Exploring the need for speed in deploying information and communications technology for international development and bridging the digital divide

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Abstract

Information and communication technology (ICT) is currently dominating the global debate on human development on the multilateral forum in general. It has been identified in gender advocacy, poverty alleviation, disadvantaged groups, and other forums as the catalyst or cross-cutting enabler. Feeding into that is a concentration of networked development practitioners at the United Nations headquarters in New York, in addition to a full representation of all 192 member states. Among these is a wealth of information useful for identifying the disconnect between the implementation of ICT development programmes and the achievement of their intended goals. It is widely recognised that the overall intention of all stakeholders is to distribute the common good derived from ICTs and related innovations. The ideal outcome from ICT-for-Development (ICT4D) would be for the national happiness indices to exponentially elevate with the deployment of ICT. However, friction between development programme rollout and the body politic in developing countries has resulted in the eviction of some donors. Some inherent challenges, such as donor fatigue and aid dependency, have also surfaced. This paper attempts to tie up the two ends through exploring the re-syncing of synergies while zooming in on key success factors.

This paper comes on the eve of the millennium development goals deadline of 2015 which acknowledges ICT as the enabler for speeding towards the finish line. The quest is to explore whether we are all speeding towards a clearly defined goal, given our varied capacities and affinities. The UN has an arsenal of diplomats and technocrats 'in a state of agitation' to spearhead the development agenda for all nations. Part of the research behind this paper delved into appreciating their focus and approach to the global challenge. Some buzzwords – digital divide, convergence and divergence of technologies – emerged from literature reviews and were explored further. To add to the medley, the research also came up with buzzwords for ICT development – thresholds, demystify technology - and went further into the technical details of defining examples. Some themes emerging from the research include the pivotal role of government and its political muscle; ICT think-tanks providing a link in the development chain; the quantum of multiple stakeholders being responsible for the speed of ICT development; and ICT already assuming its role in fast-tracking other forms of development including political. The latter has both positive and negative potential.

Keywords: ICT; Millennium Development Goals; digital divide; buzzwords; ICT4D; think tank; electromagnetic radiation; Cybermedia; Kindle; virtual desktop

'It's for vanity that a woman holds her breast when she runs, not because she is afraid it's going to fall.'

Introduction

Theoretical focus

As I hurtle down the highway in my car, there are a number of critical factors that define the speed at which I drive and the route that I take. Conditions such as the weather, traffic, passengers on board, serviceability of my car, and fuel, feed into the decision matrix determining my speed in real-time. My wife, whom I affectionately call 'the government', is an integral part of that decision process as she assumes the role of core-driver while looking after the interests

of other stakeholders. She particularly likes to take the scenic route on a 'slow Sunday drive' on any day of the week. As we navigate the information superhighway, it is equally important to take cognisance of similar parameters from various stakeholders and use them to gauge our speeds and trajectories. This analogy will serve to contextualise this research and its outcomes. Development, as dynamic as it is, requires that we take good aim and focus towards a definite goal. This is not the case with several developing countries that I reviewed who are traversing cyberspace with vaguely defined thresholds while taking their cue from developed counterparts who are on different trajectories. As a result, instead of developing, some end up underdeveloping and others get entangled in a web cast by marketing hype and capitalist gimmickry. It is hoped that this research will contribute to sharpening the focus of ICT development ahead of fast-tracking implementation of projects.

Comment on conclusion

The results on the ground in developing states reviewed pointed towards the need for development practitioners to sift through the technology hype and accept only information and communication technology (ICT) solutions that indubitably translate into a common good for the targeted communities. This is achievable given that the requisite resources are at their disposal; it is simply a matter of their being used optimally. Outreach no longer has frontiers; estranged citizenry in the diaspora can now actively participate in projects back home. After being born and raised in a developing country, but having lived in a developed country for the past four years, I can safely proclaim that ICT project rollout is feasible, especially at the level that developing countries need. This research will unravel the myth that technology comes at a price by using cheaper examples of computer lab outfits suitable for developing countries. Thanks are due to the innovations freely accessible in cyberspace that helped put together these technological constructs.

As a moral imperative, I had to underscore some salient inherent dangers from technology that were unearthed during my research.

I would not be able to sleep easy without playing my role in whistle-blowing on these hidden files. Corporatocracy already has a bad history of deliberately failing to expose huge frauds for the sake of protecting profit margins. This rings true in the ongoing medical fraud of global proportions which progressives are now debunking as scams. Dr Gary Null (2010) says vaccinations do not work and will never work, and gives his researched scientific facts on the web. Similarly negative research outcomes - outcomes that ICT marketing hype has been deliberately omitting for the sake of protecting profit margins - are now filtering to the surface because of the versatility of cybermedia.

Methodological focus

The Barmenda model was used as the methodology for conducting this research for several reasons. One being that research in technology is dynamic; hence the need for a versatile approach. Another being that the qualitative data gathered needed to be analysed consistently throughout the research period. Comparison charts were used to contrast weighted values and foreseeable trends that helped make predictions of the future of technology in development. All the interviewees chosen were either in active service or had a sound background in technology. This was necessary because of the technical nature of some of the questions.

Delimitation

Limitations to research

The lifespan of technical research is limited by virtue of the fact that technology is in a state of flux and the benefits each individual derives from it depend on how it is applied. Thus, a research with a wider outreach could have been conducted over a longer period but the benefits from it diminish in the same space. In this case the outreach was concentrated on Zimbabwe, notwithstanding the applicability of the same findings to other developing countries. There was a strong inclination towards Internet research because of time and budgetary constraints, in addition to ethical issues that sur-

faced late in the project. One astute interviewee requested my clearance from the Institutional Review Board and a letter of introduction from DiploFoundation. Both these prerequisites (in the USA) were not readily available and this setback ate into the already limited time available. To circumvent any negative fallout, such as being sued for misrepresenting facts, interviews were conducted with diplomats instead.

Since the research makes several inferences to setting thresholds for ICT development, it became pertinent to make a practical demonstration through LAB I and II. Admittedly, such labs are the purview of think-tanks, but in this instance their scope was limited to Internet research findings for the sake of demonstration.

Challenges and overcoming them

The digital divide

The knee-jerk reaction of most people interviewed was that eliminating the digital divide is a high priority ideal for developing countries. Upon delving further into the many forms of the digital divide, 75% of interviewees reckoned that the bulk of the divides constituted a chasing of shadows. The 'young vs old' divide will always be there and should be embraced by all because technology is not static. The 'urban vs rural' divide is fading into insignificance with the onset of 4G wireless networking coupled with broadband proliferation. The 'economic' divide perpetuates most of the other

divides but it should not be a major preoccupation of development practitioners since deploying ICTs narrows it. The wisdom I derived from the answers was that we should choose our losses wisely as much as we choose our battles. The 'literate vs illiterate' divide turned out to be the most prominent and requires elimination because of its healing effect on the other divides. This prominence from both e-mail and verbal interviews resulted in the zeroing in on practical solutions to effectively address ICT literacy.

Before going further to define thresholds that suit developing countries, it is necessary to de-escalate the elimination of the digital divide from the priority list. Other researchers like Yayehyirad (2006), called it 'a self perpetuating vicious cycle'. Of late, the digital divide is being seen as an elusive abyss. Popular opinion from all the literature reviews is that the abyss can be bridged but the need to cross to the other side should not consume us. What should consume us is the accumulation of common good on either side. Therefore, seeking to eliminate the digital divide is an unnecessary maximalist approach. The responses from interviewees on how to approach the digital divide are summarised in Figure 1.

Conflict zones

The research established that defining of thresholds for ICT development must be the prerogative of recipient states due to the fact that communities are at different levels of development. The government, in consultation with
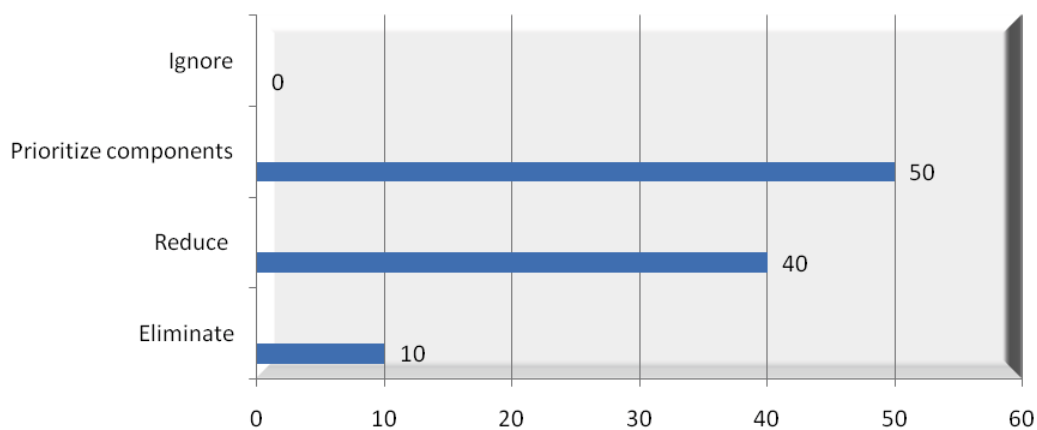

Figure 1. Solving the digital divide.

other stakeholders, has a duty to identify the people's needs relative to their level of development. The dilemma remains that if representatives of the beneficiaries are not aware of what technology is available out there, they will have difficulty choosing. Similarly, donors have to be fully conversant with the status quo on the ground in recipient communities to know the exact technology that is applicable. This research found that networked think-tanks based in recipient states can resolve this impasse by playing the middle man.

As it turned out, think-tanks are a rare breed in developing countries, resulting in many areas of conflict due to little knowledge. One interviewee narrated a fall-out that unravelled between a donor agency and a developing country host government. A UN-affiliated donor agency needed IP-phones to link up with outreach stations via satellite signal. The host country telecoms network did not have the capacity to provide the connectivity while at the same time the government had very stringent regulations on imported communication equipment. The donor agency went ahead and imported IP-phones but the consignment was declined entry and re-exported. Faced with limited options, the donor agency imported the IP-phones via diplomatic pouch and started using them. The host government discovered the use of the IP-Phones and its first reaction was to incarcerate all non-diplomatic local staff working with the donor agency. This incident has lessons in both directions.

The question of which is the best approach for deploying ICT projects was brought to the fore. The research unequivocally established that the bottom-up approach is the most appropriate. An overwhelming 90% of interviewees resonated with this approach. ICT is best introduced to the young generations who will grow in appreciation as they advance through education levels. The first logical reason for using the bottom-up approach is to demystify technology as early as possible. This is due to the fact that old vs young divide is perpetuated by older generations being generally intimidated by new technology and unfamiliar spaces. The second reason is to invest in the future because that early appreciation will nurture itself as the generations shift upwards. The third reason is to create

a forum to talent-spot individuals who deserve opportunities to develop further and assume leadership in innovation. Technology possesses a unique self-perpetuation in that once the fundamentals are known, there are enough 'help files' out there to tutor interested individuals further. Today, the Internet makes a huge contribution towards this self-perpetuation by providing free DIY (do it yourself) instruction.

The thresholds

Some semblance of thresholds has been defined in previous campaigns such as the 'one laptop per child' campaign (OLPC Foundation, 2006). A standard such as this is no longer applicable across all developing countries; first because of the high cost of ownership and maintenance' and secondly because each country's level of ICT development is different, a one-size-fit-all solution defeats logic. Another vaguely defined threshold was to increase the ICT penetration level measured as 'n' people per computer (where 'n' is a number). The 'one-computer per classroom' threshold was used in the Zimbabwe National Budget 2010/2011. After extensive Internet research, the 'one kindle per child' standard was recommended to go along with 'one computer lab per school'. The few technically savvy interviewees who perused these two proposed thresholds all gave their seal of approval.

Setting thresholds is a process as dynamic as innovation itself and there is a need to define some fundamentals that help governments and practitioners to reach amicable standards. Here again think-tanks come in handy since this requires ears and eyes on the ground while keeping an open mind to accommodate global perspectives. Some of the guiding fundamentals endorsed by interviewees are listed:

- Thresholds should remain open-ended and open to review.
- It is best done by widely networked think-tanks who are techno-savvy.
- A logical interval for reviewing thresholds would be for ministries to revise national thresholds as often as they budget for ICT, at which point they factor in new costs.
- New thresholds should take cognisance of

the fact that the newer the technology, the higher the price tag. It is in most cases worth waiting several months and paying half the price or less.

Manjoo (2010) analysed the drop of the Amazon Kindle from the introductory price of $299 to $139. He further speculated on the $99 Kindle in the near future. It was established that this is a common trend in new technology and developing states should cash in on it by waiting for new technology prices to stabilise. It is also pertinent to reveal here that the interviewees who felt developing countries should accept technology that is still under experiment also professed ignorance to any harmful side effect of wireless signal. Therefore the research maintains that only tried and tested technology should be deployed without compromise because the last thing developing communities need is to be used as guinea pigs.

Exit strategies

On an equal level of relevance to deployment strategy of ICT is the withdrawal strategy. The cases studied of evictions of donor agencies from developing states identified exit strategies as one of the contentious issues. Going back to my analogy of speeding down a highway, one constant concern every driver has is his or her next exit. In the USA, missing an exit can cost you dearly in terms of time and fuel. The question was posed to respondents on how well-defined exit plans of ICT development projects are. The probe went further to identify what should constitute these exit strategies (Figure 2). It is in the exit strategy that the project con-

tinuity and local ownership are defined. An exit strategy is the point of departure for dependency of communities on aid. Donor fatigue can also be circumvented through these pre-defined exits. It came as a surprise, however, that most respondents did not see the need to define the point of failure of ICT projects. It could be that they felt like it was planning to fail which would represent a failure to plan.

Nature has very elaborate lessons on exit strategies from which all stakeholders could learn. We give birth to our children who become greater than ourselves and then we continue to live through them in death. The government is the best policeman for ensuring that the exit strategy is in line with other policies, such as local ownership and pollution. In so doing, the government also ensures that common good does not go bad and that the heritage of coming generations is preserved. The exit strategy also defines the destruction of toxic waste resulting from the projects. Today, developing countries are sitting on landfills of hard drives, CRT monitors and other litter about whose hazardous toxicity level they are clueless (Greenpeace International, 2009).

Convergence and divergence

Cellphone technology was invented in developed countries and proliferated to the developing world to the extent of generating a business boom for the telecoms industries. The number of subscribers in developing countries now exceeds those in developed countries and the gap is widening (Global Mobile Statistics, 2011). As these
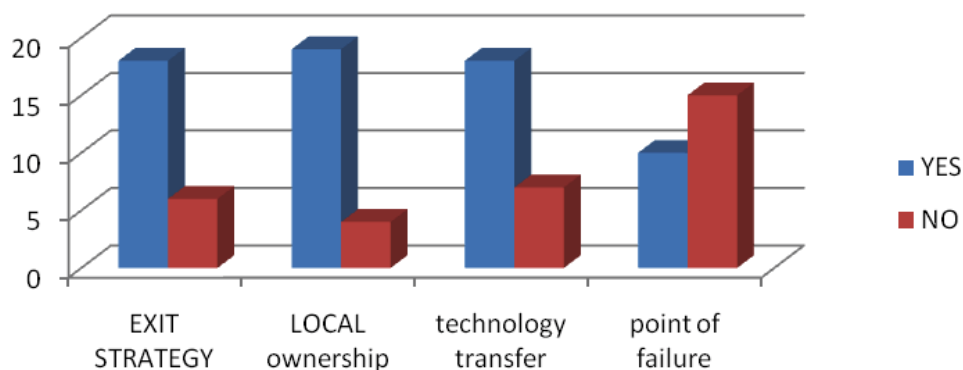

Figure 2. Exit strategy applications

swathes of subscriber bases morph into 3G/4G mobile broadband, another boom in profits and business growth is anticipated. According to the same statistics, personal computers (PC) are being overtaken by smart-phones as the No. 1 tool for web access: this is divergence. Parallel to that, usage of 3G/4G phones is growing rapidly with developing countries China and India leading: this is convergence. The same compendium forecasts that 'Mobile operators in developed countries could run out of profit in the next two to four years…' if current trends persist (Global Mobile Statistics, 2011). Africa has already poised herself for the impending convergence and divergence of technologies with the 2010 commissioning of the broadband undersea cables.

Either way, the facts point towards a new business model emerging and this is causing undercurrents of apprehension in corporate and political circles. An attempt to get interviewees to comment on the emerging business model was futile. The responses given did not support a specific trend. This goes to show the challenge of predicting technology which is in a state of flux. To add to the confusion, some publications cherry-pick statistics that promote their own brands. The bottom line is that projections should be made by dedicated experts like think-tanks who have resources at their disposal to look at the statistics holistically.

Hidden files

In computing, there is an option to hide files or even whole folders yet these remain an integral part of the consumption of computer resources. Similarly there is the excess baggage we are all carrying in the form of hidden files on research about the negative effects of wireless networking on humans. According to Prabhatam Project Ltd (2008), children are in the higher-risk category because they are in the delicate phase of human development, during which they are forming their critical consciousness and cognitive intelligence. Their skulls are thinner and smaller, making them victims of head resonance as electromagnetic waves traverse their heads. Failure to respect and play safe during this delicate phase can result in catastrophic consequences, such as neurological disorders, developmental malfor-

mations, or downright denaturing of children's brains. Firstenberg (2008) goes further to say that there is enough evidence to warrant shutting down the wireless/wifi industry. Despite that, this research established overwhelmingly that computer literacy campaigns should target elementary school children as a starting point with provision for wireless Internet access.

It is an established precept that children are the sole continuum on which human development is dependent. The only other competing continuum is the ongoing research on cryonics (Alcor Life Extension Foundation, 2011), but I do not give it any credence at achieving its desired outcomes of preserving/freezing humans for the future. Given the data put to my disposal, continuing to expose adults and children to electromagnetic radiation (EMR) is the same as allowing them to play around with smoking guns pointed at their heads. Ironically, cell phones are mostly pointed at the head or around the waistline were the recreation factories are located. The research exposed the fact that most respondents had very little knowledge of the negative effects of EMR on human or animal health.

Another reason for zeroing in on wireless networking technology is highly technical but an attempt will be made to demystify the jargon. First, it is pertinent to forewarn that most researchers admit that the human knowledge of 'the absolute range of human brain waves is incomplete…' (Healthyself, 2006). The human brain functions in the electromagnetic frequency ranges Delta [0-4Hz] to Theta [4-7Hz] to Alpha [7-12Hz] to Beta [13-40 Hz] according to Healthyself (2006). Wireless networking functions in the electromagnetic frequency space in the categories of licensed and non-licensed microwaves. Another confusing classification of EMR is the 'ionising' and 'non-ionising' representing safe and unsafe radiation as explained by Firstenberg (2008). A whole list of health issues associated with so-called safe radiation are listed by Healthyself (2006). Crammed in these delicate frequency ranges are cordless phones, microwave ovens, baby monitors, Bluetooth devices, wireless routers, mobile communication base stations, remote controls, and satellite signals to name a few. By any standard, people in urban centres, more so in developed

countries, are living dangerously. All of the above radiation pollutants are active at my residence in the USA today. Eliminating or at least reducing exposure to EMR through wireless devices is in the long-term interest of our species.

Potential of ICT

Lab I: One Kindle per child

After careful Internet research on what the current market is offering, the following technology is being recommended to set the standards at the entry level of ICT deployment: primary schools. Researched data helped reach the decision to advocate for one Kindle per child to be applied across all rural and urban schools. The Kindle has the potential to solve one of the perennial problems in rural schools: shortage of text books. Instead of hardcopy textbooks, publishing companies can buy digital rights of books which are then uploaded onto the Kindles. The Kindle is versatile enough to accept the Adobe Reader format documents which can further be freely converted to Kindle-format. Going by standards in the USA, digital rights are cheaper than printing rights and ebooks have become an instant hit (Watters, 2011).

Lab II: Computer laboratory

This lab was motivated by the Zimbabwe ICT Policy 2010/2011 (2010) which set aside an amount of $2 million for computer equipment for schools. The government in pursuance of the one-computer-per-classroom threshold allo-

cated $2 million for 60 schools. Using this same allocation as a reference point, the lab will outfit schools with computer lab equipment in a cost-effective manner so as to improve the threshold without increasing the budget. At the current market price of equipment used, the $2 million allocation will be able to outfit 120 schools with state-of-the-art multimedia computer equipment. However these figures may be deceptive in a number of ways. The lab did not factor in installation costs which in this case are minimal because most of the equipment is plug-and-play. Secondly, instead of one PC per class, the lab deploys 30 terminals per school with the flexibility to deploy them into classrooms/offices or in one computer laboratory.

A few concepts have been applied to the lab in keeping with current technological trends, such as sustainable energy, eco-friendliness, and user-friendliness. Zimbabwe, like most countries in the tropics, is endowed with free wind and solar energy and this has been factored into the design to give 24/7 power supply to the computer lab. Some of the wildest inputs to this research came from the question about what people thought was inside computers before studying them. These answers did not come as a surprise, however, because computers have been a source of mystification for years. This mystification is responsible for much intimidation that feeds into computer illiteracy. The research deemed it necessary to demystify the computer by using clear central processing unit (CPU) cases. After all is said and done, another bonus from networking rural schools with multimedia PCs is to curb the rural-urban migration of teachers which has been a problem in some areas.

Table 1. *A comparison between the kindle and the old hardcopy textbooks.*

	KINDLE [soft copy]	TEXT BOOKS [hard copy]	
√	Lower cost of ownership [including text-books]	Higher cost of ownership [including text-books]	X
√	Accommodates students with eyesight challenges	Inflexible – one print for all eyes	X
X	Gray-scale print & pictures only	Colour print optional	√
√	Night reading possible	Night reading requires extra lighting	X
√	Eco-friendly	NOT eco-friendly [paper from trees and ink toxins]	X
√	Waterproof [optional]	Waterproof [optional]	√
√	Portable	Less portable	X
X	Single point of failure [replacement]	Multiple failures [	√
√	3G/4G capability for updates	None [updates by replacement]	X
√	Free downloads [newsletters, novels]	None	X
√	Voice-to-text	None interactive	X

Table 2. *A comparison between the conventional computer lab and the proposed Virtual Desktop [smart terminals].*

	CONVENTIONAL COMPUTER LAB	NEW LAB – VIRTUAL DESKTOP	
X	Cost of ownership, high	Lower cost of ownership	√
X	Toxic waste higher [from CRT monitors and hard drives]	Toxic waste lower [flat screens and solid state drives]	√
X	PC processing capacities redundant – each PC used less than 10% at any time	PC processing capacities optimized – hyperthreading, multicore processing, etc	√
X	Maintenance cost high [more equipment]	Maintenance cost lower [smart terminals reduce hardware]	√
X	Power consumption higher [more hardware clutter]	Power consumption lower [less equipment]	√
X	Multimedia support – none by design	Multimedia support – with battery power option	√
X	Short-term investment in several hardware pieces	Long-term investment in solid-state hardware pieces	√

My daughters' high school back in Zimbabwe, St John's Emerald Hill, used to have a class size of 30 students. The same high school had a computer lab of about 30 computers towards which I used to volunteer my services in hardware and network engineering. This sitting capacity was used as the default computer laboratory size. The lab outfit components were priced at current market value which, for the sake of compilation, were replicated and the figures accumulated to national budget level of $2 million. The lab design successfully increased the 'students-per-computers' threshold using the same limited budgetary resources with value added benefits.

Conclusion

UN arsenal

Protracted Internet research established the structure of UN arsenal addressing the ICT for development (ICT4D) challenges at multiple levels from public policy formulation to capacity building and coordinating the whole gamut of stakeholders. The UN infrastructure goes deeper to all five regional levels; ESCWA (Economic and Social Commission for Western Asia) in Lebanon, ECA (Economic Commission for Africa) in Ethiopia, ECE (Economic commission for Europe) in Switzerland, ESCAP (Economic and Social Commission for Asia and the Pacific) in Thailand and ECLAC (Economic Commission for Latin America and the Caribbean) in Chile. These represent Middle East, Africa, Europe, and South America respectively. The ITU (International Telecommunications Union) also has its own global outreach through synergies with existing infrastructure.

The Economic and Social Council (ECOSOC) provides coordinating machinery for autonomous organisations within the UN at two levels: intergovernmental level and inter-secretariat level. CSTD (Commission on Science, Technology and Development) through UNCTAD, and UN-GAID (Global Alliance for IT and Development) both feed into ECOSOC for converting outcomes into multilateral public policy. UNCTAD services the CSTD which is responsible for the implementation of WSIS (World Summit on the Information Society) which in turn mandated the IGF (Internet Governance Forum) in Tunisia in 2005. UN-GAID is an informal platform open to all stakeholders interested in the information society. What is peculiar about the ICT4D organs is that they are funded from voluntary contributions and not the regular budget of the UN. This fact alone introduces a new dynamic and context which may have been responsible for challenges in accessing key information. UN member states have no control over and little access to organs that are outside the regular budget. It would do more justice to make these UN-ICT4D structures a subject of separate research.

From a multilateral level, the buck is passed down to regional level from where it is passed down to governments and ministries. One interviewee made an interesting observation on the effectiveness of ICT ministries as it relates to the level at which it is elevated in government. He observed that South Korean ICT ministry is headed by the Prime Minister causing it to grow momentously. Today South Korea has a Ministry of Science & Technology in addition to a Ministry of Information & Communication; both are dissecting the components of ICT devel-

opment. In Rwanda, the President uses a similar structure where ICT attributions are under his office while science, technology, and research are under the Education Ministry. These examples demonstrate the importance of political muscle and will to the impetus of ICT development.

Summary

Consequential to the research processes, it has become my contention that all stakeholders in ICT4D should be bold enough to take ownership of the outcome of development projects. The quantum of people looking up to stakeholders, including the generation to come, should be able to scrutinise our vision, path, and speed and still appreciate their heritage. Blaming advocacy groups for sensationalising issues who counter-blame government for bureaucratic red-tape is a failure to take responsibility of actions within our jurisdictions. Blame games between 'bedfellows' who know each other all too well exhibit naivety and a lack of flexibility. Knowing my wife's driving preferences helps me peacefully coexist with her on the highways.

My biggest fear is for the development community to wake up one day and realise that it failed to ask the relevant questions or that it went down a futile trajectory because it failed to focus critically. In introspect, our challenges can be summed thus: vision, economics, and politics. If the collective capacity of the citizenry can be realised, all these challenges amount to nothing. Visionary capacities wait to be nurtured through think-tanks, collaboration, and networking. Politics is in the hands of the people who collectively decide who must serve them in various political capacities. The economic challenge is overcome by setting strict accountability frameworks, making the right choices and setting priorities right. Governments and multilateral organisations like the UN have the challenge to steer beneficiaries towards realising their collective capacity. Emerging patterns of activism in the Arab world is exposing the untapped potential within people to use ICT in the form of 3G mobile communication and social networking. ICT is now taking its place at the centre of human development. It is catalytic, enabling, and fuelling human development, but the speed limit is for stakeholders to define. The successes of drivers of ICT development are in collaborative networking and the deliberate spreading of literacy by the literate.

To help in asking the right question, interviewees were given an open-ended request to contribute any outstanding question/s in the ICT4D debate. The responses included a wide spectrum and are summarised below:

- Policy should address the question of who is slowing down development and conduct an accountability witch-hunt if necessary.
- Policy should be clear on the intersection between state security and ICT backed by the relevant legal lingo.

Further research

Following the transition from what remained of the analogue system to digital, the USA is now finding new uses for the 700Mhz bandwidth that used to carry the analogue TV broadcast signal. Developing states could take a few pages from the USA diary to apply to their situations as they transition to digital.

A documentary entitled *Full Signal* was released in June 2010 and judging from the movie trailer and reviews, the devil is in the details. The aspects of EMR and human health are covered in depth (Full Signal, 2010). Unfortunately the movie could not be viewed in time for this research release. This documentary could be a good support for other researches in ICT4D.

The upsurge in social networking activism has given birth to cyberguerillas and cyberliberators. This portends both negative and positive potential in that affinity for mobile networking will grow due to the realisation of its empowering effect. On the other hand, sitting governments will most likely increase counter activities such as deep packet inspection, content filtering, and the infamous Internet kill-switch. Therefore, the intersection between state security and ICT policy will need to be continually researched.

Abbreviations and acronyms

CRT – Cathode Ray Tube

CSTD – Commission for Science & Technology for Development

EMR – Electro Magnetic Radiation

GAID – Global Alliance for ICT and Development

ICT – Information & Communication Technology

ICT4D – Information & Communication Technology for Development

ITU – International Telecommunications Union

UN – United Nations

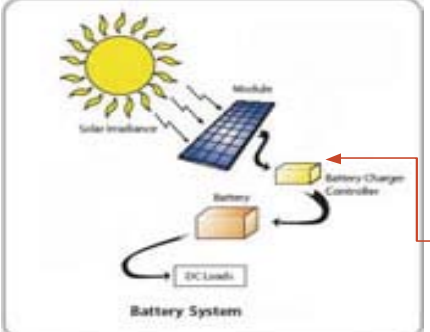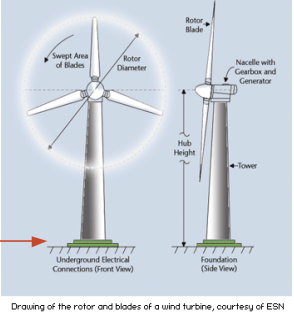**UNCTAD** – UN Conference on Trade & Development

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Appendix 1: One Kindle per child

Kindle II	Features
The Amazon Kindle II $190	# splash-proof case # dictionary built in # night reading [optional] # highlighting & under-lining # multiple books reading # e-ink technology – no glare # web browsing over wifi [optional] # capacity = 3500 books # seamless reading # battery life up to one month # read-to-me using text-to-speech software # 14-day lending of books to other kindle users # download books via wifi # $189 price from: http://www.boingboing.net/2010/06/21/ kindle-price-drops-t.html
Charger $35	# hand wind-charger # output USB optional # portable # fully manual $35 price from: http://www.amazon.com/Sidewinder-Charger-Innovative-Solutions-Tech/dp/ B000PCWYUC $3 adaptors from: http://www.amazon.com/Mobile-Cell-Phone-Charger-Adapter/dp/B0034JKJ6Y/ ref=pd_sim_dbs_sg_2
TOTAL COST PER CHILD = $225 LESS ECONOMIES OF SCALE FOR NATIONWIDE PROCUREMENT - $150 [or less]	

Appendix 2: Computer lab outfit for schools

DEVICE	FEATURES
PC Desktop	
	* 6-core processor AMD Phenom II X6 1090T = $200 * CPU cooler = $160 * Motherboard ASUS M4A87TD = $115 * RAM DDR3-1600/PC3-12800 12Gig = $290 * HDD solid state drive 120Gig = $230 * Dvd players x 5 = $100 * Power supply acrylic = $40 * multi-threading for simultaneous processing of multiple programs * overclocking * 6-core processor at 3.2 GHz * clear case for learning environments
Power Supply	
12CM LED FAN	
Flat Screen Monitor	
	* 19-inch = $100 * Accessories = $50 [mouse, keyboard, usb, headphones, mic] * low power consumption * lower freight cost * more user friendly * greener
Multimedia projector	
	$450 + $100 * multiple file format support * interface options * 100" screen * portable between classes * battery operated
Networking Devices	
L300 L300 based computer lab for 30 users [with switch]	# L300 device kits @ $215 each = $7000 + # 30 flat screen monitors @ $150 = $4500 # switch - $100 # Sharing untapped power of one PC with up to 33 virtual desktops. # each user has keyboard, mouse, sound output, # USB access at each virtual terminal # 80 percent reduction of ewaste # short deployment and upgrade periods # single software license

Power Source -	Solar Panels	Wind turbines	
			* Dual charging system from Solar panels or wind turbines * sustainable energy source * 800-Watt solar system = $3000 + * 900-watt wind turbine = $2500 * 24 Hour charging
Add a GSM broadband wireless with static/fixed dock to avoid stray wireless waves in schools			
Make use of free open source software [FLOSS] to the extent possible. UBUNTU [YLMF] Operating System; Open Office Suite; Audacity; GIMP			
TOTAL COST = $18700 less economies of scale on multiple 30-seater computer labs = $15000 [or less]			

Appendix 3: Questionnaire

RESEACHER: FELIX SAMAKANDE
RESEARCH TITLE: EXPLORING THE NEED FOR SPEED IN DEPLOYING INFORMATION & COMMUNICATIONS TECHNOLOGY FOR INTERNATIONAL DEVELOPMENT AND BRIDGING THE DIGITAL DIVIDE

The research is an effort to synchronise development intentions and sharpen strategies in deployment of ICTs in developing states. It is being conducted under the auspices of **DIPLO FOUNDATION** who are delivering capacity development programs to Africa-Carribean-Pacific (ACP) states in the area of study; **ICT POLICY & INTERNET GOVERNANCE**. This questionnaire is part of the; **RESEARCH IMPLEMENTATION PHASE**
* Please note that any information given will be used anonymously in the research outcome paper.
** Feel free to answer as many questions as you are comfortable with and you may "copy paste" or "drag-and-drop" the provided icons into the answer spaces:

☑ = YES [--☑--]
☒ = NO   [--☒--]

1) Information & Communication Technologies (ICTs) are being heralded as enablers to speeding up achievement of Millenium Development Goals (MDGs). MDGs are noble development intentions that aim to eliminate poverty and alleviate effects of natural disasters among other things. Please indicate whether you; ☑☑☑☒☒☒
_____s ubscribe to this approach and trend of thought
_____ do not agree
_____ other (specify)

2) The digital divide is one of the sore spots on ICT development between developed and developing states. In your view, should resources be channeled more towards: ☑☑☑☒☒☒
_____ eliminating the digital divide
_____ reducing the digital divide or
_____ target critical areas of the divide like literate versus illiterate divide
_____ other (specify)

3) In deploying ICT projects, which approach would you say best suits developing states: ☑☑☑☒☒☒
_____ Top-down approach [government hierarchy first then technocrats and citizenry]
_____ Bottom-up approach [school children/teachers then public servants and technocrats]
_____ Horizontal approach [any accessible levels in society whether urban or rural areas
_____ other (specify)

4) If a government is to set an ICT Development threshold or minimum acceptable literacy level, which of the following guidelines would you recommend in helping refine the process; ☑☑☑☒☒☒
_____ review the thresholds before the start of every new budget cycle
_____ use brand new hardware/software as opposed to used ones
_____ accept technology that is still under trial or experimentation

5) Do you consider that donor agencies come to developing states with sufficiently defined exit strategies: ☑☑☑☒☒☒
----
[a] Should any of the following be included in these exit strategies:
_____ local ownership of ICT development projects
_____ point of failure of projects
_____ transfer of technology

6) The numbers of broadband mobile subscribers are increasing rapidly in developing countries. Do you envisage any of the following business models emerging when the bulk of mobile broadband business/profit is generated in developing states? ☑☑☑☑ ✖✖✖
_____ developing states determining prices of technology
_____ manufacturing of technology localised in developing states.
_____ distribution of profits spreading more in favour of developing states.
_____ relocation of headquarters of ICT corporations to developing states
_____ others (specify)

7) Identify one or more areas of conflict from the list that exist between governments or politicians on one side and aid donors or development practitioners on the other?
☑☑☑☑ ✖✖✖
---- trust issues with communication equipment
---- beaurocracy by public servants
---- insufficient knowledge of technology causing suspicion
---- agenda of practitioners that is not too well defined or
---- open ended programs
---- other (specify)

8) Are ICT think-tanks a common feature in the states that you have visited? ☑ ✖
----
[a] If yes give one positive effect of their presence…..
[b] If no give one negative effect of their absence……..

9) What negative effects of wireless technology are you aware of in the following areas?
☑☑☑ ✖✖✖
---- human health…
---- animal health…
---- environmental health…
---- others (specify)…

10) In bridging the digital divide, do you think developing states should; ☑☑☑ ✖✖✖
---- follow in the footsteps of developed states
---- develop faster than developed states
---- set their own development targets and manage the digital divide in critical areas only.

11) Which of the following is pausing greater danger to development intentions especially the transfer of common good from ICT to target communities? Rate the following in the range 4 – 0 where 4 is the greatest danger and 0 is no danger. ☑☑☑ ✖✖✖
---- Donor fatigue----
---- Aid dependency----
---- Eviction of development practitioners or NGOs from some states.----
---- others (specify)----

12) Given the central role being played by ICTs in general and social networks in particular in recent political advocacy and regime change agenda in the Arab World and USA, what effects do you see this having. Rate the following on a scale of 1-6 where 1 is the most likely and 6 least likely:
☑☑☑ ✖✖✖
---- filtering of internet content by sitting governments especially social networks ----
---- the infamous internet kill-switch by governments----
---- a paradigm shift on ICT policy and internet governance----
---- escalation of deep packet inspection technology on internet users----
---- arrested development in these technologies ----
---- any other [specify]…

13) Before you were computer literate what was your understanding of what is inside the CPU box of a computer?
----

14) In ICT development for developing states, do you consider it imperative to;
☑☑☑☒☒☒
---- set some stringent development targets or thresholds before fast tracking to the finish line.
---- copy and paste development targets from those already ahead [developed states]
---- set some broad targets and speed up because technology is changing at a fast pace anyway.
---- learn from mistakes already made and speed ahead in priority areas.

15) Do you subscribe to the thinking that ICT development specification should be spearheaded by experts who are well-researched and dedicated? ☑☒
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16) The 'one-laptop per child' drive/campaign was targeting Primary/Elementary School children and higher. Do you agree with fighting computer literacy starting at this level and if not, at what target age would you recommend? ☑☒
---- primary/elementary children [grade 1 - 4]
---- university/college level adults [undergraduate]
---- high school children [grade 9-12]
---- any other [specify]-----

17) Are there any questions you think should be asked that are relevant to the discussion of ICT for Development?
Questions:_____
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Appendix 4: The Barmeda model