front cover

Academy of ICT Essentials for Government Leaders

Module 1

An Overview of ICTs and Sustainable Development

UNITED NATIONS ESCAP
Economic and Social Commission for Asia and the Pacific

UN APCICT

inside front cover

ECONOMIC AND SOCIAL COMMISSION FOR ASIA AND THE PACIFIC

ASIAN AND PACIFIC TRAINING CENTRE FOR INFORMATION AND COMMUNICATION TECHNOLOGY FOR DEVELOPMENT

Academy of ICT Essentials for Government Leaders

Module 1

An Overview of ICTs and Sustainable Development

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The Academy of ICT Essentials for Government Leaders Module Series

Module 1: An Overview of ICTs and Sustainable Development

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FOREWORD

ABOUT THE MODULE SERIES

In today's "Information Age", easy access to information is changing the way we live, work and play. The "digital economy", also known as the "knowledge economy", "networked economy" or "new economy", is characterized by a shift from the production of goods to the creation of ideas. This underscores the growing, if not already central, role being played by information and communication technologies (ICTs) in the economy in particular, and in society as a whole.

As a consequence, governments worldwide have increasingly focused on ICTs for development (ICTD). For these governments, ICTD is not only about developing the ICT industry or sector of the economy but also encompasses the use of ICTs to stimulate economic growth as well as social and political development.

However, among the difficulties that governments face in formulating ICT policy is unfamiliarity with a rapidly changing technology landscape and the competencies needed to harness ICTs for national development. Since one cannot regulate what one does not understand, many policymakers have shied away from ICT policymaking. But leaving ICT policy to technologists is also wrong because often technologists are unaware of the social and policy implications of the technologies they are developing and using.

The *Academy of ICT Essentials for Government Leaders* module series has been developed by the United Nations Asian and Pacific Training Centre for Information and Communication Technology for Development (UN-APCICT) for:

1. Policymakers at the national and local government level who are responsible for ICT policymaking;

2. Government officials responsible for the development and implementation of ICT-based applications; and

3. Managers in the public sector seeking to employ ICT tools for project management.

The module series aims to develop familiarity with the substantive issues related to ICTD from both a policy and technology perspective. The intention is not to develop a technical ICT manual but rather to provide a good understanding of what the current digital technology is capable of achieving and where technology is headed, and what this implies for policymaking. The topics covered by the modules have been identified through a training needs analysis and a survey of other training materials worldwide.

The modules are designed in such a way that they can be used for self-study by individual readers or as a resource in a training course or programme. The modules are standalone as well as linked together, and effort has been made in each module

to link to themes and discussions in the other modules in the series. The long-term objective is to make the modules a coherent course that can be certified.

Each module begins with a statement of module objectives and target learning outcomes against which readers can assess their own progress. The module content is divided into sections that include case studies and exercises to help deepen understanding of key concepts. The exercises may be done by individual readers or by groups of training participants. Figures and tables are provided to illustrate specific aspects of the discussion. References and online resources are listed for readers to look up in order to gain additional perspectives.

The use of ICTD is so diverse that sometimes case studies and examples within and across modules may appear contradictory. This is to be expected. This is the excitement and the challenge of this newly emerging discipline and its promise, as all countries begin to explore the potential of ICTs as tools for development.

Supporting the *Academy* module series in print format is an online distance learning platform — the APCICT Virtual Academy (AVA – http://www.unapcict.org/academy) — with virtual classrooms featuring the trainers' presentations in video format and PowerPoint presentations of the modules.

In addition, APCICT has developed an e-Collaborative Hub for ICTD (e-Co Hub – http://www.unapcict.org/ecohub), a dedicated online site for ICTD practitioners and policymakers to enhance their learning and training experience. The e-Co Hub gives access to knowledge resources on different aspects of ICTD and provides an interactive space for sharing knowledge and experiences, and collaborating on advancing ICTD.

MODULE 1

Fifteen years in global history is a short period of time. At the turn of the 21st century, the global community committed itself to a far reaching and comprehensive mission to promote human development. Few, at that time, would have anticipated the transformative effect that Information and Communication Technologies (ICTs) would have over the next fifteen years. Few would have anticipated the tremendous challenges that the world would have in restoring the global ecological balance and in protecting the earth from destruction by humankind.

Few today will question the capacity of the ICTs to serve as enablers of sustainable development that the world community has agreed to work towards by the target year 2030. However, though this capacity or ICTs as enablers has been recognized, there remains a fuzziness about the linkage between information and communication technologies (ICTs) and the achievement of the Sustainable Development Goals (SDGs).

This module addresses the SDGs through the prism of ICTs. It provides an overview of the intersections between ICTs and the SDGs drawing attention to the various dimensions and sectors in which ICTs can provide valuable support for national governments' plans and projects. The module invites readers to explore the various dimensions of the linkage through case studies of ICT applications in key sectors of development in Asia-Pacific countries. The module also highlights key issues and decision points, from policy to implementation, in the use of ICTs to meet development needs. The aim is to foster a better understanding of how ICTs can be used for social and economic development, and to equip policymakers and programme managers with a development-oriented framework for ICT-based and ICT-supported interventions in a range of social sectors.

This module is an overview; it touches on ideas, concepts, and practices in generalities drawing from experience and research worldwide. Later modules discuss different aspects in detail, expanding many of the themes introduced here. Readers are invited to peruse later modules for further detail. Readers are also invited to explore earlier versions of this current module and the Academy where the basics of using ICTs in human development are discussed.

MODULE OBJECTIVES

The module aims to:

1. Argue the case for Information and Communication Technologies (ICTs) in sustainable development;

2. Describe the macro relationship between sustainable development and ICTs;

3. Foster a better understanding of how ICTs can be used to achieve social and economic development; and

4. Provide a development-oriented framework for ICT-based and ICT-supported projects and interventions in a range of social sectors.

LEARNING OUTCOMES

After working on this module, readers should be able to:

1. Provide a rationale for the use of ICTs to achieve sustainable development goals;

2. Identify, cite and discuss examples of ICT applications in key sectors of development, in particular poverty alleviation, agriculture, education, health, gender, government and governance, peace, and disaster and risk management;

3. Discuss challenges in the effective application of ICTs for sustainable development; and

4. Discuss key factors in the design and implementation of ICT for sustainable development programmes and projects.

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ACRONYMS

ABIA	Annual Bibliography of Indian Archaeology
ADB	Asian Development Bank
ADPC	Asian Disaster Preparedness Center
AIDS	Acquired Immunodeficiency Syndrome
APC	Association for Progressive Communications
APEC	Asia Pacific Economic Community
APCICT	Asian and Pacific Training Centre for Information and Communication Technology for Development
APDIP	Asia-Pacific Development Information Programme
AusAID	Australian Agency for International Development
AVA	APCICT Virtual Academy
BIID	Bangladesh Institute for ICTs in Development
CIO	Chief Information Officer
CSR	Corporate Social Responsibility
DEWN	Disaster and Emergency Warning Network
ESCAP	Economic and Social Commission for Asia and the Pacific
FOSS	Free and Open Source Software
GDP	Gross Domestic Product
GEM	Gender Evaluation Methodology
GeoCMS	Geospatial Content Management System
GIS	Geographic Information System
GNP	Gross National Product
HDI	Human Development Index
HDR	Human Development Report
HINARI	Health InterNetwork Access to Research Initiative
HIV	Human Immunodeficiency Virus
ICT	Information and Communication Technology
ICTD	Information and Communication Technology for Development
IDRC	International Development Research Centre, Canada
IFAD	International Fund for Agricultural Development
IGNCA	Indira Gandhi National Centre for the Arts
IMF	International Monetary Fund
IoT	Internet of Things
IOCT	Information, Operation, and Communication Technology
IT	Information Technology
ITES	Information Technology Enabled Services
ITU	International Telecommunication Union
IVRS	Interactive Voice Response Service
KYC	Know Your Customer
LDC	Least Developed Country
MDG	Millennium Development Goal
MIGIS	Mobile Interactive Geographic Information System, China
MIS	Management Information System
MOOC	Massive Open Online Course
NCPI	National Payment Corporation of India

NDP	National Development Plan
NFE	Non-Formal Education
NGO	Non Government Organization
OCHA	Office for the Coordination of Humanitarian Affairs
OECD	Organisation for Economic Co-operation and Development
OER	Open Educational Resources
OGD	Open Government Data
OTOP	One Tambon, One Product
PC	Personal Computer
PD4SDGs	Partnership Data for Sustainable Development Goals
PFnet	People First Network, Solomon Islands
PPP	Public-Private Partnership
PRSP	Poverty Reduction Strategy Paper
RFID	Radio Frequency Identification
ROI	Return on Investment
SBP	State Bank of Pakistan
SD	Sustainable Development
SDG	Sustainable Development Goals
SMAC	Social, Mobile, Analytics, and Cloud
SME	Small and Medium Enterprise
SMS	Short Message Service
SOPAC	SPC Applied Geoscience and Technology Division
SPC	Secretariat of the Pacific Community
TEIN2	Trans-Eurasian Information Network 2
TEWS	Tsunami Early Warning System
TV	Television
UN	United Nations
UNDP	United Nations Development Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNFCCC	United Nations Framework Convention on Climate Change
UNICEF	United Nations Children's Emergency Fund
UPI	Unified Payments Interface
VoIP	Voice over Internet Protocol
VP	Village Phone
VUSSC	Virtual University for Small States of the Commonwealth
WHO	World Health Organization
WNSP	Women's Network Support Programme (APC)
WSIS	World Summit on the Information Society

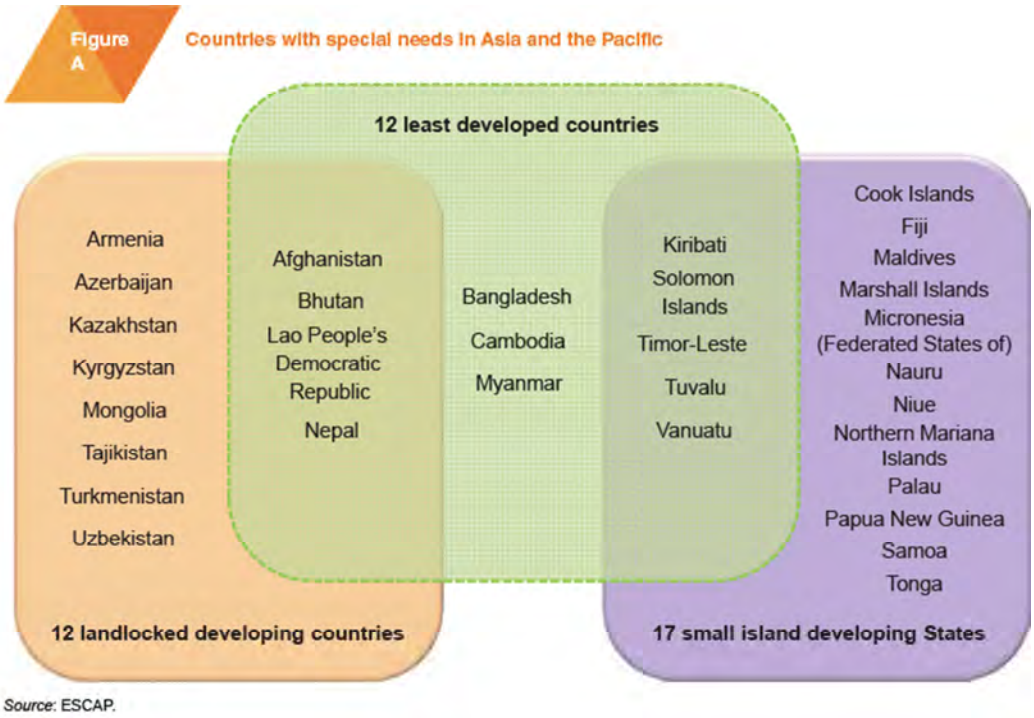
1.0 INTRODUCTION

The Asia-Pacific region is home to about a quarter of the world's population. Compared to the rest of the world, this region has the greatest diversity, with the oldest as well as the youngest civilizations, and includes the most populous states on continental Asia as well as the sparse and distant island countries of the Pacific. People of all races, ethnicities, and religions live here, and amidst great wealth there is also intimidating poverty. In this region the world's fastest growing economies coexist with the least developed countries and with countries in transition. The Asia-Pacific region also has the fastest growing telecommunications market.

The challenge of development that the Asia-Pacific region poses to the global community of donors, development agencies and practitioners is massive. There are economies of scale; and equally, diseconomies of scale. There is no one-size-fits-all, and a solution that works admirably in one country can fail miserably in another part of the same region.

For this reason, there is a critical need to segment the region's countries on the basis of some common parameters and subsequently look for innovative ways of addressing the challenges of development. More than half of the Asia-Pacific region comprises of "countries with special needs". These countries with special needs include the least developed countries (LDCs), landlocked developing countries, Pacific island developing countries and economies in transition. They not only face the problem of extreme poverty but also problems resulting from limited human resources, an economy vulnerable to exogenous changes, and remote geographical location. The current global agenda for sustainable development and the United Nations Economic and Social Commission for Asia and the Pacific (ESCAP) has identified these countries as its priority for development assistance and is focusing its attention on them.

Figure 1: ESCAP Countries with Special Needs



Source: ESCAP (2016) *Asia-Pacific Countries With Special Needs Development Report 2016* Adapting The 2030 Agenda For Sustainable Development At The National Level http://www.unescap.org/sites/default/files/CSN%20Report%202016.pdf (Accessed January 28, 2017)

Despite their diversity, the countries with special needs face common problems. Some may be small in size and population, they have small markets and high costs, and they have limited human, technical and/or natural resources. Both island states and remote mountain communities are exposed to major environmental changes and disaster risks such as tsunamis and earthquakes, floods and landslides. Politically, these countries are increasingly conscious of their vulnerability and fear that in the absence of a critical mass, they could easily become marginalized and dependent upon the technologies, systems, goods, services and materials developed by the larger and more successful states. At the same time, they recognize that they cannot afford to be left out of the mainstream of international growth and development.

There is a need therefore to find innovative approaches and solutions to address the developmental needs of the high-target countries such as Nepal or Samoa. In the era of the knowledge society, cutting-edge applications of information and communication technologies (ICTs) make possible such innovative approaches and out-of-the-box solutions. On occasion, these technologies may enable a quantum leap from scarcity to abundance.

This module views the problems of sustainable development in the Asia Pacific countries through the perspectives of ICT applications, particularly computer, Web-based, mobile and other digital technologies.[1] The module seeks to establish the link

[1] Older heritage technologies such as radio and TV will be discussed only in so far as they are integrated with digital technologies.

between the application of ICTs and the achievement of a country's human development goals, and to argue for the wise and meaningful application of ICT for development (ICTD). It is important to note at the outset, however, that there is no one-way of using ICTs to address these goals. Each country must determine its own goals, objectives, strategies and pathways to implementation. The module simply introduces readers to the linkage between the goals and the strategies (ICTs), and suggests ways of applying these strategies more effectively.

The module is divided into five sections. The first section that follows this introduction provides an overview of development as it has been broadly understood in the world, the Millennium Development Goals (MDGs), and the current Sustainable Development Goals (SDGs) The second section introduces current ICTs and scenarios. The third section explores, through a discussion of case studies, ICT applications in various sectors of development. While the development sectors are discussed separately, it is important to remember that applications in one sector, say in education, have inter-linkages with other sectors and will have spin-off benefits for other sectors. The fourth section explores ways and means of integrating government policy with the SDGs, with ICTs being the enablers. The final section of the module provides insights into the broad challenges that confront programme and project implementation..

The module is meant to provide a general background to the issues under discussion. Subsequent modules address key issues, e.g. e government, disaster risk reduction, climate change, in detail. Thus, while some may find the information new, others may find it rudimentary. There is also, for pedagogical purposes, some redundancy built into the module and in the series of which this module is a part. This is the nature of this complex field where the same issue can be explored from different perspectives and dimensions, making it all the more challenging and interesting.

1.0 THE BIG PICTURE

This section aims to:

- Summarize the global development debates in the context of SDGs
- Review the region's progress toward achieving development goals, with the MDGs as milestones;
- Introduce the Sustainable Development Goals (SDGs)

1.1 Trends in Human Development

Current development perspectives originate from the post World War II era when the term "development" was used as part of a rationale for post-war reconstruction in Europe and the "underdeveloped parts" of the world. These perspectives also emerged from the immediate post-colonial experience where most of the newly independent countries of Asia and Africa were, according to Western values, left far behind in terms of economic progress.

The perspectives were largely Western, came from a belief in theories of economic growth—measured by Gross National Product (GNP); Gross Domestic Product (GDP) and GNP per capita. Generally, it was felt it was necessary to move nations from traditional, agriculture based economies to industrial economies; and that by doing so, the benefit of industrialization would "trickle down" to the poor, resulting in the elimination of poverty. Political and social development was also seen as moving from parochial and traditional societies to "modern" societies, patterned along the development of the West. Political ideology dictated whether such development was based on the *laissez faire* capitalist system, or on direct state involvement in the manufacturing and services industries. Much of the policy and advocacy of the World Bank Group of Institutions, including the International Monetary Fund (IMF), has been based on this economic theory since their formation in the post World War II era. Over time, new paradigms emerged, such as the Washington Consensus,[2] structural adjustments, and a view that poverty could essentially be alleviated through increased private sector generated growth. Many countries adopted the economic reforms proposed in the Washington Consensus with varying results.

There was extensive criticism of the social and political consequences of such reform, especially in the context of growing globalization. The Asian financial crisis of the 1990s and more recently, the 2008 global economic crisis, ended the era of the

[2] The term **Washington Consensus** most commonly refers to an orientation towards free market policies that from about 1980 - 2008 was influential among mainstream economists, politicians, journalists and global institutions like the IMF and the World Bank. The term can refer to market friendly policies that were generally advised and implemented both for advanced and emerging economies.

belief that economic change through private sector led growth could, by itself, trigger development.

Other criticisms of these early approaches also quickly emerged. Macro level statistics collected in many countries often hid the ground realities. Improved economic growth did not necessarily lead to the eradication of poverty; instead it sometimes led to greater inequalities in the distribution of income. Empirical evidence continued to point to the failure of growth theories to alleviate poverty and reduce hunger. Instead, there were often high growth rates alongside large-scale poverty and deprivation, inequalities, social disorder and environmental degradation.

The dissatisfaction of countries with existing theories of development came from a realization that these theories did not really address or translate into improving the quality of people's lives. Human rights groups and grass-root movements continuously drew attention to the failure of economic models to address core issues concerning people all over the world, and especially in the poor, developing countries.

Concurrent to all the activity in development discourse and practice taking place throughout the 1970s, 1980s and the 1990s, a new paradigm on development emerged in the work of eminent economists and thinkers, such as Mahbub ul Haq[3] and Amartya Sen,[4] and Martha Nassbaum[5] These thinkers looked at the process of development through a more people-centred and humane approach. Mahbub ul Haq argued in his seminal publication, *Reflections on Human Development*[6] that increase in income is to be treated as an essential means, but not as the end of development, and certainly not as the sum of human life. Haq offered a new vision of human security for the twenty-first century where real security is equated with security of people in their homes, their jobs, their communities, and their environment. Haq is known as the father of the Human Development Reports (HDRs) published annually by the United Nations Development Programme (UNDP).

The failure of economic models to address issues relating to development led to the search for a new approach that placed people at the centre of the development process. The UNDP "human development" approach, based on the work of Haq and Sen, has both interest and merit because it stresses human well-being as an end for any process of economic and social development. It does so by overturning the view that focuses on material progress as the sole end. Instead, the new approach focuses on the well-being of individuals as the ultimate objective.

[3] A world-renowned Pakistani economist whose work focused on social realities and who is acknowledged as the originator of the Human Development Index.
[4] Amartya Sen is the Nobel laureate whose perspectives on development as freedom underpins current development theory and approaches in the MDGs today.
[5] A globally acknowledged philosopher who works at the University of Chicago. See http://www.law.uchicago.edu/faculty/nussbaum/
[6] Mahbub ul Haq, *Reflections in Human Development* (Oxford University Press, 1995).

"The basic purpose of development is to enlarge people's choices. In principle, these choices can be infinite and can change over time. People often value achievements that do not show up at all, or not immediately, in income or growth figures: greater access to knowledge, better nutrition and health services, more secure livelihoods, security against crime and physical violence, satisfying leisure hours, political and cultural freedoms and sense of participation in community activities. The objective of development is to create an enabling environment for people to enjoy long, healthy and creative lives."

Mahbub ul Haq (1934-1998)
Founder of the Human Development Report

Source: UNDP, "The Human Development Concept", http://hdr.undp.org/en/humandev.

This approach is called the human development approach and focuses on development within a human rights framework. According to this framework, every individual has basic rights, economic, cultural, social, political and civil. And in order to exercise these rights, every individual consequently has a right of access to education, health care and a safe environment regardless of their nationality, ethnicity, religion, gender, language or any other consideration.

Human development is measured by the human development index (HDI). The HDI is the way in which countries are described and ranked in terms of their development levels. The HDR, which has been published annually since 1990 by UNDP, is intended to open the development debate through well researched scientific and policy analyses and thematic presentations followed by recommendations for action.

The HDI is the average of measures of three indices: life expectancy, education/literacy, and standard of living. It is purported to be a way of comparing the level of development of a particular group of people (as in, developed, developing, underdeveloped) based on the availability of options -- the logic is that the more developed a group of people are, the more options are available to them).

Since the 1990s, other international and multilateral agencies have also been producing annual reports on various development themes based on their areas of work and operation.[7]

The human development approach has changed the way that the world currently looks at development. This view is reflected both at international debates and underscores the commitment given by the global community to actively pursue development. In the current global scenario, it is hard to find a national constitution

[7] Almost all the United Nations Agencies and those of the World Bank group publish annual reports on various development themes. For instance, UNICEF brings out a State of the World's Children report; while UNESCO brings out a similar report on education; and the ITU brings out the annual ICT Development Report.

that does not guarantee equal rights for all its citizens regardless of ethnicity, sex, gender, colour, religious beliefs, political leanings, social and economic status, etc.

1.2 The significance of the MDGs

The adoption of the Millennium Declaration in 2000 and the Millenium Development Goals (MDGs) by all 189 member States of the United Nations General Assembly was a watershed in global cooperation. While the importance of human development had been reiterated for decades and at various platforms and global conferences, it was the first time that all stakeholders — countries and governments, donor and development agencies, non-governmental and civil society organizations — acknowledged that unless they arrived at a common understanding and commitment, the goal of equitable development would never be reached.

The MDGs were the most broadly supported and the most specific poverty reduction strategies that the global community had articulated and championed. For the international system consisting of donor and technical aid agencies, the goals constituted a common agenda for development assistance. Each of the eight goals had specific targets, all equally important, that countries sought to meet as part of the progress toward achieving the goals by the year 2015.

For nation-states, the MDGs meant a commitment to internationally agreed upon minimum standards of development against which their performance will be measured. If the goals were met, it will mean that more than one billion people living in poverty and deprivation will have the means to a life of dignity and freedom.

1.3 Summative Review of Progress on the MDGs

There have been several reviews of global and regional progress in meeting the targets. The Millennium Development Goals Report 2015[8] has analysed both the successes and the failures. Significant successes have been achieved. In absolute numbers, more than a billion people have been lifted out of poverty. Ninety per cent of children are in schools. Gender parity has improved. Child mortality has fallen by more than half; there is better maternal care and nutrition all around; HIV/AIDs pandemic has been addressed. Significant progress has been made in providing safe drinking water, the environment has been addressed; and the tremendous growth in mobile phones is narrowing the digital divide.

Despite such significant successes on many of the eight MDG goals, progress has been uneven. More than half a billion people still remain the poorest, in extreme poverty, and have been left behind, disadvantaged because of age, gender, geographical location or ethnicity. Gender inequality persists, more women than men live in poverty, they still have less access to education, economic resources,

[8] United Nations (2015) Millennium Development Goals Report 2015. New York:United Nations, http://www.un.org/millenniumgoals/2015_MDG_Report/pdf/MDG%202015%20rev%20(July%201).pdf, (accessed October 13, 2015)

work, and are still underrepresented in both private and public decision making positions. They continue to be underrepresented in the workplace and are paid less for their work, irrespective of their educational level.

Big gaps persist in access to education, income, health care and sanitation, especially in the rural areas. And the Asia-Pacific is the region where these gaps are most evident.

Where were these gaps in achievement of the MDGs? In the Asia Pacific region, where

- Despite Asia-Pacific's unprecedented growth, one out of every three people – about 1.64 billion in our region – are still living on less than US$2 per day. Among these, 950 million are trapped in extreme poverty (living on less than US$1.25 per day), deprived of basic rights, and highly vulnerable to economic and environmental risks.

- Had income inequality not increased in three of Asia-Pacific's largest economies in 2008, an additional 189 million people would have been lifted out of poverty[9]

- All other inequalities are also present—inequality to access to well being and access to and participation in economic activities and decision making

- These inequalities are also evident in key population groups, including between women and men, persons with disabilities, youth, migrants and older persons and ethnic minorities.

Moreover, in the view of the High Level Panel of eminent persons on the Post 2015 Development Agenda constituted by the UN Secretary General,

> "Most seriously, the MDGs fell short by not integrating **the economic, social, and environmental aspects of sustainable development** as envisaged in the Millennium Declaration, and by not addressing the need to promote sustainable patterns of consumption and production. The result was that environment and development were never properly brought together. People were working hard – but often separately – on interlinked problems"[10]

[9] Lawrence Surendra (2014) "The Necessity for Sustainable Development in An Uncertain World & the Post 2015 Development Agenda. Presentation at the APCICT Partners' Meeting, November 25, 2014.

[10] United Nations. (2015) *A New Global Partnership: Eradicate Poverty And Transform Economies Through Sustainable Development. The Report of the High-Level Panel of Eminent Persons on the Post-2015 Development Agenda.* See http://www.un.org/sg/management/pdf/HLP_P2015_Report.pdf

What is clear from this evidence for the world in general, and for the Asia Pacific region in particular, is that the clear and concerted action, enabled by the MDGs did show dramatic results and that the momentum that the MDGs provided needs to be pushed further. The goals, in themselves are important, but incomplete, and there needs to be concerted action to further refine the goals into practicable action; and to add dimensions so that the global community could both 'eradicate poverty and save the planet' at the same time.

1.4 The Concept of Inclusive Development

Currently part of many national development plans and strategies, inclusive development is generally defined as development which includes and pays special attention to the needs of the poor and the excluded. The implication here is that no real and sustained development can take place, if large sections of the population are excluded from the benefits of development. To put it simply, no one can be left behind.

Beyond just definitions, Chibba (2008) argues there are various possible approaches to addressing inclusive development, including the following:

> • "inclusive and sustainable growth requires, *inter alia*, good governance, progressive politics, effective management and successful engagement in the global economy – indeed, *an inclusive growth approach* is the preferred one in Asia
>
> • inclusive development requires addressing issues of *structural transformation*, especially economic, social and demographic aspects
>
> • *a multi-pronged policy and programme mix* is indispensable to an inclusive development agenda, and this includes sensible macroeconomic policies, sound institutions, public–private sector development, effective economic policy management, consensus-building on public policies and programmes, and policies and interventions tempered to socio-economic and cultural factors."[11]

Since there are no quick or 'one size fits all' solutions, inclusive development takes a long time, even decades, for benefits to be visible. Economists have argued that there is a need to address poverty eradication and the creation of economic opportunities and broadening access to such opportunities to ensure inclusion. This means broadening access to finances, education, health, and other services that are essential. Creating social security safety nets, forging partnerships and ensuring human rights are also fundamental to the vision of inclusion. Therefore, the state has a major role to play in creating the enabling environments to ensure

[11] Michael Chibba (2008) "Perspectives on Inclusive Development, Concepts, Approaches, and Current Issues" *World Economics, Vol 9, no, 4, October-December 2008 pp. 145-156.* See https://www.academia.edu/7530148/Perspectives_on_Inclusive_Development (Accessed December 4, 2015)

inclusiveness in policy, plan and implementation; and such role should be through multipronged, multi-stakeholder approaches.

With the failure of macro-economic models of *laissez faire* economics, many Asian countries, including China and India, have chosen a path that includes a mix of state-led and market-based approaches within the context of the country's history, culture and politico-economics. Chibba cites the example of India where "In India's current development plan, the government places high priority on inclusive development, with focus on inclusive growth, and the strategy includes a key role for fiscal spending (on public goods, services and programmes) and a crucial role for state institutions. The central bank and state banks, for instance, are key players in India's financial inclusion agenda. Yet there is sufficient space in the Indian strategy for private banks and non-financial private sector"[12]

This concept of inclusive development is reflected throughout the MDGs, and as we shall see, throughout the Sustainable Development Goals (SDGs).

1.5 The Concept of Resilience in Development

If the MDGs formed one stream of thought in the development of the Sustainable Development Goals, another stream of thought emerged in development discourse and practice. This stream came from a confluence of discussions on environment and climate change, and the consequent impact on societies. How societies and systems responded to crises, natural and human, was studied extensively, leading to an understanding of the concept of resilience.

While there is no globally accepted definition of resilience within the context of development, it is broadly understood that there is a connection between the environment and how individuals and social systems respond to environment change. To some extent, a definition of resilience is "the ability of groups or communities to cope with external stresses and disturbances as a result of social, political and environmental change" [13] For example, when a society or a group within it are dependent on agriculture as their main source of livelihood, it is apparent that any change in climate or environment could impact upon their livelihood. The extent of resilience of this society or group's is its ability to cope with, weather, and adapt to changing climatic conditions or episodes related to excessive rain or drought. The better it is equipped to cope, the more resilience it has.

[12] Ibid p. 153

[13] W Neil Adger (2000) "Social and ecological resilience: are they related?" *Progress in Human Geography* September 2000 24: 347-364, available at https://groups.nceas.ucsb.edu/sustainability-science/2010%20weekly-sessions/session-102013-11.01.2010-emergent-properties-of-coupled-human-environment-systems/supplemental-readings-from-cambridge-students/Adger_2000_Social_ecological_resilience.pdf (accessed October 30, 2015)

The resilience framework looks at the root causes of vulnerability or resilience to understand the extent to which a society will bounce back better than before, just bounce back, or recover, but in a worse condition then before be able to cope with future emergencies or disasters. For instance, in an agrarian system, factors that make households resilient to food security shocks and stresses include "income and access to food; assets such as land and livestock; social safety nets such as food assistance, crop insurance, and social security; access to basic services such as water, health care, electricity, etc., households' adaptive capacity which is linked to education and diversity of income sources; and the stability of all these factors over time".[14] All of these factors were identified by the MDGs as priority sectors for governments to engage with in the period 2000-2015.

The less access households and communities have to these basic services, the more vulnerable they are to external shocks and stresses, be they disasters or conflict. The more access they have, the stronger households and communities are to shocks and stresses.

Using the resilience framework to development issues, one can examine and measure vulnerability and resilience as a household, community and even system level. Measuring and pinpointing the specific factors and conditions that make households and communities vulnerable, enables policy and decision makers to identify where and how to intervene.[15]

When one combines human development theories, the review of progress on the MDGs, the concepts of inclusive development and the resilient development framework with the global concern for the environment and climate change; the genesis of the Sustainable Development Goals becomes clearer. Essentially, all the different streams coalesce into the SDGs.

[14] Food and Agriculture Organization. *Measuring Resilience: A Concept Note on the Resilience Tool* Rome: FAO. No date. Available at http://www.fao.org/docrep/013/al920e/al920e00.pdf (accessed October 30, 2015)
[15] Ibid.

1.6 The Sustainable Development Goals (SDGs)

Sustainable development can be defined as

Box 1: Definition of Sustainable Development

Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs. It contains within it two key concepts:

- *The imperative of* ***Intergenerational Equity***
- *the concept of 'needs', as an* ***intra-generational*** *issue of equity and in particular the essential needs of the world's poor, to which overriding priority should be given;*
- *the idea of limitations imposed by the state of technology and social organization on the environment's ability to meet present and future needs*."

– "Our Common Future", Report of the World Commission on Environment and Development, 1987

The process to identify the SDGs began at the High Level Plenary Meeting of the UN General Assembly in 2010 where governments called for accelerated progress on the MDGs and also called for new ways of thinking to carry forward the UN's global development agenda.

Two primary themes dominated the UN Conference on Sustainable Development (Rio +20) in 2012 where an intergovernmental process to define the SDGs began. The themes included

- a green economy in the context of sustainable development and poverty eradication,
- and an institutional framework for sustainable development.

The mandate given by the conference was "Sustainable development goals should be action-oriented, concise and easy to communicate, limited in number, aspirational, global in nature and universally applicable to all countries, while taking into account different national realities, capacities and levels of development and respecting national policies and priorities" ((Resolution 66/288, annex, para. 247) and formed the basis for subsequent rounds of discussions and negotiations.

A 30 member open working group with representation from all five regions of the world began its work to look at innovative ways to promote the global development agenda. The UN Secretary General provided the initial input and support and an inter-agency technical support team. Eight rounds of extensive discussions followed covering a large number of issues, ranging from poverty eradication, food security, water and sanitation, employment, health, macroeconomic policy questions, means

of implementation, sustainable consumption and production, to human rights, gender equality, conflict prevention and post-conflict peace building.[16]

The report of the Open Working Group, submitted to the UN General Assembly in 2014 specified that the new global agenda should

- address and incorporate in a balanced way all three dimensions of sustainable development (economic, social and environmental) as well as their inter-linkages;

- build upon commitments already made and contribute to the full implementation of the outcomes of all major summits in the economic, social and environmental fields, including the Rio+20 outcome document;

- be action-oriented, concise and easy to communicate, limited in number, aspirational, global in nature and universally applicable to all countries; and

- be coherent with, and integrated into, the United Nations development agenda beyond 2015.[17]

Following further intergovernmental negotiations, the final version of the document *Transforming Our World: The 2030 Agenda For Sustainable Development* was submitted to the UN General Assembly and was adopted by the global community during the UN General Assembly in September 2015.[18] Five areas of critical importance for the global community as stated in the document are people, planet, prosperity, peace, and partnership.

In brief, the SDGs,[19] described visually, are

Figure 4: The Sustainable Development Goals

[16] See more at: http://www.unwomen.org/en/what-we-do/post-2015/sustainable-development-goals#sthash.4V9oqAeE.dpuf (accessed October 15, 2015)
[17] See more at http://www.unwomen.org/en/what-we-do/post-2015/sustainable-development-goals (accessed October 16, 2015)
[18] http://www.un.org/pga/wp-content/uploads/sites/3/2015/08/120815_outcome-document-of-Summit-for-adoption-of-the-post-2015-development-agenda.pdf (accessed October 16, 2015)
[19] For the full document and details, see https://sustainabledevelopment.un.org/post2015/transformingourworld (accessed October 16, 2015)

Described in words, they are:

Box 2: The Sustainable Development Goals

1) End poverty in all its forms everywhere

2) End hunger, achieve food security and improved nutrition, and promote sustainable agriculture

3) Ensure healthy lives and promote wellbeing for all at all ages

4) Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all

5) Achieve gender equality and empower all women and girls

6) Ensure availability and sustainable management of water and sanitation for all

7) Ensure access to affordable, reliable, sustainable and modern energy for all

8) Promote sustained, inclusive and sustainable economic growth, full and productive employment, and decent work for all

9) Build resilient infrastructure, promote inclusive and sustainable industrialization, and foster innovation

10) Reduce inequality within and among countries

11) Make cities and human settlements inclusive, safe, resilient and sustainable

12) Ensure sustainable consumption and production patterns

13) Take urgent action to combat climate change and its impacts (taking note of agreements made by the UNFCCC forum)

14) Conserve and sustainably use the oceans, seas and marine resources for sustainable development

15) Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification and halt and reverse land degradation, and halt biodiversity loss

16) Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels

17) Strengthen the means of implementation and revitalise the global partnership for sustainable development

Within the goals are 169 targets[20], and within each target are indicators to enable measurement on progress.

The SDGs envisage transformative shifts from earlier thinking if they are to be effectively implemented with an recognition that

- SD is an overarching organizational mandate responding to real-world development challenges
- Coherence as an organization in dealings with stakeholders is critical
- Operationalizing SD requires attitudinal changes, enhanced skills, competencies and knowledge.
- Integration of the three dimensions – Economy-Society and Environment is critical to achieve Sustainable Development
- SD also needs to be inclusive, equitable, of high quality, accountable and transparent.

Given the complexity of the SDGs, there is extensive debate in global development circles about the ways in which the SDGs could be mainstreamed and integrated into a country's planning and implementation process. Many countries have already started the process of rethinking and restructuring their national development plans. The UN Development Support group has written that

- Indonesia is promoting systematic and inclusive approaches to localize the SDGs, monitor progress and raise awareness
- In Pakistan, progress on the SDGs is being done through commitment and institutional readiness at multiple levels of government.
- In the Philippines, institutional coordination and coherence at national and sub national levels is key to the implementation of SDGs alongside multi stakeholder approaches.[21].
- The Pacific Island region is developing a Road Map to ensure that is concise and clear and that takes into account both country specific requirements and regional level needs and to develop a regional process of monitoring and evaluation.

The process of aligning and integrating the SDGs to national development goals is well underway in almost all the regions of the world.

All three pillars of sustainable development, economic, social and environmental, need ICTs to serve as enablers or catalysts, and as critical facilitators in the process of meeting the 2030 Sustainable Development Agenda. While today's trends in

[20] For a detailed understanding of the SDGs, one may refer to http://www.un.org/sustainabledevelopment/sustainable-development-goals/ (accessed October 16, 2015)

[21] United Nations Development Group (2016) *The Sustainable Development Goals are Coming to Life. Stories of Country Implementation and UN Support.* https://undg.org/wp-content/uploads/2016/07/SDGs-are-Coming-to-Life-UNDG.pdf (Accessed January 16, 2017

ICTs and their role in sustainable development will be discussed at length later, a brief introduction is provided below as a precursor to a more lengthy exposition.

Questions To Think About

Go to the site https://sustainabledevelopment.un.org/post2015/transformingourworld

Read through all the SDGs, targets, and indicators. Then discuss

1. What are the key development goals that your country has identified as part of its development policy and plan?

2. Which would be your assessment of the MDG targets is your country still needs to achieve. What goals still need to be addressed?

3. How do you understand the relevance of the SDGs to your own country contexts?

Prioritize the SDG goals that your country needs to work on in its national development plan to achieve by the year 2030

1.7 ICTs and Their Role.

In the year 2000 when the MDGs were framed, Information and Communication Technologies (ICTs) were new and novel. It was only after extensive experimentation and use in several development sectors that knowledge and understanding has been gained about the many ways in ICTs can support the development process. Speed, power, reach, versatility, and the ability to connect to the last person in the chain; flexibility in usage at national and local levels, multiple possibilities and variations in sectors and patterns or use; are some of the significant characteristics of ICTs.

While some scholars and experts have expressed a concern that ICTs and their use in sustainable development has not been explicitly stated in the SDGs adopted in 2015; the UN General Assembly resolution has clearly stated ***"the spread of information and communications technology and global interconnectedness has great potential to accelerate human progress, to bridge the digital divide and to develop knowledge societies…"***[22]**.** There is a mention of ICTs in STI (science, technology, and innovation) and in Goal 5, Target 5.b which says: ***"Enhance the use of enabling technology, in particular information and communications technology, to promote the empowerment of women".***

[22] Ibid. par. 15

Regardless of specific mention, one can no longer think of a world without ICTs. One has to recognize that ICTs are now considered “critical infrastructure” that are on par with roads and railways, aviation and space and are taken for granted as available tools for use. In fact, experience from a number of government applications in the developing countries has demonstrated that well and meaningfully applied, ICTs can be transformative in supporting development programmes.

Given the complexity of the task to translate the SDGs into action and to implement them, ICTs are essential tools enabling

- complex planning and coordination across sectors,
- facilitating outreach and improving equitable delivery of services,
- enabling increased information sharing,
- and monitoring of key efforts.

When ICTs are used to facilitate integrated approaches with cost-effective scalable solutions, the total implementation and operational costs are likely to be lower.

In light of these, it is no an exaggeration to say that the achievement of a country’s development targets is linked to the use of ICTs and, for this reason, an understanding of these technologies is imperative.

To sum up:

- The human development approach, which focuses on development within a human rights framework is the currently globally accepted concept of development.
- Progress on the achievement of the many MDG goals has taken place but has been uneven.
- The Sustainable Development Goals (SDGs) build upon the MDGs, the concepts of inclusiveness and resilience and have been accepted by the global community of nations to be the development agenda for the next fifteen years, i.e. until 2030.
- ICTs serve as enablers and can be used to facilitate complex planning and implementation processes, integrated approaches and cost-effective scalable solutions in key sectors of sustainable development

What is now required is to move toward a greater understanding of the nature of the 21st century technology scenario and to focus on the conditions and contexts that will help in the optimum utilization of these strategic tools.

2.0 THE ICT SCENARIO

This section aims to

- Introduce readers to the range of technologies available today
- Discuss Information Technology applications and Life Cycles
- Identify good applications for development
- Discuss ICT integrated Sustainable Development

2.0 The ICT Scenario (circa. 2017)

The term "circa" meaning 'around or about' is used in the title of this subsection, simply because, at the pace of change in technology and innovation, it is just as likely that by the time this module is published and used in the Asia Pacific, the technology could be out of date and the statistics would have changed.

So what's new? Let us briefly summarize current technology trends[23] from estimates derived from ITU reports.

- Seven billion people (95% of the global population) live in an area that is covered by a mobile-cellular network.
- Mobile-broadband networks (3G or above) reach 84% of the global population but only 67% of the rural population.
- By end 2016, 3.9 billion people - 53% of the world's population – is not using the Internet.
- In Asia and the Pacific and the Arab States, the percentage of the population that is not using the Internet is very similar: 58.1 and 58.4%, respectively.
- In all regions of the world, Internet penetration rates are higher for men than for women

Still, the Digital Divide persists:

- Compared to 80 per cent or more access in developed countries, only 34 per cent of households in developing countries have Internet access. In the least developed countries, only 7 per cent of households have Internet access compared to a global average of 46 per cent. In Asia, 2 in five people use the Internet, and 3 in 5 people in the CIS countries use the Internet.

- In the Asia Pacific, there are divides; with 28 per cent Internet users (compared to 84 per cent in developed Asia Pacific); mobile Internet penetration is 17 per cent, and 3G population coverage is 13 per cent (while in developed Asia Pacific, the figures exceed 100 per cent of populations.

[23] See http://www.itu.int/en/ITU-D/Statistics/Documents/facts/ICTFactsFigures2016.pdf (Accessed January 17, 2017)

Developing Asia Pacific is far behind in terms of ICTs. Notwithstanding the above data on technology trends, it is going to be critical for Asia Pacific countries to address key issues in digital infrastructure, policies and regulatory practices; to be able to anticipate technology trends; and to address potential lacunae so that the benefits of technology permeate to the broader bases of populations rather than remain in elite hands. For this, one has to explore the current technology trends in a little more detail.

Smaller, faster, more powerful and robust—this is the best description of the different technologies and applications available for use by individuals, institutions and government. How does one define technologies, identify the different applications and deploy them to maximum effect? What is given below is more generic knowledge, fully aware that contexts, conditions and technologies are constantly changing. The first stage is in the understanding of the scope and definitions of the technologies themselves.

2.1 Scope and definitions

ICTs are defined in so many ways in development literature that it can become quite confusing. Often, the term "ICTs" is used to describe the use of computers and the Internet. Sometimes, the term "ICTs" is associated with the most sophisticated and expensive computer-based technologies, and at other times, conventional technologies such as radio and television (TV), and telephony are included in the discussions. Definitions of ICTs vary widely, depending on contexts and conditions of use. The concern here is with the field of ICTD, i.e. the convergence of development practice and the use of ICTs towards achieving inclusive and sustainable human development.

For this discussion, ***we define ICTs as any communication device and application, including older more established media such as telephones, print, radio and television, and newer devices such as computer network hardware and software, and mobile telephones and the services they enable in various sectors of human activity.***

The ICT sector has changed dramatically since the year 2000. Communication technologies have become forces of social change. Today's social media and its participatory formats are as much about the technologies as they are about their applications – bringing the virtual and physical worlds closer together in dynamic ways across several platforms.

2.2 The Evolving Technology Trends

The information and communication technology (ICT) sector is versatile, heterogeneous and difficult to set limits for. Two decades ago it was easy to define and objectively describe, as each ICT was a discrete entity, with its own

infrastructure, grammar, content, and delivery modes. At that time the sector was defined as all kinds of industry and economy that have the hardware, software infrastructure of computing as well as communication. The focus was actual ICT products, such as manufacturing computers and related equipment, systems and software applications. Today, it is difficult to define its borders as all the earlier discrete media have converged onto single digital platforms. The focus has now shifted from the products to ***fields of use and ways of use.***

2.2.1 Fields of use. These are the areas in which activities use, work with, affect and are affected by or enabled by ICT products. From businesses using ICT products for supply-chain management and customer relations management; education using ICTs to enhance access while ensuring equity and quality; health for hospital management, patient records management, telemedicine, and so on.

This is no longer as simple as running an information management systems for health management or commerce, it is more of the creation of an inherent knowledge base for such information and its subsequent use in decision making. For example, in the case of health; when using computers to facilitate and provide better health services is combined with more intelligent ways of using communications, smart sensors and ways where these services become wider, more efficient and very effective. For instance, The Aga Khan Trust, with its medical services based in Karachi, Pakistan, is using the smart phone with its sensors to monitor, in real time, expectant mothers from the mountainous Gorno Badakhshan region of Tajikistan. This is but one example of use of ICTs in a sector quite different from the original purpose of product development in the ICT.

2.2.2 W**ays of use**. An understanding of the ways and methods used to employ ICT and operate using ICT, helps the operation become easier, but more reliable, intelligent, and smarter and can be accessed widely. Applying techniques such as process reengineering service-oriented architecture and other methods enables efficiency and effectiveness and adds to the power of ICT infrastructure beyond the visible and primary benefits of using it.

The ICT sector is no longer a simple listing of technology and infrastructure components. It is permeating other sectors, and adding to them the “ICT” nature in some ways.

2.3 Current Trends

Earlier trends included computing power, storage, speed, communications, and software technology and so on. These ways of looking at ICTs has changed dramatically during the last decade.

Current major technology trends include

2.3.1 Computing Anywhere and Everywhere.

The networking and connected systems with their information management platforms and applications are closely connected, making it possible to use the information systems, anytime and everywhere, through wearable, and portable devices such as smartphones and tablets, as well as systems such as the desk top computer and the laptop---all connected at the same time. Examples of such computing devices at play are shown below.

Box 3: Types of Devices

<table>
<tr><td>  </td><td>  </td></tr>
<tr><td>Wifi and Wearable</td><td>Systems</td></tr>
<tr><td colspan="2">  </td></tr>
<tr><td colspan="2">Portable</td></tr>
</table>

2.3.2 Technologies in Play

Cloud/Client computing: As opposed to storing data on a home or office computer (local storage) the practice of using a network of remote servers hosted on the Internet to store, manage, and process data, rather than a local server or a personal computer. In the simplest terms, cloud computing means storing and accessing data and programs over the Internet instead of your computer's hard drive. The cloud is just a metaphor for the Internet. For an individual user or small business, one no longer “needs to hire and retain people for installation and updates; software does not become obsolete in three years, there is very little capital expenditure, only operational costs. Instead of going through the costs and pain of acquiring infrastructure, you can get the benefits without the headaches”[24]. Cloud technology enables ubiquitous, convenient, on–demand network access to a shared pool of configurable computing resources (e.g. networks, servers, storage, applications and services). These can be rapidly provisioned and released with minimal management effort or service provider interaction, hence serving

[24] Quoted in Yoko Aoyama and Balaji Parthasarathy (2016) *The rise of the Hybrid Domain: Collaborative Governance for Social Innovation”.* Edward Elgar Publishing p.99

quickly, and at low cost the demand for computing resources, software application and storage capabilities.

> "You don't have to hire and retain people for installation and updates, software does not become obsolete in three years, there is very little capital expenditure, only operational costs. Instead of going through the costs and pain of acquiring infrastructure, you can get the benefits without the headaches. It is almost like a ready made solution of mid market India".[25]

Infrastructure and Broadband. The telecommunications industry continues to grow strongly in terms of penetration and uptake; growth driven by China and emerging markets in Asia Pacific. The growth in mobile telephony is even greater. According to Ovum, mobile cellular subscriptions will grow to 8.5 billion by 2019[26], of which 6.5 billion will be mobile broadband subscriptions. Indeed, mobile broadband is the fastest-growing ICT service in history, taking just five years to achieve one billion users.

Box 3: Estimates of the Global Market

[25] Quoted in Yoko Aoyama and Balaji Parthasarathy (2016) *The rise of the Hybrid Domain: Collaborative Governance for Social Innovation".* Edward Elgar Publishing p.99

[26] http://info.ovum.com/uploads/files/Ovum_Telecoms_Media_and_Entertainment_Outlook_2015.pdf

Table 1: Estimates of the Global Market, 2012-2015 and 2020

	2012	2013	2014	2015	2020
Mobile cellular subscriptions	6.23 bn (ITU)	6.67 bn (ITU)	6.95 bn (ITU) 7.1 bn (E)	7.09 bn (ITU)	9.2 bn (E)
Unique mobile phone users	--/--	5.2 bn (MM)	3.65 bn (WeAreSocial) 5 bn (Cisco)	3.7 bn mid-2015 (GSMA) 4.9 bn (E) 5.2 bn (World Bank)	--/--
LTE subscriptions	--/--	200m (E)	500m (E)	Q1 - 600m (E) Q4 - 1.37 bn (ABI Research)[8]	3.7 bn (E); 2.5 bn (GSMA); 3.6 bn (ABI)
Mobile broadband subscriptions	1.55 bn (ITU)	1.95 bn (ITU) 2.1 bn (E)	2.69 bn (ITU)	3.46 bn (ITU)	7.7 bn; 85% of all subscriptions (E)
Fixed broadband	635m (ITU)	710m (ITU)	748m (ITU)	794m (ITU)	--/--
Internet users	2.49 bn (ITU)	2.71 bn (ITU)	2.94bn (ITU)	3.17bn (ITU)	4 bn by 2020
Facebook users	1.06 bn MAU 618 DAU (Facebook, Dec 2012)	1.23 bn MAU 757 DAU (Facebook, Dec 2013)	1.393 bn MAU 890m DAU (Dec 2014)	1.44 bn MAU* 936 DAU* (Facebook)	--/--
Smartphone subscriptions	1.3 bn (MM)	1.7 bn (MM)	2.1 bn (MM)	40% total mobile subscriptions (E);	Equivalent to 70% world's population (E)
Smartphone stock	--/--	--/--	1.8 bn (Del) 2.7 bn (E); Q1/14 - 64% mobile phones (E)	2.2 bn (Del); Q1/15 - 75% of mobile phones (E)	6.1 bn subscriptions (E); 70% world's population (E)
Smartphone handset shipments or sales	712.6m (IDC)	30% of all mobiles (MM)	--/--	1 bn (IDC);	--/--

Source: The State of Broadband 2015. Broadband Commission. P.16 http://www.broadbandcommission.org/Documents/reports/bb-annualreport2015.pdf

A caveat needs to be mentioned here. No matter how fast or how much penetration of the telecommunications and broadband takes place, without locally driven content produced and delivered in local languages, penetration of telecommunications will be of little significance.

The Internet of Things (IoT). The Internet of Things (IoT) is a term that has been used to refer to all kinds of Internet-based applications, sensors, servers and electronic services. Essentially, it is machine to machine communication. Interconnected computing devices and even mechanical devices are each provided with a unique identifier and the ability to transfer information without and human to human or human to computer interaction. For example, a weather monitoring sensor feeding real time data to an application on a computer which will automatically and continuously interpret the weather data into relevant messages and in turn, transmit the same to mobile phone subscribers automatically could be of immense value in disaster prevention and in agriculture.

3D Printing. 3D printing seems to be not that important. In fact it is. Imagine developing a computer-based model of an artificial hand with all the specifics that fits the particular need of a patient, and then use 3D printing to get it produced and used. Or print an industrial component of a machine, car or any item, and then it printing it is using metal 3D printing. This is an important way of reducing time, and costs while providing flexibility for more accurate production of items in 3D design.

Intelligence everywhere: New technologies are characterized by intelligent software applications, No matter small or big these applications are, the level of their sophistication is becoming higher and higher by the day. We can view them as getting more intelligent. Notice how different and powerful today's applications (apps) are compared to those just two years ago. One can easily see how intelligent these new applications are. In the same sense, more applications are being more intelligent and can exist in many ways and in different platforms and environments.

Stack Technologies

Finding effective ways to link and deal with and use vast amounts of data generated by users can pose problems. Using such data to customize and deliver services in the vibrant technology scenario can result in efficient, effective and cost effective services.

Among current technology developments are 'stacks'. A technology stack is a combination of software products and programming languages used to create a web or mobile application. Applications have two software components: client-side and server-side, also known as front-end and back-end.

Each layer of the stack builds on the features of the one below it. The back end contains the business logic that works behind the scenes. Users do not see this back end or engage with it. It is often written in one of the many programming languages available.

Users see the front end, which is the visual part of the application and which could be either through a website or a mobile application. Interaction takes place through this front end.

Case Study: IndiaStack

IndiaStack is a paperless and cashless service delivery system being conceived and implemented in India. Conceived by a digital think tank iSpirit,in IndiaStack can enable government, citizens and entrepreneurs to interact with each other through an open digital platform. It is the largest application programming interface (API) that is being developed inorder to enable India's citizens to get access to goods and services digitally.

Conceived by the Government of India in 2012, IndiaStack uses the Aadhaar for authentication and builds eKYC documents, digital lockers and e signatures, and The Unified Payments Interface of the National Payment Corporation of India. The Aadhar becomes the foundational database for all other applications and services that are built in stacks upon it.

IndiaStack is conceived as a pyramidal structure based on the Aadhaar database as the base and unified payments interface (UPI) that is being developed by NPCI (National Payments Corporation of India) as the top. The two middle stacks comprise digital signatures and eKYC.

A unique feature of IndiaStack is that India will also have a consent architecture to protect privacy. It gives the data to the concerned individual and lets him decide who he can share the data with.

In the final analysis, IndiaStack is a new technology paradigm poised to handle vast inflows of data, scalable, and enable transparent interactions.

At the simplest level, a feature phone (as opposed to a smart phone) can be used to link the user's bank account to his/her bank account or Aadhar card number; and financial transactions can take place digitally and directly from one account to another without any commission or merchant bank charges.

Blockchain technology

Not too different from stacks, blockchain technology, emerging out of Bitcoin,[27] Blockchain is a "digital ledger that provides a secure way of making and recording transactions, agreements and contracts – anything that needs to be recorded and verified as having taken place. However, uniquely, rather than being kept in one place like the more traditional ledger book, the database is shared across a network of computers. This network can encompass just a handful of users, or hundreds and thousands of people. The ledger becomes a long list of transactions that have taken place since the beginning of the network, getting bigger over time".[28]

Blockchains could be used to provide a transparent, instantaneous and indisputable record of transactions, thus serving as an effective corruption fighter. It could be especially useful in keeping records of property and of financial transactions.

Since it is based on a distributed network of computers, it is difficult to hack. At the same, individual users could give or withhold their consent to access to data—thus providing some privacy and security. At this point in time, it is still a nascent technology, with many small and big issues in terms of cultural acceptance, infrastructure and regulations to be addressed, before it is fully accepted.

2.3.3 Applications in Play

A plethora of applications, ranging from sophisticated social media to a simple app enabling the home delivery of services flood the market everyday. Among the most prominent are social media.

Social Media. Web 2.0. A clutch of applications, often collectively known as social media[29] which have moved data from being a one way driven platforms and content to two way and interactive platforms. FaceBook, LinkedIn, Twitter, are some well known social media applications used for social networking, crowd sourcing, and co-creation of content.

Module 11 of the Academy deals extensively with the use of social media for development. Suffice it to say here, that the current popularity of social media is based on its distinct features:

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[27] **Bitcoin** is a consensus network that enables a new payment system and a completely digital money. It is the first decentralized peer-to-peer payment network that is powered by its users with no central authority or middlemen. From a user perspective, **Bitcoin** is pretty much like cash for the Internet. See www.bitcoin.org

[28] https://www.theguardian.com/global-development-professionals-network/2017/jan/17/blockchain-digital-technology-development-money

[29] Social Media is a group of Internet based apps that build on the ideological and technological foundations of Web 2.0, and that allow the creation and exchange of user-generated content.

- "Participation – Social media encourages contributions and feedback from everyone who is interested. It blurs the line between media and audience.
- Openness – Most social media services are open to feedback and participation. They encourage voting, comments and the sharing of information. There are rarely any barriers to accessing and making use of content, and password-protected content is frowned on.
- Conversation – Whereas traditional media is about "broadcast" (content transmitted or distributed to an audience), social media is better seen as a two-way conversation.
- Community – Social media allows communities to form quickly and communicate effectively. Communities share common interests, such as a love of photography, a political issue or a favourite TV show.
- Connectedness – Most kinds of social media thrive on their connectedness, making use of links to other sites, resources and people."[30]

2.3.4 Big Data and Analytics

Big Data. On April 5, 2015, the following were observed[31]:Every day, 2.5 quintillion bytes of data are generated equal to 2,500,000,000,000,000,000 bytes). If they are stored on blu-ray disks (high capacity DVD's) 10 million discs will be needed, and if they are stacked on top of each other, they would measure the height of 4 Eiffel towers. Such huge accumulation data has become to be known as **big data.**[32]

Big data remains a generic term but it can contain any type of data. Such data can be stored in private data centers, in public or private clouds where monstrous data storage machines keep such data to be accessed, updated and used by users. Such data can be classified: as private data, or government data. If such government data that is owned by either is made accessible to the public at no cost and free from proprietary issues, it becomes **open data.** One can speak of open government data (OGD) if this data is government managed but is made available to the public. In matters of **Big Data,** technical issues become very critical such as access, speed, volume, etc.

Big data is mostly generated from social media websites, sensors, devices, video/audio, networks, log files and web, and much of it is generated in real time and on a very large scale. Three defining properties of big data are

[30] Quoted in Emmanuel C Lallana (2014) *Social Media for Development. UNAPCICT Module 11 of the Academy of ICT Essentials for Government Leaders.* P.18

[31] http://www.vcloudnews.com/every-day-big-data-statistics-2-5-quintillion-bytes-of-data-created-daily/

[32] **Big data** is a broad term for data sets so large or complex that traditional data processing applications are inadequate See https://en.wikipedia.org/wiki/Big_data (Accessed November 26, 2015)

volume (amount of data), variety (number and types of data) and velocity (speed of data processing)

Handling of such vast amounts of data efficiently and meaningfully requires analytics. Big data analytics is the process of examining large data sets to uncover hidden patterns, unknown correlations, market trends, customer preferences and other useful business information. Findings can lead to more effective marketing, new revenue opportunities, better customer service, improved operational efficiency, competitive advantages over rival organizations and other business benefits.

For example; the continuously accumulating data about traffic in the city can be directed in the big dataset that is hosting such information, where invisible software application is continuously examining the trend of traffic through analyzing this data intelligently, thus producing recommendations and actions sent to citizens or traffic system and machines, or even to cars if they are equipped with WiFi, that will help them to make travel easier and better.

There is no only technology that is used for analytics activities—whether it be data management or datamining, for decision making.

The significance of big data and analytics for achieving the SDGs cannot be overstated. Governments need and collect data from various sources both from internal government departments and from vast amounts of data generated in the public spaces. Analytics to enable predictive planning, decision making and delivery of services through various platforms, i.e. web and mobile, enhances efficiency, effectiveness, and transparency.

2.4 Trends in Usage

In this section of this chapter, we examine the ways in which trending technologies are used. While initially, the technologies described earlier may appear discrete and separate, collectively they are powerful tools and can be described under the rubric of “Social, Mobile, Analytics, and Cloud”(**SMAC)**.

In addition to each component holding its own in its particular domain, SMAC provides SMAC boasts collaboration, mobility, accessibility and communication. Together, these are effective tools.

- ***Social.*** Using social media has become a must for all enterprises—private and public, and whether these are banks, retailers, or even the government. With over one billion individuals logged on to various social media networks, and people using social networks to view and make purchase decisions, many institutions have started using social media to optimize the services. Data collected and so generated by customers then form the vast databases which are ‘mined’ and analyzed.

- ***Mobile.*** The exponential growth of mobile devices has changed the way people access content. While smartphone and tablets provide a rich digital content at the user's fingertips, even simple 'feature'[33] phones can now be used in combination with IVRS to access banking and public utility services. Consequently, governments are also exploring and using mobile devices to deliver messages and services to citizens in a more effective manner.

- ***Analytics.*** Data gathered through social media and mobile telephony, in turn serves as the foundational base for effective decision-making. Analytics, or the process of evaluating such data can help predict consumer behavior, help banks and financial institutions weed out corruption and fraudulent practices. Using analytics, government can also be used to provide timely, personalized and location specific information to citizens.

  Cloud. Cloud computing enables the hardware free collection, storage and handling of vast amounts of data, available and accessible anywhere and anytime. Placing databases on remote servers on "cloud farms", whether private or public, frees the front or user-end of the need for heavy computing hardware, making distribution easy. Netflix and Amazon Prime are two examples of global companies exploiting cloud computing very effectively.

The real promise of SMAC technologies is not in their individual contributions toward cost savings and process efficiencies in the IT sector. Rather, it is their potential to support the continued digitized and automation of processes in the development sector to become effective enablers of sustainable development.

In concluding, one can argue that current trends ICTs offer new visions for using ICTs to enable the achievement of sustainable development goals; in transformationally different ways from what was commonplace as recently as five years ago. .

How the ICT scenarios play out in different sectors of sustainable development is the focus of the next section, which, through cases, illustrates the diverse use of old and new ICTs in varied contexts and conditions.

2.5 Socio-Political and Legal Concerns

The premise of this module has been that ICTs have and can play a pivotal role in accelerating the pace of achievement of the SDGs, that the capabilities of ICTs to provide information and knowledge inputs to decision-making; to provide an improved quality of public services and to enable outreach insensitive to time, distance and location.

[33] A feature phone is a mobile phone that incorporates features such as the ability to access the Internet and store and play music but lacks the advanced functionality of a smartphone. See https://en.wikipedia.org/wiki/Feature_phone (Accessed January 26, 2017)

While judicious uses of ICTs can indeed make this possible, research and other evidence have pointed to wider and differentiated impacts upon societies. First, like any other innovation, ICTs have a disruptive effect on society at large, transforming the ways in which individuals and communities interact with each other and the world at large. That virtual (online) communities triggered by social media will in some way "crowd out" real human communities, leading to a decline of human interactions, trust, and sociality—thereby disrupting the fabric of societies. There is also concern about Internet Addiction Disorder—a psychological condition reflected in the excessive use of the Internet that disrupts normal behaviour.

Second, the concern is that the use of ICTs, especially Internet of Things (IoT), and machine-to-machine communication may displace workers and cause mass unemployment and economic misery. There may be some merit to this argument in countries with large under-skilled and unemployed populations, but the fact is that with appropriate policies, technologies may enhance individual well-being and create a more knowledge based work force.

Third, there is a serious concern that an ICT-dependent economy is far more vulnerable to network failures than a pre-ICT economy; massive performance failures of the Internet or the power grid or cable disruptions could bring the economy to a grinding halt.

Fourth is a concern that an ICT based society could well be a surveillance society, with pervasive spying and loss of privacy. This spying may be by government, giant ICT firms or other anti social elements. Already there is evidence that large social media networks such as FaceBook or Google analyze user behavior, and then are able to enable direct, intrusive, and personal marketing. This may be called effective marketing; it is nonetheless the use of private information as a commodity—where the individual now becomes a saleable commodity. **Data privacy** becomes a major policy and implementation issue that is to be addressed by governments.

A fifth concern is that disruptions of the networked society or networked economy could be deliberate acts of cyber warfare. Such acts are deliberately used by extremist groups to indoctrinate and recruit youth, as well as to hack a government portal to case major disruptions. **Data security** now becomes a new area of concern.

And finally, there is a concern that the inequitable growth of information and communication technology could lead to a widening, rather than a narrowing of the digital divide—and without a comprehensive understanding of the ways and means of using ICTs appropriately and meaningfully, the gaps between the information rich and the information poor will growth, despite apparent growth in absolute numbers.

In short, while the SDGs represent a complex problem solving exercise, ICTs also offer complex, constantly evolving global scale tools to address the challenges of socio economic development. How the tools are used will make the difference between success and failure.

Something to do

Make a list of all the ICTs available in your country. List both the older technologies and the newer ones. Include infrastructure, devices, and appliclations.

Search the Internet for teledensity figures. Identify and list, in order of priority, which of the technologies are available

Also, identify and describe how your government handles Big Data and for what purpose. Can some of the big data be effectively used for achieving development goals?

Reflect and discuss among a group of colleagues on the above.

3.0 SUSTAINABLE DEVELOPMENT USING INFORMATION AND COMMUNICATION TECHNOLOGIES: REVIEWING CASES FROM ASIA PACIFIC.

This section aims to:

- Describe ICT applications in different sectors particularly those directly concerned with the SDGs; and
- Describe good practices in select cases of ICT application in priority development sectors.

ICTs, by their very nature, are cross-cutting tools and their application may be multi-sectoral and multi-pronged. For instance, an ICT deployment for poverty reduction may primarily focus on providing income-generating opportunities. At the same time it can also help bring women into the mainstream of economic activity, thus addressing a parallel goal, and simultaneously address issues of water management as part of sustainable development So, the objective of using ICTs for sustainable development is really to explore how these versatile technologies can be used simultaneously in a synergistic manner to "incorporate in a balanced way all three dimensions of sustainable development (economic, social and environmental) as well as their inter-linkages."

In the last fifteen years, there has been extensive experimentation in the use of ICTs for development. Much has been learned about success and failure. Some efforts that commenced early in the 21st century stand out because they are still working. Others are of more recent vintage and explore recent advances in ICTs. Cases presented in this section are examples of how ICTs have been used in different contexts. Readers may find that some of the cases presented in this section seem old and well known. There is a reason for this. The intention is to present cases that have been carefully planned, executed, and have been sustained, up-scaled, upgraded and grown especially after the first phase of implementation. Impact evaluations testifying to their successful implementation have been done for many of the cases presented here so that it is possible to identify success factors in the cases.

Early in the testing phases, it was sometimes assumed that ICTs could be the prime drivers in change. It would only be necessary to create an IT application and make it available and there would be positive impact. This perspective has given way to a realization that the best use of ICTs is to embed them within the context of a development goal and to include them through the entire process of a programme or project life cycle, from of the stage of policy development, plans of action, infrastructure and implementation, support systems and content, which in turn will address the country's development goals and agendas.

Because the SDGs are "integrated and indivisible and balance the three dimensions of sustainable development: economic, social and environmental" [34], the case studies described in the next sub section while structured within a set of goals, still reflect the myriad ways in which ICTs have been deployed to address one or more of the SDGs at the same time.

In discussing cases of ICT use in varied sectors of development, the UN Secretary General's identification of essential elements of sustainable developments (in his synthesis report to the General Assembly) comes in handy as a useful guide to organizing discussion.

Figure 3: Key elements for addressing the SDGs

Six essential elements for delivering the sustainable development goals[35]

3.1 Dignity—Pathway To Sustainable Development —To End Poverty and Inequality.

Eradicating poverty by 2030 is the overarching objective of the sustainable development agenda, specifically stated in Goals 1 and 2 of the SDGs.

[34] See https://sustainabledevelopment.un.org/post2015/transformingourworld

[35] United Nations (2014) *The road to dignity by 2030: ending poverty, transforming all lives and protecting the plane. Synthesis report of the Secretary-General on the post-2015 sustainable development agenda.* http://www.un.org/ga/search/view_doc.asp?symbol=A/69/700&Lang=E (Accessed Novemer 26, 2015)

Goal 1. End poverty in all its forms everywhere
Goal 2. End hunger, achieve food security and improved nutrition and promote sustainable agriculture

There is sufficient global evidence to show the relationship between ICTs and economic growth. Countries that have high levels of economic development also have high ICT penetration rates. Even in developing countries, industry and private sector-led growth supported by ICT has in some cases contributed to poverty reduction. However, the poor have benefited less from this type of development than the non-poor.[36] Governments need to address poverty directly and not just through interventions in the economy to spur growth that it anticipates will eventually benefit the poor.

Poverty itself is multidimensional. The faces of poverty are many. These include lack of basic income; lack of access to land, credit and services; a regular experience of hunger; no access to basic education and/or health care, especially for children and mothers; high mortality and low life expectancy; exposure to HIV/AIDS, malaria and tuberculosis; lack of sustainable livelihoods and access to jobs for young people; and increased vulnerability to natural disasters and conflict. For all these, both direct and indirect ICT intervention — i.e. using ICT to deliver services to the poor, and more supportive interventions such as natural resource mapping — are important poverty alleviation strategies.

Globally, there are a large number of countries that are using ICTs, either as standalone or in combinations to address issues relating to agriculture, rural development and poverty reduction. Mobile applications have formed the bulk of experimentation and success since their appearance on the global stage as widespread communication devices in both developing and developed countries.

Some of the findings from global experience show that the use of mobile devices has provided

- Better access to information—about market prices, leading to higher incomes; personalized and location specific climate and disaster information enabling better risk and disaster management
- Better access to extension services leading to improved agricultural practices and higher yields
- Better market links leading to direct interaction between farmers, suppliers, and buyers and less exploitation by middlemen and brokers
- Improved access to financial information, credit and other financial services to the famer, leading to financial inclusion.

[36] OECD, *Good Practice Paper on ICTs for Economic Growth and Poverty Reduction* (Paris, 2005), http://www.oecd.org/dataoecd/2/46/35284979.pdf.

All these benefits have resulted in higher incomes for the farmers and lower transaction and distribution costs for the input suppliers, e.g. seed and fertilizer. Benefits have also accrued to government departments helping in surveillance and monitoring and new opportunities for financial institutions.

A summary of a few of the experiences in using ICT applications in agriculture, rural development and poverty reduction in the Asia Pacific region include

1. Reuters Market Light in India[37]—which provides localized and personalized information via SMS text messages on weather, market prices, local and international commodity news, crop advisory tips helping famers make informed decisions, reduce waste, and optimize profits.

2. E-Dairy—Sri Lanka [38] —which has created awareness among small dairy farmers by sending SMS utilizing their mobiles.

3. China Rural Mobile Information Network [39] —started in 2009 to serve the needs of rural residents, rural businesses and rural authorities for new product development and to serve as a centralized data base to be accessed and utilized across the country.

4. B2bpricenow[40] is a free and sustainable electronic marketplace than runs an online trading and payment system for farmers, cooperatives, and small and medium enterprises (SMEs). It is a trading portal that provides the latest price update on market information for agriculture, consumer, and industrial manufactures.

5. E Krishok in Bangladesh[41], developed by the Bangladesh Institute for ICT in Development (BIID) facilitates free extension related information and advisory services for the clients (farmers) which will be bundled with input packages. Every farmer who buys an input package will be entitled to receive an information service package whose value will depend on the value of products.

6. Govi Sahana Sarana[42] 1920 in Sri Lanka is a hotline service where farmers can see advice on agriculture related problems

7. MNREGA India. [43] The Mahatma Gandhi National Rural Employment Guarantee Scheme (MNREGA is India's massive effort to reduce rural

[37] See http://rmlglobal.com (accessed October 24, 2015
[38] See https://www.changemakers.com/girltech/entries/e-diary-extension-innovative-ict-application-improving (accessed October 24, 2015)
[39] See http://siteresources.worldbank.org/INFORMATIONANDCOMMUNICATIONANDTECHNOLOGIES/Resources/MobileApplications_for_ARD.pdf (accessed October 24, 2015)
[40] See https://www.landbank.com/b2bpricenow (accessed October 24, 2015)
[41] See http://wp.ekrishok.com/ (accessed October 24, 2015)
[42] See http://www.agridept.gov.lk/index.php/1920-hotline (accessed October 24, 2015)

poverty by providing 100 days of employment, through off-farm location specific activities. The Scheme works on an end-to-end IT platform which, on one side, serves the poor and on the other provides vital data for decision making. In Bihar, one of the most poverty stricken states implementing (MNREGA) officials are using GPS enabled Android phones to monitor progress of the rural jobs scheme and keep a watch on the officials involved in the implementation of the scheme.

8. Nano Ganesh, India.[44] Is a GSM mobile based remote control system exclusively for use with water pump sets in agriculture areas. Routine problems faced by farmers in operating their water pumps, are addressed by this device with which one can save enormous amount of electricity, water, fuel, time and labor and manage water in the fields effectively.

There are a variety of such initiatives throughout the Asia Pacific[45] that illustrate the use of ICTs to provide vital linkages between rural communities and global markets, and to provide the information necessary to manage poverty alleviation programmes (e.g. poverty mapping using appropriate software). Most of the initiatives gather and synthesize data collected from multiple sources and convert the same into user-friendly information in a personalized way. Evidence from these experiments has shown that effective use of ICTs could help small farmers increase their revenues and improve their farming practices by making it possible for them to access information on agricultural know-how and market developments. This, in turn, reduces rural poverty.

3.2 People: Using ICTs to ensure healthy lives, knowledge and the inclusion of women and children.

Most of the world's poor live in the global south. While access to primary education has been provided, by 2015, to nearly 90 per cent of children in the global south, much remains to be done in terms of improving quality and equity. The three sectors, education, gender, and health are inextricably linked and they are the keys to achieving other sustainable development goals. Each affects the other. Ideally, a holistic view would then be to examine the use of ICTs in these three sectors together. However, for purposes of simplicity, each of these sectors are discussed separately.

Three of the SDGs address these sectors directly. They are

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[43] See http://www.rediff.com/news/report/bihar-govt-to-use-gps-phones-to-monitor-mnrega-progress/20130315.htm (accessed October 24, 2015)
[44] See http://www.nanoganesh.com (accessed October 24, 2015)
[45] See UNDP, "ICT and Poverty and Hunger: Asian Experiences", World Summit on the Information Society, Geneva, 11 December 2003, http://www.apdip.net/projects/rhdr/news/08012004/poverty.pdf.

Goal 3. Ensure healthy lives and promote well-being for all at all ages

Goal 4. Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all

Goal 5. Achieve gender equality and empower all women and girls

3.2.1 Health.

ICTs have facilitated two-way exchanges in health care between rural and isolated communities and urban areas, enabled effective health monitoring systems, provided access to the latest findings from medical research, and provided for a system of continuing professional education for health professionals.

From these initiatives, it may be deduced that there are two main categories of key stakeholders in the health sector who can benefit from ICT support.

1. The first category consists of ordinary people who need health care, especially those people whose access to health services and/or health-related information is limited. In short, the first category of ICT-supported health care beneficiaries includes those for whom health services are intended.

2. The second category of stakeholders includes health care providers; medical professionals such as doctors, nurses and caregivers at the primary health care level; researchers and health managers; and even policymakers in the area of health care. For the first group, ICT interventions can be direct, linking patients to expert medical services. For the second group of stakeholders, ICT interventions can be indirect and supportive through the creation of health monitoring systems or continuing professional education.

Both types of ICT interventions are discussed below.

e-Health is the umbrella term that includes all aspects of ICT use in health care. e-Health includes telemedicine, where medical advice or consultation is provided over long distances via Internet, radio, telephone or other communication technologies. Recent years have witnessed the extension of medical services through mobile applications (m-Health). These have largely consisted of health call centres, ambulance services, emergency toll free telephone services, disaster management and mobile telemedicine [46]. One form of telemedicine is interactive video conferencing where geographically separated doctors and patients can have a consultation. A camera in an examining room enables a doctor to present the patient to the specialist based elsewhere, thereby significantly reducing the costs of bringing the patient to the specialist or the cost of travel by the specialist to remote locations. This also broadens access to health care even when there is an acute shortage of medical practitioners.

[46] See http://www.who.int/goe/publications/goe_mhealth_web.pdf (accessed October 16, 2015(

A large number of Asia Pacific countries are using telemedicine to provide the link between remote doctors and specialist urban hospitals and doctors. Pakistan has been running, since 1998,[47] a "store and forward" telemedicine system where a patient's medical information is collected locally (stored) and then sent to a qualified doctor (forward) in any part of the world who is then expected to respond with a diagnosis and treatment recommendation within 24 to 48 hours. Thailand[48] is among other Asia-Pacific countries to have also developed telemedicine systems. The Trans-Eurasian Information Network 2 (TEIN2) links hospitals across a region that spans Australia, China, Indonesia, Japan, Malaysia, the Philippines, Republic of Korea, Singapore, Thailand and Viet Nam, and supports a global community of over 30 million users.[49] In Afghanistan, an innovative public-private partnership (PPP) is delivering telemedicine services to remote locations. An extensive description of telemedicine projects in several Asian countries[50] reports programmes such as HealthNet in Nepal[51] and a mobile telemedicine system with multi-communication links for urban and rural areas in Indonesia.

A case study from Pakistan illustrates the power and the capacity of Web-based telemedicine initiatives to address rural health needs.

Case 2: **Telemedicine in Pakistan**

In Pakistan where medical services for the poor are insufficient, the TelmedPak initiative seeks to use ICTs to bridge the gap between doctors and patients through two distinct ways. The first method is called Store and Forward Telemedicine (described above)**.** The other technique is known as Real Time Telemedicine: the patient's data becomes available to the specialist as soon as the local doctor receives the information. This method uses video conferencing technology and live data transmission.

[47] See TelmedPak, "Telemedicine in Pakistan", http://www.telmedpak.com.
[48] See PubMed, "The Ministry of Public Health Telemedicine Network of Thailand", National Center for Biotechnology Information, http://www.ncbi.nlm.nih.gov/pubmed/11311665.
[49] See DANTE Ltd., "TEIN2", http://www.tein2.net.
[50] See Michael Dougherty, *Exploring New Modalities: Experiences with Information and Communications Technology Interventions in the Asia-Pacific Region - A Review and Analysis of the Pan-Asia ICT R&D Grants Programme* (Bangkok, UNDP-APDIP, 2006), pp. 121-140, http://www.unapcict.org/ecohub/resources/exploring-new-modalities.
[51] See Institute of Medicine, Kathmandu, Nepal, "HealthNet Nepal", http://www.healthnet.org.np/?p=profile.

Through its initiatives in Taxilla, Gilghit and Upper Punjab, the system provides a telecommunications link between doctors and patients for a variety of health related issues. The system also provides vital health services during disasters especially in the upper reaches of the Himalayas where villages are otherwise inaccessible.

Sources:
Adapted from TelmedPak, "Telemedicine in Pakistan", http://telmedpak.com (accessed October 16, 2015)

Pakistan also has a unique initiative, Sehat First[52], which is a social enterprise started by women to provide telemedicine consulting to rural populations, especially women and children

Using ICTs to improve the quality of health care education and administration is equally important as they impact upon the provision of health services. In many developing countries there is a lack of a critical mass of health care professionals, including doctor educators for teaching hospitals. Access to important medical literature is limited for both medical students and health workers who must keep abreast of the latest developments through continuing medical education and training. ICTs have a key role to play in meeting these needs. For example, an initiative started by a young doctor in India is providing medical content in multimedia

[52] See Sehatfirst.com (accessed October 16, 2015)

format both online and offline to a large clientele of medical students, aspiring doctors and practising health professionals.[53] Global networks are providing access to medical journals and to vast online libraries either for free or at a substantially reduced subscription fee. The World Health Organization (WHO)-supported Web portal called HINARI is a global effort to provide support to health professionals and policymakers worldwide.

Case 3: **The Access to Research in Health Programme (HINARI)**

The **The Access to Research in Health Programme** (HINARI) was set up by WHO in collaboration with major publishers to give developing countries access to one of the world's largest collections of biomedical and health literature. Up to 14,000 journals (in 30 different languages), up to 46,000 e-books, up to 100 other information resources are now available to health institutions in more than 100 countries, areas and territories benefiting many thousands of health workers and researchers, and in turn, contributing to improve world health.

Launched by the United Nations Secretary General in 2000, the network has brought together public and private partners to provide equitable access to health information, and it is being effectively used by health professionals, researchers and policymakers alike.

Source:
Adapted from WHO, "HINARI Access to Research Initiative", http://www.who.int/hinari. (Accessed November 26, 2015)

Questions To Think About

Look up the HINARI website and other news reports to see how this kind of support system has been useful in tracking and tackling recent epidemics such as Severe Acute Respiratory Syndrome (SARS) and the avian flu. Do your country's health officials use this system? Why or why not?

Efforts to modernize hospital and health administration have led to the development of a large number of health administration software. These MIS enable the recording and reporting of patient data of individual departments that are then linked in an intranet system for effective administration. India's **Arogyashri**[54] combines these

[53] See MEdRC EduTech Ltd., "SmarTeach", http://www.smarteach.com. (Accessed November 27, 2015

[54] See http://www.aarogyasri.telangana.gov.in (Accessed November 27, 2015

MIS systems along with an health insurance scheme providing health insurance for tertiary care to patients below the poverty line.

Another critical application of ICT in health is the deployment of ICT-based surveillance systems for the prevention, reporting and monitoring of diseases such as HIV/AIDS, malaria, tuberculosis and leprosy.[55] The availability of such systems has enabled both international agencies and national governments to monitor and anticipate outbreaks of diseases across international borders. For instance, addressing protection against and treatment of quickly spreading diseases such as SARS, MERS and the avian flu has been possible only because of ICT-based health surveillance systems.

To sum up:

- Major stakeholders in the health sector include people needing health services, especially those with limited access to health care such as rural and marginalized people, as well as health care professionals.
- Telemedicine is the most common application of ICTs in health. Telemedicine has been used extensively in many countries of Asia-Pacific.
- There are several global efforts such as HINARI to support the knowledge needs of health professionals.
- Global surveillance systems have enabled countries to contain the threat of cross-border diseases such as SARS and the avian flu.

Something To Do

Identify one major health need among the poor and one health service in your country that is capable of meeting such a need. Discuss what kind of ICT application might be useful to effectively connect the need and the service.

3.2.2 Education.

Four major issues—access, equity, quality, and resources-- plague Asia Pacific countries in their efforts to provide education to their citizens. Using ICTs to address these four issues allows institutions and countries to increase access to education without compromising on equity or quality and in the face of decreasing financial and academic resources. In other words, more learners can have access to education, maintaining the same uniform level of quality in the face of declining funding or absence of resources such as teachers, laboratories, or libraries, irrespective of who and where they are.

[55] UNDP,*Regional Human Development Report – Promoting ICT for Human Development in Asia: Realising the Millennium Development Goals* (New Delhi: UNDP, Elsevier, 2005), pp.147-160, http://www.apdip.net/elibrary#rhdr.

A quick broad survey of national efforts will reveal that the use of ICTs for education is both extensive and diverse, ranging from a long history of successful longstanding use of conventional media—radio and TV in countries like China, India and Mexico to the very successful use of ICTs in education in Singapore.[56]

Simply following conventional ways of teaching and learning, enrolment, assessment, and certification cannot effective address the challenge of access, of providing good quality education to all of a country's children. The use of technology options is a must to bridge the demand-supply gap in education. ICTs can be and have been used to provide access to education for those who, for reasons of poverty, physical disability, geographic location, gender, conflict, occupational commitments or cultural restrictions, are unable to go to school. In patriarchal societies, technology has proven to be a cost-effective alternative to all-female schools for educating women and girls[57]. Through the open school movement, educational authorities in various countries of the Asia-Pacific region have been experimenting with different ICTs, from the conventional print materials to audio-visuals and e-learning, to provide underserved sectors with access to primary and secondary education.

Case 4: **The Open Schools of the Asia-Pacific**

Using ICTs, there are a range of efforts in the Asia Pacific to provide school education to increase access, overcome time, distance and socioeconomic barriers through open schools.

Opportunities for education in open schools include the: (1) Provision of alternative schooling systems for the educationally disadvantaged; (2) Promotion of successful transition to and performance within formal schools; (3) Raising of quality through ready-made educational materials and resources; and (4) Provision of training for teachers.

- India's National Institute of Open Schooling is by far the largest open school in the world, providing basic and secondary education to more than 1.5 million people.
- Bangladesh's open school provides similar opportunities for study as do the open schools of Sri Lanka and Pakistan.

- The Philippines' eSkwela Project aims to provide educational opportunities to school dropouts.

[56] In 1997, Singapore launched a Masterplan for IT in Education. This has led to a highly successful and innovative ICT for Education initiative with four specific pillars: curriculum and assessment; learning resources; human resource development and physical and technological infrastructure.

[57] Infodev.(2010) *Survey of ICTsfor Education in India and South Asia Country Studies.* Available at https://www.infodev.org/infodev-files/resource/InfodevDocuments_882.pdf (accessed November 25th, 2015)

The eSkwela Project utilizes an ICT-enabled, inquiry-based, interdisciplinary, and thematic approach to learning and teaching. At the heart of the eSkwela Project is its instructional design. It is a blended type of learner-centred instruction where students will have one hour of computer-aided learning via interactive e-learning modules, one hour of teacher-led instruction (based on the current needs of the learners), and one hour of collaborative group activities and project. The project currently has 123 of the 283 targeted e-learning modules certified by the Bureau of Alternative Learning System of the Department of Education. Teaching is done at e learning centres set up for the purpose. Most of the centres are community-led shared facilities, meaning the communities were the ones that sourced the infrastructure, the connectivity, the personnel, and sustainability costs.

Sources:
eSkwela, http://eskwela-apc-nstp.wikispaces.com/about+the+project.

eSkwela, "The eSkwela Project: The Establishment of Community e-Learning Centers for the Out-of-School Youth and Adults", http://alseskwela.ning.com/page/the-eskwela-project-1.

Jasmine Mohammadsali, "eSkwela transfers from CICT to Department of Education", telecentre.org, http://community.telecentre.org/profiles/blogs/eskwela-transfers-from-cict-to?xg_source=activity.

National Institute of Open Schooling, http://www.nios.ac.in.

UNICEF and Cambridge Distance Education Consultancy, *Open Distance Learning for Basic Education in South Asia* (Kathmandu, UNICEF, 2009) http://www.unicef.org/rosa/ODL_Report_(Final_version)___10_Dec_09.pdf.

Something To Do

Search the Web for initiatives, in your country or elsewhere, that are similar to the examples given in the case described. What do these initiatives have in common? What are their differences? How do each address issues of educational access, equity, quality and resources?

Other ICT initiatives in education include SchoolNets, i.e. groups of schools that use ICTs to work together or collaborate to enhance teaching and learning. SchoolNets have been set up in Africa, where collaboration between schools has been both necessary and effective, and in South-East Asia, where the system is actively being supported by international agencies. The emergence of SchoolNets

in the Pacific region highlights both the potential and the possible pitfalls that such efforts can have.

Case 5: **A SchoolNet and Community Access Model for the South Pacific**

The Samoa SchoolNet and Community Access Project is an initiative of the Government of Samoa, with funding support from the Asian Development Bank, to pilot an appropriate model for introducing ICT in schools and their respective communities.

The project involves establishing in the school a Learning Centre equipped with computers, photocopier, camera, DVD, printer, Internet connection, fax and multimedia projector, among others. Students and teachers use the Learning Centre during school hours. The same facility functions after hours as a business venture catering to community members. This scheme provides financial support to the Learning Centre. Collaboration between the school staff and respective school committees has also been strengthened through this project.

Vaitele Uta Primary School was the first school in Samoa and in the entire South Pacific to be connected as a SchoolNet school. Then Vaimauga College and Lepa/Lotofaga College joined the network. The team has since connected Amoa College and Mataaevave College on Savaii.

The connectivity model is a hybrid design using wireless broadband and dial-up connecting through a data centre. The timely introduction of the new ICT legislation by the Government of Samoa to regulate the communications sector and the issuance of new 3G licenses will only improve ICT services and connectivity. The expansion of the wireless connectivity is particularly significant, as it is relatively inexpensive to install, easily expanded to other parts of the country, and very well suited to the geography of Samoa.

Source:
http://www.schoolnet.ws/project.html (Accessed November 25, 2015)

Questions To Think About

What do you think are the benefits of connecting schools to each other, and of connecting schools to the community? How can this strategy help improve access to education, as well as the quality of education provision, in your country?

Because the use of ICTs implies a minimum level of computer literacy, it was initially promoted in the educational sector as a tool to support higher education.

Consequently, the most extensive use of ICTs in education has been in higher education, especially with the establishment of open and distance learning institutions. Today's distance education programmes are delivered online, in a mode called e-learning.

One of the oldest and most successful model of ICT application in formal education with a history of technology application dating more than three decades, especially in the Asia-Pacific region remains the University of the South Pacific.[58] Based on its enormous success, and the possibility that the consortium model[59] followed by the University of the South Pacific could be used to address the digital divide in education, the small states of the Commonwealth, especially those from the Pacific region, have formed an alliance with landlocked states to make a plea for a virtual university that would specifically address their needs while making the best use of technology options. The result is the Virtual University for Small States of the Commonwealth (VUSSC).

Case 6: **A Virtual University for Small States of the Commonwealth**

The Virtual University for Small States of the Commonwealth (VUSSC) is a robust network of small states committed to bridge the digital divide including the collaborative development and sharing of free content resources to promote learning for sustainable development.

Supported by the Ministries of Education of thirty one countries, the VUSCC focuses on creating post-secondary, skills-related courses in areas such as tourism, entrepreneurship, professional development, disaster management and a range of technical and vocational subjects. Non-proprietary, electronically held course materials that can be readily adapted to the specific context of each country are used in the offering of credit-bearing qualifications in the post-secondary institutions of the VUSCC countries. This has strengthened their educational capacity and outreach.

A major project is the creation of Open Educational Resources using existing course content to be made available via the Internet.

Nearly ten years into the effort, the first eight VUSSC graduates of the Diploma in Sustainable Agriculture for Small States are now full time secondary school teachers in Samoa. More than a thousand individuals from 31 participating

[58] See http://www.usp.ac.fj/index.php?id=usp_introduction.

[59] A consortium is a partnership of a group of institutions and/or countries who come together for achieving a common objective. Each partner, while remaining independent brings its own expertise and capabilities to enhance the skills of the whole. Consortia are based on agreements between partners that specify the rights and responsibilities of each partner in the development and use of shared resources and outputs. The University of the South Pacific, like the University of the West Indies, is a consortium or partnership between eleven countries of the South Pacific that have agreed to set up a common university to serve their needs.

countries have participated in capacity building workshops, courses, and formal programmes.

Sources:
Adapted from Commonwealth of Learning, "A Virtual University for Small States of the Commonwealth (VUSSC)", http://www.vussc.info; (accessed November 25, 2015).

Questions To Think About

The VUSSC is a long-term initiative that involves extensive cooperation and collaboration among its partners. Such collaborations have the potential to succeed, but they also face various risks that can lead to failure. What do you think are the factors for success? And what do you think are the risks that could lead to failure if not properly addressed?

Another area of educational provision where ICTs may be leveraged is Non formal Education (NFE). Today, NFE is an integral part of the concept of lifelong learning through which both young people and adults are expected to acquire and maintain skills and abilities needed to adapt to a continuously changing environment. In developing countries, basic literacy programmes are a major component of NFE and most of these continue to be delivered face-to-face. But there is evidence that this is changing.[60]

***Case 7**:* **People First Network, Solomon Islands**

A project of the University of the South Pacific used PFnet, an existing communications network, to demonstrate the application of ICT in delivering non-formal and continuing education to remote communities.

In this project, the University of the South Pacific established a PFnet gateway base station in the rural community of Sasamungga, Choiseul along with a solar-powered computer centre at the community school. Members of the community were taught pre-tertiary English and English for All Purposes at the computer centre.

Participants considered the project a success. Staff and administrators at

[60] See, for example, Tata Group, "Tata Computer-based Functional Literacy Programme" (Tata Sons Ltd.), http://www.tataliteracy.com; and Glen Farrell, *ICT and Literacy: Who benefits? Experience from Zambia and India* (Vancouver, Commonwealth of Learning, 2004), http://www.col.org/resources/publications/Pages/detail.aspx?PID=38.

Sasamunga Community High and Primary School were given access to computers. More importantly, organizational and attitude changes were observed as village leaders realized the importance of using ICTs in their communities.

Source:
Adapted from Rural Development Volunteers Association, "Pipol Fastaem", UNDP and UNOPS.

Other initiatives in non formal and life long learning include PROJECT MIND[61] in Philippines and Mongolia. The project tests the feasibility of using short message services (SMS) technologies for delivering non formal distance learning to distance socio economic, cultural and gender groups.

Two major developments in the ICT for Education sector are the movement for Open Educational Resources (OER) and the Massive Open Online Courseware (MOOCs). "Open Educational Resources (OERs) are any type of educational materials that are in the public domain or introduced with an open license. The nature of these open materials means that anyone can legally and freely copy, use, adapt and re-share them. OERs range from textbooks to curricula, syllabi, lecture notes, assignments, tests, projects, audio, video and animation".[62] Courseware freely available from the Massachusetts Institute of Technology that enables anyone anywhere to see lecture notes and videos is one such example.

A MOOC (Massive Open Online Courseware) is a course of study made available over the Internet without charge to a very large number of people. Any one who decides to learn online can simply log on to the website and sign up for the course. Some courses, broken up into small modules may charge a small fee; others are completely free. A MOOC may be less structured, may not offer academic credit, but does provide background and other information that would help to gain accreditation or the achievement of additional skills and competencies. MOOCs provide participants with course materials that are normally used in a conventional education setting -such as examples, lectures, videos, study materials and problem sets. The benefit of MOOCs is that they are often free, can be used anywhere and anytime for formal or informal learning. However, evidence suggests low completion rates among people opting to use MOOCs and there is little concrete evidence to date of effectiveness.

A key application of ICTs in education in developing countries is in teacher professional development. ICTs are an important means of training the large numbers of teachers that are needed to meet the challenge of providing education for all. And because they are the key to the effective use of ICTs in the classroom, teachers need to develop both the technical and pedagogical skills necessary for ICT-supported teaching and learning. This is particularly important in the new

[61] See https://www.facebook.com/prjctmind (accessed October 16, 2015)
[62] See http://www.unesco.org/new/en/communication-and-information/access-to-knowledge/open-educational-resources/what-are-open-educational-resources-oers/ (accessed October 16, 2015)

knowledge economy where the goal of education has shifted from developing mastery of a fixed body of knowledge and skills to developing "21st century skills" — critical thinking, information literacy, problem solving, collaborative learning, and the ability to learn new knowledge and apply that knowledge to new situation.[63]

The success of Singapore's ICT in education effort was largely based on the extensive training of teachers to work in an ICT-enhanced environment even before computers were placed in schools. Bhutan entered into a partnership with the Singapore International Foundation to systematically introduce teachers to ICTs through several training programmes in their colleges of education. The effort was synchronized with the deployment of hardware in schools for the teachers to use in ICT-supported lessons. After the first round of teacher training, the second phase saw the integration of ICTs into the curriculum as a requirement in the Bachelor of Education programme.[64] In Nepal and Bangladesh teachers are likewise being trained in a range of technologies, from computers to digital cameras.[65] Similar initiatives are underway in countries as different as Mongolia[66] and Samoa.[67] Despite the differences, there is a common recognition that without effective teacher training in ICT and curriculum integration, a major component of educational reform would be left out.

It is important to understand that ICTs are not the cure-all for all of the problems plaguing education systems. Furthermore, the potential benefits of ICTs are more likely to be realized when ICTs are introduced in the context of system wide reform in educational policies and practices. Real learning gains and the improvement of an education system will take place only when all of the elements of educational change, from policies and practices, to teachers, learners and other stakeholders, come together.

It is also important to understand that the use of ICTs in education goes beyond the simple content delivery of curriculum. Modern ICT in education provides a platform for continuous discussion between all involved in the education process (students, teachers, school administration, and parents). Secondly, ICTs provide opportunities for innovative learning in a creative way. Thirdly, ICTs provide the opportunity for the students to engage in collaborative learning and problem solving, and linking to real world situations and problems.

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[63] Wadi D. Haddad and Alexandra Draxler, eds., *Technologies for Education: Potentials, Parameters, and Prospects* (Paris, UNESCO and Washington, D.C., AED, 2002), p. 7, http://unesdoc.unesco.org/images/0011/001191/119129e.pdf.

[64] Philip Wong, "Bhutan 'Support for Teacher Education' Project", in *ICT in Teacher Education: Case Studies from the Asia-Pacific Region*, Ellie Meleisea, ed. (Bangkok, UNESCO, 2007), pp. 3-9, http://www.unescobkk.org/index.php?id=7035.

[65] Sarah Lucas Pouezevara and Binita Parajuli, "Using Video Technology for Primary School Teacher Training in Rural Nepal", in *ICT in Teacher Education: Case Studies from the Asia-Pacific Region*, Ellie Meleisea, ed. (Bangkok, UNESCO, 2007), pp. 62-73, http://www.unescobkk.org/index.php?id=7035.

[66] Ibid.

[67] Ibid.

3.2.3 Gender.

Contrary to biological sex, gender refers to the socially constructed relations between women and men in a particular society. Therefore, gender perspectives and the roles of men or women are culture bound and may differ from one society to another and from time to time. For instance, in some, it may be sheer poverty; while in others, it may manifest as gender based violence.

Gender is a critically important development issue. Global data point to the great gender disparities and discriminations that exist in many parts of the world. There is also recognition that the problems of national development, i.e. poverty, education and health, cannot be addressed and development goals achieved unless women and girls are part of the mainstream of society. Almost all the SDGs speak of inclusivity, when the term 'for all' is used. Women constitute a major proportion of the marginalized and vulnerable groups across all parts of the world.

There are two aspects to the interaction between women (including girls) and ICTs—representation and participation. The first is the representation in the content of ICTs, in websites. Much of such representation is negative, making women and girls both victims of misogyny and objectification. One consequence of such representation is cybercrime and bullying, human trafficking, and sexual abuse, especially in social media.

While representation of women and girls in ICTs is an area which cannot be stressed enough; this module is focused on the second aspect, i.e. participation of women and girls (in terms of both interaction, and benefit, both economic and social) and the role of ICTs in empowerment. *Empowerment can be defined as "Expansion in women's abilities to make strategic life choices in a context where this ability was previously denied to them"* **(**Kabeer,1999)[68] Across all approaches to women's empowerment, two requirements emerge: need to ensure access and control over resources and transform existing power equations in society.

There is global and official recognition of the importance of gender, as evidenced by the inclusion of gender equality in the both MDGs (Goal 3) and in the SDGs (Goal 5). However, there is lack of clarity at all levels of decision-making and implementation. Many development policies and programmes remain gender-blind, none more so than those involving ICT integration. According to a study of the Swedish International Development Agency,[69] although there are a number of areas where ICTs have helped to alleviate poverty, most ICT projects have focused on the "poor"

[68] Naila Kabeer (1999) *Resourcs, Agency, Achievements: Reflections on the Measurement of Women's Empowerment.* See https://www.utsc.utoronto.ca/~kmacd/IDSC10/Readings/research%20design/empowerment.pdf (Accessed December 04, 2015)

[69] Alan Greenberg, *ICTs for Poverty Alleviation: Basic Tool and Enabling Sector* (Stockholm, Swedish International Development Agency, 2005), http://www.sida.se/sida/jsp/sida.jsp?d=118&a=3607&language=en.

as a general category without necessarily paying attention to women's issues.[70] As a consequence, the projects have not benefited women. This is a problem because ICTs are increasingly becoming a major tool of social participation and economic productivity, and failure to equip women with ICT skills will marginalize them further.

Sex disaggregated data on the gender divide in the use of ICTs is noticeable by its paucity for most of the Asia-Pacific region. This makes it difficult, to argue a definitive case for the inclusion of gender issues in ICT policies, plans and strategies to policy makers in developing countries. Despite this, project level data have shown that ICTs are not gender neutral; ICTs impact men and women differently and almost always, women have many disadvantages that result in lesser access to technologies.[71]

Most of the barriers women face in accessing ICTs are the same ones they face when accessing education or economic opportunity of any kind — illiteracy, lack of education and lack of awareness, poverty, lack of time, low confidence and self esteem, and socio-cultural norms that restrict mobility. Other barriers to women's access to ICTs can be summed up in three major categories: access, content relevance, availability and usage.

ICTs can benefit women directly when women exploit ICTs to improve their own status, and indirectly when ICTs are used to improve delivery of information and services to women. ICTs offer possibilities for women to directly engage in e-commerce, and access education and e-government, bypassing the socio-cultural barriers that have hindered access to economic advancement. Among women's groups, the use of ICTs has enabled women to organize advocacy campaigns for women's rights and participation by providing a new communication forum for the expression of their views and for raising awareness of women's issues.

There are Asia Pacific examples which show that ICTs have benefited women when they have been meaningfully and appropriately embedded and integrated into programmes and activities that focus on women's empowerment.

- **Mahiti Manthana**[72] In the South Indian state of Karnataka, the Indian NGO, IT for Change, has been working with the *Prakriye,* Centre for Community Informatics and Development to see how digital technologies can strengthen the women's empowerment movement. The project is embedded in the Karnataka state level Mahila Samakhya, a national women's empowerment programme under the Central Government's Department of Education. The

[70] Anita Dighe and Usha Vyasulu Reddi, *Women's Literacy and Information and Communication Technologies: Lessons that Experience has Taught Us* (New Delhi, Commonwealth Educational Media Centre for Asia and Commonwealth of Learning, 2006), p. 33, http://www.cemca.org/CEMCA_Womens_Literacy.pdf.

[71] See Hafkin, N. (2002, July). "Is ICT gender neutral? A gender analysis of six case studies of multi-donor ICT projects." Paper presented at the United Nations INSTRAW Virtual Seminar on Gender and ICT. Retrieved August 30, 2006, from www.un-instraw.org/en/docs/gender_and_ict/Hafkin.pdf See also Jorge, S. & Hafkin, N. (2002, February). Get in and get in early: Ensuring women's access to and participation in ICT projects. In Women in Action: Women and communications [special issue]. Isis International-Manila

[72] See http://www.itforchange.net/sites/default/files/ITfC/Mahiti%20Mantana-%20website.pdf

Prakriye team began with the hypothesis that the power of ICTs could be used as building blocks to revitalize the women's empowerment. Following training of the community women, three digitally enabled components were developed and used. The first was a weekly radio broadcast (Kelu Sakhi, or Listen my friend) in the women's own voices; the second was an on demand and well as a push through video system. The third component was the village based community telecentres for public information access and run by a young female infomediary from the village. What has been learned is that it is not about technology alone, or about capacity building but about building a culture of empowerment.

- **Infolady, Bangladesh[73] and elsewhere.** The young Infolady serves as an intermediary between knowledge and women in rural Bangladesh, using ICTs as enablers. Infoladies come from low income or poor families in rural areas, with up to 12 years of schooling. They have limited job opportunities either in their communities or outside. There is three basic characteristics of Infolady, which make her successful: entrepreneurship mindset, quick learning ability and good communications skills. Infolady invests her own money at a minimum level, which is very important for ensuring entrepreneurship mindset. There is also facility for getting bank financing at single digit interest rate, supported by the Central Bank. The basic principle of services provided by Infolady is information + service, or information + service + product. The Infolady offers four kinds of services: health care service, agriculture extension service, ICT services, and activation services. For example, an Infolady offers pregnancy care service to a pregnant woman, where she demonstrates multimedia content on pregnancy care using her laptop, makes regular check-up using medical kit and sells allied products like folic acid.

- ***Likhaan*** (Centre for Women's Health), Philippines, is a grass-roots organisation based in Philippines that has been actively involved in the decade-long campaign for the passage of a Reproductive Health (RH) bill undertaken by women's groups in the country. *Likhaan* set up a online magazine with the aim of bringing in the accounts of women and youth from marginalized communities who were most in need of sexual and reproductive health services and rights (SRHR), with the hope that these accounts would ultimately influence lawmakers both directly and through generating public support, and lead into the passing of the reproductive health law.

- ***ITU Girls in ICT*** [74] The Girls in ICT initiative of the International Telecommunication Union (ITU) is a global effort to raise awareness on empowering and encouraging girls and young women to consider studies and careers in Information and Communication Technologies (ICTs). The Girls in ICT Portal is a tool for girls and young women to get an insight into the ICT sector as well as for partners to understand the importance of the International Girls in ICT Day, developed by the Digital Inclusion programme

[73] See http://dnet.org.bd/page/Generic/0/61/145/85 (accessed October 16, 2015)
[74] See http://girlsinict.org (accessed October 16, 2015)

of ITU Telecommunication Development Bureau.

These examples illustrate how, if access to and control over ICTs is enabled, women benefit in different ways. The examples that follow show how women can benefit fro new economic opportunities enabled by ICTs.

That ICTs have created new economic opportunities for women is evidenced by the large number of women in large numbers, especially in countries like India and the Philippines, have entered the workforce in IT-enabled services such as data entry services, ICT based business services, software customization) women mobile money agents, women in micro-work; women run kiosks. Telework and e-commerce enable women to work from home. These ICT-enabled economic opportunities are much more successful when designed, operated and managed by women, as in the case of e Homemakers, Malaysia.

Case 8: **E Homemakers, Malaysia**

Founded in 1998 by a single mother, e Homemakers started as 'Mothers for Mothers' - a voluntary group of mothers from multi-ethnic communities. Against the backdrop of the Asian economic crisis, the group consisted of "housewives" who managed their home-based businesses using ICT. Members were involved in women-connecting-women activities to promote the concept of working from home.

The network, while helping its members gain self-esteem through mutual support activities, had to overcome public prejudice about useless "housewives" who did not contribute to the household income. It became obvious to them that more homemakers needed economic empowerment to uplift their gender status.

Initially, eHomemakers addressed the needs of Malaysian women from middle- to low-income groups wanting or needing to stay at home to look after their children while also being economically self-sufficient. Much of the project planning, design and execution was done by women volunteers who had similar needs. In just a few years, eHomemakers enjoyed financial success and social recognition. In 1999, a static website (www.mom4mom.com) was built by volunteers to meet the information-hungry homemakers and provide a networking platform. Over time, the website could not support the growing needs of members who wanted a more dynamic platform with interactive features. During this period, the network had also grown to include more socially and financially disadvantaged members.

Besides economic empowerment, eHomemakers provides information and support on key issues affecting women like social prejudice and self-defeating mindsets. Indeed, networking through eHomemakers has turned around the lives of members who were on the brink of despair and even verging on suicide.

Challenging the traditional view that only the young and educated can use IT, eHomemakers has made their portal a democratic space through which members

have been introduced to concepts like choice, costs of working, technology use and taking better control of their lives.

Source:
http://www.ehomemakers.net/en/article.php?id=2097 (accessed October 16, 2015)

Evidence from many of these activities suggests that starting with the economic empowerment that results, women find new spaces for entrepreneurship; that recognition and status gains ensue; that women begin to create their own social spaces for articulation and aggregation of their collective interests especially through social media platforms such as FaceBook; peer learning and mentoring possibilities are enhanced with overall effect on the full expression of their empowerment.

Questions To Think About

What factors do you think account for the success of programmes like eHomemakers? Can such programmes be replicated in your country? In the ESCAP high-priority countries?

ICTs can also facilitate women's participation in government and political affairs by providing a communications platform to exchange opinions, to articulate and aggregate interests, and to engage political leaders in women's issues. Women's advocacy groups can effectively use ICTs to network and connect with each other, and to mobilize public opinion. Shirkat Gah[75], one of Pakistan's most respected women's rights groups, has used the Internet to support their networking, information and communication needs and in the process, strategically link local women's concerns with the global women's movement.[76]

The new ICT scenario has created new employment opportunities for women especially in high-speed Internet, cloud computing, green ICT goods and services and their "smart" applications. Data from IT enabled Services (ITeS) show that nearly 50 per cent of their workforces consist of young, educated women. However, for women to benefit from these opportunities, there need to be pro women policies and practices to ensure benefits and to prepare women for future workforce needs, These include[77]

1. for entrance levels by way of education, training, recruitment, internship and career incentives, which require a national reassessment of

[75] See http://shirkatgah.org (accessed October 16, 2015)
[76] W. Harcourt, "World Wide Women and the Web", in *Web Studies: Rewiring Media Studies for the Digital Age*, David Gauntlett, ed. (Rome, Society for International Development, 2000).
3.3[77] See https://www.itu.int/en/ITU-D/Digital-Inclusion/Women-and-Girls/Documents/ReportsModules/ITUBrightFutureforWomeninICT-English.pdf (accessed October 16, 2015)

educational infrastructure and delivery systems;
2. for mid-career levels through career promotion and training; and
3. for management and senior levels through mentorship, skill improvement and sponsorship programmes.

To sum up:

- The barriers that women face when accessing education and ICTs are similar — poverty, illiteracy, lack of time and lack of relevant content.
- However, when technology is placed in their hands, women are able to improve their economic and social status in the community.
- Women use technology not just to learn and to generate an income, but also to create women-friendly spaces on the Internet for building up networks to voice and share their concerns, and to lobby for gender equality.
- There are emerging opportunities for women's employment in the ICT sector provided policies and plans are in place for training, career promotion and mentoring.

Something To Do

Design an ICT-supported project to develop self-confidence and economic self-sufficiency among the marginalized women in your country. Start by identifying a specific group of women (e.g. elderly women, women in urban poor communities, adolescent girls in rural communities, or even a group of women in *a particular community*). Describe their situation and social and economic needs. Then articulate the project objectives, target outcomes and project strategy/ies. You might also specify a timeline for achieving the target outcomes.

3.2.4 Vulnerable communities, the Youth and the Disabled,

The term "for all" in the SDGs includes the youth and the disabled who need access to productive employment for equitable and sustainable economic growth.

Global youth population has swelled to an unprecedented 1.8 billion people in the year 2015. Depending on decisions made by today's policy makers, this youth population has the potential for transforming economies and societies for better or for worse, and unless this demographic surge is addressed and young people can secure access to health services, education and jobs, the potential to destabilize nations and progress exists is real.

Unfortunately, nearly one billion persons in the world also live with some disability, and nearly 80 per cent of this number live in the developing world and a large portion of this cohort are in the Asia Pacific. A majority of the disabled are poor, and if you add, gender, are doubly disadvantaged and even stigmatised in their own

communities.

If one combines the figure for youth with the figure for disability, it is clear that unless proactive action is taken, a potential disaster exists.

Unfortunately, disability was not explicitly included in the Millennium Development Goals (MDGs) or in their operationalizing targets and indicators. As a consequence, disability has largely been invisible and rarely included in national policies, programmes. This has perpetuated a situation of neglect of one of the most vulnerable communities in the world.

Endorsement of the SDGs by the world means that the global community is charged with addressing the needs of this vulnerable community of young people.

The relevance of the ICTs for the young and disabled lies in their ability to open up a wide range of services, transform existing services particularly in underserved and excluded population groups. While radio has had a long history in serving the needs of the visually impaired; among the ICTs; web services, followed by mobile telephony are the access technologies with the maximum impact[78]. Mobile phones are instrumental in helping the disabled live independently.

With the services possible through the Internet, people with disabilities can participate in a range of activities—accessing learning and education, employment, government services and consumer activities, In addition, opportunities for social participation through social media are abundant. For persons with disabilities, these services are further made possible through both computer based and web based accessibility applications such a screen readers, speech recognition (speech to text and vice versa) video communication such as sign language, and visual assistance.

More than any other ICTs in use today, mobile devices and services have by far the greatest impact on independent living for persons with disabilities. At the basic level, feature phones provide a means of on-demand communication for the user through both SMS and voice calls. This in itself can enable independent living by ensuring that emergency services, family members, personal aides, assistive and everyday services are just a call or text away.

Further, for the hearing impaired, smart phones are today provided with a range of features for hearing compatibility. Mobile devices are portable, and can easily be worn or carried by the user. This gives an important addition to the independence that the disabled can enjoy. Mobile phones can also be customized at a fraction of the cost of a larger device, making them all the more attractive.

[78] ITU (2013) *The ICT Opportunity for a Disability Inclusive Development Framework.* (https://www.itu.int/en/action/accessibility/Documents/The%20ICT%20Opportunity%20for%20a%20Disability_Inclusive%20Development%20Framework.pdf (Accessed November 26, 2015)

While there are many real life examples of how ICTs have empowered the disabled individually, one service which combines the economic needs of the youth with the economic needs of the disable is "Youth4Jobs"[79], started in India in 2012.

Case 9 Youth for Jobs

With the mission "motivate, train, place," the Indian NGO, Youth for Jobs has used their website as a link between young, disabled and poor rural youth and the marketplace. In a short span of three years, the service placed nearly 7000 young disabled persons in productive employment in various sectors of manufacturing, services and the IT and ITeS sectors.

Within three years, the service has scaled from one to sixteen training centres in nine states in India. To benefit, a person must be young, a high school graduate, come from a rural part of the country and have either a locomotor (such as disability from polio) or a hearing of speech impairment.

The initiative has won several international awards for its innovative service.

Source: http://www.youth4jobs.org/index.php and personal discussion with the founder.

[79] See http://www.youth4jobs.org (Accessed November 26, 2015)

3.2.5 The Indigenous, Displaced, and the Migrant

Invariably, three groups of people—the indigenous, the displaced and migrants-- are often taken for granted or assumed when discussions about development take place. This is because, they appear to be invisible and being dispersed as a diaspora, they have little visibility, and consequently, little voice.

3.2.5.1 Indigenous people.

> Indigenous people are people defined in international or national legislation as having a set of specific rights based on their historical ties to a particular territory, and their cultural or historical distinctiveness from other populations that are often politically dominant. The concept of indigenous people defines these groups as particularly vulnerable to exploitation, marginalization and oppression by nation states that may still be formed from the colonising populations, or by politically dominant ethnic groups. As a result, a special set of political rights in accordance with international law have been set forth by international organizations such as the United Nations, the **International Labour Organization** and the **World Bank**.[80]
>
> In 2007, the **United Nations** has issued a **Declaration on the Rights of Indigenous Peoples** to guide member-state national policies to collective rights of indigenous people—such as culture, identity, language, and access to **employment**, health, education, and natural resources. Although no definitive definition of "indigenous peoples" exists, estimates put the total population of post-colonial indigenous peoples who seek human rights and discrimination redress from 220 million to 350 million.[81]

Like any other marginalized group, indigenous people have problems accessing and exploiting the potential of ICTs. Across the Asia Pacific, they live is remote locations, with their own cultures and traditions, and outside the mainstream of society. As a consequence, they face almost all issues of poverty, in addition to threats on their natural habitat due to the increasing encroachment of government and private industry.

An interesting effort to give voice to tribal and indigenous communities is currently underway in India.

Case 10: CGNet Swara[82]

> Many of the estimated 80 million members of India's tribal communities lack access to any mainstream media outlets. This often poses serious barriers to their socio-economic development, as their grievances about government

[80] https://www.indigenouspeople.net/
[81] Ibid.
[82] http://indiagovernance.gov.in/files/cgnet-swara.pdf

neglect and economic exploitation remain unvoiced. In addition, certain factions (such as the Maoist insurgency) can exploit their frustration and isolation to violent ends.

CGNet Swara is a voice-based portal, freely accessible via mobile phone, that allows anyone to report and listen to stories of local interest. Reported stories are moderated by journalists and become available for playback online as well as over the phone

The software underlying CGNet Swara is open-source and freely available from an online repository. The system was originally developed as a project at the Massachusetts Institute of Technology, and is currently maintained with the support of Janastu[83], Microsoft Research India and several volunteers.

While the technology for building interactive voice services (IVR) has been around for a long time, what distinguishes CGNet Swara is the ability for callers to contribute information to the system. Most IVR platforms are designed for callers to listen to messages, but on CGNet Swara, they can also record their own messages for others to hear. Our platform includes a moderator's interface that enables privileged users to review the recordings, and optionally annotate or edit them, prior to making them public.

In the first 21 months of its deployment in India, CGNet Swara has logged over 70,000 phone calls and released 1,100 messages.

3.2.5.2 The Displaced

Whether as a result of war, flood, or other natural and man-made disasters, there are more than 60 million people globally, desperately in need of assistance and humanitarian aid. Especially after a natural disaster, the displaced need to communicate to their near and dear and also cash to address their immediate needs until longer term rehabilitation can take place.

Radio and television systems might fail; power supplies might interrupt telecommunications and Internet connectivity. In such situations, the power of the mobile phone to reach out to individuals and collectively to groups cannot be underestimated. Humanitarian aid agencies are currently exploring new ways of delivering cash and electronic vouchers to the affected. Delivering cash through mobile may still have some limitations, because the displaced may be lacking in “Know Your Customer” or (KYC) documents. In this circumstances electronic pre-paid cards are useful

Case 11: Oxfam and Visa Prepaid cards in the Philippines

[83] http://janastu.org/

The global NGO, Oxfam, teamed up with Visa to deliver Prepaid Visa cards to persons displaced after the Typhoon Haiyan (Local name: Yolanda) as part the Electronic Prepaid Solution. These cards were issued based on the assumption that 'access to money is vital during disasters especially when livelihoods and the local economy are severely affected'[84] A monitoring survey revealed that beneficiaries used the prepaid card for cash withdrawal and purchase through point-of-sale (POS). First time prepaid card users reported **100% success** with their transactions.[85]

Yet another Filipino NGO, Mercy Corps launched the TabangKO ("my help") program to deliver emergency cash assistance to households affected by Typhoon Haiyan. A mobile banking platform was used to make the cash transfers intended to help households meet immediate needs after disaster. The programme also aimed to familiarize beneficiaries with financial products such as savings accounts. Evaluation provided insights into improvement of similar cash transfer programmes.[86]

3.2.5.3 Migrants

Migrant workers may be considered as communities on the move. These movements may be within national borders or international, from one country to another. When discussing the relationships and impacts of human development, migration, and ICTs, awareness of the disparities and inequalities on access and use that exist between groups and amongst countries is critical; because such inequalities of access and use have implications on many migrants' access to ICTs and their ability to use these tools; as they do for their families and friends that reside in their country of origin.

For highly skilled migrants who are moving from one city or country to another, access and use of ICTs may not be significantly different from before and after the move. Many have probably used the Internet for preparation prior to, during, and after the journey. ICTs open up doorways to employment, transportation, money transfers, services en route and less risk of theft or loss of money because they no longer need to carry large sums of cash with them.

For the lesser privileged migrants, ICTs can play a very important role. Migrants are deeply connected to ICTs because it is these tools that keep them in touch with their families and communities back home, and to access news from home. Migrants also use ICTs in very specific ways. In addition to using mobile phones as tools for financial transactions and remittances, migrants contribute to websites sharing information and experiences. Sometimes, a call for help is transmitted through a

[84] http://policy-practice.oxfam.org.uk/blog/2015/05/oxfam-and-visa-team-up-for-innovative-payment-solution-for-disaster-affected-communities (Accessed January 27, 2017)
[85] Ibid.
[86] https://www.mercycorps.org/research-resources/beyond-meeting-immediate-needs-impact-electronic-cash-transfer-approaches (Accessed January 27, 2017)

helpline[87] or through social media. In India, a tweet to the Minister for External Affairs from a stranded migrant worker often results in immediate help and action to assist the individual.[88]

A study conducted among Indonesian domestic workers in Singapore[89] showed that for the domestic worker, the mobile phone provides a measure of independence and privacy in communication. Access to Internet and telephony can be restricted in an employer's home; the domestic worker bypasses such restrictions by having her own access. Purposes of use are the same—communicating with family, mobile banking, sending money home, etc.

The interface between banking and mobile services has had a huge impact on the volume and speed of international remittances. At times of crises in the family such as illness, birth, or death mobile banking has become a much more timely and likely option for migrants than in the past.

There are also changes taking place in the realm of building and maintaining relationships as a result of many new applications, especially Web 2.0 apps such as FaceBook, FaceTime, Whatsapp[90], etc. Connecting to family and friends to share news and information, the digital relationship is transformed irrespective of time and distance. Combine this with GPS technologies, and the digital relationship grows further. [91]

While there be significant differences in how different economic classes of immigrants use ICTs, the future of ICTs and their impact on migrants is more dependent on increasing penetration of telecommunications infrastructure into the hinterland, rather than on new and variant developments in current technologies and applications.

[87] Reported in Jean Yves Hamel (2009) *Information and Communication Technologies and Migration.* Human Development Research Paper 2009/39 http://hdr.undp.org/sites/default/files/hdrp_2009_39.pdf (Accessed January 27, 2017)

[88] The Indian Minister for External Affairs, Ms. Sushma Swaraj, regularly uses Twitter to come to the rescue of Indian stranded abroad. The Twitter handles of all Indian missions abroad are publicly available and response to calls for help is speedy and effective.

[89] http://www.solutionexchange-un-gen-gym.net/wp-content/uploads/2015/11/Migration-and-ICT-Use.pdf

[90] Naming these applications should in no way be construed as an endorsement of any one.

[91] A conscious decision is made here to exclude the discussion of the political ramifications of ICTs on migrant communities.

Something to do

Identify at least one case and one socio-economic group in each of the sectors—health, education, gender, and vulnerable populations in your country.

Write it up as a case study for inclusion in your national version of Academy Module 1

3.3 Planet—Pathways to Resilient Development--ICTs to Protect the Planet--Environment, Climate Change, and Green ICTs and Disaster Risk Mitigation

Some disaster or another occurred almost daily in the period between 2000 and 2015, with the Asia Pacific being the worst hit. Not all the disasters were related to weather and climate change; but that does not take away from either the loss in human lives or damage to countries' fragile socioeconomic conditions.

There have been largely unpredictable events such as earthquakes, volcanic eruptions, landslides, flash floods, and tsunamis; there also have been predictable events such as cyclone and typhoons, and conflict. There are also health related disasters, such as the airborne avian flu which can devastate a poultry industry in a country. Nearly 500,000 people have died, and an estimated damage of 525 billion dollars has been incurred.

In nearly 10 of the 17 goals, the SDGs draw attention to the dangerous consequences that inequitable distribution of resources and unbridled exploitation of natural resources have created a for the survival of the earth. The global community is charged with reversing the damage of global climate changes, in various parts of the world. Island states are particularly vulnerable to the effects of global warming and rising sea levels while landlocked and mountainous states are vulnerable to the melting of glaciers, soil erosion and avalanches. The most vulnerable victims of climate change are the poor, wherever they are located, since the scale of global degradation results in the loss of their livelihoods.

6) Ensure availability and sustainable management of water and sanitation for all

7) Ensure access to affordable, reliable, sustainable and modern energy for all

8) Promote sustained, inclusive and sustainable economic growth, full and productive employment, and decent work for all

9) Build resilient infrastructure, promote inclusive and sustainable industrialization, and foster innovation

10) Reduce inequality within and among countries

11) Make cities and human settlements inclusive, safe, resilient and sustainable

12) Ensure sustainable consumption and production patterns

13) Take urgent action to combat climate change and its impacts (taking note of agreements made by the UNFCCC forum)

14) Conserve and sustainably use the oceans, seas and marine resources for sustainable development

15) Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification and halt and reverse land degradation, and halt biodiversity loss

Modules 9 and 10 of the Academy of ICT Essentials for Government Leaders Module Series examines disasters and the relationship between environment, climate change, and green ICTs extensively. For this reason, this section will only introduce how countries have moved in the last decade to addressing three intrinsically linked issues—environment, disasters, and climate change.

In 2015, the global community stands at a crucial crossroads, where climate change, the global community's capacity to act, and the transformative power of ICTs meet.

In the last decade, especially after the 2004 Asian Tsunami, there has been extensive work in the role of ICTs in the four stages of disaster risk reduction (mitigation, preparedness, response and recovery). There are two distinct but closely interconnected areas in which the enhanced capabilities of ICTs assist both governments and citizens alike. For the government, ICTs enable better documentation, coordination of spatially separate sectors; while engaging with the general public in interactive ways, both by keeping them informed and by receiving critical information from them, thereby empowering them vis a vis the authorities. For those affected by disasters, timely and better information enable preparedness, timely information and help, and through social media, interact with family and others

Two categories of some illustrative cases in the composite area of environment, climate and disaster are summarized here. The first kind is citizen early warning systems of using mobile phones and cell broadcasting for disaster warning. The second consists of governments' efforts in comprehensive policy and systems approaches.

Early warning systems:

- In Nepal, where agriculture is the mainstay of incomes in the Central and Southern region, and NGO, Practical Action, with donor support, introduced the use of mobile phones for disaster warning. It did this by developing a phone based early warning system allowing upstream and downstream communities to exchange information on flood signs and occurrences.
- In Sri Lanka, the country worst hit by the tsunami of 2004, the Disaster and Emergency Warning Network (DEWN)[92] is an innovation based on widely available mobile technologies such as SMS and cell broadcast aimed at rendering a cost effective and reliable mas alert system. The network connects mobile subscribers, police stations, identified religious, social community centres and the general public to a national emergency alarm centre. DEWN is also available in Mongolia, Philippines, Lao PDR and Bangladesh. [93]

- In Bangladesh, the Local NGO, Shushilan, responded to climate challenges by developing two ICT-based plant clinics in the subdistrict of Kaligonj (part of Satkhira district). So called "plant doctors" – that is, local agricultural extension workers employed by Shushilan – use ICTs in order to assist farmers; providing the farmers with the information they require. ICTs can also be used by the plant doctors to share experiences between farmers, and to pass on early warnings on floods and cyclones that are generated by the Bangladesh Meteorology Department, mainly via mobile phone.
- The Tikiwiki GeoCMS project of the Pacific Islands Applied Geoscience Commission (SOPAC)[94] aims to reduce the vulnerability of the Pacific Island Countries to the adverse effects of climate change through the development of an integrated planning and management system. The GeoCMS system has made it possible for the Pacific Island Countries to publish their geographical data for access and sharing over the Internet. All this helps in reducing the vulnerability of these nations as governments can access important information that can now be made available in a "just in time" manner.[95]

[92] See http://www.gsma.com/mobilefordevelopment/dewn-dialogs-disaster-and-emergency-warning-network-2 (accessed October 17, 2015)
[93] UNICEF (2010) Mobiles For Development http://www.unicef.org/cbsc/files/Mobiles4DeReport.pdf (accessed October 16, 2015)
[94] On 1 January 2011, SOPAC became a division of the Secretariat of the Pacific Community, and has been renamed the SPC Applied Geoscience and Technology Division (SOPAC).
[95] Breaking Barriers: The Potential of Free and Open Source Software for Sustainable Human Development - A Compilation of Case Studies from Across the World (Bangkok, UNDP, 2006),

- In China, digital broadcasting is used for alarm and rescue. The use of digital broadcasting is based on its wide availability, cost and other factors. Warnings are given through picture and text, without the user having any control of it, i.e. switching off. This is combined with traditional tools such as loudspeakers located at strategic places for greater effectiveness.[96]

A review of the presentations made at the UNESCAP Conference on "ICT for Promoting Inclusive and Disaster Resilient Development, May 2015[97], reflects the range of activities in this area. Countries such as India, Philippines, and Sri Lanka has established coherent national frameworks, encompassing policy, legislations, institutions, systems, and processes for addressing issues of environment, climate change and disaster. Others are at a more nascent stage—Bangladesh, Nepal, and some countries in the ASEAN region—Cambodia, Laos, and Myanmar, for instance.

Nonetheless, all countries in the region are committed to creating effective systems and should, within a few years, have them in place.

Information needs for addressing environmental changes and threats, disaster risk reduction, and climatic patterns are enormous. For governments, such needs include national development plans, demographic and spatial patterns, socio-economic conditions, details about land use patterns, vulnerability assessments, Geographic Information Systems (GIS) data, among others. Data about telecommunications and telecom density, channels of communication that public have access to; the reach and credibility of such channels are among the information needed. The average citizen needs timely, location specific, and relevant information.

While there may be databases, it is with Big Data that opportunities exist for governments to optimally use ICTs. Data from multiple sources can be rapidly analysed for decision-making. A government can combine Big Data with interactive and two way communication channels such as mobile telephony and social media to increase coordination between different sectors, improve the effectiveness and efficiency of action; and prepare for future policies and action.. In particular, uses of ICTs, mobile phones and social media in emergency and disaster situations are detailed in Module 11 of the Academy.

Disaster warning systems need not necessarily be for one country alone. Natural disasters such as typhoons, earthquakes and tsunamis often affect several countries within the same geographic area. The same is true of environment disasters such as oil spills and nuclear contamination (especially in the South Pacific), as well as

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http://www.unapcict.org/ecohub/resources/breaking-barriers/ and http://www.iosn.net/pacific-islands/case-studies/tikiwikigeocms/.

[96] See http://www.unescap.org/sites/default/files/China%20-%20Digital%20Broadcasting%20for%20Alarm%20and%20Rescue%2C%20case%20study%20-%20Professor%20Wang.pdf (Accessed November 26, 2015)

[97] See http://www.unescap.org/events/workshop-ict-promoting-inclusive-and-disaster-resilient-development (Accessed November 26, 2015)

health disasters such as the avian flu. Thus, cooperation is the key in coping with such disasters, and collaborative efforts such as TEWS have the potential to be highly effective. Sentinel Asia[98] is a disaster management support group in the Asia-Pacific region that brings together 54 organizations from 22 countries and nine international organizations in a "voluntary and best-efforts-basis initiative by participating organizations" for sharing information on a digital platform.

Social media have been extensively used in the last decade to enable two way communication between government and publics at times of crisis.

- Since April 25, the day of the first earthquake, the government set up a number of Twitter accounts, including for the Prime Minister's Relief Fund, the National Police and the National Emergency Operations Center. Officials have realized they have to interact with citizens about issues that matter- and have been using these channels to fix problems related to the recovery efforts. The government is also disseminating data on all relief funds collected and disbursed through an Earthquake Relief Portal.
- The National Institute for Disaster Management, Pakistan, has an active Facebook page for communication to the external publics.
- In 2012 the Government of The Philippines initiated a plan to consolidate hashtags on social media in order to concentrate the effectiveness of information gathering and dissemination of information on social platforms.

There are other efforts that use ICTs to address the consequences of disasters. However, much depends not on the technologies but on the use they are put to, especially the human element that can make the difference between successful use and dismal failure.

For more information on the use of ICTs for Disaster Risk Management see *Module 9 of the Academy of ICT Essentials for Government Leaders Module Series*. See also *Module 11 for examples of Social Media in Environment, Disasters, and Climate Change and* APCICT's *ICTD Case Study 2 on ICT for Disaster Risk Reduction*.[99]

To sum up:

- ICTs have a major role to play in addressing environmental issues, through the use of GIS and to draw sharp attention to the consequences of deforestation.
- ICTs have an essential role to play in addressing issues of climate change and green growth through digitization of manual processes, and dematerialization or the replacement of human activities by electronic equivalents.
- Using energy efficient ICTs such as laptop computers and mobile phones can also contribute to reducing the carbon emission of ICTs themselves.

[98] Masahiko Honzawa, "Sentinel Asia: Asia Branch Activities", Japan Aerospace Exploration Agency, http://unpan1.un.org/intradoc/groups/public/documents/APCITY/UNPAN025931.pdf.
[99] APCICT, *ICT for Disaster Risk Reduction*, ICTD Case Study 2 (Incheon, UN-APCICT/ESCAP, 2010), http://www.unapcict.org/ecohub/ict-for-disaster-risk-reduction-1.

- Disaster risk management is important for equitable sustainable development to take place.
- ICT-based remote sensing and disaster warning systems have changed the way we understand and respond to weather and climate.
- It is important to address issues affecting the vulnerable and marginalized. Disaster risk management must be part of a comprehensive development programmes with strong support among the poor.

Something To Do

Identify one ICT-based natural resource or disaster management system that your country subscribes to or has developed. Describe it in detail and determine how it takes the interests of the poor into account and how resilience is built in. If it does not do so, what modifications would you make to ensure that it meets the needs of the poor?

3.4 Prosperity—Pathway for ICTs to Promote a Strong, Inclusive and Transformative Economy

Before proceeding further, it bears repetition that the SDGs are essentially indivisible and all are based on the integration of three pillars—economic, societal, and environmental sustainability, and with three key elements in mind—inclusiveness, resilience, and sustainability. "Prosperity" as a pathway to sustainable development and reflected in Goals 7 to 10 of the SDGs is based on the premise that the world needs to 'ensure access to affordable and clean energy; promote decent work and economic growth; advance industry, innovation, and infrastructure; and reduce inequalities'[100]

7) Ensure access to affordable, reliable, sustainable and modern energy for all

8) Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all.

9) Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation.

10) Reduce inequalities within and among countries.

[100] Quoted in Asian Development Bank (2016) Knowledge Showcases: *Information and Communication Technologies for Prosperity*. https://www.adb.org/sites/default/files/publication/213266/ict-prosperity.pdf (Accessed January 27, 2017)

The role of ICTs in many of these goals is discussed in the earlier section. The focus here is on economic growth. It is argued here that the key to prosperity lies in economic security, which in turn enables access to other social services such as education, health, equality, and participation. Economic security, in turn, is dependent upon access to economic resources. Which is why the focus here is on 'inclusive finance' and the role of digital financial inclusion.

The poor often feel that lack of access to basic income and lack of access to credit and financial services are the single most important reason for their present conditions. Hence, the importance of "inclusive finance' and microfinance.

Inclusive finance, according to the United Nations, is defined as '*universal access, at a reasonable cost, to a wide range of financial services, provided by a variety of sound and sustainable institutions*[101]'. While the definition may vary[102], it is widely agreed that inclusive finance does not only refer to 'access' to finance. Instead, it embraces multiple layers of financial inclusion such as financial use, financial literacy, regulatory framework, assessment of enabling environment, consumer protection, monitoring framework, and so forth.

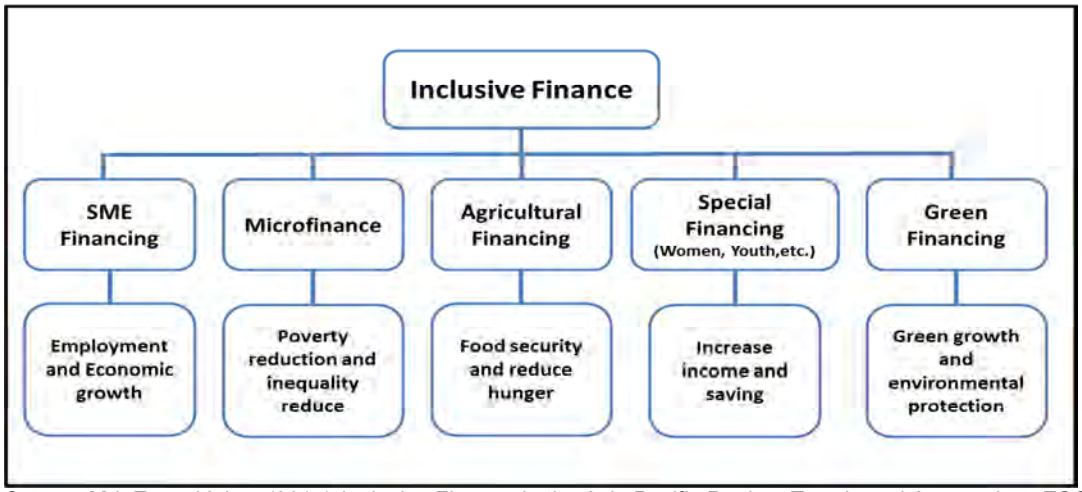
Financial inclusion refers to "a state in which all working age adults, including those currently excluded by the financial system, have effective access to the following financial services provided by formal institutions: credit, savings (defined broadly to include current accounts), payments and insurance." [103]

[101] UN-DESA website for Financing for Development: Inclusive Finance http://www.un.org/esa/ffd/topics/inclusive-finance.html (Accessed January 27, 2017)

[102] The World Bank and IMF adopted a more specific and measurable definition as '*the proportion of individuals and firms that use financial services*[102]', which focuses more on measuring actual use than providing the access. On the other hand, ESCAP's 2015 discussion paper[102] takes a more inclusive approach by defining inclusive finance as '*the process of ensuring access to appropriate financial products and services needed by all members of the society in general, vulnerable groups in particular, at an affordable cost in a fair and transparent manner by mainstream institutional players*'.

[103] **Source:** CGAP on behalf of the Global Partnership for Financial Inclusion (GPFI). "Global Standard-Setting Bodies and Financial Inclusion for the Poor: Toward Proportionate Standards and Guidance, cited in AFI, op cit. p.6 See http://www.afi-global.org/sites/default/files/publications/2016-02-womenfi.1_0.pdf

Figure 4 Inclusive Finance at a Glance



Source: Md. Ezazul Islam (2015) *Inclusive Finance in the Asia Pacific Region: Trends and Approaches.* ESCAP (2015) https://www.unescap.org/sites/default/files/3-ESCAP_FfD_Financial%20inclusion_24April2015.pdf (retrieved August 20, 2016)

Financial inclusion has three stages—access; the transaction, and post-transaction. Each of these stages is important and ICTs have a useful role to play.

Access. Access to financial services requires banking and financial institutions are available on the ground, close at hand and readily accessible. Regulatory norms for identification documentation and zero balance accounts for small savings to be deposited there.

- Papua New Guinea's Nationwide Microbank launched MiCash, with the clear objective of banking the unbanked. MiCash was initially marketed as a savings product, and the uptake within a few months from launch was relatively high: in June 2012, 70% of MiCash customers were not previous customers of Nationwide. To date, women constitute 38% of the MiCash customer base and tend to use it primarily for savings purposes. Combined with this, the Nationwide Microbank launched an extensive on the ground, face to face financial literacy initiative, reaching women in villages and plantations.[104]

- Bangladesh Bank has simplified KYC for mobile bank accounts and "no frills" bank accounts. Both accounts are drivers of financial inclusion.[105]

- In Pakistan, "UBL Omni (Pakistan): State Bank of Pakistan (SBP) introduced

[104] http://www.gsma.com/mobilefordevelopment/wp-content/uploads/2015/03/SOTIR_2014.pdf (Accessed January 27, 2017)

[105] Alliance for Financial Inclusion (AFI) (2016) *Policy Frameworks To Support Women's Financial Inclusion.* See http://www.afi-global.org/sites/default/files/publications/2016-02-womenfi.1_0.pdf (retrieved July 27, 2016

regulation for tiered-KYC requirements where accounts with higher transactions and balances require successively higher forms of identification and documentation. In June 2011, SBP went a step further and replaced the requirement for biometric information for "Level 0" accounts, which have lower balances, by allowing agents to digitally capture photos of the client and her ID at her home, business or local shop. All of UBL Omni's banking agents are enabled for Level 0 account opening"[106]

ICTs can be used as effective enablers for the provision of access and the delivery of services. Insensitive to time and distance, using ICT platforms can help the payments governments make and receive, including social transfers fast, safe, and simple.

- The Chinese government now delivers subsidies to beneficiaries through bank accounts. Recipients can visit one of 900,000 bank agents, such as mom-and-pop shops, and use their card to collect their funds through an electronic point of sale device.

Transaction. The actual act of financial transaction, which often entails going to a bank or financial institution to draw or deposit money, to borrow or to make payment can be simplified using digital solutions. Any number of e wallets, mobile money platforms, and payment gateways currently exist worldwide. It is significant that many migrant workers use such mobile money platforms for remittances to family from their workplaces abroad.

To transact on a digital platform, an individual needs to have access to at least a "feature phone", to have a minimum balance in the account, and to have a minimum level of digital literacy. There are also transaction costs—for each digital transaction, banks or third party mobile wallet provider may charge a 1 to 2 per cent fee.

To address this problem, India's Unified Payment Interface (UPI) had made transactions free of any charges and has made the system account-to-account transaction, eliminating third parties.[107] UPI is a payment system that allows money transfer between any two bank accounts by using a smart or feature phone. UPI allows a customer to pay directly from one bank account to different merchants, both online and offline, with the hassle of typing credit card details, bank codes or net banking/wallet passwords.

Post transaction. What is the value of digital financial inclusion for the government, for business, for financial institutions, and for the poor?

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[106] Women's World Banking (2015) *Digital Savings:The Keys to Women's Financial Inclusion. https://www.womensworldbanking.org/wp-content/uploads/2015/08/Digital-Savings-The-Key-to-Women%E2%80%99s-Financial-Inclusion_WomensWorldBanking.pdf*

[107] http://www.thehindu.com/business/Economy/What-is-Unified-Payment-Interface/article14593189.ece (Accessed January 27, 2017)

For government, the value of digital finance is that it brings more people into the formal economy; improves efficiency, increases accountability and transparency, reduces tax evasion by large and small enterprises and individuals and provides vast amounts of financial data on which to base economic decisions. Governments can also use the information gathered through registration processes to build an effective database for policy making

For business, especially for financial services, it brings in more business and enables the provision of superior customized and personalized services, from banking and credit to insurance, improves efficiency of services, while at the same time providing vast amounts of data. Banks and financial institutions can bundle services-savings, credit, and insurance and individualize customer service and experience. For small businesses, going digital helps to access larger markets, makes supply chain management and accounting easier; reduces the costs of doing business.

For the poor, there remains much to be done. According to the ESCAP discussion paper, financial inclusion has mainly several dimensions pertaining to the supply-side and demand-side. The options described above are part of the supply side of financial inclusion and cover provision of financial markets/services and institutional capacities of bank and financial institutions. There is a demand side, however, which consists of awareness and knowledge of financial products, financial literacy, credit absorption capacity, etc.[108].

The supply side of microfinance alone is not enough. It has to be coupled with associated factors such as financial literacy, building consumer financial capabilities and for consumer protection and policies which take the conditions and constraints of poor families in the informal economy into account. Financial literacy and education comprises of three elements:

- **Financial Literacy:** Skills and knowledge to make informed financial decisions
- **Financial education:** The process of building knowledge, skills and attitudes to become financially literate. It introduces people to good money management practices with respect to earning, spending, saving, borrowing, and investing.
- **Financial capability:** the ability and opportunity to use the knowledge and skills implied in financial literacy. Financial capability is a broader concept that necessarily links individual functioning to the entities of the financial system.
- **Digital Literacy.** The creation of awareness about financial and (digital) financial services, and the promotion of digital literacy in order to benefit equitably from the inherent advantage in digital financial inclusion is essential.

Something to Do

Can you name the digital payments gateways available in your country? How many of these are international? And how many are national and unique to your country?

Write a case study of one digital financial inclusion initiative undertaken by the government in your country. Identify and write about the three stages-access, transaction, and post transaction.

3.5 Justice—Pathways for ICTs to Promote and Build Sustainable Development

In order to create a more humane world, and to enable the progress toward the other SDGs, the global community has charged itself with the commitment to

> **16) Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels**

Using ICTs to provide efficient and prompt services to citizens, taking steps to protect a country's culture and history, and using ICTs to promote peace and harmony are ways in which government can move toward building strong institutions

3.5.1 ICTs, Government and Governance

Module 3 of the Academy of ICT Essentials for Government Leaders Module Series describes e-government applications extensively, while *Module 2* focuses on policy and the governance of ICT infrastructure and services. Therefore, this module will simply provide readers with a bird's eye view of some of the numerous e government initiatives in the Asia Pacific region.

The latest *United Nations e-Government Survey 2014: E Government for the Future We Want*[109] *defines e government as*

> "E-government and innovation can provide significant opportunities to transform public administration into an instrument of sustainable development. E-government is "the use of ICT and its application by the government for the provision of information and public services to the people" (Global E-Government Readiness Report 2004). More broadly,

[109] See http://unpan3.un.org/egovkb/Portals/egovkb/Documents/un/2014-Survey/0ExecutiveSummary.pdf (accessed October 17, 2015)

> e-government can be referred to as the use and application of information technologies in public administration to streamline and integrate workflows and processes, to effectively manage data and information, enhance public service delivery, as well as expand communication channels for engagement and empowerment of people. The opportunities offered by the digital development of recent years, whether through online services, big data, social media, mobile apps, or cloud computing, are expanding the way we look at e-government"

E government development in the Asia Pacific region shows varying trends. East Asian countries, e.g. Korea and Japan are doing extremely well and are in leading positions in e government leadership. Many South Asian countries are moving ahead, with Sri Lanka and Maldives showing much progress. There is uneven development in the Southeast Asian region with Singapore leading, and others starting to embrace ICTs and e government for development, e.g. Indonesia, Philippines, Brunei, and Vietnam. Central Asia still falls short in terms of intrastructure, online services and e services.[110]

The great diversity of the Asia Pacific region is reflected in the diversity and range of the e government activities taking place. A large number of countries have already implemented e procurement services[111], and the use of government portals and mobile phones for service delivery in taxation, customs, and excise, and consular services.

- In Sri Lanka, by dialling 1919 using any phone, citizens can have access to all the services offered by the government. The beauty of the service is that it comes in both Singhala and Tamil, making the service easier and more efficient when dealing with government departments.

- Mamamayan TXT-CSC[112] in the Philippines, is a support mechanism to provide improvement on government frontline services, act on requests, recommendations, complaints and other concerns of the citizen in an upfront, courteous and effective manner.

- In Kyrgyzstan, the electronic e Ayil project[113] to provide citizen servicdes was implemented incrementally in 14 pilot locations between 2006 and 2009.. Key stakeholders included the government and local municipalities, NGOs and

[110] See https://www.itu.int/en/ITU-D/Regional-Presence/AsiaPacific/Documents/Events/2014/October-MIS/Session3_UNPOG.pdf (Accessed November 26, 2015)
[111] See http://www.egov4dev.org/transparency/case/indiatender.shtml . See also http://www.egov4dev.org/transparency/case/indonesiatender.shtml (accessed October 16, 2015)
[112] http://www.egov4dev.org/mgovernment/resources/case/txtcsc.shtml (accessed October 17, 2015
[113] See https://books.google.co.in/books?id=bPOIWfJWFowC&pg=PA45&lpg=PA45&dq=e+ayil+project&source=bl&ots=uBzqsKa4cU&sig=WGiMArQPeG0wc-PB8zWj6F19vzk&hl=en&sa=X&ved=0CB0Q6AEwAGoVChMI3uyonZ7fyAIVxqOUCh2UtwwE#v=onepage&q=e%20ayil%20project&f=false (accessed October 16, 2015)

civil society organization, and the UNDP.

- In Vanuatu, a birth certificate being a key document to ensure benefits and protection for children, the UNICEF, along with the Government of Vanuatu, has been using mobile phones to register births of children especially from the distant islands. The birth registration system simplifies the process by allowing birth registration information about a newborn baby to be entered into a pre-programmed mobile phone which in turn sends the data to a specific Civil Registry database[114]

Other e-government applications in the Asia-Pacific region are in various stages of planning and implementation. In Cambodia, the Government Administration Information System was established to improve land and vehicle registration, put in place an electronic approval system, improve administrative services and generate revenue for the government.

The e-government applications briefly described above are examples of government-to-citizen services, which focus on the supply side. e-Governance focuses on the demand side. It is important to note this particular characteristic as we begin to explore the concept of e-governance.

Something To Do

Go the site: https://www.itu.int/en/ITU-D/Regional-Presence/AsiaPacific/Documents/Events/2014/October-MIS/Session3_UNPOG.pdf

Review the four stages of the Online Service Index presented there. Analyze and place your country, in the stage that you feel is appropriate. Then, list the steps that are needed to move your country to the next stage of development in the index.

Good governance is the visible evidence of a situation where all government procedures and processes are easy and facilitative for the citizen and where they are available for public scrutiny online, the media, citizen groups and civil society organizations can monitor government action or inaction. Governments need to interact and engage with citizen in a multiplicity of ways, not just to provide efficient and effective services, but also for transparency and accountability in an increasingly democratic and participative world. E-Governance is one of the most effective ways of combating corruption. Electronic voting, for example, can curb election-related anomalies. .

E-Procurement which is another example of how ICTs can help improve governance, is today commonplace in many Asia Pacific countries. Successful

[114] See http://www.unicef.org/pacificislands/04_CASE_STUDY_Vanuatu_.pdf (accessed October 16, 2015). See also http://www.unicef.org/cbsc/files/Mobiles4DeReport.pdf (accessed October 16, 2015)

examples of e procurement include India and the Philippines.[115]

E-Governance makes possible other forms of public engagement with government. Government websites and portals can include citizen charters for citizens to be aware of their rights with reference to specific services. The websites can promote online discussions and online voting on specific issues, making decision-making more participatory. The websites can also help concerned agencies track public grievances and respond to citizen complaints and issues more effectively. Citizens, in turn, can interact with government officials, draw attention to public issues, receive quick responses and action for their requests for information or for redress of grievances, and even develop citizen report cards and other measures of social audit of how efficiently and effectively government is functioning. All of these can be done at a lower cost and with greater efficiency than previously possible. Using appropriate access infrastructure at affordable prices (e.g. community telecentres), governments can ensure that even the poor can reap these benefits of e-governance.

Social media have emerged in recent years as additional tools that governments can use as they engage with citizens. Social media can serve as an additional information channel, a mechanism for feedback and consultation, enhanced citizen participation, and as a platform for increased interagency collaboration.[116] Module 11 of the Academy includes a large of real life examples currently in implementation throughout the Asia Pacific.

To sum up:

- Government consists of a formal superstructure while governance is concerned with outcomes of government functioning.
- The purpose of ICT interventions in government is to optimize efficiency while providing citizen-friendly services that encourage greater citizen participation in governance and public affairs.
- ICT interventions in government significantly reduce the levels of corruption by making procedures transparent and minimizing opportunities for irregularities in transactions with government personnel (e.g. bribery).
- Social media have emerged as vital tools enabling governments to engage and interact with citizens.

Something To Do

1. Visit the website http://www.meesevaonline.com and explore how this award-winning e-government service of India's Andhra Pradesh government can be replicated in your country context.

[115] See http://www.eprocurement.gov.in/default.asp and http://www.philgeps.net.
[116] Emmanuel C Lallana (2014) Social Media for Development. UNAPCICT Academy of ICT Essentials for Government Leaders. http://www.unapcict.org/academy (Accessed December 04, 2015)

2. Pick an example of an e-government initiative from your own country and discuss what you consider to be its strengths as well as its weaknesses, if any. Where you identify any weaknesses, suggest how these can be addressed.

3.5.2 ICTs and the Preservation of Cultural Diversity and Resources

Throughout history, societies have expressed concern for the preservation and promotion of their cultures, historical monuments and documents. In an age in which globalization has created a networked world, there remains an uneasy balance between the forces of globalization and the preservation of indigenous cultures in many parts of the world. The concern is twofold: (1) The fear that a culture could face extinction globally; and (2) The loss of national cultural heritage could take place among the younger segments of society. The perception that existing cultural diversity and heritage can be easily swamped or destroyed by ICTs is very real. In recent decades, there has been great concern that the liberalization process has led to a questioning of and a shaking loose of cultural values long held dear and protected by individual societies as their cultural inheritance. The impact of such a liberalization process is most evident in the flow of information and knowledge products from the more developed countries to the less developed.

The Tokyo Declaration[117] on Asia-Pacific Perspectives to the World Summit on the Information Society (WSIS) drew attention to the rich cultural diversity and heritage of this region and called on the WSIS to ensure its preservation. In turn, the WSIS Commitment and Agenda for Action recognized that: “In the evolution of the Information Society, particular attention must be given to the special situation of indigenous peoples, as well as to the preservation of their heritage and their cultural legacy.”[118]

A carefully planned strategy in the use of ICTs to preserve culture would include:

- Digitization – The documentation, in digital form of existing cultural resources and the creation of digital products—videos, animations, tutorials, booklets and interactive websites that outline the histories and cultures.

- Distribution – The use of emerging technologies and contemporary cultural modes of expression, including Web 2.0 applications to promote the cultures across the world.

The benefits of digitization are many. Digitization enhances access to many, faster and easier, both on location and through the World Wide Web. Hidden and difficult to

[117] World Summit on the Information Society Asia-Pacific Regional Conference, "The Tokyo Declaration: The Asia-Pacific Perspective to the WSIS", http://www.unescap.org/idd/documents/tokyo_declaration.pdf

[118] World Summit on the Information Society, Tunis Commitment, WSIS-05/TUNIS/DOC/7-E, 18 November 2005, http://www.itu.int/wsis/docs2/tunis/off/7.html.

access materials, archeological sites and documents can be digitized and made publicly available, allowing access to many viewers at the same time. Digitized materials serve as surrogates to the originals; and digitization can enhance preservation efforts by reducing the handling of original documents. Reduced access to the original helps to protect them from loss or damage, etc. The digital copy may serve also as backup in case of disasters, such as fire and flooding. Digitization is cheaper than photocopying in terms of low-cost distribution of huge data. It also provides reduced long-term storage costs and greatly reduces document storage space by 80 per cent.[119]

Following digitization, the use of ICTs to promote cultures and for rural tourism is another way of preserving and promoting local cultures while at the same time providing economic boosts to rural economies. From booking accommodation and tours electronically through websites, to reviewing digital archives of photographs and other digital materials locally created and displayed would have the effect of promoting rural destinations without causing much environmental or ecological damage. Digital sound and light shows that showcase local history and culture are ways of both promoting and preserving culture. Evidence from research into a telecentre in Bario, Sarawak, Malaysia highlighted how the use of ICTs to create a website led to the development of rural tourism as a major economic opportunity for the community.[120]

Web 2.0 applications provide new opportunities for protection and promotion of local cultures. For instance, blogs and tweets (on blog sites or on Twitter) about the experience of travelling in a country or destination help others in making travel decisions, as well as helping them to understand local cultures better through "a second hand view or experience". In earlier times, people's understanding of cultures was determined either by first hand experience of travel or through media such as newspapers and TV. With Web 2.0 applications, which enable and encourage "user generated content" the experience of understanding cultures and contexts becomes richer.

By using digital technologies, the field of cultural history has begun to transform the process of re-creating and understanding the past. Integrating the traditional expertise of heritage management, museology, history, and archaeology with the powerful new tools of digital information technologies, has enabled countries to protect, preserve and even promote their own cultures as venues for tourism, an important economic activity in many Asia-Pacific countries.

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[119] Fe Angela M. Verzosa, *"Digital Initiatives in Archival Preservation"*, paper presented at the International Conference on Challenges in Preserving and Managing Cultural Heritage Resources, Quezon City, the Philippines, 19-21 October 2005, http://paarl.wikispaces.com/file/view/Digital_Initiatives_in_Archival_Preservation.pdf.

[120] Roger Harris, "Tourism in Bario Sarawak: A Case Study of Pro-Poor Community-Based Tourism", Asian Encounters, 25 Nov. 2009, http://asianencounters.spruz.com/pt/Tourism-in-Bario-Sarawak-Malaysia-A-Case-Study-of-Pro-Poor-Community-Based-Tourism-Integrated-into-Community-Development/blog.htm.

Case 11: **Digital Preservation of Indian Cultural Heritage at IGNCA**

The Indira Gandhi National Centre for the Arts (IGNCA) in India has been intensively engaged in the digitization of materials, post digitization, editing, high capacity storage, retrieval and dissemination of its extensive archives on Indian culture and heritage. The technology used for this development is based on open standards using Unicode, a multilingual standard for fonts that is accepted worldwide. Search is available both in English and Hindi (Devanagari), and users have the option to search or browse materials from a specific type of collection (e.g. books, manuscripts, slides, audio, video, etc.) or from the entire collection.

IGNCA is coordinating the Annual Bibliography of Indian Archaeology (ABIA) project, a global network of scholars cooperating on an annotated bibliographic database for publishers covering South and South-East Asian art and archaeology. Countries participating in ABIA include Bangladesh, Bhutan, Cambodia, India, Indonesia, Malaysia, Nepal, the Netherlands, Pakistan, Sri Lanka and Thailand.

Sources:
Ramesh C. Gaur, "Digitization and Digital Preservation of Indian Cultural Heritage: Multimedia Digital Library Initiatives at IGNCA, New Delhi", presentation slides, http://www.ignca.nic.in/PDF_data/kn_digital001_pdf_data/T4d_Digital_Preservation.pdf; The ABIA Project, http://www.abia.net; and personal visit to IGNCA by author in 2009.

Bhutan is one country, where the preservation of cultural heritage is part of its

national development policy, best illustrated through its commitment to Gross National Happiness,[121] rather than Gross National Product as an indicator of development. Bhutan is a participant in the ABIA project described in the case study.

There are other efforts in the Asia-Pacific region, undertaken nationally in different countries and also across the Asia-Pacific region. Among these initiatives are Mabbim, the umbrella body for the Malay language in South-East Asia, which is planning the set up an official website for the Malay language, along with the publication of an online version of an encyclopedia on the Malay race. The Tamil-speaking diaspora have launched an initiative to boost Tamil language content and online tools on the Internet; a similar initiative was launched by the Speak Mandarin campaign in Singapore. Local language Web content initiatives have also been launched for developing country languages like Marathi. Dozens of websites promote local music in countries like India, Brazil and South Africa.[122]

There are a variety of software options that can form the basis of choice to address these issues. However, software decisions would have to be made on what addresses the specific goals and objectives of a project in the preservation of cultural resources; the types of media (text, pictures, sound and video) that are involved; how much is to be captured and stored new; how much is to be digitized and restored; costs and affordability; data security; and sharing and dissemination.

To sum up:

- The Tokyo Declaration and the WSIS Agenda for Action have recognized that particular attention must be given to the preservation of heritage and cultural legacies.
- Two ways in which ICTs can be used to preserve and promote cultural heritage and diversity include digitization and distribution.
- There are many areas in which ICTs, if effectively utilized, can contribute to the preservation and promotion of cultural identity.
- Promoting rural tourism through ICTs can go a long way in promoting local cultures and improving the economic opportunities for local communities.
- There are many available software options that countries can choose from to digitize and distribute their culture products. Web 2.0 applications are examples of such available options.

3.5.3 ICTs and Peace

There can be no development without peace. It is as simple as that. Development

[121] Alejandro Adler Braun, "Gross National Happiness in Bhutan: A Living Example of an Alternative Approach to Progress", Wharton International Research Experience, 24 September 2009, http://www.grossnationalhappiness.com/OtherArticles/GNHPaperbyAlejandro.pdf.
[122] Madanmohan Rao, "Nature of the Information Society: A Developing World Perspective", paper prepared for the ITU Visions of the Information Society Project (n.d.), pp. 7-8, http://www.itu.int/osg/spu/visions/papers/developingpaper.pdf.

and prosperity can only be achieved if the local situation is peaceful and stable. Regions experiencing conflicts invariably have low levels of development. Decades of excellent development work by countries and international organizations can be destroyed by conflict in a matter of weeks. The returns on investing in conflict prevention, or in building lasting peace, are definitely larger than the investments that are required to reconstruct countries and build peace after conflict.

In and of themselves, technologies can't create peace. But they can certainly contribute to an environment where people can more easily communicate, understand the current situation, Information and communication technologies can be a huge aid in the effort to build lasting peace, by helping people communicate, view information, make decisions, and understand each other better. At a time when social media are determining the way people communicate, connect, articulate and aggregate public views, no discussion on ICTs for sustainable development would be complete without a discussion on peace.

- In the Philippines, large scale demonstrations, organized via cell phones and SMS were a major factor in forcing President Joseph Estrada to resign, thus bringing about change without large-scale violence.
- In India, large scale demonstrations, again, organized countrywide via cell phones, SMS and Facebook pages, compelled the government to enact fresh laws making for stricter punishment for crimes against women.

Information and communication technologies can be used in peacemaking efforts in several different ways:

- To provide information—providing reliable and timely information, the use of ICTs can reduce the risk of rumours spurring negative attitudes and actions.
- To help people process information—websites can help people to understand and process information
- To support relationships—social networking sites such as change.org help to build public opinion, through signature campaigns, on matters of social importance.
- To help people understand each other

The ICT for Peace Foundation[123] works to facilitate and improve effective and sustained communication between peoples, communities, and other stakeholders involved in conflict. It also looks at the role of ICTs in crisis management, and includes the different types of ICT-supported activity that are carried out in conflict prevention and management, peace operations, humanitarian relief and disaster assistance, and post-conflict peace-building and reconstruction.[124] Some examples are briefly described below.

[123] See http://ict4peace.org/?cat=9 (Accessed November 26, 2015)

[124] This section is drawn from the publication: Daniel Stauffacher and others, *Information and Communication Technology for Peace: The Role of ICT in Preventing, Responding to and Recovering from Conflict* (New York, United Nations ICT Task Force, 2005), http://www.unapcict.org/ecohub/resources/information-and-communication-technology-for-peace-the-role-of-ict-in-preventing-responding-to-and-recovering-from-conflict.

ReliefWeb, [125] a service of the United Nations Office for the Coordination of Humanitarian Affairs (OCHA), is a hub for humanitarian information. The website offers a "Web feed" service to deliver customized content to partners' websites, and users can create password-protected profiles to manage material of particular interest to them. It posts some 150 maps and documents daily from over 2,000 sources, and has offices in three time zones to ensure that news items are updated round the clock.

Alertnet[126] is a project of the Reuters Foundation that focuses on rapidly developing humanitarian emergencies and on early warning about future emergencies. For instance, through their service of breaking stories, photographic coverage of disasters, and aid agency news feed, they provide timely, reliable and relevant information for aid agencies to act upon.

In post-conflict reconstruction, ICTs can be used to disseminate the terms of a ceasefire agreement to warring factions and local communities, and in the process clarify the situation and build support. It can also be used to raise awareness of war crimes tribunals or truth commissions, increasing common understanding of the processes necessary to support the rule of law.

Peace is not created with a one-time act: the cease-fire, accord or reconciliation are milestones towards peace. True peace is built over time by helping people communicate, view information, make decisions, and understand each other better.

Forgotten Diaries[127] is an online platform that brings together youths from "forgotten" conflict zones to share their experiences and develop projects. Forgotten Diaries enlisted young bloggers from conflict zones that have been neglected by mainstream media to share their stories and challenges with the world through the blogging platform. Forgotten Diaries then empowered these bloggers by providing online training and then supporting them with small grants to develop and implement small community peace building and development projects.

ICT-supported campaigns to promote reconciliation can influence political leaders and promote information exchange and dialogue between local communities. In the final analysis, it is the creation of a space for dialogue and discussion on a people-to-people basis that goes a long way in creating an atmosphere of good will that will propel the peace-building process forward.

To sum up:

- ICT for Peace includes any types of ICT-supported activity that are carried out in conflict prevention and management, peace operations, humanitarian relief and disaster assistance, and post-conflict peace-building and reconstruction.

[125] See OCHA, "ReliefWeb", http://www.reliefweb.int.
[126] See Thomson Reuters Foundation, "Alertnet", http://www.trust.org/alertnet/.
[127] See Forgotten Diaries, http://www.forgottendiaries.org.

- ICT interventions can be used for building peace, beginning with preventing conflict and later mitigating the effects of large- and small-scale conflicts.
- ICT for Peace interventions are carried out by multilateral agencies such as the United Nations, the private sector such as Reuters, and non-governmental organizations such as Youth Action for Change.

Something To Do

1. Go over the OCHA website (http://www.unocha.org) and determine who its target audiences are. What does the website aim to achieve? How effective do you think is the website in peace-building?

2. Look for information about armed conflict in your country or elsewhere in the Asia Pacific region. Describe the conflict (what is it about, when and how did it start, who is involved, what is the impact). And then come up with specific recommendations on how ICTs can be used to resolve the conflict or to mitigate some of its effects. Be as specific as possible when describing the ICT intervention you are recommending (i.e. which technology or combination of technologies, how is the technology to be used, who should be involved in the effort, who are the targets, what are the target outcomes).

3.6 Partnership—Pathways to Catalyse Global Solidarity for Sustainable Development

In the Synthesis report of the Secretary General of the United Nations, the former Secretary General identified the sixth key element of the Sustainable Development Agenda as "**Partnership".**

17) Strengthen the means of implementation and revitalize the global partnership for sustainable development

While partnership was also a key element of the MDGs, i.e. Goal 8, the explicit emphasis in the SDGs reflects the recognition that these goals cannot be achieved without a sustained collaborative effort among all stakeholders.

Strategic alliances between business, government and civil society are a growing feature of both developed and emerging economies. Such multi-stakeholder partnerships are necessary because it is increasingly clear that no one sector in society can deliver the complexities of sustainable development alone

In global literature, there is extensive debate on the nature of collaborative partnerships in delivering development goals. In what way and at what level can

partnerships play a leveraging role. And are such partnerships indeed the "hybrid domain posited by Aayoma and Parthasarathi?"[128]

It has been argued in the earlier version of Module 1 of the Academy that multistakeholder alliances are key to the effective implementation of development goals. The view holds here too, but with a further exploration of the ways and levels of such partnerships. However, the implementation of the SDGs envisages a shift in delivery from the global community to national governments-whose responsibility it is to implement and achieve the goals that they have ascribed to in accepted the Sustainable Development Agenda 2030.

Biermann, et al. (2007) [129] describes three governance deficits where multi-stakeholders are meant to address: regulatory deficit, implementation deficit, and participation deficit.

A regulatory partnership would be particularly helpful in situations where public regulation is largely non-existent. As will be described in the next section, arriving at policy and strategy to implement the SDGs at a national level could benefit from multistakeholder collaborations at international levels.

Case 12: The Global Partnership for Sustainable Development

The Global Partnership for Sustainable Development is a multi-stakeholder network of more than 150 data champions harnessing the data revolution for sustainable development. Its members represent the full range of data producers and users, including governments, companies, civil society groups, international organizations, academic institutions, foundations, statistics agencies and data communities. The Global Partnership serves as an invaluable convener, connector and catalyst, building trust and encouraging collaboration among stakeholders to fill critical data gaps and ensure data is accessible and usable to end extreme poverty, address climate change and pave a road to dignity for all by 2030.

Source: https://sustainabledevelopment.un.org/partnership/?p=9691

The Asia Pacific Urban Forum organized by UNESCAP in 2015 is another such global partnership aimed at providing a platform for catalyzing of regional and global processes and development objectives.[130]

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[128] Aayoma and Parthasarathi (2016) op. cit

[129] Multi-stakeholder Partnerships for Sustainable Development: Does the Promise Hold? Frank Biermann, Man-san Chan, Ayşem Mert and Philipp Pattberg CSR PAPER 28.2007 https://sustainabledevelopment.un.org/content/documents/1744ENI%20Foundation.pdf (Accessed January 28, 2017) p.3

[130] http://www.unescap.org/events/apuf6/partners (Accessed January 28, 2017)

Partnerships or alliances at national levels would include the same kind of partners as at the international level, except that their terms of reference would largely be confined to the national boundaries. Such national level partnerships are particularly useful to address the "implementation gap" bringing in the government as policy maker, the private industry as an effective implementation partner.

Participation is a key ingredient of successful implementation of the SDGs. It is here that CBOs and NGOs bring in their expertise to address the last mile connections, and the outreach needed to effectively implement sustainable development projects.

Case 13 The Partnership Data for SDGs

"The **Partnership Data for SDGs (PD4SDGs)**, launched at the 2016 Partnership Exchange special event, is a United Nations initiative that seeks to bring together a range of stakeholders committed to supporting the Sustainable Development Goals in an open and transparent manner by improving the transparency of the work being carried out by multi-stakeholder partnerships and voluntary initiatives in their support to the Sustainable Development Goals.

The initiative has been developed by the UN Department of Economic and Social Affairs, the UN Global Compact and UN Office for Partnerships in response to United Nations Member States stressing the need to develop ways to improve transparency, accountability and the sharing of experiences of multi-stakeholder partnerships and on the review and monitoring of these partnerships.

The PD4SDGs seeks to bring greater transparency, coherence, impact, and comparability of the work carried out by multi-stakeholder partnerships and voluntary initiatives in their support of the SDGs, by establishing standardized framework for how information on voluntary commitments and partnerships should be published on websites and associated knowledge products. By providing a standardized framework for how such information should be published, the PD4SDGs initiative aims to bring greater transparency, coherence, impact, and comparability of the work carried out by multi-stakeholder partnerships and voluntary initiatives in their support of the SDGs.

The initiative also aims to support the follow-up and review process of the 2030 Agenda for Sustainable Development, which is centralized around the High-level Political Forum on Sustainable Development."

Source: https://sustainabledevelopment.un.org/sdinaction/pd4sdgs

As early as 2002, the Global Knowledge Partnership undertook six case studies to examine the nature of partnerships. Relevant even today, the key lessons emerging from the case studies include

- "the importance of taking a strategic approach to developing design parameters for a partnership (such as through reference to the DOI Dynamic Development framework) and finding partners able to contribute the necessary 'mix' of resources and competencies, in particular to ensure the long-term sustainability of ICT interventions;

- the importance of business partners understanding their commercial case for entering the partnership, be that reputation, local knowledge, testing of new products and services, or viable financial rates of return; and

- recognition by the public sector that to reach poor communities living in remote locations, there may be a need for subsidies for private investors and/or concessional rates for network access."[131]

Something to Do

Can you identify and describe one multistakeholder partnership working toward implementation of the Sustainable Development Goals in your country?

In this section, various possible applications of ICTs to meet the needs of specific development sectors in the Asia-Pacific region have been described. Although the discussion has been organized in terms of sectors, it should be noted that the use of ICTs for meeting the country's development goals provides opportunities to adopt a more integrated approach to development. Such an approach is necessary because in development, failure in one sector will have an adverse effect on another (for example, failure to provide education for all will mean that poverty alleviation efforts will meet with little or no success). However, while some countries are able to effectively harness ICTs for development, there are many countries where putting ICTs in the service of development remains a daunting challenge. The next section discusses ways of addressing this challenge.

Test Yourself

Choose a sector of development in your country and propose how ICTs can be used to improve, optimize and accelerate progress toward the SDG targets in this

[131] Global Knowledge Partnership. (2002) *Multistakeholder Partnerships: Issue Paper.* *https://www.odi.org/sites/odi.org.uk/files/odi-assets/publications-opinion-files/2117.pdf* (Accessed January 28, 2017)

sector. Describe the sector and how it relates to other development sectors.

Write your answer in such a way as to justify the use of ICTs in the chosen sector to the finance ministry of your country.

Section IV: Sustainable Development, ICTs, and National Development Plans

This section aims

- To explore the ways in which SDGs can be integrated into national development plans
- To explore how ICTs can be integrated into national development plans to achieve the SDGs

Toward the end of the first section of this module, discussion focused on what nations that have subscribed to the SDGs need to do for implementation. In the SDGs, the shift has been to a greater role for national governments. In fact, the prime responsibility for delivering on the SDGs has shifted from the global community to national governments. For this reason, the role of each national government has become more pronounced, since governments will "*decide [on] how these aspirational and global targets should be incorporated into national planning processes, policies and strategies*".[132]

To recap briefly, countries need

- To set up their own robust national-level targets and plans: Country-level implementation plans with targets that take into account national priorities
- To establish funding and delivery models, especially since resource mobilization to achieve the SDGs is seen largely as a national obligation. Every country must identify sources of financing. Each country must deliver on the unfinished agenda of health and nutrition MDGs but also be prepared to address the emerging burden of non-communicable diseases, and ensure better financial protection from health shocks.
- To identify and scale up innovations and new practices for greater effectiveness. Multiple innovations have been made worldwide in improving sharing on child and maternal health, counseling women and caregivers and care of neonates. Innovations in the use of mobile phones, medical devices and indigenous solutions have yielded results and these must be scaled up for maximum impact.
- To build effective partnerships between different stakeholders, government, private sector, non government agencies and civil society organizations on the ground to build effect support for large scale government programmes.

[132] Transforming our world: the 2030 Agenda for Sustainable Development, para 55.

- To set up effective monitoring and evaluation systems, irrespective of the human resources at their command. Getting the right interventions to the right people at the right time is important. A dedicated well funded, high quality monitoring and surveillance system can enable transformation

This section briefly discusses the significance of these tasks and the intersections between ICTs and national development plans of action.

4.1 SDGs and National Development Planning

There have been worldwide discussion in government, academic, international organizations, think tanks and non-government organizations on ways in which the SDGs can be integrated into national development planning. While different agencies have different perspectives, there is agreement that

1. The process is transformationally different from the usual ways of doing business or governing, in that it is now necessary to incorporate three key features—economic, social, and environmental in all aspects of planning and implementation.

2. Whatever the methodology followed, the process will no longer be hierarchical or in silos—it perforce has to be cross-sectoral and more in addressing the demand side, rather than the supply side.

3. There is no one-way or 'one size fits all'; each country will have to find its own path to achieve the goals of the SDGs.

4. More than anytime before, ICTs, as enablers, have the capacity to provide vital support at all stages and at all levels for achieving the SDGs.

The complexity of the SDGs and their implementation is, in all likelihood give rise to 'wicked problems'. "Wicked problems" are a "class of social system problems which are ill formulated, where the information is confusing, where there are many clients and decision makers with conflicting values, and where the ramifications in the whole system are thoroughly confusing."[133]

Wicked problems are characterized by multiple interdependencies and, from a social planning perspective, are not amenable to scientific solutions.[134] Governments are going to have to come to terms with the reality that they are like to face a large number of "wicked problems' in the implementation of the SDGs in a coherent and time-bound manner.

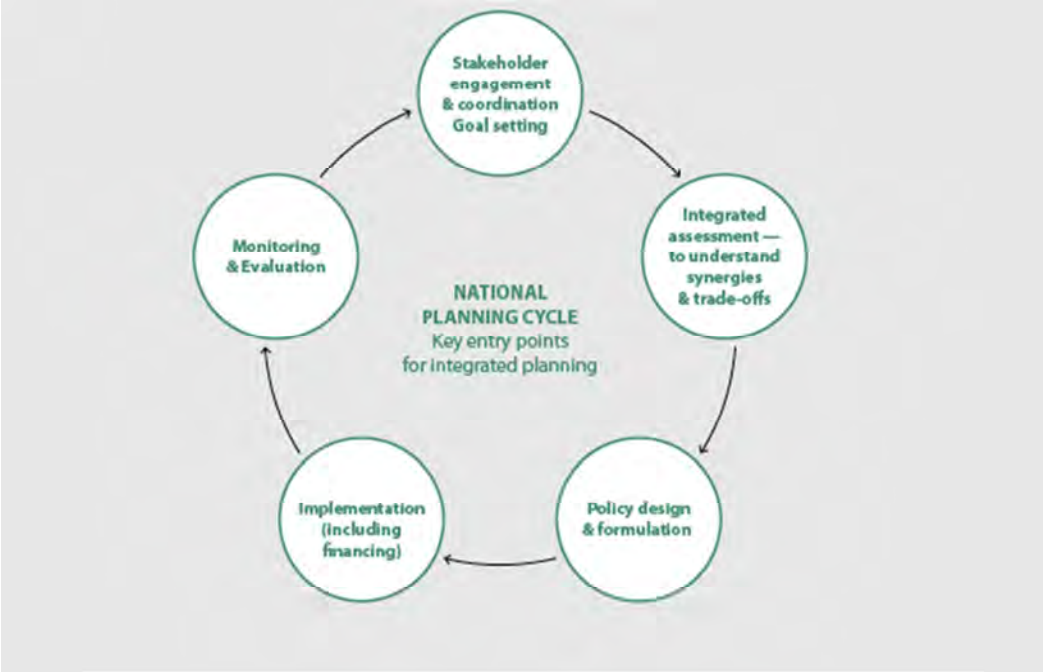
[133] Churchman, C W (1967) "Guest Editorial: Wicked Problems" *Management Science* 14(4) B-141-142

[134] Rittle, H.W. & Webber M.M. (1973) "Planning Problems are Widked Problems" in N. Cross (Ed.) Developments in Design Methodology. New York: John Wiley and Sons

The first task of each government is to juxtapose the SDGs alongside their current realities and current pace of change. Finding that the "business as usual" trajectory is no longer sufficient, governments may choose to engage in a "back-casting process'[135] Back casting means "generating a desirable future, and then looking backwards from that future to the present in order to strategize and to plan how it could be achieved."[136] A back-casting exercise simply means the creation of a long term plan with targets, milestones and markers, and identifying time bound steps, including financing needed to achieve each milestone.

The generic process of national policy making may differ slightly from country to country, but by and large follows a cyclical process with five key elements described in the figure below. Each of the stages of the cycle are important and necessary and feed forward into the next stage/next phase.

Figure 5: National Policy Making Cycle



Source: http://www.un-page.org/files/public/undp_synthesis_report.pdf

Within the context of the SDGs, earlier ways of working, with Poverty Reduction Strategy Papers (PRSPs) or National Development Plans would need modification with the identification or creation of a single nodal government wide agency tasked with the implementation of the SDGs. This could be an existing government body such as the Philippine Council for

[135] https://sdg.guide/chapter-3-tools-for-designing-sdg-strategies-and-roadmaps-a8172680d5ef#.d8w01vj46
[136] Ibid.

Sustainable Development[137] or the Indian Niti Ayog[138]. The process would begin with **stakeholder** meetings and consultations.

Stakeholders include government officials at national and sub national levels, think tanks and domain specialists, academia, financial institutions, civil society, industry, ICT specialists, and CBOs and NGOs as representatives of beneficiary groups. Interdepartmental coordination is essential in all stages; but it is best to start at the beginning of the process so that goals and targets are set; and modalities for working across the three dimensions of the SDGs are ensured. These consultations could also serve as platforms for stocktaking to understand where the region, country, subnational provinces, cities, etc. stand with regard to achieving all seventeen and individual goals. Rapid assessments can be done using existing data and can help in identifying data gaps in given sectors.

The second part of the process involves assessments. Need assessments at the field level; and in delineating of synergies and tradeoffs are essential. Needs Assessment is done through a baseline study and profiling the beneficiary group.

Needs are of different types—

- Felt or manifest needs, directly perceived and expressed by the beneficiary group
- Unfelt or latent needs, important for the people and needing attention, but unexpressed because the beneficiary group did not really perceive them or understand them, e.g. safe water, or soil pathogens, telecommunications and connectivity, etc.
- Real needs or constraints to development—these may not be expressed by people, but may be due to inadequate infrastructure, lack of facilities, or poor political priorities. In other words, the backwardness of the beneficiary group may not be because they do not know and are not aware but because of other constraints.
- Social and cultural needs—social values and norms that would support or inhibit the introduction of the initiative.
- Communication needs—availability and access to various traditional media platforms as well as Internet and Mobile and Smart Telephony. Location specific information on what media platform people use for what information and which one holds maximum credibility.

Baseline studies help in collecting the information for decision-making and to establish benchmarks so that planning and monitoring of the SDG agenda. Baseline data need to be carefully collected and should be comprehensive profiles of the target group, with indicators closely related to the given intervention. For instance, knowing the income level of the beneficiary group would help project managers determine if a service is to be provided free or charged. Or for example, knowing literacy levels and knowing how many people have simple mobile phones vs. smart phones might help in

[137] http://pcsd.neda.gov.ph/ (Accessed January 28, 2017)
[138] http://niti.gov.in/ (Accessed January 28, 2017)

determining if the delivery should be through simple SMS or through an IVRS (interactive voice response system), or through a combination of traditional and social media.

Needs assessment also includes SDG financial needs and costs and how they would be mobilized. In estimating financial needs, it is necessary to ensure that capital and recurring costs are included. One way of doing this would be to earmark or set aside a given percentage of the national budget exclusively to address the cross-sectoral SDG goals.

The third stage in the process is policy design and formulation. This may include a vision statement, a long-term perspective plan and a more detailed annual operational plan across the fifteen-year period. While examining financial requirements, care to be taken to ensure that economy-wide effects of SDGs are addressed.

Implementation across sectors, across national and sub national regions, and across diverse population groups would necessitate the creation of a robust set of indicators against which monitoring and evaluation can take place. Indicators will form the backbone of the implementation and monitoring process.

For instance, much of the data needed for decision-making is already available in government databases as **Big Data.** Some of the sources of **Big data** which are already available in government databases include

- The census, i.e. the systematic decadal recording from all members of the population,
- Household surveys, i.e. national sample surveys of randomly selected households that provides data on demographic and socio economic characteristics, including sex disaggregated data
- Agricultural surveys and data, i.e. of farms and animals, agricultural crop cycles and incomes, and agriculture specific environmental data.
- Geospatial data across geographies,
- Civil registration and vital statistics on education, health, property,
- Economic statistics, i.e. incomes, savings and consumption patterns,
- Environmental data, including from real time sensors, ground stations, satellite imagery across a wide range of environmental indicators.

Data-mining and analytics as required for decision-making needs expertise, which would not necessarily be available in a Ministry/Department Promoting Small and Micro Enterprises. Thus, involvement of ICT specialists at an early stage would provide critical insights and make the difference in policy and project design upfront.

4.2 Integrating ICTs in SDG Implementation.

The real power of ICTs lies in their potential to improve development outcomes. It is now globally recognized that digital inclusion is necessary for sustainable development to take place especially since ICTs serve as catalysts both on the supply and demand sides of development.[139]

There are two dimensions to the deployment of ICTs to support the SDGs—one—ICT policies and the second, the inclusion of ICT expertise in all sectors and at all levels of policy, decision-making, and implementation.[140]

4.2.1 ICT Policies

If ICT enabled transformation is envisaged, governments need to ensure that the entire public sector comprising of and including service delivery in poverty reduction, agriculture, education, health, disaster risk reduction, environment, and government is fully supported by high quality ICT infrastructure. This would, in turn mean,

- Telecommunications penetration and broadband connectivity to all public facilities—urban and rural by 2020 so that ICTs enabled support to deployment of SDG programmes can be effectively provided.
- Effective use of USO[141] funds for extending reach and access.
- ICT training of all relevant public officials and service providers on a regular and continuing basis to orient and to update knowledge and applications in the fast evolving sector
- The development and deployment of ICT based delivery systems in all sectors of development
- Deployment of the Internet of Things (remote sensing and control of connected devices) for the public infrastructure and environmental management
- Encouraging and deploying Public-Private (PPP) and Hybrid domain partnerships such as social enterprises as part of Corporate Social Responsibility. (CSR).

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[139] ICT Regulation Toolkit. www.ictregulationtoolkit.org/1.1 and "UN report shows broadband potential for economic and social development". http://undesadspd.org/Home/tabid/40/news/113/Default.aspx

[140] Adapted from The Earth Institute (n.d.) *SDGs and ICTs. https://www.ericsson.com/res/docs/2015/ict-and-sdg-interim-report.pdf* (Accessed January 29, 2017)

[141] The universal service obligation (USO) is the obligation placed on universal service providers to ensure that standard telephone services, payphones and prescribed carriage services are reasonably accessible to all people on an equitable basis irrespective of where they reside or their activity.

- Deployment of an ICT-based SDG information system that connects public services, public facilities, the business sector, and the public

4.2.2 Engagement with other sectors

While there are a range of policy options available for governments to expand telecommunications infrastructure and services, for ICTs to be deployed effectively to address SDG goals, it is absolutely necessary that experts, and the Ministries and officials dealing with communications and information technologies be an integral part of the policy and implementation process from the initiation stage as vital stakeholders to monitoring, evaluation and feed forward. It is not necessary to put the technologists ahead of decision making; at the same time, bringing the IT sector after policies are made and plans are in place could be counterproductive.

At the same time, this would allow the IT Ministry to understand what is needed of them to ensure that the IT policy and infrastructure plans are aligned to the development plans of the government.

The role of the Chief Information Officers (CIOs) and Chief Technology Officers (CTOs) within the context of the SDGs assumes importance as the role shifts from the traditional one of being the individual to managing the ICT infrastructure, procurements, and governance, to that of being a key strategist as part of a development team. As part of the team working to integrate SDGs into the National Development Plans, the CIO or CTO must be able to identify challenges, risks, and opportunities of including ICTs in the strategic planning process; must be able to advise on strategic ICT choices among the many options available, and must be able to monitor and propose mid course corrective actions. The CIO or CTO becomes a key member of the national plan to integrate the SDG into national development policies and plans of the government.

This section has largely explored specific ways in which the SDG can be mainstreamed into national development policy and the more specific role of ICTs in enabling the achievement of the SDGs. The next section explores other issues, often assumed and therefore often discussed, but which are key to the implementation of successful ICTD programmes and projects.

Something to Do

Go to your country's national portal. Find the National Development Plan. Read through it.

Discuss, with colleagues in your department, what changes need to be take place to

1. Align your country's national development plan with the requirement of the SDGs
2. Identify what steps you would take to do so and what the role of ICTs would be

5.0 KEY ISSUES IN THE USE OF ICTS IN DEVELOPMENT

This section aims to:

- Discuss key issues determining success or failure of ICTD programmes and projects;
- Conclude the discussion of macro issues in the relationship between ICTs and development; and
- Establish key linkages between this module and other modules in the *Academy of ICT Essentials for Government Leaders*.

One of the most damaging statistics in public sector ICTD is to look at the number of failed ICTD projects. According to some sources, over 70 per cent of ICT projects fail.[142] Determining the causes of project failure and learning from them is very tough because of all the variables involved. Why do projects succeed or fail? While there are few systematic assessments of success or failure, what seems to be a clear consensus among experts is that often issues are not of technology but managerial in nature. These factors could relate to lack of vision and strategy, poor project management, poor change management, dominance of politics and self-interest, lack of requisite competencies, and technological incompatibilities.[143] Whatever the causes, it is important to recognize that in ICTD, there are even more issues—many relating to the understanding of ICTD and the use, specifically, of using ICTs as key tools in the achievement of development goals.

Given the complexity of the SDGs, there is a need to explore new models of governance and planning, in which one has to determine exactly where ICTs fit it. If public and private sector are seen as being at two ends of a spectrum, the use of ICTs for sustainable development would sit at a congruence point or the boundary of each touching the other. This point is, perhaps, best described as the 'hybrid domain' [144] by Aoyama and Parthasarathy (2016).

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[142] Tim Rainey, "Why do so many public sector ICT projects fail?" publicservice.co.uk, 25 April 2007, http://www.publicservice.co.uk/feature_story.asp?id=7622. See also Richard Heeks, "Success and Failure Rates of eGovernemnt in Developing/Transitional Countries: Overview", e-Government for Development, Institute for Development Policy and Management, University of Management, 19 October 2008, http://www.egov4dev.org/success/sfrates.shtml.

[143] Richard Heeks, "eGovernment for Development: Success and Failure in eGovernment Projects – Evaluation", Institute for Development Policy and Management, University of Manchester, http://www.egov4dev.org/success/evaluation/factormodel.shtml.

[144] Yuko Aoyama with Balaji Parthasarathy (2016) *The Rise of the Hybrid Doman: Collaborative Governance for Social Innovation. Edward Elgar https://books.google.co.in/books?id=KxalDQAAQBAJ&pg=PA1&source=gbs_toc_r&cad=3#v=onepage&q&f=false* (Accessed January 18, 2017)

5.1 ICTD Policy

Most governments in the Asia Pacific region have an ICT policy and the necessary legislation making the implementation of the policy in place. Most countries see ICT as a 'critical infrastructure' enabling both economic progress and development. Most countries also have a national development plan or policy in place, one which lays out the roadmap for achieving human development goals. The questions to be asked are: Does the IT policy have 'development' as a stated or implicit perspective? Does the development policy have a clear place for ICT as enabling tools to facilitate, accelerate, and enhance the achievement of development objectives?

For countries in the Asia-Pacific region, a clear-cut enabling ICTD policy is the first stage at which governmental decision-making is critical. Since *Module 2 of the Academy of ICT Essentials for Government Leaders Module Series* discusses the ICT policy process extensively and *Module 7* focuses on ICT project planning, the purpose here is simply to describe the broad issues and concerns in deciding both the nature and extent of use of ICTs in development policies and programmes.

In most developing countries, ICTD policy is the domain of IT and telecommunications departments.[145] These departments tend to focus more on business and technology issues, and be excessively pro-market and not sufficiently development-oriented. Even where some IT and telecommunications sectors do concern themselves with development, the approach is generally from the technology rather than the development perspective, with emphasis on connectivity and infrastructure, e-government, e-delivery and growth, rather than on needs-based and people-centric improvement of "quality of life". The development departments, on the other hand, tend not to have a good ICTD orientation and even if they do, they are not able to significantly influence ICTD policy partly because they are not able to engage with IT departments. While the situation is gradually beginning to change, what needs to be understood is that new policies for ICTD involving both the technology and the development departments have to be developed if the unprecedented opportunities for development arising from strategic use of ICT are not to go to waste.

An ICTD policy is very different from an IT development policy. The former requires the fusion of disciplines as different as engineering and rural sociology. In fact, the use of ICTs for sustainable and inclusive social and economic development is a multidisciplinary undertaking, requiring team effort. Partnerships and collaboration between various stakeholders, i.e. government, private sector, civil society and non government organizations are essential in ICTD policymaking, planning and implementation.

[145] Anita Gurumurthy and Parminder Jeet Singh, *Political Economy of the Information Society: A Southern View* (Montevideo, Instituto del Tercer Mundo, 2005), p. 18, http://wsispapers.choike.org/papers/eng/itfc_political_economy_is.pdf.

A national alliance that includes government, the private sector and civil society is required to maximize the opportunities provided by the new ICT-driven environment for national development. Government can create favourable policy and regulatory environments, provide a common fund for the development of underserved locations[146], commit to e-government, and strengthen national capacity toward greater acceptance and use of ICTs for national development. The private sector in turn can provide the ICT infrastructure and invest in services.

Public Private Partnerships (PPPs), which are extensively discussed in *Module 8*, can be of many types — from simple participation in the development of IT applications as part of corporate social responsibility to a complete project taken on a turnkey basis, built, owned and operated by the private sector. The benefit of such partnerships is that the huge financial and technical infrastructure, which poor governments can ill afford, is shifted to the private sector. Other advantages that governments can derive from PPPs include increased efficiency in the execution of projects, reduced risk for the public sector and the stimulation of innovation in the provision of public services.

Civil society can mobilize communities and create relevant content for poverty reduction and e-inclusion through participatory processes. Ownership or operation becomes community-driven and community-owned, giving a sense of pride in achievement and the return on investment that becomes visible very quickly. In this kind of multi-stakeholder partnership, each partner in the national alliance, in conjunction with the communities that they work with, evolves its own ethos and model that it finds most suitable at the grass-roots level where the ultimate beneficiaries are the poor.

Such a coming together of various stakeholders gives rise to what Aoyoma and Parthasarathy (2016) call the social innovations or social enterprises— ones that bring together the practices of the private sector to specifically address social goals.[147]

It is important to recognize that ICT-based interventions are inherently different from conventional ones. In several countries in Asia-Pacific, regulatory and pricing mechanisms control what technologies can be used, and what content is delivered over these technologies. Policy frameworks also tend toward greater centralization and control over the technologies. Such regulatory practices are in conflict with the potential of ICTs. Technologies are not merely hardware but a set of management and operational practices. Thus, policies governing their use need to remain open, flexible, innovative and responsive. Frequent reviews are needed to ensure that the special

[146] The Universal Services Obligation Fund (USOF) is a fund created from a levy on telecom service providers and used in countries such as Chile, Pakistan, Mongolia, and India to facilitate service to underserved areas and populations of the country.
[147] Aoyuma and Parthasarathy (2016) op. cit .

needs of ICT-based programmes and projects are addressed.[148] *Module 2* argues for this kind of coherence in ICTD policy formation and practice.

Maximizing the use of ICTs for developing countries will require an understanding not only of the opportunities that ICTs present, but also of the limitations and the likely trade-offs. It is important to know when, where and whether to incorporate (or not) ICTs as a key element in the project cycle. And once such a decision to use ICTs has been made, it is then necessary to examine how ICTs are integrated into a project cycle. There are a number of concerns to be addressed here and these are discussed in the next section.

To sum up:

- ICTD policy requires new systems of planning, management and project implementation characterized by the engagement and active participation of different sectors of the economy and the community.
- Maximizing the use of ICTs requires an understanding of both its potentials and limitations.
- Convergence means more than just technology coming together. It means a merger of many disciplines, in particular the engineering sciences and the social and behavioural sciences.
- Convergence also means a multi-stakeholder partnership where government can implement favourable policy, regulation, funding and capacity building; the private sector can build infrastructure and invest in services; civil society can work with communities; and communities can own and drive initiatives.

Something To Do

Identify the department tasked with ICT policymaking in your country. Does the department have an inter-ministerial or inter-agency consulting or advisory group where both provider and user ministries are included? If yes, review its composition and decide whether all who should be included, are included.

If there is no such consulting or advisory group and you were to draft a proposal for its constitution, what argument would you use to justify its creation and composition (specify which agencies should be represented in the group)?

[148] Usha Vyasulu Reddi and Rukmini Vemraju, "Using ICTs to bridge the digital divide", in Anita Gurumurthy and others, eds., *Gender in the Information Society* (UNDP-APDIP and Elsevier, 2006), http://www.apdip.net/publications/ict4d/GenderIS.pdf.

5.2 Planning ICTD Interventions

Module 7 explores ICTD Project Management extensively. The purpose here is to introduce some elements of planning that are unique to ICTD programmes and projects. The first question to be asked is: What is the objective? Is there a development objective or goal to be addressed or is because a new technology has become available? In other words, is there a development or a technology focus?

If there is a development objective, it is usually determined at a macro level in terms of a programme/project's broad goals. These decisions are usually made at the early stages of project design and may or may not include ICTs in an integral way.

A technology or ICT-driven focus is based on the assumption that access to timely and relevant information through ICTs will *per se* promote economic growth as it provides opportunities to generate income. For example, initiatives such as telecentres offering access to e-mail and the use of a website as a marketing tool are favoured because they offer the opportunity to promote goods and to improve sales.

Moreover, the ICT-driven approach to development is more likely to emphasize communication as a good outcome in itself. The development objective and ICT-supported approach first clarifies the development goal that the project seeks to address; works out the information and communication needs; and then looks at cost-effective ways of using ICTs to address the goals and the needs.

Whichever approach is taken, careful project planning is essential to avoid gaps between design and reality — in contexts, in approaches to planning and implementation, and in perceptions and philosophies between the different stakeholders. Without planning, the consequence is often a mismatch between priorities, investments, deliverables and outcomes.

The Australian Agency for International Development (AusAID) has developed a framework and checklist for the design of ICTD projects that will bring clarity to the planning process (see Box 4).

First, ICT initiatives should be explicit about their development goals and expected outcomes. In an analysis undertaken for the AusAID – Virtual Colombo Plan, Curtain[149] has argued that ICT project goals should have a sharp focus and be clearly linked to specific MDG goals. The value of creating clear-cut links is that it makes it possible to exclude projects that cannot demonstrate their likely impact in terms of specific development objectives. It

[149] Richard Curtain,, *Information and Communications Technologies and Development: Help or Hindrance?* (Canberra, AusAID, 2004), p. 29, http://www.developmentgateway.com.au/jahia/webdav/site/adg/shared/CurtainICT4DJan04.pdf.

would also help in determining whether the project should be ICT-driven or ICT-supported. Technology choices then become simpler. Such an exercise would go a long way in reducing the possibility of project failure.

The next major question to ask is: Is the programme or project top-down or community driven? In other words, is the ICTD intervention driven by supply or demand? A large number of projects fail because they are followed a top down push approach to development without adequate attention to local contexts and needs, To be successful, ICTD interventions should be demand- rather than supply-driven, and the demand should come from the community itself. This implies the need to build partnerships with the community and to foster a sense of ownership by the community. Building such partnerships and working with the community is a long, slow and demanding process but it is potentially effective in delivering project objectives.

Third, ICT solutions should be sensitive to local conditions and limitations, including those related to infrastructure, access, relevance and language, and they should be designed to last and be sustainable. The choice of access technologies to provide connectivity; computer hardware and software elements; security systems to protect both the systems and the data from hacking, viruses and other security breaches are critical and depend on local conditions, rather than what is available in technology rich cities and locations. *Modules 4, 5 and 6* discuss these issues in more detail.

Fourth, a strong political commitment from the government is required. Such a commitment must be backed by an adequate budgetary allocation that is adequate both in quantity and in the nature of its distribution.

Fifth, where resources are limited, multi-stakeholder partnerships can lessen the burden of everyone involved. By ensuring multi-stakeholder partnerships, the government can reduce its own role to that of facilitating the creation and equitable diffusion of infrastructure, and the adaptation and scaling up of successful pilot projects. Private sector and civil society organizations can provide funding assistance in the development of content, and facilitate and enable community participation. Strategic international and regional partnerships can also be explored. By pooling scarce resources, universal systems can be created for the benefit of all. Collaboration at this level takes time to build, but the results are definitely likely to create a win-win situation for all.

Sixth, while all ICT projects are well defined with processes, targets, and timelines, implementation on the ground is a different story. Most development projects, especially if they are donor-funded, operate with fixed targets and fixed time frames. While these are planning constraints, it also has to be recognized that using ICTs effectively as development tools requires their long-term and sustained use. This is because the use of ICTs requires both attitudinal and systemic changes in organizations and communities, and it is necessary to provide a sufficient lead time for ICTs to be embedded in the social fabric of the community. There are also time lags

associated with the decision to use, the deployment of appropriate technologies, capacity building and use. These processes, although ideally parallel, are often done in a sequential and linear manner, necessitating more time than originally planned.[150] For this reason, a project can fail because sometimes by the time the project starts to show dividends, the fixed time frame is over, donor support is withdrawn and the project flounders.

Once a decision to use ICTs in a development programme or project has been made, there are several steps that need to followed in determining the strategy for technology choice and deployment. Some of these steps are detailed next.

5.3 Needs Assessment and Baseline Studies

Often, beneficiary groups and their needs are determined from outside the ICT platform decisions. This identification tends to be at a very general level and in terms of broad objectives. Project managers, however, require much more detailed information about the characteristics of the beneficiary groups and their specific needs to translate broad objectives into implementation.

Needs assessment is a critical input into ICTD project planning. Neglect of this stage could have disastrous consequences for the success of the project. Since an extensive discussion of needs assessment is given in section 4, it is mentioned here as a recap.

5.4 Technology Issues and Challenges

Based on baseline data, technology choices can be made. Factors that determine technology choice include

- Reach vs. Access. The reach of any technology is not the same as its access. For instance, reports[151] show that more than half of the world's mobile phones are in the Asia Pacific. The same report shows that when multiple connections for the same individual are factored in, the penetration rate of mobile phone is South Asia alone is around 36 per cent. Then, when one compares the kind of devices (simple vs. smart phone) owned and the kind of connectivity (2G vs. 3G or 4G), the numbers of subscriptions and connections declines further. A study conducted by the Singapore Internet Research Centre in four countries, Philippines, Myanmar, Vietnam and Indonesia showed that word of mouth from close relatives and friends through face to face communication is the most common form of receiving and sharing risk

[150] Glen Farrell, *ICT and Literacy: Who benefits? Experience from Zambia and India* (Vancouver, Commonwealth of Learning, 2004), http://www.col.org/resources/publications/Pages/detail.aspx?PID=38.
[151] See https://gsmaintelligence.com/research/?file=08bd184710b7e671e80cfe6693cead2d&download (accessed October 16, 2015)

related information across the four countries. Variations in Internet and mobile phone access limited the extent to which social media were helpful during crises.[152]

- Ownership and Control. Access is also determined by patterns of ownership and control. Availability of a phone is also not the same as access. If there is one phone in the family, the question is who accesses it? Especially, if the target group of beneficiaries are women, it would be important to know if they own and control the device; or in what way they have access to the technology.

- Technology driven vs. people driven. A choice of technology, because it is the latest available in the world is often the wrong choice. "New" can either be seen with reference to the "newness of technology" or in the context of "what's new for the given target group or society.[153] It is the latter choice that is important.

- Cost. Cost of development, deployment, delivery and receipt by the beneficiary is also a factor. Different technologies have different development and deployment costs. A mobile App may be cheaper that a website or an IVRS to develop; yet, all three may be necessary for optimum success. In any ICTD project, it is important to examine the relative costs of the technology carefully, because it is often necessary to deliver messages through different channels for maximum success. Cost also has to be considered in the context of constant technology evolution and improvement and what it would cost to upgrade and re-engineer for such technology innovation.

5.5 Content Issues and Challenges

Content is the most important part of any ICTD effort. Infrastructure can be in place, access can be provided, websites and portals can be designed, but if there is no content, particularly relevant content, the initiative will probably not be adopted by users. Content is part of the user experience that often determines the success or failure of any ICTD effort.

Moreover, ICTD content development poses the greatest of challenges, both for the developer and for the user. Content development is a critical area that is often overlooked or given less importance in ICTD interventions. However, it is the most important. Common concerns raised by ICTD specialists in developing country contexts and projects often points to the fact that the content is lacking; what there is, is often protected by copyrights and intellectual property laws, and is not freely available. In addition, the content lacks local relevance.

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[152] Lai, Chih-Hui, Chib, Arul, Ling, Richard (2015) "State of Use of Mobile Technologies for Disaster Preparedness in South East Asia" *Global Disaster Preparedness Center.* http://preparecenter.org/sites/default/files/ntu_final_report.pdf (Accessed December 04, 2015)

[153] See Livingstone, Sonia (1999) New media, new audiences? *New media and society*, 1 (1). pp. 59-66. ISSN 1461-7315; http://eprints.lse.ac.uk/archive/00000391/ (accessed October 16, 2015)

There are many challenges that need to be addressed in the areas of language and content within the Asia-Pacific context, where English language proficiency is not high, especially outside metropolitan areas. Even in countries such as India and the Philippines, which have optimized the benefit derived from a large pool of English speaking software and content development specialists, language and literacy issues pose a major challenge for socially disadvantaged populations, cultural minorities and women in particular.

In developing content, key issues of concern are

- User profiles (gathered from the needs assessment) in terms of socioeconomic, linguistic, and cultural factors, needs, ICT access and availability profiles.
- Content relevance in terms of defined needs, existing experiences, culture, social, religious and gender related biases
- Content structure and user experience—how easy or how hard is it to use the content.
- Interactivity
- Upgradation as and when needed
- Localization, customization and translation of content

The process of content development should also include what could be called "multiple outputs from a single process." Simply stated, content can, at the time of creation be designed for delivery through multiple channels, radio, television, websites, tablets and mobile phones. The development of content in this way reduces the costs of creation as well as ensuring that the beneficiary group can receive and interact with the content in the way they are most comfortable with.

Content delivery, finally, may be developed on a high-end platform; but it must be so designed that it can be delivered on a simple unsophisticated device, e.g. the ordinary mobile phone, rather than the smart phone. This is because data in the Asia Pacific show that despite falling costs, the number of mobile connections may exceed the size of the world population soon, the figures when adjusted for people who have more than on connection reduces the number by half; and when further adjusted for the number of subscribers with 2G (only voice and text), the percentage falls further[154] Thus, creating multiple outputs from a single process of content development enables project managers to reach beneficiaries, no matter where they are or what their IT access is.

5.6 Some Other Challenges in ICTD

ICT projects run into difficulties for many reasons. Some of these include

[154] *Asia Pacific Mobile Economy, 2015.* GSM Association. Available at https://gsmaintelligence.com/research/?file=fba9efc032061d5066b0eda769ad277f&download (accessed October 17, 2015)

- Divergence between the project goals of the managers and those of the target groups is a common cause of failure.
- Gaps between design and reality caused by different contexts and conditions that are operating are also a frequent cause of project failure.
- Issues of available data, technology infrastructure, work processes, cultural attitudes and motivations, staffing and skills, project time frames, management structures, inadequate budgetary provisions, and gaps between planning and implementation lead to mismatches.[155]

Many of these issues are discussed in *Module 7* of this series.

5.6.1 The challenge of scale.

ICTD interventions in developing countries face the challenges of scale. Countries that have invested in large-scale systems have had to address the issues of centralized planning and deployment versus local relevance and regional needs and demands. All of them have had to face issues of access, equity and interactivity and have been, to some extent, overtaken by technological developments emerging out of the digital revolution. In contrast, digital ICT interventions tend to be small initiatives, locally friendly, responsive to the community, and problem-sensitive. This has been their strength. However, many have remained as "pilots" and have not been mainstreamed. As a result, when donor funding has ended, these pilots end as well. When they have been successful, efforts have been made to replicate them or to scale them up but sometimes without taking into account the differing contexts and conditions, and thereby negating the very features that made them successful. As the Asia-Pacific Development Information Programme (APDIP) of UNDP has pointed out, "localized adaptations to the opportunities offered by ICTs are fairly easy to achieve…adjustments at national levels require wholesale institutional reform and change management practices that can be expected to encounter entrenched resistance, scepticism, and interests that are vested in the status quo."[156]

Scale is also an issue especially in small, low and sparse population countries. Economies of scale enable countries like China and India to optimise results simply on the basis that the higher the number of users, the lower *per unit* costs, and implementation costs. Small countries face issues of "diseconomies of scale". Their small size makes project planning and implementation more expensive in terms of *per unit* costs, sometimes making the project unviable.

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[155] Richard Heeks, *Failure, Success and Improvisation of Information Systems Projects in Developing Countries*, Development Informatics Working Paper Series, Paper no. 11 (Manchester, Institute for Development Policy and Management, University of Manchester, 2002), http://www.sed.manchester.ac.uk/idpm/research/publications/wp/di/di_wp11.htm.

[156] Roger Harris and Rajesh Rajora, "ICTs for Governance and Poverty Alleviation in India", UNDP-APDIP, http://www.apdip.net/projects/2003/in.

5.6.2 Human Capacity Building.

Human capacity building is an essential element for effective use of ICTD. The ICTD skills required for different sets or groups of people may be different; but without building up of ICTD capacities, the full potential and benefits of the technologies cannot be availed of. A major group of people in need of capacity building include the following:

- Policymakers and decision makers – People with power to mobilize top-level support and commitment.
- Planners and project designers – Middle level functionaries, who design, cost and implement initiatives. Such functionaries include academics, IT specialists, technology designers, content experts and developers, among others.
- Champions – Key individuals who drive the process, volunteer to be test cases, and sell ideas to peers. They are often capacity builders themselves.
- Trainers of trainers – Key individuals responsible for the training of field level personnel and workers. These trainers must themselves be champions and are deeply committed to the cause. They need to have a good understanding of both ICTs and the contexts and conditions in which these are to be deployed and used. These will be the key persons who are trained as part of a national capacity building activity.

Capacity building for these groups of people needs a continuous sustained, institutional building approach to build the core competencies in ICTD. A combination of need assessment, institutional partnerships, training materials developed by carefully selected regional resource persons, testing and use of the materials in training programmes on site and off site, and critical evaluation is required. The experience of APCICT in developing the *Academy of ICT Essentials for Government Leaders* Programme is a good example of systematic human capacity building in ICTD.

5.6.3 Partnership Building.

A recurrent theme in this module has been the importance of the involvement of different stakeholders and players in ICTD interventions. This theme has stood out in discussions of convergence as a grand alliance of ICT technologies, academic disciplines, and varied partners from government, private sector and civil society, and the users, citizens and beneficiaries of development.

Nowhere is this more important than in the ICTD sector. This is because different sets of knowledge, skills and competencies rest with different groups of stakeholders and players. Governments and aid agencies do not have the expertise to deal with the delivery of ICTs on the ground. ICT specialists, who come with specialist technical skills, are not necessarily knowledgeable on social and change processes

that development requires. Neither government nor ICT specialists have the ability to connect with poor communities the way that civil society organizations do. And project management skills in an ICTD setting are even harder to find.

Systematically, findings from research and impact studies into ICTD projects have revealed the absence of community engagement, involvement and active participation, limiting the success of ICTD projects. Issues that have emerged from research include:

- Skill factors, where different partners tend to have unrealistic expectations of local skills and knowledge on a variety of topics including IT and management.
- Input-output factors – Difficulties that may arise as a result of unequal investments by partners, and/or unequal gains by partners. Partners are not always explicitly aware of their mutual interest and potential mutual gains and risks in projects.
- Socio-cultural factors – Differences in the working ethos and working styles of different partners.
- Systems factors – Integrating the different partners and activities into a common vision and mission of the project.
- Trust factors – The absence of trust between partners and promising more than can be delivered.[157]

Key lessons learned from an extensive survey of partnerships in ICTD for poverty reduction revealed that partnership building needs: clear focus in terms of shared goals and alignment of objectives; formal structure of partnership agreements and clearly defined roles and responsibilities; accountability; ownership; and ethical frameworks. Partnership implementation involves a willingness to adapt to changing conditions, leadership, team building, mutual understanding and respect. A deep understanding of the project conditions and local contexts—political, social and technological, is also essential.[158]

5.7 ICTD Project Evaluation

There have been several analyses of success or failure of ICTD projects done by scholars and global agencies.[159] Clarity of objectives, target groups,

[157] A.J.Gilbert Silvius, Anand Sheombar and Jakobus Smit, "The Partnership Health of ICT Projects in Developing Countries", in Pacific Asia Conference Information System (PACIS): PACIS 2009 Proceedings (2009), http://mmu.academia.edu/AnandSheombar/Papers/327670/The_Partnership_Health_of_ICT_Projects_In_Developing_Countries.

[158] Marije Geldof and others, *What are the key lessons of ICT4D partnerships for poverty reduction? Systematic Review Report* (2011), http://www.gg.rhul.ac.uk/ict4d/workingpapers/DFID_ICT_SR_Final_Report.pdf.

[159] See Karen Eggleston, Robert Jensen, and Richard Zeckhauser, "Information and Communication Technologies, Markets, and Economic Development", in *The Global Information Technology Report 2001-2002: Readiness for the Networked World*, Geoffrey Kirkman, et. al., eds. (New York, Oxford University Press, 2002),

intermediaries, policy environments, institutional arrangements, key linkages, processes, capacity building efforts, technology choices and funding models — these are all factors that have been found to make the difference between success and failure.

Across all sections of this module, one theme has underlined the discussion—that development is a people focused concept; and the use of ICTs in development must remain synchronized with people related contexts and problems for which solutions are to be found. Therefore, there is a great need to gather real and accurate information that will enable the design and implementation of ICTD projects. This will help reduce the high level of failures in ICTD programmes and project reported in an earlier section of the module; and will also help the meaningful and appropriate use of ICTD solutions to address time, location, problem and location specific situations.

The search for accurate and reliable information, the use of such information as an input in the project cycle (i.e. in planning, design and implementation), and the assessment of the impact of a given programme or project within a development framework is commonly called development monitoring and evaluation.

Case 14: Proposed ICT Indicators

The Partnership on Measuring ICT for Development, an initiative of 14 multilateral organizations of the United Nations, World Bank , OECD, and other groups has worked toward developing ICT indicators to help track the Sustainable Development Goals and targets. It represents a concerted effort to include ICTs in the post 2015 development agenda and to harmonize their inclusion in the framework. It also recognizes the cross-cutting nature of ICTs.

The joint proposal reflects the recognition of ICTs as a key development enabler. Most of the indicators have been endorsed by the UNSC1, which also recognized the important role of ICTs for the post 2015 development framework.

Source: https://www.itu.int/en/ITU-D/Statistics/Documents/intlcoop/partnership/Partnership-

http://cyber.law.harvard.edu/publications/2002/The_Global_Information_Technology_Report_2001-2002; and S. Batchelor and S. Sugden, *An Analysis of infoDev Case Studies: Lessons Learned* (Readings, Gamos Ltd. and Big World and Washington, D.C., *info*Dev, 2003), http://gamos.org.uk/sustainbleicts/execsumm.htm. For case studies from the region, see UNDP-APDIP, "ICTD Case Studies", http://www.apdip.net/resources/case. For case studies from India, see Avik Ghosh, *Communication Technology and Human Development: Recent Experiences in the Indian Social Sector* (New Delhi, Sage Publications, 2006).

The important aspect to note about the indicators is that they are quantifiable measures normally used in reports, i.e. tele-density, number of subscribers, etc. They do not provide the qualitative aspect of a project's success or failure and do not yield insights into what works, what does not, and why.

Development evaluation is a broad and multifaceted concept. It is as complex a process as the development it seeks to evaluate. Evaluation of ICTD projects brings an additional dimension to the complexity. What does one evaluate—the overall programme in which the technology is embedded; the technology or the technology solution per se; the user, or the benefit for the user? Is it financial sustainability or social sustainability? What do the two terms mean? Does one look at short-term impact or long-term effects? Does one look at effects or effectiveness and what is the difference between the two? What kinds of designs are suitable for evaluating ICTD programmes and projects? These and many other questions come to mind adding to the confusion about the impact of ICTD programmes and projects in a given social context and condition.

Evaluating ICTD projects is not about academic research. Neither is it for pushing the frontiers of knowledge nor for writing a book. ICTD evaluation is designed to address and solve real world problems and provide solutions to those problems. ICTD evaluation is important because:

- In very simple terms, evaluation is necessary to know if an ICTD solution succeeded or failed to achieve its objectives.
- As a planning tool, evaluation is needed to determine whether the ICTD solution is likely to meet the needs of all stakeholders, the donors and funding agencies, the implementing agencies, and the beneficiaries.
- Evaluation is necessary to establish that an ICTD solution is financially and socially sustainable in the long run.
- Evaluation is needed to establish whether investment in an ICTD solution is worth the expenditure.

There are various stages of evaluation. Broadly, these fall into three categories: formative, process, and summative.

Formative evaluation or Baseline is conducted before or at the beginning of a programme or project. Data collection at this stage helps to formulate general and specific objectives and strategies, develop protocol materials, and improve upon the project. Feed forward studies, pilot or prototype testing, and resource mapping are some of the elements of formative evaluation.

Process evaluation or monitoring is critical. It is also called monitoring or concurrent evaluation. Monitoring or concurrent evaluation is usually taken to mean ongoing, current and frequent assessment of planned work. In development programmes and projects, monitoring is done to assess the performance of a project. It is also done to ensure that the project is on track, and that intended changes are taking place. If they are not, corrective measures may be necessary.

Summative evaluation is carried out after a programme or project is completed and in the context of development work, is defined as "mostly a more thorough examination than monitoring, at specific points in time, of programmes, projects or organization, usually with an emphasis on impact on the people and commonly also relevance, effectiveness, efficiency, sustainability, and replicability."[160]

At a result of summative research, it should be possible to analyse causes of success and failure, identify strengths and weaknesses, and make definite recommendations for the future, both for individual programmes and for the system as a whole. For this reason, summative evaluation studies "impact" and addresses issues such as financial and social sustainability, scaling up, or closing down.

Case Study 15: **Gender Evaluation Methodology (GEM)**

Gender Evaluation Methodology (GEM) is a guide to integrating a gender analysis into evaluations of initiatives that use ICTs for social change. Pioneered by the Association for Progressive Communications (APC), Philippines, and used extensively all over the world, GEM provides a sound methodology framework not just for integrating gender analysis into evaluation of ICTD initiatives, but also a framework that can be used in ICTD projects that target marginalized and poor communities

The tool is for APC Women's Network Support Program (WNSP) members as well as other practitioners who share a common commitment to gender equality and women's empowerment in ICTs, including:

- ICT initiatives for social change
- Project managers and project staff using ICT in projects without a specific gender or women's focus
- Evaluators working in the IT field
- Donors and development agency staff working in the IT field
- Gender focal points that support women's and IT issues
- Policymakers
- ICT planners
- Consultants in the area of gender and ICTs

Source: GEM, http://www.apcwomen.org/gem; and author's own use of GEM in evaluation of ICTD projects.

[160] Reidar Dale, *Evaluating Development Programmes and Projects*, 2nd edition (New Delhi, Sage Publications, 2004), p. 50.

Evaluation of ICTD programmes and projects is, by definition, different from stand- alone development project evaluation. While the same methods used for other development projects may be applied, the kind of information that an ICTD evaluation has to yield goes beyond traditional evaluation techniques.

To evaluate the ICTD intervention, it is necessary to ask a variety of questions that will explain different parts of the process. For example, evaluation questions for the technology component can be related to: costs, language and relevance, user friendliness and usability, the presentation and packaging, organizational change and project management.

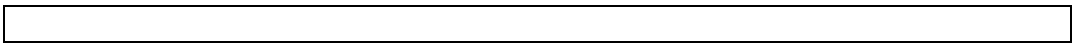
It is only by building up a body of information that others engaged in similar efforts learn from peer experience and save valuable time and effort. There should also be a record of different kinds of activities carried out. For instance, management criteria for proposals, reports of stakeholder consultations, contracts, study plans, documentation, mapping, budgets and cost accounting, logistics, project decision points, sampling plans, staff training and evaluation, field control methods, material preparation and pre-testing, data processing and management, project monitoring and report preparation—all form important historical documentation that could describe success or identify causes of failure. And these are areas where there is very little information; and which must be collected and preserved.

To sum up:

- A people-centric rather than ICT-centric approach is critical for ICTD programmes and projects to succeed.
- The factors that spell the difference between success and failure of an ICTD project include clarity of objectives, target groups, intermediaries, policy and institutional arrangements, capacity building efforts, technology choices and funding models.
- A successful small-scale initiative requires more than just replication in a different context to succeed. Scaling up an ICTD effort requires wholesale institutional reform and change management.
- Evaluation is an ongoing process and a very important part of all development projects, including those that have ICTs as part of the project.

Something To Do

Select any one ICTD programme in your country, and analyse it in terms of policy, planning and implementation. In looking at the policy angle, determine what ICTD policy or policies complement or support the programme. In looking at the planning and implementation aspects, use the good practice guide for ICTD projects (Box 3) to evaluate the programme. Finally, on the basis of what you determine to be the programme's limitations, suggest ways of improving the programme.



6.0 SUMMARY

This first module in the *Academy of ICT Essentials for Government Leaders* module series addresses the broad issues of development and argues for the meaningful application of appropriate ICTs toward accelerating the pace of sustainable development in developing countries of Asia-Pacific. In specific, it focuses on the linkage between the Sustainable Development Goals (SDGs) and ICTs.

Different from the first version, the first section of the module introduces readers to discussions that preceded the acceptance of the Sustainable Development Goals in September 2015, drawing attention to its key pillars, i.e. humanity, resilience, and sustainability

The second section of the module looks at the ICT landscape in 2015, identifying not so much technologies, but processes that are currently in place.

The third section of the module explores the use of ICTs in specific SDG goals by describing key elements and cases that are good practice. Cases selected are from the Asia Pacific.

The fourth section of the module describes, in brief, the process of national policy development and its alignment with the SDGs and with the concept of 'smartness' in planning and in technology. the between national development, and smart technologies.

The final section of the module describes, in broad terms, challenges in the application of ICTs for development. It underscores the need for ICTD programmes and projects to be "of the people, by the people, and for the people". People-centric, rather than technology-centric, approaches are always more successful.

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http://www.change-management.com/tutorial-defining-change-management.htm

CVR IT Consulting: Project management templates
http://www.cvr-it.com/Confirm_NonProfit.php.

Definition of “change management”
http://www.change-management-coach.com/definition-of-change-management.html

Ethical Guidelines for Social Science Research in Health
http://www.cehat.org/publications/ethical.html

EWET Education with Enterprise Trust
http://www.ewet.org.za

IDEA International Development Ethics Association
http://www.development-ethics.org/what_is

Markkula Center for Applied Ethics
http://www.scu.edu/ethics/

Online Ethics Center
http://www.onlineethics.org/

Project in a Box: Software for project management
http://www.projectinabox.org.uk/community.asp

Ten Big Myths about Copyright Explained
http://www.templetons.com/brad/copymyths.html

Understanding Copyrights and Related Issues
http://www.wipo.int/freepublications/en/intproperty/909/wipo_pub_909.html

What is Intellectual Property?
http://www.wipo.int/about-ip/en

GLOSSARY

Analogue	Measuring or representing data by means of one or more physical properties that can express any value along a continuous scale. For example, the position of the hands of a clock is an analogue representation of time.
Asynchronous	Not synchronized or coordinated in time.
Audio-graphics	Computer-based technology that enables simultaneous transmission of voice, data and graphic images across local telephone lines.
Broadband	Telecommunications in which a wide band of frequencies is available to transmit information.
Broadcast	Transmission of a radio or TV programme or signal for public use.
Cable television	A system of providing television to consumers via radio frequency signals transmitted to televisions through fixed optical fibres or coaxial cables as opposed to the over-the-air method used in traditional television broadcasting (via radio waves) in which a television antenna is required. FM radio programming, high-speed Internet, telephony and similar non-television services may also be provided via cable.
Collaborative learning	Learning through the exchange and sharing of information and opinions among a peer group. Computers can be used to mediate collaborative learning for geographically dispersed groups.
Common service facilities	A common location in a community where multiple services are offered to community members.
Computer-based learning	The use of computers as a key component of the educational environment. While this can refer to the use of computers in a classroom, the term more broadly refers to a structured environment in which computers are used for teaching purposes. The concept is generally seen as being distinct from the use of computers in ways where learning is a peripheral element of the experience (e.g. computer games and Web browsing).
Conference conferencing	A computer-based conference where the different participants, who are at different locations, need not be

(asynchronous)	online at the same time.
Conference conferencing (synchronous)	A computer-based conference where the different participants, who are at different locations, must be online at the same time.
Computer file transfer	The movement of one or more files from one location to another. A collection of electronically stored files can be transferred by physically moving the electronic storage medium, such as a hard disk, compact disk or thumb drive, from one place to another, or by sending the files over a telecommunications medium. On the Internet, the File Transfer Protocol (FTP) is a common way to transfer a single file or a relatively small number of files from one computer to another.
Convergence	The coming together in a seamless way of telecommunications technology with all media, text, audio, graphics, animation and video such that all are delivered on a common platform while also allowing the user to choose any combination of media to interact with.
Correspondence materials	Materials for a distance education course, where the course of study is conducted by post, and the learning materials and student assignments are also conducted by post.
Corporate social responsibility	Also called corporate responsibility, corporate citizenship and responsible business, it is a concept whereby organizations consider the interests of society by taking responsibility for the impact of their activities on customers, suppliers, employees, shareholders, communities and other stakeholders, as well as the environment.
Cybercafé	A shop that offers computing facilities such as Internet access and e-mail.
Digital	Electronic technology that generates, stores and processes data in terms of two states: positive and non-positive. Positive is expressed or represented by the number 1 and non-positive by the number 0. Thus, data transmitted or stored with digital technology is expressed as a string of 0s and 1s.
Digital divide	The gap between individuals and societies with the resources to participate in the knowledge economy and those without such resources.

Economies of scale	Reduction in cost per unit resulting from increased production, realized through operational efficiencies. Economies of scale can be accomplished because as production increases, the cost of producing each additional unit falls.
Electronic blackboard	A device that looks like an ordinary blackboard or whiteboard, but can be interfaced with a computer.
Electronic bulletin board	A computer that is running software that allows users to leave messages and access information of general interest.
e-Commerce	The buying and selling of goods and services through the Internet, especially the World Wide Web.
e-Learning	A general term used to refer to a form of learning in which the instructor and student are separated by space or time, and where the gap between the two is bridged through the use of online technologies.
E-mail	A store-and-forward method of composing, sending, storing and receiving messages.
Facsimile	An exact copy or reproduction transmitted electronically.
First-generation learners	The first generation in a family to benefit from formal schooling.
Information literacy	The ability to recognize the need for information, and find, evaluate and use that information in whatever format (print index, online database, Internet, etc.) it appears.
Interactivity	In computers, interactivity is the dialogue that occurs between a human being (or possibly another live creature) and a computer program.
Multimedia	The use of computers to present text, graphics, video, animation and sound in an integrated way. The term is also used to describe systems that support the interactive use of text, audio, still images, video and graphics. Each of these elements must be converted in some way from analogue form to digital form before they can be used in a computer application.
Non-formal education	Any organized, systematic, educational activity conducted outside the framework of the formal school system to provide selected types of learning to particular subgroups in the population, adults as well as children.

SMS	Short message service, a service for sending text messages on a cellular telephone system.
SchoolNets	Networks of schools. SchoolNets promote the development of knowledge societies by connecting schools to the Internet; building connections among students, teachers and schools; sharing information and resources; and supporting e-learning in online, networked environments.
Synchronous Radio	Synchronous means coordinated in time, if not in place. For radio, this means that transmission and listeners must tune in to the radio station at the same time although they may be in different locations.
Tele-classrooms	A system of creating a virtual classroom with students.
Teleconferencing	Interactive electronic communication between two or more people at two or more sites that makes use of voice, video and/or data transmission.
Teledensity	A term commonly used to describe the number of telephone lines per some unit of the population (often per 100 people).

NOTES FOR TRAINERS

The module has been written within a particular perspective and with a special focus. The purpose of these "Notes for Trainers" is to try to align the author's perceptions of the module content with those of national and regional training institutions and individuals who will take the modules forward in their own individual settings.

As noted in the section entitled "About The Module Series", this module is designed to have value for different sets of audiences and in varied and changing national conditions. It is also designed to be presented, in whole or in part, in different modes, on- and off-line. Case and country studies may change from region to region and from country to country and therefore, the module may require customization to suit local settings. What will be presented and how it will be presented should depend on the situation at hand. The module may be studied by individuals and by groups in training institutions as well as within government offices. The duration of the training sessions will determine the extent of detail in the presentation of content.

These "Notes" offer trainers some ideas and suggestions for presenting the module content more effectively. Trainers may adopt, adapt or create afresh the training plans presented here.

General Notes on Effective Training Techniques

The module is designed for self-study as well as for "classroom" delivery. Thus, each section of the module begins with a statement of learning objectives and ends with a summary of key points. Readers may use the objectives and summary of key points as a basis for assessing their progress through the module. Each section also contains discussion questions and practical exercises that may be accomplished by individual readers or used by trainers.

Case studies form a significant part of the module content. These are intended for discussion and analysis, particularly in terms of the extent to which the key concepts and principles presented in the module work in real-world programmes and projects. It is important for readers to appreciate the need to adapt ICT-based and ICT-supported approaches and models to suit local conditions.

The module is written according to the principles of adult learning. For example, it is recognized that adults learn best when they are free from stress and information overload, and they are able to decide for themselves what is important to be learned. The self-study questions and practical exercises are designed to enable readers to draw on their own experience to benchmark the content and to think reflectively on the issues presented. The aim is to make the content as closely relevant to their work experience as possible, and to enable them to link the knowledge gained to their own experience in order to solve problems. It is recognized that the readers of this module could

themselves serve as knowledgeable resource persons. Trainers should keep this in mind when using the module as a training resource in different settings and with different groups of audiences. For example, trainers may encourage participants to cite other cases and examples from their own experience to substantiate the content of the module.

Structuring the Sessions

Depending on the audience, time available, and local settings and conditions, the content of the module could be presented in different structured time capsules. What could be covered in sessions of different durations is outlined below. Trainers are invited to modify the session structure based on their own intimate understanding of the country and audience.

For a 90-minute session

For senior policymakers: A broad summary of Section 2 of the module for a general understanding of ICT applications in development, including a detailed explanation of any one example from the case studies cited.

For project implementation staff: Any one sector out of Section 3, including a detailed explanation of any one example from the relevant sector for the given target audience.

For programme and/or project management staff: Section 4, which looks into challenges to the use of ICT in development, along with a detailed presentation of any one case study from Section 3.

For a three-hour session

For an audience of policymakers: A broad summary of Sections 2 and 4, and a detailed explanation of any one case study followed by a practical session of 1 ½ hours.

For an audience of programme and/or project management staff: A broad summary of the relevant development sector from Section 3 and a detailed presentation of Section 4, followed by a practical exercise in project design and implementation planning.

Generally, a three-hour session could be divided into two 90-minute sessions containing a summary of a relevant section and a case study followed by a practical group exercise.

For a full day session (6 hours duration)

Use four 90-minute sessions and design the content progressively starting with Section 1 and progressing to Section 4. Use the same pedagogical approach described above.

For a three-day session

About half a day could be spent on Section 2 of the module.

A day and a half could be spent on Section 3 of the module, with a field visit on the second day to a nearby ICTD application.

Lessons learned from the field visit could be used to bolster the discussion of Section 4 of the module on the third day. Participants could be invited to link the different challenges to the use of ICTs with the case study/field visit and to the content of the module being presented, so that they take away from the three-day programme a sound understanding of the critical importance of proper planning, design and implementation.

For a five-day session

A five-day session would be ideal for people involved in programme and project implementation. The emphasis in the module should be on the key sections 3 and 4, and the in-class sessions should be interspersed with field visits to case study locations nearby.

Day 1 could consist of an extensive exploration of Section 2 of the module. Half a day could be spent on exploring progress on the MDGs, and on establishing the inter-sectoral linkages. For instance, a poverty alleviation initiative is likely to have spin-offs in health care and in education. Such linkages should be explored as they are vital to programme design and implementation. The second half of Day 1 could be spent on exploring the different ICTs, with a focus on looking at convergence and digital divide issues. A visit to a nearby telecentre, if possible, could round off the day's activities.

Days 2 and 3 could focus on the applications of ICTs for meeting different MDGs (i.e. Section 3), with at least half a day devoted to a field visit. Case studies can be explored in detail. The field visit should be followed by an exercise applying to a planned intervention key principles and design features observed during the field visit.

Days 4 and 5 could continue with the exercise. The materials in Section 4 of the module could be presented in an instructor-led session in the morning, followed by extensive practical work by individuals and groups in the afternoon. The fifth day would close with presentations of the exercise followed by peer review.

Trainers are encouraged to adapt for use the training slide presentations available at APCICT's website (http://www.unapcict.org/academy).

Trainers are also encouraged to structure each session to include both a lecture cum discussion, and individual or group exercises.

Ideally, there should be no more than 25 participants in a training session.

Trainers should use the references listed, and look up the original documents and websites cited. Trainers may also use other relevant case studies. However, they should remember to cite all references and sources in the presentation.

ABOUT THE AUTHOR

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UN-APCICT

The United Nations Asian and Pacific Training Centre for Information and Communication Technology for Development (UN-APCICT) is a subsidiary body of the United Nations Economic and Social Commission for Asia and the Pacific (ESCAP). UN-APCICT aims to strengthen the efforts of the member countries of ESCAP to use ICT in their socio-economic development through human and institutional capacity-building. UN-APCICT's work is focused on three pillars:

1. Training. To enhance the ICT knowledge and skills of policymakers and ICT professionals, and strengthen the capacity of ICT trainers and ICT training institutions;
2. Research. To undertake analytical studies related to human resource development in ICT; and
3. Advisory. To provide advisory services on human resource development programmes to ESCAP member and associate members.

UN-APCICT is located at Incheon, Republic of Korea.

http://www.unapcict.org

ESCAP

ESCAP is the regional development arm of the United Nations and serves as the main economic and social development centre for the United Nations in Asia and the Pacific. Its mandate is to foster cooperation between its 53 members and 9 associate members. ESCAP provides the strategic link between global and country-level programmes and issues. It supports Governments of countries in the region in consolidating regional positions and advocates regional approaches to meeting the region's unique socio-economic challenges in a globalizing world. The ESCAP office is located at Bangkok, Thailand.

http://www.unescap.org

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The Academy of ICT Essentials for Government Leaders Module Series
Series editors: Shahid Akhtar and Patricia Arinto

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Module 2 - ICT for Development Policy, Process and Governance

Module 3 - e-Government Applications

Module 4 - ICT Trends for Government Leaders

Module 5 - Internet Governance

Module 6 - Network and Information Security and Privacy

Module 7 - ICT Project Management in Theory and Practice

Module 8 - Options for Funding ICT for Development

http://www.unapcict.org/academy