Is There a Paradox Involved with the Progress Represented by ICT Developments?

Dan Remenyi and Shawren Singh
School of Computing, University of South Africa
Singhs@unisa.ac.za

Abstract: The developments in ICT since the first computers were implemented have facilitated changes to society in a number of important ways. These changes have occurred steadily and have been accepted largely without discussion as to how they have impacted the way our society functions. These developments in ICT and their resulting applications have been perceived as progress, but there has been little if any discussion as to what actually constitutes progress. Although ICT has delivered great benefits there is clearly some downside to the technology, which has not been adequately addressed and which deserves careful attention. In fact a review of papers in the Electronic Journal of IS Evaluation reveals no comment on this important subject and this study serves to fill a gap in the literature. This paper reports on the findings of an exploratory study which includes the results of a qualitative survey. The main objective of the paper is to review the impact of ICT on society by examining the benefits which have been facilitated by its implementation, while at the same time considering the challenges the technology offers. The paper concludes with a call for more awareness of how ICT is changing our society and for a more in depth discussion and debate on what the implications are for society of the increasing and ubiquitous application of the technology.

Keywords: ICT and progress, benefits and challenges, downside of technology, Business architecture, auto-voyeurism, spam, ICT facilitated fraud, ICT and personal convenience, depersonalisation, technological determinism

1 Introduction

By 2002 it was 50 years since the first applications of computers were introduced in civil organisations both in the UK and the USA (Remenyi, 2002). In recognition of this milestone there were comments about how ICT had developed and what was being achieved by its use. These comments were not so much a matter of Moore's Law or the price performance ratio of the technology (Schaller, 1997), but rather were related to how ICT could facilitate change in processes and practices in everyday life (Silverstone and Haddon, 1996). It was already clear that computers had had a major impact on the lives of many people and organisations in the Western World[1] (Jin and Cho, 2015; Landes, 2003). At the same time many governments were actively pursuing e-Government agendas (Bannister, 2012; Singh, 2014) in order to take advantage of the technology and many individuals would have regarded these developments as evidence of society's progress towards being able to offer its members a more satisfactory way of life (Law et al., 2014; Gurgul and Lach, 2012).

In a paper in the Journal of Information Technology, Remenyi (2002) pointed out that ICT played a major role in shaping society and our way of life and asked the question, *What kind of society do we want?* Of course, this was a rhetorical question and it was intended to initiate some reflections on how ICT was benefiting society and whether we were cognizant of the challenges which its use created. The question led directly to the issue of the values that underpin any individual's attempt to answer it. One of the values regularly encountered with regards to ICT is that innovative technology is always regarded as delivering benefits to society. This idea was commented on by Zuboff (1988) who said,

> *There is still this childlike belief that technology will make things perfect.*

But there is no great body of evidence to support the proposition that new technology is universally beneficial. Certainly there is evidence that technology can result in challenges as well as benefits.

[1] For example it is currently estimated that there are 3.2 billion users of the internet. This represents approximately 45% of all humans on the planet. Also there may be as many as 20 billion ICT based devices connected through the internet. http://www.forbes.com/sites/jacobmorgan/2014/10/30/everything-you-need-to-know-about-the-internet-of-things/

The key considerations were and still are*, Is the application of technology itself always a good thing?* At one level this may be understood as asking the question*, Is it always better to be able to do things more quickly, or produce more for less to make some aspect of our lives easier, or are there limits to how far we should push efficiency and even effectiveness?* Of course there are other demanding questions which such an enquiry can present[2].

Now, more than a decade since the question was first posed (Remenyi, 2002)there has been little discussion on this topic. ICT has developed in leaps and bounds and it has facilitated a number of innovations in the lives of individuals. It has been pointed out that for many people the way they work, the way they spend their leisure time and the way they run their homes have all been substantially changed by the application of ICT (Díaz et al., 2015, Kumar et al., 2015; Line et al., 2011). As suggested back in 2002 organisations especially have seen many ICT facilitated innovations, and nowadays various aspects of the virtual organisation touch individuals in the workplace in a number of ways. At the same time the employment of this technology has not only delivered improvements in efficiency and effectiveness, but has also changed the very structure of a number of important industries (Carr, 2015). For example, the transport industry has been considerably affected by a disruptive change with the introduction of UBER Cabs - a current and controversial application (Liss, 2015, Ávalos and Sofía, 2015).

At a more general level, the way society functions in terms of how individuals relate to one another has been evolving and this evolution has been influenced by what ICT has to offer (Nocentini et al., 2015; Zaidi et al., 2015). Ubiquitous mobile telecommunications have allowed relationships to be sustained over distance and time in a way that was not at all foreseeable only 30 years ago. The use of social media has changed how people relate to one another (Hennig-Thurau et al., 2013; Johns, 2014; Casella et al., 2014), especially how they share and exchange ideas and memories as part of a new approach to social intercourse. Such applications have been criticised for creating the phenomenon of auto-voyeurism, which is not universally regarded as sensible.

e-Government applications have changed how the citizen is serviced, by changing the way taxes are collected or paid, passports are issued, police forces are managed, immigration controls are implemented to mention only a few applications of the technology (Worrall, 2011,;Annttiroiko, 2008). e-Participation, e-Petitions, e-Canvassing and e-Voting systems are sometimes described as promoting a higher level of democracy (Annttiroiko, 2008; Bannister, 2012), although it has also to be recognised that there has been a steady decrease in the interest shown by many citizens in the democratic process, with some countries reporting record low turnouts by voters for elections (Zaidi et al., 2015; Annonymous, 2014).

On the other hand there may be a darker side to ICT and politics as mobile telecommunications is said to have played an important role in toppling unsatisfactory governments during the so-called Arab Spring[3,4]. Furthermore ICT has been accused of helping terrorists, as well as making the work of fraudsters and scammers easier (Choo, 2015; Veerasamy et al., 2011; Krenker et al., 2007). e-Mail traffic offering opportunities to make easy money, acquire illegal drugs and questionable medicines, as well as making contact with 'enthusiastic' social partners are indicative of anti-social practices being promoted on the Internet. It is still suggested that pornography is the biggest or one of the biggest industries on the web (Koerner, 2000; Galante et al., 2010).

Notwithstanding the foregoing impacts on society, there has not been any attempt to conduct a review of the impact of these ICT facilitated developments or changes. Much of the information available is the result of anecdotal evidence reported casually in the media, which has a tendency to exaggerate the novelty of developments and to mis-state the shortcomings of technological innovations.

[2] One of these is the difficult issue of technological determinism (Smith and Marx,1994). This paper does not attempt to explore the philosophical considerations involved with technological determinism, but rather focuses on the current application of the technology as it is used today.

[3] Pointing to ICT developments as a facilitator of the Arab Spring revolutions illustrates the point that in parallel to what has been happening to the technology there has also been the issue of globalisation. Globalisation has been facilitated by ICT, but at the same time it has itself facilitated the use of ICT. In countries which have been suspicious of ICT and globalisation the internet and the web have in some ways been slower to take root and develop.

[4] This has been described by some as promoting mob rule (Keen, 2015).

It is clear for many reasons, including the growth of ICT as an industrial sector, that computers and telecommunications technology have improved many aspects of our society, but it has also produced a number of important challenges. It is commonly understood that there can be downside effects to the application of ICT developments (Fuglseth and Sørebø, 2014; Von Marées and Petermann, 2012). But how significant these effects are has received little attention in the academic literature. It is the objective of this paper therefore to review the claim that there is a substantial downside to the progress reported by advocates of the enthusiastic use of ICT.

The research reported in this paper represents an exploratory study, which is a first step in reviewing the impact of ICT developments on our way of life. The objective of the paper is to stimulate a debate on the *Paradox of Progress* and perhaps develop some ideas as to how to cope with the challenges which the technology creates.

2 Research Design

This is an empirical research study which involved the collecting of qualitative evidence in the form of opinions from a group of well-informed individuals who have been involved with the use of ICT personally and professionally. The invitations to participate in this study were sent by e-mail and the responses were returned the same way. This approach is described in this study as a survey, despite there being no numeric data requested. Although the data is qualitative in nature (Myers, 2009), the responses have been counted to establish the frequencies of the issues mentioned by respondents and these frequencies have been ordered.

Thus the data was collected by way of an opinion survey. An invitation to participate was sent to 75 individuals who were qualified professionals, regarded as being in a position of having an informed opinion concerning the benefits and challenges created by the application of ICT. These people were invited to state what they regarded as important applications of ICT developments and what benefits and challenges they offered. No attempt was made to ask them to rank or rate these opinions. This information was collected under three headings, which referred to the use of the technology at a personal level, at an organisational level and at a societal level.

The approach used did not employ a random sample, but rather a purposeful sample. The questionnaire was unusual in that it was embedded in a short explanation of the research objective and it provided an example of how the questions could be answered. A copy of this research instrument is provided in Exhibit 1.

Clearance from the academic ethics committee of the university was applied for and obtained. An e-mail accompanied the questionnaire which acted as both a participants' information sheet and as a letter of consent.

A total of 36 responses were received and this was considered a sufficiently large number for an exploratory study. The data was consolidated and read in order to establish the main issues to be used for the purposes of coding. The data was coded and the codes summarised using ATLAS.ti to facilitate the recording and the further analysis. SPSS was also used for confirmatory Correspondence Analysis.

The first step in the analysis of the data was a summary of the comments made by the respondents. This was achieved by coding the data and by entering these into ATLAS-ti.

3 Findings

The results of the survey are commented upon under the three headings of Personal level impact of the technology, Organisational level impact of the technology and Societal level impact of the technology.

3.1 Personal level impact of the technology

The data relating to the personal use of ICT was the first to be addressed.

The opening step in the processing of the data was to conduct content analysis. This analysis was based on the frequency of the key concepts or issues which were indicated by the respondents and this was performed for each section of the data.

The results of the content analysis for the Impact of ICT developments at the personal level showed that there were eight issues of importance to the respondents. These together with the number of times they were indicated and their percentage and cumulative frequency are shown in Figure 1.

No.	Issue	Total Count	Percentage	Cumulative %
1	**Connectivity**	34	36%	36%
2	**Access to entertainment**	15	16%	52%
3	**Access to knowledge**	12	13%	65%
4	**Efficiency of purchasing**	12	13%	78%
5	**Personal freedom**	9	10%	87%
6	**Education**	5	5%	93%
7	**GPS**	5	5%	98%
8	**Speed of processes**	2	2%	100%
		94	100%	

Figure 1: Counts of the issues raised by the informants concerning personal level impact of the technology

A relatively small number of different issues were indicated and none of these issues were surprising. It was to be expected that everyone would point to the importance of connectivity. Connectivity was seen by most as being a function of mobile phones with others emphasising the importance of e-mail and social media software. It was interesting to see that entertainment was the second most stated issue with music and video being emphasised, but gambling and pornography also being indicated. Access to knowledge in the form of Google and Wikipedia was the third, while efficiency in purchasing with online shopping and price comparison websites as well as online banking being quoted as the fourth most frequently cited benefit.

In a sense all the issues which followed on from connectivity were themselves highly coupled with the ability of ICT to offer high speed and reliable telecommunications. The issue of personal freedom was particularly interesting in this respect as it was described as being "able to be anywhere one wanted and at the same time being able to service business requirements and remain a part of a group involving family and friends".

Education referred to online courses including Massive Open Online Courses (MOOCs). The issue of GPS (geographical positioning systems) is self-explanatory. Speed of process is a comment on how the technology has delivered systems which can respond more rapidly through, for example, improved broadband.

It is interesting to reflect on the fact that all of these benefits are directly driven by the issues of connectivity which seems an overarching issue.

3.2 Personal benefits and challenges

When the respondents' comments on the personal benefits and challenges were summarised, an interesting picture developed which is shown in Figure 2.

No.	Issue	Benefits	Challenges
1	**Connectivity**	*Friends and family and work associates maintaining and improving relationships*	*Being overwhelmed, coping with change, and fighting spam and fraud, lack of attention as to what is going on round you at present.*
2	**Access to entertainment**	*On-line music and video and pornography and gaming*	*Becoming addictive*
3	**Access to knowledge**	*Google and Wikipedia as a global repository of easy accessible facts*	*The ease of falsifying information, relying on other to discover and publish information*
4	**Efficiency of purchasing**	*On-line banking & shopping and price comparisons*	*Spending too much time researching and buying, depersonalised*
5	**Personal freedom**	*Greater ability to plan ones own life with working from home etc*	*More planning and less doing & personal data threatened*
6	**Education**	*Life long education free with MOOCs etc*	*Questionable authenticity*
7	**GPS**	*Getting around*	*Being sent in wrong directions & personal movements monitoring, spy in the sky*
8	**Speed of processes**	*Saves time and making the most of time*	*Less time to think, decisions by computer*

Figure 2: A list of the benefits and challenges associated with developments in ICT at the personal level

The data collected here confirms our general expectations that the benefits would be associated with connectivity. It is however interesting to see these issues articulated in this way. For example, being overwhelmed was regarded as a consequence of connectivity, and on reflection potential connectivity does mean that the degree of contacts one allows cannot be carefully controlled. Furthermore, difficult situations were indicated by employees who have been instructed by their employers to take a mobile phone with them on their annual vacation.

Although spam and having to be continually on the lookout for fraudsters was indicated, it did not receive as much emphasis as one might have expected. In a similar way issues related to illegal downloading of entertainment material was mentioned, but was not emphasised.

In general the benefits could be described as delivering increased convenience and the challenges may be described as an elevation of pressure on the individual.

The detail of the issues and the benefits and challenges are largely self-explanatory and the outcome of this analysis suggests that the downside of the technology at the personal level is relatively minor in relationship to its benefits.

3.3 Organisational level impact of the technology

The second step was to perform content analysis on the responses which were received regarding the impact of ICT developments at the organisational level. In this section there were 10 issues and these are shown in Figure 3.

No.	Issue	Total Count	Percentage
1	Connectivity	34	21%
2	Cost reduction	34	21%
3	Restructuring organisations	30	19%
4	Improves managerial control	20	12%
5	Cooperative organisations	15	9%
6	24/7 business access	10	6%
7	Business intelligence	8	5%
8	Presentation of ideas	5	3%
9	Corporate knowledge bases	3	2%
10	Education and training	3	2%
		162	100%

Figure 3: Counts of the issues raised by the respondents concerning organisational level impact of the technology

Once again connectivity was one of the top issues. However the count on this issue was matched by cost reduction and the issue of restructuring the organisation followed closely. Improving managerial controls and cooperative organisations were also well represented in the data. These five issues represent 82% of the concepts indicated. The remaining five issues were 24/7 business access, business intelligence, presentation of ideas, corporate knowledge bases and education and training. These were mentioned relatively infrequently, together representing only 18% of the counts.

The first six issues, which represent 88% of the responses, are all heavily dependent on connectivity.

3.4 Organisational benefits and challenges

The benefits described here were right across the board in terms of organisational activities and confirms the fact that ICT plays an increasingly critical role in organisational design and operations. ICT is also seen as a pillar in determining the relationships between the organisation and its clients and suppliers. These issues are outlined in Figure 4.

No.	Issue	Benefits	Challenges
1	**Connectivity**	*Easy of 24/7 communication with staff, customers and suppliers, connecting decision makers, marketing through e-mail and social tools*	*Reduces the opportunity for face to face contact leading to reducing clarity, also can lead to over familiarity*
2	**Cost reduction**	*Supply chain management, creative relationships between vendors and purchasers, outsourcing*	*Micromanagement, sweatshops, marginalisation, siliconisation of processes, redundancies*
3	**Restructuring of organisations**	*Virtual, working from home, outsourcing, new forms of organisation & transactions*	*Less control than the traditional forms of organisation*
4	**Improves managerial control**	*Real-time reporting systems, more understanding of organisations through internal and external databases, Big Data, better integration*	*Micromanagement leading to demotivated staff*
5	**Cooperative organisations**	*Synergies across firms and across industries, opportunities to outsource*	*Risk of being let down*
6	**24/7 business access**	*Continual access, building customer relationships*	*Often impersonal and not satisfying to customers*
7	**Business intelligence**	*Knowing the market place better, competitive advantage, faster reaction times*	*Becoming obsessive*
8	**Presentation of ideas**	*Idea for communications, promotes creativity*	*Superficiality and monotony*
9	**Education and training**	*More efficient and effective workforce*	*Can be expensive, needs careful management*
10	**Corporate knowledge bases**	*Much better understanding of organisations and the opportunitries and the challenges they face*	*Difficult to manage and expensive*

Figure 4: A list of the benefits and challenges associated with developments in ICT at the organisational level

One interesting fact highlighted here is that the top six issues, which account for 88% of the responses, are directly underpinned by fast high quality data communications. The other four issues are related to the availability of knowledge.

When the issues identified here are considered as a whole it is hard to imagine any modern organisation functioning without extensive use of ICT, in that so many different aspects of an organisation are addressed by the data.

In general, and reflecting on Figure 4 at a high level, the benefits could be described as delivering an opportunity to reconfigure organisational architecture to improve efficiency and effectiveness and the challenges may be described as the consequence of using ICT in such a way that it depersonalises organisational or business processes and thus creates a less welcoming environment for both employees and clients.

Once again the benefits appear to significantly outweigh the challenges.

3.5 Societal level impact of the technology

The most striking aspect of the data acquired concerning the societal level impact of the technology was the relatively large number of issues indicated. With 17 issues it was almost as many as the personal level and the organisational level together. Also the amount of detail supplied by the respondents concerning the benefits and the challenges was substantially greater for this set of issues.

No.	Issue	Total Count	Percentage
1	Connectivity	32	22%
2	Information gathering	30	21%
3	Surveillance	12	8%
4	Government efficiency	10	7%
5	Social media	10	7%
6	Smart weapons	8	6%
7	Education	8	6%
8	Public security	6	4%
9	Entertainment enhancement	6	4%
10	Reduction in social contact	5	3%
11	Medical advances	3	2%
12	Political influence of the street	3	2%
13	GPS	3	2%
14	National boundaries	2	1%
15	Job creation	2	1%
16	Smart cities	2	1%
17	Citizen engagement in elections	2	1%
		144	100%

Figure 5: Counts of the issues raised by the respondents concerning societal level impact of the technology

The main issue here is the range of facets of life which are stated to be affected by the technology. There are social issues, medical issues, political issues as well as job creation, military prowess and national boundaries to mention only some. Having reflected on this list it is hard to miss the point that ICT has now become a significant influence in the direction of society as a whole.

When it comes to the societal level, except for connectivity and information gathering the counts is much more evenly spread across the issues raised by the respondents.

Of course, in much the same way as it did with the personal and organisational level issues, connectivity underpins many of the societal issues described in Figure 5.

Some of these issues affect general lifestyle such as reduction in social contact and the availability of jobs. The increasing presence of surveillance is also a matter which changes the way we perceive our society to function. Government efficiency, smart weapons, citizen engagement in elections may be seen as more remote unless one is engaged in these issues professionally.

The number and the range of issues addressed through the use of ICT at the societal level are impressive and it has clearly been advantageous to employ this technology. It is also important to remember that on a daily basis new applications for the technology are being developed and it is not likely that this continual development will cease or even slow down in the near future.

3.6 Societal benefits and challenges

A number of the issues recorded in Figure 6 are of substantial political importance and are indicative of how ICT can deeply affect how we envisage and manage our society. In a number of instances the issues directly address controversial government policy. One example of this is information gathering. The creation of large databases describing the population is often perceived as being a useful tool for any government for rational policy development, but at the same time there is some disquiet about how such comprehensive data might be used against certain sections of the population by an unscrupulous government in the future[5]. There is also disquiet about whether such a database would be hacked by criminals. Surveillance is another such issue. There is also the view that such systems may be used to spy on individuals who may not be in favour with the government. The issue of spying on citizens is a particularly interesting one which needs to be considered in conjunction with the concept of the digital footprint. It is not at all clear whether it is possible for an individual

[5] The classic example of this is how the databases of citizens created by the government of the Netherlands in the 1930s were used by the Nazi occupation forces to locate and transport Jews to concentration camps.

to completely erase any communication which he or she may have made using the Internet or the web[6]. Therefore anything which was said in the past can potentially be resurrected and used against an individual. It is no longer possible to be able to walk away from one's history and simply forget what has been said. This in a sense allows historical prying as well as current spying.

Smart weapons, especially in the form of precision guided bombs and drones are regarded by some to cause excessive harm with a high degree of collateral casualties and are thus unacceptable. Additionally certain governments appear to be using the Internet itself as a weapon as occurred in Estonia (BBC 2007) and perhaps happened with regards to North Korea and the Sony Corporation. In the civil world the fact that ICT allows international shopping with the avoidance of certain taxes, often VAT or sales tax, is also regarded as problematic.

No.	Issue	Benefits	Challenges
1	**Connectivity**	*The world can be reached easily and inexpensively making government more efficient and effective*	*Overwhelming, how to think about where to start organising the potential of the technology, the technology is not ubiquitous*
2	**Information gathering**	*A better understanding of the composition of society, better understanding of the needs and the aspiration of the population, better understanding of population trends*	*Potential to use this for political ends and for social engineering*
3	**Surveillance**	*Improves local security, discourages crime*	*Privacy threatened and snooping on the citizen*
4	**Government efficiency**	*Better services to the citizen, fewer delays, better utilisation of tax receipt*	*expensive and not necessarily achieving its objective*
5	**Social media**	*A more connected society, keeping up with people and news, fast responses to events*	*Opportunities for spam and fraud*
6	**Smart weapons**	*Greater military ability to target and destroy enemies*	*More casualties*
7	**Education**	*Children and adults skill improvement, a better society*	*Can be expensive and misdirected*
8	**Public security**	*Detects and thus reduces threats of attack and improves feeling of safety*	*Danger of the Big Brother state*
9	**Entertainment enhancement**	*Online 24/7 entertainment, 3-D entertainment*	
10	**Reduction in social contact**	*Better personal relationships conducted from a distance, time and space independence*	
11	**Medical advances**	*Better health and longer and more satisfactory life*	
12	**Political influence of the street**	*Politicians' attention can be more easily grabbed, more aware of the citizen*	*Distraction for major objectives*
13	**GPS**	*More rational routes, efficient transportation*	
14	**National boundaries**	*Buying from abroad at better prices, more sharing of information*	
15	**Job creation**	*Low level jobs moved to cheap labour market*	*Unemployment in home market, mixed satisfaction with the service rendered*
16	**Smart cities**	*Better scheduling and provision of services*	
17	**Citizen engagement in elections**	*Antidote to political disentrancement*	*Potential political extremism*

Figure 6: A list of the benefits and challenges associated with developments in ICT at the societal level

In comparison to the benefits there are relatively few challenges identified by the respondents and there was no sense in any of the data obtained that these challenges were perceived as substantive.

[6] There are particularly interesting developments in this respect with powerful lobbies wanting to introduce what has become known as the Right to be Forgotten (Rosen 2012).

It is interesting to note that not all the benefits were matched by challenges. Entertainment enhancement, reduction in social contact, medical advances, GPS, and national boundaries were all seen to be entirely beneficial with no challenges being suggested from any respondents.

But for all the other issues there do seem to be "side effects" or potential downsides to the application of the technology which need to be considered.

In general and reflecting on Figure 6, the benefits could be described as being in different categories. Firstly ICT can offer governments an opportunity to improve the functioning of how it plans and services society. Secondly ICT can be seen as a driver of change in social relationships. Thirdly there is the question of ICT facilitating advances which can potentially make lives more pleasant. Finally there are direct political implications such as the impact the technology can have on the political process itself.

The complexity of the information offered here suggests that a graphical presentation might be helpful in understanding the responses and this was undertaken using ATLAS.ti.

3.7 The range of benefits

Figure 7 combines the three sets of issues described above and illustrates to some degree the breadth and the complexity of the role of ICT in society as a whole.

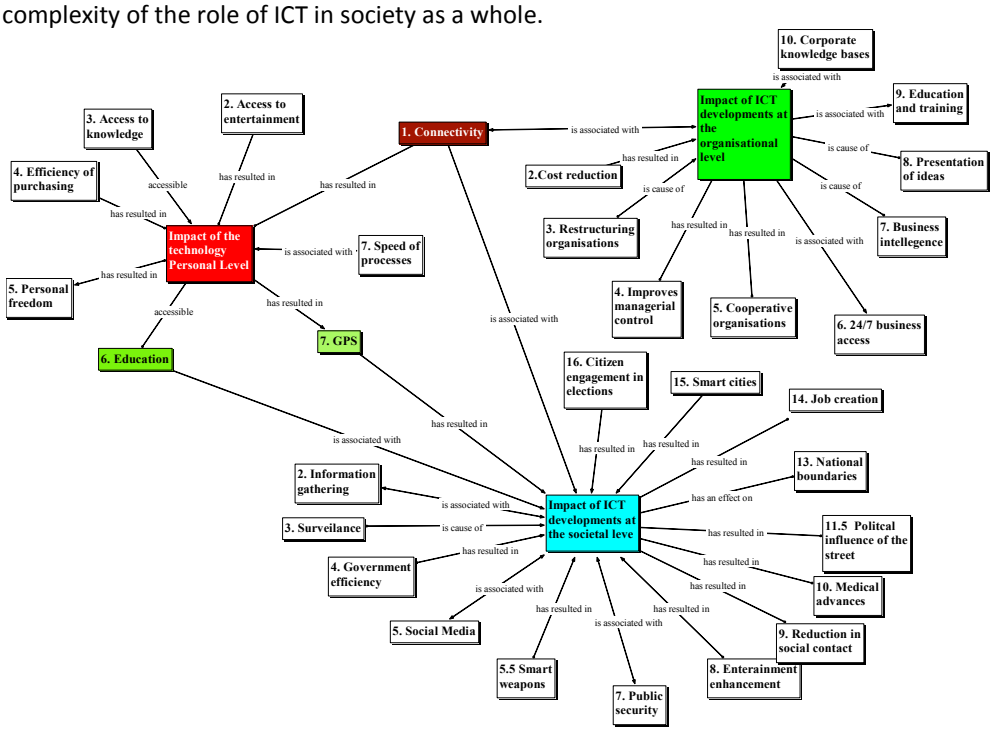

Figure 7: A diagrammatical representation using ATLAS.ti of all the issues identified in the survey

From Figure 7 it may be seen that connectivity plays a role in all three sets of issues, and GPS and Education, although much less important, are present in two sets. A number of other issues are also interconnected, but for clarity of presentation the numerous joining lines have been omitted from Figure 7. This ATLAS.it diagram gives an impression of the complexity of the responses which were received. The fact that many of these issues are entwined makes them difficult to discuss separately. What they represent is just how important ICT has become to the lifestyle people in the developed world enjoy.

The total overall number of issues included in the summarisation of the data was 32 and these have been listed in order of frequency in Figure 8.

3.8 Summary of data analysis or findings

Examining Figure 8 and observing the number of counts it may be seen that the first 15 issues account for 80% of the concepts indicated. Although the number of counts can be interpreted to represent how important an

issue is, it is clear that some of the issues with even small counts represent aspects of society that can have a considerable impact on how it functions. Furthermore, as this is essentially a qualitative study it would not be sensible to discount or minimise the importance of even the low scoring issues.

No.	Issue	Count - P	Count - O	Count - S	Total Count	Percentage	Cummulative
1	Connectivity	34	34	32	100	25%	25%
2	Cost reduction		34		34	9%	34%
3	Information gathering			30	30	8%	41%
4	Restructuring organisations		30		30	8%	49%
5	Improves managerial control		20		20	5%	54%
6	Access to entertainment	15			15	4%	57%
8	Cooperative organisations		15		15	4%	61%
9	Access to knowledge	12			12	3%	64%
10	Efficiency of purchasing	12			12	3%	67%
11	Surveillance			12	12	3%	70%
12	Education and training		3	8	11	3%	73%
13	24/7 business access		10		10	3%	75%
14	Government efficiency			10	10	3%	78%
15	Social media			10	10	3%	80%
16	Personal freedom	9			9	2%	83%
17	Business intelligence		8		8	2%	85%
18	GPS	5		3	8	2%	87%
19	Smart weapons			8	8	2%	89%
20	Entertainment enhancement			6	6	2%	90%
21	Public security			6	6	2%	92%
22	Education	5			5	1%	93%
23	Presentation of ideas		5		5	1%	94%
24	Reduction in social contact			5	5	1%	95%
25	Corporate knowledge bases		3		3	1%	96%
26	Medical advances			3	3	1%	97%
27	Political influence of the street			3	3	1%	98%
28	Citizen engagement in elections			2	2	1%	98%
29	Job creation			2	2	1%	99%
30	National boundaries			2	2	1%	99%
31	Smart cities			2	2	1%	100%
32	Speed of processes	2			2	1%	100%
		94	162	144	400	100%	

Figure 8: Overall view of the response frequencies

As a final step towards synthesising the findings of the qualitative analysis, the data (counts of each category) was subjected to Correspondence Analysis using SPSS (Figure 8).

The purpose of this was to confirm whether the numerical representation of the data would reveal any clustering of the issues. The results of the correspondence analysis showed issues clustering around the three different perspective levels with which it was originally collected, i.e. personal perspective, organisational perspective and societal perspective.

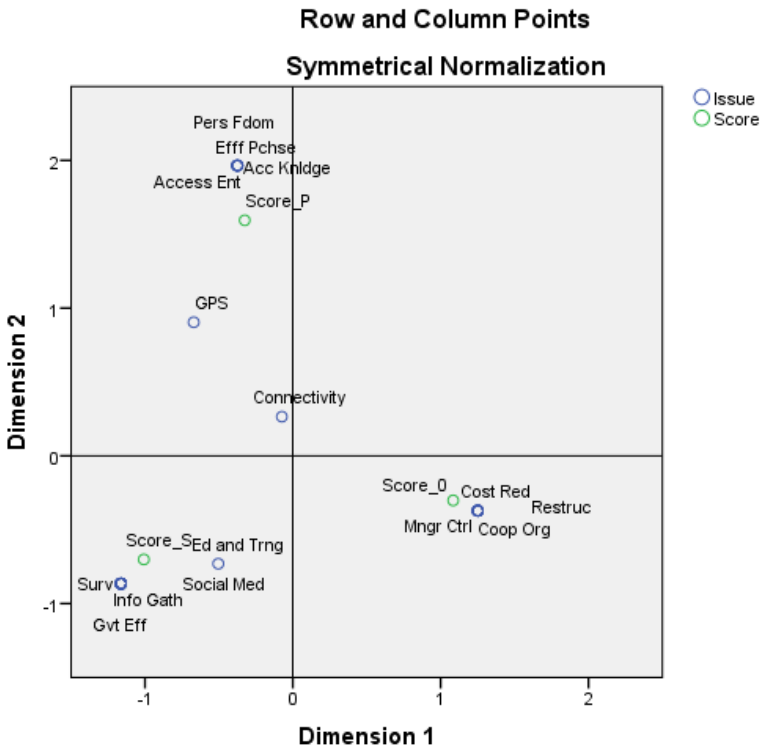

Figure 9: A perceptual map showing the results of correspondence analysis

4 Discussion of data and findings

The results of the data analysis support the notion that the application of ICT has facilitated substantial changes at all three levels explored. The benefits identified by respondents varied considerably. Some of the respondents' replies were virtually uncritical of the impact of the technology and therefore there were either no challenges indicated or only minor ones. However it is clear that the respondents were aware to a degree of some of the challenges which accompany the application of the developments.

The impact of the technology at the personal level was largely to do with increased convenience, while at the organisational level the impact is broader and the technology provides an ability to rethink organisational architecture. These improvements may be seen as a form of progress. But at the societal level ICT has a far wider and deeper potential affect. The range of issues indicated impact most aspects of the life of a citizen. The implication of this is that ICT reaches far beyond what is traditionally considered to be its domain of improving efficiency and effectiveness. ICT has the ability to change the fabric of the society in which it is used. Issues such as the reduction in social contact, surveillance, national boundaries, citizen engagement in politics, political influence on the street are generally not indicated in the academic literature and are only infrequently discussed in the popular press. These issues may or may not be perceived as representing progress, depending on one's point of view.

As mentioned above, with regard to the challenges at the personal level the respondents' issues may be summarised by describing them as creating pressure on the individual and there is substantial evidence for this. With regards to the organisational level challenges the issue here is that ICT applications cannot replace the experience which people obtain by being in contact with other humans. An ICT application may well be more efficient, but it is quintessentially impersonal. The question then arises *To what extent can these depersonalised applications be considered progress?* However it appears that this depersonalisation is not regarded by many to be a major inhibitor in the use of the technology.

The challenges associated with the societal impact are so varied that they are difficult to summarise. Perhaps the key issue here is that ICT may well be providing, consciously or unconsciously, a series of tools which may

actually be profoundly changing society itself.[7] Thus governments could use ICT to snoop on its citizens in a way reminiscent of that described by George Orwell (1949). Could this be envisaged as constituting progress? From a resources point of view governments can and have spent large sums of money on e-Government applications which have not necessarily delivered the benefits envisaged and thus valuable resources have been wasted.

In addition organisational impacts of the technology affect societal values. Some of the efficiencies which ICT have facilitated in organisations have resulted in the off-shoring of jobs to other countries where the labour costs are considerably lower and where the safety standards are sometime non-existent. This shrinks the number of job opportunities in the home country or market. Although there have been protests about this it is not clear that such expressions of disapproval can be effective and consequently there is a persistent unemployment problem in some countries. In parallel with this there appears to be some breakthroughs in artificial intelligence which have resulted in improvements in robotics, and this could be understood as also having potential negative effects on the long term job market.

Extremist organisations have used web and internet technologies to further their agendas. Except for China, other governments have not been prepared to implement direct controls on such activities. Other anti-social activities include the internet sometimes being overburdened with spam and by fraudsters sending messages intended to inveigle monies from some of the most vulnerable members of our society.

The entertainment industry is bothered by the unauthorised distribution of its products. Film makers estimate that copyright infringements which are facilitated by the use of the Internet and the Web could lose the industry as many as a quarter of a million jobs. As a result they have created an entity called FACT (Federation Against Copyright Theft). It is not clear how effective this is or can be (Lodderhose, 2014).

If any summary of these challenges can be made it is perhaps that ICT offers opportunity to governments and to other organisations and individuals to influence society in ways that may not be in the best interests of the population as a whole. Except in China, there does not appear to be any appetite to control the use of ICT at this level. In fact what is more concerning is that there is so little discussion on this issue. The question *What sort of society will we allow ICT to facilitate?* seems to be too difficult for us to face up to now. As a result we may be sleep walking into a way of life which we may regret later.

What is clear is that the elements of progress facilitated by ICT, which are being slowly absorbed by our society, will when reflected upon in the future be seen to have made major changes to the way we live. Our society will not be simply more efficient and effective, but will actually be quite different. Exactly in what way has yet to be determined.

5 Conclusion

The analysis of data from the respondents of the opinion survey indicated that ICT developments had facilitated many applications which had delivered numerous benefits across a wide range of issues in their lives. The technology also produced some challenges, but the benefits seem to have far outweighed the challenges. The downsides of the technology do not seem to have captured in any significant way the active concern of the respondents to this survey, and these worries are seen as being minimal, but with some reservations being expressed. It is reasonable to suggest that the respondents were more than pleased with the progress which had been made by the use of technology. From the data the idea that there may be a paradox associated with the developments of new applications of ICT did not strongly appear. Rather the data can be interpreted to suggest that Zuboff's (1988) statement that we naively believe that technology will always result in a better life strongly underpins our attitudes. Of course this is an exploratory study and further detailed studies are required to establish the extent of this belief in the greater population.

This has been an exploratory study which was undertaken for the purposes of helping to define the parameters around which a discussion or debate could take place with regards to the further application of ICT. It seems that Moore's Law has not yet reached any point where we can expect that the limit of technology

[7] This idea of society changing in a non-deliberate way through the use of ICT (Putnam, 2000) is quite different to the social appropriation of technology (Mackay and Gillespie, 1992). It is sometimes said that by absorbing new ICT applications society is sleep walking into a new world of which we do not currently understand all the consequences.

has or will be soon be reached. The application of ICT is only limited by the imagination of systems developers and therefore we can expect a continued flow of benefits and challenges to be offered by this technology, and where this will take our society is by no means certain. It is time to decide what sort of society we want in 20 or maybe even 50 years time.

Exhibit 1

The Paradox of Progress

Introduction

The progress which has been made by ICT and the benefits it has delivered to us could not have been imagined 60 years ago when the first commercial computers were used in the UK and the USA. Developments in both computing power and in telecommunications have literally transformed our lives in many different ways. At the heart of this have been the Internet and the connectivity it has delivered, which of course have brought many advantages. But with these advantages there have been challenges, which may not have been entirely expected. One such example is mobile phones, which allow access to people anywhere at any time, but at the same time brings with it the possibility that peoples private time is imposed upon. Another example is Internet banking, which is a great advantage over having to go to a bank or wait for bank statements to arrive in the post, but at the same time is vulnerable to attacks by fraudsters.

In general it is possible to say that ICT developments have had impacts at a personal level, an organisational level and at societal level. Of course these levels are not mutually exclusive and there is a degree of overlap.

This research proposes a balance sheet representing some of the benefits delivered by developments in ICT and some of the challenges which have accompanied these developments. These benefits and challenges are listed under three major headings which are Personal Impacts, Organisational Impacts and Societal Impacts. You are invited to list up to three ways in which ICT developments have in your opinion impacted individual lives, organisational performance and society in a more general way.

Examples of these are as follows:

Impact of ICT developments at the personal level

Change produced by the technology	*Benefit*	*Challenge*
Internet shopping	Feature and price comparisons	Inundated with spam from sellers

Impact of ICT developments at the organisational level

Change produced by the technology	*Benefit*	*Challenge*
Monitoring employee efficiency	More profitable operation	Less empathic work place and less loyalty from the work force

Impact of ICT developments at the societal level

Change produced by the technology	*Benefit*	*Challenge*
e-Government applications	Delivery of more efficient services	Loss of privacy

Requesting your opinion

The purpose of this survey is to collect the opinions of knowledgeable respondents about what they regard as the most important benefits that have been delivered from ICT and the challenges which have resulted as a result of these developments.

Respondents are asked to supply up to three benefits and three challenges under the headings of Personal Impacts, Organisational Impacts and Societal Impacts. Respondents are asked to insert these in the boxes below.

Impact of ICT developments at the personal level

Change produced by the technology	*Benefit*	*Challenge*
1.		
2.		
3.		

Impact of ICT developments at the organisational level

Change produced by the technology	*Benefit*	*Challenge*
1.		
2.		
3.		

Impact of ICT developments at the societal level

Change produced by the technology	*Benefit*	*Challenge*
1.		
2.		
3.		

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