

Sustainable Development Solutions Network

Report Part Title: Introduction: ICT and the SDGs

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Report Author(s): The Earth Institute, Columbia University and Ericsson

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Introduction: ICT and the SDGs

The new Sustainable Development Goals (SDGs), set out a shared global agenda for human development that is fair, inclusive and sustainable. Far more ambitious than the Millennium Development Goals, they call for several bold breakthroughs by the year 2030, including the end of extreme poverty (SDG 1) and hunger (SDG 2), universal health coverage (SDG 3), universal secondary education (SDG 4), universal access to modern energy services (SDG 7), sustainable cities (SDG 11), combating climate change (SDG 13), and protecting marine (SDG 14) and terrestrial (SDG 15) ecosystems.¹⁰

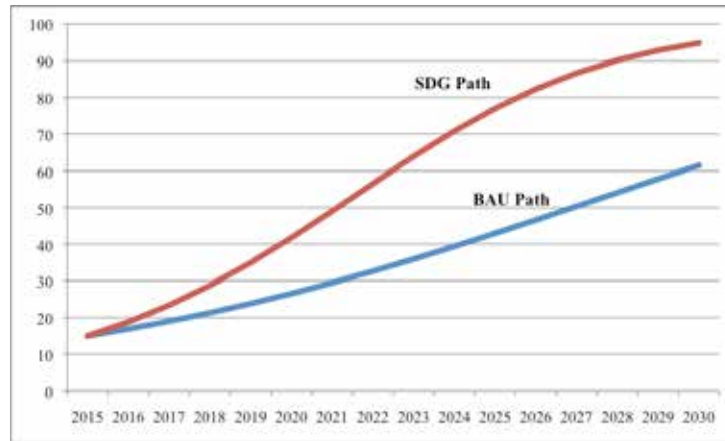
Meeting these 'stretch' goals will require a transformation of societies far deeper and faster than in the past—a rate of change that continued economic growth in a Business-As-Usual (BAU) context simply cannot deliver. To succeed, the SDGs must embed the values that underpin inclusive transparent societies and rapidly leverage innovative policies, technologies, services and solutions with vastly improved reach to meet ambitious global targets while ensuring no-one is left behind.

Information and communication technology (ICT) is an existing and widely deployed technology that can be mobilized to step up the pace and scale of transformation. The central role ICT can play in delivering innovative, integrated, cross-sectoral sustainable development outcomes has been highlighted by the UN Broadband Commission for Sustainable Development.¹¹ In a series of reports, the Broadband Commission has made a strong case for harnessing the transformational potential of ICT and broadband as a means of implementation for the SDGs. Not only can ICT deliver innovation, connectivity, productivity and efficiency gains across many sectors, it can strengthen resilience of critical infrastructure and help to overcome social and economic exclusion.¹²

Beyond Business-As-Usual

Many of the SDGs call for the economy to reach *universal* coverage of some core service by 2030, e.g. healthcare (SDG 3), pre-primary up to secondary education (SDG 4), access to safe water and sanitation (SDG 6), and access to reliable electricity (SDG 7). In most low-income countries, a Business-as-Usual (BAU) path will not be sufficient to achieve these universal coverage goals by the target date of 2030. As illustrated in Figure 1, the BAU path will support partial achievement of the goals but will not deliver full achievement. The path to universal coverage must be accelerated, as shown by the SDG path in Figure 1. ICT-based solutions can be central to that acceleration if governments, universities and the private sector work in partnership towards this goal.

Figure 1. Comparison of BAU and SDG Paths



In this figure, two hypothetical pathways towards 2030 are illustrated, with 'Years' on the x-axis and 'Percent Achievement of Universal Coverage Goals' on the y-axis. Theoretically, the Business-As-Usual (BAU) path will support partial achievement of the goals and the SDG path will fully achieve the goals.

Why ICT, why now?

ICT can be a crucial enabler in helping to achieve the SDGs, particularly in today's low-income countries where closing the development gap requires substantial effort, innovation and investment. In its infancy during the MDGs, mobile broadband is a rapidly evolving, 'leapfrog' technology now reaching maturity. In 2000, there were 700 million mobile subscriptions; today there are 7 billion.¹³ Mobile broadband offers staggering gains in accessibility, scalability and affordability that can enable countries to close multiple development gaps at record speed,¹⁴ without the outlay of traditional infrastructure.¹⁵

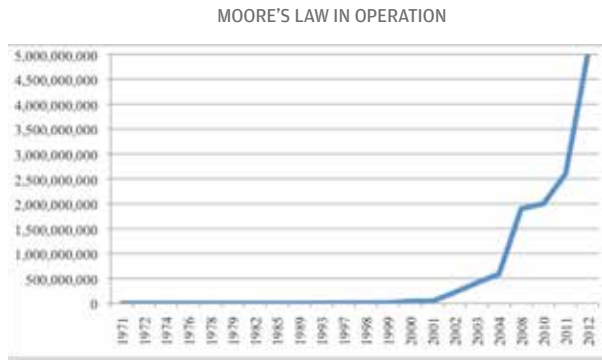
By 2021, over 90 percent of the world's population will be covered by mobile broadband networks.

Source: Ericsson Mobility Report 2015

Figure 2. The Sustainable Development Goals



Figure 3. The Transistor Count on Intel Microprocessors, 1971-2012 (based on Intel data¹⁶)



ICT has experienced the fastest global diffusion in history, with the time taken for the global public to adopt ICT-based applications such as mobile phones, computers, the Internet and social media outstripping any previous technology.

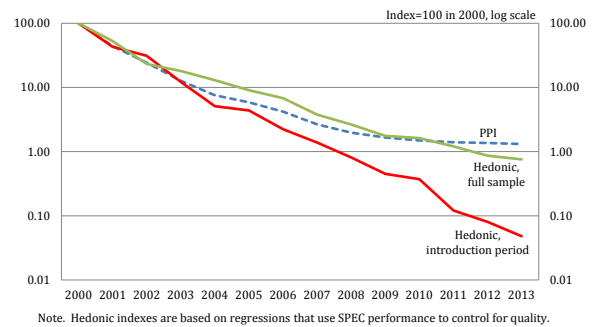
Thanks to Moore's Law—the doubling every two years of the number of transistors in a dense integrated circuit¹⁸—ICT has given rise to The Information Age, the fifth great technological age. Since the onset of the Industrial Revolution, each new wave of technology has provided a major impulse to global economic development (Figure 3). ICT has spurred global economic growth for the past three decades, but its greatest gains are yet to be achieved and are expected to pave the way for the Age of Sustainable Development—a sixth great wave of sustainable technologies that will make achievement of the SDGs possible.

Mobile connectivity has been able to scale at this pace due to the industry focus on global standards, interoperability and other factors. This has led to dramatic economies of scale, falling handset prices, etc., which has improved affordability.

The resulting surge in microprocessor performance and sharp decrease in unit cost has also contributed to high productivity growth in the ICT industry and rapid diffusion of ICT products.

Today there is near universal uptake of mobile telephony—mobile subscriptions in Africa have gone from almost no subscribers in 2000 to around 950 million today and by 2021, over 90 percent of the world's population will be covered by mobile broadband networks.¹⁹ This global shift towards what Ericsson has termed the 'Networked Society' brings unprece-

Figure 4. Price Index for Microprocessor Units (MPU), quality adjusted¹⁷



dent opportunities to address global sustainable development challenges as ICT drives disruptive change across every sector of society.

Already, mobile phones are enabling dramatic breakthroughs in e-finance and e-health, overcoming longstanding gaps in access to facilities such as bank branches and clinics. In many parts of the world, ICT is transforming cost-intensive public services and paving the way for advances in e-commerce, governance, trade and transportation. Future advances in ICT—mobile broadband, the Internet of Things (IoT), robotics and artificial intelligence, 3-D printing, and others—will provide the tools for additional, unprecedented advances in healthcare, education²⁰, agriculture, energy services and environmental monitoring and protection.

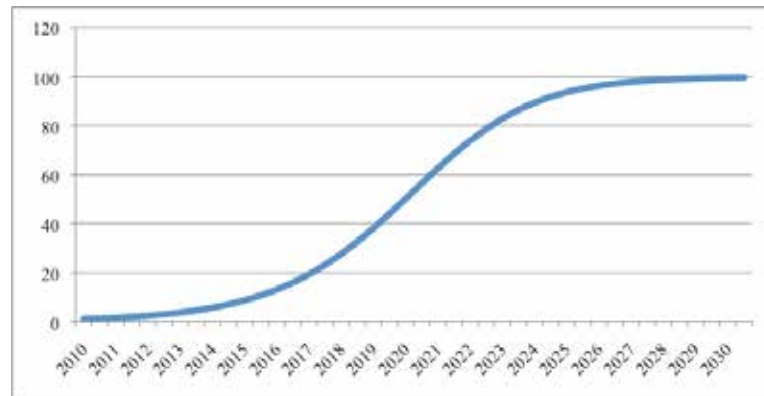
A rapid diffusion technology

Uptake or diffusion of a technology or service (such as electrification, secondary-level education, or primary health coverage) typically follows an S-shaped curve as in Figure 5. Use or penetration starts at a very low level and initially increases only gradually. After some time, uptake accelerates. As the coverage rate approaches 100 percent, growth will slow again and finally come to a halt when coverage is complete.

In the case of ICT, not only has its own diffusion S-curve been extraordinarily steep, but it has the potential to increase the rate of diffusion in other aspects of the economy too.

In short, ICT has the power to bring about a digital transformation of society as a whole. Specifically, it has extraordinary potential to *increase the rate of diffusion* of a very wide range of technologies, applications and platforms. Key areas in which technology and service diffusion can be accelerated via ICT include healthcare, education, financial services, energy and fighting climate change. Accelerated uptake of ICT-

Figure 5. Illustrative S-Shaped Technology Diffusion Curve



based services across these sectors will be key to achieving the SDGs by their target date of 2030.

Particularly in low-income countries, where a BAU path will not deliver universal coverage goals by 2030, together with the finance, frameworks, partnerships and policies recommended by the UN Broadband Commission Task Force on Sustainable Development, ICT can be a critical catalyst for rapid uptake of the innovative solutions needed to put the world on the SDG path and meet the goals.²¹

The speed of diffusion of mobile telephony and now mobile broadband reflects certain critical characteristics of ICT technologies, including: (1) their rapidly declining costs; (2) business models that enable access of poor households to the technologies; (3) the remarkable range of low-cost or free applications; (4) the relative ease of building the hardware backbone (e.g. fiber network) and (5) the ability of wireless broadband to reach the 'last mile' through microwave transmission rather than physical cable.

Five ways that ICT can help

ICT can dramatically boost the uptake of SDG-supporting technology and services in five major ways:

1. Speed and scale of ICT uptake

As noted above, ICT itself diffuses with remarkable speed and at a global scale; the digital transformation has already begun. Mobile subscriptions went from a few tens of thousands in 1980 to over 7.4 billion subscriptions in 2015. Facebook users went from zero in 2004—the year the platform was launched—to 1.5 billion users in mid-2015. According to projections by Ericsson Mobility Report²², mobile broadband (3G or above) will cover more than 90 percent of the world's population and go from

Mobile subscriptions went from a few tens of thousands in 1980 to over 7.4 billion subscriptions in 2015.

Source: Ericsson Mobility Report, November, 2015

almost one billion subscribers in 2010 to 7.7 billion subscriptions by 2021. Smartphones will grow from near-zero subscriptions in 1999, when NTT DoCoMo introduced the first smartphone, to around 6.4 billion subscriptions by 2021. Piggybacking on ICT's staggering ability to scale will help with widespread inclusion and reaching the 'last mile'.

2. Reduced deployment costs

ICT can also markedly reduce the cost of deploying new services. In healthcare, for example, ICT makes possible a greatly expanded role for low-cost Community Health Workers (CHWs), enabling a large number of diagnoses and treatments to be made at community level during CHW visits rather than by doctors at high-cost facilities. In education, ICT enables students to access quality online teaching even when no qualified teachers are locally available. Online finance allows individuals to obtain banking services even in regions where no banks are present. These simple examples show how ICT is introducing vital services for the first time in low-income countries. Similarly in high-income countries, cost savings from ICT are already disrupting major sectors across the economy, enabling rapid, pervasive change.

3. Growth of public awareness

ICT can dramatically speed up public awareness of new services and technologies and therefore the demand and readiness for these. In the past, information on new technologies spread by word of mouth, local demonstration,

and gradual scale-up of government programs and services. Now, with torrents of information flowing in real time through the Internet, social media, mobile communications and other e-channels, information travels instantly around the globe, bar in the handful of societies isolated by closed regimes. News, music, fashion, fads and new technologies ricochet around the world in days, not decades, making it easier to reach more people in a shorter timeframe.

4) Rapid upgrade rate

National and global information networks enable rapid innovation and upgrading through new applications. All new technologies go through a learning curve during which they evolve incrementally through each generation of improvement. Every phase is marked in principle by lower costs, greater resilience, easier use, and wider applicability. ICT is speeding up these generational cycles. Global information flows are enhanced and technology developers are much more attuned to advances in other parts of the world. There is a trend towards many ICT applications becoming open-source—or at least interoperable—which enables gains made by a developer in one part of the world to be picked up and built on by others on the other side of the globe, accelerating the whole process of technology upgrade. The growing speed of the global innovation cycle is shortening the duration of each technology generation, especially for ICT-based solutions, meaning progress happens faster.

5) Low-cost digital training

The final way that ICT can accelerate technology diffusion is by providing low-cost online platforms for training workers, students and others in these new technologies. The revolution of Massive Open Online Courses (MOOCs), for example, enables students anywhere to gain free access to high-quality university courses, including courses in design and use of ICT. Special training materials are also being delivered conveniently over smart phones, tablets, laptops and other devices. Deploying multiple channels for training materials makes it easier to provide workers with real-time, in-service training that does not disrupt work schedules but integrates training into the work itself. In this way, ICT-hosted training modules and courses provide a means to train millions of workers, especially young and under-employed workers, in the uses of new ICT applications for SDG-oriented service delivery.

Lessons from key SDG focus areas

To illustrate the potential of ICT to drive and accelerate progress on the SDGs beyond Business-As-Usual (BAU), this report summarizes lessons to date. Broadband is a key enabling infrastructure for all aspects of the economy

and to illustrate how, this report explores the future outlook for four key SDG focus areas: health, education, financial services, and energy and climate change. In each case ICT offers potential for widespread, accelerated uptake by:

- reducing the unit costs of service delivery;
- expanding the range of services that can be offered;
- economizing on scarce resources (ICT can be used to upskill local workers, who can be trained online rather than having to send a trainer to a physical location; and
- accelerating institutional learning through online communities.

In general, the case studies in this report point to an exciting future. Many of the breakthroughs needed for the SDGs are already in operation, albeit on a very small scale. The good news is that ICT, by its very nature, makes rapid scale-up of today's demos to tomorrow's national programs both feasible and realistic.

The case studies also highlight the many practical hurdles to effective large-scale implementation of state-of-the-art e-health, m-health, m-commerce, e-education and smart energy and transportation services, where:

- public sector regulations do not yet enable full utilization of ICT;
- numerous small, fragmented demonstration projects need to be successfully scaled into national-scale programs with business models addressing urban and rural areas;
- the physical infrastructure for wireless broadband needs rapid expansion and upgrading, especially to public facilities like schools and clinics;
- the various components of an ICT-based system need to be interoperable across several competing platforms;
- significant training of personnel is required to manage the new systems; and
- incubation of new ICT start-ups capable of providing locally appropriate services needs to be nurtured under public-private partnerships.

Creating an enabling environment

Fulfilling the SDGs calls for multi-sectoral partnerships, as described in SDG 17, and governments, investors, academic institutions, businesses and citizens need to collaborate and prepare for ICT-enabled transformation to a Networked Society. While private-sector applications of ICT have soared, many of the challenges of sustainable development—health, education, infrastructure and environmental sustainability—require a deep role for policymakers and the public sector to drive progress by 2030.

Governments and policymakers have a special responsibility to ensure that ICT is included in urban and rural planning as a basic infrastructure and that key public-sector agencies, institutions and policy frameworks are reformed to support ICT-enabled transformation. Many government processes—payments, tax collection, procurement, training, human resources, program design, public deliberation, information management, analytics, legislative drafting, even voting—should be upgraded with the transformative capability of ICT in focus. Institutional quality will increasingly be defined by how effectively entities fulfill the vision of the SDGs by adopting cutting-edge solutions that facilitate provision, transparency, openness and efficiency, as well as high throughput of public services. In a fully Networked Society, more efficient, cost-effective ICT-enabled services and transactions will lead to the transformation of skills and the creation of new jobs. Ensuring that no-one is left behind will be critical in this period of transformation.

To harness ICT effectively for the 2030 Agenda and move away from Business-As-Usual, governments need to ensure that the entire public sector, including service delivery in health, education, energy, and infrastructure, is fully supported by high-quality ICT infrastructure. This could include:

- Promoting ICT as a basic infrastructure in urban and rural planning and investment
- Broadband connectivity of all public facilities by 2020.
- ICT training of all relevant public officials and service providers.
- ICT-based delivery systems for healthcare, education and infrastructure.
- Deployment of the Internet of Things (remote sensing and control of connected devices) for public infrastructure and environmental management.
- Encouragement of universities to scale up education and incubation of ICT solutions, including through partnerships with the business sector.
- Public-Private Partnerships (PPP) for ICT-enabled systems.
- Adoption of state-of-the-art indicators and real-time data collection to track progress against the SDGs.

At the epicenter of the societal transformation process, national governments and policymakers have a key role to play in ensuring effective uptake and adoption of ICT. Without supportive government policy, the private sector cannot drive rapid growth of ICT at scale. Governments are accountable for the policies and legislative framework governing the deployment of ICT. They oversee land use, allocation of spectrum, right-of-way for fiber and other infrastructure, and the tax and regulatory policies that will ultimately determine the

speed of rollout of the ICT backbone and access networks, the flourishing of service providers, and the uptake of ICT-based solutions in essential public services as well as efficient governmental funding systems.

Against a backdrop of pressing global challenges, an ambitious global development agenda, and rapid ICT-enabled transformation, standing still is the biggest enemy. Technology has evolved much more rapidly than policy, underscoring the need to close the gap, so that the technology can be fully leveraged. From this perspective, policymakers need to act rapidly to address the issues and challenges identified in Chapter 9, and mobilize the investment, policies, technology and partnerships needed to drive national collective action in line with the conclusions and recommendations in Chapter 10 and Chapter 11.²³ With the right frameworks and policies in place, ICT can help deliver the transformative change the world needs to meet our ambitious shared development goals and ensure no-one is left behind.