"IKS & the Information Society - synergism and antagonism"

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Abstract

This paper will examine the contrasts and compliments between Indigenous Knowledge Systems and the computer & communication technology driven Information Society. Are they mutually exclusive? And can a synergism be obtained? Is there room for both in this crucial time, and if so how can it be if it is not to fatten the pockets of the existing legacy market holders? All these questions and more will be addressed in a paper that will draw on the many rivers of knowledge that flow in this regard.

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Introduction

Interesting and challenging circumstances exist in 21st Century South Africa. There is a lot to reconcile between cultures in moving forward to a just society, of which the framework has been laid in terms of a human rights constitution. Amongst the many attributes of the diverse cultures is technology - regarded as one of the essences of all civilisation, in the broadest sense of that word. It is this that I wish to explore in this essay, with particular reference to the movement to re-establish Indigenous Knowledge Systems (IKS) as form of cultural revival, and Western technologies, or more broadly, technique. Is the 'modern' and the 'ancient' mutually exclusive, and why and how can they be reconciled?

Before looking at contemporary contradictions and possible syntheses, I would like to offer a brief revisionist version of the rise of western technology & science to show that not all is what it seems or commonly believed. From this perspective, I will visit the much-espoused Information Society, and thereafter will look how this technology can dovetail with the IKS movement. I will also be looking at how such a synthesis that could reflect the broader realities in our society.

This essay should not be seen as providing any profound hypothesis, rather it is the authors intention that it offer readers a broad and critical perspective on the above topics, as well as provide the basis for further discussion.

The rise of the west

The relationship between Science & Technology, and the processes by which knowledge & technique is transferred, are fundamental to understanding the modern technological prowess on the West. However, the record of ancient civilisations shows that the evolution of technique occurred independently in many dissociated and diverse cultures such as India, China, the Americas, the Mediterranean and indeed here in Africa. However, developments were not necessarily parallelled. Cardwell suggests many factors for this in his history of technology[1]. The inference he draws is that for science & technology to prosper, establishment of centres of excellence have to be established and there has to be more that one. These centres should have a common culture, a common philosophy, and not suffer for constraints on originality. Furthermore he shows that cultures that were dominated by oppressive religious rituals (such as the practice of human sacrifices of the Aztecs), were not conducive to the advancement of science & technics. Cardwell also attributes the ease and rate of communication as another factor that contributes towards technological & scientific progress.

The establishment of powerful empires were not always based on home-grown scientific and technological enterprise and expertise - in many cases it was appropriated from other cultures. For example, the Romans used Babylonian, Greek and Egyptian civil engineering in constructing their cities. They are regarded as having made notably few contributions to science and technics, although they genius lay in administration and law.

The first (Western) Information Revolution is generally considered to be a Italian Renaissance affair. However Gutenberg's printing legacy owes a lot to the technology paper making that was introduced from China[2]. With the ability to reproduce manuscripts by mechanical printing, came the systematic and often long-distance dissemination of knowledge.

As Shapin[3] and many other authors have elaborated, it was the rise of Mathematics in this same period that led to what is regarded as the Scientific Revolution. Initially these numerical

[1]Cardwell, Donald, *"The Fontana History of Technology"* (Fontana Press, London, 1994), pp.21-48
[2]Cardwell, Donald, *"The Fontana History of Technology"*, pp. 51-52

methods served commercial purposes, in particular accounting and financial systems. Thus the development of Western Technique was all to do with the rise of capitalism in fourteenth century Italy, as Mumford explains in "Technique & Civilization"[4]:

> "Capitalism turned people from tangibles to intangibles: its symbol ... is the account book ...its life-value lies in its profit loss account. Everything becomes saleable and purchasable."

The rise of mathematics spawned of into the realm of the Natural Philosophers, where mathematical tools helped make sense of the world and mechanise nature. Copernicus great work challenging the geocentric world was a supreme exercise in this regard, since it was mathematics that he used to displace the geocentric world and put the sun back into it's throne, as he satirically put it. Many see this as the birth of (western) science that led to the making of rational sense of the world. However few give credit to the vast body of astronomical knowledge that was inherited from the previous Islamic Arab period and which formed a crucial basis for this work.

Italian Renaissance Science met a swift death when Catholic Church dogma saw it as refuting the sacrosanct scriptures that claimed the Earth as the centre of the universe. The movement shifted thereafter to Protestant England, which was more tolerant of free thinkers in this regard. The natural philosophers such as Robert Hooke and Isaac Newton went on to make supreme discoveries within the ambit of that centre of excellence, the Royal Society. Whilst some others might have revelled in the joys of knowledge, the inventions that were informed by these discoveries were driven largely by utilitarian motives. The accurate mapping of the stars and precision clocks were driven by the need for more accurate naval navigation, which was a prerequisite to larger scale and further reaching colonialism.

The Industrial Revolution, which followed, should more correctly be regarded as the Industrious Revolution. Accurate mapping and sighting devices, informed by Newton's great work on Optics, helped map out the land for the nobles who claimed it as theirs in this early act of dispossession. This forced tenants away from subsistence farming and the tradition of sharing the land, and into the factories where their cheap labour spun cotton and weaved

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[3]Shapin, Steven, "The Scientific Revolution" (University of Chicago Press, Chicago, 1996), pp.57-64
[4]Munford, Lewis, *"Technics and Civilization"* (Harcourt, Brace and Company, New ork, 1934), pp.23-28

cloth. The great mill steam engines that are proudly display in museums today as icons of the "Industrial Revolution" only came much later in the late 18th and 19th century. Technologies such as steel hulled boats, railway systems and the advent of the telegraph led not only to large scale extraction of mineral wealth, but also introducing dependencies for on-going service & support as elaborated by Headricks in "The Tentacles of Progress"[5]. Their technology enabled not only the extraction of wealth from colonial territories, but also introduced new economic dependencies.

Military technologies used to establish dominance in the colonies need little introduction. High precision metalworking and the use of metal alloys coupled with high explosives were used to systematically decimate any opposition in the march towards global domination. Such dominance was sustained by this same technological 'superiority' until such a time when diffusion of these technologies permitted significant opposition, or when due to other factors, the Imperialistic powers simply relented their grip. The role of medical science & technologies should also be considered: for instance the discovery and use of Quinine to combat Malaria allowed the foreigners to survive in environments that would not have[6].

The 20th Century saw some literally earth-shaking science - the rise of quantum physics at the turn of the century was to cumulate in nuclear weapons, the likes of which will forever hang over humanity like a dark cloud waiting to break. From an indigenous perspective, the 'new' psychics rose in the early 20th century mainly in Germany from Einstein, Planck, Heisenberg and others. Germany was the origin of many other significant technological innovations such as Roentgen's discovery of the X-Ray in 1895. The discipline of Chemical Engineering can be traced back to Germany in this period. Many factors have been attributed to this, including the establishment of many centres of excellence and large investments in education. The phenomenal scientific and technological developments in this ultimately gave rise to Imperialist aggression, the first uses of chemical weapons and later the type of unified military power that allowed Hitler's forces to sweep through Europe with unprecedented terror with the *Blitzkrieg*[7].

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[5]Headricks, Daniel *"The Tentacles of Progress: Technology Transfer in the Age of Imperialism, 1850-1940"* (Oxford Univeristy Press, 1998)

[6]Headricks, *"The Tentacles of Progress"*, pp.231-237

[7]De Landa, Manuel, *"War in the Age of Intelligent Machines"* (Zone Books, New Yrk, 1991), pp. 74-75

> "Men and machines ... meshed together to create a tactical formation that was more than the sum of its parts"

The mass mobilisation of science by the allies in response gave rise to several key developments, of which atomic fission was the most significant. Semiconductors developed for radar. and electronic computers for calculating missile trajectories were others which later spin-offs were to permeate and diffuse to broader civilian use.

However, the rise of science during this period in the USA was not an all-American indigenous phenomena - agricultural wealth accumulated in the post-civil war period financed the importation of European scientists to fill posts at the Universities. This was largely during the inter-war years, and provided the intellectual basis for later developments. It was a group of European scientists that proposed the construction of the atomic fission bomb in a letter to President Roosevelt in 1939[8], which ultimately led to the Manhattan Project.

The focus of post-war science & technology shifted to the USA, with the Cold War providing the impetus. The intercontinental ballistic missile was built on technology pioneered by Nazi Germany, and successfully appropriated by both powers. Such lethal technology was made deadly accurate by means of miniaturised digital electrons, the first use of the integrated circuit being in the Minuteman missile[9]. This technology was pioneered specifically for this purpose and was later to form the basis of the Personal Computer revolution. Vast industries were spawned, many of which focussed on defence contracting where there could never be a seemingly adequate enough computer-controlled technological shield protecting the North American continent[10]. The rise of the Information Technology industry in the USA could be seen as one of the major factors which has led to it's dominance today.
This very broad sweep at the role of science & technology in history does not attempt to be complete, it is simply to illustrate that technological developments informed by the scientific revolutions established the world order as it exits today, much of which is in the shadows of 19th century Imperialism and the 20th century Cold War.

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[8]Rhodes, Richard, *"The Making of the Atomic Bomb"* (Touchstone, New York, 1986), p.160
[9]Ceruzzi, Paul, "A History of Modern Computing" (MIT Press, Cambridge, 1998), pp.186-189
[10]Edwards, Paul, *"The closed world: computers and the politics of discourse in Cold War America"*, (MIT Press,Cambridge, 1996), pp.75-111, SAGE was constructed to be the first computer controlled aerial early warning system, but the time it was

Technology transfer between technologically developed (and dominant) nations and the so-called second and third worlds are often put as a means of addressing imbalances, perhaps providing a short cut to development. However, such schemes often have had an ulterior motives. For instance, the so-called Green Revolution whereby biological techniques to increase agricultural productivity introduced in India resulted in increased dependency on imported fertilisers from the country that developed these techniques, the USA. The success of any technology transfer depends on wether it is imposed, or wether it is consciously and selective adopted. The success of technological transfer in 19th century Japan is an excellent example.

The Information Revolution, Ver 7

Many would associate the term "Information Revolution" immediately with the recent development of the Internet and the "Information Society" a very recent, late 20th century phenomenon. However, it is just one of a series in the history of communications. As Winslow shows in "Media Technology and Society"[11], each of these technologies, such as the telegraph, telephone, radio and television at their time of introduction were touted at the time as bringing about a new revolutionary means of information communication that would change the world forever. Perhaps there was some truth in these claims, although all of these were simply extensions of the one-to-many or one-to-one communication relationships. Thus I would like to argue for the uniqueness of this latest installment in the linage of communication revolutions, the Internet, since it brings about a many-to-many communication relationship. Due to this unique characteristic, the Internet warrants special attention in the context of this discussion.

As I have shown elsewhere[12], the reason for this uniqueness is that this system evolved with a essentially anarchistic nature. The early ARPANET, which was a Cold War project in the USA, simply provided a fundamental and essentially minimalist communication network.

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made to work, it was outdated by the development of ICBM's.

[11]Winston, Brian "Media Technology and Society, A history: From the Telegraph to the Internet" (Routledge, London, 1998)

[12]Gillespie, Bruce "The primordial soup of cyberspace" MSC Dissertation (unpublished, Imperial College, London, 2000),

Further (unplanned) functionality, such as the now ubiquitous electronic mail, was constructed by the user community - the basic network providing a very elementary fabric, which led to the Social Construction of the system as it became popular. This system could be seen as acting as a catalyst for the freeing of human potential, as evident in it diverse functionality which satisfies users needs. This came about only because the users were able to contribute towards its functionality in a completely unrestrictive yet mutually beneficial way. The successful functioning of the holistic system was possible despite any centralised control.

The modern Internet was a coalescence of many former independent systems, some totally exclusive of the ARPANET. For instance, the Usenet community was much larger than the privileged few who enjoyed the online ARPANET[13]. Usenet was a form of electronic communication but used a store-and-forward system that meant ordinary telephone lines could be used for periodic connections. It was known as the 'Poor mans ARPANET"[14]. Earlier systems elsewhere in the world, such as the Prestel public data system developed in the UK and Minitel in France, broke the conceptual ground for multi-media public information access and for what we could now consider 'Cyberspace'. Essential ingredients of these systems were not only the provision of information, but the facilities for the very community using the system to publish their own information. So it's users were not passive consumers, but can just as easily be active contributors as well. Unlike many of the previous Information Revolutions, the Internet provides this unique many–to-many relationship, which completely undermines although often complements traditional media control systems.

Another essentially noteworthy characteristic of the development of the Internet is that up until recently, it was not commercial, or ever driven by capitalistic forces. Whilst we have to acknowledge that it's roots were funded by the global bastion of capitalism, the United States of America, in days driven by fear of nuclear annihilation, many subsequent developments such as the now commonplace World Wide Web took place outside the USA. In this case it was at CERN in Switzerland. The user community then, and it is to some extent now, generally unaware of physical borders, and generally collaboration in development of standards and functionality lacks any elements of nationalism. There is not a global melt

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Available on the Internet athttp://icarus.pcb.co.za/entopia/msc2000/dissertation/complete.pdf

[13]Hauben, Michael and Hauben, Ronda, "Netizens, on the History and Impact of Usenet and the Internet", (IEEE Computer Society Press, Los Alamios, 1997)

down into a homogenous culture - users are free to express themselves, and experience others, learning to tolerate and cooperate despite differences. The Internet communication system can be argued as not undermining any particular culture, instead if can be seen as setting culture free. This is not the same as the globalisation of culture that the masses are subjected to via commercial television, which inevitably results in some form of dominance. With the Internet, it's just as easy for any particular culture to have an identity or assert itself as any other. Being able to contribute as easily as consume could be seen as strengthening one's own culture since one can easily articulate it in the face of others.

However, a dark cloud hangs of the landscape of cyberspace. This is what Brain Winston calls the law of the "Suppression of radical potential"[15]. As he shows, many great ideas and innovations that posed a threat to the status quo or market dominance by large corporations and multinationals were ultimately silenced in one way or another by those with the power to do so. Although he does not comprehensive discuss the history of the Internet, his understanding of the suppression of radical potential can be applied to recent developments in the Internet and IT industry. For instance, all readers will no doubt be familiar with the multinational Microsoft Corporation, which has generated billions of dollars in wealth for its owners through it's monopoly of the Personal Computer operating system, Windows™. It is common knowledge that Microsoft's market success in not through good engineering but by the sheer strength of it's marketing as well as it's technological lock-in of the core operating system. It's products have faced no real opposition in the market place, and those that have, have either been annihilated in one way or another[16]. Microsoft's plans in turning the once free and user-centred Internet into one that forces use of it's own products are well advanced. There are many other examples of the Law of the Suppression of Radical Potential operating, such as the demise of the music sharing system Napster.

However, those that espouse the Internet-centred Information Society as a necessity of modern life should be carefully assessed - who's interests are they serving? Particularly in Africa, where in the areas outside the technology-rich Metropolises, there is a lack not only

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[14]Hauben, Michael and Hauben, Ronda, "Netizens, on the History and Impact of Usenet and the Internet", pp.35-56

[15]Winston, Brian "Media Technology and Society, A history: From the Telegraph to the Internet" (Routledge, London, 1998), pp.11-15

[16]The Netscape World Wide Web browser, which long predated the Microsoft Internet Explorer, was effectively eliminated by Microsoft's inclusion of it's own browser in its operating system. This allowed Microsoft to start introduction proprietary Internet functional, forcing more use of its own products for development.

of telecommunication and IT support infrastructures, but more importantly human resources to support such infrastructures. Therefore, it is not necessarily a desirable solution to introduce complex technological systems that cannot be supported locally; such skills ultimately should be intrinsic in any community. This then leaves traditional and disadvantaged societies in a serious state of disparity, since according to Wilhelm, the centres of power lie with the Information Rich[17]. And certainly the information gap is widening between the information rich and information poor in this country.

[17]Wilhelm, Anthony "Democracy in the Digital Age", (Routledge, New York, 2000), p.74

Conclusion

Whilst one can hardly do justice to the history of science and technology in a brief essay such as this, I have taken a broad sweep to show how not only how technique and science arose out of certain cultures, but how they were assimilated, appropriated and in some cases unwittingly imposed. The trajectory of technique was not a linear one to the present state of "modernity". And perhaps we will never be modern, as Bruno Latour suggests[18]. I have also shown that there have been many recurring themes in the history of the rise of West, in particular that colonisation and technological domination started at home.

Technique, sometimes informed by science, is often linked to culture. However, knowledge & technique is easily transportable and can be selectively assimilated from a position of strength. But does technology drive history? The answer is not easily found. However, I argue that technologies such as the Internet-based Information Technology can be empowering for everyone and a catalyst for development and cultural re-affirmation, since it facilitates the very basic need of human communication. Given current disparities in South Africa, much remains to be done to create a just an equitable society, and more balanced flow of information amongst equal partners is vital.

Providing universal access to IT in communities where it is to be most be most relevant and effective in this discussion is wrought with difficulties and challenges. Complicating this is the extreme forces of capitalism that often operates with covert agendas to create lasting dependencies. The original ethos of the Internet, the sharing of knowledge for mutually beneficial purposes, has got lost in a maze of commercialism. A critical and cautionary embrace is perhaps the best path to follow.

The importance of rediscovering indigenous technique and reintroducing components of this into contemporary society (where appropriate) is an important part of a de-colonising and humanising process, and this must be asserted. However, simultaneous to this, contemporary science and technology should not be ignored. Priority should be given to developing human resources around technologies that can play a constructive role in society. A synergy of

[18]Latour, Bruno *"We Have Never Been Modern"*, (Longman, London, 1993)

technique, incorporating both the modern and the ancient, must be created. We should not be reticent to pick and choose items out of the Western technological inventory that can enrich our society and facilitate development. However, this blend should invigorate and stimulate both deeply rooted cultural practices as well as incorporate contemporary innovation, thus providing the tools for survival and prosperity in the 21st century.