

Books or Bytes?
Querying Information & Communication Technology in the Development Context
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Introduction

In the government, corporate, and academic declarations of 21st century Canada, “cutting edge” technologies are often touted as the solution to all that ails, including all that ails in those foreign nation-states contentiously labelled, “undeveloped,” “underdeveloped,” or, “less developed”¹. Although biotechnology and other new creations are afforded a notable degree of attention, electronic information and communication technologies (ICT²) in particular are seen as a necessary “silver bullet” with which impoverished nations are to be rescued from their misery. This may be accurate. However, a dearth of research evaluating all of the ways in which new ICT may impact the social, economic, and ecological worlds of those in underdeveloped countries leaves such assumptions tentative at best. Sometimes the case for the widespread promotion of new ICT relies on *argumentum ad metum*, or an appeal to fear, such as the following: “without innovative ICT policies, many people in developing countries... *will be left behind* [emphasis added]” (Manohar 2005:47). Although fear can be a very helpful human emotion, in critical analyses of these issues such arguments should be viewed with suspicion. Rather than attempting a comprehensive evaluation, the purpose of this essay is to query the applicability of information and communication technologies in the international development context, and particularly, to raise issues regularly overlooked or dismissed in the bulk of the LIS literature. The desire is to approach ICT from a cautionary, reflexive perspective, rather than one outright dismissive. A paper of this size and breadth will always be insufficient in addressing the heterogeneity of developing locales.

If one is to evaluate the worth of ICT to development, one must first ask—what is (are) the goal(s) of international development? Todero proposed three primary development

¹ This essay will not attempt to tackle the messy nuances and history of these terms, but instead uses them interchangeably and with several grains of salt. I ask the reader to be mindful of the fact that the concept of “development” may be applied to many different areas of human life, and that no implied hierarchy of cultural folkways is intended. Rather, I use these terms for lack of familiar alternatives, and perhaps to highlight, with some irony, the assumptions regarding economic and material growth implicit in Western discourses on development.

² Information and communication technologies will be abbreviated, “ICT” throughout this essay. Although ICT usually, and for the purposes of this essay, refers to computers and telecommunications, it may also include printing and binding equipment, photo-duplication and micro-reproduction machines and systems analysis tools (Ifidon 1994:27). According to Kebede, ICTs are the key tools through which information is captured, processed, stored, manipulated and exchanged in the information age (2004).

objectives that I feel are most appropriate: provision of basic sustenance (i.e. clean water, food, clothes, shelter), freedom from servitude (direct or indirect), and maintenance of self-esteem (Toderó 1992). If ICT is to deserve its current reputation, it must in some way satisfy these objectives. I will return to this question in the conclusion.

In this essay I begin with a brief survey of the existing ICT and ICT related infrastructural resources present in the developing world, followed by a focus on what is perhaps the most central issue in the ICT debate—economics. I then attend to some cultural issues untouched by the preceding sections, navigate the largely uncharted territory of ICT environmental impact, and finally recognize some of the positive aspects proven or estimated to be associated with ICT. I conclude the essay with a discussion about how an aid organization may best proceed in light of the preceding considerations.

Existing Infrastructure and ICT related resources

Just having access to a computer does not translate to its usage in the acquisition of information if other essentials like infrastructure for electricity and telephone lines, appropriate content of information and literacy of users are not addressed (Gyamfi 2005:22).

There are several cost and resource considerations in the establishment and maintenance of ICT in the developing world. These include: the availability and costs of telephony or other means of data transmission; the initial capital costs for hardware and software; the costs and availability of repair and technical support; training costs; and finally, the availability of energy (in an appropriate form) to power the necessary equipment. In order to provide an empirical background for subsequent sections, this section will provide an “objective” survey of the current ICT situation in the developing world.

According to the United Nations Development Program, in 2003 developing countries had, on average, one-fifth of the number of telephone mainlines, and one-seventh the number of cellular subscribers per capita as did high-income countries. But particular geographic regions are even worse off—Sub-Saharan Africa has but 9 telephone mainlines per 1,000 people (high-income countries have 562). For every 1,000 people, high-income countries have 477 internet users, as compared with 4 in the least developed countries (United Nations Development Program 2005: 265).

For most ICT and associated resource measures, Africa is the continent least well off. There are only 2.6 telephone landlines and 1.47 cellular connections for every 100 inhabitants, as compared with 67.3 and 40 for the US, respectively (Ya'u 2004:15). In the 1990s, with 13% of the world's population, Africa had only 6% of the radios, 3% of the TVs, and 2% of the newspapers in the world (Golding 1998:75-76). According to the International Telecommunications Union, there are only 1.06 PCs per 1000 people in Africa, as compared with 67.30 for the US and 15.36 for the world in general; whereas the world average for internet hosts per 10,000 people is 232.66, Africa is 3.44, and the US 3714.01 (Ya'u 2004:15). The cost of internet connectivity is also prohibitive in Africa. According to New Partners for Africa's Development (NEPAD), the cost of an internet connection in Africa is 20% of the local GDP per capita, as compared with a world average of 9%, and 1% for high income countries (Ya'u 2004:16). Globally, the percentage of the rural population with access to electricity was only 44% in 1990, though this doubles the figure for 1970 (Davis 1995:8). For graphic representation of country specific information in interactive map format, see the IDRC Information and Communication Technologies for Development web page (http://www.idrc.ca/panasia/ev-43441-201-1-DO_TOPIC.html).

In addition to the physical barriers impeding access to ICT in developing countries, there exist human barriers, such as insufficient information literacy, both in terms of the skills needed to use a computer as well as the ability to understand the social, economic, political and ethical issues surrounding the use of information (Gyamfi 2005:23). But taking a closer look at these "human barriers," unearths many contentious issues.

Economic Nexus

Information technology can be an instrument to make economic development in the developing countries more efficient. Yet the developed countries should desist from enshrining it as the major item in assistance and talking about unrealistic dreams (Asahi Shimbun newspaper editorial as quoted in Ubiquity, August 1st, 2000).

Many authors, from both developed and underdeveloped nations, reveal in their writing an "automate at all costs" perspective, one founded upon the belief that information technologies offer a direct way out of poverty, but only if embraced immediately and comprehensively (see, for instance, Ifidon 1994; Ogunsola 2005). In the words of the United Nations: "new technology

offers an unprecedented chance for developing countries to ‘leapfrog’ earlier stages of development. Everything must be done to maximize their peoples’ access to new information networks” (United Nations 2000). From this perspective, failing to invest heavily in ICT is often described as an opportunity cost. Such perspectives must be juxtaposed with the more sobering assessments which invert the opportunity cost argument, that is, analyses which account for lost traditional development opportunities (such as education, water, food and energy resource development), or eroded cultural propagation, should ICT become a primary focus of economic development. Many feel that we are currently undergoing a transition from an industrial economy to one information based (see, for instance, Jimba 1999), but some may question the extent to which such intangibles as information could actually *replace* tangibles such as food, clothing and shelter. For some critics, information technologies, “benefit only those who have moved beyond obtaining the basic necessities of life” (Adamu 2002:25). Similarly, one may argue that books and telephones were essentially ICT products of, rather than replacements for, industrialization, and thus contemporary ICT innovations simply reform earlier trends rather than revolutionizing society.

James (2001) suggests that many options exist for low-cost ICT development, and that instead what is lacking is a centralized institution which records and disseminates the otherwise diffuse information about these options. He provides many convincing examples of technologies produced by organizations in both developed and underdeveloped nations that are notably cheaper and often more adaptable and durable for developing contexts than their more pervasive counterparts. However, the relativity of James’s “affordability” must be addressed: the “cheap” \$200 price for computers often mentioned in his article (2001) is twice that of the average per capita GDP in developing countries (Adamu 2002:27).

Another recent development in the effort to produce affordable ICT is the “\$100 Laptop”. This device weighs one kilogram and can be powered by a crank handle. According to its inventor, Nicholas Negroponte, co-founder of the Media Lab at the Massachusetts Institute of Technology, and board member of Motorola, the \$100 laptop will help eradicate poverty when it is distributed to children in remote rural communities of the developing world. Although in many ways this sounds like a fantastic contribution to the endeavour to eliminate the digital divide, it was met with mixed reactions at its launching at the 2005 World Summit on the Information Society in Tunis, Tunisia. Besides the rush of people lining up to purchase the

laptop for their children, CNN reporter Syliva Smith recorded a host of criticisms from various African conference participants, some of which I shall reproduce here, and throughout this essay: “it is a very clever marketing tool... under the guise of non-profitability hundreds of millions of these laptops will be flogged off to our governments... That's the only way of achieving the necessary economies of scale to get the price low... If you live in a mud hut, what use is that computer for your children who don't have a doctor within walking distance?” (Smith, S. 2005). Though anecdotal, these comments are likely demonstrative of a precautionary sentiment present in the African community.

The uneven geographic texture and often contentious nature of international political and economic systems complicates the evaluation of an ICT development agenda. Both neo-classical capitalist and socialist economic environments offer advantages and disadvantages with regard to the development of ICT in the developing world. Ogunsola paradoxically argues that globalization is currently, “driven by more subtle ideology propagated by the international financial institutions and the World Trade Organization through the influence of [ICT],” and yet, that, “multinational corporations are the most important vehicles for transferring technology around the globe” (2005). This type of contradiction is rife in the literature, and will be discussed below. Manohar agrees with the latter view, stating: “experiences show that the private sector has been the most innovative player and the major driving force behind ICT development” (Manohar 2005:47), and that: “India has demonstrated to all the developing countries that no technology can succeed unless and until there is active collaboration between the public and private sectors” (Manohar 2005:51).

Manohar describes the Indian Tobacco Co. “E-choupal” (*trans*: “village square”) e-business as particularly beneficial for village farmers, who may access local and futures commodity prices and local weather conditions. Apparently, the hope of the Indian Tobacco Co. is that the E-choupal system will become a major commercial conduit of Wal-Mart proportions (Manohar 2005:49). But it seems that Manohar overlooks a degree of dissonance between the nature of farming and the provision of information regarding external influences. Once planted, a farmer cannot suddenly change their crop at harvest simply because E-choupal alerts them to falling commodity prices—they are still subject to external market forces despite real-time data. Similarly, the inaccuracy of weather reports aside, real-time data on weather conditions will not bring them water if there’s a drought or allow them to switch from tomatoes to cranberries if

there's a flood one week before harvest. As elucidated by Marthe Dansokho from Cameroon at the \$100 Laptop launch: "African women who do most of the work in the countryside don't have time to sit with their children and research what crops they should be planting" (Smith 2005). To be blunt, Manohar's suggestions betray a certain ignorance of the very real connections, and lack thereof, between ICT based development solutions and their on-the-ground context.

The view that the development of domestic ICT industries in LDCs is prerequisite to ensuring economic and political independence is commonly held (Nkereuwem 1996:26). Ogunsola's underlying wish is for African nations to become primary producers rather than consumers of ICT, thus freeing them from a fate that he terms, "digital slavery" (2005). But this may be a fool's dream. Some have argued that automation and computerization stifles creativity and serendipity (Postman 2003:121), characteristics central to research and development, product innovations, and competitive marketing techniques. Africa lacks the domestic economic conditions to lead in research and development—OECD countries spend 2% of their GDP on R&D, whereas the average for Africa is 0.2% (Ya'u 2004:15-16). Market entry will be difficult in an arena where large multinational companies control over 80% of the information economy market (Jimba 1999:81). Most importantly, within the free-market, foreign-investment approach that Ogunsola (2005) prescribes, one may identify an unfortunate irony whereby existing drones of production may become exactly that—digital slaves—the profits garnered from their labours floating up and away into the coffers of multinational companies' shareholders (Ya'u 2004:20).

Rodino-Colocino makes the compelling argument that digital divide research regularly overemphasizes access issues and neglects those pertaining to the *digital labour force* divide, and that this bias privileges diffusion over equality, thereby serving marketing rather than socially constructive interests (2006:488). She distinguishes between first and second wave digital divide research, defining the former as particularly focused on technologies and access points, the latter on technological skill acquisition. Though self styled as "redefining," second wave research still presupposes the first wave's technological determinism, and worse, it unintentionally supports the economic stratification it claims to critique. That is, by prescribing the widespread promotion of ICT skill acquisition, second wave research also encourages the expansion of cheap labour markets. Although the substantive content of Rodino-Colocino's article focuses on the ICT industry in Seattle, Washington (499-505), her argument and findings are particularly relevant in the international development context, where the growing mobility of capitalism is

able to shift exploitative labour practices to impoverished areas of the world (Robins 2002; Ya'u 2004). The fact that a stark economic divide existed even amongst those in the ICT industry in what was for a time the world's hearth of the new digital economy suggests that perhaps, "computer technologies are neither 'keys to the vault' of riches nor means to an 'Information Age Commonwealth'" (Rodino-Colocino 2006:499). I've often argued that a village's economy will likely collapse if ninety-five of the one-hundred residents take up blacksmithing; the computer industry is no different.

Digital divide rhetoric at times contains deceptive inversions of real and imagined causal relationships; this may be owed to the tension between tacit capitalist interests and publicized rationales. For instance, given that internet access and education are correlated, Hoffman et al., in a study purported to research the effects of internet access on participation in the "emerging digital economy," recommend that, "to ensure the participation of all Americans in the information revolution, it is critical to improve the educational opportunities for African Americans" (2001:94, as quoted in Rodino-Colocino 2006:492). Rodino-Colocino deftly catches the inversion here: "education, in other words, is a vehicle for, rather than an effect of, more widely diffusing internet technology" (2006:492). Interestingly, she found that various levels of government cut funding for education significantly during Washington State's technology boom (505), undermining arguments that information technologies amass public wealth and supporting Noble's (2001) claim that modern employers desire trained but not necessarily educated workers. Castells frames trained workers as "generic labour" and educated workers "self-programmable labour", and between these two groups he sees an irresolvable chasm in terms of socioeconomic power (2000). However, Rodoni-Colocino's research revealed that in the ICT industry, even those possessing Castell's "self-programmable labour" were little better off with regard to job security.

In "Are African Women Online Just ICT Consumers?" Robins (2002) analyses the issues raised by Rodino-Colocino (2006), but in the African context, and articulated with the added dimension of gender. Her findings generally confirm and elaborate Rodino-Colocino's contentions regarding labour. For instance, women's work with computers tends to be clerical, and thus increased automation of office environments only further entrench the extant "pink-collar ghetto," whether in Africa or Europe (see Belt et al. 2000). De Alcantera, as quoted in Ya'u (2004:21), states: "With the exception of some groups (like software programmers), it

seems that most teleworkers who are predominantly women are receiving extremely low wages; and some of them work in the kind of modern-day sweatshop conditions that characterised export oriented manufacturing throughout the developing world” (De Alcantera 2001:12).

Robins asks, “who designs and runs [ICT] projects, and to what end? What are the criteria under which people are chosen to gain access or take part in training? What is the content of these sites, and to what end is it formulated?” (2002:239). She concludes that capitalist motives behind otherwise well-intentioned initiatives establish African women as consumers of Western communication products rather than citizens who strive for equality. Africa itself is viewed by capital as exploitable terrain rather than a collection of states, communities, and individuals struggling to improve their lives (2002). Robins describes the ways in which much of the ICT drive has been instigated by transnational corporations and the NGOs and governments they control. She points out that recent wholesale privatization of telecommunications in Africa was demanded by international lending institutions as part of imposed structural adjustments, and that this privatization opened the door to foreign interests in ICT (2002:240). This leads Robins to frame ICT in terms reflective of dependency theory: “the information highway is reproducing this [colonial] dependency-creating practice, this time not with raw materials or cash crops, but through ICT use and the accompanying need for the technology and know-how produced by transnational telecommunications corporations” (2002:241). In some instances, cheap provision of sophisticated commercial information technologies may be crudely analogous to the drug pusher / user relationship, whereby the former provides a costly, less-than-necessary, but ultimately addictive luxury product at little expense until the latter cannot live without it and is willing to forego basic necessities so as to satiate the new need.

As Adamu observes, “businesses are not in the business of reducing poverty; their main purpose is to maximize return to shareholders.” (Adamu 2002:25). Ya’u presents a compelling list of the ways in which profits from ICT products and services are funnelled from developing countries to the aforementioned shareholder coffers:

- *the extremely mobile nature of capital allied with the inability of third world countries to tax e-commerce or online transactions;*
- *the extremely high level of profit repatriation from developing countries by ICT companies or businesses;*
- *direct transfers during the purchase of ICT equipment;*

- *large sums of money paid to international infrastructure providers;*
- *worsening settlement rates imposed by Northern Telecommunications companies on telephony;*
- *the costs of connection to the international internet backbone;*
- *the high mobility of capital in a world dependent on foreign direct investment (FDI) is forcing developing countries to lower tax regimes in order to attract FDI, and thereby eroding their revenue from taxation; and finally,*
- *in terms of trade and commerce, local firms are ill-equipped to compete with transnational ones, thus exacerbating capital flight. (Ya'u 2004:20)*

Adamu (2002) alleges that aid agencies are often oblivious to the conflict between real development needs and those ultimately driven by for-profit market forces. He also argues that even not-for-profit organizations are selling a commodity—in this case an ideology—and that their good intentions may ironically have the effect of creating new markets for corporate predators. “The question is whether the concept of a wired world is a true globalization of the human consciousness... or a cunning business strategy to expand diminishing and saturated home markets” (Adamu 2002:26).

Rather than classifying digital divide literature in waves, Sassi (2005) identifies four approaches which hold what she terms either “weak” or “strong” hypotheses. The “technocratic approach” possesses the weak hypothesis that the segregation associated with ICT is temporary and mainly owed to disparate skills and the ability to use the internet. It does not challenge the substance or value of an assumed “information society”. The “social structure,” “information structure and exclusion,” and, “modernization and capitalism,” approaches are essentially similar critiques of differing breadths, and all are founded upon the strong hypothesis that, “the emergence of the information society will create new social cleavages and strengthen old ones” (Sassi 2005:686). Many of the preceding arguments presented here are without doubt associated with the strong hypothesis, and similar works reviewed by Sassi support and expand these theses. Sparks’ (2000) research, for instance, finds evidence that, “the distribution of the internet and the associated opportunities for political and cultural enrichment map even more closely the existing distributions of wealth and power than other, older technologies such as the printing press” (Sassi 2005:689). Complementing this comparison, Postman argues that computer technology has not come close to the printing press in its power to inspire radical and substantive social,

political and religious thought. “If the press was, as David Riesman called it, ‘the gunpowder of the mind,’ the computer, in its capacity to smooth over unsatisfactory institutions and ideas, is the talcum powder of the mind” (Postman 1993:116). For Sparks (2005), the challenge is to diffuse social relations, not technology.

Inherent in Sassi’s modernization and capitalism approach is the logic that if one seeks deeper understanding of the impact of ICT, then one must query the causes of its emergence (Sassi 2005:692); in the naissence of the internet, of course, much can be attributed to the military-industrial complex and associated attempts to reinforce existing power structures (Dutton & Peltu 1996). Citing Jan van Dijk (1999), Sassi describes the connection between the project of modernization and information technologies, whereby ICT has assisted with expansions of scale, the further division and differentiation of labour, and the rationalization and individualization of society, culture and the economy (2005:692). Castells calls this “informational capitalism” (2000). The manner in which capitalist systems increasingly add layers of technical complexity so as to dull the barbs associated with earlier layers and ensure the smooth operation of production and consumption seems to corroborate Tainter’s observation of this phenomena in the 1980s—according to Tainter, a pattern of increasing investments in complexity and associated diminishing returns is the key explanatory variable in the political and economic collapse of societies throughout history (1988).

Sassi concludes that the broader the theoretical and empirical horizon an approach to the digital divide possesses, the wider the definitions of technology (i.e. more than simply internet connectivity), the more dire the future prospects, and the more radical the proposed solutions tend to be (2005:695). It should be noted that the “strong” critiques reviewed here apply largely to the popular suggestion that ICT will create economic and cultural opportunities for developing regions; they are less applicable to the humbler suggestions that increased ICT may assist in furthering communication networks and/or simply provide greater exposure to alternative ideas.

Expanding on Sassi’s approach model (2005), and Rodoni-Colocino’s (2006) sensitivity to the contradictions pervasive in the digital divide research, it seems that digital divide literature is split between that viewing ICT as prescriptive and that seeing it as symptomatic of socioeconomic disparity. However, an implicit dialectic relationship between the causal premises of these poles complicates the analysis. Within the prescriptive approach, which assumes that information technologies create economic advantage, one can often identify a

contradictory prescription which necessitates precedent economic advantage (i.e. increase education and access so as to increase use of ICT). This contradiction supports the contention of the symptomatic school that information technologies are simply products and tools of neo-classical capitalist interests. However, the symptomatic literature, perhaps at loss for practical ways of achieving global economic revolution, often concludes with the same prescriptive measures it critiques. Beyond debate over the direction of the causal relationship between ICT and poverty is the question of causation and correlation itself—is correlation necessarily causation in this case?

The literature suggests that large scale NGOs with corporate interests and ICT methods are increasingly pulling the strings of international development. Those most often mentioned were: the International Telecommunications Union, the World Bank, the International Monetary Fund, the International Chamber of Commerce, and various UN agencies (see Robins 2002; Ya'u 2004). Jimba recommends that:

The attention of information specialists needs to be drawn to the fact that the whole range of the information technology economy (from conception to implementation) is lopsided towards the business and political interest of Western countries and their various research and development laboratories. This then places the whole benefits of information technology squarely in the hands of these countries... Third World countries which wish to participate in the Information Age (do they have any option?) will require therefore to spend huge chunks of their... foreign exchange to purchase the required infrastructure, pay for international communication devices, purchase software, etc... it is doubtful if these expenditures will translate into better living standards for the Third World populace (1999:81).

But is even questionable whether expenditures on ICT will translate into comprehensively better living standards in the wealthy countries—Venkat (2005) points out that the current 12% poverty rate in the US is the same as it was before the ICT revolution, and that the gap between the rich and poor there has expanded by 50% over the last 25 yrs. If this is true, why would this strategy work in the economically uneven global context?

Further reading in this area may be found in the earlier readers edited by Odedra-Straub, W'O Okot-Uma and Cyranek (1995), Roche and Blaine (1996), and Krishna and Madon (2003). To conclude this section, I offer the amusing comments a reader wrote in response to the earlier

quote from *Ubiquity*: “Has it ever been shown that there is a ‘digital divide’ anymore than there is an ‘automotive divide’, a ‘video divide’, or a ‘vaccination divide’? Yet, we don’t have calls for sending every poor person a new Cadillac or Sony TV. Which is more important to people in undeveloped nations—clean water or the ability to order underwear online from Victoria’s Secret?” (Capelli 2000). Though in some ways sharply insightful, this commentator’s statements do risk oversimplifying or even trivializing the complex issues in question; they also reflect the seemingly irresistible tendency for speculators in the developed world to determine what those in the less developed world actually need.

Cultural Debris

Although it is impossible to completely detach cultural issues regarding ICTs from economics, this section raises additional points not well housed under the preceding rubric. If, as argued in the preceding section, ICT is the product of a particular capitalist and colonial history, and Marshall McLuhan’s, “the medium is the message,” is accepted at face value, then what message does ICT bring to the new cultures in which it is inserted?

Some question the efficacy and ethical validity of transferring ICT and its related content from Western industrialized contexts to those in developing countries (see, for instance, Walsham, 2001). They argue that it is impossible to separate the adoption of the Internet mindset from the particular worldview with which its naissance was associated, particularly the technological and scientific ethos of Europe and North America (Adamu 2002:25). With regard to the oft cited benefit of information sharing, some query how much value the information produced by MDCs can offer LDCs, and whether the former would actually reciprocate by recognizing the knowledge produced by the latter (28). As Adamu warns: “there is emerging a second conquest of the Third World and not an exchange of cultural values. The internet serves as an ‘electronic Trojan Horse’” (2002:26). Lack of reciprocity may be especially acute where MDCs disagree with the political and economic systems of a particular LDC. With respect to cultural imperialism and access to information, it is conspicuous that most of the recent initiatives to bring research information access to the developing world (see Long 2005:245), are focused almost exclusively on scientific information. Ya’u suggests that the communicative cultural plurality promised in the ICT rhetoric stands in sharp contrast with the reality, which instead has seen the homogenization and magnification of privileged voices (2004:20).

Information is seldom neutral or socially benign, and thus information coming from unfamiliar cultural sources could have devastating effects. I offer as a poignant example the relationship between certain types of mass media exposure and eating disorders. Though the research record is still building, and there are a number of potential intervening variables, a correlation between a media targeted demographic and the presence of eating disorders amongst members of that demographic opens up the possibility of a causal connection. For instance, an approximate rise in eating disorders amongst African American women correlated with a rise in the targeting of this group by mainstream media may suggest that exposure to this type of information is socially detrimental (for a review of the literature see Collier 2001). But of course, to be fair, it does not logically follow that all types of information exposure are socially detrimental.

Access to information that strengthens democratic decision making is often touted as one of the benefits accompanying ICT. However, a growing “corporate colonization” of democratic and critical spaces on the internet is challenging this assumption (Dahlberg 2005). In his research to discover which sites are drawing the most attention from those seeking public content and interaction, Dahlberg concludes that, “although the Internet provides for the articulation and contestation of diverse views in multiple spaces, corporate portals and media sites are directing much online attention toward conservative news and consumer practices” (2005:172).

Another related and more obvious challenge to the alleged need to foreground internet access in development strategy is the fact that content language on the internet tends to favour European languages, particularly English, and thus remains inaccessible to those with other language backgrounds (Gyamfi 2005:23). 90% of the information stored on the internet is in English, and more than 7% of the remaining content in other European languages (Adamu 2002:26). Gyamfi describes the great dearth of information content written in African languages and/or catering to contemporary African contexts (2005:27-28); however, absent from his list of needs in this respect is the need for computer servers which host this type of content, returning us to the economic landscape.

Again in the words of World Summit on the Information Society participant Marthe Dansokho, “we know our land, and wisdom is passed down through the generations. What is needed is clean water and real schools” (Smith 2005).

Environment & Sustainability

In the library literature concerning information technology there appears to be a perennial absence of discussion around the environmental sustainability of ICT development, whether in Canada or abroad in less developed regions. As Rodino-Colocino suggests, technological determinism seems to preclude any form of structural critique (2006), and I would extend her argument to include critiques of environmental impact. Wholesale embrace of ICT is perhaps not advisable if it precipitates natural resource depletion or environmental destruction, particularly given that these would ultimately undermine the perpetuation of ICT.

A major challenge in attempts to succinctly evaluate these issues is their sheer complexity. For instance, in an anonymous review of the UNDP's 2001 *Human Development Report* in *The Economist*, the author(s) defends the wholesale promotion of new technologies as helpful beyond reproach. The example they cite is the doubling of world cereal output following the green revolution, and on this basis they chastise "well-off protesters who vandalize [crops] of genetically modified maize" (*Economist* 2001:68). They are correct that the green revolution increased volumes of yield per labour unit, but what they fail to acknowledge is that the sustainability of these methods is widely questioned, and the environmental and economic externalities associated with them are problematic and in some cases (particularly with genetically modified organisms) unknown (Daly & Cobb 1989). There seems to be a lag between the introduction of a new technology, knowledge of its impact by those directly affected, and the wider recognition of these impacts by the greater society. The plow is a good example of this—the damage caused by the plow was recognized many decades ago, and now a rather large and growing number of farmers practice the "no-till" method (often meaning low-tillage) (see, for instance, Garcia-Torres 2003), yet in popular works written by those outside of the agricultural community, the plow is still regarded as universally accepted, advantageous, and emblematic of, "the triumph and dominion of man [sic] over nature"³. Science as a discipline holds that all theories are subject to disproof, but with capitalist incentives innovations which have not benefited from longitudinal research are prematurely dumped outside the lab and onto the market. In summary, too often inappropriate technologies or those associated with high risks are promoted prior to rigorous assessment.

³ This is not a direct quote but rather an intentional cliché synthesized from countless similar statements.

The foregoing authors who argued for the growth of a domestic ICT industry in less developed countries would be wise to take heed of the resource demands associated with computer production. The energy and water used in the microchip fabrication process far exceeds the energy (and associated water) consumption used to run a computer (Murphy et al. 2003). 6400 MJ of energy, or 260 kg of fossil fuels are needed to produce the average desktop computer; over its lifespan this is more energy than that used by a refrigerator (Williams 2004). Over its ever decreasing lifetime of currently less than three years, the average computer has been estimated to use 74,000 L of water, mostly deriving from the production process (Frey et al. 2000). Computer production also requires a rather vast array of minerals, some of which are precious, including gold, silver, tin, copper, aluminum, lead and zinc; a proportion of the energy required to produce a computer would be derived from the mining of these resources. Over the same lifespan a computer is estimated to have an ecological footprint of over 1800m², or approximately 9% of a person's overall ecological footprint (ibid.)⁴.

As our current system powers the production and use of computers largely through petroleum sources (including the manufacture of plastic parts or mining of precious metals), it may be wise to consider the future volatility of oil prices. Alternative renewable energy sources cannot replace the millions of years of energy concentrated in oil, and contrary to images provided by the media, hydrogen does not constitute an energy source itself but rather must be separated using other energy sources. If, as noted in an earlier section, electrical power is in short supply in rural areas of less developed regions, what effect will the increased demand for electricity from the introduction of computers have on the local environment? Banks of shining solar panels are common on development brochures, but these are extremely expensive, even by first world standard. Will the need for energy to power ICT precipitate a corresponding growth in the use of polluting gasoline or diesel engines? Or will the cash-strapped governments somehow respond to the demand by building cheap coal-fired power plants⁵ and stringing thousands of kilometres of copper wire to move the energy? These are questions which must be addressed.

⁴ An "Ecological Footprint" is defined as: "...the land (and water) area that would be required to support a defined human population and material standard indefinitely," (Wackernagel & Rees 1996:158), but it is often also applied to particular consumption practices or products.

⁵ In Africa, the continent drawing the biggest attention from development organizations, over 70% of the energy consumed is drawn from oil and coal. Currently the continent uses less than one sixth the amount of energy per capita as North America (British Petroleum 2006).

Perhaps more disturbing than the resource demand to build and run computers is production pollution and current disposal practices and politics. Currently, of the 20-50 million tonnes of “E-Waste” generated in the US each year (Greenpeace 2006), 63% is sent to the landfill, 22% is incinerated, and 15% is recycled (Frey et al. 2000). Most of the E-Waste that is recycled is sent to China, India, and African countries where health is damaged by the open-fire processing of chips and boards in order to extract the elements (Pucket, et al. 2005). Murphy *et al.* list twenty eight chemicals used in the production of microchips (2003), many of which are listed on the US Comprehensive Environmental Response, Compensation, and Liability Act list of Priority Hazardous Substances (Environmental Resource Handbook 2005/2006:614-620); where the bulk of these will end up it’s still too early to say. According to the US Environmental Protection Agency, lead concentrations in the air at monitor manufacturing plants were found to be 90 times higher than the regulatory safety level (EPA 2001). Mercury is actually incorporated into the physical substrate of LCDs, but the emissions from coal fired power plants (used in the production of both CRTs and LCDs) is a larger source of exposure.

Discourses dealing with environmental problems seem equally plagued by the unrealistic promises of ICT. Within the literature of the public and private sectors, as well as the mass media, there exists a belief that new technologies in general and information technologies in particular will remedy any environmental problems that we create. However, despite the proliferation of ICT and corresponding exponential growth in data collection and processing in the Western world, by all accounts the environmental situation is not improving. In addition, it seems that there can never be enough environmental information available to satisfy policy makers or regulators such that they implement the sometimes radical changes that need to be made. To foreshadow Postman’s quote below, and at risk of oversimplifying complex issues: global warming is not caused by a lack of information.

Ultimately, our play and work on the internet demands and is supported by a plethora of unsustainable agricultural methods. It has only been within the last several decades that the vast majority of the first world population does not have to get their hands dirty growing food or manufacturing shoes, but can instead rest their clean nails upon a keyboard.

Benefits— Keep the Baby, Throw Out the Bathwater

As forewarned in the introduction, the bulk of this essay takes a critical approach to the question of ICT diffusion in the developing world, in the interest of addressing issues seldom discussed in the popular and academic literature. However, ICT is not inherently evil—a tool is essentially neutral and inert except when produced, handled, or disposed of by a human. In the words of one scholar:

Although the digital innovations in digital technology are impressive, we must not forget that technology in itself is not a determinant of change, only a facilitator. As with any other technology, it is the social context within which these new technologies are introduced and, more importantly, implemented, that determines their usage and impact... The information revolution has much less to do with bits and bytes than it has to do with the realities and aspirations of everyday people (Uimonen 1997)

Though some of the social contexts described above seem less than promising, there are glimmers of hope. In this section I will address some of these.

Although the preceding discussion would lead one to believe that wholesale conversion of a less developed country's economic system to ICT hardware or software production would be suicidal, surely there are other points along the continuum. We might conjecture that supporting the development of a small but robust ICT industry in developing countries would encourage economic diversification and reduce dependence on low-earning, economically erratic agricultural exports. For other industries, universal access may prove economically advantageous, at least in terms of market entry—it is now possible for individuals, micro-enterprises, and small and medium-sized businesses to exploit the internet to sell their goods or services to a much larger (potentially global) market.

Sassi sees potential in ICT for increasing and reinforcing social networks and communication in rural and poor areas of underdeveloped regions (2006:698). Access to ICT may give isolated communities global presence and exposure not afforded by the existing mass media; for instance, a community may post locally produced community information on the internet, or read about others in similar situations on the other side of the world. Robins found

that several of the women working at NGOs in Senegal felt that ICT is crucial for the networking of women's organizations (2002:243).

Ifidon describes a positive link between the availability of information and agricultural production, whereby the peak of the marginal rate of return on investment in information is much higher than that for increases in tractors or fertilizers (1994:31).

With regard to ICT in academics, Long makes the very valid point that despite higher production costs of providing journals online, the distribution costs are significantly reduced, and if the developed countries bear the burden of these higher production costs, less developed countries may benefit (Long 2005:244-245).

To summarize, in the words of Sassi: "technology as such does not drive social and political activities, since their causes are deeper, but it does facilitate their organization, mobilization and expression" (2005:698).

Conclusions

Does ICT hold the potential to satisfy or assist in satisfying Todero's (1992) three development objectives? Probably—subject to a number of conditions. They also have the potential to undermine development objectives if not introduced carefully. Moving forward with development projects without considering the host of related contextual issues risks repeating the poor development project success record of the previous century. The difficulty, of course, is that changes to many of the systemic problems that an international library development organization faces are beyond the means of the organization. However, carefully proceeding in a way which will not exacerbate existing problems should be seen as a achievable option. It appears that the promotion of an information and communication technology may indeed be a beneficial development tactic, *but only if*:

- a) it does not come at the cost of basic needs fulfillment;
- b) it does not displace cheaper or more culturally suitable information alternatives;
- c) it does not displace domestic production;
- d) it does not induce a dependency relationship with the economically advantaged;
- e) it recognizes and mitigates intersecting dimensions of oppression at all scales, such as the subordination of coloured women at ICT telecentres;
- f) it does not lead to the erosion of local cultural tradition;

- g) it catalyzes the exchange of information and technology production; and,
- h) it does not diminish a region's natural resources or damage ecological systems over time.

Rather than simply asking in isolation, “is ICT a valuable prescription?” it may be helpful to juxtapose computer ICT with an alternative, such as book provision, especially given that library development organizations face an economic opportunity cost relationship between the two. Point “b” implies that if books are ultimately cheaper or more acceptable to the local community, they should be chosen over ICT. Advantages associated with books include low-risk loaning, considerable portability, timelessness of format, and an absence of need for power or telecommunications connections. Comparative advantages associated with computer ICT include a higher potential for currency of information, and the ability to use them for communication purposes. Preservation issues are probably debatable and contingent on such things as the ability to make backups, susceptibility of collections to fire or water damage etc. Like all good collection development plans, it may be ideal to strike a balance rather than choosing one or another. One way to test the integration potential of ICTs without committing to costly telecommunications and ISP providers would be to introduce computers with CD-ROMs. The fact that popular prescriptions have all but forgotten this format is perhaps demonstrative of the built-in obsolescence engineered by commercial interests.

Setting aside critical reflexivity so as to address ground-level tactics, Gyamfi (2005) suggests four approaches for providing what he terms “universal access,” namely, access to a telephone, a computer and the internet. These four approaches include: *telecentres*, which are essentially community centres providing telephone and Internet connectivity, as well as other information technologies, on a pay-per-use basis; *technology resource centres*, which are essentially the same as the latter, except in that they cater to schools; *techmobiles*, described as “rolling computer laboratories” with Internet access; and “*old boy networks*”, or alumni associations, which may provide a source of, or labour for, raising funds (Gyamfi 2005:25). Similarly, he recommends increasing focus on training teachers in information literacy, and on the role that libraries may play in this pedagogy. In addition to the practical cost savings, one benefit of the telecentre model is the way in which these bring ICT to the less developed regions in a communal, public fashion, rather than following the Western model of internet access in every home (Robins 2002:238).

Synthesizing Gashaw (2002) and Nulens, et al. (2001), Gyamfi highlights the importance of local needs assessments when introducing ICT, which must include the nature of user tasks, the cultural norms of the particular group, the state of electronic resources, and the skill level and experience of the ICT user (2005:28). Nkereuwem (1996:29) emphasizes the need for aid agencies to address issues around ICT self-sufficiency, such as supporting the development of indigenous information technologies and strengthening ICT education and training. In response to scenarios such as those in which the internet is brought to villages before an adequate road is constructed, Venkat actually suggests that communities and development agencies would be better off allocating resources to older and cheaper technologies, such as radios for improving literacy (2005).

Ya'u recommends several elements he sees as imperative to Africa-focused ICT strategies, several of which were discussed above: ICT should be supported for development purposes only, not as an end in itself; access to information and ICT should be universal and not versus market-led; local network infrastructure must be locally owned; African debt must be forgiven; ICT goods and services must be produced domestically; state-sponsored ICT education must become standardized; and, African language content development should be promoted (2004:27).

It is worth learning from the mistakes and problems plaguing earlier and current development projects. A mid-1990s study on the support of international aid organizations in developing ICT found that, despite many positive aspects, their assistance tended to be "sporadic and uncoordinated," and that the one-time, special-purpose nature of the donations precipitated problems with compatibilities, maintenance and repair rather than fostering self-sufficient domestic production and solutions (Nkereuwem 1996:28). In some cases the strings attached to ICT grants were especially conspicuous, such as the USAID policy requiring that their grant monies be spent exclusively on equipment from US suppliers (ibid.). USAID is apparently unabashedly candid in explicating their links between development and business opportunities (Robins 2002:240). Some problems that have arisen with computer donation programs include non-functioning computers, which become a burden with regard to disposal, and a lack of hardware and software uniformity which undermines teaching and maintenance (Gyamfi 2005:24).

Aid organizations must check themselves to ensure that they are not impulsively bedazzled by shiny new inventions, nor that they, “have a tendency to seek technological fixes for complex social problems” (Light 2003:136). Many seem convinced that technological innovation is synonymous with human progress. In his popular work entitled, *Technopoly* (1993), Neil Postman argues that individuals and institutions are not fundamentally improved through electronic automation; although they may work faster and/or be seen to carry more authority, defects in their assumptions, ideas and theories remain untouched. Interestingly, Postman detected the essence of the digital divide debate at the dawn of internet proliferation, and with the clarity often available before repetitive rhetoric and *argumentum ad populum* obscure various dimensions of a new tool or institution, he presents an interesting argument for the invalidity of such concerns:

...the computer argues, to put it baldly, that the most serious problems confronting us at both personal and public levels require technical solutions through fast access to information otherwise unavailable. I would argue that this is, on the face of it, nonsense. Our most serious problems are not technical, nor do they arise from inadequate information. If a nuclear catastrophe occurs, it shall not be because of inadequate information. If families break up, children are mistreated, crime terrorizes a city, education is impotent, it does not happen because of inadequate information... (Postman 2003:119).

Postman animates what he sees as a deficit of technological modesty by paraphrasing Norbert Wiener: “if digital computers had been in common use before the atomic bomb was invented, people would have said that the bomb could not have been invented without computers” (Postman 1993:119-120). Technologically determinist theories tend to neglect or dismiss relevant non-technological variables in their attempts to explain social phenomena, and in this way issues of race, class, and gender are replaced by those of technical resources (Rodino-Colocino 2006:490). “The arrival of the Computer Revolution and the founding of the Computer age have been announced many times. But if the triumph of a revolution is to be measured in terms of the social revision it entrained, then there has been no computer revolution” (Weizenbaum 1976:32, as quoted in Postman 1993:116).

A final critical, personal thought—I received my primary, secondary, and some tertiary education without the aid of electronic information technology, and to my knowledge, I managed

to become literate, and did not demonstrate abnormal difficulty in adopting the electronic technologies I currently use. I definitely do not see the proliferation of the ICTs as having improved the quality of my life; most likely there has been a zero-sum change, though perhaps there's actually been a decline. Peer pressure necessitates its usage, and it probably increases voluminous productivity considerably. Whether it actually improves my understanding of issues, more than an equal amount of time spent with books and paper, is questionable. Whether it makes me happier is not a question—quite simply it does not (except perhaps with regard to e-mail over long distances?). As one guest reporter in the *The Asahi Shimbun Asia* newspaper commented: “the world overvalues ICT. It is just a means, not an end. And if the end is a happy life, there are a lot of other means than ICT” (Widhayawiro 2000). I do not wish to condemn the introduction of ICT in the international development milieu, only that, “we should not privilege the promise of technology above other challenges” (Rodino-Colocino 2006:498).

It is worth noting for future research on libraries and development that most of the theoretically and critically insightful literature is to be found in the non-LIS journals of the social sciences; in the case of ICT and the political economy, for instance, those journals catering to the disciplines of media studies, communications, and sociology are most useful. The bulk of the library literature tends to focus on the pragmatic aspects of specific case studies, or takes a whimsical, speculative approach regarding future possibilities, with a vacuum of theory betwixt the two. Drawing on a blend of references from both LIS and non-LIS sources is likely to build a theoretically and empirically solid work.

Relevant Internet Resources:

(Note: many of these organizations subscribe to an ICT approach to poverty reduction)

\$100 Laptop

<http://laptop.org/>

The Asia Foundation

<http://asiafoundation.org/>

Basel Action Network

<http://www.ban.org/>

Bellanet

<http://home.bellanet.org>

Book Aid International

<http://www.bookaid.org/cms.cgi/site/index.htm>

Book Donations For Development Handbook (CODE)

http://codecan.org/english/documents/Book_Donations.pdf

British Petroleum Statistical Review of World Energy

<http://www.bp.com/productlanding.do?categoryId=91&contentId=7017990>

The Digital Divide Network

<http://www.digitaldivide.net/>

IDRC Communication Technologies for Development

http://www.idrc.ca/panasia/ev-43441-201-1-DO_TOPIC.html

Intermediate Technology Development Group

<http://www.itdg.org/>

International Federation of Library Associations and Institutions

<http://www.ifla.org/>

International Institute for Sustainable Development

<http://www.iisd.org/>

International Labour Organizations

<http://www.ilo.org/>

International Telecommunications Union

<http://www.itu.int/home/index.html>

Internet Society

<http://www.isoc.org/>

Librarians Across Borders

http://www.bcla.bc.ca/_page/10100133.100.0.aspx

United Nations Development Programme

<http://www.undp.org/>

United Nations Economic Commission for Africa

<http://www.uneca.org/codi/>

United Nations Environment Programme

Division of Technology, Industry, and Economics

<http://www.unep.fr/en/>

The World Bank

<http://www.worldbank.org/>

World Health Organization Blue Trunk Libraries

<http://www.who.int/library/country/trunks/index.en.shtml>

World Summit on the Information Society

<http://www.itu.int/wsis/>

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