Academy of ICT Essentials for Government Leaders

An Overview of ICTs and Sustainable Development

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

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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 Asian and Pacific Training Centre for Information and Communication Technology for Development (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. Rather, its purpose is 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 individuals or as a resource in a training course or programme. The modules are stand-alone 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 discipline and its promise, as countries leverage the potential of ICTs as tools for development.

Supporting the Academy of ICT Essentials for Government Leaders module series in print format is an online distance learning platform—the APCICT Virtual Academy (http://e-learning.unapcict.org)—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.

AN OVERVIEW OF ICTS AND SUSTAINABLE DEVELOPMENT

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. Moreover, 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.

Today, few will question the capacity of ICTs to serve as enablers of sustainable development that the world community has agreed to work towards by the target year 2030. However, although this capacity of ICTs as enablers has been recognized, there remains fuzziness about the linkage between 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 through 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 Module 1 of the Academy of ICT Essentials for Government Leaders modules series in which the basics of using ICTs for human development are discussed. Please refer to http://www.unapcict.org/academy.

MODULE OBJECTIVES

THE MODULE AIMS TO:

1. Argue the case for leveraging ICTs in sustainable development;
2. Describe the macrorelationship 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 the SDGs;
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 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 ICTs for sustainable development programmes and projects.

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The module was drafted by Usha Rani Vyasulu, with valuable inputs from Saleem Zoughbi and feedback from ESCAP and APCICT's partners who participated in the multiple rounds of review. Module development was coordinated by Robert de Jesus and Nuankae Wongthawatchai. Editing support was provided by Christine Apikul. Kyoung-Tae Kim, with assistance from Kevin Drouin, proofread the manuscript. Joo-Eun Chung and Kyoung-Tae Kim undertook administrative support and other necessary assistance for the issuance of this module.

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ACRONYMS

ABIA	Annual Bibliography of Indian Archaeology
AIDS	Acquired Immunodeficiency Syndrome
APC	Association for Progressive Communications
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
CIO	Chief Information Officer
CTO	Chief Technology Officer

DEWN	Disaster and Emergency Warning Network
ESCAP	Economic and Social Commission for Asia and the Pacific (United Nations)
GDP	Gross Domestic Product
GEM	Gender Evaluation Methodology
GeoCMS	Geospatial Content Management System
GIS	Geographic Information System
GNP	Gross National Product
HINARI	Health InterNetwork Access to Research Initiative
HIV	Human Immunodeficiency Virus
ICT	Information and Communication Technology
ICTD	Information and Communication Technology for Development
IGNCA	Indira Gandhi National Centre for the Arts (India)
IMF	International Monetary Fund
IT	Information Technology
ITU	International Telecommunication Union
IVR	Interactive Voice Response
KYC	Know Your Customer
MDG	Millennium Development Goal
MERS	Middle East Respiratory Syndrome
MOOC	Massive Open Online Course
NGO	Non-Governmental Organization
OCHA	Office for the Coordination of Humanitarian Affairs (United Nations)
OER	Open Educational Resource
PFnet	People First Network (Solomon Islands)
SARS	Severe Acute Respiratory Syndrome
SDG	Sustainable Development Goal
SIDS	Small Island Developing States
SMAC	Social, Mobile, Analytics and Cloud
SMS	Short Message Service
SOPAC	Secretariat of the Pacific Community Applied Geoscience and Technology Division
UNDP	United Nations Development Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNICEF	United Nations Children's Fund
VUSSC	Virtual University for Small States of the Commonwealth
WSIS	World Summit on the Information Society

LIST OF ICONS

Case Study

1. INTRODUCTION

The Asia-Pacific region is home to nearly 60 per cent of the world's population.[1] 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 extreme 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 development challenges that the Asia-Pacific region faces is massive, and there is no one-size-fits-all solution—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.

Thirty-six countries in the Asia-Pacific region are least developed countries, landlocked developing countries or small island developing states. Collectively, they are referred to as "countries with special needs".[2] 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. In the implementation of the current global agenda for sustainable development, the 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. Countries with Special Needs in Asia and the Pacific

Source: ESCAP, Asia-Pacific Countries with Special Needs Development Report 2016: Adapting the 2030 Agenda for Sustainable Development at the National Level (Bangkok, 2016). Available from http://www.unescap.org/sites/default/files/CSN%20Report%202016.pdf.

1 ESCAP, "Population Dynamics". Available from http://www.unescap.org/our-work/social-development/population-dynamics.

2 ESCAP, *Asia-Pacific Countries with Special Needs Development Report 2017: Investing in infrastructure for an inclusive and sustainable future* (Bangkok, 2017). Available from http://www.unescap.org/publications/asia-pacific-countries-special-needs-2017.

Despite their diversity, the countries with special needs face common problems. Some may be small in size and population, some have small markets and high costs, and many 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 therefore an urgent need to find innovative approaches and solutions to address the developmental challenges of the countries with special needs. 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. For instance, in countries like Afghanistan, where fixed line telephony was practically destroyed during the conflict years, mobile telephony has enabled such a quantum leap from scarcity to abundance.

This module examines the linkage between ICTs and sustainable development, and the practice of ICT for development (ICTD). This practice focuses on the meaningful application of ICTs—particularly computer, web-based, mobile and other digital technologies[3]—to achieve the human development goals of countries in Asia and the Pacific.

It is important to note at the outset that there is no one-way of using ICTs to address development goals—each country must determine its own ICTD goals, objectives, strategies and pathways to implementation. This module aims to develop a common understanding of the approaches and challenges of ICTD, and introduce ways that countries can formulate and implement their ICTD strategies effectively.

The module is divided into five sections. The first section that follows this introduction provides an overview of the Millennium Development Goals (MDGs) and the Sustainable Development Goals (SDGs). The second section introduces current ICT trends and scenarios. The third section explores, through a discussion of selected 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 interlinkages with other sectors and will have spin-off benefits or drawbacks for other sectors. The fourth section looks at ways of formulating ICTD policies and plans, including how they can be linked with the SDGs. The final section of the module offers insights into the broad challenges that confront ICTD programme and project implementation.

The module is intended to introduce the issues under discussion. Subsequent modules address various key issues in greater detail—For example, Module 3 on e-government applications, Module 6 on information security and privacy, and Module 9 on ICT for disaster risk management. Also, note that many issues discussed in Module 1 on the linkage between ICT applications and meaningful development are not elaborated here. This module builds on content presented in Module 1, although there may be some repetition of content. For pedagogical purposes, the same issues may be discussed in more than one module in this Academy of ICT Essentials for Government Leaders module series. 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.

3 Older technologies such as radio and television will be discussed only in so far as they are integrated with digital technologies.

2. THE BIG PICTURE

This section aims to:

- Introduce the SDGs;
- Summarize global development debates in the context of the SDGs; and
- Review the Asia-Pacific region's progress towards achieving development goals, with the MDGs as milestones.

2.1 Trends in Human Development

Current development perspectives originated 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 that 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 believed that nations needed to shift from traditional, agriculture-based economies to industrial economies, and 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 italicize capitalist system, or on direct state involvement in the manufacturing and services industries.

Much of the policy and advocacy of the World Bank Group, including the International Monetary Fund (IMF), have been based on this economic theory since their formation in the post-World War II era. Over time, new paradigms have emerged, such as the Washington Consensus,[4] 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 reforms, 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 belief that economic change through private sector led growth could, by itself, trigger development.

Other criticisms of these early approaches also quickly emerged. Macrolevel 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.

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

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-roots movements continuously drew attention to the failure of economic models to address core issues concerning people all over the world, especially in the poor, developing countries.

Concurrent to all the activity in development discourse and practice taking place throughout the 1970s, 1980s and 1990s, a new paradigm on development emerged in the work of eminent economists and thinkers, such as Mahbub ul Haq,[5] Amartya Sen[6] and Martha Nassbaum.[7] These thinkers looked at the process of development through a more people-centric and humane approach, which came to be known as the human development approach.

The human development approach focuses on development within a human rights framework. According to this framework, every individual has economic, cultural, social, political and civil rights. 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.

The human development approach has changed the way that the world currently looks at development. In the current global scenario, it is hard to find a national constitution that does not guarantee equal rights for all its citizens regardless of ethnicity, sex, gender, colour, religious beliefs, political leanings, and social and economic status.

2.2 Significance of the MDGs

The adoption of the Millennium Declaration in 2000 and the eight Millennium Development Goals (MDGs) by all 189 member states of the United Nations General Assembly was a turning point 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.

There were several reviews of global and regional progress in meeting the targets. The *Millennium Development Goals Report 2015*[8] analysed both the successes and the failures. These reviews showed that the concerted action enabled by the MDGs did not lead to dramatic results, and the momentum that the MDGs provided needed to be pushed further. The goals, in themselves were important, but incomplete. Recommendations included the need to collaboratively refine the goals into practicable actions that both eradicate poverty and save the planet.

5 Mahbub ul Haq was a world-renowned Pakistani economist who created the Human Development Index.

6 Amartya Sen is the Nobel laureate whose perspectives on development as freedom underpin current development theory.

7 Martha Nassbaum is a globally acknowledged philosopher and the current Ernst Freund Distinguished Service Professor of Law and Ethics at the University of Chicago.

8 United Nations, *Millennium Development Goals Report 2015* (New York, 2015). Available from http://www.un.org/millenniumgoals/2015_MDG_Report/pdf/MDG%202015%20rev%20(July%201).pdf.

2.3 The Concept of Inclusive Development

Inclusive development is generally defined as development that 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.

According to Chibba, inclusive development requires the following:[9]

- Good governance, progressive politics, effective management and successful engagement in the global economy;
- Addressing issues of structural transformation, especially economic, social and demographic aspects; and
- A multi-pronged policy and programme mix that involves 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 socioeconomic and cultural factors.

To ensure successful inclusive development, governments need to adopt inclusive approaches in their decision-making processes that incorporate the contributions of all stakeholders—including poor and marginalized groups—in addressing development issues.

2.4 The Concept of Resilience in Development

Various global discussions on environment and climate change, and the consequent impact on societies, have resulted in the development of the concept—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 environmental change.

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."[10]

For example, when a society or a subgroup within it is 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 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.

The resilience framework[11] looks at the root causes of vulnerability or resilience to understand the extent to which a society could recover or bounce back after a disaster, conflict or other adversities. This includes looking at a society's ability to "bounce back better", which is the ability to use the recovery process to improve physical, economic, social and environmental conditions to create a more resilient society.

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9 Michael Chibba, "Perspectives on Inclusive Development: Concepts, Approaches and Current Issues", *World Economics*, vol. 9, no. 4 (October-December 2008), pp. 145-156. Available from https://www.academia.edu/7530148/Perspectives_on_Inclusive_Development.

10 W. Neil Adger, "Social and ecological resilience: are they related?" *Progress in Human Geography*, vol. 24 (September 2000), pp.347-364. Available from 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.

11 A framework in which any project, activity, initiative, organization or company is analysed in terms of their overall impact, taking into consideration the social, economic and environmental needs and consequences of the action.

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 and electricity;
- Access to education and diversity of income sources; and
- The stability of all these factors over time.[12]

The less access agrarian households and communities have to these basic assets and services, the more vulnerable they are to external shocks and stresses.

2.5 The Sustainable Development Goals

The human development theories, review of progress on the MDGs, concepts of inclusive development and resilience, and the global concern for the environment and climate change, described above, contributed to the genesis of the SDGs.

Box 1. What is 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 three key concepts:

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

Source: Brundtland Commission, Report of the World Commission on Environment and Development: Our Common Future (Oxford University Press, 1987). Available from http://www.un-documents.net/our-common-future.pdf.

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

In 2012 at the United Nations Conference on Sustainable Development (Rio+20), an intergovernmental process to define the SDGs began. The conference insisted that the SDGs 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".[13] This mandate formed the basis for subsequent rounds of discussions and negotiations.

12 Food and Agriculture Organization, "Measuring Resilience: A Concept Note on the Resilience Tool", no date. Available from http://www.fao.org/docrep/013/al920e/al920e00.pdf.

13 United Nations General Assembly, Resolution adopted by the General Assembly on 27 July 2012, sixty-sixth session, agenda item 19 (A/RES/66/288*), 11 September 2012, paragraph 247. Available from http://www.un.org/en/ga/search/view_doc.asp?symbol=%20A/RES/66/288.

Subsequently, a 30-member Open Working Group with representation from all five regions of the world began its work to develop the SDGs. The final version of the document, *Transforming Our World: The 2030 Agenda for Sustainable Development* was submitted to the United Nations General Assembly and was adopted by the global community during the United Nations General Assembly in September 2015.[14] The 17 SDGs (see Box 2) can be divided into five areas of critical importance, as stated in the document—people, planet, prosperity, peace and partnership.

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 well-being 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

14 See The President of the General Assembly, "Transforming Our World: The 2030 Agenda for Sustainable Development", 12 August 2015. Available from 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.

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 United Nations Framework Convention on Climate Change 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 revitalize the global partnership for sustainable development

Source: United Nations, "Sustainable Development Goals". Available from https://sustainabledevelopment.un.org/sdgs.

There are 169 targets in the SDGs,[15] 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 a recognition of the following:

- Sustainable development is an overarching organizational mandate responding to real-world development challenges;
- Coherence as an organization in dealings with stakeholders is critical;
- Operationalizing sustainable development requires attitudinal changes, enhanced skills, competencies and knowledge;
- Integration of the three dimensions—economy, society and environment—is critical to sustainable development; and
- Sustainable development needs to be inclusive, equitable, of high quality, accountable and transparent.

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 Agenda for Sustainable Development.

15 For a detailed understanding of the SDGs, see United Nations, "Sustainable Development Goals". Available from http://www.un.org/sustainabledevelopment/sustainable-development-goals/.

While today's trends in 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 website: https://sustainabledevelopment.un.org/sdgs.

Explore all the SDGs, and their targets and indicators. Then discuss the following:

1. What are the key development goals that your country has identified as part of its national development policy and plan?
2. To what extent do they match the SDGs? Which SDGs are not addressed in your country's national development policy and plan?
3. How relevant are the SDGs to your country's context?

Prioritize the goals that your country needs to work on in its national development policy and plan to achieve the SDG targets set for the year 2030.

2.6 ICTs and Their Roles

In the year 2000 when the MDGs were framed, ICTs were new and novel. It was only after extensive experimentation and use in several development sectors that knowledge and understanding was gained about the many ways that ICTs could support the development process. Some of the significant characteristics of ICTs that support development interventions include: the speed, reach and versatility of ICTs in communicating and sharing information; the ability to connect to the last person in the chain; and the flexibility in usage across multiple levels and sectors.

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, the United Nations General Assembly resolution asserted that: "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".[16]

ICTs are mentioned in several SDGs. For instance:

- Goal 4, Target 4.4 requires a growth in the number of adults and young people with relevant (technical and vocational) skills, a task that cannot be accomplished without the use of ICTs;
- Goal 5, Target 5.b aims to enhance the use of enabling technologies, in particular ICTs, to promote the empowerment of women;
- Goal 9, Target 9.c specifically calls for an increase in access to ICTs, and particularly, universal Internet access in the least developed countries; and
- Goal 17, Targets 17.6 and 17.8 point towards enhancing the use of ICTs for international cooperation in science, technology and innovation.

16 Ibid., para. 15.

The ICT infrastructure is recognized as one of the critical infrastructures of nation states as we can no longer think of a world without ICTs. Earlier technologies such as print, radio and television expanded the reach and speed of information delivery, but communication was essentially one way, from one to many users. Newer digital technologies, on the other hand, have allowed the providers and users of information to communicate and interact with each other. More importantly, these technologies have enabled users to become providers of information, particularly through various social media services such as Facebook and YouTube. Recent advances in digital technologies have supported efforts to plan and implement the 2030 Agenda for Sustainable Development, especially in:

- Complex planning and coordination across sectors;
- Facilitating outreach and improving equitable delivery of services;
- Enabling increased information sharing; and
- Monitoring 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 the points made above, it is not an exaggeration to say that the achievement of a country's development targets is linked to the use of ICTs. For this reason, an understanding of these technologies is imperative.

2.7 Scope and Definitions

ICTs are defined in so many ways in development literature, it can be quite confusing. Often, the term "ICTs" is used to describe the use of computers and the Internet. Sometimes, the term is associated with the most sophisticated and expensive computer-based technologies, and at other times, conventional technologies such as radio and television, and telephony are included. Definitions of ICTs vary widely, depending on contexts and conditions of use.

In this module, ICTs are defined as any communication device and application, including older more established media such as telephone, print, radio and television, and newer devices such as computer network hardware and software, mobile phone and the various services they offer.

ICTD is the convergence of development practice and the use of ICTs towards achieving inclusive and sustainable human development.

To sum up:

- The human development approach, which focuses on development within a human rights framework, is the current globally accepted concept of development.
- Countries made significant progress in social, economic and environmental development in their efforts to achieve the MDGs, but progress was uneven.
- The SDGs build upon the MDGs, and the concepts of inclusiveness and resilience, and have been accepted by the global community of nations as the development agenda for the next fifteen years, 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.

The next section aims to provide a better understanding of the nature of the 21st century technology scenario, with a focus on the conditions and contexts that will help in the optimum utilization of ICT tools for the achievement of the SDGs.

3. THE ICT SCENARIO (CIRCA 2017)[17]

This section aims to:

- Introduce the range of technologies available today;
- Provide an overview of the ICT trends and usage; and
- Draw attention to some sociopolitical concerns.

Latest reports from ESCAP and the International Telecommunication Union (ITU) reveal the following global and regional trends:[18]

- About seven billion people or 95 per cent of the world's population is living in areas reached by mobile phones.
- But about half of the world's population is not using the Internet. By the end of 2016, 3.9 billion people or 53 per cent of the world's population was not using the Internet. In Asia and the Pacific, the percentage was higher at 58.1 per cent.
- Mobile-broadband networks (3G or above) have reached 84 per cent of the global population, but only 67 per cent of the rural population.
- Despite dynamic development in mobile broadband in Asia and the Pacific, the region still lags behind Latin America, Europe and North America in the number of mobile-broadband subscriptions per 100 inhabitants.
- Fifty-two per cent of global fixed-broadband subscribers are from member countries of ESCAP. North and East Asia, especially China, drive 75 per cent of these connections. But in 2016, fixed-broadband penetration in Asia and the Pacific was below the world's average of 12.4 subscriptions per 100 inhabitants.
- In 18 ESCAP member countries, less than 2 per cent of their populations had fixed-broadband subscriptions in 2016.

These statistics show both impressive and worrying trends. Particularly worrying is the digital divide between developed and developing countries in Asia and the Pacific. For instance, in developing Asia-Pacific, Internet penetration is 28 per cent, compared with 84 per cent in developed Asia-Pacific. Mobile Internet penetration is 17 per cent and 3G population coverage is 13 per cent in developing Asia-Pacific, while in developed Asia-Pacific, both figures exceed 100 per cent. A study by ESCAP confirmed that the digital divide in the region is widening at an alarming speed.[19]

17 The term "circa" meaning "around or about" is used in the title of this section because, given the pace of change in technology and innovation, the technology could be out-of-date and the statistics would have changed by the time this module is published and used in the Asia-Pacific region.

18 ESCAP, "State of ICT in Asia and the Pacific 2016: Uncovering the Widening Broadband Divide", Technical Paper by the Information and Communications Technology and Disaster Risk Reduction Division, 2016. Available from http://www.unescap.org/resources/state-ict-asia-and-pacific-2016-uncovering-widening-broadband-divide. See also See ITU, *ICT Facts and Figures 2016* (Geneva, 2016). Available from http://www.itu.int/en/ITU-D/Statistics/Documents/facts/ICTFactsFigures2016.pdf.

19 Ibid.

There is also a gender digital divide where Internet penetration rates are higher for men than for women in all regions of the world. The global Internet user gender gap grew from 11 per cent in 2013 to 12 per cent in 2016, and the gap remains large in the world's least developed countries at 31 per cent.

It is going to be critical for Asia-Pacific countries to address key issues in digital infrastructure, policies and regulatory practices in order to be able to anticipate technology trends and address the widening digital divide. Countries will need to enable the production of locally driven and gender specific online content and applications in local languages to encourage the usage of the Internet.

Let's now turn to the technology trends. Smaller, faster, more powerful and robust—a typical description for the different technologies and applications that are emerging today for use by individuals, institutions and governments. These advanced technologies that are related to artificial intelligence, the Internet of Things and big data will require access to broadband connectivity as well as human resources and skills to leverage these technologies for sustainable development. Without these prerequisites, countries risk losing out on the transformative opportunities that these advanced technologies could bring to achieving the SDGs.

3.1 The Evolving Technology Trends

Two decades ago, each ICT was a discrete entity, with its own infrastructure, content and delivery modes. At that time the ICT sector could be divided into different industries for the hardware and software. The focus was on actual ICT products, such as the manufacture of computers and related equipment, and the development of systems and software applications. Today, the earlier discrete media have converged onto single digital platforms. The focus has now shifted from products to fields of use and ways of use.

3.1.1 Fields of Use

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

This is no longer as simple as running an information management system for commerce, education or health care. It involves the creation of an inherent knowledge base and its subsequent use in decision-making—made possible through interconnected devices, sensors and other components. For example, the Aga Khan Trust, with its medical services based in Karachi, Pakistan, is using smartphones with sensors to monitor in real time, expectant mothers from the mountainous Gorno Badakhshan region of Tajikistan.

3.1.2 Ways of Use

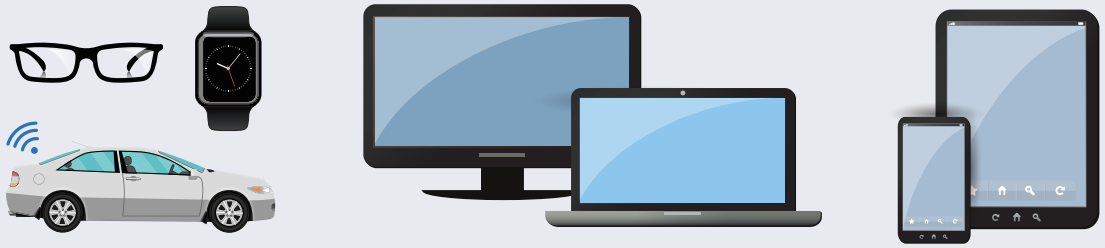
ICTs are permeating other sectors, and are no longer just used as tools for specific functions. Instead, through techniques such as process reengineering, service-oriented architecture and other methods, they have become platforms for operations and service delivery.

3.2 Current Trends

3.2.1 Computing Anywhere and Everywhere

The networked and connected systems with their information management platforms, applications and services can be accessed anytime and everywhere, through wearable and portable devices such as smartphones and tablets, as well as systems such as desktop computers and laptops. See Box 3 for examples of such devices.

Box 3. Types of Devices



Wi-Fi and Wearable Devices | Systems Devices | Portable Devices

3.2.2 Trending Technologies

Cloud Computing

One can either store data on a home or office computer, or store data on a remote server. Cloud computing is the practice of using a network of remote servers hosted on the Internet to store, manage and process data. In other words, cloud computing means storing and accessing data and programs over the Internet instead of your computer's hard drive.

Cloud technology enables 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, and at lower cost. For an individual user or small business using a cloud service, this could mean that one no longer needs to hire and retain people for installation and updates, and there is very little capital expenditure, only operational costs.[20]

Internet of Things

The Internet of Things has been used to refer to all kinds of Internet-based applications, sensors, servers and electronic services. Essentially, it is machine-to-machine communication where interconnected computing devices, and even mechanical devices, provided with a unique identifier can transfer information without human-to-human or human-to-computer interaction. For example, a weather monitoring sensor feeding real-time data to an application on a computer can be developed to automatically and continuously analyse the weather data and deliver relevant messages to mobile phone subscribers. Such an application can be of immense value to agriculture and disaster preparedness.

20 Yoko Aoyama and Balaji Parthasarathy, *The Rise of the Hybrid Domain: Collaborative Governance for Social Innovation* (Edward Elgar Publishing, 2016), p. 99.

3D Printing

3D printing may not seem important—but it is. For example, computer-based models of prosthetics can be produced with 3D printing, which has significantly reduced the production cost of prosthetics—making them more affordable and widely available. Similarly, 3D printing can reduce the cost of various engineering and medical innovations. Another example is using metal 3D printing to develop prototypes of various components of machineries or cars, which has led to quicker time to market and lower cost.

Artificial Intelligence

Artificial intelligence refers to, "the development of computer systems able to perform tasks normally requiring human intelligence, such as visual perception, speech recognition, decision-making and translation between languages".[21]

Artificial intelligence in transportation systems, for example, manages and predicts traffic flows and volumes. Driverless car is expected to reduce human error, enhance safety and cut commuting time. Artificial intelligence in health is improving the diagnosis of diseases.[22] Artificial intelligence also plays a major role in the development of smart systems, including smart buildings, smart grids and smart cities that are enhancing the efficiency of energy use and contributing to climate change mitigation.

There are many component technologies that are driving the development of artificial intelligence. For example, the Internet of Things enables collection and exchange of data through network-connected sensors and devices that operate mostly without human intervention. Mobile and broadband technologies enable voice and data transmissions to data storage locations, mostly using cloud computing technologies. The collected data, known as big data, is then analysed. Each of the above components is important on its own, but when aggregated and consolidated, the components can produce synergistic and transformative impacts, culminating into artificial intelligence applications that bring new value.[23]

Technology Stacks

In the current scenario, different agencies independently collect vast amounts of data from individual citizens and/or customers. Among current technology developments dealing with big data are "stacks". A technology stack is a combination of software products and programming languages used to create a web or mobile application that connects different databases. Each layer of the stack builds on the features of the one below it. Software applications written for stacks are called "middleware".[24]

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21 English Oxford Living Dictionaries, "artificial intelligence". Available from https://en.oxforddictionaries.com/definition/artificial_intelligence.

22 See for example, James Gallagher, "Artificial intelligence 'as good as cancer doctors'", *BBC*, 26 January 2017. Available from http://www.bbc.com/news/health-38717928.

23 ESCAP, *Artificial Intelligence and Broadband Divide: State of ICT Connectivity in Asia and the Pacific 2017* (Bangkok, 2017). Available from http://www.unescap.org/sites/default/files/State%20of%20ICT2017_Final.pdf.

24 A middleware is software that acts as a bridge between an operating system or database and applications, especially on a network.

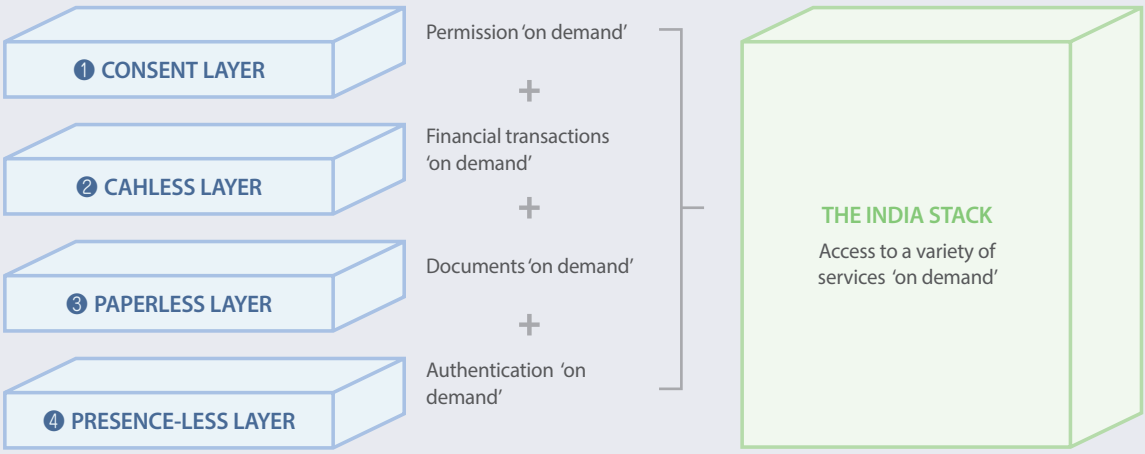
Case Study 1. India Stack

The India Stack is a set of application programming interfaces that allow governments and private companies to deploy cashless and paperless technology products. Conceived by the Government of India in 2012, this open technology platform is being developed by the Indian Software Product Industry Round Table that provides various functionalities upon which applications can be developed for various devices and systems, including desktops, phones and wearables.

India Stack is based on Aadhaar, India's national identification project using biometrics that gives every resident a unique identification number. The Aadhaar becomes the foundational database for all other applications and services that are built in stacks upon it.

The other stacks include a digital locker system in which documents (e.g., land ownership records, university transcripts, medical records) tied to the Aadhaar number are stored, an authentication system using e-signatures, and a unified payments interface of the National Payment Corporation of India. A consent architecture is being developed to protect privacy. It gives individuals with the Aadhaar number control over who gets access to personal data, and what kind of data is allowed to be accessed.

Figure 2. The Four Layers of the India Stack



The India Stack allows companies to quickly give customers insurance coverage, and individuals can easily open bank accounts or apply for loans. It also enables cashless transactions. Reliance Jio, a mobile network operator, leveraged India Stack to issue mobile SIM cards more quickly, thus improving customer experience. The entire SIM activation process that previously took 3-5 days now takes only a few minutes.

Sources: India Stack, "India Stack - The Bedrock of a Digital India", 17 November 2016. Available from http://indiastack.org/india-stack-the-bedrock-of-a-digital-india/; Tech2, "India Stack is the key technology platform that could transform India into a cashless economy", 12 December 2016. Available from http://www.firstpost.com/tech/news-analysis/india-stack-is-the-key-technology-platform-that-could-transform-india-into-a-cashless-economy-3694019.html; and Pavithra Babu, "What is IndiaStack and How is it Set to Change India?" Razorpay, no date. Available from https://razorpay.com/blog/what-is-indiastack-and-how-is-it-set-to-change-india/.

Blockchain Technology

Blockchain technology is an example of a stack emerging out of cryptocurrencies, such as Bitcoin[25] Blockchain is defined as, "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, 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".[26]

Blockchains can 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 financial transactions.

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

3.2.3 Trending Applications

A plethora of applications, ranging from sophisticated social media to a simple application enabling the home delivery of services are flooding the market every day. Among the most prominent is social media.

Social media is a group of Internet-based applications that builds on the ideological and technological foundations of Web 2.0, allowing the creation and exchange of user-generated content.

Facebook, LinkedIn and Twitter are some well-known global social media applications used for social networking, crowdsourcing and co-creation of content. Asian examples of social media include: WeChat and Weibo from China; LINE from Japan; and Kakao Talk and Cyworld from the Republic of Korea.

Module 11 of the Academy of ICT Essentials for Government Leaders module series deals extensively with the use of social media for development. The current popularity of social media is based on its distinct features, as follows:[27]

- **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 seen as a two-way conversation.

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25 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 intermediary. From a user perspective, Bitcoin is like cash for the Internet. See https://bitcoin.org.

26 Katherine Purvis, "Blockchain: What is it and what does it mean for development?" *The Guardian*, 17 January 2017. Available from https://www.theguardian.com/global-development-professionals-network/2017/jan/17/blockchain-digital-technology-development-money.

27 Emmanuel C. Lallana, *Module 11: Social Media for Development*, The Academy of ICT Essentials for Government Leaders Module Series (Incheon, APCICT/ESCAP, 2014), p. 18. Available from http://www.unapcict.org/academy.

- **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 television show.
- **Connectedness** – Most kinds of social media thrive on their connectedness, making use of links to other sites, resources and people.

3.2.4 Big Data and Analytics

In 2015, it was estimated that 2.5 quintillion bytes of data were generated daily.[28] This would fill 10 million Blu-ray disks (high capacity DVDs), which when stacked on top of each other, would be equivalent to the height of four Eiffel Towers. Such huge accumulation of data has become known as big data—a broad term for data sets so large and complex that traditional data processing applications are inadequate.[29]

Big data is normally stored in public or private data centres, or in public or private clouds. Such data can be classified as government or private data. When big data is made accessible to the public at no cost and free from proprietary issues, it becomes open data.

Big data is mostly generated from social media sites, sensors, devices, video/audio files, networks, log files and the web, and much of it is generated in real time and on a very large scale. Three defining properties of big data are **volume** (amount of data), **variety** (number and types of data) and **velocity** (speed of data processing).

Governments need and collect data from various sources both from internal government departments and from vast amounts of data generated in the public spaces.

The 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 information. Findings can lead to more effective planning and marketing, new revenue opportunities, better customer service, improved operational efficiency and competitive advantages over rival organizations.

For example, the continuous accumulation of traffic data in the city can be analysed to improve traffic flows and suggest routes to reduce road congestion. This is particularly relevant in Asia and the Pacific as many cities in the region face increasing traffic volume that is resulting in traffic congestion, more road accidents and urban pollution.

The significance of big data and analytics for achieving the SDGs cannot be overstated. Big data and analytics have been used to optimize energy use, and track diseases like dengue fever, malaria and Ebola. The United Nations Statistical Commission created a Global Working Group on Big Data for Official Statistics to investigate the benefits and challenges of big data, including the potential for monitoring and reporting on the SDGs.[30]

3.2.5 Bots

A bot "is"a software application that runs automated tasks (scripts) over the Internet. Typically, bots perform tasks that are both simple and structurally repetitive, at a much higher rate than would be possible for a human alone."[31] Bots can be used for productive tasks, and they can also be used for malicious reasons. One of the best examples of

28 VCloudNews, "Every day big data statistics - 2.5 Quintillion bytes of data created daily", 5 April 2015. Available from http://www.vcloudnews.com/every-day-big-data-statistics-2-5-quintillion-bytes-of-data-created-daily/.

29 Wikipedia, "Big data". Available from https://en.wikipedia.org/wiki/Big_data.

30 United Nations, "Using Big Data for the Sustainable Development Goals". Available from http://unstats.un.org/bigdata/taskteams/sdgs/.

31 Wikipedia, "Internet bot". Available from https://en.wikipedia.org/wiki/Internet_bot.

a good bot is a search engine spider. Such bots troll the web and index new pages for a search engine. The value of bots lies in their ability to search and collate big data, whether for more effective marketing or for better provision of services.

3.3 Trends in Usage

In this subsection, the ways in which trending technologies are used are examined. 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 collaboration, mobility, accessibility and communication. Together, these are effective tools.

- **Social** – Using social media has become a must for all enterprises—private and public—whether these are banks, retailers or governments. With over one billion individuals logged on to various social media networks, and people using social media networks to view and make purchase decisions, many organizations have started using social media to optimize their services. Data generated by customers then form the vast databases that are "mined" and analysed.
- **Mobile** – The exponential growth of mobile devices has changed the way people access content. While smartphones and tablets provide rich digital content at the users' fingertips, simple feature phones[32] can also be used in combination with interactive voice response (IVR) systems to access banking and public utility services. Consequently, many governments are 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 predict consumer behaviour, help banks and financial institutions identify corruption and fraudulent practices, and provide timely, personalized and location specific information to citizens, among other benefits.
- **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 users' need to invest in heavy computing hardware, and makes distribution easy. Netflix and Amazon Prime are two examples of global companies exploiting cloud computing very effectively.

The real promise of SMAC technologies, however, is not in their individual contribution towards cost savings and process efficiencies in the information technology (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.

To conclude, current ICT trends are offering new visions for using ICTs to achieve the SDGs, which would not have been imaginable even five years ago. How the ICT scenarios play out in different sectors of sustainable development is the focus of the next section, which, through case studies, illustrates the diverse use of old and new ICTs in varied contexts and conditions. Before that though, let's first consider some sociopolitical and legal concerns related to the current ICT trends.

32 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 Wikipedia, "Feature phone". Available from https://en.wikipedia.org/wiki/Feature_phone.

3.4 Sociopolitical and Legal Concerns

Although ICTs can help achieve the SDGs, there is a set of challenges in the use of ICTs that needs to be addressed.

ICTs have a disruptive effect on society at large, transforming the ways in which individuals and communities interact with each other. There is concern that 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 in which the excessive use of the Internet disrupts normal behaviour.

ICTs, especially Internet of Things and machine-to-machine communication, may displace workers and cause mass unemployment. There may be some merit to this argument in countries with large under-skilled and unemployed populations. However, with appropriate skills enhancement and vocational education policies, technologies may enhance individual well-being and create a more knowledge-based workforce.

An ICT-dependent economy is 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.

An ICT-based society could become a surveillance society, with pervasive spying and loss of privacy. This spying may be by government, giant ICT firms or other anti-social elements.

With big data and analytics, personal data has become a saleable commodity. As a result data privacy has become a serious concern. The unscrupulous sale of mobile subscribers' data has already led to persistent intrusions to individuals' privacy. Additionally, there is evidence that large social media networks such as Facebook and Google analyse users' behaviour, and then enable direct and intrusive marketing.

Another area of serious concern is data security. Disruptions of the networked economy and society could be deliberate acts of cyberwarfare. Such acts have been used by extremist groups to indoctrinate and recruit youth, as well as hack government portals to cause major disruptions.

A particular concern for governments is managing the rapid build-up of public opinions and news, especially fake news, online.

Finally, there is concern for the inequitable growth of ICTs, leading to a widening digital divide—where the gap between the information rich and the information poor will grow, despite apparent growth in absolute numbers.

In short, while the SDGs represent a complex problem-solving exercise, the use of ICTs also has a set of challenges that needs to be addressed. How the tools are used for sustainable development will determine the success or failure of the interventions.

To sum up:

There have been dramatic changes in technology within the last five years.

- Devices have become cheaper and faster, and more versatile, robust and reliable.
- Mobile phones have overtaken all others as the technology of choice in both developed and developing countries. ICT growth in the Asia-Pacific region is driven by a few countries—namely, China, Japan, Republic of Korea and Singapore—leading to a skewing of teledensity in the region.
- Not explicitly visible to the users, cloud computing, the Internet of Things, 3D printing, artificial intelligence, technology stacks, blockchain technology, big data and bots are changing the way information is stored, processed and delivered.

- SMAC or Social, Mobile, Analytics and Cloud, are the new ways through which both the market and government are trying to reach out to the end users. At the same time, big data is being analysed in order to customize and personalize relevant and timely information.
- For governments, these new trends are a boon. For example, governments can use big data and analytics as part of effective governance.
- These new technology trends also raise serious sociopolitical and legal concerns in the areas of personal data privacy and security, cyberwarfare, rising unemployment as technology displaces human intervention, and a widening digital divide between the "haves" and the "have-nots".

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 applications. How are these ICTs being used?

Search the Internet for ICT statistics. See for example the ITU database (http://www.itu.int/en/ITU-D/Statistics/Pages/default.aspx) and the World Bank database (https://data.worldbank.org/).

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 engage in a group discussion on the above.

4. APPLICATION OF ICTS FOR SUSTAINABLE DEVELOPMENT: CASE STUDIES FROM ASIA AND THE PACIFIC

This section aims to:

- Describe the use of ICTs for sustainable development in different sectors; and
- Discuss good practices and lessons learned from the ICTD case studies.

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 strengthen women's participation in economic activity, thus addressing a parallel goal. Therefore, when using ICTs for sustainable development, it is important 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).

In the last fifteen years, there has been extensive experimentation in the field of ICTD, and much has been learned about the successes and failures. Some of the case studies presented in this section are well-known initiatives that commenced in the early 21st century. They stand out because they have been carefully planned, executed, sustained, upscaled and upgraded and are still working well today. Impact evaluations testifying to their successful implementation have been conducted in many of the case studies, thus, it is possible to identify success factors in these case studies. Other case studies are more recent and explore the advances in ICTs.

Early in the experimentation of ICTD, it was sometimes assumed that ICTs could be the prime drivers in change—in other words, it was believed that creating an ICT application and making it available would lead to positive impact. This perspective, however, has given way to a realization that the best use of ICTs is to embed them within the context of a development goal and include them throughout the entire process of a programme or project life cycle, including policy development, action planning, and roll out of infrastructure, support systems and content.

The case studies are organized by the six key elements of the SDGs identified by the United Nations Secretary-General in his synthesis report to the General Assembly (see Figure 3). While the case studies are structured within a set of goals, the myriad ways in which ICTs have been deployed to address one or more of the SDGs will be highlighted.

Figure 3. The Six Key Elements of the SDGs

Sustainable Development Goals

People	Dignity	Prosperity	Justice	Partnership	Planet
Ensure healthy lives, knowledge and the inclusion of women and children	End poverty and fight inequalities	Grow a strong, inclusive and transformative economy	Promote safe and peaceful societies and strong institutions	Catalyze global solidarity for sustainable development	Protect our ecosystems for all societies and our children

Source: United Nations General Assembly, The road to dignity by 2030: Ending poverty, transforming all lives and protecting the planet – Synthesis report of the Secretary-General on the post-2015 sustainable development agenda, sixty-ninth session, agenda items 13 (a) and 115 (A/69/700), 4 December 2014. Available from http://www.un.org/ga/search/view_doc.asp?symbol=A/69/700&Lang=E.

4.1 Dignity: End Poverty and Fight Inequalities

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

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. In developing countries, industry and private sector-led growth supported by ICTs has in some cases contributed to poverty reduction. However, the poor has benefited less from this type of development.[33] Governments need to address poverty directly, not just through interventions in the economy to spur growth and anticipate that it will eventually benefit the poor.

Poverty itself is multidimensional. It includes 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 interventions are important poverty alleviation strategies. An example of a

33 Organisation for Economic Co-operation and Development, *Good Practice Paper on ICTs for Economic Growth and Poverty Reduction* (Paris, 2005). Available from http://www.oecd.org/dataoecd/2/46/35284979.pdf.

direct ICT intervention is the use of ICTs to deliver services to the poor, and an example of an indirect or supportive intervention is natural resource mapping.

Globally, there are a large number of countries that are using ICTs, either as stand-alone 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 the widespread availability and increasing affordability of mobile devices in both developing and developed countries.

Some of the findings from global experience show that the use of mobile devices has contributed to the following:

- Better access to information on market prices, leading to higher incomes;
- 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 intermediaries and brokers;
- Improved access to financial information, credit and other financial services, leading to financial inclusion; and
- Personalized and location-specific climate and disaster information, leading to better management of risks.

A few of the experiences in using ICT applications in agriculture, rural development and poverty reduction in the Asia-Pacific region are summarized below:

- eKrishok,[34] developed by the Bangladesh Institute of ICT in Development, offers information and advisory services to farmers through mobile phones and the Internet.
- China Mobile, a state-owned telecommunications company, has developed a rural information network specifically for rural and remote areas of the country, including services and products for rural residents, agricultural enterprises and rural governments.[35]
- The Mahatma Gandhi National Rural Employment Guarantee Scheme[36] is India's effort to reduce rural poverty by providing 100 days of wage employment in a year. An ICT platform for the scheme provides information to the rural poor, and offers tools for officials to manage the scheme and monitor progress.
- Nano Ganesh,[37] developed in India, is a mobile-based remote control system for water pump sets in agricultural areas. This device addresses the routine problems faced by farmers in operating their water pumps, saving an enormous amount of electricity, water, fuel, time and labour.
- Reuters Market Light[38] provides localized and personalized information to Indian farmers via short message service (SMS) on weather, market prices, local and international commodity news, and crop advisory tips. The information helps famers make informed decisions, reduce waste and optimize profits.

34 eKrishok. Available from http://wp.ekrishok.com.

35 Christine Zhenwei Qiang and others, "Mobile Applications for Agriculture and Rural Development", *World Bank*, December 2011. Available from http://siteresources.worldbank.org/INFORMATIONANDCOMMUNICATIONANDTECHNOLOGIES/Resources/MobileApplications_for_ARD.pdf.

36 M. I. Khan, "Bihar govt to use GPS phones to monitor MNREGA progress", *Rediff News*, 15 March 2013. Available from http://www.rediff.com/news/report/bihar-govt-to-use-gps-phones-to-monitor-mnrega-progress/20130315.htm.

37 Nano Ganesh. Available from http://www.nanoganesh.com.

38 RML Agtech Pvt. Ltd. Available from http://rmlglobal.com.

- B2bpricenow.com is an online trading and payment system for Filipino farmers, cooperatives, and small and medium-sized enterprises.[39]
- E-dairy Sri Lanka[40] provides timely market information to small dairy farmers via SMS to increase their incomes.
- Govi Sahana Sarana[41] is a toll-free hotline service for farmers in Sri Lanka. Farmers can call 1920 to talk to officials during office hours for agriculture-related assistance.

There are a variety of such initiatives throughout the Asia-Pacific region that illustrate the use of ICTs to establish vital linkages between rural communities and global markets, and 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 them into user-friendly information.

Evidence from these experiments has shown that effective use of ICTs could help farmers improve their farming practices and increase their revenues by making it possible for them to access information on agricultural know-how and market developments. This, in turn, reduces rural poverty.

To sum up:

Access to timely information, especially in agriculture, can make a big difference for many of the rural poor who are engaged in agriculture. The case studies in this section show how timely information regarding water and power availability, market prices, and other extension services has resulted in increased incomes—the first step in poverty reduction.

4.2 People: 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 to nearly 90 per cent of children by 2015, much remains to be done in terms of improving its quality and equity. The three sectors—education, gender and health—are inextricably linked and they provide the basis for achieving other SDGs. Ideally, the use of ICTs in these three sectors should be examined together in a holistic manner. However, for the purpose of simplicity, the sectors are discussed separately.

SDGs 3, 4 and 5 address these sectors directly.

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

39 Land Bank of the Philippines, "B2BPriceNow". Available from https://www.landbank.com/b2bpricenow.

40 Indrani Sharma, "e-Dairy extension: An innovative ICT application to improve productivity", *Changemakers*, no date. Available from https://www.changemakers.com/girltech/entries/e-diary-extension-innovative-ict-application-improving.

41 Mahinda Rajapaksa, "Development of the Agricultural Sector", 27 August 2016.

4.2.1 Health

ICTs have improved access to health care in rural and remote communities by facilitating exchanges with doctors in urban areas. ICTs have also enhanced the effectiveness of health management and monitoring systems, provided access to the latest findings from medical research, and enabled continuing education for health care professionals.

These ICT for health initiatives show that there are two main categories of stakeholders in the health sector who can benefit from ICT support:

1. People who need health care, especially those people whose access to health care services and/or health-related information is limited.
2. People who are providing health care services, including medical professionals such as doctors, nurses and caregivers; researchers and health managers; and even policymakers in the area of health care.

For the first group of stakeholders, ICT interventions can be direct, linking patients to expert medical services. For the second group, ICT interventions can be indirect and supportive through improvements in health monitoring systems and continuing professional education. Both types of ICT interventions are briefly 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 ICTs.

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.[42]

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 local doctor to present the patient to the specialist based elsewhere, thereby significantly reducing the costs and the risks 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.

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, 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. Another technique used is real-time telemedicine using video conferencing technology and live data transmission. With this technique, the patient, local doctor and specialist can interact in real time.[43]

The Government of Thailand began exploring the potential of telemedicine since the 1990s by connecting hospitals with health care facilities throughout the country.[44] Linking hospitals across the region since the early 2000s is the Trans-Eurasian Information Network that provides broadband connections to many countries for research, education and health care, including telemedicine.[45]

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42 See World Health Organization, *mHealth: New Horizons for Health through Mobile Technologies*, Global Observatory for eHealth Series – Volume 3 (Geneva, 2011). Available from http://www.who.int/goe/publications/goe_mhealth_web.pdf.

43 TelmedPak, "Telemedicine in Pakistan". Available from http://telmedpak.com.

44 Narong Kasitipradith, "The Ministry of Public Health telemedicine network of Thailand", *International Journal of Medical Informatics*, vol. 61, no. 2-3 (May 2001), pp. 113-116. Available from http://www.sciencedirect.com/science/article/pii/S1386505601001332.

45 See Asi@Connect, "Project". Available from http://www.tein.asia/tein4/project/project.do.

An extensive description of telemedicine projects in several Asian countries[46] reports programmes such as HealthNet in Nepal[47] and a mobile telemedicine system with multi-communication links for urban and rural areas in Indonesia.

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 a critical mass of health care professionals, including educators for teaching hospitals, is lacking. Access to important medical literature is limited for both medical students and health workers who must keep up-to-date with 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 format, both online and offline, to medical students, aspiring doctors and practising health professionals.[48] 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-supported web portal called HINARI is a global effort to support health professionals and policymakers worldwide (see Case Study 2).

Case Study 2. Access to Research for Health Programme

The Access to Research for Health Programme (HINARI) was set up by the World Health Organization in collaboration with major publishers to give developing countries access to one of the world's largest collections of biomedical and health literature.

As of September 2017, up to 13,000 journals (in 45 different languages), 56,000 e-books, and 120 other information resources are available to health care institutions in more than 115 countries benefiting thousands of health care workers and researchers.

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: World Health Organization, "Hinari Access to Research for Health Programme". Available from http://www.who.int/hinari.

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 the Severe Acute Respiratory Syndrome (SARS), the Middle East Respiratory Syndrome (MERS) and the avian flu. Do your country's health officials use this system? Why or why not?

46 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. Available from http://www.unapcict.org/ecohub/resources/exploring-new-modalities.

47 HealthNet Nepal. Available from http://www.healthnet.org.np/?p=profile.

48 MediSys EduTech Private Limited, "SmarTeach". Available from http://www.smarteach.com.

Efforts to modernize hospital and health administration have led to the development of a large number of health administration software. These management information systems enable the recording and reporting of patient data that are then linked in an intranet system for effective administration. Arogyashri[49] combines these management information systems along with a health insurance scheme to provide health insurance for tertiary care to patients below the poverty line in the Indian state of Telangana.

Another critical application of ICTs 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.[50] 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, the protection against and treatment of highly contagious diseases such as SARS, MERS and the avian flu have been possible 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 the health care sector, and has been used extensively in many countries of the Asia-Pacific.
- There are several global efforts such as HINARI to support the knowledge needs of health care professionals.
- Global surveillance systems have enabled countries to contain the threat of cross-border diseases such as SARS, MERS 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 the kinds of ICT applications that might be useful to effectively connect the need and the service.

4.2.2 Education

Four major issues plague Asia-Pacific countries in their efforts to provide education to their citizens—access, equity, quality and resources. ICTs have been used to address these issues. In fact, a quick broad survey of national efforts reveals 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 television—in countries like China and India, to the very successful use of ICTs in education in Singapore.[51]

49 Aarogyasri Health Care Trust, Government of Telangana, India. Available from http://www.aarogyasri.telangana.gov.in.

50 UNDP, *Regional Human Development Report – Promoting ICT for Human Development in Asia: Realising the Millennium Development Goals* (New Delhi, UNDP and Elsevier, 2005), pp.147-160.

51 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.

In "education for all" efforts, ICTs have been used to provide educational access to 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, the use of ICTs has proven to be a cost-effective alternative to all-female schools for educating women and girls.[52] Through the **open school movement**, educational authorities in various countries of the Asia-Pacific region have been experimenting with the use of different ICTs—including conventional print materials, audio-visuals and online learning tools—to provide underserved communities with access to primary and secondary education (see Case Study 3).

Case Study 3. Open Schools of the Asia-Pacific

Open schools in the Asia-Pacific region aims to: (1) provide alternative schooling for the educationally disadvantaged; (2) promote successful transition to formal schools; (3) improve the educational performance of students; (4) raise the quality of education through ready-made educational materials and resources; and (5) provide training for teachers.

Examples of open schools include the following:

- India's National Institute of Open Schooling – the largest open school in the world, providing primary and secondary education to more than 1.5 million people;
- Open schools in Bangladesh, Pakistan and Sri Lanka also offers primary and secondary education to all; and
- The Philippines' eSkwela Project focuses on providing educational opportunities to school dropouts.

The eSkwela Project utilizes an ICT-enabled, inquiry-based, interdisciplinary and thematic approach to teaching and learning. At the heart of the eSkwela Project is its instructional design. It is a blended type of learner-centred instruction where students 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 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 these centres are community-led shared facilities, which means the infrastructure, connectivity, personnel and maintenance costs are covered by the communities.

Sources: eSkewela, "The eSkwela Project: The Establishment of Community e-Learning Centers for the Out-of-School Youth and Adults". Available from https://als-eskwela.wikispaces.com/About; Jasmine Mohammadsali, "eSkwela transfers from CICT to Department of Education", Telecentre Foundation Blog, 25 May 2011. Available from http://community.telecentre.org/profiles/blogs/eskwela-transfers-from-cict-to?xg_source=activity; National Institute of Open Schooling. Available from http://www.nios.ac.in; and UNICEF and Cambridge Distance Education Consultancy, Open and Distance Learning for Basic Education in South Asia (Kathmandu, UNICEF, 2009). Available from http://www.unicef.org/rosa/ODL_Report_(Final_version)___10_Dec_09.pdf.

52 Infodev, *Survey of ICTs for Education in India and South Asia Country Studies: Vol. 1 Extended Summary* (Washington D.C., 2010). Available from http://www.unapcict.org/ecohub/survey-on-icts-for-education-in-india-and-south-asia/at_download/attachment1.

Something To Do

Search the web for initiatives, in your country or elsewhere, that are similar to the examples given in Case Study 3. What do these initiatives have in common? What are their differences? How do the initiatives address issues of educational access, equity, quality and resources?

Another ICT for education initiative is **SchoolNet** in which a group of schools use ICTs to work together to enhance teaching and learning. SchoolNets have been set up in South-East Asia and the Pacific subregion (see Case Study 4), with support from international agencies.

Case Study 4. A SchoolNet and Community Access Model for the 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 ICTs in schools and their respective communities.

The project involves establishing in the school a Learning Centre equipped with computers, photocopier, camera, DVD player, printer, Internet connection, fax and multimedia projector, among other equipment. Students and teachers use the Learning Centre during school hours, and the same facility functions after hours as a business venture catering to community members. This business model contributes to the sustainability of the Learning Centre. Moreover, collaboration between the school staff and respective school committees has 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. Later, Vaimauga College, Lepa/Lotofaga College, Amoa College and Mataaevave College on Savaii joined the network.

The connectivity model is a hybrid design using wireless broadband and dial-up access to a data centre. The timely introduction of the new ICT legislation by the Government of Samoa to regulate the telecommunications sector and the issuance of new 3G licenses will 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: Samoa SchoolNet. Available from http://www.schoolnet.ws/project.html.

Questions To Think About

What do you think are the benefits of connecting schools to each other, and 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?

As 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 through e-learning programmes.

The University of the South Pacific[53] remains one of the oldest and most successful models of ICT application in formal education with a history of technology application dating more than three decades. Based on its enormous success, and the possibility that the consortium model[54] 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, 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) (see Case Study 5).

Case Study 5. A Virtual University for Small States of the Commonwealth

The VUSSC is a robust network of small states committed to collaborate in the development and sharing of free content to promote learning for sustainable development.

Supported by the ministries of education of 31 countries, the VUSCC focuses on creating post-secondary, skills-related courses in areas such as tourism, entrepreneurship, professional development, disaster risk management, and a range of technical and vocational subjects.

Non-proprietary course materials in digitized formats 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 of the VUSCC is the creation of open educational resources using existing course content, which are made available online.

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 the 31 participating countries have attended capacity building workshops, courses and formal programmes of the VUSSC.

Source: Commonwealth of Learning, "A Virtual University for Small States of the Commonwealth (VUSSC)". Available from http://www.vussc.info.

53 The University of the South Pacific, "About the University". Available from http://www.usp.ac.fj/index.php?id=usp_introduction.

54 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 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.

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 in **non-formal education** (see Case Study 6). Today, non-formal education 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 non-formal education and most of these continue to be delivered face-to-face. But there is evidence that this is changing.[55]

Case Study 6. People First Network, Solomon Islands

A project of the University of the South Pacific used the People First Network (PFnet), an existing communications network, to demonstrate the application of ICTs 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 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: Rural Development Volunteers Association, "Pipol Fastaem", UNDP and UNOPS.

Two major developments in the ICT for education field are the movement for **open educational resources** (OERs) and the **massive open online courses** (MOOCs). 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, audios, videos and animations".[56] An example is the Massachusetts Institute of Technology OpenCourseWare that provides free access to all its course content.[57]

55 See, for example, Tata Sons Ltd., "Tata Computer-based Functional Literacy Programme". Available from http://www.tataliteracy.com; and Glen Farrell, *ICT and Literacy: Who Benefits? – Experience from Zambia and India* (Vancouver, Commonwealth of Learning, 2004). Available from https://www.col.org/resources/ict-and-literacy-who-benefits-experience-zambia-and-india.

56 UNESCO, "What are Open Educational Resources (OERs)?" Available from http://www.unesco.org/new/en/communication-and-information/access-to-knowledge/open-educational-resources/what-are-open-educational-resources-oers/.

57 Massachusetts Institute of Technology OpenCourseWare. Available from https://ocw.mit.edu.

A MOOC is a course of study made available over the Internet to a very large number of people. Anyone who decides to learn online can simply log on to the given website and sign up for the course. Popular MOOC platforms include Coursera, edX, FutureLearn and Udacity.

Some courses may charge a small fee, but many are completely free. MOOCs provide participants with course materials that are normally used in a conventional education setting, such as lectures, videos, study materials and problem sets. However, MOOCs may be less structured than a university course, may not offer academic credit, and may not provide the background and other information that would help gain accreditation or the achievement of additional skills and competencies.

Although MOOCs offer many benefits—they are often free, and can be used anywhere and anytime for formal or informal learning—studies have shown low completion rates of MOOCs, and there is little concrete evidence to date of their effectiveness in increasing access to education. Language remains a significant barrier as most of the MOOCs are currently in English.

Another key application of ICTs in education in developing countries is in the **professional development of teachers**. ICTs are an important means of training the large number of teachers that are needed to meet the challenges of providing education for all.

As teachers are key to the effective use of ICTs in the classroom, teachers need to develop both the technical and pedagogical skills for ICT-supported teaching and learning. This is particularly important in the new 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" that include critical thinking, information literacy, problem solving, collaborative learning, and the ability to learn new knowledge and apply that knowledge to new situations.[58]

The success of Singapore's ICT in education effort was largely due to the extensive training of teachers on teaching 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.[59]

In Bangladesh, Mongolia, Nepal and Samoa, teachers are likewise being trained to use a range of technologies, from computers to digital cameras, to enhance their teaching.[60]

In all these initiatives, there is a common recognition that without effective teacher training in ICTs 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 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

58 Wadi D. Haddad and Alexandra Draxler, eds., *Technologies for Education: Potentials, Parameters, and Prospects* (Paris, UNESCO and Washington, D.C., Academy for Educational Development, 2002), p. 7. Available from http://unesdoc.unesco.org/images/0011/001191/119129e.pdf.

59 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. Available from http://www.unescobkk.org/index.php?id=7035.

60 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. Available from http://www.unescobkk.org/index.php?id=7035.

system-wide reform in educational policies and practices. Real learning gains and the improvement of an education system will take place only when all the elements of educational change, from policies and practices, to teachers, learners and other stakeholders, come together.

It is also important to note that the use of ICTs in education goes beyond content delivery. ICTs in education can potentially provide:

- A platform for continuous discussion between all involved in the education process (students, teachers, school administration and parents);
- Opportunities for innovative learning in a creative way; and
- Opportunities for students to engage in collaborative learning and problem solving.

To sum up:

- ICTs' impact on education is second only to their impact on business practices. In conditions where access to educational opportunities is limited due to the lack of human, learning and financial resources, ICT tools can help to address these hurdles.
- Open schools, school networks, and open and distance learning institutions are using ICTs extensively to reach underserved and marginalized population groups, whether in the high population countries such as Bangladesh, or in the remote small island states in the Pacific.
- OERs and MOOCs make high-quality content available anywhere and anytime for both learners and teachers. Collaborative content development has also been undertaken as institutions come together to pool resources.
- Skills and knowledge upgradation for teachers, access to academic resources for improved research and the provision of non-formal learning to those left out of the educational system are some of the others uses of ICTs for education.

4.2.3 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 women and men are culture bound and may differ from one society to another, and can change over time.

Gender is a critically important development issue. Global data points to persistent gender disparities and discriminations in access to health care, education, employment and many other aspects of development, and women constitute a major proportion of the marginalized and vulnerable groups across all parts of the world. But there is recognition that the SDGs and national development goals cannot be achieved unless gender disparities and discriminations are addressed, and women and girls are empowered and provided with equal opportunities.

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 the news, on television, on YouTube videos, etc. Much of such representation is negative, making women and girls both victims of misogyny and objectification. The consequences of such representation include, cybercrime and bullying, human trafficking, and sexual abuse, especially on social media.

While the negative representation of women and girls in ICTs is an area that cannot be stressed enough, this module is focused on the second aspect—the participation of women and girls in the use of ICTs and the impact of their participation, including the role of ICTs in empowering women and girls.

Women's 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".[61] Across all approaches to women's empowerment, two requirements for empowerment emerge: (1) the need to ensure access and control over resources; and (2) the need to transform existing power relations in society.

Globally, there is official recognition of the importance of gender, as evidenced by the inclusion of gender equality in both the MDGs (Goal 3) and 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,[62] although there are a number of areas where ICTs have helped to alleviate poverty, most ICT projects have focused on the "poor" as a general category without necessarily paying attention to women's issues.[63] 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.

There is a lack of sex-disaggregated data on the gender divide in the use of ICTs 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 policymakers in developing countries. Despite this, project-level data has shown that ICTs are not gender neutral—ICTs impact women and men differently and almost always, women have many disadvantages that result in lesser access to technologies.[64]

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 sociocultural norms that restrict mobility. Other barriers that women face in accessing and using ICTs include the lack of affordability of devices and Internet connectivity, lack of relevant content, lack of digital literacy and skills, and lack of security and trust in ICTs.

ICTs can benefit women directly when women use 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 services, bypassing the sociocultural barriers that would have hindered access. 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 of ICTs benefiting women when the ICTs have been meaningfully and appropriately embedded and integrated into programmes and activities that focus on women's empowerment. Some examples are summarized below:

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61 Naila Kabeer, "Resources, Agency, Achievements: Reflections on the Measurement of Women's Empowerment", *Development and Change*, vol. 30 (1999), pp. 435-464. Available from https://www.utsc.utoronto.ca/~kmacd/IDSC10/Readings/research%20design/empowerment.pdf.

62 Alan Greenberg, *ICTs for Poverty Alleviation: Basic Tool and Enabling Sector* (Stockholm, Swedish International Development Agency, 2005). Available from http://www.sida.se/contentassets/e2425616ca0542e0a55270d5087e0c3a/icts-for-poverty-alleviation_1080.pdf.

63 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. Available from http://cemca.org.in/ckfinder/userfiles/files/CEMCA_Womens_Literacy1.pdf.

64 Nancy Hafkin, "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 in 2002.

- Indian non-governmental organizations (NGOs)—IT for Change and the Centre for Community Informatics and Development-collaborated on a project with the Department of Education in Karnataka to empower rural women. In the project, women were trained to produce radio programmes and videos for other women in their communities, and run a village-based telecentre.[65]
- Dnet, a social enterprise in Bangladesh, has built the capacity of over 100 Infoladies to provide information and services to rural communities. Trained and equipped with modern ICT devices (laptop, tablet or smartphone with Internet connection), Infoladies travel around villages on her bicycle offering, for a small fee, information and services related to health care, agriculture and e-government. For example, Infoladies can provide pregnancy care service by showing videos related to pregnancy, child birth and child care on her laptop, conducting basic check-up with her medical kit, and selling prenatal products like folic acid.[66]
- Likhaan or the Centre for Women's Health, is an NGO in the Philippines that has been providing health care services to women in marginalized communities, and advocating for their rights. Through its advocacy work for a Reproductive Health Law, Likhaan created an online magazine to collate stories of women and youth from marginalized communities most in need of sexual and reproductive health services and rights. The online magazine helped to influence lawmakers both directly and through generating public support.[67]
- The ITU Girls in ICT initiative is a global effort to raise awareness on empowering and encouraging girls and young women to consider studies and careers in ICT. The Girls in ICT Portal is a tool for girls and young women to find out about the ICT sector, as well as coordinate the organization of and active participation in the annual Girls in ICT Day.[68]

These examples illustrate that when women have access to and control over ICTs, they can benefit in many ways. At the same time, ICTs have created new economic opportunities for women, especially in countries like India and the Philippines where women have been employed in various IT-enabled services, related to data entry, ICT-based business, software customization and mobile money. Furthermore, tele-work and e-commerce have made it possible for some women to work from home. It has been found that these ICT-enabled economic opportunities are much more successful when designed, operated and managed by women, as in the case of eHomemakers in Malaysia (see Case Study 7).

65 Anita Gurumurthy and others, "Mahiti Manthana: Reimagining a women's empowerment programme through digital technologies", *IT for Change*, 2010. Available from http://www.itforchange.net/sites/default/files/ITfC/Mahiti%20Mantana-%20website.pdf.

66 Dnet, "iSocial". Available from http://dnet.org.bd/page/infolady.

67 Wikipedia, "Likhaan". Available from https://en.wikipedia.org/wiki/Likhaan.

68 ITU, "Girls in ICT Portal". Available from http://girlsinict.org.

Case Study 7. eHomemakers, Malaysia

Founded in 1998 by a single mother, eHomemakers 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 ICTs. Soon, the network of housewives expanded and they were using ICTs not only for running and promoting their businesses, but also for connecting with each other for mutual support and gaining self-esteem.

Initially, eHomemakers built a website for posting relevant information, but over time, the website could not support the growing needs of members that included middle- and low-income housewives, as well as various socially and financially disadvantaged groups, who wanted a more dynamic platform with interactive features.

Challenging the traditional view that only the young and educated can use ICTs, 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.

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

Source: eHomemakers. Available from http://www.ehomemakers.net.

These examples show that the new ICT scenario has created new employment opportunities for women, and when given the opportunity, women have been able to use ICTs to empower themselves economically and socially. Through the use of ICTs to jumpstart their career or grow their entrepreneurial activities, women have been able to gain recognition and status. At the same time, women have used the ICT tools and skills gained to create their own social spaces for articulation and aggregation of their collective interests, especially through social media platforms such as Facebook. Women have also used these platforms for support, peer learning and mentoring, resulting in the collective empowerment of women.

However, for women to fully benefit from the opportunities that ICTs can offer, there needs to be pro-women policies and practices that prepare women for future workforce needs, including the need for training and career support at three levels:[69]

- For entry-level jobs – relevant education, training, recruitment, internship and career incentives;
- For mid-career levels – career promotion and training; and
- For management and senior levels – skill improvement and sponsorship programmes.

69 ITU, *A Bright Future in ICT Opportunities for a New Generation of Women* (Geneva, 2012). Available from https://www.itu.int/en/ITU-D/Digital-Inclusion/Women-and-Girls/Documents/ReportsModules/ITUBrightFutureforWomeninICT-English.pdf.

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? What about in the countries with special needs?

Besides economic empowerment, ICTs can contribute to the political empowerment of women. ICTs can facilitate women's participation in government and political affairs by providing a communication platform to exchange opinions, articulate and aggregate interests, and engage political leaders in women's issues. Women's advocacy groups can effectively use ICTs to network and connect with each other, and mobilize public opinion. Shirkat Gah,[70] one of Pakistan's most respected women's rights groups, has used the Internet to support its networking, information and communication needs and in the process, strategically link local women's concerns with the global women's movement.[71]

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, social and political 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 strategies. You might also specify a timeline for achieving the target outcomes.

70 Shirkat Gah Women's Resource Centre. Available from http://shirkatgah.org.

71 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).

4.2.4 Youth and Persons with Disabilities

The term "for all" in the SDGs includes youth and persons with disabilities, which are discussed in this subsection. Other groups that the SDGs specifically address are indigenous peoples, displaced persons and migrants, which are discussed in the next subsection.

In Asia and the Pacific there are 717 million young people aged 15 to 24, comprising 60 per cent of the world's youth.[72] Significant numbers of youth in the region are unable to access education, health services and jobs. Policymakers play an important role in enabling the youth population to contribute positively to the development of economies and societies.

Also in Asia and the Pacific, one in six people live with disability, and this number is likely to increase as a result of population ageing, climate-related disasters, chronic health conditions, road traffic injuries and poor working conditions, among other factors.[73] Persons with disabilities face multiple barriers that restrict them from participating in the economy and society on an equal basis, particularly if they are poor and/or female. They are also more vulnerable to various risks, including natural disasters, violence and social exclusion.

As disability was not explicitly included in the MDGs, it was largely invisible and rarely included in national policies and programmes. This perpetuated a situation of neglect of one of the most vulnerable communities in the world. However, the SDGs refer specifically to persons with disabilities and the youth population in several of the goals. Endorsement of the SDGs means that the global community is now charged with addressing the needs of these vulnerable communities.

The relevance of ICTs for the young and disabled lies in their ability to open up a wide range of services, and transform existing services for underserved and excluded population groups. While radio has had a long history in serving the needs of the visually impaired, web services followed by mobile telephony are the access technologies with the maximum impact for persons with disabilities.[74]

Online services, especially those targeted at excluded population groups, open up their opportunities for learning and education, and for employment and commerce. They can also use the Internet to access government services and voice their concerns in various online forums and social media platforms.

Moreover, the applications that assist persons with disabilities access the Internet—such as screen readers, speech recognition software, video communication that incorporates sign language and visual assistance—are increasing and becoming more affordable. Some of these applications are integrated in mobile devices, and have enabled persons with disabilities to live independently.

While there are many real life examples of how ICTs have empowered persons with disabilities, one service that combines the economic needs of the youth with the economic needs of persons with disabilities is "Youth4Jobs", which started in India in 2012 (see Case Study 8).

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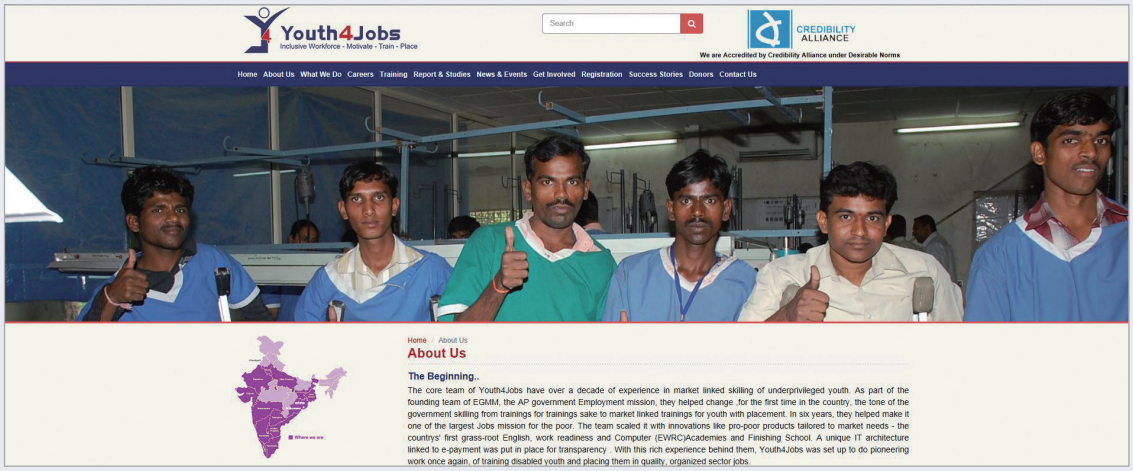
72 ESCAP, "Youth". Available from http://www.unescap.org/our-work/social-development/youth/about.

73 ESCAP, "Disability in Asia and the Pacific: The Facts", no date. Available from http://www.unescap.org/sites/default/files/Disability%20The%20Facts.pdf.

74 ITU, *The ICT Opportunity for a Disability Inclusive Development Framework* (Geneva, 2013). Available from https://www.itu.int/en/action/accessibility/Documents/The%20ICT%20Opportunity%20for%20a%20Disability_Inclusive%20Development%20Framework.pdf.

Case Study 8. Youth4Jobs, India



With the mission to "motivate, train and place", Youth4Jobs, an Indian NGO, has used its website to link young, disabled and poor rural youth with potential employers. In a short span of three years, Youth4Jobs placed nearly 7,000 young disabled persons in productive employment in various manufacturing and service sectors, including in IT and IT-enabled services.

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

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

Source: Youth4Jobs. Available from http://www.youth4jobs.org/index.php.

It is important to note that youth and persons with disabilities also face many barriers that restrict them from accessing and using the Internet. Generally, these groups have low incomes and they may not be able to afford access to the Internet.

Particularly for persons with disabilities, many websites and mobile applications are not accessible to them, which means the websites and applications are designed in such a way that make them difficult or impossible for persons with disabilities to use.

For example, in India, a study tested 7,800 government websites in 2012 and found that 75 per cent had accessibility barriers for persons with disabilities.[75] In 2016, another study tested 18 of the most popular government Android apps and found that 16 of them had accessibility issues for people with visual impairment.[76] In Vanuatu, a 2016 study found that all government websites hosted and managed by the Office of the Government Chief Information Officer had accessibility barriers.[77]

75 Centre for Internet and Society and Hans Foundation, "Accessibility of Government Websites in India: A Report", 26 September 2012. Available from http://cis-india.org/accessibility/accessibility-of-govt-websites.pdf.

76 Nirmita Narasimhan, "We tested 18 government apps, and most are not fully accessible to the disabled", *Factor Daily*, 31 August 2016. Available from http://factordaily.com/tested-18-government-apps-citizens-found-accessibility-issues-disabled/.

77 Government of Vanuatu, "Right to Information Web Accessibility Guidelines for Web Developers and Content Managers", September 2016. Available from https://ogcio.gov.vu/images/RTI_Vanuatu_Accessibility_Guidelines_MF.pdf.

As part of government's commitment to the SDGs and to the Convention on the Rights of Persons with Disabilities to promote inclusive development and empower persons with disabilities, many countries have developed policies, legislations and/or guidelines to ensure that online services and products are accessible to persons with disabilities.[78] Yet, the World Report on Disability states that progress on their enforcement and implementation has been slow.[79]

To sum up:

- The youth, and among them, the disabled are increasing in number in the Asia-Pacific region.
- The MDGs did not specifically mention persons with disabilities. But, the SDGs refer to youth and to persons with disabilities in several of the goals.
- There are some initiatives that use ICTs to address disability issues, but these are few and far apart.
- Unless proactive initiatives are taken, this vulnerable group is likely to fall further behind.

4.2.5 Indigenous Peoples, Displaced Persons and Migrants

Three groups of people—indigenous peoples, displaced persons and migrants—are often taken for granted or assumed when discussions about development take place. This is because they have limited access to and control over resources to voice their concerns and make decisions.

Indigenous Peoples

Indigenous peoples 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.[80]

Many indigenous peoples continue to suffer from marginalization and discrimination, extreme poverty, lack of political representation and participation, lack of access to social services, and other human rights violation.

In 2007, the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP) was adopted by the United Nations General Assembly. It sets a standard for the protection of indigenous rights, but because it is not legally binding on states, it has been difficult to enforce.

Like other marginalized group, indigenous peoples have problems accessing and harnessing the potential of ICTs because they often live in remote hard-to-reach locations and have little capital to invest in ICTs. There are examples, however, of indigenous peoples successfully using ICTs—from community radio to social media—to gather and disseminate information, voice their issues, and advocate for their rights. An interesting effort to give voice to tribal and indigenous communities is currently underway in India (see Case Study 9).

78 Internet Society, "Issue Paper: Asia-Pacific Bureau - Digital Accessibility", 25 July 2017. Available from https://www.internetsociety.org/resources/doc/2017/issue-paper-asia-pacific-bureau-digital-accessibility/.

79 World Health Organization and World Bank, *World Report on* Disability (2011). Available from http://www.who.int/disabilities/world_report/2011/en/.

80 Indigenous Peoples Literature. Available from https://www.indigenouspeople.net/.

Case Study 9. CGNet Swara, India

Many of the estimated 60 million members of India's tribal communities lack access to any mainstream media outlets. This poses serious barriers to their socioeconomic development, and their grievances about government neglect and economic exploitation remain unvoiced.

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

The software underpinning 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 the NGO Janastu, Microsoft Research India and several volunteers.

While the technology for building IVR services 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.

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

Source: Janastu. Available from http://janastu.org.

Displaced Persons

Whether as a result of war or various natural and human-induced disasters, there are more than 60 million displaced persons globally, desperately in need of assistance and humanitarian aid. Especially after a natural disaster, displaced persons need to communicate with their family and friends, and they also need cash to meet their immediate needs.

However, during these crises, radio and television systems may fail, and telecommunications network, Internet connectivity and power supplies may be disrupted. In such situations, the use of mobile phones 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 devices may still have some limitations, because the displaced may be lacking "know-your-customer(closing quotation mark) (KYC) documents. In such circumstances, electronic prepaid cards are useful (see Case Study 10).

Case Study 10. Oxfam and Visa Prepaid Cards in the Philippines

The global NGO, Oxfam, teamed up with Visa to deliver prepaid Visa cards to Filipinos displaced after Typhoon Haiyan in 2013. 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".

A monitoring survey revealed that beneficiaries used the prepaid card for cash withdrawal and purchase through points of sale. First-time prepaid card users reported 100 per cent success with their transactions.

Another NGO, Mercy Corps, launched the TabangKO ("My Help") programme, which successfully used a mobile banking platform to deliver emergency cash to Filipino households affected by Typhoon Haiyan. The programme also aimed to familiarize beneficiaries with financial products such as savings accounts. An evaluation of the programme provides insights into improvement of similar cash transfer programmes.

Sources: Amy O' Donnell and Maria Theresa Nina Espinola Abogado, "Oxfam and Visa team up for an innovative payment solution for disaster-affected communities", Oxfam Policy and Practice Blog, 12 May 2015. Available from http://policy-practice.oxfam.org.uk/blog/2015/05/oxfam-and-visa-team-up-for-innovative-payment-solution-for-disaster-affected-communities; and Meghann Rhynard-Geil, "Beyond meeting immediate needs: The impact of electronic cash transfer approaches on disaster recovery and financial inclusion", Mercy Corps, 26 May 2015. Available from https://www.mercycorps.org/research-resources/beyond-meeting-immediate-needs-impact-electronic-cash-transfer-approaches.

Migrants

Migrants 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. This is 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 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 and services en route, and reduce the risk of theft or loss of money because migrants no longer need to carry large sums of cash with them.

ICTs can also play an important role for migrants with fewer resources, particularly mobile phones, which are becoming increasingly affordable. Mobile phones are used by migrants to maintain ties with their families and communities at home, and access news from home.

Additionally, mobile phones are used for financial transactions and remittances. The interface between banking and mobile services has had a huge impact on the volume and speed of international remittances, and has significantly helped families cope with crises at home such as illness, birth or death.

Migrants contribute to websites, online discussion forums and social media sites by sharing information and experiences, providing insider knowledge on migration that is discrete and unofficial. Sometimes, a call for help is

transmitted through a helpline[81] 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.[82] Generally, social media has opened up new communication channels for migrants that can assist and ease the process of migration.[83]

While social media may help migrants, social media could potentially play a role in the recruitment of trafficking victims. Social media allows traffickers to access a greater number of victims and advertise their services over larger spatial distances. However, law enforcements are making use of big data from social media and other platforms to identify trafficking cases. Also, helplines, crowdsourcing and crowdmapping platforms have emerged for citizens to report and help identify traffickers.[84]

Something To Do

Find out how a marginalized group has used ICTs to improve its social and economic conditions. Write it up as a case study for inclusion in the national version of this module. See Case Studies 7, 8, 9 and 10 as examples.

To sum up:

- Three groups of people—indigenous peoples, displaced persons and migrants—are often taken for granted or assumed to be included—but there is evidence that they need special attention.
- Many indigenous peoples, displaced persons and migrants continue to suffer from marginalization and discrimination, extreme poverty, lack of political representation and participation, lack of access to social services, and other human rights violation.
- There are very few initiatives to address their needs, and the SDGs have made a special mention that attention needs to be paid.
- ICTs could help address their needs, particularly to communicate with family and friends, seek assistance during emergencies, and send and receive cash.

81 Jean Yves Hamel, "Information and Communication Technologies and Migration", UNDP Human Development Research Paper 2009/39, August 2009. Available from http://hdr.undp.org/sites/default/files/hdrp_2009_39.pdf.

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

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

84 See Child Helpline International. Available from https://www.childhelplineinternational.org; International Association of Internet Hotlines. Available from http://www.inhope.org; Internet Watch Foundation. Available from https://www.iwf.org.uk/; and Timo Luege, "Europol Turns to the Crowd to Identify Locations of Child Abuse", *Social Media for Good*, 2 June 2017. Available from http://sm4good.com/2017/06/02/europol-turns-to-the-crowd-to-identify-locations-of-child-abuse/.

4.3 Planet: Protect Our Ecosystems for All Societies and Our Children

Between 2005 and 2015, there were 1,625 reported disaster events in the Asia-Pacific region. Approximately 500,000 people lost their lives, around 1.4 billion people were affected, and there was USD 523 billion worth of economic damage.[85] South-East Asia, part of the earthquake-prone Pacific "Ring of Fire" has been the most disaster prone, while the subregion with the greatest economic damage has been East and North-East Asia. The number of people affected by disaster in the Pacific Island countries may be smaller in absolute numbers, but still represents a substantial size of their populations.

Goals 11 to 15 of the SDGs draw attention to the dangerous consequences that inequitable distribution of resources and unbridled exploitation of natural resources have created 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.

Goal 11. Make cities and human settlements inclusive, safe, resilient and sustainable

Goal 12. Ensure sustainable consumption and production patterns

Goal 13. Take urgent action to combat climate change and its impacts

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

Goal 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 examine 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 the last decade, especially after the 2004 Asian Tsunami, there has been extensive work in the effective use of ICTs in the four stages of disaster risk reduction (mitigation, preparedness, response and recovery).

For governments, ICTs enable better documentation and coordination of sectors and people, and at the same time, allow better engagement with the general public in interactive ways—by keeping them informed and by receiving critical information from them. For those affected by disasters, timely and relevant information enables preparedness.

85 ESCAP, *Asia Pacific Disaster Report: Executive Summary* (Bangkok, 2015). Available from http://www.unescap.org/sites/default/files/Executive%20summary%20.pdf.

A review of the presentations made at the ESCAP Conference on ICT for Promoting Inclusive and Disaster Resilient Development in May 2015,[86] reflects the range of activities in this area. Many countries have established, or are in the process of establishing, coherent national frameworks, encompassing policies, legislations, institutions, systems and processes for addressing issues of environment, disasters and climate change.

The 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, socioeconomic conditions, details about land-use patterns, vulnerability assessments, and geographic information systems (GIS) data, among others. Data and information about telecommunications and telecommunications density, channels of communication that public have access to, and the reach and credibility of such channels, are also needed.

In addition to databases managed by governments, the use of big data and big data analytics for monitoring changes, trends and needs are being explored. For communicating with citizens, mobile phones and social media are increasingly being used by governments, in addition to broadcast media such as television and radio.

Some illustrative cases in the composite area of environment, disasters and climate change are summarized below:

- In Bangladesh, the Department of Agricultural Extension in Fulbaria, Mymensingh developed a digital plant problems identification system that provides images of about 1,000 problems of 150 plants, and solutions to these problems. The system can be uploaded on a mobile device that agricultural extension officers can use to diagnose problems and provide recommendations to farmers. This system has also been introduced in farmers' schools and training courses on agriculture, and the government is planning to replicate it countrywide.[87]
- In India, The Karnataka State Natural Disaster Monitoring Centre provides real-time weather information, forecasts, early warnings, and advisories about natural disasters in the state. The organization deployed an ICT system that aggregates information coming from 6,000 rain gauges and more than 750 weather stations that transmit data every 15 minutes. This automated a system that was largely manual, and it now provides real-time visualization. The time it takes to generate reports decreased from 20 hours to 30 minutes. The web-based system allows public users to query and view the weather database.[88]
- In Mongolia, an Earthquake Disaster Warning System, comprising of a control tower, television and radio stations, siren towers, mobile control centre and a cell broadcast service is being implemented.[89]
- In Nepal, where agriculture is the mainstay of incomes in the central and southern region, an 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.
- The Tikiwiki GeoCMS project of the Secretariat of the Pacific Community Applied Geoscience and Technology Division (SOPAC) aimed to reduce the vulnerability of the Pacific Island countries to the adverse effects of climate change by making it possible for the Pacific Island countries to publish their geographical data for

86 ESCAP, "Workshop on ICT for Promoting Inclusive and Disaster Resilient Development", May 2015. Available from http://www.unescap.org/events/workshop-ict-promoting-inclusive-and-disaster-resilient-development.

87 UNDP Bangladesh, "Report of the Mid-Term Evaluation of the Access to Information – II Project (a2i)", November 2015.

88 Jack Dangermond, "Geographic information system driving digital transformation in India", *Livemint*, 19 May 2017. Available from http://www.livemint.com/Industry/bXjtTHHuWOTBZ2CZlWxEOJ/Geographic-information-system-driving-digitaltransformation.html.

89 ESCAP, *Building e-Resilience in Mongolia: Enhancing the Role of Information and Communications Technology for Disaster Risk Management* (Bangkok, 2016). Available from http://www.unescap.org/resources/building-e-resilience-mongolia-enhancing-role-information-and-communications-technology.

access and sharing over the Internet. Since 2010, SOPAC has been unifying its diverse spatial data collection under a standardized, secure and user-friendly system, with the goal of having a common platform that can be used for integrated planning and management across the Pacific Island countries.[90]

- In the Philippines, Rappler, a local news site developed Project Agos that combines social media analysis, crowdsourcing and a machine learning classifier. Agos will scan social media, including SMS sent to a unified number, for appeals for help and situation reports nationwide. It automatically analyses and plots the data on a web-based map so that local government officials and responders can visually identify areas in need of help and what exactly is needed.[91]
- In Sri Lanka, following 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 mass alert system. The network connects mobile subscribers, police stations, identified religious and social community centres, and the general public to a national emergency centre. DEWN is also available in Bangladesh, Lao PDR, Mongolia and the Philippines.[93]

Disaster information systems and 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 environmental disasters such as oil spills and nuclear contamination (especially in the Pacific Islands), as well as health disasters such as the avian flu.

Thus, cooperation is the key in coping with such disasters, and collaborative efforts such as the tsunami early warning system have the potential to be highly effective. Sentinel Asia[94] is a disaster management support group in the Asia-Pacific region that brings together 54 organizations from 22 countries and nine international organizations to share information on a digital platform.

Social media has been extensively used in the last decade to enable two-way communications between government and the general public at times of crisis. Examples include the following:

- In the aftermath of the 2015 Nepal earthquake, the Prime Minister's Relief Fund, the National Police and the National Emergency Operations Center created Twitter accounts to interact with citizens. Officials realized they have to interact with citizens about issues that matter and have been using these channels to address problems related to the recovery efforts.
- The National Institute for Disaster Management, Pakistan, has an active Facebook page for public communication.
- In 2012 the Government of the Philippines started to standardize the use of hashtags on social media to disseminate information and respond to urgent needs during disasters. The United Nations Office for the Coordination of Humanitarian Affairs built on the lessons gained in the Philippines to elevate this standard to the global level to promote more consistency across countries and disasters. This has helped responders reduce the amount of time needed to find relevant information.

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90 SOPAC, "Map and Spatial Data Repository". Available from http://gsd.spc.int/maps-and-spatial-data-repository.

91 Rappler, "#ProjectAgos: A call to action", 20 September 2013. Available from http://www.rappler.com/move-ph/39377-introducing-project-agos.

92 Olly Parsons, "DEWN, Dialog's Disaster and Emergency Warning Network", *GSMA*, 6 February 2015. Available from https://www.gsma.com/mobilefordevelopment/programme/disaster-response/dewn-dialogs-disaster-and-emergency-warning-network-2.

93 UNICEF, "Mobiles for Development", October 2010. Available from http://www.unicef.org/cbsc/files/Mobiles4DeReport.pdf.

94 Masahiko Honzawa, "Sentinel Asia: Asia Branch Activities", Japan Aerospace Exploration Agency, presentation. Available from http://unpan1.un.org/intradoc/groups/public/documents/APCITY/UNPAN025931.pdf.

There are other efforts that use ICTs to address the consequences of environmental degradation, disasters and climate change. 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, see the following APCICT resources:

- Module 9 of the Academy of ICT Essentials for Government Leaders module series on ICT for disaster risk management;
- Module 10 of the Academy of ICT Essentials for Government Leaders module series on ICT, climate change and green growth;
- Module 11 of the Academy of ICT Essentials for Government Leaders module series on the use of social media to tackle issues related to the environment, disasters and climate change (Sections 3 and 4); and
- ICTD Case Study 2 on ICT for Disaster Risk Reduction.[95]

To sum up:

- ICTs have a major role to play in addressing environmental issues, disaster risks and climate change.
- ICTs can enhance the monitoring and management of data and information, and improve the efficiency of systems, including early warning systems.
- ICTs can facilitate multi-sector and multi-stakeholder engagements, including vulnerable and marginalized communities.
- The use of mobiles phones, social media and big data analytics are increasingly being used to tackle complex challenges.

Something To Do

Identify one ICT-based natural resource or disaster risk management system that your country subscribes to or has developed. Describe it in detail and determine how it: (1) takes the interests of the poor into account; and (2) how resilience is built in, i.e., the ability of the system to resist, absorb and recover from the effects of a disaster. If it does not do so, what modifications would you make to the system?

95 APCICT, *ICT for Disaster Risk Reduction*, ICTD Case Study 2 (Incheon, 2010). Available from http://www.unapcict.org/ecohub/ict-for-disaster-risk-reduction-1.

4.4 Prosperity: Grow a Strong, Inclusive and Transformative Economy

As mentioned, the SDGs are essentially interlinked and are based on the integration of three pillars—economic, social and environmental sustainability, with three key elements in mind—inclusiveness, resilience and sustainability. "Prosperity" as a pathway to sustainable development, 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".[96]

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

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

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

Goal 10. Reduce inequalities within and among countries

It is argued here that the key to prosperity lies in economic security, which enables access to other social services such as education, health, equality and participation. Economic security is dependent upon access to economic resources. The focus in this section 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 main reasons 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".[97]

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".[98]

While the definition may vary,[99] it is widely agreed that inclusive finance does not only refer to "access" to finance. Rather, it embraces multiple layers of financial inclusion such as financial use, financial literacy, regulatory and monitoring framework, assessment of the enabling environment, and consumer protection.

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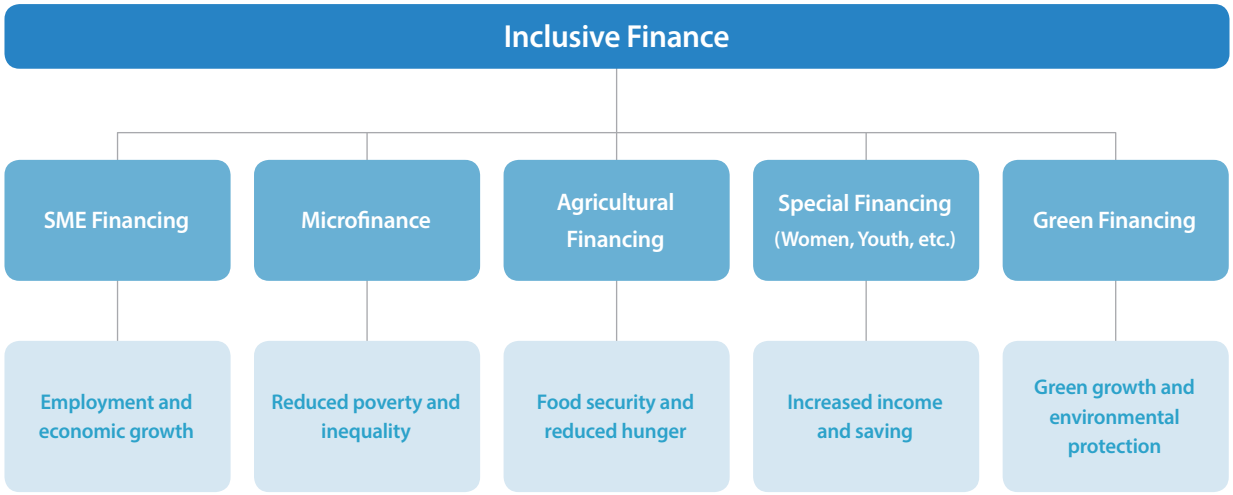
96 Asian Development Bank, "Knowledge Showcases: Information and Communication Technology for Prosperity", Issue 74, November 2016. Available from https://www.adb.org/sites/default/files/publication/213266/ict-prosperity.pdf.

97 United Nations Department of Economic and Social Affairs, "Financing for Development: Inclusive & Local Finance". Available from http://www.un.org/esa/ffd/topics/inclusive-finance.html.

98 Global Partnership for Financial Inclusion, "Global Standard-Setting Bodies and Financial Inclusion for the Poor", no date. Available from http://www.gpfi.org/sites/default/files/documents/CGAP.pdf.

99 The World Bank and IMF adopted a specific and measurable definition as: "the proportion of individuals and firms that use financial services", which focuses more on measuring actual use than providing the access. On the other hand, ESCAP 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".

Figure 4. Inclusive Finance at a Glance



Source: Md. Ezazul Islam, "Inclusive Finance in the Asia Pacific Region: Trends and Approaches", draft discussion paper presented at the Asia-Pacific High-Level Consultation on Financing for Development in Jakarta, Indonesia, on 29-30 April 2015. Available from https://www.unescap.org/sites/default/files/3-ESCAP_FfD_Financial%20inclusion_24April2015.pdf.

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

ICTs have enabled access to and the delivery of financial services. In particular, the rapid growth in mobile phone uptake has resulted in its innovative use to deliver financial services. ICTs have also enabled the provision and collection of KYC documentation required by financial institutions. Examples of increased access to financial services through ICTs include the following:

- Papua New Guinea's Nationwide Microbank launched MiCash, a service where users can access their bank accounts through their mobile phones to make or receive payments. The uptake within a few months from launch was relatively high—70 per cent of MiCash customers were not previous customers of Nationwide. To raise financial awareness and attract customers, Nationwide launched an extensive on-the-ground, face-to-face financial literacy initiative, reaching women in villages and plantations. As a result, women constitute 38 per cent of the MiCash customer base and tend to use it primarily for savings purposes.[100]
- Bangladesh Bank simplified KYC for mobile bank accounts and "no frills" bank accounts. Both accounts are drivers of financial inclusion.[101]
- The State Bank of Pakistan introduced a regulation for tiered-KYC requirements where accounts with higher transactions and balances require successively higher forms of identification and documentation. In June 2011, the State Bank of Pakistan 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 at

100 GSMA, "2014 State of the Industry: Mobile Financial Services for the Unbanked", 2014. Available from http://www.gsma.com/mobilefordevelopment/wp-content/uploads/2015/03/SOTIR_2014.pdf.

101 Alliance for Financial Inclusion, "Policy Frameworks to Support Women's Financial Inclusion", March 2016. Available from https://www.afi-global.org/sites/default/files/publications/2016-08/2016-02-womenfi.1_0.pdf.

home, work or local shop with his or her identification document. Citizens can open Level 0 accounts outside conventional bank branches, with the many agents of United Bank Limited.[102]

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

Transaction

Financial transactions that often entail going to a bank or financial institution to withdraw or deposit money, make payments or apply for loans can be simplified using digital solutions.

In recent years, many e-wallets, mobile money platforms and payment gateways have emerged. The problem with mobile financial services is that there is no global standard, which creates interoperability issues. This means users on one mobile network are not able to transact with users on a different mobile network. Moreover, the cost of digital transactions can be high.

India has attempted to address these challenges through its unified payment interface that allows users to transfer funds between any bank accounts using a mobile application on their smartphones. Transaction fees have also been waived.[103]

Post-transaction

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

For business, especially for financial services, digital finance expands the reach, thus brings in more business. It also enables the provision of customized and personalized services, while at the same time provides vast amounts of data for decision-making. For small businesses, going digital helps to access larger markets, makes supply chain management and accounting easier, and reduces the costs of doing business.

For the poor, digital finance has increased access to financial services, but much remains to be done in building their financial literacy and capabilities, and in ensuring that consumer protection and policies take the conditions and constraints of poor families in the informal economy into account.

Financial literacy and education comprises of four 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; and

102 Women's World Banking, "Digital Savings: The Keys to Women's Financial Inclusion?" 2015. Available from https://www.womensworldbanking.org/wp-content/uploads/2015/08/Digital-Savings-The-Key-to-Women%E2%80%99s-Financial-Inclusion_WomensWorldBanking.pdf.

103 Manojit Saha, "What is Unified Payment Interface", *The Hindu*, 26 August 2016. Available from http://www.thehindu.com/business/Economy/What-is-Unified-Payment-Interface/article14593189.ece.

- **Digital literacy** – The ability to use ICTs to access and use financial services safely, with awareness of the possible risks and ways to avoid them.

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 a digital financial inclusion initiative undertaken by the government in your country. Identify and write about the three stages—access, transaction and post—transaction.

4.5 Justice: Promote Safe and Peaceful Societies and Strong Institutions

In order to create a more humane world, and to enable the progress towards the other SDGs, the global community has charged itself with the commitment to SDG 16.

Goal 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, protect a country's culture and history, and promote peace and harmony are ways in which government can move towards building strong institutions.

4.5.1 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 provide a bird's eye view of some of the numerous e-government initiatives in the Asia-Pacific region.

The *United Nations E-Government Survey 2014*[104] defines e-government 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 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."

The *United Nations E-Government Survey 2016*[105] combines three indices to arrive at an E-Government Development Index-Online Services Index; Telecommunications Infrastructure Index; and Human Capital Index. Countries are ranked according to the overall E-Government Development Index, revealing varying trends in the subregions of

104 United Nations, *United Nations E-Government Survey 2014: E-Government for the Future We Want* (New York, 2014). Available from https://publicadministration.un.org/egovkb/en-us/Reports/UN-E-Government-Survey-2014.

105 United Nations, *United Nations E-Government Survey 2016: E-Government in Support of Sustainable Development* (New York, 2014). Available from https://publicadministration.un.org/egovkb/en-us/reports/un-e-government-survey-2016.

Asia and the Pacific. East Asian countries—Japan and the Republic of Korea are taking the lead in e-government. Many South Asian countries are moving ahead, but there is uneven development in South-East Asia with Singapore leading, and others just starting to embrace ICTs and e-government for development, e.g., Myanmar and Timor-Leste. Central Asia and the Pacific Island countries still fall short in terms of online services, infrastructure and human capital.[106]

The diversity of the Asia-Pacific region is reflected in the wide range of e-government activities taking place. A number of countries have already implemented one-stop shops for e-government services, and used websites and mobile applications to deliver taxation, customs, excise and consular services. A few examples showing the diversity of e-government activities are provided below:

- 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.
- In the Philippines, Mamamayan TXT-CSC[107] is an SMS-based service managed by the Civil Service Commission that allows citizens to send queries or lodge complaints on any government services.
- In Sri Lanka, by dialling 1919 using any phone, citizens can have access to all the services offered by the government in both Singhalese and Tamil, making the service easier and more efficient when dealing with government departments.
- In Vanuatu, the Government of Vanuatu and the United Nations Children's Fund (UNICEF) established a system to register births using mobile phones that can be sent to the Civil Registry database.[108]

These e-government services are examples of government-to-citizen services, and focus on the supply side. E-governance focuses on the demand side. It is important to note this distinction as we begin to explore the concept of e-governance.

106 United Nations Project Office on Governance, "2014 UN E-Government Survey and E-Government Indicators", presentation made at the ICT Regional Forum on Telecommunications/ICT Indicators in Bangkok, Thailand on 13-16 October 2014. Available from https://www.itu.int/en/ITU-D/Regional-Presence/AsiaPacific/Documents/Events/2014/October-MIS/Session3_UNPOG.pdf.

107 Emmanuel C. Lallana, "TXT CSC: SMS Service for the Philippines Civil Service Commission", *eGovernment for Development*, February 2004. Available from http://www.egov4dev.org/mgovernment/resources/case/txtcsc.shtml.http://www.egov4dev.org/mgovernment/resources/case/txtcsc.shtml.

108 UNICEF, "Mobiles for Development", October 2010. Available from http://www.unicef.org/cbsc/files/Mobiles4DeReport.pdf; and UNICEF, "Partnerships Lifting Birth Registration Numbers in Vanuatu", Child Protection Case Study, no date. Available from http://www.unicef.org/pacificislands/04_CASE_STUDY_Vanuatu_.pdf.

Something To Do

Stage 1	Stage 2	Stage 3	Stage 4
• Emerging information services • Web presence	• Enhanced information services • Simple two-way communication	• Transactional services • Services (financial and non-financial) available 24/7	• Connected services • Integration and citizen empowerment



The United Nations E-Government Survey is based on a four-stage model that start with a basic web presence (Stage 1), followed by simple two-way interactions between governments and citizens (Stage 2). In Stage 3, some of the services can be completed entirely online such as filing taxes online or applying for certificates, licenses and permits. In Stage 4, public services are well integrated online with one-stop platforms allowing access to a range of public services and increasing citizens' engagement in policy design and development.

Review this four-stage model. Analyse and place your country in the stage that you believe is appropriate. Then, list the steps that are needed to move your country to the next stage of development.

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. Good governance is the visible evidence of a situation where all government procedures and processes are easy and facilitative for the citizen, and are open for public scrutiny, allowing the media, citizen groups and civil society organizations to monitor government action or inaction.

E-governance is one of the most effective ways of combating corruption. E-voting, for example, can curb election-related anomalies. E-procurement is another example of how ICTs can help improve governance, and is today commonplace in many Asia-Pacific countries. Successful examples of e-procurement can be found in India and the Philippines.[109]

E-governance makes possible other forms of public engagement with government. Government websites and portals can include citizen charters that show the quality of service citizens can expect, including the time period for provision of various services. Government websites can host online discussions and online voting on specific issues, making decision-making participatory. Websites can also help concerned agencies track public grievances and complaints more effectively.

109 See eProcurement Platform for Andhra Pradesh and Telagana States, India. Available from http://www.eprocurement.gov.in/default.asp; and Philippine Government Electronic Procurement Service (PhilGEPS). Available from http://www.ps-philgeps.gov.ph/.

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 on how efficiently and effectively government is functioning. All of these can be done at a lower cost and with greater efficiency using ICTs. Through 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 has emerged in recent years as a set of 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, and enhanced citizen participation, and a platform for increased interagency collaboration.[110] Module 11 of the Academy of ICT Essentials for Government Leaders module series includes many case studies on governments' use of social media in Asia and the 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 has enabled and increased governments' engagement and interaction with citizens.

Something To Do

1. Visit the website http://ap.meeseva.gov.in/ and explore how this award-winning e-government service of India's Andhra Pradesh government can be replicated in your country context.
2. Select an e-government initiative from your own country and discuss what you consider to be its strengths and weaknesses. Where you identify any weaknesses, suggest how these can be addressed.

4.5.2 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 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 Tokyo Declaration[111] 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.

110 Emmanuel C. Lallana, *Module 11: Social Media for Development*, The Academy of ICT Essentials for Government Leaders Module Series (Incheon, APCICT/ESCAP, 2014). Available from http://www.unapcict.org/academy.

111 World Summit on the Information Society Asia-Pacific Regional Conference, "The Tokyo Declaration: The Asia-Pacific Perspective to the WSIS". Available from https://2001-2009.state.gov/documents/organization/16871.pdf.

In turn, the WSIS Commitment and Agenda for Action recognizes 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."[112]

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; and
- **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 access materials, archeological artefacts 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 and items. Reduced access to the original helps to protect them from loss or damage. The digital copy may serve 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.[113]

Following digitization, the use of ICTs to promote cultures and for rural tourism is another way of preserving cultural diversity, 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 created locally, 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 on 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.[114]

Web 2.0 applications provide new opportunities for the protection and promotion of local cultures. For instance, blogs and tweets about the experience of travelling in a country or destination help others better understand local cultures and make travel decisions. In earlier times, people's understanding of cultures was determined either by first-hand experience of travel or through media such as newspapers and television. 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 ICT tools, 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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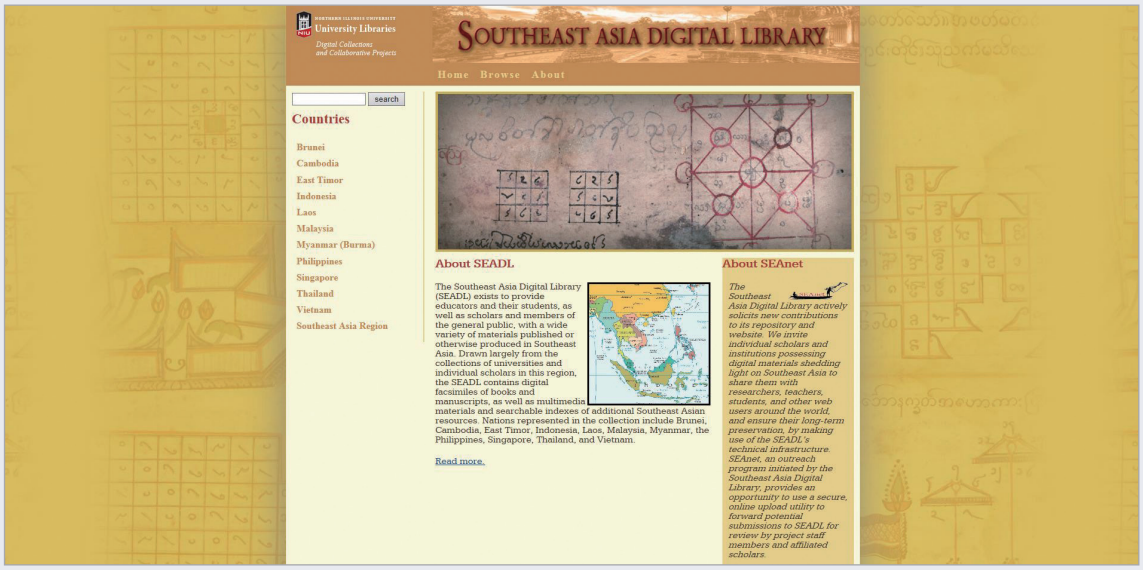
112 World Summit on the Information Society, Tunis Commitment, WSIS-05/TUNIS/DOC/7-E, 18 November 2005. Available from http://www.itu.int/wsis/docs2/tunis/off/7.html.

113 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, Philippines, 19-21 October 2005. Available from http://paarl.wikispaces.com/file/view/Digital_Initiatives_in_Archival_Preservation.pdf.

114 Roger Harris, "Tourism in Bario Sarawak: A Case Study of Pro-Poor Community-Based Tourism", *Asian Encounters*, 25 November 2009.

Case Study 11. Southeast Asia Digital Library

Eleven countries in South East Asia have come together to create a region-wide digital library that provides educators, students, scholars and the general public with a variety of materials published within the region. Materials include books and manuscripts, multimedia materials, and searchable indexes of South-East Asian resources.



Source: Southeast Asia Digital Library. Available from http://sea.lib.niu.edu/aboutseadl.

There are a number of efforts underway to preserve and promote cultures in the Asia-Pacific region. Among these initiatives are Mabbim, the umbrella body for the Malay language in South-East Asia, which is planning 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 has launched an initiative to boost Tamil language content and online tools on the Internet. A similar initiative has been launched by the Speak Mandarin campaign in Singapore. Local language web content initiatives have also been launched for developing country languages like Marathi. Moreover, dozens of websites promote local music.

Other examples include the Asia-Pacific Database on Intangible Cultural Heritage[115] and the Western Solomons Research Database.[116]

To sum up:

- The Tokyo Declaration and the WSIS Agenda for Action recognize that 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.

115 Asia/Pacific Cultural Centre for UNESCO, "Asia-Pacific Database on Intangible Cultural Heritage". Available from http://www.accu.or.jp/ich/en/index.html.

116 Western Solomons Research Database. Available from http://westernsolomons.uib.no/index.php.

- 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.

4.5.3 Peace

There can be no development without peace. It is as simple as that. Development 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 development progress 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 cannot create peace. But they can contribute to 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 is 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. Citizens have made use of ICTs, particularly mobile phones and social media, to advocate for change through non-violent means:

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

ICTs can be used in peacemaking efforts in several different ways:

- **Provide information** – Providing reliable and timely information, the use of ICTs can reduce the risk of rumours spurring negative attitudes and actions;
- **Help people process information** – Websites can help people to understand and process information;
- **Support relationships** – Social networking sites such as change.org help to build public opinion, through signature campaigns, on matters of social importance; and
- **Help people understand each other**.

A number of organizations are leveraging ICTs to promote peace:

- The ICT for Peace Foundation[117] 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.[118]

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117 ICT for Peace Foundation. Available from http://ict4peace.org.

118 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). Available from 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,[119] a service of the United Nations Office for the Coordination of Humanitarian Affairs (OCHA), is a hub for humanitarian information. It posts about 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. The website offers a "web feed" service to deliver customized content to users.
- Thomson Reuters Foundation News, formerly Alertnet,[120] covers stories that are often overlooked by mainstream media on humanitarian emergencies, as well as on issues related to women's rights, human trafficking and climate change. The stories are available free of charge to small media outlets and NGOs around the world.

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 ceasefire, 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.

The Groundviews website[121] is an online space for Sri Lankan citizens to highlight alternative perspectives on governance, human rights, the arts and literature, peace-building and other issues. The website shares stories about life in conflict zones, calls attention to humanitarian emergencies, and reports on violence, rights violations, corruption and other issues that are not featured in mainstream media.

Another initiative is Games for Peace[122] that aims to connect young people from conflict areas using multi-player online gaming events. It is a growing community of people who use popular commercial video games to counter negative stereotypes. The games allow people to connect and communicate, and promote conflict resolution.

ICT-supported campaigns to promote reconciliation can influence political leaders and promote information exchange and dialogue between local communities. Essentially, ICTs can create a space for dialogue and discussion that can propel the peace-building process forward.

To sum up:

- ICTs have been used in conflict prevention and management, peace operations, humanitarian relief and disaster assistance, and post-conflict peace-building and reconstruction.
- To promote peace, ICTs can be used to help people communicate, view information, make decisions and understand each other better.
- Multilateral agencies such as the United Nations, private sector institutions such as Reuters, and NGOs such as Youth Action for Change are using ICTs to promote peace.

119 ReliefWeb. Available from http://www.reliefweb.int.

120 Thomson Reuters Foundation News. Available from http://news.trust.org.

121 Groundviews, "About". Available from http://groundviews.org/about/

122 Games for Peace. Available from http://gamesforpeace.org/.

Something To Do

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).

Provide specific recommendations on how ICTs can be used to help resolve the conflict or 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 target audiences, and what are the target outcomes).

4.6 Partnership: Catalyze Global Solidarity for Sustainable Development

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

The sixth key element of the Sustainable Development Agenda is "partnership", represented in SDG 17.

Partnership was a key element of the MDGs (Goal 8), and is again emphasized in the SDGs, reflecting the recognition that these goals cannot be achieved without a sustained collaborative effort among all stakeholders.

Strategic alliances between government, business 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?

It is generally agreed that multi-stakeholder partnerships are essential in the planning and implementation of the SDGs at all levels—from global to the local levels. Biermann and others[123] describe three governance deficits where multi-stakeholder partnerships 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. Moreover, arriving at policy and strategy to implement the SDGs at the national level could benefit from multi-stakeholder collaborations at the global level. See Box 4 for an example of a global multi-stakeholder partnership to address gaps in data collection.

123 Frank Biermann and others, "Multi-stakeholder Partnerships for Sustainable Development: Does the Promise Hold?" Corporate Social Responsibility Paper 28.2007, December 2007, p. 3. Available from https://sustainabledevelopment.un.org/content/documents/1744ENI%20Foundation.pdf.

Box 4. Global Partnership for Sustainable Development Data

The Global Partnership for Sustainable Development Data 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.

Partners include international organizations, development banks, donor agencies, think tanks, private industry, global consulting firms, civil society organizations and NGOs.

Source: Global Partnership for Sustainable Development Data. Available from https://sustainabledevelopment.un.org/partnership/?p=9691.

The SDGs emphasize that partnerships need to focus on mobilizing and sharing knowledge, expertise, technology and financial resources. The Asia-Pacific Forum on Sustainable Development and the Asia-Pacific Urban Forum, both organized by ESCAP, are examples of regional platforms for sharing good practices and lessons learned, jointly reviewing progress, and providing support to countries with special needs.[124]

Partnerships at national levels would include similar kinds of partners as at the global and regional levels, except that their terms of reference would largely be confined to national boundaries. Strategic partnerships that include government, private sector and civil society organizations will be critical in the successful implementation of the 2030 Agenda for Sustainable Development.

As early as 2002, the Global Knowledge Partnership undertook six case studies to examine the nature of partnerships for ICTD interventions. Relevant even today, the key lessons emerging from the case studies include the following:[125]

- The importance of taking a strategic approach to developing design parameters for a partnership 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.

124 ESCAP, "Asia-Pacific Forum on Sustainable Development 2017". Available from http://www.unescap.org/events/apfsd4; and ESCAP, "Sixth Asia Pacific Urban Forum". Available from http://www.unescap.org/events/apuf6.

125 Global Knowledge Partnership, "Multistakeholder Partnerships: Issue Paper", 2002. Available from https://www.odi.org/sites/odi.org.uk/files/odi-assets/publications-opinion-files/2117.pdf.

More recent initiatives that are seeking to improve the effectiveness of multi-stakeholder partnerships for achieving the SDGs include the following:

- The Partnership Data for SDGs is a United Nations initiative that brings together a range of stakeholders committed to improving the transparency and accountability of multi-stakeholder partnerships and voluntary initiatives in their support to the SDGs. This includes the sharing of good practices and lessons learned on establishing and sustaining multi-stakeholder partnerships, and the review and monitoring of these partnerships.[126]
- The Small Island Developing States (SIDS) Partnership Framework aims to encourage, monitor and ensure the implementation of partnerships for the sustainable development of SIDS. The elements of the framework consist of a steering committee, organization of an annual multi-stakeholder SIDS partnership dialogue, a partnership reporting template for collecting progress updates from all active partnerships providing for both monitoring and accountability, and a platform for continuous dialogue and experience sharing.[127]
- The Pacific SDGs Roadmap, undertaken by the Pacific Islands Forum Secretariat, aims to provide a more strategic and integrated approach to the implementation of the SDGs at the national and regional levels, including the fostering of south-south cooperation and creation of an enabling environment for establishing partnerships in the region.[128]

Something To Do

Can you identify and describe one multi-stakeholder partnership working towards implementation of the SDGs 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 by sector, 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 impact upon the effectiveness of poverty alleviation efforts.

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.

126 United Nations Sustainable Development Knowledge Platform, "Partnership Data for SDGs". Available from https://sustainabledevelopment.un.org/sdinaction/pd4sdgs.

127 United Nations Sustainable Development Knowledge Platform, "SIDS Partnership Framework". Available from https://sustainabledevelopment.un.org/topics/partnerships/sidspartnershipframework.

128 ESCAP, "Developing Partnerships for the Sustainable Development Goals in support of the reviews of the High-level Political Forum - Asia and Pacific: Summary", 2016. Available from https://sustainabledevelopment.un.org/content/documents/12887Summary%20of%20the%20EGM%20on%20Partnerships.pdf.

Something To Do

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

5. ICTS, SUSTAINABLE DEVELOPMENT AND NATIONAL DEVELOPMENT POLICY AND PLANNING

This section aims to explore how ICTs can be integrated into national development plans to achieve the SDGs.

Towards the end of Section 2, discussion focused on what nations that have committed to the SDGs need to do to achieve the goals. In the SDGs, 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 how these aspirational and global targets should be incorporated into national planning processes, policies and strategies".[129]

To recap, countries need to:

- Develop national-level targets and implementation plans that take into account national priorities;
- Establish funding and delivery models, since resource mobilization to achieve the SDGs is seen largely as a national obligation. Every country must identify sources of financing;
- Identify and scale up innovations and new practices (e.g., through the use of mobile phones and various indigenous solutions) for greater effectiveness and maximum impact;
- Build effective partnerships between different stakeholders, including government, private sector and civil society organizations, to support large-scale programmes; and
- Set up a monitoring and evaluation system. Getting the right interventions to the right people at the right time is important. A dedicated well-funded, high-quality monitoring and evaluation system can enable transformations.

This section briefly discusses the intersection between ICTs and national development plans of action.

5.1 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 especially since ICTs serve as catalysts for both the supply and demand sides of development.[130]

129 United Nations, "Transforming our World: The 2030 Agenda for Sustainable Development" (A/RES/70/1), para 55. Available from https://sustainabledevelopment.un.org/content/documents/21252030%20Agenda%20for%20Sustainable%20Development%20web.pdf.

130 infoDev and ITU, "ICT Regulation Toolkit: Chapter 1.1 Context". Available from http://www.ictregulationtoolkit.org/toolkit/1.1; and UN News Centre, "UN report shows broadband potential for economic and social development", 6 June 2011. Available from http://www.un.org/apps/news/story.asp?NewsID=38623#.WdsFeTCTPIU.

There are two dimensions to the deployment of ICTs to support the achievement of the SDGs: (1) ICT policies; and (2) the inclusion of ICT expertise in all sectors and at all levels of policy, decision-making and implementation.[131]

The ITU carried out an extensive mapping of the ICTs, WSIS action lines and linkages to the SDGs.[132] The document that emerged shows clear connections between goals, the role of ICTs and sector-specific agencies engaged with each of the goals and targets.

5.1.1 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 a high-quality ICT infrastructure. This would include the following:

- Telecommunications penetration and broadband connectivity to all public facilities—urban and rural by 2020 so that ICT-enabled deployment of SDG programmes can be effectively provided;
- Effective use of universal service obligation funds[133] to extend reach and access;
- Relevant ICT training for all public officials and service providers on a regular and continuous basis to orient and update knowledge and applications in this rapidly-evolving sector;
- 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;
- Promotion and deployment of public-private partnerships and hybrid-domain partnerships, such as social enterprises as part of corporate social responsibility; and
- Deployment of an ICT-based SDG information system that connects public services, public facilities, the business sector and the public.

India offers an example of how ICTs can be integrated and aligned to address the SDGs (see Case Study 12).

131 Earth Institute and Ericsson, "How Information and Communications Technology can Achieve the Sustainable Development Goals", no date. Available from https://www.ericsson.com/res/docs/2015/ict-and-sdg-interim-report.pdf.

132 ITU, "WSIS-SDG Matrix: Linking WSIS Action Lines with Sustainable Development Goals", 2015. Available from https://www.itu.int/net4/wsis/sdg/Content/Documents/wsis-sdg_matrix_document.pdf.

133 The fund is established by national governments to promote universal access to telecommunication services. They financially motivate telecommunication service operators to provide service in locations that would not be commercially viable otherwise. Initially, the funds' focus has been on providing basic telecommunication services to unserved and underserved areas. But as countries formulate their national broadband strategies, the role of these funds has shifted to the building of the broadband infrastructure and providing universal broadband access. See ESCAP, "The Impact of Universal Service Funds on Fixed-Broadband Deployment and Internet Adoption in Asia and the Pacific", Asia-Pacific Information Superhighway Working Paper Series, October 2017. Available from http://www.unescap.org/resources/impact-universal-service-funds-fixed-broadband-deployment-and-internet-adoption-asia-and.

Case Study 12. India Aligning ICTs to SDGs

Digital India is India's technology solution to infrastructure and service delivery bottlenecks. It aims to provide the necessary tools to ensure the equitable delivery of service and benefits to citizens.

It aligns ICT policies with the SDGs, and rests on nine pillars as follows:

1. Broadband highways
2. Universal access to mobile connectivity
3. Public Internet access
4. E Governance – Reforming government through technology
5. E Kranti – Electronic delivery of services
6. Information for all
7. Electronic manufacturing
8. IT for jobs
9. Early harvest programmes

The government proposes to use "Aadhar" the unique digital identity system for all citizens as the foundational backbone to address the requirements of different social and economic groups, and provide targeted and beneficiary-specific services.

Source: Premjit Lal, "Digital India and GCCS 2017", presentation made at the Side Event to the Asia Pacific for Sustainable Development, in Bangkok, Thailand, on 29-31 March 2017.

5.1.2 Engagement with Other Sectors

For ICTs to be deployed effectively to address the SDGs, it is absolutely necessary that experts, and the ministries and officials dealing with ICTs be an integral part of national and local development planning processes from the initial stage as vital stakeholders. This would allow the ICT Ministry to understand what is needed, and ensure that the ICT policy and infrastructure plans are aligned with the development plans of the government. It is not necessary to put the technologists ahead of decision-making; at the same time, bringing the ICT sector after policies are made and plans are in place could be counterproductive.

The role of the chief information officers (CIOs) and chief technology officers (CTOs) within the context of the SDGs assumes importance as their role shifts from the traditional management of the ICT infrastructure, procurements and governance, to being key strategists in a development team. As part of the team working to integrate SDGs into national development plans, the CIO or CTO must be able to:

- Identify challenges, risks and opportunities of including ICTs in the strategic planning process;
- Advise on strategic ICT choices among the many options available; and
- Monitor and propose mid-course corrective actions.

The CIO or CTO becomes a key member of the national plan to integrate the SDGs into national development policies and plans of the government.

This section has largely explored specific ways in which the SDGs 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 not 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:

- Any changes that need to take place to align your country's national development plan with the SDGs; and
- The role of ICTs in helping your country achieve the SDGs..

To sum up:

Effective use of ICTs to address the SDGs needs action at both the national and subnational levels. Since the goals are complex and require a merging of economic, social and environmental aspects while also ensuring inclusivity and equity, the following is necessary:

- A multistage approach so that the benefits cascade down to the last mile.
- The harmonization of national policies and plans, and engagement with multiple stakeholders.
- The CIO of the government plays a greater and more proactive role in ICTD policymaking and implementation.
- The CIO's role shifts from merely being a technology officer to being one who is involved in all aspects of national development policy, planning and implementation.

6. KEY ISSUES IN THE USE OF ICTS FOR DEVELOPMENT

This section aims to:

- Discuss the main factors that determine the success or failure of ICTD programmes and projects;
- Conclude the discussion on 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 module series.

One of the most damaging statistics in public sector ICTD is the number of failed ICTD projects. According to some sources, over 70 per cent of ICT projects have failed.[134] 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? There seems to be a clear consensus among experts that factors determining the success or failure of projects are often not technology-related but are people-related. These factors include, lack of vision and strategy, poor project management, poor change management, dominance of politics and self-interest, lack of requisite competencies, and technological incompatibilities.[135] Whatever the causes, it is important to recognize that in ICTD projects, there are even more issues-many relating to the understanding and use of ICTs to achieve 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. If the public and private sectors 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, best described as the "hybrid domain"[136] by Aoyama and Parthasarathy.

The hybrid domain refers to an emerging institutional form that overlaps public and private interests, where states, corporations and civil society develop common agendas and goals despite the differences in their primary objectives. The use of ICTs to address the SDGs calls for technical expertise alongside knowledge of social behaviour. The institutional form that emerges to tackle a social problem using high levels of technical expertise found mostly in the private sector, e.g., the IT and IT-enabled service industry, is unlike what is found in either public or private sector individually. Hence, the term hybrid domain.

134 Tim Rainey, "Why do so many public sector ICT projects fail?", *publicservice.co.uk*, 25 April 2007; and Richard Heeks, "Success and Failure Rates of eGovernment in Developing/Transitional Countries: Overview", e-Government for Development, Institute for Development Policy and Management, University of Management, 19 October 2008. Available from http://www.egov4dev.org/success/sfrates.shtml.

135 Richard Heeks, "eGovernment for Development: Success and Failure in eGovernment Projects", Institute for Development Policy and Management, University of Manchester, 19 October 2008. Available from http://www.egov4dev.org/success/evaluation/factormodel.shtml.

136 Yoko Aoyama and Balaji Parthasarathy, *The Rise of the Hybrid Domain: Collaborative Governance for Social Innovation* (Edward Elgar Publishing, 2016), p. 99.

6.1 ICTD Policy

Most governments in the Asia-Pacific region have an ICT policy and the necessary legislation in place that regard ICT as a "critical infrastructure" enabling both economic and social development. Most countries also have a national development plan or policy in place—one that lays out the road map for achieving human development goals. The questions to ask are the following:

- Does the ICT policy have "development" as a stated or implicit perspective?
- Does the development policy have a clear place for ICTs 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 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.[137] 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, often do not 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 countries wish to leverage the unprecedented opportunities for development arising from strategic use of ICTs.

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 and civil society organizations, are essential in ICTD policymaking, planning and implementation.

To promote and facilitate such partnerships, governments can create favourable policy and regulatory environments, provide a common fund for the development of underserved locations (e.g., universal service obligation fund), commit to e-government, and strengthen national capacity towards 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, which are extensively discussed in Module 8 of the Academy of ICT Essentials for Government Leaders module series, can be of many types—from simple participation in the development of ICT 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 benefits of such partnerships include increased efficiency in the execution of

137 Anita Gurumurthy and Parminder Jeet Singh, "Political Economy of the Information Society: A Southern View", *Instituto del Tercer Mundo*, 2005, p. 18. Available from http://wsispapers.choike.org/papers/eng/itfc_political_economy_is.pdf.

projects, reduced risk for the public sector and the stimulation of innovation in the provision of public services. The partnerships' greater efficiency allows government funds to be redirected to other important socioeconomic areas.

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 a quick return on investment. 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 Aoyama and Parthasarathy call social innovations or social enterprises—ones that bring together the practices of the private sector to specifically address social goals.[138]

It is important to recognize that ICT-based interventions are inherently different from conventional ones. In several Asia-Pacific countries, regulatory and pricing mechanisms control what technologies can be used for, and what content is delivered over these technologies. Policy frameworks also tend towards 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 needs of ICT-based programmes and projects are addressed.[139] Module 2 of the Academy of ICT Essentials for Government Leaders module series 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.

138 Yoko Aoyama and Balaji Parthasarathy, *The Rise of the Hybrid Domain: Collaborative Governance for Social Innovation* (Edward Elgar Publishing, 2016), p. 99.

139 Usha Vyasulu Reddi and Rukmini Vemraju, "Using ICTs to bridge the digital divide", in *Gender in the Information Society*, Anita Gurumurthy and others, eds. (UNDP-APDIP and Elsevier, 2006).

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)?

6.2 Planning ICTD Interventions

Module 7 of the Academy of ICT Essentials for Government Leaders module series explores ICTD Project Management extensively. The purpose here is to introduce some elements of planning that are unique to ICTD programmes and projects.

ICTD programmes and projects could be ICT-driven or ICT-supported. The ICT-driven approach is based on the assumption that access to timely and relevant information through ICTs will promote economic growth as it provides opportunities to generate income. For example, initiatives such as telecentres offering access to online marketing tools are favoured because they offer the opportunity for small businesses to promote goods and improve sales.

The ICT-supported approach first clarifies the development goal that the project seeks to address, works out the information and communication needs, then looks at cost-effective ways of using ICTs to address the goals and 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) developed a framework and checklist for the design of ICTD projects that brings clarity to the planning process, as follows:[140]

- Why? – Is the ICTD project aimed clearly at achieving a specific development goal?
- Who? – Is there a clearly specified target audience that the project is aimed at?
- How? – Is the form of ICT to be deployed appropriate in terms of cost, support, maintenance and compatibility with existing information flows?
- How? – Is the form of ICT to be deployed scalable to enable it to be replicated and expanded?
- How? – Are appropriate intermediaries being used?
- How? – What scope is there for public-private partnerships?
- What? – Is the content transmitted by the ICT relevant to the target audience and is it in a language easily understood by the audience?

140 Richard Curtain, *Information and Communications Technologies and Development: Help or Hindrance?* (Canberra, AusAID, 2004), p. 29.

- How long? –- Is the project self-sustaining and over what period?
- How well? – What performance measurement, monitoring and evaluation processes are in place?
- What risks? – What unexpected events or situations might arise? What should be done to manage these?

Addressing the questions above in consultation with all partners and stakeholders should help project managers avoid the pitfalls that have led to the failure of many ICTD projects. Some further lessons learned and good practices include the following:

- ICTD initiatives should be explicit about their development goals and expected outcomes, with clear links to the SDGs. The value of creating clear links is that it makes it possible to exclude interventions that do not contribute to the goals. It 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.
- ICTD initiatives should be demand driven 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. A large number of projects fail because they follow a top-down approach to development without adequate attention to local contexts and needs.
- ICTD initiatives 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, the computer hardware and software elements, and the security systems are critical and should depend on local conditions, rather than what is available in technology-rich cities and locations. Modules 4, 5 and 6 of the Academy of ICT Essentials for Government Leaders module series discuss these issues in more detail.
- A strong political commitment to ICTD from the government is required. Such a commitment must be backed by a budgetary allocation that is adequate both in quantity and in the nature of its distribution.
- Where resources are limited, multi-stakeholder partnerships can lessen the burden of everyone involved. By ensuring multi-stakeholder partnerships, the government can shift its 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 likely to create a win-win situation for all.
- Most development projects, especially if they are donor-funded, operate with fixed targets and fixed time frames. While these are planning constraints, it 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. This often means that by the time the project starts to show dividends, the fixed time frame is over, donor support is withdrawn and the project is seen to have failed because it did not meet the target objectives.[141]

141 Glen Farrell, *ICT and Literacy: Who Benefits? – Experience from Zambia and India* (Vancouver, Commonwealth of Learning, 2004). Available from https://www.col.org/resources/ict-and-literacy-who-benefits-experience-zambia-and-india.

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

6.3 Needs Assessment and Baseline Studies

Often, beneficiary groups and their needs are determined from outside the community, and ICT platform decisions are made without taking into account ground realities. As a result, such needs 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.

The various needs that should be assessed include the following:

- Felt or manifested needs that are directly perceived and expressed by the beneficiary group;
- Unfelt or latent needs that are important and require attention, but unexpressed because the beneficiary group does not understand them or does not perceive them as important (e.g., safe water, soil pathogens, telecommunications and connectivity);
- Real needs or constraints to development that the beneficiary group is aware of and understands as important, but are unexpressed due to various constraints (e.g., inadequate infrastructure, lack of facilities, poor political priorities);
- Social and cultural needs, values and norms of the beneficiary group that would support or inhibit the introduction of the initiative; and
- Communication needs of the beneficiary group, including the types of information that the group seeks, the media platforms that the group uses, and the extent to which the group trusts the different media platforms.

The purpose of baseline studies is to establish benchmarks against which to monitor and assess progress and effectiveness during and after various interventions to achieve the SDGs. Baseline data needs to be carefully collected and should include comprehensive profiles of the beneficiary group, with indicators closely related to the planned intervention. For instance, knowing the income level of the beneficiary group can help project managers determine if a service is to be provided free or charged. Or, knowing the literacy levels and the number of people with feature phones versus smartphones can help determine if delivery should be through SMS, an IVR system, a mobile application, or a combination of traditional and social media.

Needs assessment should also include financial needs and costs and how these 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 cross-sectoral goals.

6.4 Technology Issues and Challenges

Needs assessments and baseline data can help determine technology choices. The following factors should be considered:

- **Reach vs. access** – The reach of any technology is not the same as its access. More than half of the world's mobile phones are in the Asia-Pacific region. But when multiple connections for the same individual are factored in, the penetration rate of mobile phones in South Asia alone is only around 36 per cent. Then, when the type of device and the speed of connectivity are also considered, the number of subscriptions and connections for those with smartphones and broadband (3G or 4G) are even lower.[142] A study conducted by the Singapore Internet Research Centre in four countries—Indonesia, Myanmar, Philippines and Viet Nam—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-related information across the four countries. Variations in Internet and mobile phone access has limited the extent to which social media has been helpful during crises.[143]
- **Ownership and control** – Access is determined by patterns of ownership and control. If there is one phone in the family, the question is who can access it? When the beneficiaries of an ICTD project are women, it would be important to know if they own and control the chosen technology, and in what ways they have access to it.
- **Technology driven vs. people driven** – Choosing a 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 audience or society".[144] It is the latter choice that is important.
- **Cost** – This includes the cost of technology development, deployment, delivery and receipt by the beneficiary. Different technologies have different development and deployment costs. A mobile application may be cheaper than a website or an IVR system 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, because it is often necessary to deliver messages through multiple channels for maximum success. Cost also has to be considered in the context of constant technology evolution and improvement, including the need for re-engineering and regular upgrades.

6.5 Content Issues and Challenges

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

142 GSMA, "The Mobile Economy 2015", 2015. Available from https://gsmaintelligence.com/research/?file=08bd184710b7e671e80cfe6693cead2d&download.

143 Chih-Hui Lai, Arul Chib and Rich Ling, "State of the Use of Mobile Technologies for Disaster Preparedness in South East Asia: Report to Global Disaster Preparedness Center, American Red Cross", March 2015. Available from http://www.sirc.ntu.edu.sg/Publications/Documents/LaiChibLing2015_State_of_the_use_of_mobile_technologies_for_disaster_pre%20%20%20%20(2).pdf.

144 Sonia Livingstone, "New media, new audiences?" *New Media and Society*, vol. 1, no. 1 (1999), pp. 59-66. Available from http://eprints.lse.ac.uk/archive/00000391/.

A common concern raised by ICTD specialists in developing country contexts and projects is the lack of locally relevant content in local languages. Globally, there are over 7,000 living languages, and 50 per cent of these are from the Asia-Pacific region.[145] A large number are still not present on the Internet-87 per cent of the websites are in just ten languages.[146] According to the latest data from W3Techs, about 52 per cent of the websites are in English.[147] Yet, only an estimated 10 per cent of Asia's population can understand English.

When there is content, however, it is often protected by copyrights and intellectual property laws, and is not freely available.

Thus, there are many challenges that need to be addressed in the areas of content and language within the Asia-Pacific context. In developing content, key considerations include the following:

- Understand the target audience. Through needs assessments, gather socioeconomic, linguistic and cultural profiles, as well as their information and communication needs;
- Involve the community in creating content to improve relevance, as well as sustainability of the content development effort. Consider gender relations when involving the community in content development. Women and men have different needs and technology preferences;
- Involve the target audience in designing and testing the content structure to ensure that it is user-friendly and accessible, particularly for persons with disabilities;
- Encourage, promote and facilitate interactivity and feedback and ensure that a mechanism is in place to correct and modify content;
- Put in place a mechanism for the regular review and update of content, as well as its localization, customization and translation, if required; and
- Develop a support system for content creation, including the provision of training and learning materials, and the presence of facilitators or trainers to assist users in content creation.

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

145 Ethnologue. Available from https://www.ethnologue.com/.

146 W3Techs, "Usage of content language for websites". Available from https://w3techs.com/technologies/overview/content_language/all.

147 Ibid.

6.6 Other Challenges in ICTD

ICTD projects run into difficulties for many other reasons. For instance:

- Divergence between the project goals of the managers and those of the target audience 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; and
- 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.[148]

Many of these issues are discussed in Module 7 of the Academy of ICT Essentials for Government Leaders module series.

6.6.1 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.

At the same time, there have been many small ICTD initiatives that are locally friendly, responsive to the community and problem-sensitive. 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 the United Nations Development Programme 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."[149]

Scale is also an issue especially in small, low and sparse population countries. Economies of scale enable countries like China and India to optimize results simply on the basis that the higher the number of users, the lower the per unit 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.

148 Richard Heeks, "Failure, Success and Improvisation of Information Systems Projects in Developing Countries", Development Informatics Working Paper Series, Paper No. 11, Institute for Development Policy and Management, University of Manchester, 2002. Available from http://unpan1.un.org/intradoc/groups/public/documents/NISPAcee/UNPAN015601.pdf.

149 Roger Harris and Rajesh Rajora, "ICTs for Governance and Poverty Alleviation in India", UNDP-APDIP, 2003.

6.6.2 Human Capacity Building

Human capacity building is an essential element for effective use of ICTD. The ICTD skills required for different groups of people may vary, but without building up 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, ICT 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 sustained, institutional building approach to enhance the core competencies in ICTD. A combination of needs assessments, institutional partnerships and relevant training materials, including their testing and 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.[150]

6.6.3 Partnership Building

A recurrent theme in this module has been the importance of involving different stakeholders in ICTD interventions. This is because different sets of knowledge, skills and competencies rest with different groups of stakeholders. 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.

Findings from research and impact studies into ICTD projects have revealed the following key factors that limit the success of ICTD projects:[151]

- **Skill factors** – Different partners tend to have unrealistic expectations of local skills and knowledge on a variety of topics including ICT 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.
- **Sociocultural factors** – Differences in the working ethos and styles of the partners.

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150 See APCICT, *ICT Human Capacity Building for Development, ICTD Case Study 1* (Incheon, 2010). Available from http://www.unapcict.org/ecohub/ict-human-capacity-building-for-development-3.

151 A.J.Gilbert Silvius, Anand Sheombar and Jakobus Smit, "The Partnership Health of ICT Projects in Developing Countries", 2009. Available from http://mmu.academia.edu/AnandSheombar/Papers/327670/The_Partnership_Health_of_ICT_Projects_In_Developing_Countries.

- **Systems factors** – Difficulties in agreeing on a common vision and mission for the project when multiple partners with different expectations and interests are involved.
- **Trust factors** – Absence of trust between partners and promising more than can be delivered.

Key lessons learned from an extensive survey of ICTD partnerships include the importance of having the following:[152]

- Clear focus in terms of shared goals and alignment of objectives;
- Formal structure of partnership agreements and clearly defined roles and responsibilities;
- Accountability;
- Ownership;
- Ethical frameworks;
- Willingness to adapt to changing conditions;
- Leadership;
- Team building;
- Mutual understanding and respect; and
- Deep understanding of the project conditions and local contexts—political, social and technological.

6.7 ICTD Project Evaluation

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 data and 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.

The search for accurate and reliable data and 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 programme or project are commonly part of a development monitoring and evaluation process.

Box 5. Proposed ICT Indicators

The Partnership on Measuring ICT for Development, an initiative of 14 multilateral organizations of the United Nations, World Bank, Organisation for Economic Co-operation and Development, and other groups, has worked towards developing ICT indicators to help track the SDG targets in a harmonized manner.

152 Marije Geldof and others, "What are the key lessons of ICT4D partnerships for poverty reduction? Systematic Review Report", February 2011. Available from http://www.gg.rhul.ac.uk/ict4d/workingpapers/DFID_ICT_SR_Final_Report.pdf.

Among the 232 SDG indicators however, only seven are ICT indicators covering six targets of four of the SDGs. Yet, ICTs are recognized as a key development enabler. The important role that ICTs play in achieving the SDGs has also been stressed by the ICT community, including WSIS, the Commission on Science and Technology for Development and the United Nations Group on the Information Society. It is therefore important that all areas where ICTs play a role are measured and monitored.

With this in mind, the Partnership on Measuring ICT for Development has established a Task Group on ICT for the SDGs to propose a thematic list of ICT indicators that could be used to measure ICT availability and use in sectors relevant to the SDGs that are not covered in the global SDG indicators framework. The Task Group will further aim to improve the availability of disaggregated data.

Source: ITU, "Partnership on Measuring ICT for Development". Available from http://www.itu.int/en/ITU-D/Statistics/Pages/intlcoop/partnership/post2015.aspx.

An important point to note about the indicators is that they are quantifiable measures (e.g., teledensity and number of subscribers). They do not provide the qualitative aspects of a project's success or failure, and do not yield insights into what works, what does not and why. Monitoring and evaluation aim to capture both quantitative and qualitative aspects.

The monitoring and evaluation of ICTD programmes and projects are important and are conducted for the following reasons:

- To know if an ICTD solution succeeded or failed to achieve its objectives;
- As a planning tool, 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;
- To assess whether an ICTD solution is financially and socially sustainable in the long run;
- To establish whether investment in an ICTD solution is worth the expenditure; and
- To examine the intended and unintended impacts of the ICTD solution.

Development evaluation is a broad and multifaceted concept. It is as complex a process as the development project it seeks to evaluate. There are various stages in an evaluation of programmes or projects. 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 design. Feed forward studies, pilot or prototype testing, and resource mapping are some of the elements of formative evaluation.
- **Process evaluation or monitoring** is the ongoing and frequent assessment of ongoing activities in the programme or project. Process evaluation aims to assess the performance of a project, check that the project is on track, and ensure 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 is defined as, "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."[153]

Following a summative evaluation, 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.

Box 6. Gender Evaluation Methodology

The 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), 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.

For example, in Bangladesh, a country where one in every two males accesses information online yet only three in a hundred women do, GEM found that access for schoolgirls is not just about the availability of computers and classes. For girls, it requires the support of the entire community and flexible school schedules.

Sources: Gender Evaluation Methodology for Internet and ICTs: A Learning Tool for Change and Empowerment. Available from http://www.genderevaluation.net/; and author's own use of GEM in evaluation of ICTD projects.

Evaluation of ICTD programmes and projects brings additional complexities. 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. These are areas where there is very little information, and which must be collected and preserved.

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

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 audiences, 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 checklist for ICTD projects developed by AusAID to evaluate the programme (see Section 6.2).

Finally, on the basis of what you determine to be the programme's limitations, suggest ways of improving the programme.

7. SUMMARY

This 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 towards accelerating the pace of sustainable development in developing countries of Asia-Pacific. Specifically, it focuses on the linkage between SDGs and ICTs.

Following an introduction in Section 1, Section 2 introduces the discussions that preceded the adoption of the SDGs in September 2015, drawing attention to its key pillars—humanity, resilience and sustainability.

Section 3 looks at the ICT landscape in 2016, identifying not so much technologies, but processes that are currently in place.

Section 4 explores the use of ICTs in specific SDGs by describing key elements and cases that are good practice. Cases selected are from the Asia-Pacific region.

Section 5 describes, in brief, the process of national policy development and its alignment with the SDGs and the concept of "smartness" in planning and in technology.

Section 6 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.

NOTES FOR TRAINERS

The purpose of these "Notes for Trainers" is 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 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. The module can also be presented, in whole or in part, in different modes, face-to-face or online.

Case 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 Sections 2 and 3 of the module for a general understanding of the SDGs and ICT applications in development, including a detailed explanation of a relevant case study.

For policymakers working in a particular development sector: An overview of Section 2 and the relevant sector from Section 4, including a detailed explanation of a case study from the relevant sector.

For project management staff: Sections 5 and 6, which look into the challenges of using ICTs in development, along with a detailed explanation of a case study from Section 4.

For a three-hour session

For policymakers: A broad summary of Sections 2 to 4, and a detailed explanation of a relevant case study followed by a practical group exercise of 1½ hours on policy analysis or design.

For project management staff: A broad summary of relevant development sectors from Section 4 and a detailed presentation of Sections 5 and 6, followed by a practical group exercise on 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)

Use six one-hour sessions and design the content progressively starting with Section 1 and progressing to Section 6. Use the same pedagogical approach described above.

For a three-day session

About half a day could be spent on Sections 2 and 3 of the module.

A day and a half could be spent on Section 4 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 Sections 5 and 6 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 Sections 5 and 6, 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 Sections 2 and 3 of the module. Half a day could be spent on exploring progress on the SDGs, and on establishing the intersectoral 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 SDGs covered in Section 4, 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 Sections 5 and 6 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 a combination of lecture, 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 in the Further Reading section, 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.

FURTHER READING

About the SDGs

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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.
Analytics	The systematic computational analysis of data or statistics.
Application Programming Interface	A set of subroutine definitions, protocols and tools for building application software.
Asynchronous	Not synchronized or coordinated in time.
Audio-graphics	Computer-based technology that enables simultaneous transmission of voice, data and graphic images.
Big data	Extremely large data sets that may be analysed computationally to reveal patterns, trends and associations, especially relating to human behaviour and interactions.
Broadband	Telecommunications in which a wide band of frequencies is available to transmit information.
Cloud computing	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.
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.
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 online browsing).

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.
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.
Digital divide	The gap between individuals and societies with the resources to participate in the knowledge economy and those without such resources.
E-commerce	The buying and selling of goods and services through the Internet, especially the World Wide Web.
E-KYC	An electronic Know Your Customer system used by banks and financial institutions.
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.
Email	A store-and-forward method of composing, sending, storing and receiving messages.
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.
Hashtag	A word or phrase preceded by a hash sign (#), used on social media sites and applications, especially Twitter, to identify messages on a specific topic.
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, it is the dialogue that occurs between a human being (or possibly another live creature) and a computer program.

Internet of Things	The interconnection via the Internet of computing devices embedded in everyday objects, enabling them to send and receive data.
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.
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.
SMS	Short message service, a service for sending text messages on a cellular telephone system.
Teleconferencing (asynchronous)	A computer-based conference where the different participants, who are at different locations, need not be online at the same time.
Teleconferencing (synchronous)	A computer-based conference where the different participants, who are at different locations, must be online at the same time.
Teledensity	A term commonly used to describe the number of telephone lines per some unit of the population (often per 100 people).
Wi-Fi	A facility allowing computers, smartphones, or other devices to connect to the Internet or communicate with one another wirelessly within a particular area.

APCICT/ESCAP

The Asian and Pacific Training Centre for Information and Communication Technology for Development (APCICT) is a regional institute of the Economic and Social Commission for Asia and the Pacific (ESCAP). APCICT aims to strengthen the efforts of the member countries of ESCAP to use ICT in their socioeconomic development through human and institutional capacity-building. 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.

APCICT is located at Incheon, Republic of Korea.

http://www.unapcict.org

ESCAP

The Economic and Social Commission for Asia and Pacific (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 socioeconomic challenges in a globalizing world. The ESCAP office is located at Bangkok, Thailand.

http://www.unescap.org

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