributors will see how their ideas may develop and contribute.

Dr. Will Venters
Faculty Editor

Inaugurating *iSChannel*

“One of the distinguishing marks of LSE was throughout that it never remained silent,” writes Ralf Dahrendorf in his introduction to *A History of the London School of Economics*. Scurrying through bustling Houghton Street and the Library over the past year has confirmed for us the importance of the LSE as it has been at the forefront of international conferences, fiery controversies, and scholarly debates for over a century. We feel that the students in the Information Systems Department at the LSE are perpetuating the words of Dahrendorf and continuing the scholarly sounds of the London School of Economics.

iSChannel started as an abstract idea to cobble together a handful of arguably academic articles. Over the past many months, the publication has taken on a life of its own with editorial meetings, endless emails, Skype and Google Talk conversations, and redrafts of articles. As article submissions trickled in and the journal started to take shape, *iSChannel* started to become something more, a major academic enterprise for many of us in the IS Department.

This publication would have been impossible without the contributions of the many students involved, from the editorial team to those who offered informal advice.

The enthusiastic response and critical feedback startled us. We also laud the reviewers for their time in reading critically and opining clearly. A special thank you is in order for every student in the IS Department because each page of this publication represents a collection of minds.

The inaugural edition of *iSChannel* showcases articles from across the information systems topical spectrum. We en-

deavored to sketch a theme for the articles but realised that the intellectual breadth found among our peers is a motif in itself. The publication starts with two semi-academic pieces written on current event topics by Harry Mann and Danish Dada. The next two articles deal with the power of the Internet in publishing and those who control the power of the Internet. Articles with theoretical models are subsequently exhibited with Eszter Bartis’s work and Katie Price’s article on user resistance. The publication focuses next on technology in developing countries and e-government. It concludes with Muhammad Umar Zafar’s article that illuminates a future direction for IT adoption.

iSChannel is an attempt to raise the visibility and spotlight the work of students at the LSE studying information systems. What appears in your hands may appear to be a finished first edition, but *iSChannel* is still a work in progress. We take solace in Winston Churchill’s comment on writing a manuscript: “The last phase is that just as you are about to be reconciled to your servitude, you kill the monster, and fling him out to the public.”

It is with great admiration of our peers and respect for the open-mindedness of certain key members of the IS Department such as Dr. Will Venters and Prof. Ian Angell, that we submit *iSChannel* to you, the public. We hope that *iSChannel* becomes an annual publication and a seminal sound in the critical field of information systems.

Omer Tariq & Kabir Sehgal
Co-Founders & Editors-in-Chief

Reinventing Community Networks as Economic Development Solutions

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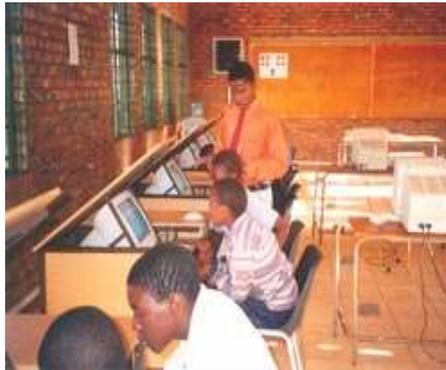
O P I N I O N

Networks exist in all our communities, small or large. But what are the key challenges facing the development of online community networks, and are they the solution to economic development in our rural and urban communities?

The history of community networking can be characterised as being the era when early adopters with a vision for their communities created online collaborative systems intended to empower a majority of the local community, but found themselves unable to capture the imaginations and participation of more than a small number of citizens. Many were dismayed into thinking that perhaps online networking would not work. The digital divide was the most common excuse used as a tool to blame the lack of effectiveness of online communities. This article argues that simply access is not the key to such community networks, as creating value is the key.

Communities meeting and coalescing is nothing new, ask any anthropologist. But the proliferation and use of ICTs to facilitate this is a new phenomenon. Since the 1980s of the hundreds of innovative community networking projects which have been created over the past decade most proved unable to inspire a growing number of citizens without the support and validation of the existing community leadership and media. The politics of control have limited public perception of the profoundly empowering collaborative community Internet applications that are possible.

In both urban and rural communities we have a new need for new knowledge on an ongoing basis to keep from falling further behind in a world of accelerating change. Growing civic intelligence requires new community learning systems. Community innovation systems are needed to stimulate widespread innovations. Local grassroots champions are often “prophets without honour in their home lands.” How can we reach the point where the majority consensus finally accepts the validity of their visions and innovations? To realise the



Our key developable resource is the learning potential of each and every citizen.

greatest potential for community networking the ongoing support of both the media, and our leadership at all levels is fundamentally necessary.

Now that we’ve had over a decade to become familiar with the Internet, the evolutionary process of creating widespread awareness of common sense community Internet applications appears to be at an important turning point. Costs for computer and Internet access have steadily declined and Internet speeds have steadily increased. The author lives in broadband Britain, and as costs become lower there is no doubt that more and more of British society will have access to the fastest connection speeds available. Today, we in Britain are seeing rapidly growing Internet applications in all sectors of commerce and society.

The dramatic economic decline of rural areas in the developed world in America and in the UK in particular has created new pressures to find innovative solutions. Our past economy depended primarily on big corporations, but today

the reverse is true, the real growth is in micro-enterprises. Our key developable resource is the learning potential of each and every citizen.

E-commerce is steadily being recognized as a viable option to tap into global markets. Outsourcing jobs to India has certainly validated tele-work. The U.S. government has passed legislation to dramatically promote tele-work for federal employees. Here in the UK we are constantly finding more and more jobs being shipped abroad via the call centre revolution. Individual entrepreneurs using eBay number up to 114 million, now too many to ignore, exchanging 28 billion in goods per year, with 430,000 persons self-employed full-time using eBay.

Rural communities around the world, many now with equal Internet access to American communities are aggressively embracing their newfound global market potential. No longer do U.S. communities enjoy a ten-year first-to-market advantage of local Internet access over our global rural competition.

Awareness is steadily growing that if we were all able to share a common vision and pull together, great things are truly possible. The barn-raising metaphor fits here, as web-raising could be held with everyone working together to share that new knowledge most needed to deal with accelerating change. Creating communities that can learn to competently manage new knowledge on an ongoing basis, to become real learning communities, has become both necessary and viable.

The key lesson we can draw from the evolution of community networking projects is that “The devil is in the details!” It won’t happen based on good intentions alone, but only through care-

ful planning and widespread authentic community collaboration at all levels.

Return on Investment

The challenge for community networks continues to be the incentive for participation. Individuals need to be willing to commit their time based on the personal satisfaction that their donated time produces real value and is socially recognized. Value needs to be quantified as a visible measurable outcome that can be celebrated. "Less is more" in the age of information overload. Having everyone create a personal web log is not necessarily the answer.

Information condenses to knowledge which condenses to wisdom, and value is created in the age of information overload.

Once the process of creating value is demonstrated, two key issues arise:

1. Which tools and specific best practices produce the greatest value leveraging the time and energy of citizens? In other words, "What applications produce the greatest value 'return on investment' for time and effort?"

2. How are citizens most effectively engaged in sustained collaborative learning activities to produce steadily greater value per time invested as they increase their skills and knowledge regarding the diverse tools and proven best practices?

This is a double-barrelled opportunity, creating a progressively more powerful community skills base that produces exponentially greater value as more citizens contribute by collaboratively sharing new knowledge. We need to quantify the effectiveness of the successive levels of tools and best practices with an eye toward the accelerating evolution of more diverse and powerful applications.

The authenticity of genuine participation will be measured by the demonstration of effective training coupled with rather immediate visible outcomes everyone can understand and celebrate. The challenge will be to demonstrate the most effective use of volunteered time to create the most outstanding resources providing the greatest possible benefit to others. Whether the first successful models come from foreign communities or from our own, is up to us. It is just a matter of who and when.

A case study: Donnie Morrison, a grass-roots champion of the Outer Hebrides Islands in Northern Scotland, saw dwindling populations in his regional communities. Young people were moving away, schools were losing students, the local economies were dying. Donnie was successful in bringing high speed Internet to his communities and high-paying tele-work jobs, and today the communities are once again healthy and growing. (See <http://www.work-global.com>) By Donnie's own report, his most successful innovation and key to his success was his creation of a community skills registry database.

The questions we're at last starting to ask are "What's the best our community can do for itself based on new knowledge of the best successful innovations already working for other communities?" What does our community do to inhibit innovations? and what have other communities done successfully to encourage and support innovation?

The challenge faced potentially by all communities is "What's the best way to routinely gather and share the best innovations as they emerge to benefit all communities?"

The questions we need to ask of our communities is not simply how many people will they put online, but what value will they create. Imagine inner city areas forming their own online skills communities, the disadvantaged would be given a global voice in the information world and who is to say that through collaboration their skills set doesn't rise to put them on a par in the global market for outsourcing.

We hear so much talk of the digital divide, and how to bridge it. In a recent study undertaken in Leeds it was evident that community networks harnessing social and cultural capital were the biggest determinants for success or failure in the digital divide when looking at the socially excluded. If we are harnessing these networks for aiding people to learn, then there is no reason that we cannot harness these networks for community economic development. The questions we have to ask ourselves are:

- Are all local business web sites listed in one place to support local online shopping and to generate awareness as to which local businesses are now doing business on the Internet?
- Are all local e-commerce support

businesses listed in one place so anyone can easily find the expertise they need to bring their business online?

- Are local experts and community mentors celebrated for the value they bring to the community and listed where people can find them?
- Does your local media regularly celebrate local e-commerce success stories? Or are they ignored?
- Are successful innovations from similar communities to yours readily shared locally by any means?
- Are entry-level e-commerce education training opportunities (such as eBay) and peer mentoring programs readily available in your community?

Answering yes to as many of the above questions is a clear indicator that things are on the right track. In an age of global competitiveness we need to harness not all the skills of the individual but the skills of the collective. The unlocked potential of inner city areas is huge, and now the tools are there to take this forward. Let us see soon the likes of inner city Leeds take on New York in the e-commerce revolution, or London take on Delhi – and of course win. What is clear is that the benefits of online collaboration in both rural and urban areas aren't harnessed enough. Capturing the imagination of policy makers to support such networks might be the catalyst for change.

ABOUT THE AUTHOR

Harinder Mann is a PhD candidate in the Department of Information Systems. His research has included a two and a half year study of the digital divide in an inner city area. He teaches on the ADMIS course and is a previous graduate of ADMIS (2000). His research areas include the effects of ICTs on the disadvantaged and ICTs for development in the context of UK.

From Cyborgs to Androids: Where have all the humans gone?

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Imagine having a chip implant which allowed you to communicate with a computer, or a bionic arm that provided you with super-human strength. Sound a bit too strange for you? If self enhancement isn't your cup of tea, picture meeting a new colleague at work, so attractive that you failed to notice it wasn't human.

Eerily enough – you don't need an over-active imagination or an affinity for science fiction to conjure up these scenarios. Each of them is already a reality. So what do you choose? – to join in or to be overruled?

These are our only options, claims Kevin Warwick, a crazed cybernetics professor at the University of Reading notorious for having two chips implanted in his body; enabling his movements and nerve impulses to be tracked and manipulated by a computer, essentially allowing him to interact with it.

So where do cyborgs and androids come in? Well, increasingly – everywhere. But before thinking about how we will be overrun by these evil beings, let us start with the basics.

A cyborg is a Cybernetic Organism; a life form that crosses the boundaries between human and machine. Numerous cyborg theorists argue that almost all of us that live in a modern society are cyborgs, due to our reliance on artificial enhancements, such as mobile phones to extend our capacity for communication. However, a more interesting situation is where machine and human exist physically as one.

Implantable technology has been around for years, and the common cyborgs are those fitted with pacemakers and similar devices. There's no problem with medical innovation, one may rightly point out. However the use of such technology is moving towards enhancement rather than rectification. What was once

an obsession of mad scientists is making its way into mainstream humanity.

In 2003, Jesse Sullivan, an amputee, was transformed into a cyborg, being able to carry out routine tasks with a bionic arm which responded to the firing of nerve impulses created when he thought about the task.

The replication of human thought and emotion is far more difficult. This is the greatest problem for those trying to drive us mortals into extinction.

But that is history, and the Cyberhand Project goes a step further, not only reacting to brain signals, but also providing natural sensory feedback in response to touch by stimulating specific nerves. So it's becoming a reality – a fully functional bionic hand capable of both movement and feeling. Only much stronger than the more traditional soft flesh and brittle bone; I for one would never get into a fight with the likes of Jesse Sullivan.

But as I said, cyborgs are no longer the creation of a medical disability. A US surveillance company known as City-Watcher.com recently implanted its employees with VeriChip: an FDA-cleared Radio frequency Identification (RFID) microchip. This freakish device allows for GPRS tracking and high level security clearance. Those concerned with the privacy issues of this application do so rightly, as Verichip has already been hacked. So much for security!

Differing from cyborgs, an android is what (at present) is a far less complex and intelligent structure: an automaton

that resembles a human being; be it in physical appearance, behaviour or both.

But we can tell the difference between robots and computers, right? Professor Ishiguro from Osaka University's Intelligent Robotics Laboratory begs to differ. Last year he unveiled 'Repliee Q1Expo' – a 'female' robot that looks incredibly human. This android has silicone human-like skin, appears to breathe, blink, and even displays the constant subtle shifting exhibited by human beings. He believes that in certain contexts he can make people believe that androids are human.

The replication of human thought and emotion is far more difficult. This is the greatest problem for those trying to drive us mortals into extinction. The Turing Test has been taking place for over 50 years now, where programmers try to make their creations indistinguishable from a human counterpart, to judges that interact via a computer terminal. So far no program has passed, but the test remains the ultimate goal for many.

With the overlap of the organic and the artificial it is becoming increasingly difficult to differentiate between human and computer. As we leap to new technological bounds we can only wonder what the real implications of such 'progress' will be. For those like Kevin Warwick, becoming a cyborg is the only way to stay ahead in the game of life, which he claims will soon be run by a superior intelligence.

As for me—I'm off to go and buy myself a copy of *Artificial Intelligence for Dummies*. If it is going to happen, I might as well be prepared.

WikiNews: A World Flattener?

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Wikinews attempts to produce a news service using Wikis and the input of a collaborative community of volunteers. This takes place within the changing world of today's news media that are deeply affected from the Internet phenomenon and ubiquitous technologies. Participatory journalism has already appeared in other forms and has been hailed as a major altering force in the news landscape. Wikinews being a project of the Wikimedia Foundation (WF) has inherited several properties from its sister project Wikipedia. These include the Neutral Point Of View (NPOV) policy and the exclusive use of Wiki technology. Although WF appears to be an ideal organisation for such a collaborative project, Wikinews has failed so far to attract a critical mass of users. An important factor for this failure appears to be the foundation's institutional characteristics that have restricted Wikinews from facing the new challenges of its news environment.

Introduction

New York Times columnist Thomas L. Friedman, has identified the "self-organising collaborative communities" on the net as one of the world's ten flattening forces (Friedman, 2004). These communities have gathered individuals around areas of interest (Pralhad & Ramaswamy, 2004) and managed to create a new mode of production quite distinct from markets and hierarchies based around the concept of what Yochai Benkler calls commons-based peer production (Benkler, 2002). Commons are freely licensed to everyone. Each member of the community voluntarily contributes to any part of the creation process. Although its driving motives are not direct monetary rewards or exclusive property rights, they have in many cases competed and sometimes outperformed conventional hierarchy and market mechanisms. Examples include the Apache web server and the Wikipedia encyclopaedia that have surpassed in popularity their respective commercial counterparts of Microsoft IIS and Encyclopaedia Britannica.

Friedman acknowledges that collaborative communities already have an impact in his own profession, journalism (Friedman, 2004). Interlinked blogs, peer review of news articles (slashdot, plastic) and grassroots article publishing (KuroShin, Ohmynews, Indymedia) have successfully appeared in cyberspace. In the midst of all these new services the Wikimedia Foundation, the project that runs Wikipedia, launched its own community-based news production project on December 2004. Wikinews, as it was named, is different than any of its counterparts as it uses Wiki technology for the production of news stories. Such technology has been successfully deployed in the Wikipedia project and it allows anyone to add, edit and write articles given some basic rules. Wikinews has also adopted the Wikipedia regulation of Natural Point Of View (NPOV) meaning that stories must not be biased (Wikinews, 2006a). The following text will attempt to analyse the Wikinews project in the context of the today's rapidly changing news production landscape.

The changing face of news media

Traditional news reporting has been for many years based on the doctrine "few talk and the rest merely listen" (Moglen, 1997). The intrinsic properties of conventional news mediums such as television, radio and newspapers have helped to estab-

lish this attitude. The output of these reporting channels does not easily facilitate original input or feedback from the public. The media companies fully control the production and are able to filter any input in order to present a story that they believe would generate the most viewers, listeners or readers and possibly help protect their business or political interests. The expert journalist reports on running issues and the public apathetically accepts the facts presented. An analogue can be made here with the typical doctor-patient relationship. The doctor prescribes medication and the uninformed patient has no option than to follow her advice. Thus this kind of journalistic process can be named news as prescription.

A new medium though has infiltrated the daily life of the individual and presents radical changes for doctors and journalists alike. The Internet today is widely used and its access interfaces are currently expanding beyond the conventional home and office use. Mobile and home entertainment devices are integrating its functionality and increasing its influence. The Internet unlike its conventional counterparts allows for a wider range of use and reduces the cost of publishing and transmitting information. This has undermined the expert power of the information gatekeepers be it doctors or journalists. A patient today can be more informed than the practitioner on issues concerning her disease and will often challenge, compliment or even refute a doctor's advice based on information she gathered on the net (Khanna, 2006). Similarly individuals in the news context using the interactivity that the Internet provides will attempt to express an opinion, report an unreported fact or angle and in some cases falsify a journalist's report. An indicative example of this change has been the bloggers revelation of the fabricated documents presented by CBS News concerning George W. Bush's Air National Guard (CNET, 2004). News as prescription is under fire and even its most dominant figure, Rupert Murdoch, has acknowledged that "citizen participation" is to alter how traditional journalism operates for good (Guardian, 2005).

Peer news production has been at the forefront of changing and facilitating the new needs of the "patient" public. Citizens create blogs presenting their articles in chronological order and linking each other to create their own news networks. Various portals present selections of blogs and prescribed news stories to be heavily commented by the participants (typical Slashdot.org stories have over 400 comments). Other sites accept article submissions that are then reviewed by the

community according to their ideological, thematic or quality controls (KuroShin, Ohmynews, Indymedia). Traditional media have also recognised the importance of these new services and some have incorporated them in their web presence, as the UK Telegraph's "Your view" and blog services demonstrate. Wikinews is called to find its place in this new world, but before going into that let us first have a look at its salient characteristics.

Wikimedia Foundation

Wikinews is a project of the non-profit Wikimedia Foundation. The foundation was formed after the unexpected success of Wikipedia and runs a number of projects such as Wiktionary, Wikiquote and Wikibooks. Wikipedia was created in 2001 to provide additional content for the PhD-edited and reviewed Nupedia encyclopaedia. This new project was based on Wiki technology allowing anyone to create or change articles. Wikipedia proved a great success in its own right and Nupedia was dropped. Today it contains more than 4 million entries and has more than 45,000 registered editors (Giles, 2005). Its creator Jimmy Wales, the current chair of the Wikimedia Foundation, appears to be a passionate supporter of Ayn Rand's Objectivism. This philosophical movement supports the existence of a mind-independent reality that the individual perceives via sensory perception and is able to rationally process in order to gain knowledge ("non-contradictory identification"). This position might have influenced the "absolute and non-negotiable" Neutral Point Of View (NPOV) policy on Wikipedia that has also been transferred on other Wikimedia projects including Wikinews (Wikipedia, 2006b). Besides this policy all Wikimedia projects have also inherited much of Wikipedia's technological infrastructure, which is based on its GPL licensed software MediaWiki.

The Wikimedia Foundation is organised in a way that encourages volunteers to contribute in its projects. Its non-profit nature assures the contributors that their unpaid efforts are not used to generate income for its owners. Hence the Board of Directors does not gain direct monetary rewards and the resulting products are licensed under the GNU Free Documentation License or the Creative Commons licenses. Thus all works are freely available for use and modification, a fact that highlights the public benefit character of the foundation. Another crucial factor in engaging community support is transparency and openness (Tsiavos, 2006). Information on the foundation's decisions, budget and directors are openly available to anyone creating a trust-based relationship with the contributors. This attitude encourages donations and merchandise sales for the foundation that covers basic costs including payments for the 3 permanent employees, office expenses, hardware and bandwidth costs. One here might wonder what is the driving force for the board of directors in freely organising such a project. The answer is publicity and reputation that can easily translate to indirect economic benefits. Its founder, Jimmy Wales, for example using his Wikipedia credentials has received \$4 million venture capital investment for his Wikia company and is one of the directors of the Socialtext group that specialises in Wiki-based solutions for businesses.

Volunteer engagement and Wikimedia projects' promotion stretches beyond cyberspace. Non-profit associations have been set up in Germany and France and more are to follow in

different countries around the world. A yearly conference is also organised each summer to bring the community together to exchange ideas and interact, creating a greater bonding and commitment around the project. Such initiatives are important as they generate local interest and publicity and so increase contributor participation and readership. Wikinews had the advantage to be a part of this established Wikimedia network, which provides it with potential users and contributors as well as with technical infrastructure and policies. Such an advantage though might have opposite effects if the project was not to quickly identify and change established Wikimedia practices that do not apply in its own context.

Wikinews

Wikinews aims at synthesising news reported on mainstream media sources and publishing original reports from members of its community and the public (Wikinews, 2006). The service is run using a bundle of technology, aggregate participant action (market), norms and policy regulation (Lessig, 1998). Its technology side operates using MediaWiki that was originally built for Wikipedia. MediaWiki is now redeployed and its functionality has been slightly altered to facilitate Wikinews special needs. News stories are initially submitted under its "Stories in development" section where users review their relevance and correct or augment their content. Eventually and if the stories have reached a sufficient level of quality the community-selected administrators publish them on the main Wikinews page. Even then users are allowed to change the articles, which are only protected from editing two weeks after they are first published. The detailed version history of the changes is stored and anyone can browse it. Using this function users are allowed to make up to three reverts a day to an older article version and so undo changes they believe are inappropriate. In order to prevent vandalism and deal with urgent matters such as copyright infringement or offensive material administrators are allowed to delete pages, protect stories and block users.

It is clear though that these technological restrictions alone are not sufficient to bring a desired result. The fact that anybody is able to change the content of a page requires a sufficient number of readers who can spontaneously revert inadequate alterations or vandalism. Eric Raymond's open source remark that "given enough eyeballs all bugs are shallow" seems to also apply for Wikis (Voss, 2005). Especially in the case of vandalism (e.g. delete or replace the contents of an article) the fact that reverting the changes requires less effort than to vandalize a page has successfully worked for Wikipedia (Lih, 2004) and appears to apply for Wikinews too. Such defences are further increased as users have the option to "Watch" a page meaning that they receive an email notification when updates are made and so are able to quickly make any reverts if necessary. Vandalism though is just a minor aspect of what the community needs to achieve in order to collectively produce a news story.

Consensus needs often to be reached in order to create an article. To facilitate agreement each article contains a "discussion" page where the community can analyse it. The dialogue though is not open-ended as certain norms have been created following the official Wikinews policies. These, amongst other, ask contributors to present facts only if these have been published in a reputable source and in the case of

original reporting only if the evidence is verifiable (e.g. audio recording of an interview). The Natural Point Of View (NPOV) policy is also heavily used in the discussion and so an attempt is made to present all sides of a story “without bias” (Wikimedia, 2006a). Adherence to these norms has been partly achieved through the extensive introduction tutorials and documentation that senior group members often reference to “educate” newcomers. As one would expect though consensus is not always reached and so in some instances a vote is initiated to resolve a conflict.

Article writing through using the successful Wikipedia recipe is not enough. The outcome needs to be appealing to a news audience. Creative Commons Attribution licence of its content does allow the free propagation of the news and RSS support permits the display of headlines on other sites, but these have not yet helped Wikinews to reach a critical mass of users. Hence a vicious circle is created, not many readers result in a small number of contributors that lead to few articles making Wikinews reading not worthwhile. The NPOV has achieved a great deal for Wikipedia that has managed to fill the market gap of the slowly updated traditional encyclopaedias (Lih, 2004). It does though not seem, in its own right, to generated a great deal of excitement in the news context. Opinionated news and commentary has been one of the driving forces for other successful peer news production services like slashdot. NPOV prohibits such stories condemning Wikinews to eternal neutrality.

The problem is further increased, as the top news categories, again following the Wikipedia paradigm, are not topic or country specific, but rather language centred. This presents a great obstacle for common ground community building as the issues vary from local New Zealand stories to obscure, for some parts of the world, sports to technology specialised topics. It has been suggested that a successful wiki thrives on the divide and rule idea (Schröder, 2005), meaning that one needs to bring together the arguing sides to achieve a better product and engage the community, but in the Wikinews case the wide range of topics make such an approach impossible given the variant non-conflicting background of its contributors. Keeping all the above facts in mind let us now try to draw some conclusions.

Conclusions

Wikimedia Foundation does provide an ideal organisational structure for the development of peer production projects. Its communal decision making mechanisms, non-profit character and transparency are just some of the characteristics that help create trust and engage the community. The massive deployment of MediaWiki to support the Wikipedia project has also given the foundation unique knowledge on wiki technology, which it currently uses exclusively on all its projects. Wikinews has inherited this wealth and is called to make use of these core competences (Hamel, 2002) in the changing world of news production. The result though has so far not been as successful as one would expect. Having a closer look at the news context should give us a better insight of the possible causes of Wikinews failure to reach the critical mass of users.

Peer news production has been challenging the old prescribed news models. Its various shapes and forms have been com-

bined, reconfigured and deployed (Khanna, 2006) to provide an all-inclusive service to the public. Blogs are not just articles, but also allow for basic commentary. UK Telegraph has intergraded blogs in its conventional news structure. kuro5hin allows for Slashdot-like peer-reviewed comments in addition to its community published articles. Indymedia’s local news sites provide forum discussions to engage the community. Wikinews in contrast follows the almost institutionalised Wikimedia dogma of using wikis as its exclusive technology. This approach, which possibly derives from its founder’s interest in the commercial side of the wiki circuit, has resulted in a monolithic and un-colourful service.

Wikis and the so much praised NPOV policy are not irrelevant and do contribute in the peer production news landscape. NPOV though in its own right is un-intriguing for the users that need an additional non-wiki space to express their opinions and read what others think of the running news. Moreover, Wikinews ought to change its structure and focus around topic centred news moving away from the Wikipedia-inspired language categorisation. This should allow the creation of interest-based communities (Prahald & Ramaswamy, 2004) rather than just gathering same language speaking individuals that have nothing else in common.

Breaking from its institutional context norms and “non negotiable” policies ought to help Wikinews reach the so much desired critical mass of users. In doing so it might enable it to provide rich news content and more importantly original reporting from the mobile connected individual. Such aims though currently seem at best ambitious. Wikinews’s vision is definitely a world flattener, but its practice is myopic to say the least. Wikimedia Foundation needs to look beyond its own successful recipes for ideas of realising its world changing dreams.

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Internet Censorship: The End of Digital Libertarianism?

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Cyberspace regulation has recently emerged as a hot topic in media as well as the academic discourse in legal and socio-political study of Information Systems. Regulation of cyberspace is primarily defined by state-controlled Internet filtering, but there are other forms of control at various levels. This paper aims to investigate cyberspace control from the modalities of regulation perspective, looking at the various forms of control exercised by the state directly as well as indirectly through non-state actors. The control of governments over Internet has put to rest the views of Internet as libertarian architecture, out of jurisdiction of governments. No state allows its citizens completely unrestricted access to information. The reality on ground is that states shall try to vet what type of information on the Internet is allowed to its subjects. There is a need for understanding the methods by which state controls the Internet in order to make it more resilient against state regulation.

The justification and reasons for studying the Internet

“Is the coverage being given to Internet in media and academic discourse justified?” one may ask. There have been other media relaying information on large scales that were not covered in similar manner. Why then is the Internet deserving of so much attention? (Sommer, 2001) questions the sanity of considering the cyberspace as ‘legally central.’

There is, however, evidence to back the case for serious consideration of the Internet. Emphasis, in the new economy, is on exploring new methods of value creation. (Clippinger & Bollier, 2003) while discussing the need for new value creation methods, quote Internet law experts David Johnson and Susan Crawford pointing to the blindness of human being to the Internet as proof that value can be created by working together, uninitiated by government action or exploitation of private property, markets or firms.

Another reason for serious study of the Internet is the fact that governments around the world are making proactive efforts to control it. Embedded within the code of the Internet are features that make it a very fast and relatively intractable medium than traditional forms of media (Shapiro, 2000). These are:

- many-to-many forum: In contrast with traditional broadcast-based media (radio, television and the press), the Internet is a many-to-many medium. This is most evident in P2P and online communities.
- digital content: The digital nature of internet content makes it easier to replicate and mirror to new destinations thus making it hard for governments to control.
- distributed and packet-switched architecture: The fact that data is divided into packets that can each take any of various channels to reach the destination makes it easier for users to route around filtered gateways.
- interoperability: The compatibility of the underlying software and hardware with each other increases the reach of the Internet. It also becomes harder for the government to control the Internet by disallowing specific applications.

(Shapiro, 2000) also mentions broadband and universality as additional features. While broadband increases the size and

type of content that could be accessed from Internet, universality is more a ‘right’ that has yet to be achieved. Again the design of Internet and Web makes it open and accessible to anyone able to connect to it but ideas like the digital divide address the gap between the digitally privileged and the have-nots.

The above features of the Internet – any form of content can be uploaded anywhere in the world and accessible instantly to a large number of people and be easily mirrored - make governments feel more threatened and react to controlling it. Certainly the unrestricted flow of hundreds of gigabytes of data is much more worrisome than a hundred or so copies of a book, magazine or video. These features form what is known as the architecture of the Internet, which (Lessig, 1998a) mentions as one of the four modalities of regulating an entity. Before proceeding with further discussion of Internet control, we shall discuss the four modalities of regulation and the ecology of regulation based on the New Chicago School (Lessig, 1998a).

Four Modalities of Regulation

(Lessig, 1998a) mentions four modalities that can regulate an entity – law, market, norms and architecture. Law is a way to directly control an entity, by banning its very use or production. Markets help to increase prices or create or reduce demands. Norms may discourage people. The most interesting modality though, is architecture, also known as nature or code which regulates an entity by its design. In the “New Chicago School” however, law not only regulates directly but also indirectly by regulating the three other modalities.

The “New Chicago School” establishes regulatory links between law and the other modalities. It is a more realistic model as it sees government using law to control the other three modalities and using them together for better control and regulation.

This distinction of views in the old and new Chicago school was instrumental in defining two different perspectives of Internet and the State. The first view, of which Robert Perry Barlow (of the Declaration of Independence of Cyberspace fame) is the most well-known proponent, takes note of the

embedded features of the Internet discussed above, and sees them as opposing forces to governments trying to control Internet through law-enforcement (Barlow, 1996). It sees freedoms of Internet users – a digital- or cyber-libertarianism – guaranteed by its design. It encourages the designers of Internet-based applications to continue the service to the public by making its architecture more conducive to freedom.

The second view describes this libertarianism as a hype of cyberspace (Lessig, 1998b). Governments are regulating the Internet by using other modalities, of which architecture is the most significant. It suggests that in addition to increasing the integration of the three modalities (norms, markets and architecture) with the Internet for increasing its freedom-of-use, their susceptibility to state regulation should be noted and efforts should be made to make them resist it.

(Boyle, 1997) uses Foucauldian analysis to discredit digital libertarianism. Whereas digital libertarianism proposes cyberspace as an alternative sovereignty to that of the State, Boyle points to Foucault's challenge to the vision of power as sovereignty with a vision of surveillance and discipline. Control of architecture, especially by monitoring and filtering its usage, is the most common regulation in the case of the Internet. As shall be seen from cases discussed in the next section, the State is most interested in using law to regulate the architecture of Internet. This is also because Internet is a heavily architecture-based technology. And controlling its architecture is probably the most effective way for governments to control it while allowing to maintain (or trying to maintain) a good image. Quoting Mitchell Kapor of the Electronic Frontier Foundation from (Reagle, 1998), "Architecture is politics."

Internet Censorship

The architecture of the Internet is constantly evolving. One problem in law regulating the Internet directly is this very supposition that the architecture of cyberspace is static. This was most evident in the episode regarding the US Communications Decency Act (CDA), which was signed by Presidential decree in 1995 only to be made void by the Supreme Court 16 months later. The Act made the deliberate transmission of "indecent" messages to anyone under the age of 18 an offence punishable by law. One of the reasons cited by the US Supreme Court in dismissing the Act was that technology to screen kids did not yet exist (Shapiro, 2000).

In real world America, mentions (Lessig, 1998), pornography distribution in minors is regulated by norms, markets and architecture as kids do not venture near dodgy areas, cannot afford to pay the price to acquire such material and certainly cannot dress up as adults to hide their ages. The architecture of the Internet of 1995, however, could not screen kids from accessing indecent material. The Internet of 1995 was the Internet depicted by the New Yorker cartoon (Steiner, 1993) showing a dog using a computer with the caption "On the Internet no one knows you're a dog." A more recent cartoon on the Web shows a dog on a computer with the screen welcoming him with his personal data and personality traits (UNC, 1997) - a "reality check" into the architecturally changed Internet. Credit cards are now used to screen kids to adult-only services on the Internet.

The first generation of Internet control involved using the law. The CDA mentioned above was one such instance. In Ger-

many charges were brought up against Internet Service Providers (ISP's) and a student for disseminating offensive material (neo-Nazi propaganda and leftist literature, respectively) (Shapiro, 2000). In China, where government-opposed or banned movements like Falun Gong relied heavily on the Internet for mobilization of their members, government dissidents Lin Hai and Huang Qi were arrested and tried with wide coverage of their trials in media so that their fate was widely known.

States started moving towards indirect control via architecture soon after the first wave of Internet controls. Verdicts of legal cases often ordered measures to control access on parts of ISP's. The German ISP CompuServe whose head was fined \$60,000 USD and announced a 2-year suspended jail sentence required the ISP to monitor user activity online. In Iran a crude regulation of the Internet was carried out when, according to a report by Human Rights Watch, the government opened online chat-rooms where only two people could converse with each other. Other cases of (ethically questionable) interference in architecture were noted in China where, according to a study carried out in 2002 users requesting the URL www.google.com were redirected to other search engine pages. Later the government was found to be using a different strategy where search requests were passed through a proxy server and, if found to be searching for specific keywords, users would end up losing their Internet connection for a time period that ranged from a few minutes to hours (Zittrain, 2004). In other instances users requesting specific sites got "technical errors" (socket errors, and time-outs), making it hard to tell whether the site was actually blocked or undergoing down-time.

The Chinese government handling of Internet censorship is different from that of the Saudi government in two ways - transparency and formalization. In Saudi Arabia, where the government did not allow Internet access to citizens until it had installed filters (Shapiro, 2000) and where a large number of non-sexually explicit sites were blocked including proxy-circumventing websites, there is a clear definition of banned content and access to a blocked sites redirects the user to a webpage explaining the government's content filtering process. According to (Zittrain & Edelman, 2002), the user is allowed access to a feature where he can request unblocking or blocking of web content.

Transparency is in fact a salient feature of recent indirect Internet regulation methods. One form of refined indirect Internet regulation is by the recent mushrooming of Google's localized services. As an alternative to having its site blocked or its queries interfered by local service providers, as in China, Google has now opened localized services in various countries where search results are altered as per government recommendations. In an interview given to *Playboy* in September 2004, while Google co-founders had expressed knowledge of their site being blocked in China and later allowed due to huge public demand, they had stated they were not happy with policies of other search engines that had established local presence in the country and were offering restricted information to users. Google now offers a similar "restricted service" in China since January 2006 with sensitive information removed while stating, on the official Google blog, that it was "not an easy choice" and that they "aren't happy".

However one difference between Google's current services at

www.google.cn is transparency. A result on searches with black-listed keywords returns the following text in Chinese at the bottom of the page:

据当地法律法规和政策，部分搜索结果未予显示。

“According to the local legislations and policies, some of your search results are not available.” (text searched: “Tiananmen square”)

This type of transparency is also found on other Google sites. A search for “The American Nazi Party” in www.google.fr results in:

En réponse à une demande légale adressée à Google, nous avons retiré 5 résultat(s) de cette page.

“A legal claim required removal of 5 search results.”

The US government in the past has, in a reaction to the availability of strong encryption technologies, tried to promote and force weaker encryption standards by persuading standard-setting bodies to promote them as well as giving incentives to manufacturers. Manufacturers of the “Key Escrow” encryption standard were provided with incentives such as relaxed export controls for software using the standard. This was a case of using the market indirectly for regulation.

The way ahead

The acceptance of indirect regulation of the Internet points to a number of propositions for making progress in cyberspace freedom. (Samuelson, 2000) mentions five challenges for regulating the Global Information Society – the need for new laws and policies, proportionality, flexibility, preserving values and trans-national co-operation. The need for new policies is easier to decide once we accept the state’s desire to control Internet directly via laws and indirectly via norms, markets and architecture.

Proportionality and flexibility point to the need for new policies to not be over-protective and be designed with a simple and minimalist character. In a recent talk at the Oxford Internet Institute’s Research and Policy Workshop Professor Jonathan Zittrain mentioned four “Principles of Censorship” that would promote acceptable Internet controls. These are transparency, formalization (both of which are exemplified in the discussion on the Saudi filtering regime above), limitation of scope and reduction of collateral censorship.

Preserving values and transnational cooperation are more political in nature. When emphasizing on preserving values, it is important to not stay put on values of a certain culture and export those values abroad. Values held by certain states based on ethnic, social or religious reasons demand as much respect as those upheld by others, based on freedom and individualism. The Internet can be a source of learning of new cultures which can bring about a slow change, but it should not be used as a tool to thrust institutionalized values and beliefs, no matter how progressive or modern, to foreign lands. Transnational cooperation requires countries to concentrate on policy goals rather than the means to achieve them. An example is transparency where individual countries may restrict content as per state policies, but ensure the policies are well-known to the general public. Once policies are out in the open, it would be easier for them to be discussed and ultimately be aligned with the values of the local population.

(Shapiro, 2000) mentions that indirect control of Internet allows governments to easily get away with what they want to do without problems like constitutional limits or public outcry. He blames “obscure committees” behind communication protocols and standards, comprising of technical professionals, mainly engineers and computer programmers, as the reason for government’s hijacking of these committees for their own motives. The New Chicago School points to the need for making the architecture and other modalities resistant to law. This would require adequate thinking on the social and political implications of technology while drafting standards and designing new technologies.

Conclusion

The article looked at the New Chicago School model as a better way of understanding the realities of Internet regulation by the State than digital libertarianism. It looked at the types of Internet Regulation in various locations for evidence of applying the New Chicago School model to it. As a result, most current Internet Censorship can be attributed to the state’s indirect regulation by regulating the architecture of the Net. Various measures and guidelines are mentioned as the way forward towards a more info-democratic model of the Internet. The New Chicago School allows us to appreciate the link between architecture, norms and markets with law. A more globally accessible Internet would require more resistance to be built into the Internet from the point of view of these methodologies to make them more defiant from being regulated by law.

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Metaphors as Tools for Managing Information Systems

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In this essay I suggest that metaphors are useful tools for understanding complex phenomena such like organisations or information systems. Forming a common understanding in certain social contexts, metaphors might prove to be useful as managerial tools. First, it will be demonstrated that technology is a heterogeneous notion, therefore a certain level of congruence in interpretations exist. Then, I will introduce the usage and importance of metaphors, and in the last section it will be suggested that they are useful tools for supporting understanding and management.

Technology as a heterogeneous term

Before starting to explain how metaphors demonstrate the different interpretations co-existing in an organisation, it will be presented that using the general term 'technology' is not sufficient as technological artefacts differ significantly.

The most obvious sub-categories are the 'hardware' and 'software' components of technology, the former consisting material or physical objects while the latter being made up of information. This straightforward differentiation is used e.g. by Griffith (1999: p474) claiming that this way it is possible to draw on numerous previous researches. Orlikowski (1992) disagrees with this wide definition arguing that it becomes invaluablely abstract.

Kallinikos, in his article suggesting to reopen 'the black box' of technology, points out that "technologies differ substantially in terms of how they define their domain of application, and organise and embody knowledge and experience in artefacts" (2002: p288).

A valuable perspective by Louw (1987) is that proceduralized and interpretative information systems are two ends of a continuum. Proceduralized systems are 'purely' technical, formalized systems "that are bound with structure, measurements and data" (p22). These systems benefit from the computer's ability to process vast quantities of data which become outputs used by people.

Interpretative systems are based rather on "interpretations that people apply to interactions, needs or influences" (p22). In case of these systems, communication forms the interpretation and evaluation based on the skills and tacit knowledge that people apply to their work.

In short, interpretative systems are exposed to different interpretations which are formed by the communicative process among relevant social groups.

It is argued here that, as this complexity and a wide variety of existing, possibly incongruent interpretations cause "difficulties and conflicts around developing, implementing and using technologies" (Orlikowski & Gash, 1994: p180), an effective managerial tool would be needed to support the convergence of interpretations of organisational members.

Studying metaphors means analysing language in use to explore linguistic behaviour. That enables us to examine the

impacts metaphors have on cognition, attitudes and therefore, on behaviour (Lakoff & Johnson, 1980; Hamilton, 2000).

On Metaphors

Metaphors are pervasively present in our everyday speech and thinking, they are "ways of understanding and experiencing one kind of thing in terms of another" (Hirschheim & Newman, 1991: p37). It has been suggested by (Lakoff & Johnson, 1980) that abstract thoughts are intrinsically metaphoric.

Metaphors draw on imagination and thus help to highlight certain characteristics. Using this linguistic tool, first, there must be certain level of similarity between the object of study and the metaphor as a tool. Second, it must depict a notion (situation, topic etc.) with which we are more familiar than with the original (Kamoche et al., 2000).

History of metaphors in a nutshell

Already the Greek philosophers, Plato and Aristotle, were acknowledging the power of metaphors (consider for example the famous metaphor of the cave as the limits of human knowledge in Plato's 'Republic'), but the objective and rationalistic traditions in the classical era were not cultivating their usage. In the second half of the twentieth century, scholars like Nietzsche emphasized that human concepts were metaphoric by nature (Hamilton, 2000).

From the 1960s, more organisational scientists discovered the importance of metaphors in studying organisations claiming that they provide richer understanding of organisational behaviour (Morgan, 1986).

The modern view acknowledged the central role and the unproblematic usage of metaphors. The influential works of Lakoff (e.g. Lakoff, 1993) suggest that "metaphor is fundamentally conceptual, not linguistic, in nature" (p244). This new insight spread the conscious use of metaphors and pulled the notion into limelight.

Types of metaphors

Metaphor is regarded as to be the "fundamental trope or mode of figurative speech" (Hamilton, 2000: p239). Lakoff and

Johnson (1980) suggest that our thinking is conceptually and systematically driven by metaphors and therefore, they structure our attitudes and actions (p39). The expression 'root metaphor' refers to fundamental and highly influential metaphors (Ortony, 1993, in: Hamilton, 2000).

In this discussion, however, I will focus on what Lakoff and Johnson (1980: p52-55) call 'imaginative or nonliteral metaphors'. These metaphors focus on outside the domain of the metaphor, that is, on the unused part. These can be (1) the extensions of the used part, (2) the instances of the unused part or (3) the instances of novel metaphor: a new way of thinking about something.

According to Hamilton (2000: p239), the power of the metaphor is in its originality, and in this respect the mismatch is the 'essence' of the metaphor. As long as a metaphor remains "new", it is the mismatch that alerts the hearer to look for parallels not immediately apparent from a direct comparison.

The use of Metaphors in Organisations and IS

Metaphors, and generally, symbols are widely used for sense making in organisations (Weick, 2001; Hirschheim & Newman, 1991). Morgan (1986) suggests that to understand the sense making process, attention needs to be focussed upon those symbolic processes through which individuals create and sustain reality.

Originating from the influential work of Gareth Morgan (1986), metaphor has become an "important theme in contemporary organisational studies" (Hamilton, 2000: p242).

Weick's suggestion draws on the complexity of organisations: "if you want to study organisations, study something else" (1999: p541, in Kamoche et al., 2000) and motivates the use of metaphors. This allows us to research a complex, rather incomprehensible phenomenon through a more familiar idea.

"...the use of metaphor implies a way of thinking and a way of seeing that pervades how we understand our world generally... It is easy to see how this thinking has relevance for understanding organisation and management. For organisations are complex and paradoxical phenomena they can be understood in many different ways. Many of our taken-for-granted ideas about organisations are metaphorical, even though we might not recognise them." (Morgan, 1986: p12-13)

As information systems are complex phenomena as well, similarly to Morgan's and Weick's argument, we expect that the use of metaphors will shed light on different perceptions and interpretations of IS.

There are already wide-spread metaphors for information systems: consider for example, the metaphor of the Internet as a 'world-wide-web' (Hamilton, 2000). It not only proved to be very effective in conceptualising its structure but also have extensions, such as the 'spider' referring to the browser software.

Also a prevalent metaphor is technology as a "black box" (e.g. Kallinikos, 2002) or we might consider the language used in business when selling technologies as "solutions" for (all and any) problems in organisations.

Boyd reiterates an observation made earlier by Hesse and

Kuhn: "For practical purposes, there is no alternative to the use of these metaphors because their cognitive content cannot be made explicit" (Boyd, 1979, in: Hamilton, 2000: p242). That means, that metaphors can convey uniquely rounded insights and complex understandings of such complex phenomenon as information systems.

When a metaphor misguides or loses explaining power

The use of metaphors has its shortcomings: firstly, the metaphor distorts the object of investigation if attention is not paid to the not shared features. (Kamoche et al, 2000). That means it might become misleading and therefore result in dysfunctional consequences (Hirschheim & Newman, 1991). Second, a 'metaphorical trap' emerges if a metaphor gets too widely embedded into thinking (Walsham, 1993) resulting that it becomes common and therefore, lacks explanation power.

Social Cognition Through Metaphors

Organisations are conceived as socially sustained cognitive enterprises where thought and action are linked (Smirchich, 1983). According to Schein (1986), people working in different functional areas develop unique social and cognitive schemes which guide their interpretations of the world.

Metaphors are pervasive both in thought and action (Lakoff and Johnson, 1980) which are closely linked. "Images and metaphors are not only interpretive constructs of ways of seeing; they also provide frameworks for action. Their use creates insights that often allow us to act in ways that we may not have thought possible before." (Morgan, 1986: p343).

It is interesting to note here Orlikowski's argument that structures get inscribed in technological artefacts through usage (Orlikowski, 2000). That means that metaphors through influencing our actions will shape structures of technological artefacts, therefore their usage.

It is argued here, that as the development of soft or complex artefacts such as software packages or information systems can not be directly observed. However, tools as metaphors might be helpful to gain understanding of different existing interpretations.

Metaphors as Managerial Tools for influencing social cognition

I start with Weick's statement: "it takes a complex sensor to understand the complex world" (2001: p6).

The progressive incorporation of a specific metaphor into common language brings with it a set of attitudes and understandings with a powerful capacity to influence common norms and behaviours. This interpretation of metaphor reveals a range of opportunities and problems with the use of metaphors in practice. Opportunities are that metaphors generate creative insights (Morgan, 1986: p345) which provide new ways of understandings in organisations. These concepts can be communicated rapidly and effectively (Hamilton, 2000: p241).

To summarize my argument, on the one hand, metaphors support understanding by attributing images to complex phenomena. At the same time, metaphors can be used both to persuade and influence. That suggests that management can use

metaphors to influence social cognition on information systems in use.

The problem with the usage of metaphors is that they are limited in scope by nature and therefore, unable to convey the full scope of a new idea (Hamilton, 2000). Also, committing to a single metaphor can be blind other aspects and new concepts, that is, inhibit learning.

Along with these drawbacks, it is suggested here, that metaphors are useful tools to support and shape employees' perceptions and interpretations about information systems. As metaphors influence thoughts and actions, that will result in a rather adequate convergent attitudes and behaviours.

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Receiving the Patient Record into Practice: A Journey from a Log to Logging In

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Healthcare organisations are undergoing a momentous transformation from a paper-based patient record to one that is electronic. In this paper I will address how such technology is received by medical work practices. I will refer to the technology in question as the electronic patient record (EPR), concentrating on how healthcare workers in primary and speciality care practices receive the EPR in terms of ‘acceptance’ and ‘resistance’. To begin, a brief history of how the patient record evolved and its effect on the transformation of work processes will be discussed. I will then demonstrate how the unique context in which the record coexists contributes to its receptiveness. Examples of how EPR systems are accepted and resisted from the literature will follow. Finally, I will reflect on the factors themselves, discuss means of improving acceptance and conclude with the need to bridge research in medicine with other institutions for a more thorough understanding of technology resistance in work practices.

Introduction

The area of introducing technological innovations into work practices, especially organisations as complex as medicine, has been a source of much research. Though this paper concentrates on primary and specialty care practices, the same themes of acceptance versus resistance are found in hospital settings (Berg et al., 1998; Sicotte et al., 1998; Berg & Toussaint, 2003). The characteristics unique to the two work environments will be discussed. Upon integrating the new information and communication technology (ICT), the goal of the organisation, in either setting, is to achieve a “synergistic interrelation” among healthcare workers—or a level of synergy comparable to that in the paper-based environment (Berg, 2000, p. 487). The ICT in question is the electronic patient record (EPR), though several similar acronyms are prevalent in the literature: electronic medical record (EMR), electronic health record (EHR), computer-based patient record (CPR), and patient care information system (PCIS), a more comprehensive term. Issues with aligning this new artefact with existing work practices have generated extensive research. Factors of acceptance found in the literature when analysing the response of healthcare workers (physicians or clinicians, nurses, and clerical staff) to EPRs will be addressed. To thoroughly understand the effects EPRs have on work practices, one needs to take a holistic perspective in considering the record’s history, the effects of its format transformation, and the context in which it subsists (Berg, 2000; Berg & Toussaint, 2003).

Historical Context

In order to understand how the record is received into primary and specialty care practices we need to first appreciate how it came to be. In accordance with Berg and Toussaint (2003), it is not sufficient to simply identify successful EPR implementations, instead, assigning meaning to the record in terms of its historical context provides for a richer argument. The notion of medical recording has evolved over the centuries; it is only until the twentieth century that the record materialised from a physician’s logbook to the record that we are most familiar with today (Berg, 2000; Anderson & Forsythe, 1970;

Berg, 2004). The notion of systematically reporting patient information was seen as unnecessary since the physicians towards the end of the nineteenth century worked independently, focusing only on their own patients. There was no need for a uniform means of recording data given that many physicians used their memory as a primary means of relaying patient information (Berg, 2000; Anderson & Forsythe, 1970; Berg, 2004). However, at the turn of the twentieth century a more standard means of record keeping emerged in Western medicine (Berg, 2000). Work routines had to be adjusted to accommodate for the new patient-centred record; medical professionals were now held responsible for ensuring the completeness of the record (Berg, 2000).

Attempts to automate the patient record date back to the late 1950s and early 1960s when Western medicine was confronted with the digital computer (Berg, 2000; Berg, 1999). The process of integrating EPRs into the medical work environment is complicated. The patient record has acquired so much value through the centuries that a mere translation from that which is physical to that which is digital is naive. Researchers have argued that the paper record connotes more than simply patient data; much can be inferred from the weight, appearance, and handling of the record itself (Berg, 2000; Berg, 2004; Heath & Luff, 1996; Berg, 1999). Heath and Luff (1996, p. 359) argue that the “handwriting in the paper record...provides a rich array of resources to practitioners” in that the “doctors’ ability to recognise the handwriting of their colleagues...[gives] a certain flavour to statements”.

However, others argue that a paper record is not dependable and hence a computerised managing system is necessary to ensure quality care (Burton et al., 2004). The EPR system standardises the record’s layout and contents, which positively contributes to medical work practices (Burton et al., 2004; Heath & Luff, 1996). Though not all agree: “the system therefore removes the economy, gestalt, and tailorability of the paper medical card which is an essential part of the ways practitioners are able to use the record for professional practice within the consultation” (Heath & Luff, 1996, p. 359).

As gathered from the above literature, the record itself is a multifaceted artefact. Thus, implementing EPRs is not a

smooth process and should not be handled using a traditional information systems development approach (Berg, 2000; Walsham, 1993). We need to delve deeper into the context in which the record must coexist with human and nonhuman entities within the organisation (Berg, 2000).

Organisational Context

It has been argued that a comprehensive understanding of the context in which the technology cooperates has been ignored by systems developers (Heath & Luff, 1996). Thus, to improve the acceptance of EPRs it is crucial that “their production not only [is] sensitive to the local ‘goings on’, but also to the potential circumstances in which [the records] will be read and accessed (Heath & Luff, 1996, p. 361). Therefore, one cannot separate the record from its context; they are interrelated and interdependent. The unique characteristics of the medical environment will now be discussed to ensure that the reader has a thorough understanding of how the records need to be contextualised for an EPR system to be accepted and used in work practices.

Understanding the context in which any information system interacts is vital to its success. Therefore, in understanding the role of EPRs we must view the technology in question as a social system in which medical information is constantly interacting with the organisation and its components (Checkland & Howell, 1998). This “contextual nature of medical information” co-evolves with the organisation, hence its newly acquired fluidity (Berg & Gloorman, 1999). Van der Lei in Berg and Gloorman (1999, p. 56) presents a contradictory argument in that the information is “context-bound”; however, it plays an active role in accumulating and coordinating information enabling the record’s meaning to be acceptable in other contexts (see Berg, 1999). Berg and Toussaint (2003, p. 226) also note the record’s functional, not static, qualities in stating that “medical knowledge as a fluid category...is constantly [adapting] to local needs and changing circumstances”. As an active part in the social system, the record depends on organisational arrangements for full functionality and meaning (Checkland & Howell, 1998). The responsibility lies with the healthcare workers to create the record and assign it value; it is through the layout of the record itself where this meaning is generated (Berg & Toussaint, 1999; Heath and Luff, 1996). Consequently, this constructed meaning transforms the information system to that of a social system, where it subsists through the communication and interpretation of the people in the organisation (Checkland & Howell, 1998).

In a medical organisation, healthcare workers communicate and interpret information via the patient record. It becomes the focal point of the interrelation between human and nonhuman entities (Berg, 2000). The flow and management of documents between such entities within the organisation is fundamental to their effective interaction. The patient-centred record evolved from such a need to coordinate this interactivity (Berg, 2000; Strauss et al., 1985). Berg and Toussaint (2003) also support this notion of information flow in that the key components of the organisation “cannot be conceptualized as atomic bits”, therefore, the nature of the “work is inevitably improvisational, ad hoc, and reactive” (Berg & Toussaint, 2003, p. 228). The interconnectedness of unpredictable tasks present a “never ending stream of contingencies”, further emphasising the fact that primary care practices are “complex

adaptive systems” (Strauss et al. in Berg, 2000, p. 493; Singh et al., 2004, p. 235; see also Berg, 1999).

Though the focus of this paper has been confined to primary and specialty care, the same contextual characteristics discussed above can be applied to hospitals (Flood & Scott, 1987; Strauss et al., 1985; Berg et al., 1998). It is important to note that the literature does not necessarily distinguish between the different environments (e.g. primary care versus hospitals); therefore, an overlap is not only prevalent but also acceptable. For the purpose of this paper, defining healthcare organisations as social systems is sufficient in evaluating how EPR systems are received by their environment in terms of work practices. The attributes that best demonstrate the complex interrelation of activities in the aforementioned practices are unpredictability, uncertainty, and ad hoc routines; all need to be considered to ensure the desired receipt of the ICT in question.

EPR Reception

The amount of literature that discusses clinical outcomes post-EPR implementation is rather extensive. Though a common lens from which the research is presented is lacking. Some studies concentrate on a specific aspect of the EPR system, such as health maintenance reminders and electronic communication (Schellhase et al., 2003; Kittler et al., 2004; van der Kam, 2000) while others are more comprehensive in their approach by addressing the system as a whole, which is the focus of this paper. Questions then emerge of whether or not EPR implementation issues (strictly in terms of the record itself) can be learned and then applied towards implementing the special features. The issues of acceptance discussed in this paper are specific to the use of the records in an EPR system, excluding any additional EPR capabilities. Though this limits my scope, it provides for a stronger argument in terms of categorisation. Additionally, it should be noted that measuring satisfaction is subjective (Davis et al., 1989). Drawing from my own interpretations of the literature, I have categorised the determinants of satisfaction versus dissatisfaction and reasons thereof in the following sections.

Furthermore, the selected literature takes into account an initial time lapse since no convincing systems development project forces the technology upon its organisation without some sort of transition period (e.g. from paper-based to electronic). This waning period is incremental by nature. Katzenberg et al. (1996) and Singh et al. (2004) introduce a partial implementation when measuring acceptance of EPRs. Moreover, examples from the following literature demonstrate that the institutional issues previously discussed contribute greatly to the technology’s acceptance in primary and specialty care practices.

Resistance

In reviewing the literature I found six factors that contributed to healthcare workers resisting the EPR system in their everyday work practices: opposition to change; negative attitude towards computers; lack of involvement in early stages; lack of user-friendliness; and increased work load. Burton et al. (2004), Gleiner (1996) and Mechanic in Engestrom (1988) found that healthcare workers are reluctant to modify their

role in the organisation and therefore do not support the effort to improve current work practices. Gleiner (1996, p. 4) states that “clinicians are perfectly happy with their paper records, as long as the record is complete and available at the point of service”. Negative attitudes towards computers, including information management, create resistance among workers (Davis et al. in Lankton & St. Louis, 2005; Engestrom, 1988).

Furthermore, even when there is an overall acceptance of the system, the fear of error reporting, commonly associated with computer use, creates a hostile setting (Singh et al., 2004). Another prevalent factor of EPR resistance concerns user participation in the design process, resulting in uncertainty in system expectations (Karsh et al., 2004). The lack of user-friendliness, defined as inflexibility of the records themselves and disruption of work routines, has considerable impact on acceptance. In terms of inflexibility, healthcare workers saw the record as constraining to the pre-existing environment in that they had to “work around individual patient trajectories to be highly varied, ad hoc, and adapted to the particular needs” of the patient (Berg, 2000, p. 493; see also Heath & Luff, 1966; Javitt in Engestrom, 1988). Specifically, there was difficulty in retrieving data and viewing the record in its entirety in order to obtain an overview of the patient’s medical condition (Bayegan et al., 2002; Heath & Luff, 1996; Resier in Berg, 2000; Nilsson et al., 2002).

Further, Hodge (2002, p. 20) argues that it is physically disruptive to increase the number of workstations: EPRs create “workflow issues...physicians are nomadic by nature in making rounds...[therefore] sitting down at a terminal and logging on each time is inconvenient”. Finally, introducing EPRs into the work routine increases the workload of healthcare workers in that there no longer exists the anticipation that previously ensured a smooth workflow. The “pre-structured forms”, instead, create an “additional burden” (Berg, 2000, P. 497; Heath & Luff, 1996).

Acceptance

Evidence of incorporating EPRs into work practices where healthcare workers were receptive to the system in its entirety was less common. Though articles do exist, you have to question the motive. These journals, though described by journal-provider services as ‘academic’, seemed to be more promotional (Ruffin, 2002). In questioning their credibility, I chose not to include them. For literature I deemed more appropriate, I found three emerging themes of EPR acceptance: user involvement, unified vision, and user-friendliness. To increase the potential of user acceptance, Gonzalez-Heydrich et al. (2000) found that providing demonstrations to the workers and promoting criticism ensured a positive response. The most prevalent motive for acceptance was a unified vision or organisational census signifying a universal understanding of the advantages of the system (Singh et al., 2004; Burton et al., 2004; Katzenberg et al., 1996; Gonzalez-Heydrich et al., 2000; Berg, 2004). To ensure agreement throughout the project lifecycle, Katzerberg et al. (1996) specifically used an incremental approach, which seemed more credible and long-lasting than using a popularity contest (Gonzalez-Heydrich et al., 2000); however, both were effective.

Approaches to EPR Implementation

In reflecting upon the comprehensive list of factors affecting how EPRs are received into work practices one might ask if the tool should fit the organisation or the organisation fit the tool—a topic of controversy in the literature (Berg, 2000). Aligning the organisation’s work routines with ICTs—the tools—may create the desired “synergistic interrelation”, but in the case of medical organisations it may also contribute to a loss in patient-centred care (Berg, 2000, p. 500). To achieve cooperation, a mutual understanding by both human and non-human entities should exist so that the health organisation can provide the best care, the workers and technology can function harmoniously, and synergy can ultimately be achieved (Berg, 2000; Berg, 1999).

A few underlying points need to be mentioned that were used in circumventing resistance: providing an incentive and using an iterative approach through prototyping (Burton et al., 2004; Gleiner, 1996; Berg, 2000). Incentives were used to ‘kick-start’ user acceptance of the ICTs and immediately increase interoperability, as exemplified by the “pay-for-performance model” which reduced workers’ initial prejudices towards ICTs (Burton et al., 2004). Furthermore, Katzenberg et al. (1996) and Berg (2000) suggest an iterative approach in which prototyping would be used to customise the ICT to a particular organisation’s needs. Healthcare workers have learned to cope with the unpredictability and uncertainty embedded in their work environment through anticipation in a paper-based environment (Berg, 2000). Therefore, using a more tailored approach to EPR implementation would allow the workers to readjust their work practices to deal with ad hoc routines and reintroduce the anticipation necessary in achieving synergy (Berg, 2000).

Conclusion

Though detailed examples, specific to EPR systems, can be provided for each of the factors, it is important to note that the supporting evidence is not unique to health information systems. Issues of user participation, preconceived attitudes, motivation and unified vision, and user compatibility are common concerns in evaluating IS implementation projects (Sauer, 1993). This presents an interesting question: if medical organisations are so contextually unique then why can similar implementation issues be found that coincide with other IS projects, not specific to medicine? I agree that healthcare should be treated individually and not coupled with financial institutions, for instance, however, lessons can be learned from both domains.

Research involving the implementation of ICTs in healthcare lacks sufficient tools to effectively study the interplay between humans and technology as “emerging hybrids” (Latour and Walsham in Berg, 2000, p. 495). To ensure full functionality in this context, neither the EPR nor the routines of doctors and nurses should be submissive. The current means of analysing this interaction is limited since the environment itself is extremely complicated (Berg, 2000). With the increasing number of features being added to the EPR system, the need for analysing the interdependent entities is crucial to a more comprehensive understanding of the acceptance of EPRs in work practices. Moreover, Karsh (2004, p. 334) argues that “further research using comparison groups and longitudinal methods [is] needed to more completely uncover

how EPR implementation impacts perceptions of the technology". Though the field is rich with research, it is important to provide a more rigorous framework to structure future EPR implementation projects. This framework can then be used to address issues of receptiveness involving the implementation of supplementary EPR capabilities, since contextually speaking they are compatible. Furthermore, resisting change, especially concerning ICTs, is common in medical environments. Knowledge gained from analysing the aforementioned factors of resistance should not be restricted to medicine. In bridging the knowledge across various IS project domains (finance, education, government), extensive lessons can be learned from the resisters. The shared knowledge can be used to create commonalities for further understanding of IS acceptance versus resistance in work practices.

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Attempting to Model What Cannot Be Modelled? A Review of the Literature on User Resistance to IS Implementation

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Over the past 25 years, user resistance to new information systems has been documented as a prevalent issue for IS professionals. Five relevant models of resistance were found in the IS literature (TAM, equity-implementation model, interaction theory, attributional model, and multilevel model). After an overview of the models, the factors of resistance that they outline are examined to determine their applicability to various real-world situations. These factors include: behavioural intentions, equity, power, and causal attributions. Using literature from IS as well as psychology, the benefits and the shortcomings of each of these factors are discussed. It is shown that to date, the dynamic process of resistance has not been accurately modelled using a limited number of factors as no one factor can be used in every implementation situation. The multilevel model of resistance is then reviewed and suggestions for more dynamic models of user resistance are made.

Introduction

There are many reasons for the failure of the London Ambulance Service's computer-aided despatch system (LASCAD) cited in the IS literature, one of which was user resistance (Fitzgerald & Russo, 2005). But what factors caused resistance in this case and others and can it have been prevented? This paper will examine the literature on user resistance, focusing on the factors of resistance and their use in models.

User resistance is defined as "an adverse reaction to a proposed change which may manifest itself in a visible, overt fashion or may be less obvious and covert" (Hirschheim & Newman, 1988: p. 398). It is not a rare occurrence in the implementation of an information system. In fact, it has been regularly noted as a prevalent issue in IS projects (Hirschheim & Newman, 1988; Lapointe & Rivard 2005; Markus, 1983; Martinko et al., 1996). Even if resistance does not lead to project failure, it is still a problem in that it can cause a project to go over budget, miss deadlines, and prevent the capture of emergent properties of the IS. Though "better theories of resistance will lead to better implementation strategies and, hopefully, to better outcomes" (Markus, 1983: p. 430), it is rarely a topic that is thoroughly studied, meaning that explanations of how and why resistance occurs are seldom found in IS literature (Lapointe & Rivard, 2005).

Over the past twenty-five years, IS researchers have developed five theoretically based models of resistance (Joshi 1991, Lapointe & Rivard, 2005; Marakas & Hornik, 1996; Markus 1983; Martinko et al. 1996), along with the Technology Acceptance Model (TAM) (Davis et al., 1989), five of which will be discussed in this paper. Marakas and Hornik developed a model of passive resistance misuse, which outlines a covert manifestation of resistance rather than a factor of resistance as this paper has set out to discuss. TAM differs from the other four models in that it does not explicitly deal with user resistance. It is understood that acceptance and resistance are not at opposite ends of a spectrum (Lauer & Rajagopalan, 2003), and thus TAM cannot be included with the models of resistance because acceptance of a technology means the absence of resistance. However, TAM will nonetheless be included in the discussion as it implicitly addresses the issue of user resistance in the sense that acceptance implies a lack of severe resistance. Also, TAM is a more influ-

ential and well-used model than the others (Hodgson & Aiken, 1988) and therefore should be included in the present paper.

The first section of this paper will present an overview of the five models, after which they will be put aside. The main focus will be an examination of the key factors of resistance that the models have outlined. By reviewing literature from IS and psychology (as a number of the models are based on concepts from social psychology), the current paper will demonstrate why each of the key factors is useful in the prevention of resistance in certain cases, but irrelevant in others. Because of the shortcomings of these factors in some situations, a more dynamic model of user resistance will be explained.

Model Overviews

Markus (1983) pointed out that implementers should aim to prevent resistance, rather than to overcome it. Once users have begun to resist an IS, implementers must determine the users' reasons for resisting as well as a way to reconcile users with the system. The following models are designed to improve our understanding of how and why user resistance occurs in order to recognize and solve potential problems to implementation before resistance can become an issue (Lapointe & Rivard, 2005).

TAM (Davis et al., 1989) is a positivist approach to determining whether or not users will accept a new IS. It explains acceptance in terms of a user's perception of the usefulness and ease of use of the IS, as well as his attitude toward using the IS. If a user perceives an IS to be useful and easy to use, he will form a behavioural intention to use the IS, and will therefore use it.

Joshi (1991) explains resistance in terms of Equity Theory. He posits that users assess changes in their equity before and after implementation. They then compare their personal change of equity to that of the organization and members of their peer group. User resistance will occur if inequity is perceived.

Markus' Interaction Theory (1983) holds that systems are resisted because of the relationship between technical features

of the system and characteristics of the users; simply changing user or system attributes will not prevent resistance. If an IS causes certain users to lose power, they will exhibit resistance behaviours.

The Attributional Model of Reactions to Information Technology (AMRIT) (Martinko et al., 1996) posits that each individual user makes a causal attribution of an IS based on internal and external influences and past successes and failures with similar systems. The attribution then leads to expectancies for future outcomes and eventually the outcomes form the user's affective and behavioural reactions to the IS.

Factors of Resistance

While the exact factors causing or preventing resistance are a debated topic, the fact that a better understanding of these is important to systems implementers is agreed upon by researchers (Swanson, 1988). The models above focus on different factors in understanding user resistance to the implementation of an IS; behavioural intentions, equity, power, and causal attributions. The literature on the strengths and weaknesses of each of these factors will be examined below.

Behavioural Intentions

Behavioural intentions are determined by perceived usefulness and perceived ease of use of the technology. This has been empirically tested by (Davis et al., 1989) as well as Mathieson (1991). In both studies, potential users of optional systems (spreadsheet or writing applications) were given information about the new system and asked to complete a questionnaire to determine their perceptions of usefulness and ease of use, and their attitudes toward the program. Both studies found that behavioural intentions could be accurately predicted from these three factors. Davis also went on to find that a user's behaviour towards a technology (acceptance) is directly related to his behavioural intentions. This implies that implementers could determine the likelihood of users to accept a new IS using a prototype of the new system along with a questionnaire.

Despite the success of behavioural intentions in predicting user acceptance of a new IS, other researchers have been sceptical about its real-world validity. TAM (and behavioural intentions) is designed to measure acceptance of a technology used on a volitional basis. Imagine that a user is given the option to use either WordPerfect or Microsoft Word; if the user says that he intends to use WordPerfect, he will most likely do so provided there are no outside influences to his decision making process. However, the same does not apply to an organisational setting where the use of systems is often required (Mathieson et al. 2001). In a group or organisational setting, a user's attitudes towards a technology will not necessarily reflect actual behaviours (Hodgson & Aiken, 1988; Mathieson, 1991). Use and usefulness focus on forming attitudes toward the actual technology, not the context in which it is being used, meaning that social factors are not taken into account. This does not affect predictions of behavioural intentions in situations where the acceptance of the technology is decided individually, but in group settings, even simple behaviours are subject to external constraints (Ajzen, 2002). For example, if an employee holds a positive attitude towards,

and intends to use, a new email system he may not actually use it because the manager of his department has chosen not to. So, although behavioural intentions can accurately predict user acceptance in volitional circumstances, there are certainly situations in which it loses its predictive abilities. Because of issues such as this, Legris, Ingham, et al. (2003) concluded that TAM is missing significant factors for determining the acceptance of new technologies.

Equity

Equity theory (not to be confused with Joshi's equity-implementation model) was originally proposed by Adams (1965) and is based on social exchange theory from psychology. Equity theory was designed to be used in order to explain person to person social interactions, but has been generalized and tested in many situations (Greenberg & Orstein, 1983), including IS. The basic idea behind equity is that a person will feel comfortable when his perceived inputs are equal to perceived outputs. When this concept is applied to the implementation of an IS, examples of inputs include: assignment of new tasks, effort in learning a new system, and fear of failure, whereas examples of outputs include: usefulness of the system, increases in power, and a more pleasant work environment (Joshi 1991). A user will compare the change that the new IS causes in his own perceived inputs and outputs to the change that he perceives in the organisation's and his peer group's inputs and outputs. If a user determines that the implementation of an IS did not change his individual equity, he still may conclude that other members of staff have increased their outcomes. In this case he would perceive inequity and resist the IS. In this way, equity theory can be applied to different social contexts within IS. If implementers were able to determine the major inputs and outputs for the users, they could take steps to ensure that they remained balanced in order to prevent resistance.

Though equity can be used to explain a wide range of implementation situations, it too has shortcomings. In stating that people make judgements based on equity, an assumption that humans behave rationally is made, however, humans often behave irrationally (Markus, 1983). (Pratto et al., 1999) found that not all people behave in the manner prescribed by equity theory. People who prefer equality between groups were found to prefer that positive outcomes were given out based on need rather than merit, which would be considered irrational according to equity theory. In an IS context this could mean that users will not necessarily resist given a new technology's requirement of more inputs without greater outputs, as long as the outputs were given to other users in need of them. (Greenberg & Orstein, 1983) found that users may resist more strongly if they believe that a superior has raised their perceived outcomes solely for the purpose of increasing their inputs or suppressing their resistance, as Joshi suggests.

According to equity theory, a user will attempt to decrease inputs or increase outputs in response to a perceived inequity. This explains why users passively resist a new technology; they are decreasing their inputs by not using the technology at all or by ignoring certain features. However, it does not explain why users may use the new system because they are required to, whilst continuing to use the old system as well (causing greater inequity by doubling inputs by performing the task twice) (Lapointe & Rivard, 2005) or why users will

sabotage the new system (causing a greater inequity by severely reducing outputs) (Vorvoreanu & Botan, 2000).

These shortcomings all have implications for the role of equity in Joshi's model. Because humans often act in an irrational manner, there will be instances where the equity-implementation model cannot be used to predict resistance to a new IS.

Power

Following the emergent perspective of causal agency, users in organisational settings and technology affect one another in unknown ways (Markus & Robey, 1988), one of which being shifts of power among users. Implementing an IS with the purpose of changing the balance of power is considered a 'non-rational purpose' because different groups of an organisation will have different objectives, as each would like to gain power for themselves (Markus, 1983). Management might tell users the purpose of a new system is to improve processing time, whereas the actual purpose is to gain power by gaining control over information or monitoring users (Doolin, 2004; Gray, 2001). Markus recognizes that because of the irrationality of shifts in power, there is no single tactic for dealing with resistance due to a loss of power, however, she does suggest that any organisational issues are solved before the IS implementation.

Though it can be argued that power is an ever present issue in IS implementation, it is not always an issue in resistance to implementation. Power is a factor of resistance on an organisational level (Lapointe & Rivard 2005; Markus, 1983) and thereby does not leave room for explaining resistance at a personal level. According to Markus, resistance at the individual level is unimportant because the resistance of a single user will not have a significant effect on the success of the IS. This argument does not consider the possibility that a number of users are resisting the IS because of factors on the individual level (such as equity or stress) or that a single resistant user has the ability to persuade others to exhibit resistance behaviours as well (Marakas & Hornik, 1996). As with other factors of user resistance, power is dependant on user perceptions. If users are unaware of power struggles within the organisation, perhaps because they are occurring in upper management, power will not be an issue in user resistance. Often-times power is inherent in the implementation of an IS (Markus & Robey, 1988), but this does not always translate into power being a key factor in user resistance.

Causal Attributions

Causal attributions about information systems are formed by recalling past experiences with similar technologies and by attributional styles of users (positive or negative) (Abramson et al., 1980, Martinko et al., 1996). An example of a negative style would be where a user attributes an IS failure to the internal, rather than external, characteristics of the system. He might think 'ERP systems are prone to failure' instead of 'the project manager wasn't very good'. Internal attributions of failure are more likely to lead to resistance because the user will feel that the success or failure of the system is entirely out of his control and may be unwilling to put any effort into its use. Obviously, past experiences and attributional styles

vary from person to person, so Martinko et al. have suggested way to make user resistance not dependant on these factors, such as: differentiating the new technology so it is not grouped with past experiences and ensuring that users have only positive encounters with the IS.

(Martinko et al., 1996) write that users who make negative attributions to past IS failures will learn to be helpless (i.e. learned helplessness, or LH) and therefore passively resist the new IS. The problem is that LH is a concept from social psychology which has been misused in this case. It actually takes many failures to form LH (Seligman, 1990), and as most users to not experience many failed implementations of the same type of system, LH is unlikely to occur in an IS context. Though negative causal attributions and past experiences will affect users' behaviours towards an IS, they will not necessarily be in the form of resistance.

The Big Picture

All four of the reviewed models of resistance are positivist in that they imply that resistance can be modelled using a minimal number of factors. Through the review of the models of user resistance and the examination of the literature on the factors of resistance contained in the models, it can be seen that no single model is able to explain resistance in every situation. There are many different issues to keep in mind when trying to prevent resistance; organisational culture, group associations within the organisation, personal characteristics and perceptions, functionality of the technology, and many more. The usefulness of each factor is very much dependant on the situation (Joshi, 1991; Markus, 1983), and therefore resistance is difficult to capture in a single model.

(Lapointe & Rivard, 2005) have proposed a multilevel model of resistance to IS implementation. Their model posits that resistance behaviours are dynamic, and will therefore vary during the implementation process. Initially, users assess an IS in terms of how it relates to their current individual and organisational status. As the implementation process progresses, users will continuously re-evaluate and may change both the level and focus of their resistance. The multilevel model allows for user resistance on two levels: individual and unit (group, department, organisation, etc.), unlike the other models that either explained resistance on either an individual level (TAM, equity-implementation, AMRIT) or at the unit level (interaction). By allowing for a second level of analysis, the multilevel model is taking a step towards a model of resistance that can be applied to any situation. Lapointe and Rivard also allow for users to change their focus to other factors of resistance as time progresses. At first, users may resist an IS because of a perceived inequity between inputs and outputs, but later in the implementation process they could realise that their managers chose to implement the system in order to gain more power. Users might then change their focus of resistance to that of power issues. Though the multilevel model is new (September 2005), and thus has not really been tested for real-world applicability, it seems that a multi-dimensional, dynamic model is more suited to the phenomena of resistance than the single dimension, single factor models examined above.

Though the Multilevel model of resistance is designed to fit a number of varied situations, we still must ask, Are we trying to model something that simply cannot be put into a model? As shown with the LASCAD case study, it is difficult to determine

which factors, or combination factors of resistance are acting in a given situation. In addition to resistance factors, there is also the possibility that users are resisting in an attempt to prevent a flawed system from being implemented (Keen, 1981). In the case of the LAS, users resisted based on past problems with technology, power shifts, and inequity. The new despatch system was implemented despite this, only to fail due to technical inadequacies (Fitzgerald & Russo, 2005). It may be that IS professionals may need to 'drop their tools' when dealing with resistance and base decisions on situational factors rather than attempting to follow a model (Weick, 1996).

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How Understanding Trust Benefits E-Commerce

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The idea of risk is often associated with trust. “Trust signalling is always undermined by the hi-jacking of the signalling systems by untrustworthy operators,” says Kieron O’Hara, from the University of Southampton. He is speaking to the implicit concern with trust: those with malicious intentions may exploit risk. It is because of the possibility of attacks, threats, and risk that the concept of trust emerges. E-commerce is susceptible to those who attempt to hi-jack the signalling system. Practitioners of e-commerce should fully understand the theoretical aspects of trust and its relationship with risk before offering a valuable service. In this paper, I will present the (Mayer, et al., 1995) theoretical model for trustworthiness. The next section will identify three aspects of e-commerce that may qualify it as untrustworthy. The final section will show how practitioners of e-commerce can integrate the theoretical model and learn to value the understanding of trust in the business domain. I conclude that it is important for business and security managers to understand the nexus of e-commerce and trustworthiness before offering a service or implementing a solution.

Introduction

“Trust signalling is always undermined by the hi-jacking of the signalling systems by untrustworthy operators,” says Professor Kieron O’Hara. Signals of trustworthiness can be conveyed by a uniform, professional qualification, or a ritzy business card, for example (O’Hara, 2006). A police officer wears a uniform in order to be identified; so too can a criminal wear a police uniform to be misidentified as an officer. Trust may always be undermined, but the benefits of taking risks can outweigh the costs. O’Hara is describing how trust can be circumvented, but he is also describing perhaps the most salient characteristic of trust, risk. Risk is the possibility of suffering harm and losing something that is valued: “Trust implies uncertainty – and therefore risk,” (O’Hara, 2006). In order to trust, one must recognize the possibility of risk. I trust my friend to submit my paper for me, but I risk the possibility that he will forget to do so: “the antidote to perceived risk is trust,” (Boyd, 2003). More specifically, “Trust is not taking risk per se, but rather it is a willingness to take a risk,” (Mayer, et al., 1995).

To associate trust with risk is critical for e-commerce practitioners. The e-commerce market is indeed growing; in 2003, US retail e-commerce generated \$56 billion, up from \$44.3 billion a year earlier (eMarketer, 2004). Despite the economic growth of e-commerce, many consumers are still concerned that online transactions are untrustworthy. To many, e-commerce is unreliable, untrustworthy, and risky. E-commerce must overcome several obstacles, from reduced social cues to assuring consumers of a website’s security, in order to build trust.

This paper evaluates trust from a theoretical perspective in order to identify lessons for practitioners. It relies upon the (Mayer, et al., 1995) conceptualization of trustworthiness. After describing the theoretical model, I will apply it to e-commerce and identify three obstacles to achieving trust. After identifying the pratfalls of online transactions, I will conclude with a brief list of solutions. The tenor of this paper will focus on O’Hara’s quotation – trust involves perpetual risk. The goal of this paper is to elucidate why security and business managers should evaluate trust from a theoretical perspective.

Theoretical Model

(Mayer, et al., 1995) thoroughly examined the literature on trust and have provided a fine theoretical model and adequate definition: “the willingness of a party to be vulnerable to the actions of another party based on the expectation that the other will perform a particular action important to the trustor, irrespective of the ability to monitor or control that other party,” (Mayer, et al., 1995).

With this working definition of trust in mind, it is important to understand how it is achieved. That is, how does someone who is willing to trust or the “trustor” actually trust the one receiving the trust or the “trustee”? One must be trustworthy in order to gain trust. Trustworthiness is a personal construct in that it operates at the interpersonal level (Covey, 1992). Trust is “a relation between an agent and an object,” and in order for that relationship to work, it takes trustworthiness (O’Hara, 2006). Trustworthiness is what “lubricates social life,” or helps society run more smoothly (Putnam, 2001). (Mayer et al., 1995) describe the characteristics that qualify an individual or institution as trustworthy, thereby creating a theoretical model that one may evaluate e-commerce. The three characteristics are (1) ability, (2) benevolence, and (3) integrity, all of which are signalling systems for trustworthiness.

Ability deals with competence and capability. Experts and critics are often solicited for their opinions and advice because they are competent within their domain. Dr. Sanjay Gupta, the medical correspondent for CNN, for example, often doles out medical advice to millions of viewers. He is trustworthy because he is an acclaimed doctor. (Mayer, et al., 1995) recognize a difference between ability and competence, as ability deals with performing a task-specific process. That is, I have the ability to cook a tasty dinner even though I am not an expert chef like Jamie Oliver. Indeed, trustworthiness is “relative to a task,” (O’Hara, 2006). O’Hara puts forward the following proposition: “I am trustworthy if I claim I will do X under certain conditions, then I will do X if those conditions obtain,” (O’Hara, 2006). In other words, one is in control of one’s own trustworthiness insofar as the claim or task is obtained or completed. Ability is a signalling system because it shows that one is capable, competent, and able to

perform a task or operation.

Benevolence deals with good intentions and kindness. That is, the trustee exhibits a “specific attachment to the trustor,” (Mayer, et al., 1995). Benevolence is different from ability because it speaks to the personal or intimate nature of trustworthiness. This feeling of benevolence can arise from being familiar with the trustee. I feel my peers to be trustworthy not only solely because they are able and competent but I know they have good intentions towards me. My interactions with them over time have shown me their benevolence and compassion. Trustworthiness is “relative to an intention,” (O’Hara, 2006). Benevolence can often be found in cooperation: “If we are cooperating, then I do not have to oversee the subtasks I trust you to do (and mutual trust is bonding),” (O’Hara, 2006). In other words, mutual trust and bonding can lead to benevolent feelings. Benevolence is a signalling system because it connotes a personal bond between the trustor and trustee, which leads to feelings of trustworthiness and ultimately trust.

Finally, integrity deals with honesty and principles. The trustor believes the trustee to be trustworthy if the trustee operates under certain parameters. These parameters can be core values, a mission statement, a code of ethics, or principles, to name a few (McFall, 1987). Certain companies believe in avoiding taxes and relocating to the Cayman Islands or Bermuda. The trustor may see the company or the trustee as shirking its civic duty: a conflict of values arises. It is an even greater conflict if the company lives by a core value that states it will be engaged in the community and demonstrate corporate responsibility. The trustor will not trust the trustee because the trustee, in this case, is violating its core values. Integrity is a signalling system because it connotes the honesty, openness, trustworthiness of both the trustor and trustee.

These three characteristics of trustworthiness lead to “Proposition 2”: “Trust for a trustee will be a function of the trustee’s perceived ability, benevolence, and integrity and of the trustor’s propensity to trust,” (Mayer, et al., 1995). This is not to say that trustworthiness always leads to trust. A trustee like e-Bay could be able, benevolent, and replete with integrity, but the trustor still mistrusts the company. The nexus of trustworthiness and mistrust is known as “opportunity costs,” (O’Hara, 2006). E-commerce practitioners like e-Bay must strive to increase the probability of trust from the trustor by applying Proposition 2 to their operations, products, and services.

Untrustworthiness of E-Commerce

E-commerce consumers have not formed personal and intimate bonds with the shipping clerks or sales consultants of Amazon.com, like they may have at a brick-and-mortar bookshop. This is not to say that websites cannot reinforce more personable trust found at brick and mortar shops. The website Meetup.com brings millions of people together by organizing events: person A can meet person B and then keep up to date with each other by using Meetup.com service (Sander, 2005). The website keeps trust alive by using technology to help organize. Even though Meetup.com is not an example of e-commerce, it shows that technology, namely the Internet, can aid and abet already trusting relationships. It serves as the “sociological superglue” to relationships (Putnam, 2001). This is an important lesson to learn for e-commerce practitio-

ners—technology can reinforce already trusting relationships.

E-commerce often fails to meet Proposition 2. E-commerce is outside the social circle of customers: the customer has very little to evaluate a particular website since the social cues are removed. E-commerce does not always demonstrate ability, benevolence, and integrity – therefore, it has difficulty demonstrating the signalling systems of trustworthiness. I will use three examples to illustrate how e-commerce fails to adhere to Proposition 2. These examples relate to (1) lack of automation, (2) lack of social cues, and (3) lack of assurance. As a result, some “95% of consumers have declined to provide personal information to Web sites,” and 63 percent of these did not do so because “they do not ‘trust’ those collecting the data,” (Hoffman et al., 1999).

Automation helps to increase the likelihood of Proposition 2 and is a signaling system for trustworthiness. Take an e-commerce website that requires laborious efforts from the consumer: too many fields to complete and no automatic verification email for the purchaser. This e-commerce website is demonstrating that (1) it is not able or competent to deal with many fast transactions, (2) there are no signs of benevolence because the user has to spend more time, (3) the website seems unprofessional, untrustworthy, and without integrity. It fails to adhere to Proposition 2. To be sure, it is important that the information is recorded accurately and securely, but one of the primary advantages for e-commerce is that of automation, thereby driving down the transaction cost of an order (Lee, 2003). It is not only a way to demonstrate trustworthiness but a good business practice, playing to the market channel’s advantage. Automation also leads to predictability – an e-commerce website will operate in a particular manner (O’Hara, 2006). Many e-commerce websites do not understand that the “lack of automation really hinders in the efficiency and speed of meeting the customer needs,” (Lee, 2003). To automate the e-commerce system is to signal trustworthiness to the trustor.

Social cues help to increase the likelihood of Proposition 2 and are a signaling system for trustworthiness: “Human trust decisions, however, are also based on affective reactions, which can be triggered by interpersonal cues,” (Riegelsberger, 2003). E-commerce removes the social cues and increases the anonymity for trustors-cum-shoppers (Bargh & McKenna 2003). Take a website that has text-only ordering forms with no options to speak with a real person. This website is (1) demonstrating that it is not able to be personable, (2) there are no signs of benevolence because of reduced social cues, and (3) it seems removed from the knowable world, a world without integrity. Such a website fails not only fails to adhere to Proposition 2 and demonstrate trustworthiness, it is not doing good business. That is, many customers look for interpersonal social cues, and the e-commerce website is failing to meet this desire (Riegelsberger, 2003). Indeed, the Internet medium supposedly removes social and interpersonal cues from “real life” interaction: is it not just a sunk cost of e-commerce? This is not necessarily true, as a solution will be presented later, and e-commerce practitioners should recognize that social cues are a signaling system for trustworthiness. If I can see or hear someone, I gain an understanding of the person albeit a small one. This understanding can be enough to convince me to complete a transaction with the trustee. To increase social cues is to signal trustworthiness to the trustor.

Assurance helps to increase the likelihood of Proposition 2 and is a signalling system for trustworthiness. Consider a university bookstore that has an online ordering system. It wants to send an email to existing customers about discounts on new hardcover biographies. But the bookstore does not use any mechanism to assure customers that it is actually the shop sending the emails and not an impostor. With the litany of reports of online counterfeiting, fraud, and theft – how can the customer really be assured? By not taking the appropriate measures to assure the customer, the bookstore is demonstrating that it is not (1) able to communicate effectively with customers, (2) showing benevolence towards customers (as they needlessly worry), and (3) acting with integrity, as customers may doubt the legitimacy of the emails. It behoves e-commerce practitioners to demonstrate assurance in all operations as it is a signaling system for trustworthiness (Daman, 2006).

Signal Hi-Jacking

Not only do several e-commerce websites fail to adhere to Proposition 2, but even if they introduced new “trustworthy measures,” it would not guarantee total trust on the part of the trustor. That is, O’Hara’s comments now rise to the fore – trust signaling can be undermined by hi-jacking. Malicious users can hi-jack the characteristics of trustworthiness: (1) an expert assurance agent who demonstrates ability, (2) who shows good intentions towards you because he knows you, (3) and works at a well-respected company – can still overcharge and pocket the money. Someone who demonstrates the aforementioned and ostensible signs of trustworthiness can still be untrustworthy: “Once signaling systems are in place they can be forged,” (O’Hara, 2006).

Say the crooked insurance agent is discovered and the public learns of his scam. The trustor will then learn to become more vigilant and less trusting of the agent’s institution; moreover, the trustor will be less willing to send signals to the trustee, in this case, the institution (O’Hara, 2006). If the institution, at some point in the future, wants to solicit private details from the trustor, the trustor will probably think twice about trusting the company. Based on the trustor’s experience with the company, he or she is less inclined to trust. Therefore, if the trustor cannot trust the trustee, and the trustee cannot receive proper, trustworthy signals from the trustor – there is no use in pursuing a “strategy” of trust (O’Hara, 2006). In other words, a company that is not trusted will likely go out of business because customers want to deal with institutions that are trustworthy.

Signal hi-jacking is a recognized and assumed risk of trust. Even though the credit card databases of EasyJet.com or RyanAir.com could be hacked, I still use the website because it is efficient. Moreover, I feel the site is trustworthy because the company is (1) able to sell tickets, (2) benevolent as it informs me of cheap fares, and (3) honest (demonstrating integrity) because I have not experienced any previous breaches of trust. It is a risk every time one uses an e-commerce website, but e-commerce suffers because practitioners do not recognize that lack of automation, lack of social cues, and lack of assurance add to the worries of customers (Lee, 2003). Practitioners must learn how to make up for what e-commerce lacks, knowing full-well that signal hi-jacking will always be a threat.

While practitioners should work diligently to reduce the risk (and signal hi-jacking), it is equally as important to reduce the perceptions of risk for users (McKnight et al., 2002). That is, work towards finding ways to increase automation, social cues, and assurance. While trust may be perpetually susceptible to signal hacking, it is important that practitioners work towards assuring customers that the probability is low.

Lessons and Solutions for Practitioners

The three characteristics of trustworthiness – ability, benevolence, and integrity – are critical to understand for e-commerce practitioners because they create a model for which to strive. One may conduct rigorous quantitative and qualitative analysis on whether these aspects of trustworthiness are associated with the e-commerce company and website. The theoretical model can help to determine areas of concern and improvement. But before an e-commerce company starts to scrutinize the trustworthiness of its operations, it should consider a variety of solutions offered below that can lead to increased automation, social cues, and assurance.

Increased automation will help build trustworthiness for e-commerce practitioners because it will make the service faster, more efficient, and seemingly more reliable. One way to increase automation is to look towards the promises of the “semantic web.” Right now, most web pages are “stupid” in that they simply present data. There is no ostensible way to manipulate and use the information, from sports scores to financial figures (Frauenfelder, 2004). Take the example of a public colloquium occurring on 5 April 2007 listed on the LSE homepage. In order to manipulate the data and integrate it into one’s address book, one must open the calendar and manually insert the information. With the semantic web, one can simply click a button, informing the computer you will attend the colloquium. The information would automatically be inserted into your address book, provide Global Position Satellite (GPS) directions to the event, and inform the ticket office to reserve tickets (Frauenfelder, 2004). The implications for e-commerce are quite significant because transactions will be able to occur more quickly, not to mention kick-start the supply chain. Customers will be able to search in “ordinary language” as opposed to keywords because items will be classified with long descriptions and better explanations (Koprowski, 2003). E-commerce practitioners should look towards introducing semantic web solutions in order to increase automation and bolster trustworthiness.

Increased social and interpersonal will help customers feel more familiar with an e-commerce company. Perhaps this is why e-Bay, the biggest auction website company bought Skype, an internet telephony service, for some \$2.6 billion (Broache, 2005). Sometimes text is not rich enough to describe a particular item. The richer the media – sounds, photos, and videos – the more comfortable a customer may feel with the e-commerce website (Bos et al., 2002). Trustors are familiar with actual dialogue, as it is used on a daily basis. One can listen for insinuation, intonation, and expressiveness in an individual’s voice. In the e-Bay example, internet telephony will give the trustor a greater opportunity to gage the ability, benevolence, and integrity of the trustee. By increasing the social and interpersonal cues, the likelihood of Proposition 2 coming into effect is far greater.

Increased assurance will help customers feel more comfort-

able and secure with an e-commerce company. It will lead to the trustor overcoming feelings of doubt and risk. Take the Amazon.com recommendation system that allows users to suggest, laud, and criticize various publications. One of the problems to such a system, however, is “the reluctance of individuals to reveal preferences in order to find groups of people that share them,” (Huberman et al., 1999). Another pratfall of recommendation system is the “difficulty of convincing potential advice-takers of the credibility and reliability of the recommendations,” (Huberman et al., 1999). A community-wide conference key is suggested to help make the recommendation system as reliable as possible. That is, each member of a certain community, say a deontological philosophers group on Amazon.com, would be in possession of a community key for decrypting messages, recommendations, and advice. Community keys allow for the virtual replication of real-life communities and social life. By having a recommendation system where community members can partake in open, honest, and frank discussion and recommendations, customers are more assured of the relevancy and trustworthiness of information.

Discussion

While it is true that each these solutions can lead to increased trustworthiness, they are still susceptible to signal hi-jacking. Even if an e-commerce website introduces internet telephony or video chat, a malicious user could still hi-jack these signaling systems. What was meant to increase communication and trustworthiness may turn into a new avenue of attack for hi-jackers.

To rid e-commerce from risk is nearly impossible. E-commerce practitioners should concern themselves with reducing the perception of risk and increasing the perception of ability, benevolence, and integrity. It can achieve Proposition 2 by introducing measures or tactics such as semantic web services, internet telephony, or community-key recommendation systems.

Furthermore, brick-and-mortar stores have an advantage of having a physical locale. Customers can envision the store, whether it is in a safe neighbourhood, and the type of people who work there. E-commerce websites are limited to only a name or word such as “Amazon.com” or “Half.com.” Therefore, e-commerce websites must try doubly hard to associate their brands with words and perceptions of trust. An e-commerce website should work towards associating itself with descriptions such as “reliable” and “safe.” E-commerce websites must battle for the perceptions of trustors and customers. They can do so by introducing examples as mentioned earlier.

Conclusion

O’Hara’s remark is accurate in that signals of trust can be hi-jacked. But they have always been susceptible to hi-jack – before the era of e-commerce, and in the age of Democritus. The point is therefore not to attempt the nearly impossible and eliminate risk, but to reduce the concerns of customers. The relevancy and tenor of O’Hara’s remarks have been alluded to throughout this paper: risk is part of trust.

After examining trustworthiness with a theoretical model and

suggesting solutions, it is important to realise where this paper ends: it is critically important for security managers and businesspeople to understand the dimensions of trust. Even if trust is always undermined with the threat of hi-jacking, it is still important for e-commerce practitioners to understand how trust works and how it can benefit e-commerce. Practitioners can work towards reducing the threat of hi-jacking, and then creating the perception of strength among customers and trustors.

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E-Voting: The Security Perspective

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E-Voting security has been at the forefront of a growing debate on e-voting systems. The academic community has recently begun exploring the issue and two main streams of thought have appeared. One supports universal and absolute security with the use of physical ballots and the other claims that such security is not a necessity in all contexts. Important aspects of the debate include voter authenticity, voter anonymity, system accountability, system disclosability and system availability. Theories used to present the argument include systems theory and structuration theory, but the theoretical underpinnings of the topic are still highly underdeveloped. The research methods are mostly interpretivist and include cases studies, qualitative analyses and action research. Future research on the topic should include case studies of open source systems implementations as well as research in how e-voting security should be handled in cases of weak democracies.

Introduction

Election systems have traditionally been based on paper ballots and in some cases on mechanical devices such as lever and punch card machines. The last fifteen years following the wider trend of ICT adoption in government (e-government) some countries have started slowly adopting and in some cases fully substituting traditional voting systems with electronic voting systems (E-Voting). E-Voting comes in different forms and shapes. A general distinction could be made between electronic machine voting (eMV), which is voting on an election controlled device, and electronic distance voting (eDV), which allows voting remotely using mediums such as the Internet, Short Message Service (SMS), and interactive TV (Svensson & Leenes, 2003).

Following such developments and starting only six years ago the information systems' academic community is slowly beginning to explore the various aspects of e-voting. The research has touched on a wide range of issues including the reasons for and against adopting the different forms of the technology, whether the time is right for such an adoption, whether the technology is context specific, arguments for and against its centralized or decentralised management, whether and how it influences the election results and the use of open or proprietary source systems.

The most significant and most written about issue on the literature though is the security of e-voting systems. Elected governments in modern democracies derive their legitimacy from the electorate process. As such this process has an immense weight and importance and failing to secure its validity could undermine the system of government (Caltech/MIT Technology Project, 2001). The rest of this text will present and analyse the literature on e-voting security.

Security Debate

Overview

Security in e-voting includes a wide range of issues and actors and is highly related to the type of technology used (Xenakis & Macintosh, 2004). It also relates to the procedures and standards that are put in place to overcome technological security

shortcomings (Mohen & Glidden, 2001; Williams & King, 2004; Xenakis & Macintosh, 2004). E-Voting needs to be secured from the voters, election officials, programmers, technicians and system administrators (Jones, 2004). The threats posed could be internal e.g. the vendor, election officials. Or they could be external such as individuals, well funded agencies, states, parties, criminals, terrorists, many of whom cannot even be prosecuted (Jefferson & Rubin & Simons & Wagner, 2004; Svensson & Leenes, 2003). The motives of the attackers range from publicity (Mayniham, 2004), to foreign intelligence and terrorist acts (Phillips & Spakovsky, 2001), to governments manipulating the system for their benefit (Mercuri & Camp, 2004).

The overall debate of the literature consists roughly of two main views. On one side the zealots of absolute security who do not trust that electronic means provide a sufficient level of transparency, privacy and reliability to be trusted by the electorate, and so always requiring some form of physical verifiability of the result. On the other side researchers whose main belief is that in specific contexts a sufficient level of security could be achieved through physical and electronic procedures and standards.

A comprehensive context of security issues is given by the CESG (Communications-Electronics Security Group) standard made for the UK Government (Xenakis & Macintosh, 2004) and includes voter authenticity, voter anonymity, data confidentiality, data integrity, system accountability, system integrity, system disclosability, system availability, system reliability, personnel integrity and operator authentication and control. The debate on the most controversial of these categories is presented below.

Voter Authenticity

E-Voting systems must ensure that only the eligible individuals are allowed to vote. Remote voting presents some challenges in doing so since the voter cannot be identified in person. This has led to a greater percentage of fraud in mail-in votes and suggestions that eDV will present the same weakness in a greater scale due to computer automation (Phillips & Spakovsky, 2001). A possible example would be a virus or a Trojan horse, which could spread to the victims' machines via

mass emails, presenting itself as the voter in order to manipulate the ballot according to its creator's intentions (Mohen & Glidden, 2001; Rubin, Simons & Wagner, 2004). Such a threat is significant and possible in major elections (e.g. US presidential election) due to its high popularity as a target of attacks, but it is argued that it is not a particular threat in smaller elections where the stakes and spread of the voters is different (Mohen & Glidden, 2001).

Voter Anonymity

Voter privacy is considered highly important in modern states and is a requirement on several international conventions (Svensson & Leenes, 2003). eDV though is unable in its own right to enforce ballot secrecy since the voter could exercise his or her right in any environment. This could compromise the vote secrecy and even force ballot casting to the preferred candidate of one's parent, spouse, employer, church and so forth (Phillips & Spakovsky, 2001; Xenakis & Macintosh, 2005). Lack of privacy in combination with weak voter authenticity on eDV could lead to more twisted effects in the election process such as vote selling, bidding and switching (Mercury, 2000; Jefferson et al., 2004).

In order to counter measure such effects various methods have been suggested such as strong legislation against vote coercion (Mohen & Glidden, 2001). Procedural solutions such as having a multi-modal multi-day election that permits voters to override any previous vote on the last day, which is set to only allow ballot casting in election centres (Svensson & Leenes, 2003).

System Accountability

A voting system should be able to detect malfunctions and possible manipulations, reconstruct the result and be capable of identifying its causes. Auditing the election process in terms of its electronic and physical processes help towards that goal (Jones, 2004; Phillips & Spakovsky, 2001).

Auditing though presents a major challenge in e-voting systems. The fact that voter anonymity needs to be maintained disallows the voter from receiving a receipt, like in financial transactions, that shows how he or she voted. Such a receipt could have then been checked against the actual results in order to verify their correctness (Jones, 2004).

In an attempt to adjust the financial receipt in the voting context the concept of voter-verified paper trail has been suggested. This only works in eMV as it requires the voter to get a printed receipt from the voting machine then check its correctness and place it in a ballot box (Grove, 2004; Jefferson & Rubin & Simons & Wagner, 2004). This allows for an end-to-end audit since both input verification and reliable recount becomes possible (Jones, 2004).

Lack of such receipts makes auditing less reliable (Mayniham, 2004; Grove, 2004; Jefferson & Rubin & Simons & Wagner, 2004; Jones, 2004). Suggestions to better this reliability concern propose recounts using a third party software mechanism that are different from the original in order to verify the result (Mohen & Glidden, 2001; Jones, 2004).

System Disclosability

On systems that voter-verified paper trails are not used, trust for the validity of the election outcome is shifted towards the software vendors and any possible subcontractors (Xenakis &

Macintosh, 2005). Such trust is not sufficient so standards for the external scrutiny of the vendors in terms of software and processes are put forward (Phillips & Spakovsky, 2001).

E-Voting systems need to be tested and certified by experts both in terms of code and functionality (Mayniham, 2004). There is a growing debate on whether these systems should be tested only on government approved specialised laboratories or whether they should be open source so that anyone could examine and critique them (Mayniham, 2004).

Open source supporters claim that open systems result in greater transparency, trust and confidence since there is universal scrutiny (Xenakis & Macintosh, 2005; Mayniham, 2004). They also suggest that such the oversight increases the incentive of the vendor to produce more secure code and fix errors in order to avoid negative publicity (Mayniham, 2004; Kitcat, 2004).

Open source opponents on the other hand claim that most open source projects are usually maintained by a single person and that the popular ones (for which public scrutiny really works) are only those that are actually used by the developers themselves. Since e-voting systems belong to the first category opening their source will not provide any benefits in terms of security (Kitcat, 2004). They also claim that even if the code developed is open source its hard to ensure that the code used on election day has not been altered as was the case with the Diebold e-voting scandal in the US (Mayniham, 2004; Kitcat, 2004).

In terms of the procedural measures suggestions have been made for public observers to monitor the process either through specially created computer monitors (Phillips & Spakovsky, 2001) or through a series of logic and accuracy tests of the machines on election day (Williams & King, 2004). Other researchers have though disregarded them as inadequate and contributing more towards feeling rather being secure (Mayniham, 2004; Phillips & Spakovsky, 2001).

System Availability

E-Voting systems need always to be available. Failure to do so could result in voter disenfranchisement. One of the most significant issues with eDV and most particularly with Internet voting is the Denial Of Service (DOS) attacks. These are a fundamental problem of the Internet architecture and although preventative measures could be employed (Mohen & Gliddens, 2001) there is no absolute guarantee of safety (Mercury, 2000; Mohen & Glidden, 2001; Xenakis & Macintosh, 2005). DOS attacks are always a threat to interrupt the e-voting service. In order to minimise the risks, procedural measures have been suggested. These ask for a multi-day multi-modal voting process that reserves the last day only for eMV. This will ensure that no matter the disruptions on the eDV the last day could ensure that all voters do cast their ballots normally (Mohen & Glidden, 2001; Xenakis & Makintosh, 2004).

Theories

The majority of the e-voting literature does not employ any of the widely used IS theories. This is probably the result of the fact that the literature is still in its early stages. The papers that do so use the structuration theory (Svensson & Leenes, 2003), systems theory (Mayniham, 2004), principal-agent theory (Mayniham, 2004), computer science theory (Mercuri

& Camp, 2004) and social identity theory (Oostveen & Besselaar, 2005).

In security, aspects of the systems theory such as the natural accident theory and the high reliability theory are applied. E-Voting systems are viewed as highly complex systems that according to natural accident theory make accidents inevitable. Minor errors in various parts of the complex and closely coupled system could result in unexpected feedback loops. As a result errors in e-voting systems cannot always be predicted and their probability becomes almost inevitable as the complexity of the system increases (Mayniham, 2004).

Election systems though must be reliable and failure to be so could undermine the system of government (Caltech/MIT Technology Project, 2001). In an attempt to resolve the unpredicted system errors the high-reliability theory is employed. This theory is viewed by Mayniham as complementary to the natural accident theory although there is an academic debate on whether they are complimenting (LaPorte, 1994) or contradicting (Sagan, 1999) each other. The theory advocates that building a highly reliable system requires high levels of technical competence acquired through an environment that rewards error reporting and promotes continuous system improvement. The fact that elections are infrequent and use temporal stuff makes it hard to build the appropriate technical knowledge base required (Williams & King, 2004). The theory's requirement for transparency and error reporting favours an open source implementation of e-voting. High-reliability theory also advocates high level of redundancy on the system in order to be able to recover from the unavoidable system errors, such redundancy could be achieved using data audits as well as software and hardware recovery systems (Mayniham, 2004; Jones, 2004).

Structuration theory is also used to demonstrate and explain why different countries employ different forms of e-voting systems and security measures. So according to the theory these measures are distinct as the actors' decisions over time and in each country are influenced by different social and institutional contexts, which are in turn change influenced from these decisions (Svensson & Leenes, 2003). So security in e-voting is influenced by a country's norms, the electoral interests of dominant political actors, industrial and economic pressures and general policy ambitions such as attitudes towards e-government (Svensson & Leenes, 2003). Structuration theory could be considered as complementary to the system theory perspective described above as it looks at the political context.

Epistemology and philosophical assumptions

Most research methods in the literature use interpretivist methodologies. These include many cases studies (Jefferson & Rubin & Simons & Wagner, 2004; Xenakis & Macintosh, 2004; Larsen, 1999; Deutsch & Berger, 2004; Coggins, 2004; Xenakis & Macintosh, 2005), few qualitative analyses (Mercury, 2000; Phillips & Spakovsky, 2001; Mercury & Camp, 2004; Jones, 2004; Svensson & Leenes, 2003) and some action research (Mohen & Gliddens, 2001; Kitcat, 2004; Williams & King, 2004).

Positivist's research methods are also employed to a lesser extent in the form of experiments (Herrnson, et al., 2005; Oostveen & Besselaar, 2005), quantitative analysis (Phillips &

Spakovsky, 2001; Mayniham, 2004) and an empirical survey (Herrnson, et al., 2005).

In more detail almost all the security related research uses interpretivist methods, which seems to derive from the fact that it is hard to quantify security related issues. In the only case that quantitative analysis has been used (Mayniham, 2004) residual votes have been wrongly identified as a factor of reliability. Wrongly because it did not take into account the fact that residual votes could also be cast as a protest vote (Mercuri & Camp, 2004). On the other hand all research related with e-voting usability uses positivist research methods such as experiments and empirical surveys.

Conclusions

The e-voting research as a whole is mostly critical though there are some normative elements trying to influence the course of things especially in the US context. At the moment and since this is still a new field the research is not very well interlinked. This is apparent since there is currently no theory sharing among the papers, excluding those produced by the same authors (Xenakis & Macintosh, 2004; Xenakis & Macintosh, 2005).

The subject's literature volume though seems to increase every year. At the same time the importance of the research is stepped up as a growing number of governments are considering e-voting in the next few years (Svensson & Leenes, 2003). These factors combined with the fact that the field is relatively unexplored makes up for a vibrant future debate.

The limitations on this literature review have been mainly the language and the space available. Language because only English papers could be searched and so limiting access to papers from Brazil and maybe India where e-voting is already happening in full scale. Space as it did not allow for a more complete discussion on the literature debate.

Although the user-verified paper trail form of the technology is presented as the only valid universal solution for e-voting in the majority of the literature, one could recognize that the opposite side of the argument is highly underrepresented. E-Voting without user-verified physical audits could have a place in some particular contexts and countries especially if transparency through open source technology is maintained.

Future research in e-voting needs to be extended beyond the US context. It should check on the results of open source implementations in elections like Australia. It should widen its scope by looking at issues raised in non typical western countries e.g. e-voting in India and Brazil that have already full scale e-voting systems. Finally e-voting security research could be combined with concepts like e-oppression in an attempt to determine the role of international organisation like the UN in observing elections in weak democracies where the loss of privacy and government intervention could have severe effects.

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The Causes and Trends of the Digital Divide

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The digital divide has been defined by some as a term used to describe the discrepancy between people who have the access and resources to use new information and communication tools (such as the Internet) and people who don't have it. The term also describes the discrepancy between those who have the skills, knowledge and abilities to use the technologies and those who do not. There is a large body of literature on the digital divide and its causes and trends. This review is a critical study of some of these papers. The papers reveal several causes for the existence of the digital divide. This review concentrates on the social, economical, and gender aspects of the divide. It exposes some of the key debates in this field. It finds that these papers do not stick to any particular theories or models but prefer to use case studies to understand the phenomenon instead. The review concludes by stating that this area is a socially relevant topic even today and could definitely benefit from continued research.

Introduction

The advent of the Internet can be seen as one of the most significant advances of the twentieth century. This 'network of networks' was touted to be the means of communication and information retrieval. Despite the fact that the initial response to the Internet fell short of expectations, a marked rise could be seen in its adoption and use in the nineties (DiMaggio et al., 2001). The new computing and communication technologies were expected to overcome geographical and social barriers (Graham, 2002); the Internet would create a smaller, more close-knit global community. The high adoption rate of the Internet (unprecedented in any other mass communication technology) seemed to suggest that it was well on its way to do the same.

"According to Castells, we live in an historic period of transformation, where a new societal system is emerging. The two key features of this new order are informationalism and globalism." (Wilenius, 1998).

The Internet soon permeated into day-to-day life to such an extent that people started considering the lack of Internet access to be a 'disruptive event' (Hoffman et al., 2004). However, this permeation and the obvious advantages it offered has now become a major bone of contention amongst many.

A surge of concern was expressed over the rising problem of this new technology being available to only one part of society, namely the people in the high-income bracket. In the early 80s, Schreiber (1984) spoke about how society had got divided into the information "haves" and "have-nots" with the advent of computers and the Internet. He expressed anxiety over the fact that the blacks in America were being left behind in the computer race as they could not afford the new technologies. This was about the time when the term 'digital divide' came into existence.

For this review, I have studied seventeen academic papers published since the turn of the century on the phenomenon of the digital divide. I have tried to chart out the various reasons pointed out by academics for the existence of the divide. This review tries to study the emergence of this phenomenon and the trends it has followed over the years by seeing how the debate in this field had developed.

Does it actually exist?

Initially, the 'divide' referred to the gap that was forming between the richer and the poorer sections of society. However, soon people were talking about the digital divide as a 'complex and dynamic phenomenon'. While some denied the existence of a digital divide, others claimed that it would disappear on its own (Dijk & Hacker, 2003). Sassi (2005) believes that the spread of the Internet will follow the S-curve; so, while initial adoption may increase social gaps, these gaps will close eventually. Others also expressed that when 'saturation' sets in among higher categories, the lower categories would soon catch up in adoption of the Internet (Dijk & Hacker, 2003). While some hope that these societal gaps will evaporate eventually, yet others show that even though saturation in terms of diffusion of information goods such as radio and television occurs rather rapidly, the same is not true for information systems such as telephone and cable (Schement, 1999 referred in DiMaggio, 2001).

Understanding the causes of the Digital Divide

Several reasons have been cited as causes of the digital divide. The 'digital divide' now implies

"inequalities in access to the Internet, extent of use, knowledge of search strategies, quality of technical connections and social support, ability to evaluate the quality of information, and diversity of uses." (DiMaggio et al., 2001).

Another way of defining the digital divide is by classifying individuals as either tech-savvy or less savvy (Hoffman et al., 2004). Graham (2002) sees this phenomenon as giving the powerful more power over people, time and space, while eroding all powers of those who are marginalised or rendered off-line.

Access and Training

Let us examine these one at a time. A lot of people believe that providing everyone the access to computers and communication technologies could help in bridging the digital divide (Cawkell, 2001; Strover, 2003; Korupp & Szydlik, 2005). The view that policy packages needed to incorporate low-cost ver-

sions of information technology to allow this diffusion to take place was also very popular (James, 2002). However, only in recent times have people started grasping the fact that access to these technologies does not imply adoption of the technologies or effective use of it (Hollifield & Donnermeyer, 2003). More and more people are realising that computers and network connections (material access) are only a part of the resources required by people to make full use of technology. A lot of other factors come into play (Warschauer, 2003). Dijk and Hacker (2003) cite mental access, skills access and usage access as relevant to explaining the problem of information inequality. Even though popular opinion is that the digital divide will be bridged when every citizen gets access to a computer and an Internet connection, studies suggest that the major problems of inequality will only start at this point (Dijk & Hacker, 2003).

Just by providing people with computers and Internet access, we cannot hope to devise a solution to bridge the digital divide, especially when the people don't know how to use these new technologies. The concentration now has to shift to teaching non-users the relevant digital skills. This includes instrumental skills such as being able to operate a computer, informational skills of being able to search and process information, and strategic skills to be able to use the information effectively (Dijk & Hacker, 2003). This could give new users the confidence boost they need to be able to start using computers and the Internet.

Social and Cultural Inequality

"Analyzing causes and trends of the digital divide provides valuable insights into newly emerging trends in social inequality" (Korupp & Szydluk, 2005).

Stanley (2003) shows that race and culture also have a profound effect on the adoption and use of technology. Studies have shown that Asians or Caucasians have higher probability of owning and using computers than African-Americans or Latinos. People, especially non-computer users, have fears, assumptions and pre-conceived notions about technology. If these were alleviated, then perhaps they would be more willing to use them. Stanley tries to explore the complex relationship between ethnicity, identity and the attitudes of people to computers. She cites three non-cost related psychosocial factors for people's non-adoption of technology. These factors are their perception of how relevant the technology is to them, their fear of new technologies, and how they envision themselves with regards to technology. Several researchers have carried out analyses in various countries to show how cultural and social differences affect technology adoption. They relate the digital divide to differing levels of economic, technological and social development. However, Corrocher & Ordanini (2002) show in their model, that the divide exists regardless of technological, social and economic differences.

Warschauer (2003) comments that the divide which exists, is not digital, but social in nature. He says that by referring to this phenomenon as the digital divide, it is implied that the divide can be overcome by providing everyone with a computer and an Internet connection. But we have seen enough studies that disprove this point. Thus he comes up with the concept of Social Embeddedness of Technology. This states that:

"while a digital divide framework suggests that technology 'impacts' a social situation, in fact, technology and society are co-constitutive. While technology can help shape social relations, social relations also shape how technology is developed and deployed" (Warschauer, 2003).

The Gender Divide

Among all these divides that have formed with the advent of the computer and Internet, a gender inequality in technology adoption and use has also been noticed. Studies show how masculine and feminine behavioural intentions to use a system differ with respect to attitude toward using the system, subjective norms and perceived behavioural control (Venkatesh et al., 2004). According to Fountain (2000) referred in Korupp & Szydluk (2005), a startling gender inequality is found when studying adoption and participation rates of women in technology related fields. Research shows that women are less likely to own a computer than men, they are more practical in the use of computers, and they may use them at their place of work but are less likely to own a computer or access the Internet for private use (Korupp & Szydluk, 2005). However, they also note that the strong gender bias that was noticed initially is slowly starting to fade away. Dijk and Hacker, (2003) emphasise that even though the gender divide in terms of technology possession is closing, the skills and usage gap remains as before. However, this gap is not as wide among girls and boys as it is for adults. The 'computer generation' brought up in digital technology homes is found to be more receptive of new communication and information technologies.

Conclusion

Thus, I have tried to chart out the exciting debate that exists in the literature on the digital divide with respect to the causes and trends of the divide. As a collection, their attention to political, social and economic contexts allows us to see the digital divide as far more than access to equipment. There are of course several aspects of the debate which could not be introduced here due to limited time and space. However, some of the basic factors and trends have been examined. This review is neither exhaustive nor definitive; it merely brings out some of the salient points prevalent in IS literature.

While most people concentrate on the availability and access issues that lead to the digital divide, there is a trend of academics moving in to explore how cultural, regional, educational and age differences affect the inequality gap. More recently, there have also been more composite views given on the existence of the digital divide. While some may treat it as a problem that needs to be solved, others believe the existing gap will fill up on its own over the years. My personal opinion on the matter is that although some academics believe the gap will get bridged on its own in due time, this problem is much more deep rooted than any other previous divide, and I'm quite doubtful about it closing up on its own.

Whatever may be the outcome, the point to be noted is that the digital divide is very much existent in the current situation.

"Our results indicate that this gap is opening up again. Future

research should continue to focus on this issue.” (Korupp and Szydlik, 2005).

Research needs to be carried on in understanding its trends. Only then, if at all, can steps be taken to bridge the gap.

We are standing at a critical moment in time where we need to reassess the digital divide to adopt new courses of action that will help integrate Information Technology into society. Some areas for future research could be international and cross-cultural findings, and also the role political systems, organization-level and community-level practices and existing structural inequalities play in the current situation.

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The Failure of E-Government in Developing Countries

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E-government is often heralded as the new way forward for both developed and developing countries. There are several examples of how this new form of government leads to increased rates of development and allows for greater democracy, and how it can be successfully implemented in developing countries (e.g. Krishna & Walsham, 2005; Bhatnagar 2002). In contrast to this line of argument, the purpose of this literature review is to demonstrate how e-government fails in developing countries. Given the afore mentioned focus of this article, the criticism of the implementation of e-government in developing countries as well as the identification of a set of solutions to common problems in this field is beyond the authors current scope. Instead, this paper will serve as a study of what often goes wrong when e-government is introduced in developing countries, thereby allowing those in the field to use this knowledge to anticipate potential problems and create more robust and effective plans.

The Definition of E-Government Failure

According to the World Bank website (2005), e-government can be defined as:

“information technologies...that have the ability to transform relations with citizens, businesses, and other arms of government...[and] can serve a variety of different ends: better delivery of government services to citizens, improved interactions with business and industry, citizen empowerment through access to information, or more efficient government management...benefits can be less corruption, increased transparency, greater convenience, revenue growth, and/or cost reductions.”

Given the aforementioned definition, it is evident that e-government is not merely the computerisation of a government system, but the ability of technology to achieve levels of improvement in various areas of government, transforming the nature of politics and the relations between governments and citizens.

For the scope of this discussion, e-government failure will be defined as the inability to reach the goals already mentioned.

E-Government in Developing Countries: The Current Situation

It is appropriate at this stage to establish why this literature review deals specifically with the failure of e-government in developing countries. Numerous studies have shown that it is not just e-government applications, but also information systems in general that fail in developing countries. A literature review in this field concludes by stating, “successful examples of computerisation can be found...but frustrating stories of systems which failed...are more frequent” (Avgerou & Walsham, 2000).

According to Heeks (2003) who has done a substantial amount of research in the subject area, most implementations of e-government in developing countries fail, with 35 percent being classified as total failures (e-government was not im-

plemented or was implemented but immediately abandoned), and 50 percent as partial failures (major goals were not attained and/or there were undesirable outcomes).

It is therefore reasonable to conclude that there are a large proportion of cases where e-government has failed in developing countries. This is a disturbing fact, especially as developing countries have a limited number of resources available to them, and cannot afford to wastefully spend large amounts of money typical of such projects.

Reasons for Failure

There are numerous articles available in information systems literature that deal with the failure of information systems (e.g., Lyytinen & Hirschheim, 1987; Horton & Lewis, 1991) and the failure of information systems in developing countries (Boon, 1992; Beeharry & Schneider, 1996). This paper tries to focus specifically on literature dealing with e-government in developing countries rather than the more general literature, although at times it has been appropriate to include such literature; for example when the authors have been involved with e-government in developing countries. Because the stipulated topic is part of a relatively new field, there is not much history of academic literature, or any significant changes in thinking over time. Most of the citations in this paper are of literature that has been published in the last ten years. Differing perspectives and paradigm shifts are often the luxuries of phenomena that have been in existence for some time.

According to the philosopher Heidegger (1978), the essence of technology in the world is not something technical, or a means to an end. Instead, the essence of technology is a revelation that challenges the world by ordering it and creating a concrete infrastructure. This once again can be ordered to create such a revealing and so can continue go on. Ciborra (2005) uses this framework when describing the use of e-government in developing countries; where the focus of technology is the ordering of the relationship between the administration and the citizen, in setting the boundaries between the

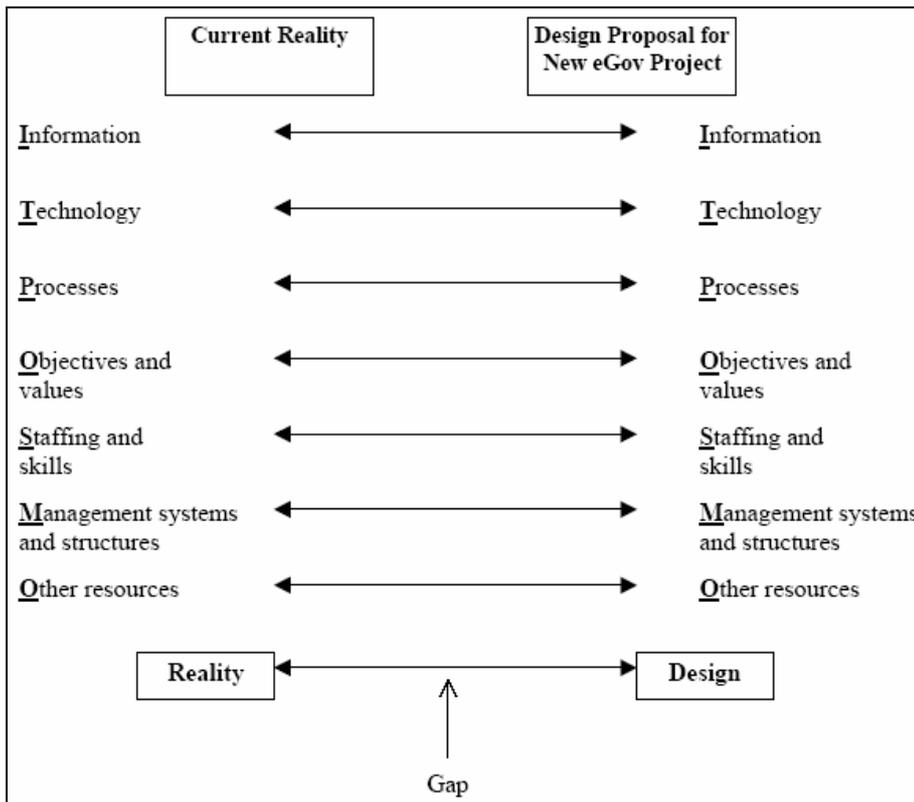


Fig. 1: Heeks Model illustrating the gap between Reality and Design. (Heeks, 2002; 2003)

state and the market, and in ensuring of greater accountability and transparency. He states that this is often the reason for developing countries to partake in e-government projects, as having such a system is believed to equate to good governance and increased development, and hence affects their receipt of aid from rich states.

Using a subjective ontology, Ciborra (2005) suggests that this motive, so often cited as the reason for the adoption of e-government in developing countries, is highly questionable. Good governance is not always the outcome of e-government; bureaucratic or military administrations will not automatically become more transparent, efficient and market-like as a result of it. Using a case study of e-government implementation in Jordan as a background, he speculates that developing countries may not be ready for such a system where citizens are seen as customers. This would mean that the privileged segments of the population may have access to the services more easily, corruption can continue as favouritisms and bribery are offered to new intermediaries, and levels of democracy and competition will not be affected. Thus, it can be deduced that Ciborra (2005) holds the view that that the notion of e-government on its own is not suited for developing countries to obtain the associated benefits; and that instead political and social changes are required alongside the implementation of electronic mediums. Alternatively, he indicates that an economy will be required to develop to a service delivery state or a minimal state (Kahn, 1997), where failures due to governance breakdown, corruption, rent seeking, distortions in markets and the absence of democracy are addressed before e-government can be implemented within it.

A contrasting and more objective ontological approach to the failure of e-government in developing countries can be seen in research by Heeks (1998; 2002; 2003), which provides clear-cut situations that

often result in failures. By examining numerous cases of IS and e-government failure in developing countries, Heeks (2002; 2003) states that a major reason for these failures is the mismatch between the current reality and the new future system (for example, an e-government platform). The chances of failure increase as the gap grows. Heeks (2002; 2003) uses the following model to illustrate this situation.

The problem that often arises with developing countries is that there is frequently a mismatch between the current and future systems, due to the large gap in the physical, cultural, economic, and various other contexts between the software designers and the place it is being implemented (Heeks, 2002).

The model has led Heeks (2003) to identify archetypes of situations where design-reality gaps are common. These are summarised below:

- **Hard-Soft Gaps:** the difference between the actual technology (hard) and the social context (people, culture, politics etc.) in which it operates (soft).

- **Private-Public Gaps:** the difference between the private and public sectors means that a system that works in one sector often does not work in the other one.

- **Country Context Gaps:** the gap that exists when trying to use the e-government systems for both developed and developing countries.

It is this idea of gaps as conceptualised by Heeks (2002) can be seen as a framework upon which almost all available literature on the failure of e-government in developing countries is based. Even Ciborra's (2005) view, where there is a gap between the political situation that is present and that which is required for successful e-government implementation can be placed in Heeks' framework. Numerous other articles talk of factors that lead to failure, and in order to create a meaningful classification, these will be organised according to Heeks' (2003) archetypes.

Hard-Soft gaps are arguably one of the most commonly cited examples of e-government failure in developing countries. An interpretive set of case studies concerning e-government projects in Kerala, India, has revealed that the numerous factors which allow individuals in developing countries to access the services effectively are ignored. These factors depend on resources, skill-levels, values, beliefs and motivations of those involved in the project (Madon, 2004). From this we can stipulate that a lack of training, skills and change management efforts all would affect the rates of failure, as this would create a wide gap between the technology and the context in which it exists.

Cecchini and Raina (2004) state that it is imperative for e-government projects to establish the service and information needs of the community that it serving, and that the technology itself should be developed in collaboration with local

staff. This would considerably decrease the Hard-Soft gap, and create a sense of local ownership. It is also important to involve the people most closely related to the project by improving local awareness of the project through promotional campaigns. Cecchini and Raina (2004) go on to say that “the local administrative and political actors need to be involved in the implementation of the project, otherwise the likelihood of failure increases dramatically”.

Jaeger and Thompson (2003) assert that an e-government system would fail if the government did not take an active role in educating citizens about the value of e-government. E-government would also fail if the users did not have the ability to use the technology to enable access of useful information and services. This would lead to a low user base, as the system would not be equally accessible by all citizens.

Linked to this is the lack of skills and training which are required to effectively use an e-government system that are available to government officials and citizens. This problem has been referred to by numerous academics (Heeks, 1999; Moon, 2002; Ho, 2002). It is a particularly significant problem in developing countries due to the chronic lack of qualified staff and training schemes, which are necessary conditions for the existence of successful e-government schemes (Ndou, 2004). The same stance has been taken by Basu (2004) who states: “there are insufficient numbers of people in developing countries trained in appropriate technologies...training opportunities are also straining to meet needs”. The low rates of literacy in developing countries make this situation very difficult and costly to change, thus accounting for why e-governments so often fail in these countries.

The issue of change also forms part of the Hard-Soft gap, as an e-government initiative constitutes the realignment of working practices and government functions. The public sector must change and reengineer its processes to adapt to the new technology and culture of an e-government (Ebrahim & Irani, 2005). This can be problematic and can result in some stakeholders resorting to politics due to their reluctance to share information, which might be perceived as a reduction of their authority (Ebrahim & Irani, 2005). If this and other forms of resistance are not managed using change management or similar initiatives (Ndou, 2004), the gap between the technology and the social context in which it operates will not be bridged.

Private-Public gaps are the next archetype defined by Heeks (2003), who uses the metaphor of square pegs and round holes to describe the situation of trying to fit an information system designed for the private sector into the public sector.

A common problem associated with the public sector are the high turnover rates of government IT staff due to uncompetitive payment and employment conditions as compared to private sector organisations (Ebrahim & Irani, 2005). This leads to a lack of public sector skills, and as a result e-government projects are often outsourced to the private sector, fuelling a

clash of culture and values, as well as large gaps between the design and reality (Heeks, 2003).

Navarra and Cornford (2005) acknowledge that private sector organisations do not operate as governments. In the private sector, planning is usually carried out from the top down, and implemented via a chain of command in collaboration with

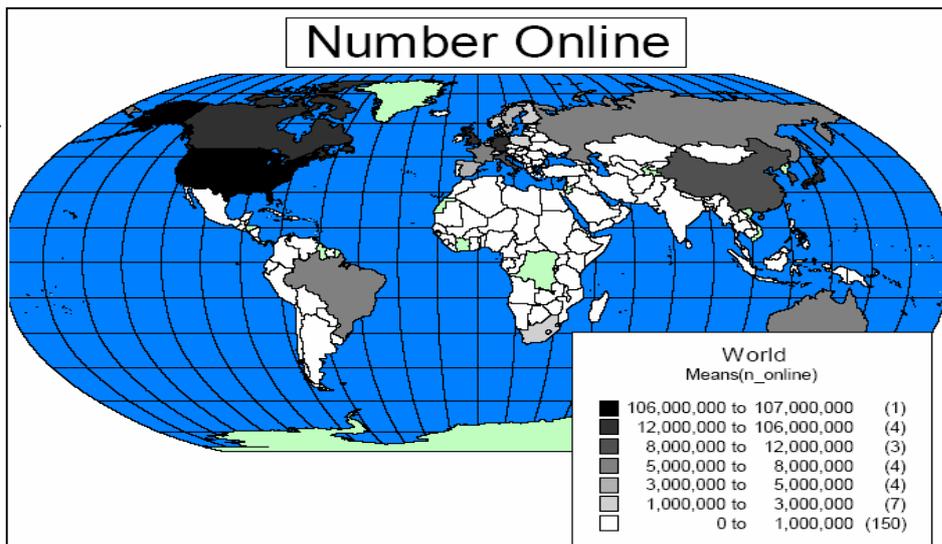


Fig. 2: The Global Digital Divide between developed and developing countries. (Norris, 2000)

training and change management initiatives. This is not the case in the public sector, and it is unwise to apply the private sector model to the creation of an information system that serves the government.

Unlike the private sector, government officials in developing countries are frequently technology centred, rather than information centred when thinking of e-government initiatives (Ballantine and Cunningham, 1999). This can cause significant gaps between the software that is developed in the private sector and that which the government expects.

E-government projects in developing countries are usually driven by individual government departments that frequently depend upon aid from donors. Once this financing ceases, there is often insufficient funding to continue the project. (Schware & Deane, 2003). Private sector IT investments rarely run out of funding, as money is usually allocated specifically for such investments.

It is unfortunate that large, impressive projects are often preferred by governments in developing countries, as these projects are seen as evidence of political action and as a response to a particular problem. However, the risk of failure is proportional to the size of the project, and large projects often fail (UNDESA, 2003).

Ciborra (2005) has also talked of the gap between the public and private sectors. Given the way that private sector systems are designed, governments would have to change their view of the recipients of these e-government projects from citizens to customers. This represents a substantial paradigm shift and is the reason that many developing countries face difficulties with e-government applications (Pratchett, 1998). Ciborra (2005) identifies numerous problems with seeing a citizen as a customer. A customer needs market mechanisms, and the right to choose between different alternatives. This is not possible for an e-government application that operates as a monopoly. Furthermore, the private sector sees customers as a

means to increased profitability, and it introduces price discrimination and similar mechanisms to create inequalities between customers. On the other hand the government must provide an equal service to all customers (citizens) to create a successful e-government platform.

The final archetype defined by Heeks (2003) is where failures of e-government in developing countries occur due to Country Context gaps. Using an off-the-shelf solution from an industrialised country for a developing country will often result in large design-reality gaps. This is due to many reasons, such as differences in working cultures, skill sets, access to technology, and relevant infrastructure. However, the former two issues have already been cited as contributors to the Hard-Soft gap, and will not be discussed here.

Developing countries often have a poor IT infrastructure, which constitutes a further obstacle for the implementation of e-government (Tapscott, 1996). There may not be consistent and reliable electricity, telecommunications, and Internet access (Jaeger & Thompson, 2004). For e-government to succeed in a developing country, it is first required to put the necessary technological infrastructure in place, so that all citizens can have equal access.

This lack of infrastructure can cause problems if an e-government model from a developed country is adopted in its entirety by a developing country. One of the benefits of e-government in developed countries is cost reduction in the transfer of information and online transactions. However due to a lack of infrastructure in most developing countries, the telecommunications costs can be high, thereby nullifying this benefit (Schware and Deane, 2003). In situations such as this, it may be more appropriate to look at low-tech solutions that fit in with the existing infrastructure (Cecchini & Raina, 2004).

Numerous people in developing countries do not have access to information and communications technology, even if the infrastructure is available. The Digital Divide is ever present, and there is a large gap between the educated elite who can afford technology, and the uneducated poor who cannot (Basu, 2004). The divide is not just within countries, but between the developed and developing countries as is illustrated by the figure below (Norris, 2000):

It is quite evident that with such a wide disparity in access to technology throughout the world, a solution in a country with high levels of connectivity will not necessarily work in a country with extremely low levels.

Conclusion

Although the archetypes provided by Heeks (2002) serve as a useful mechanism for categorisation, one can argue that his model is simplistic, and the concept of gap analysis can be applied to almost any situation of organisational or governmental change. It is fairly apparent that the larger the gap between a proposed and an existing system of working, the more difficult it will be to successfully implement the new system, due to various factors that may relate to culture, preconceptions and existing rigidities. Another drawback of using such a categorisation when classifying issues is the sub-

jective nature of interpreting what category a certain issue belongs to—some issues can arguably be included in more than one category. It is important to bear in mind that the most important issue is not the classification of the reasons for failure into different categories, but to understand the potential failings, thereby being more equipped to deal with such problems if they were to arise.

This literature review provides a brief overview of the reasons so many e-government projects fail in developing countries. In general, the major problem is seen to be the gaps that exist between the design and the reality of the system. The topic of e-government is still quite new, and perspectives are quite likely to change over time. There is scope for further research in both the areas of success and failure of e-government in developing countries, and undoubtedly as more real-world cases come forth, so will new interpretations.

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Future Prospects for IT Adoption Studies: Move Along or Make Way

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This paper looks at the recent studies on IT adoption in organizations. It looks critically at these studies by comparing the outcomes with their shortcomings. It then attempts to place this field of study in comparison with information systems research elsewhere to provide a perspective regarding its future prospects. In all, eleven different IT adoption articles, from leading IS journals, have been studied and their methodology discussed. In addition, four other articles, on macro IS theories have been included in the study for purpose of comparison and in order to appreciate the scope and pace of progress in this area of IS studies. The study of the IT adoption articles and the comparison with the development of the scope of macro IS theories highlights that the former field requires a greater sense of purpose and broader perspectives in order to move out of an apparent stagnation. Otherwise, it is in the danger of being swamped by progress in different, but related, fields of IS study. It is hoped that this paper will highlight the need for some fresh thinking in the narrowly defined area of IT adoption to allow further progress and to keep pace with research in other areas of IS.

Introduction

In this essay, I will try to highlight recent patterns of research into IT adoption issues. I will present the state of this area of IT research on the basis of fifteen different articles in leading IS journals. Out of these, ten articles are based on active research, or a prescription for such research. All of these articles adopt different ways of modelling the adoption behaviour, except for one which looks at the pattern of resistance to adoption. Also, seven of the articles adopt quantitative data gathering and analysis using sophisticated statistical models to provide a descriptive understanding of the process of adoption, while two articles use a more qualitative data gathering technique through case studies to provide a more explanatory overview of the process of adoption, or the resistance to it.

On the basis of these articles, I wish to demonstrate that in this rather mature area of IS research, a certain stagnation may be setting in due to continued preoccupation with either highly sophisticated statistical models flaunting their high explanatory power in terms of the variance explained in the dependent variable through R² (or adjusted R², if you like), or qualitative case studies that richly capture the unfolding of interesting events in a process of IT adoption following the introduction of a new technology, but do not allow generalization because of the specificity of the situation and the small number of respondents and cases.

I will venture to compare this area of research with the theorizing taking place at a more macro level regarding emergence of technology in organizations, in order to show that, in the latter case, important theories have emerged, which have much greater appeal and broader relevance, and at the same time have paved way for subsequent work to build upon.

Exposition of Recent IT Adoption Research

The underlying argument behind the IT adoption research is based on the issue of productivity paradox that continues to dog IT investments, and the reported low levels of IT usage. Given the high investment being made into Information Technology, the low level of utilization is a challenge for organizations as well as the people related with this field. For this rea-

son, much has been written about IT adoption issues with the objective of identifying key factors that can create user apathy or even outright resistance to adopting IT, in the hope that such research would help generate a set of practices or guidelines for managers of IT to help achieve higher levels of IT adoption, leading to better system utilization.

Among the numerous recent studies, (Venkatesh & Morris, 2000; Venkatesh et al., 2003; Thatcher & Perrewe, 2002; Ahuja & Thatcher, 2005; Karahanna et al., 1999; Gallivan et al., 2005 and Agarwal & Karahanna, 2000) have done research into this field by developing models of various predictors and measures of IT adoption, using past research as well as intuitive reasoning, to generate hypothetical relationships between variables of interest. They have then developed elaborate techniques for empirically testing these models by using statistical constructs to explain the key target, predictor and moderating variables. The explanatory power of these models has then been assessed in terms of the percentage of variance in the dependent variable explained by the model through R². In addition, the validation or otherwise of the different hypotheses has been used to refine the original models and offer discussions regarding their significance for practice and further research. The key measure of IT use in most cases is the users' intentions to adopt or use IT. In some cases, the actual usage behaviour has been included as an additional measure.

(Venkatesh & Morris, 2000) provide a model that extends the well known technology adoption model (TAM) by including the role of subjective norms along with the influence of perceived usefulness and perceived ease of use on the behavioural intentions to use IT. They have collected data from 342 respondents in five different organizations where a new technology has recently been introduced. This is done as part of a longitudinal study to measure the impact of perceived usefulness, perceived ease of use and subjective norms on the intentions to use IT, in the presence of two moderating variables, age and experience with IT. Data is gathered at three stages, namely, immediately after introduction (which they call short term), and then after one and three months, respectively (long term). Various hypotheses are formulated to describe the relationships between the predictors and measures of IT usage,

and the moderating influence of gender and IT experience on them. The key finding is that perceived usefulness is a strong predictor of IT usage for men and overshadows the influence of perceived ease of use and subjective norms.

A closer look at this study reveals certain issues that raise questions regarding its usefulness. Firstly, a longitudinal study which gathers data within a short period of five months (additional two months to collect usage data for the last stage at which intentions data was collected) can hardly lend itself to extrapolation regarding continued use of technology that the study hopes to address.

Secondly, as we will see in our discussion of other models, in the keenness to make adoption a statistically measurable process, different constructs have been created. Unfortunately, these constructs characteristically fall short of comprehensively representing the “variable” of interest. For example, usage has been measured in terms of average weekly use, which is clearly not only difficult to report, but also ignores many qualitative aspects of usage.

The scales used for constructs such as intention to use are also problematic due to the poorly worded statements in the questionnaire. For example, “Given that I had access to the system, I predict that I would use it,” is hypothetical and clearly doesn’t capture intentions in a useful way.

Finally, in spite of all the sophistication of the model, the implications are quite impractical and even preposterous. For example, it is suggested that given the difference in the determinants of intentions to use IT between men and women, there should be different IT training programmes for them.

(Venkatesh, 2003) goes further in developing a unified theory of acceptance and use of technology (UTAUT). It identifies eight models from previous research (including theory of reasoned action, technology acceptance model, theory of planned behaviour and innovation diffusion theory, among others) and then offers an integration of the key variables and constructs in these models in the UTAUT.

The usefulness and salience of the finding aside, we again see some important issues that make such modelling questionable. Usage data is based on a system feature that automatically logs off “idle” users. This surely does not capture the nature of usage or interaction with IT.

Moderating variables, such as experience and age have been treated as discrete dummy variables. Experience is potentially a rich construct and can hardly be reflected in a dummy variable that can take on at most two or three values.

Regarding gender, there is the argument whether we should look at the biological sex or the psychological sex when studying such phenomena.

In the end, performance expectancy seems to be the leading predictor of usage intentions. The practical implications, thus, remain limited, in spite of some bold assertions such as that the social influence is more relevant for older users, especially women.

In addition to ease of use and perceived usefulness, computer anxiety and computer self efficacy have also received significant attention in IT adoption literature. Thatcher and Perrewe (2002) develop a model that explain intentions to use in terms of users’ feelings of computer anxiety and computer self effi-

cacy. Specifically, they study the effect of broad stable traits such as negative affectivity and trait anxiety, and situation specific stable traits such as personal innovativeness in information technology, on dynamic individual differences of computer anxiety and computer self efficacy. They model these relationships to generate a number of hypotheses regarding the nature of influences that different traits exert on the individual’s feelings towards using IT.

The results clearly show the importance of personal innovativeness in information technology as a strong influence on users’ perceptions of computer anxiety and self efficacy. However, the implications in the article relating to developing training programmes based on people’s traits seem less useful. We also sense problems in the measurement process due to the hypothetical nature of some questions (“I would if:”) and obtaining response on sensitive issues relating to negative affectivity (fear, shame, etc.). In the construct used for trait anxiety, four items were dropped out of the ten used in previous research. The internal consistency of such constructs, then, becomes questionable.

(Ahuja & Thatcher, 2005) recognize the problems with using intentions alone as a measure of IT usage, because intentions may be constrained from translating into behaviour due to various contextual factors. Instead, they use the theory of trying from behavioural literature, to suggest the theory of trying to innovate with IT as a measure of IT usage, since it involves an appreciation of the impediments to successful use of IT. They focus on innovation as a path to diffusion of technology, citing previous literature regarding diffusion and emergent use of IT. They use the concept of trying to innovate with IT to study the influence of overload and autonomy in the work environment. Using this framework, they collect data from volunteering students to study the influence of overload and work environment on their efforts to innovate with IT. The results support the hypotheses being tested, including the moderating role of gender on the relationships.

In spite of clear and useful results, the study does not address the influence of some important variables from other studies, such as age, education, experience with IT, and socio-economic background of users. These variables were seen as confounding and therefore excluded from the study. Another shortcoming is the collection of data from students as they cannot be expected to represent the organizational users especially when issues of work related autonomy and overload are involved.

(Karahanna et al., 1999) try to identify the antecedents of pre-adoption and post-adoption behaviours, separately. They argue that pre-adoption involves potential users for whom adoption is an issue and their attitudes are based on cognition and affect. On the other hand, post-adoption involves users for whom continued use is relevant and their attitudes are shaped by past experience. The set of attitudes are likely to change from adoption to continued use given the concept of cognitive dissonance. Therefore, they study the impact of personal interest characteristics (that determine the strength of the individual’s attitude) and social influences (subjective norms) on behaviour towards IT, while differentiating between users and potential users. They study the issue of adoption of Windows 3.1 in a large financial organization, where 50 percent of all PC owners had converted to Windows from MS DOS. While the design of the study is quite clever in terms of identifying an environment where the users and potential users could be

clearly identified, it should be clear that in terms of their views, the two groups would in any case have a different set of reasoning to support why they were or were not using Windows. Hence, these biases should have been expected to colour the responses, rendering them less useable to explain the differences in terms of the stage of adoption. Thus we see that the users had stronger beliefs supporting their continued use of Windows. Quite interestingly, the profile of users is also different from that of potential users, as they constitute relatively more managers, MBAs and Master/Bachelor qualified.

(Agarwal & Karahanna, 2000) take a different approach by moving away from focussing on the instrumentality considerations and, instead, looking at the holistic experience with IT in explaining individuals' intentions to use IT. They argue that the prevalence of richer media, graphics, addiction to the web and more engaging experience with IT suggests that people's attitude and intentions towards IT use are shaped increasingly by whether they are having enough fun using it. They introduce the concept of cognitive absorption, building on similar concepts in previous literature, to suggest how personal innovativeness with IT and playfulness can combine (as cognitive absorption) to influence perceptions of usefulness and ease of use of IT, which in turn affect behavioural intentions towards IT use. They define cognitive absorption in terms of temporal dissociation, focussed immersion, heightened enjoyment, control and curiosity. However, their selection of students as respondents and Internet as the technology experience makes the interpretability of the findings very contextual. As a cross-sectional study, it cannot be expected to enlighten on the emergence of usage patterns in organizations.

Each of the above mentioned studies focus on the user to study the process of adoption in the organization. (Jasperson et al., 2005) suggest that the IT adoption behaviour is the outcome of individual cognitions and organizational drivers. Thus from the individual's point of view, the attention that he gives to an IT innovation, his cognitions with respect to the innovation, his history of using IT, and his sensemaking of the new technology may be important determinants of his behaviour towards the innovation. On the other hand, there are organizational processes of work system outcomes, sensemaking and interventions that affect the final outcome in terms of adoption. These the authors put forward as key extensions to the UTAUT (Venkatesh et al., 2003). However, they stop short of employing the complex model in actual research. The model in spite of its detail, ends up dividing the IT adoption processes into distinct sub-processes and separating the individual from the organization.

(Gallivan et al., 2005) do attempt to look beyond the individual user and include the role of coworkers in hypothesizing about IT adoption and usage levels. Using social information processing theory, they posit that individual and social influence factors, specifically coworkers' influence, work together to affect the individual's beliefs and behaviour regarding IT use. They focus on training as one of the key facilitating factors that shape the beliefs and attitudes of the individual, but suggest that while training equips individuals for the use of IT, it cannot alone help increase IT usage. The influence of coworkers, especially as lead users/resident experts/informal consultants, affects the individual's own pattern of IT usage. At the same time, they investigate whether the influence of coworkers is in the form of mere compliance by the individual or if there is a concomitant internalisation of their beliefs.

In spite of its high explanatory power (R² of about 70 per cent), the model fails to support most of the hypotheses regarding impact of training, beliefs regarding training and self efficacy, on training. One finds numerous problems with the modelling itself, such as the statistical problems with aggregating results from the individual to the (work) group level, use of single item attitudinal constructs and measurement of usage in "past week".

Thus, we find in all of the quantitative models a preoccupation with achieving a high R², by modelling complex social processes involving human beings. Such models, in themselves, constrain understanding and appreciation of these social processes by forcing researchers to think "inside the box." (Lamb & Kling, 2003) have criticised the atomic view of the user as an individual as being too narrow a concept to understand the complexity of factors that lead to adoption of technologies within organizations. Making use of actor-network and new institutionalist theories, they instead suggest the concept of the social actor, whose interaction with, and adoption of, technologies is shaped by a varying self-representation through affiliations, environments, interactions and identities.

Two other recent IT adoption studies, (Beaudry & Pinsonneault, 2005) and (Lapointe & Rivard, 2005) differ from the abovementioned studies in that they adopt a more qualitative data gathering approach based on case studies and exploratory interviews. Both studies yield rich understanding of adoption related issues in real environments. (Beaudry & Pinsonneault, 2005) develop a coping model of user adaptation to show how users overcome their feelings after their initial appraisal of an innovation, to adapt in a variety of ways, resulting in different outcomes. The case study, unfortunately, is based on retrospective questioning and cross-sectional research, which might reduce its usefulness. Both cases involve banks and the individuals being studied were accounts managers.

(Lapointe & Rivard, 2005), on the other hand, study resistance to the adoption of packaged software solutions for a paper-free environment in three hospitals. The study brings out interesting comparisons and lessons. However, we again see that the hospital environment, characterized by the polarization between doctors, nurses, administrators and pharmacists is too specific to allow a generalization of the findings.

Comparative Perspective: Macro Theories regarding Emergence of IT in Organizations

In order to substantiate my views regarding the state of the IT adoption research, I will now present comparable developments elsewhere in the IS literature. Theories of institutionalism, actor-networks and social construction spell out the emergent nature of information systems. In these theories individuals have a role to play in the adoption of the technology, but that role is circumscribed by the contextual factors that shape the emergent technology. (Silva & Backhouse, 1997) in their account of circuits of power highlight the processes of agency, social integration and system integration, resulting in organizations moving in the direction of achieving collective goals. Individuals play a negotiation role based on the resources and means available to them. (Orlikowski & Barley, 2001), too, talk of organizations as active players, "responding strategically and innovatively". The institutional context that emerges is resistant to change because it is the outcome of generations of organizational actors shaping the

technology by integrating it into their everyday practice. (Orlikowski, 2000) emphasizes emergent use instead of simple adoption processes. She even challenges the stability implied in the social constructivist approaches and the concept of structures being embedded in technology. Instead, she stresses upon appreciating the enactment role of humans in shaping the “technology-in-practice.” Her presentation of case studies on the adoption of Lotus Notes are more illustrative than the IT adoption studies we have discussed earlier.

(Swanson & Remiller, 1997) argue that human role does not shape the emergence of technology only from the point of adoption onwards. It actually goes back to shaping an organizing vision for the technology within a much bigger process of sensemaking. Organizing vision discourses that take place across “IT practitioners”, “business problematic” and communities of people dealing with inventing, promoting and adopting technologies, help in interpreting, legitimating and mobilizing the technologies.

Conclusion

The purpose of providing a brief introduction to macro theories in the IS field is two-fold: firstly, to give a flavour of the very broad spectrum that constitutes the IS field of study, so that we can appreciate where IT adoption studies are placed within this spectrum. Secondly, I wish to illustrate the point of vantage from which these theories can extend to move into the area of IT adoption, as illustrated by the case studies in (Orlikowski, 2000), (Orlikowski & Barley, 2001), and Silva & Backhouse, 1997). Compared to the IT adoption studies that remain focussed on achieving greater explanation of observed variance through R2, or attempting broad generalizations of case studies that are not grounded in sound theories, the macro theories in IS retain an open-minded approach. They attempt to provide a clear lens (Orlikowski, 2000) instead of a keyhole, to study real life IT phenomena.

IT adoption studies will therefore need to look beyond restrictive models and focus instead on their usefulness by extending the domain of research and focussing on broader outcomes of adoption. Otherwise, they are likely to be swamped by the progress in other areas of IS study.

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