Tools for Development

Using Information and Communications Technology to Achieve the Millennium Development Goals

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As computers and the Internet have continued to transform the economy and society, the role of information and communications technologies (ICTs) in fostering development has become more generally recognized. The Okinawa Charter on the Global Information Society, adopted by leaders of the G8 countries at their Summit meeting in August 2000, highlighted the importance of ICTs in the global development agenda. The G8 called for concerted action to disperse the benefits of the "digital revolution" to the entire global community and established a multi-stakeholder partnership, the Digital Opportunities Task Force (G8 DOT Force), to develop new, innovative strategies for using ICTs to spur social, economic and civic development. In its report to G8 Leaders, the DOT Force focused on the contribution ICTs can make to meeting basic development needs: "Creating digital opportunities is not something that happens after addressing the "core" development challenges; it is a key component of addressing those challenges in the 21st century."[1]

Similarly, the recent work of the UN ICT Task Force has also emphasized the enabling role of ICTs in the development process. Established in March 2001by the UN Secretary-General at the request of the Economic and Social Council, the UN ICT Task Force has become the primary vehicle for private and public sector collaboration in promoting ICTs for development. The Task Force advises the Secretary General, provides strategic direction to multilateral and bilateral efforts to support ICTs and development, and acts as a catalyst for cooperation in programmes and initiatives aimed at narrowing the digital divide.

Sponsored by the UN ICT Task Force, this paper represents an attempt to define more precisely how ICTs can be used to further the achievement of basic development objectives. Using the Millennium Development Goals (MDGs) endorsed by world leaders in September 2000 as a baseline for analysis, the paper conducts a "mapping" exercise, which links the application of ICTs to broader development goals as expressed in the MDGs. The "mapping" of ICT tools to the attainment of the millennium goals in specific development areas leads to a series of ICT-specific targets and suggests possible indicators for measuring progress.

The Task Force intends to present the results of this work at the upcoming World Summit on the Information Society (WSIS) in December 2003, as well as success stories that illustrate the application of ICTs to meet specific socio-economic goals and national case studies analyzing the current situation in several countries in greater detail. In this manner, Task Force members hope to provide world leaders with an opportunity to demonstrate in tangible terms the way in which the effective application of ICTs can advance the overall global development agenda.

> ICTs are not just another sector of economic and social development. On the contrary…the ICT revolution can provide powerful new tools both for addressing people's basic needs and for enriching the lives of poor people and communities in unprecedented ways. …Creating digital opportunities is not something that happens after addressing the "core" development challenges, it is a key component of addressing those challenges in the 21st century….Development efforts will not realize their full potential if they remain limited to traditional approaches to development and international cooperation.
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> *-- Creating Digital Opportunities for All : Meeting the Challenge, 2001*

[1] G8 DOT Force, Creating Digital Opportunities for All : Meeting the Challenge, 2001

2.0 The Millennium Development Goals

At the Millennium Summit in September 2000, world leaders agreed on a set of goals to guide global development in the 21st century. What have become known as The United Nations' Millennium Development Goals, or MDGs, include: halving extreme poverty and hunger, achieving universal primary education and gender equity, reducing under-five mortality and maternal mortality by two-thirds and three-quarters respectively, reversing the spread of HIV/AIDS, halving the proportion of people without access to safe drinking water and ensuring environmental sustainability. They also include the goal of developing a global partnership for development, with targets for aid, trade and debt relief.

The MDGs embody a strong political mandate, endorsed by the leaders of all UN member states; offer a comprehensive and multi-dimensional development framework; and set clear quantifiable targets to be achieved in all countries by 2015. They are central to the fight against poverty and the struggle to create opportunity, prosperity, health, safety and empowerment for all of the world's people, especially the poorest and traditionally marginalized groups.

Box 1.1: Millennium Development Goals

Goal 1: Eradicate extreme poverty and hunger

- **Target 1:** Halve, between 1990 and 2015, the proportion of people whose income is less than one dollar a day
- **Target 2:** Halve, between 1990 and 2015, the proportion of people who suffer from hunger

Goal 2: Achieve universal primary education

- **Target 3:** Ensure that, by 2015, children everywhere, boys and girls alike, will be able to complete a full course of primary schooling

Goal 3: Promote gender equality and empower women

- **Target 4:** Eliminate gender disparity in primary and secondary education, preferably by 2005, and to all levels of education no later than 2015

Goal 4: Reduce child mortality

- **Target 5:** Reduce by two-thirds, between 1990 and 2015, the under-five mortality rate

Goal 5: Improve maternal health

- **Target 6:** Reduce by three-quarters, between 1990 and 2015, the maternal mortality ratio

Goal 6: Combat HIV/AIDS, malaria and other diseases

- **Target 7:** Have halted by 2015 and begun to reverse the spread of HIV/AIDS
- **Target 8:** Have halted by 2015 and begun to reverse the incidence of malaria and other major diseases

Goal 7: Ensure environmental sustainability

- **Target 9:** Integrate the principles of sustainable development into country policies and programmes and reverse the loss of environmental resources
- **Target 10:** Halve, by 2015, the proportion of people without sustainable access to safe drinking water
- **Target 11:** By 2020, to have achieved a significant improvement in the lives of at least 100 million slum dwellers

Goal 8: Develop a Global Partnership for Development

- **Target 12:** Develop further an open, rule-based, predictable, non-discriminatory trading and financial system
- **Target 13:** Address the Special Needs of the Least Developed Countries
- **Target 14:** Address the Special Needs of landlocked countries and small island developing States

Target 15: Deal comprehensively with the debt problems of developing countries through national and international measures in order to make debt sustainable in the long term

Target 16: In co-operation with developing countries, develop and implement strategies for decent and productive work for youth

Target 17: In co-operation with pharmaceutical companies, provide access to affordable, essential drugs in developing countries

Target 18: In co-operation with the private sector, make available the benefits of new technologies, especially information and communications

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Since the Millennium Summit, the MDGs have become widely accepted within the world community as targets for the international development efforts, and as the standard for measuring the progress and effectiveness of development programs. However, while accepted as the international benchmark for development, the achievement of the MDGs by the target date of 2015 poses immense challenges. Work continues on devising the most effective ways and means of meeting this challenge in terms of the policies, institutional mechanisms and resources required to meet the final objective. While the formula for success must include many factors, ICTs will play an essential role. Indeed, harnessing the power of ICTs can contribute substantially to realizing each and every millennium goal; either directly (e.g. through greater availability of health and reproductive information, training of medical personnel and teachers, giving opportunity and voice to women, expanding access to education and training) or indirectly (through creating new economic opportunities that lift individuals, communities and nations out of poverty.)

3.0 ICTs as Tools for Development

Since ICTs are often associated only with the most sophisticated and expensive computer-based technologies, many underestimate their capacity to contribute to meeting development goals. For our purposes, however, ICTs include the full range of electronic technologies and techniques used to manage information and knowledge, as defined by the United Nations Development Program (UNDP): "ICTs are basically information-handling tools - a varied set of goods, applications and services that are used to produce, store, process, distribute and exchange information. They include the "old" ICTs of radio, television and telephone, and the "new" ICTs of computers, satellite and wireless technology and the Internet. These different tools are now able to work together, and combine to form our "networked world" - a massive infrastructure of interconnected telephone services, standardized computing hardware, the Internet, radio and television, which reaches into every corner of the globe."[2]

ICTs are an important sector of economic activity, achieving high growth rates in developed as well as in developing countries. ICTs are also a platform to exchange data, information, knowledge and a tool to implement applications (e.g. e-commerce, e-schools, e-health, etc.). As such, ICTs can play a catalytic role as an enabler to development. Recent developments in technologies, reduction in prices, greater availability of networks and a more user-friendly approach to technologies are strengthening the role that ICTs can play in support of development. In this context, ICTs support all of the 8 MDGs, not only MDG #8, for which the infrastructure aspect of ICTs has been clearly identified.

ICTs offer the developing world the opportunity to 'leapfrog' several stages of development by use of "frontier" technologies that are more practical, environmentally sound and less expensive than undergoing the traditional stages and cycles of progress to the Information Society. Cellular service, for example, has become the first and only telephone service for people in many developing countries where it is available much sooner – and much cheaper - than fixed line service. Countries such as Gabon, Uganda, Morocco, the Ivory Coast, Rwanda, and Tanzania have used ICT innovation to bypass barriers linked with fixed line infrastructure, making a quantum leap into the Information Age.[3] Many governments, private sector and civil

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[2] **Essentials**, UNDP Evaluation Office (Sept. 2001), No. 5, pg. 2. www.gipiproject.org/practices/essentials5-web.pdf

[3] Hudson, Heather, "Solving the Connectivity Problem," **TechKnowLogia**
http://www.unesco.org/bangkok/education/ict/teaching_learning/solving/technologies.htm

society members are beginning to recognize the potential offered by ICTs in overcoming structural and historical weaknesses affecting emerging economies.

> "ICTs have brought about a new hope for the developing world. Many of these countries continue to labour in the agricultural age and their economic development is thus restricted and unable to move on and catch up with the developed world. Most developing nations have also been unable to industrialize their economies leading to greater impoverishment and dependence. In this context, the very prospect of 'leapfrogging' the traditional stages and cycles of progress, is seen as revolutionary. Telemedicine, distance education, wireless applications, the use of the Internet for a wide variety of critical information dissemination tasks – hold the promise of overcoming fundamental barriers of infrastructure which have plagued the developing world."
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> -- "Promoting ICT for Human Development in Asia, Realizing the Millennium Development Goals," (2002) An initiative of the Asia-Pacific Development Program and Human Development Resource Centre (UNDP), New Delhi.

The "digital revolution" created by ICTs has the power to transform production processes, commerce, government, education, citizen participation and all other aspects of our individual and collective lives; therefore it can create substantially new forms of economic growth and social development. On the other hand, the digital divide between rich and poor is threatening to exacerbate the existing social and economic inequalities, so the potential costs of inaction are greater than ever before.

While there are many examples of the positive transformational impact of ICTs, the inclusion of developing economies into the Information Society is a far from simple process. In fact, we are only beginning to understand how the application of ICTs relates to the achievement of social goals and economic growth. Moreover, much debate remains about the relevance of ICT in the development equation. Some question if the benefits will truly outweigh the cost.[4] Others caution the view of ICT for development as a "techno-quick-fix" for solving development problems that have spanned generation upon generation.[5] Others see ICTs as an either/or scenario, meaning that with ICTs come unacceptable tradeoffs in alternative development investments.[6]

ICTs should not be seen as a panacea for all development problems. Nor should they be seen as a standalone solution but a complement to ongoing development investments.[7] Major advances in ICTs combined with rapid growth of global networks such as the Internet offer enormous opportunities to narrow social and economic inequalities and support sustainable local wealth creation, and thus help to achieve broader development objectives. For example, "Creating a Development Dynamic : The Final Report of the Digital Opportunities Task Force" (2001) examined over three hundred ICT for development initiatives and collected empirical evidence that illustrated the role of ICTs in generating new economic opportunities, delivering improved healthcare and education, promoting sustainable environmental management, fostering democratic governance by empowering people and organizations, and making government processes more efficient and transparent.[8]

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[4] Kenny, Charles (World Bank), "Development's False Divide," **Foreign Policy** (January/February 2003), Vol. 4, No. 3. http://www.foreignpolicy.com/issue_janfeb_2003/kenny.html

[5] Wade, Robert (London School of Economics), "How to harness ICTs for wealth creation in developing countries, and what donors can do to help. Or, when are development fads beneficial?," Draft paper prepared for OECD/UNDP conference on the Knowledge Economy, (March 5-6, 2001).

[6] Wilde, Kate (2003) "Measuring and Enhancing the Impact of ICTs on the Millennium Development Goals – A discussion paper for the 4th session of the United Nations ICT Task Force".

[7] Zambrano, Raul "ICT for Development: Facing the Policy Challenges," **Sustainability at the Speed of Light**, World Wildlife Federation, (July 2002), pg. 115. http://www.panda.org/downloads/general/ict_sustainability.pdf

[8] The Digital Opportunity Task Force (2001) "Creating a Development Dynamic, pg 115; " http://www.opt-init.org/framework/pages/contents.html

4.0 Mapping ICT's to Development Goals, Targets, and Indicators

The overall objective of this paper is to map the role of ICTs in helping to achieve Millennium Development Goals (MDGs), building on the global development objectives and indicators already developed by the United Nations.

Building upon the foundation provided by the MDGs, a qualitative as well as a quantitative analysis is required to explain the role of ICTs in support of each one of the MDGs. Documented case studies and examples will be used as well as an analytical grid, defining broad ICT goals relating to the MDG targets. The intent is not to suggest a prescriptive approach but rather to design a progress tracking tool, which could be used, for example, to measure progress accomplished between the two phases of the WSIS: Geneva 2003 and Tunis 2005.

ICT goals can be developed in support of each MDG. However, the task of developing specific ICT indicators, and eventually targets against which progress could be measured, is a more difficult challenge. Not only solid data is required but a rationale needs to be developed to ascertain the relevance of every ICT indicator to the MDGs. Such work should be based on the agreed-upon goals, hard data available in various organizations, and supported by anecdotal evidence coming from the field. For example, while it is comparatively easy to measure telecommunications infrastructure and investment, it is much more difficult to assess the human dimension of ICT for development (the nature and quality of human capital, the skills and capacities of citizens).

Industrialized countries have numerous measurement tools at their disposal to determine ICT penetration, such as indices relating to personal computer and Internet usage, teledensity, electronics consumption, gross enrollment ratios of technical students and so on. Adding complexity to this exercise, available data are particularly deficient for developing countries. Comparability of data from country to country is also a concern. Measurement tools will need to be chosen based on the availability, quality and correlation/standardization of data sources.[9]

A set of ICT goals is therefore suggested in this paper and some indicators are presented for illustrative purposes. The latter will be refined in a second phase of this work and will be based on the work being conducted by specialized international organizations developing and/or using development indicators. The UNDP, the World Bank, the ITU, the UNESCO/ORBICOM network are such organizations.

To the extent possible, for each MDG, a three tier structure will be applied in demonstrating the relevance of ICTs for that particular goal: 1) a macro level ICT goal which would capture national elements, planning functions and global issues; 2) a system level, to indicate the impact of ICTs at the level of a hospital, a school board, a city, in designing and implementing services; 3) an individual level to illustrate the impact of ICTs on the citizen, with a focus on the poor.

A matrix mapping ICTs to the eight key spheres which comprise the MDGs is proposed as a guide to illustrate the relevance of ICTs in achieving MDGs. It is not meant to be prescriptive, nor exhaustive. The matrix provides a snapshot of how ICTs relate to MDGs and suggests some ICT-specific indicators which can be used to measure progress in applying ICTs to the development agenda. In a future step, specific ICT targets could even be suggested based on the available data on this topic.

A certain fluidity with the methodology is required at this early stage of the exercise; further methodological instruments and issues will be developed throughout its course. In the meantime, a number of considerations are offered. For example, the exercise must bear in mind the combination of external factors, capacities and policy decisions that led to a specific ICT for development impact. Will political interests need to be managed? How will what we seek to achieve with ICTs interact with the efforts of other players in the development equation? Special attention will need to be paid to ensure continued policy cohesion within the ICT for development arena as well as within the larger development agenda.

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[9] Sciadas, George, in collaboration with the Orbicom Network, "Monitoring the Digital Divide" (March 2002) pg. 14.

5.0 The MDG/ICT Matrix

This matrix is composed of the following four primary themes. "MDG Goals and Targets" and "MDG Indicators" represent the eight Millennium Development Goals, related targets and their respective indicators as adopted in the Millennium Declaration at the General Assembly of the UN in September 2000. "ICT Goals to attain MDGs" therefore presents a mapping of the role of ICTs in helping to achieve Millennium Development Goals. "ICT Indicators" presents a sample of indicators that could be used to ensure progress in applying ICTs to help achieve the MDGs. These indicators, with the addition of specific targets, will need to be refined in a second phase of this work.

6.0 Linkages & Future Work

The objective of the mapping exercise and the ICT-MDG work generally is to demonstrate the role of ICTs as powerful tools for social and economic development. Their potential contribution to the achievement of development objectives reinforces the need to place ICTs in the mainstream of development strategies and thinking, both nationally and internationally. At the national level, this argument supports the current efforts of several developing countries in developing domestic e-strategies aimed at the application of ICTs to the delivery of public services (health, education and government services), the use of ICTs to improve business efficiencies (through electronic commerce and e-business), and the creation of a legal, policy and regulatory framework that is conducive to the growth and adoption of ICTs. Moreover, the mapping of ICTs to the Millennium Development Goals argues strongly for the need to factor them into the national PRSP process.

The UN ICT Task Force will demonstrate to world leaders at the World Summit on the Information Society (WSIS) in December 2003 how ICTs can have an effective impact in developing countries. The matrix illustrates in practical terms how ICTs can contribute to meet the development challenges expressed by each of the MDGs. Further work is required to refine the analysis and eventually set specific ICT-related targets.

-- UN ICT TASK FORCE --

Millennium Development Goals and ICT Matrix

	MDG Goals and Targets	MDG Indicators	ICT Goals	ICT Indicators -- For illustrative purposes only --
Goal 1	**Eradicate extreme poverty and hunger**			
	Halve, between 1990 and 2015, the proportion of people whose income is less than $1 a day	• Proportion of population below $1 a day • Poverty gap ratio *(incidence x depth of poverty)* • Share of poorest quintile in national consumption	Tier 1: Increase access to market information and lower transaction costs for poor farmers and traders. Increase efficiency, competitiveness and market access of developing country firms. Tier 3: The direct benefits of using ICTs need to translate into economic growth in rural and urban areas, indirectly creating more jobs in traditional sectors, such as farming and fishing.	- Correlation of average income with ICT as % of GDP - PRSPs (poverty reduction strategy papers) that include ICTs (IMF)
	Halve, between 1990 and 2015, the proportion of people who suffer from hunger	• Prevalence of underweight in children (under five years of age) • Proportion of population below minimum level of dietary energy consumption		

	MDG Goals and Targets	MDG Indicators	ICT Goals	ICT Indicators -- For illustrative purposes only --
Goal 2	**Achieve universal primary education**			
	Ensure that, by 2015, children everywhere, boys and girls alike, will be able to complete a full course of primary schooling	• Net enrolment ratio in primary education • Proportion of pupils starting grade 1 who reach grade 5 • Literacy rate of 15 to 24-year-olds	Tier 1: Increase supply of trained teachers through ICT-enhanced and distance training of teachers. Integrate ICT training into curriculum. Improve the efficiency and effectiveness of education ministries and related bodies through strategic application of technologies and ICT-enabled skill development. Tier 2: Empower teachers at the local level through use of ICTs and networks that link teachers to their colleagues. Broaden availability of quality educational materials/resources through ICTs, local content distribution. Tier 3: Use of ICTs to provide schooling and training, including vocational training outside of schools. Use of radio broadcasting to provide schooling and training.	- The Total and % of schools with Internet connectivity - Student/computer ratios - Number of teachers trained on the usage of ICTs (train the trainer) - Number of learning materials available in digital form in local languages - Number of educational websites - Number of e-learning products/services - Number of radio programs and/or hours of radio programming offered in local languages for general schooling and vocational training

	MDG Goals and Targets	MDG Indicators	ICT Goals	ICT Indicators -- For illustrative purposes only --
Goal 3	**Promote gender equality and empower women**			
	Eliminate gender disparity in primary and secondary education preferably by 2005 and in all levels of education no later than 2015	• Ratio of girls to boys in primary, secondary, and tertiary education • Ratio of literate females to males among 15- to 24-year-olds • Share of women in wage employment in the nonagricultural sector • Proportion of seats held by women in national parliament	Note: ICT goals for MDG #2 apply here as well. Tier 1: Deliver educational and literacy programs specifically targeted to poor girls and women using appropriate technologies. Influence public opinion on gender equality through information and communication programs using a range of ICTs. Tier2: Vocational and schooling programs targeted at girls outside traditional school environment (e.g. using community centres in villages, telecentres, etc.). Tier 3: Use radio broadcasting to offer locally-relevant training for girls.	- ICT literacy among girls - Women as % of all Internet users, (The World's Women 2000, United Nations) - Number of female IT workers/No. female technical workers (as % of total) (UNDP – Human Development Report) - Percentage distribution of third-level (university, teachers college or higher professional school) enrollment by field of study – Science and Engineering (Women's Indicators and Statistics Database, Wistat, Version 4, United Nations) - Number of programs and/or hours of radio broadcast targeted at girls schooling and vocational training

	MDG Goals and Targets	MDG Indicators	ICT Goals	ICT Indicators -- For illustrative purposes only --
Goal 4	**Reduce child mortality**			
	Reduce by two-thirds, between 1990 and 2015, the under-five mortality rate	• Under-five mortality rate • Infant mortality rate • Proportion of one-year-old children immunized against measles	Tier 1: Increase monitoring and information-sharing on disease and famine. Increase access to health information, through locally-appropriate content in local languages. Tier 2: Enhance delivery of basic and in-service training for health workers. Increase access of rural care givers to specialist support and remote diagnosis. Facilitate knowledge exchange and networking among policy makers, practitioners and advocacy groups - Under-five mortality rate - Infant mortality rate Tier 3: Use radio broadcasting and telecentres to offer health information (e.g. measles) in local languages.	- Train the practitioners on the use of ICTs - General statistics on access and usability - Proportion of one-year-old children immunized against measles - Number of programs/hours of information sessions

	MDG Goals and Targets	MDG Indicators	ICT Goals	ICT Indicators -- For illustrative purposes only --
Goal 5	**Improve maternal health**			
	Reduce by three-quarters, between 1990 and 2015, the maternal mortality ratio	• Maternal mortality ratio • Proportion of births attended by skilled health personnel	Tier 1: Increase monitoring and information-sharing on maternal health. Increase access to reproductive health information, including information on AIDS prevention, through locally-appropriate content in local languages. Tier 2: Enhance delivery of basic and in-service training for health workers. Increase access of rural care givers to specialist support and remote diagnosis. Tier 3: Use of radio broadcasting and telecentres to offer health information in local languages.	- % of local content on the subject of maternal mortality vs. foreign content - General statistics on access and usability - Number of programs/hours of information sessions

	MDG Goals and Targets	MDG Indicators	ICT Goals	ICT Indicators -- For illustrative purposes only --
Goal 6	**Combat HIV/AIDS, malaria, and other diseases**			
	Have halted by 2015 and begun to reverse the spread of HIV/AIDS Have halted by 2015 and begun to reverse the incidence of malaria and other major diseases	• HIV prevalence among 15- to 24-year-old pregnant women • Contraceptive prevalence rate • Number of children orphaned by HIV/AIDS Prevalence and death rates associated with malaria • Proportion of population in malaria-risk areas using effective malaria • prevention and treatment measures • Prevalence and death rates associated with tuberculosis • Proportion of TB cases detected and cured under DOTS	Tier 1: Increase monitoring and information-sharing on diseases. Increase access to reproductive health information, including information on AIDS prevention, through locally-appropriate content in local languages. Tier 2: Enhance delivery of basic and in-service training for health workers. Increase access of rural care givers to specialist support and remote diagnosis. Tier 3: Use of radio broadcasting and telecentres for information sessions on HIV/AIDS, malaria and other diseases in local languages.	- % of local content on the subject of HIV/AIDS vs. foreign content - General statistics on access and usability - Number of programs/hours of information sessions

	MDG Goals and Targets	MDG Indicators	ICT Goals	ICT Indicators -- For illustrative purposes only --
Goal 7	**Ensure environmental sustainability**			
	Integrate the principles of sustainable development into country policies and program and reverse the loss of environmental resources	• Change in land area covered by forest • Land area protected to maintain biological diversity • GDP per unit of energy use • Carbon dioxide emissions (per capita)	Tier 1: Use of remote sensing technologies and communications networks for more effective monitoring, resource management and mitigation of environmental risks e.g. GIS to combat illegal logging, illegal fishing, to help forest protection. Increase access to/awareness of sustainable development strategies, in areas such as agriculture, sanitation and water management, mining, etc. Greater transparency and monitoring of environmental abuses/enforcement of environmental regulations. Tier 2: Facilitate knowledge exchange and networking among policy makers, practitioners and advocacy groups. Tier 3: Use of broadcasting and communication network for information sharing (e.g. quality of air, water) and alerts (e.g. storm, fire).	
	Halve, by 2015, the proportion of people without sustainable access to safe drinking water	• Proportion of population with sustainable access to an improved water source		
	Have achieved, by 2020, a significant improvement in the lives of at least 100 million slum dwellers	• Proportion of population with access to improved sanitation • Proportion of population with access to secure tenure [Urban/rural disaggregation of several of the above indicators may be relevant for monitoring improvement in the lives of slum dwellers]		

	MDG Goals and Targets	MDG Indicators	ICT Goals	ICT Indicators -- For illustrative purposes only --
Goal 8	**Develop a global partnership for development**			
	Develop further an open, rule-based, predictable, nondiscriminatory trading and financial system (includes a commitment to good governance, development, and poverty reduction—both nationally and internationally)	• Some of the indicators listed below will be monitored separately for the least developed countries, Africa, landlocked countries, and small island developing states.	Tier 1,2,3: Use ICTs for information sharing, discussion groups access to specialized data bases.	
	Official development assistance Address the special needs of the least developed countries (includes tariff-and quota-free access for exports enhanced program of debt relief for HIPC and cancellation of official bilateral debt, and more generous ODA for countries committed to poverty reduction)	• Net ODA as a percentage of DAC donors' gross national income • Proportion of ODA to basic social services (basic education, primary health care, nutrition, safe water, and sanitation) • Proportion of ODA that is untied • Proportion of ODA for environment in small island developing states • Proportion of ODA for the transport sector in landlocked countries	Tier 1,2,3: Use ICTs for information sharing, discussion groups access to specialized data bases.	

	MDG Goals and Targets	MDG Indicators	ICT Goals	ICT Indicators -- For illustrative purposes only --
	Market access Address the special needs of landlocked countries and small island developing states (through the Barbados Programme and 22nd General Assembly provisions)	• Proportion of exports (by value, excluding arms) admitted free of duties and quotas • Average tariffs and quotas on agricultural products and textiles and clothing • Domestic and export agricultural subsidies in OECD countries • Proportion of ODA provided to help build trade capacity	Tier 1,2,3: Use ICTs for information sharing, discussion groups access to specialized data bases.	- No. of UNCTAD trade points
	Debt sustainability Deal comprehensively with the debt problems of developing countries through national and international measures in order to make debt sustainable in the long term	• Proportion of official bilateral HIPC debt cancelled • Debt service as a percentage of exports of goods and services • Proportion of ODA provided as debt relief • Number of countries reaching HIPC decision and completion points		

	MDG Goals and Targets	MDG Indicators	ICT Goals	ICT Indicators -- For illustrative purposes only --
	Other In cooperation with developing countries, develop and implement strategies for decent and productive work for youth In cooperation with pharmaceutical companies, provide access to affordable, essential drugs in developing countries In cooperation with the private sector, make available the benefits of new technologies, especially information and communications	• Unemployment rate of 15- to 24-year-olds • Proportion of population with access to affordable, essential drugs on a sustainable basis • Telephone lines per 1,000 people • Personal computers per 1,000 people	Tier 1: Promote public-private partnerships to deploy ICTs in the pursuit of all MDGs. Promote distance working facilitated by ICT to create service-sector jobs in developing countries in such industries such as call centres, data entry and processing, and software development. Promote telecentres (not only to provide communications, but to also create direct employment for men and women). Improve youth learning skills on ICT and using ICTs to meet the challenges of the knowledge-based global economy of the 21st century. Provide online drugs databases. Combine low and high technology to achieve relative ubiquity of access to effective and affordable information and communication technology tools. Promote digital literacy through e-learning. Development a critical mass of knowledge workers with the technical capabilities to provide and maintain ICT infrastructure.	Designated MDG Indicators specific to ICT - Telephone lines per 1,000 people - Personal computers per 1,000 people Other potential indicators: - Number of people trained in ICTs (local capacity building) - Number of local companies registered with ICTs as main/major business - Number of local domain names registered (locally) - or domain addresses registered to an address in a country - Number of PCs per thousand / phones/mobiles per thousand / radios/radio stations per thousand - National ICT policy or dialogue on ICT policies - Competitive market / degree of market regulation - Number of ISPs per thousand - Local ICT-related 'patents' registered - Number of registered software licences in country - Number of institutions (i.e.: schools, hospitals, local governments, banks, universities, libraries, etc) connected electronically - Number of web pages in major 'local' languages - Number of IP addresses/domain names/e-mail accounts - Number of people employed in local ICT sector

Notes on the MDG/ICT Matrix

MDG # 1 *-- ICT impact on the eradication of extreme poverty and hunger*

- Number of ICT initiatives related to the eradication of extreme poverty and hunger: the presence of initiatives related to ICT use in these areas is a promising source of information, though systematic measurement of their specific impact would be challenging. Data collection will cover the actual ICT programmes, uses and applications launched by all the social actors, including the state, the NGOs and the private sector in attempting to fight the eradication of poverty and hunger within developing countries.

MDG # 2 *-- ICT impact on the achievement of universal primary education*

- ICT access and usage in primary schools: Statistics on children's access and usage in the classroom of ICTs are the most direct indicators of ICT advancement. IDRC's Scan-ICT project offers a number of important country-specific ICT and education indicators related to access and usage under the following themes: ICT penetration, ICT investment, Users and Usage/Access. Specifically, statistics on the *Total and % of schools with Internet connectivity* could be ascertained by studies such as Scan-ICT (to date, project countries are: Ethiopia, Mozambique, Senegal, Ghana, Morocco, Uganda) and National Survey of ICTs in South African Schools. S*tudent/computer ratios* would also be a key indicator also be obtained for specific developing nations through Scan-ICT.

- ICT policy environment related to education: this would entail measurement relating to the consideration of primary education needs in a country's ICT plan, policy or strategy.

- *Number of teachers trained on the usage of ICTs (train the trainer):* Studies such as SchoolNet.sa's Educator Development for ICT Framework would provide this type of data.
- Content: the presence of content related to ICT and (primary) education would be an important indicator, particularly in terms of the number of learning materials available in digital form in local languages; the number of educational websites; and the number of e-learning products/services related to primary education. Scan-ICT's country reports do contain a "content-based" indicator on ICTs and education, however, this indicator is more related to user-based content as opposed to education-based content.

- ICT initiatives related to primary education: the presence of initiatives related to ICT use in primary education in developing countries would provide a valuable source of information, though systematic measurement of their specific impact will be challenging.

Note: The "Global Survey and Guide to ICT Planning in Education" may be a critical overall indicator of ICT progress in the field of education when it becomes available. With the support and collaboration of the World Bank Institute and the Educational Development Center, Inc. (EDC), Information Technologies Group at Harvard University is developing a survey and subsequent Guide to ICT Planning in Education, an assessment tool that will benchmark the progress that communities in the developing world have made toward integrating information and communication technologies (ICT) into their education systems. This initiative may serve as a critical step to achieving a general indicator for ICT penetration/impact within primary education for the developing world.

***MDG # 3** -- ICT impact on the promotion of gender equality and the empowerment of women*

ICTs create significant opportunities for bridging the gender divide and supporting the empowerment of women in developing countries. Examination of (recent) past, present and future impacts of ICTs as they relate to gender will serve as an indication of what we've done, where we are currently and where we need to go to utilize to the fullest the unique possibilities the information society brings for women's social, political and economic empowerment. Measurement of ICTs' impact could surround areas such as:

Women's ICT access and usage: Statistics on women's access and usage of ICT are the most direct indicators of advancement in bridging the gender divide, yet they are perhaps the most scarce and inexact to ascertain.[10] An added impediment is that there is little consistency with data collection.[11] Indicators specific to Internet use are *Women as % of all Internet users, (The World's Women 2000, United Nations with citations from CyberAtlas and NUA)*(includes data for Sub-Saharan Africa, South America and specific regions in Asia).

In several countries, economic and cultural barriers prevent girls from attending schools. ICTs can play a major role in supporting schooling and vocational training efforts in environments outside the traditional schools (e.g. at a community Centre). This impact needs to be measured in the pursuit of MDG #2 and #3.

- Women and ICT-related employment and education: indicators such as the *No. of female IT workers/No. female technical workers (as % of total) (UNDP – Human Development Report)* could assist in determining women's participation in the workplace of the new economy. Women's advancement through their participation in ICT-related careers could also be determined/predicted through an examination of fields of educational study. This could be measured by statistics on *Percentage distribution of third-level (university, teachers college or higher professional school) enrollment by field of study – Science and Engineering (Women's Indicators and Statistics Database, Wistat, Version 4, United Nations)*.
- Women's ICT initiatives: the presence of initiatives in developing countries that bring about women's advancement through the use of ICTs is a promising source of information, though measurement of their specific impact would be challenging.

***MDG # 4, 5 & 6** -- ICT impact on the reduction of child mortality, improving maternal health and combating HIV/AIDS, Malaria and other major diseases*

While there are many specific indicators for child mortality, improving maternal health and combating HIV/AIDS, Malaria and other major diseases, is very difficult to develop those related to ICT. Measuring the impact of ICT on health generally seems to be fairly difficult because there are obviously many other factors that impact health. Consequently one has to look to so called "surrogate endpoints", e.g. better information flow, better management of health systems etc.

The World Health Organization is struggling with the problem of developing ICT-related indicators for health and have, as part of the UN ICT Task Force Action Plan, initiated a literature review on ICT/health projects (carried out by CIDA).

In the meantime, available indicators relate mainly to content as well as access, policy and programming. They include:

- Content: the presence of content related to ICT and health (specifically, child mortality, improving material health and combating HIV/AIDS, Malaria and other major diseases) offers some ability for assessment. Scan-ICT provides perhaps some of the best data available on health-related content for Ethiopia, Mozambique, Senegal, Ghana, Morocco and Uganda. Statistics have not been broken down by disease area. They have however been broken down by form of content -- telemedicine,

[10] United Nations Development Fund for Women (UNIFEM), "The World's Women 2000," New York: United Nations, pg. 96.

[11] Nancy J. Hafkin, "Some thoughts on gender and telecommunications/ICT statistics and indicators," 3rd World Telecommunication/ICT Indicators meeting, Geneva, January 15 – 17, 2003, pg. 2.

research, data-base, information systems, application software, distance learning, health promotion, e-mail, other – which is a very necessary foundation in which to build upon.

- The work of Scan-ICT provides key accessibility and usage indicators in the area of health and ICT specifically relating to institutions (ICT penetration, usage and ICT investments and spending) and individuals (human capacity).

- ICT policy environment related to health: this would entail measurement relating to the consideration of health and healthcare needs in a country's ICT plan, policy or strategy.

- The existence of specific programs and campaigns relating to ICTs and the health sector would be a useful indicator. This may be as simple as determining the increased number of member countries using the World Health Organization's Health Internetwork.

MDG # 7 *– ICT impact on environmental sustainability*

ICT can make a valuable contribution to sustainable environmental management by improving monitoring and response systems, facilitating environmental activism and enabling more efficient resource use. Indicators to measure these impacts could take shape around the following:

- Content: Scarcity of relevant and reliable information has always been a substantial obstacle to more effective environmental management. Used to collect, process and disseminate information, ICT enables a better understanding of issues such as climate change and biodiversity and helps to monitor ecological conditions so that prevention and mitigation measures can be activated. ICT further provides a medium for sharing information and good practices on increased access to/awareness of sustainable development strategies, in areas such as agriculture, sanitation and water management and mining. Therefore, the presence of content related to ICT and the environment would be a key indicator.

- Prevention/monitoring of environmental disasters: ICT is being deployed extensively to monitor and respond to environmental disasters in developing countries. The incidence to which ICTs are a factor in aiding disaster preparedness are important statistics, particularly in terms of reductions in casualties and property loss.

- Improved efficiency and resource management: ICT applications can be used to reduce the consumption of energy, water and other essential natural resources through more efficient agriculture and industrial procedures.

- ICT initiatives related to the environment: the presence of environmental initiatives related to ICT use in developing countries is a promising source of information, though systematic measurement of their impact would pose a challenge.

MDG # 8 *– Developing a global partnership for development*

The dynamic interplay between ICT and its meaningful impacts on economic development, human capacity, gender equality, health and the environment must be recognized and monitored accordingly. The MDGs recognize the role of ICTs and its impact on human development exclusively through MDG #8 rather than as an important component of all MDGs as recommended by this paper. Out of 48 quantifiable indicators the UNDP, other UN departments, funds and programmes, the World Bank, and the OECD identified to assess MDG progress, two are ICT-specific and solely infrastructure-related:

- Telephone lines per 1,000 people
- Personal computers per 1,000 people

Clearly, infrastructure-based measurements do not show the whole picture. Other indicators that could be considered are:

- Number of people trained in ICTs (local capacity building)
- Number of local companies registered with ICTs as main/major business
- Number of local domain names registered (locally) - or domain addresses registered to an address in a country
- Number of PCs per thousand / phones/mobiles per thousand / radios/radio stations per thousand
- National ICT policy or dialogue on ICT policies
- Competitive market / degree of market regulation
- Number of ISPs per thousand
- Local ICT-related 'patents' registered
- Number of registered software licenses in country
- Number of institutions (i.e.: schools, hospitals, local governments, banks, universities, libraries, etc) connected electronically
- Number of web pages in major 'local' languages
- Number of IP addresses/domain names/e-mail accounts
- Number of people employed in local ICT sector

ICT indicators and targets are being developed by different organizations. These indicators related directly to MDG #8 and indirectly to the #7 MDG. They can provide an overall framework to monitor the progress of developing countries vis-à-vis the digital divide. Two studies that also provide such potential mechanisms are Orbicom's "Monitoring the Digital Divide" and *info*Dev's "Global Information Technology Report 2002-2003".

Orbicom's work assesses the magnitude of the digital divide or, more specifically, a country's progress toward the "infostate," through thematic clusters of indicators surrounding infodensity and info-use.

*info*Dev's Global Information Technology Report benchmarks and monitors the progress of 82 countries towards a networked economy. The index is comprised of three elements: the environment for ICT offered by a given country or community; the readiness of a communities' stakeholders to use ICTs; and finally, the usage of ICT amongst these stakeholders.

Though Orbicom and *info*Dev take into account the needs of developing countries, their methodologies may prove impractical (for the time being); both studies acknowledge the enormous gaps in data for emerging economies. However, what is perhaps the most valuable aspect to these works is that they represent a framework of key statistical indicators that we must work towards achieving to measure the impact of ICT for development efforts.[12]

Doing so will, of course, necessitate the combined efforts of organizations such as the ITU, OECD, UNDP, UNESCO, the World Bank, Orbicom and *info*Dev, to name a few. Monitoring the digital divide will truly require a global partnership for development.

[12] *info*Dev, "The Global Information Technology Report," New York: Oxford University Press (2003), Pg. 10.

-- Annex 1 : Selected Resources --

Making the Case: Information Communications Technologies and the Millennium Development Goals -- Selected Resources

"Genoa Plan of Action – Report of the Digital Opportunity Task Force" (July 2001)

"Implementation of the United Nations Millennium Declaration: Report of the Secretary General," http://ods-dds-ny.un.org/doc/UNDOC/GEN/N02/506/69/PDF/N0250669.pdf?OpenElement

"Science, Technology and Innovation: Challenges and Opportunities for Implementing the Millennium Development Goals," (January 2003) Draft report of the Task Force on Science, Technology and Innovation, United Nations Millennium Project.

Report of the Inter-agency Expert Group on Millennium Development Goals Data and Trends, 2002 http://millenniumindicators.un.org/unsd/mi/mdg_report.pdf

"The Role of Information and Communication Technologies in Economic Development - A Partial Survey, ZEF," Discussion Papers on Development Policy Bonn (May 1999) pages 3-6, http://www.developmentgateway.org/download/164685/zef_dp7-99.pdf

United Nations Statistics Division. "Monitoring progress towards the achievement of the Millennium Development Goals" (October 2002) http://millenniumindicators.un.org/unsd/mi/mi_highlights.asp

Wilde, Kate (2003) "Measuring and Enhancing the Impact of ICTs on the Millennium Development Goals – A discussion paper for the 4th session of the United Nations ICT Task Force".

Towards a Global Framework: Methodology and Indicators -- Selected Resources

Daly, John "Measuring Impacts of the Internet in the Developing World." IMP: Information Impacts Magazine. (May 1999) http://www.cisp.org/imp/may_99/daly/05_99daly.htm

Mansell, R., and Wehn, U., (Eds.) (1998) Knowledge Societies: Information Technology for Sustainable Development, New York: Oxford University Press. http://www.susx.ac.uk/spru/ink/knowledge.html Chapter 2 -- Indicators of developing country participation in 'knowledge societies'

Sciadas, George, in collaboration with the Orbicom Network, "Monitoring the Digital Divide" (March 2002) pg. 14.

"Promoting ICT for Human Development in Asia – Realizing the Millennium Development Goals," (2002) An initiative of the Asia-Pacific Development Program and Human Development Resource Centre (UNDP), New Delhi.

The MDG/ICT Matrix - Selected Resources

OECD, "How ICTs can help achieve the Millennium Development Goals – Room document 6," Meeting on Integrating ICT in Development Programmes (March 2003)
http://www.oecd.org/xls/M00039000/M00039637.xls

Snow, Crocker, "Matching the Millennium Development Goals, Information and Communications Technologies and Government Actions: A Preliminary Report" February 2003) Money Matters Institute, Inc., Boston.

UNDP, "The Role of ICT in Enhancing the Achievement of Millennium Development Goals," A Contribution to the Work of Millennium Project
Task Force 10 on Science and Technology (February 21, 2003) – CIDA matrix.