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Report on the progress made in the implementation of the outcomes of the WSIS during the past 20 years

Background paper for WSIS+20 discussion

Unedited Draft
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PREFACE

The World Summit on the Information Society (WSIS) was held in two phases, in 2003 and 2005. Its *Geneva Declaration of Principles* declared the common desire of governments and other stakeholders 'to build a people-centred, inclusive and development-oriented Information Society' that would enable individuals, communities and people to achieve their full potential, facilitate sustainable development and fulfil human rights.[1] Since 2005, while technology and services have evolved and the Information Society has moved from aspiration to reality, the outcome documents from WSIS have underpinned subsequent international agreements on digital development, including the *Global Digital Compact* adopted alongside the United Nations' *Pact for the Future* in 2024.[2]

The *Tunis Agenda for the Information Society*, which concluded WSIS, gave responsibility for the system-wide review of WSIS to the UN's Economic and Social Council (ECOSOC), and invited the UN General Assembly to undertake an overall review of implementation of WSIS outcomes in 2015.[3] That 2015 review reaffirmed the WSIS principles and called for a further review by the Assembly in 2025.[4]

The Commission on Science and Technology for Development (CSTD) has conducted annual reviews of WSIS implementation on behalf of ECOSOC since 2005,[5] and published an extensive systematic report on WSIS implementation as a major contribution to the General Assembly review in 2015.[6]

This new report, commissioned by CSTD in 2024, has been prepared as a contribution to the twenty-year review to be conducted by the Assembly in 2025. As anticipated by CSTD five years ago,[7] it looks at the issues to be explored in the review through two lenses: the first (primarily in Chapters 1 and 2) focused on experience since WSIS, the second (primarily in Chapter 3) focused on trends and priorities identified today that will affect the future evolution of the Information Society and its relationship with other aspects of sustainable development and human rights. It draws, in doing so, on the extensive work which CSTD has undertaken over the past two decades, wide-ranging literature from UN and other international sources, independent reports, and extensive consultation with governments, international organisations and other stakeholders.

INTRODUCTION

Overview

In November 2005, the international community gathered in Tunis for the second and final session of the World Summit on the Information Society (WSIS). That gathering concluded a process, begun at the ITU Plenipotentiary Conference in 1998, to build global understanding of the growing importance of information and communication technologies (ICTs) in many aspects of economy and society.

WSIS established a vision of 'a people-centred, inclusive and development-oriented Information Society, where everyone can create, access, utilize and share information and knowledge,' built around sustainable development and human rights.[8]

Enormous change has taken place in information and communication technologies (ICTs) since the Summit. Technologies that were in their infancy at the beginning of the 21st century have become mainstream, and in some cases already been displaced by later innovations. Mobile telephony has become geographically pervasive, while the Internet and online social networks have become important to the lives of majorities in many countries. Digitalisation has had major impacts on economies, public services and governance. Successive waves of new technologies, now including artificial intelligence (AI), have emerged, offering new opportunities and posing unexpected challenges for governments, businesses and individuals as expectations of the Information Society have rapidly evolved. The pace of technological development and the scope and scale of its impact on economy, society, culture and governance are accelerating.

These changes have not, however, been equally distributed. The digital divides between and within countries that were identified at WSIS have continued to inhibit economic and social development and constrain the opportunities that ICTs can bring to individuals and communities. The goal of universal connectivity that has been embraced by the international community is still some distance from achievement, and inequalities in digital access and use increasingly feed into other international and intranational inequalities. Digitalisation has also brought with it new challenges to governance, development and rights, such as those concerned with cybersecurity, data governance and environmental impact.

These digital developments have not taken place in isolation. The international community's adoption in 2015 of the *2030 Agenda for Sustainable Development*, including its wide-ranging and substantive Sustainable Development Goals (SDGs), marked a new phase in international commitments to development that encompassed economic, social and environmental goals. The world has also experienced two global crises since the Summit – economic recession in 2007-2009 and the COVID-19 pandemic in 2020-2022 – the latter of which set back progress towards the SDGs. Poverty, hunger and inequality continue to blight the lives of many. New conflicts have erupted in several world regions. The impact of climate change has become more apparent; efforts to curtail it yet more urgent. While funding for international development rose in the years up to 2023,[9] it has come under increasing pressure. The need to revitalise international cooperation in the face of these challenges is encapsulated in the United Nations' *Pact for the Future* which was adopted by the General Assembly in 2024.[10]

The Information Society that has evolved since WSIS needs to be considered in the context of these wider international developments. Its importance is reflected in the central role it is now

called on to play in achieving the SDGs, and in the *Global Digital Compact*, addressing further opportunities and risks associated with digitalisation, that was adopted alongside the *Pact for the Future*.[11]

Many of the aspirations expressed at WSIS have now been realised, and some exceeded. Others remain unfulfilled. The Information Society has become reality for many, particularly in developed countries, but remains a distant prospect for others, particularly in Least Developed Countries (LDCs). Its growth has created opportunities for human development but also raised new, often unanticipated, threats to security, the environment and social welfare. These achievements and developments to date, and the opportunities and challenges arising for the future, are the theme of this report.

WSIS outcomes

The World Summit on the Information Society was held in two phases, in Geneva in November 2003 and Tunis in December 2005. The first phase concluded with adoption of the *Geneva Declaration of Principles* and the *Geneva Plan of Action*, which focused on the development potential of ICTs and established a framework of Action Lines concerned with eleven areas of ICT policy and development. It also identified ten broad targets for connectivity over the period to 2015.[12] The second phase adopted the *Tunis Commitment* and *Tunis Agenda for the Information Society*, which focused on financing mechanisms, Internet governance and the monitoring and assessment of WSIS outcomes.[13] These four documents established an international consensus of global goals for digital development that has informed all subsequent international agreements up to and including the *Global Digital Compact* adopted by the General Assembly in 2024.

They have also provided a framework for annual consideration and review of progress in different areas of ICT development, with the involvement of all stakeholders. The Action Lines adopted in the *Tunis Plan of Action* are reviewed at the annual WSIS Forum, while the Internet Governance Forum (IGF) provides a unique annual space for discussion of Internet-related issues. Both are multistakeholder gatherings that draw together expertise from Governments, international organisations, the private sector, civil society, academia and relevant technical and professional communities. An inter-agency UN Group on the Information Society (UNGIS) was established to encourage inter-agency cooperation, alongside a Partnership on Measuring ICT for Development supported by international organisations within and beyond the UN family. It was agreed that the Secretary-General should prepare an annual report on the implementation of WSIS outcomes, which supports the task of system-wide follow-up that was entrusted to CSTD.

WSIS' outcomes were systematically reviewed by the General Assembly in 2015, drawing on discussion fora and reports organised and prepared by UN entities including ITU, UNESCO and CSTD. In this WSIS+10 review, the General Assembly reaffirmed the vision of 'a people-centred, inclusive and development-oriented Information society,' the Action Lines and other implementation mechanisms established at the Summit – including the IGF, whose mandate was extended for ten years – and 'the value and principles of multi-stakeholder cooperation and engagement' that had been adopted there. It determined that a further review should take place in 2025 and recommended that this should also be a contribution to the 2030 review of the *Agenda for Sustainable Development* which includes the SDGs.[14]

The structure of this report

This report is divided into three main chapters. These draw on evidence from discussions at meetings of CSTD, from the wide range of literature published on the Information Society since WSIS, particularly that from entities within the UN family, and from the consultation processes undertaken by CSTD and other UN entities ahead of the WSIS+20 review. These included an open consultation process undertaken by the CSTD Secretariat during 2023 and 2024, as well as an open questionnaire which received more than 180 responses from international organisations, governments, business associations, civil society organisations and research institutes; detailed written contributions from UN entities and other organisations with responsibilities for WSIS implementation; and observations by Action Line facilitators. Regional consultation meetings were held in conjunction with four of the five UN Regional Commissions during 2024, at the global IGF and UNCTAD eWeek in 2023, and at the European Dialogue on Internet Governance (EuroDIG) in 2024. CSTD also organised expert discussion groups to extend assessment of five specific aspects of the Information Society, which illustrate wider digital development and priorities for the future. These were concerned with e-government, the digital economy, the environment, gender and women's rights and children's rights and welfare.

Chapter 1 describes some of the most significant changes that have taken place in digital technology and services, in the ICT sector and the digital economy. These changes have been driven by rapid advances in technology and entrepreneurial vigour on the part of businesses and have been influenced by the enabling framework for innovation and digital governance that emerged from WSIS and other developments in international relations, sustainable development and the global economy.

Chapter 2 describes the spread of these technologies and services within the world community and considers the extent to which the Information Society that has evolved since WSIS has fulfilled the goals set out in the WSIS outcome documents. It assesses developments in each of the Action Line areas and other processes agreed at WSIS in six main sections concerned with digital inclusion, the digital ecosystem, the digital economy, sustainable development, human rights, and digital governance.

Chapter 3 considers some further opportunities and challenges facing the Information Society today and into the future, the priorities identified by United Nations entities and other stakeholders in consultation inputs and wider literature, and the relationship between WSIS, the GDC and SDGs.

A concluding chapter reviews the evolution of the WSIS framework in the light of developments described in the report.

Many different aspects of the Information Society are discussed in this report. Any discussion of these shows that they are highly interconnected. In order to facilitate use of the report on a selective basis and for reference purposes, each chapter and each section within each chapter has been written so that it can be read on a stand-alone basis, reiterating points that are made in other sections where necessary rather than relying on cross-referencing.

CHAPTER 1

THE DEVELOPMENT OF INFORMATION TECHNOLOGY AND SERVICES SINCE WSIS

The outcome documents of WSIS were concerned with ways in which technology might support the building of a 'people-centred, inclusive and development-oriented Information Society.' How that Information Society might be established and what it might contain are constantly evolving.

Chapter 1 of this report is concerned with the development of information technology and services since the Summit. Many of the innovations in technology and services that excited delegates at the Summit in 2003 and 2005 have become pervasive or been superseded by further innovations in the subsequent two decades. Projected impacts that were then mere aspirations have since become realities, while successive waves of innovation have led to new technologies and services that were unanticipated at the Summit, greatly extending the scope of digital development and the opportunities that it has made available to countries, communities and individuals. Many of these have contributed positively to achieving and exceeding Summit goals while others have proved challenging or controversial. This Part of the report begins with an overview of the context within which these developments and the implementation of WSIS outcomes have taken place and then briefly summarises the main changes in digital technology and services that have affected implementation of those outcomes.

The international context for digital development

The two decades since WSIS have seen major changes in the global agenda for development, built around the Sustainable Development Goals (SDGs), which were adopted by the United Nations in 2015 in its *2030 Agenda for Sustainable Development*[15] as successors to the Millennium Development Goals (MDGs) that framed development approaches from 2000 to 2015.[16] Although the SDGs do not include a separate Goal concerned with ICTs, the *Agenda* recognised that the spread of these technologies had 'great potential to accelerate human progress'[17] while SDG9 specifically called on the international community to increase access to ICTs, aspiring to achieve 'universal and affordable access' in LDCs by 2020.[18] ITU has subsequently maintained a matrix that draws together WSIS Action Lines and SDGs.[19]

Rapid growth in the pervasiveness and capabilities of digital technologies has greatly increased their significance to sustainable development since 2015. Their potential to 'fast-forward progress' was emphasised in a compilation of reports by UN agencies and programmes published by ITU in 2017[20] and has been repeatedly reinforced in later years. The *Global Digital Compact*, adopted by the General Assembly in 2024, begins with the assertion that digital technologies 'hold out the promise of accelerating the achievement of the Sustainable Development Goals.'[21]

Two global crises have affected progress towards achieving sustainable development and WSIS goals since the Summit. The financial crisis of 2007-2009 held back progress towards achievement of the MDGs and adversely affected investment in digital infrastructure across the globe.[22] The COVID pandemic of 2020-2022 likewise set back progress towards the SDGs,[23] though its impact on digital development was more complex as governments, businesses and individuals turned to digital technology to overcome the constraints on physical activity imposed through lockdowns.[24] In the longer term, their role in recovery from both crises is thought to have accelerated the growing importance of ICTs within the world economy.[25]

Other trends in global affairs have influenced the context for both sustainable and digital development, reinforcing the significance of ICTs as they have become mainstreamed across all areas of public policy and come to play an increasingly influential role in relations between countries and economies.

Growing attention has been paid since WSIS to rapidly evolving and potentially high risks posed to the environment including climate change, overexploitation of scarce resources, loss of biodiversity and pollution. Greenhouse gas emissions (GHGs) that contribute to climate change have continued to grow in spite of commitments to move towards 'net zero', increasing risks that global temperatures will exceed the 1.5˚C of warming thought to be the maximum that current ecosystems can withstand.[26] The relationship between technology and environmental sustainability is complex. Digital technologies and services have the potential to 'unlock new capabilities and opportunities for advancing environmental sustainability,' as the GDC acknowledges, [27] but also require high levels of energy consumption, which contributes to GHGs, as well as impacting on the use of critical resources and pollution.

The *Pact for the Future*, which was adopted by the General Assembly in 2024, recognises that 'the global security landscape is undergoing profound transformation' with 'increasing and diverse threats to international peace and security,' whose maintenance is a core objective of the UN system.[28] Conflicts in a number of world regions have intensified in recent years, posing increased threats to the lives of civilians as well as military personnel. Increased use of drones and other weapons systems dependent on digital technologies is changing the modalities of conflict and has raised concern about risks from terrorism as well as disputes between nation states. Risks to cybersecurity, including those from non-state actors, have been increasingly recognised as threatening political and economic stability.

Challenges such as these were instrumental in the UN Secretary-General's 2021 initiative *Our Common Agenda*[29] and are fundamental to the *Pact for the Future*, which seeks to reinvigorate international cooperation. The *Pact* reinforces the SDGs and other international agreements such as those concerned with climate change, peace and security and human rights, and seeks to 'transform global governance … to help us to achieve a world that is safe, peaceful, just, equal, inclusive, sustainable and prosperous.'[30]

The contribution of digitalisation towards this goal is articulated in the *Global Digital Compact*. This reiterates commitment to the WSIS outcome documents to address the opportunities and challenges of digital technologies – which it describes as including 'immense potential benefits for the well-being and advancement of people and societies' as well as 'new risks for humanity, some of which are not yet fully known' – with the aim of ensuring 'human oversight of technology in ways that advance sustainable development and the full enjoyment of human rights.'[31]

The *GDC* sets out and elaborates five broad objectives to achieve this goal – to:

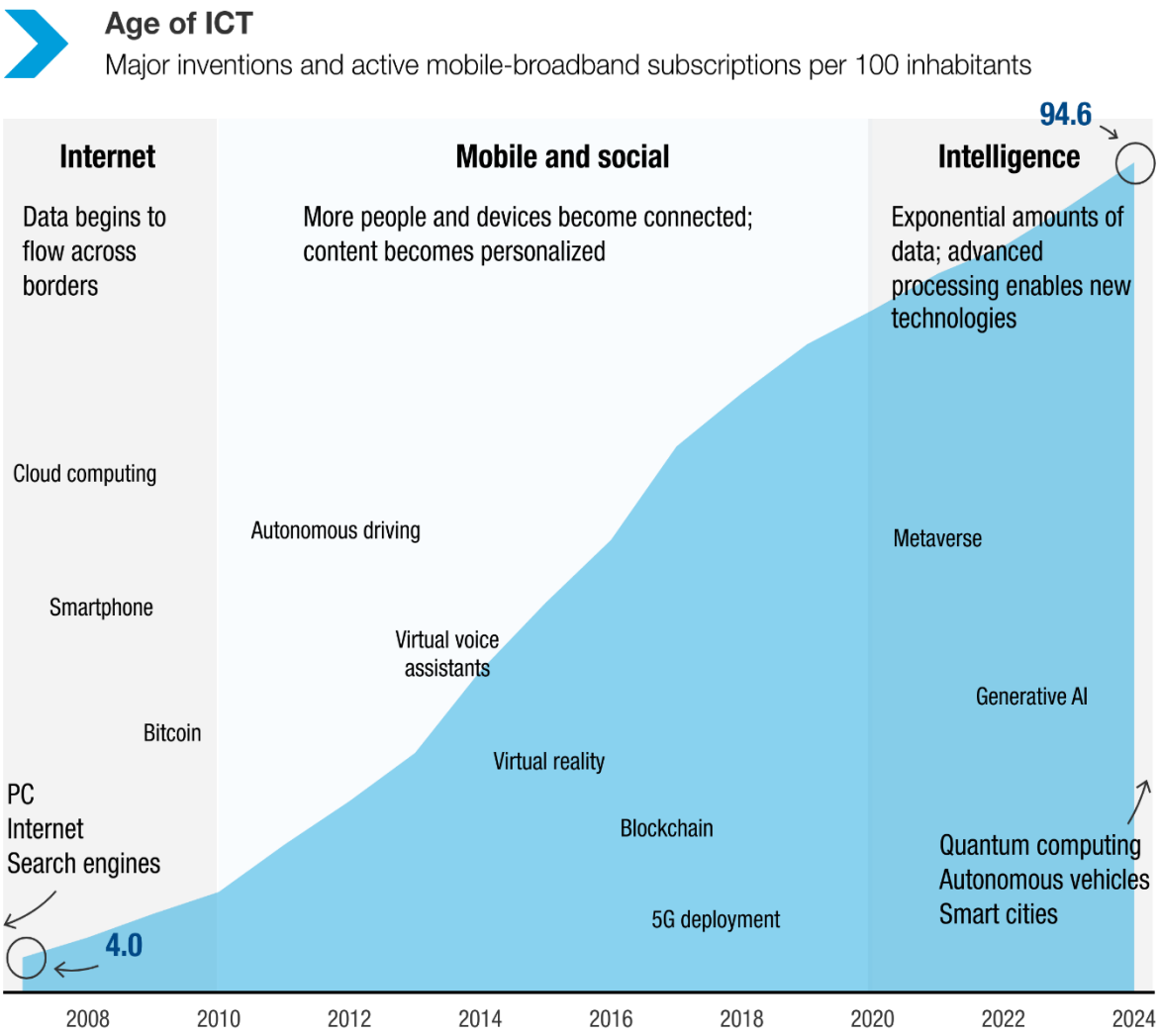
1. *close all digital divides and accelerate progress across the Sustainable Development Goals;*
2. *expand inclusion in and benefits from the digital economy for all;*
3. *foster an inclusive, open, safe and secure digital space that respects, protects and promotes human rights;*
4. *advance responsible, equitable and interoperable data governance approaches;* and
5. *enhance international governance of artificial intelligence for the benefit of humanity*.[32]

It invites the WSIS+20 review to identify how WSIS processes and fora 'can support the contribution of all stakeholders to [its] implementation.'[33]

The evolution of digital technology since WSIS

The pace and scale of technological innovation in ICTs since WSIS are unprecedented within human history. Earlier transformative technologies – such as the steam engine, electric power and the internal combustion engine – took decades to evolve and spread around the world. The revolution in digital technology has been much faster and continues to accelerate. Although rapid growth has been continuous, three waves of technological innovation can be distinguished in this process of digitalisation: the first, beginning well before the Summit, associated with computerisation; the second, around the time of the Summit, with the Internet, especially after the introduction of graphical user interfaces and then social media; the third, now current, associated with the emergence of AI, advanced robotics and other frontier technologies. The recent evolution of ICTs is illustrated in Figure 1.

Figure 1: The evolution of ICTs



Source: UN Trade and Development, data from ITU (2024).

Quantitative measures of digital innovation illustrate its pace and scale. The computing power in one of today's smartphones, for instance, is said to be greater than that of the most sophisticated computer at the time WSIS was first proposed, in 1998.[34] Global IP traffic has grown from 100GB per second in 2002 to 46,000GB per second in 2017 and 382,000GB per second in 2024.[35] International Internet bandwidth is estimated to have tripled between 2019 and 2023, with global data traffic quadrupling over a slightly shorter period.[36] This exceptionally dynamic growth has been driven by a number of factors, including the rate of growth in the capacity of digital networks and devices (a derivation from Moore's Law[37]); the network effects within communication markets, which intensify the value of participation to their users; and intense competition between communications and other digital businesses to secure the benefits of bringing new hardware and services to market before competitors have done so (first-mover advantage).

One result of the growth in computing capability has been the liberation of computing from fixed locations. Mainframe computers had already been displaced by networked stand-alone PCs in many offices and businesses before WSIS. Portable, or laptop, computers, first became available in the 1980s, and have increasingly displaced desktops in both personal and business use since WSIS, now accounting for the majority of personal computers sold.[38] They too have faced competition from the introduction of tablets, which are yet more portable, smartphones and, most recently, wearable digital devices.

The period since WSIS has, therefore, seen the emergence of a far wider range of new technologies, devices and services than was envisaged at the Summit. As early as five years on from WSIS, CSTD reported on critical developments that were transforming digital technology, including transition from narrowband to broadband networks, the growth of markets for mobile telephony and mobile Internet, and the emergence of social networks and cloud computing.[39] Its ten-year review of WSIS in 2015 focused on a second group of transforming innovations, including datafication and the growth of big data analysis, 'smart' systems and the Internet of Things (IoT).[40]

More recent waves of innovation seem poised to bring about even faster and yet more pervasive transformation in technology and services and, through them, in economy, society and governance and in the daily lives of individuals. Recent years have seen the growing use of blockchain technology, the emergence of extended (virtual and augmented) reality, and substantial investment in the 'metaverse' and other innovations offering new ways of doing business and new types of user experience. Artificial intelligence, machine learning, advanced robotics and automated systems now lie at the heart of innovation, drawing on both the accelerating capabilities of digital devices and the accumulation of massive data sets derived from the digitalisation of human activity. These technologies are poised to reconfigure an Information Society that has been spreading worldwide during the past two decades, achieving what is often described as 'digital transformation'.

The advance of digital technologies is interlinked with other areas of technological research and development in a fast-changing world. Big data analysis and AI have enabled scientists, technologists and medical sciences to innovate in adjacent fields more quickly, in greater depth and with more rapid impact than was possible in earlier computing generations, including work in other frontier technologies such as nanotechnology and biotechnology.

The reach and impact of these extraordinary developments in digital technology and services has, however, varied greatly between regions, countries, communities and individuals. Money for research and development and resources such as the technical skills required for meaningful use of new technologies are unequally distributed. Developed countries and high-income developing

countries have been better placed to take advantage of the opportunities of these technologies than the majority of developing countries, particularly LDCs. Wealthier and more educated individuals have been better placed to derive benefits than those with low incomes or fewer educational advantages. Concerns, reflected in the consultation for this report, have become widespread that the digital divides in connectivity and usage identified at the time of WSIS are increasingly evident in the deployment and exploitation of newer technologies.

A number of substantive trends in digital technology can be identified as driving growth in ICTs' potential, use and impact during the period since WSIS. These include the shift from narrowband to broadband and from fixed to mobile technology, expanding infrastructure networks, and the growing popularity and pervasiveness of technologies associated with cloud infrastructure, the Internet of Things, automation and robotics, and smart systems.

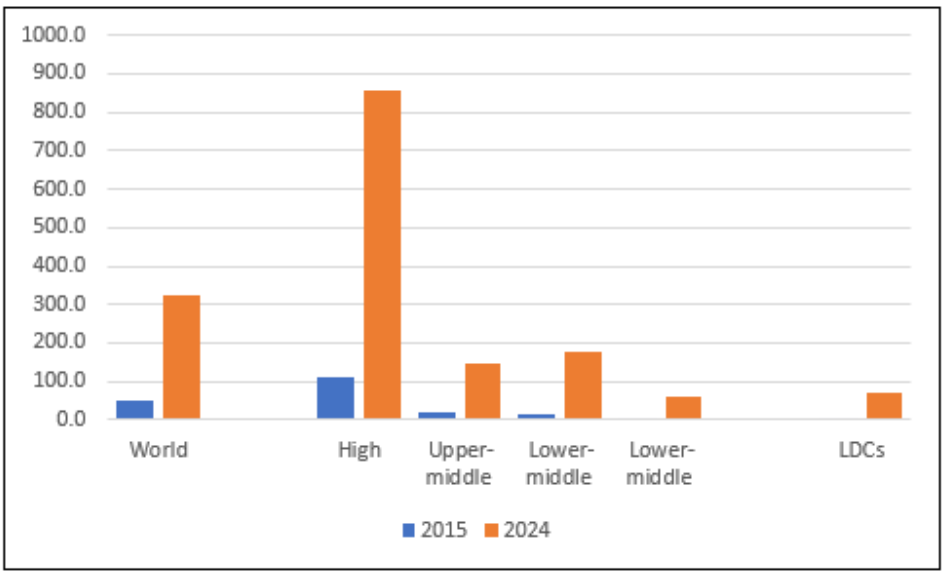
1. From narrowband to broadband

The Summit's outcome documents recognised the importance of broadband networks, capable of high-speed data transfer, at what was then the cutting edge of progress towards an Information Society, and urged governments and businesses to strengthen broadband infrastructure at international, regional and national levels.[41] The dial-up Internet access that was still prevalent at the time of WSIS offered speeds of up to 56kbit/s, making use of Internet slow and unreliable. Broadband speeds of 50Mbit/s and more are now commonplace in developed countries and available to users in many urban areas elsewhere, enabling them to access far more complex services quickly and reliably.[42] Large businesses, governments and other organisations make extensive use of even faster broadband services to manage their businesses and data, particularly through the cloud. Mobile broadband has been particularly important in providing higher bandwidth in developing countries.

The general availability of broadband has come to be seen, in the years since WSIS, as the essential foundation for efforts to achieve digital transformation – an inflection point or 'game changer' in digital development. Its critical importance for achieving developmental impact was emphasised by the establishment of the Broadband Commission for Digital Development – a partnership between ITU, UNESCO and other stakeholders – in 2010. (This was renamed the Broadband Commission for Sustainable Development in 2015.) The deployment of fast broadband networks has become a central component of regional infrastructure development programmes such as those promoted by UN Regional Economic Commissions, and of national digital strategies in more than 150 countries. The Broadband Commission has advocated that all countries should have such strategies in place by 2025.[43]

There are, however, still substantial digital divides that have significant impacts on broadband usage and, thereby, impacts on development. Broadband speeds available to end-users are substantially faster in the majority of developed countries than in most developing countries. Figure 2 illustrates growth in the use of international bandwidth per Internet user between 2015 and 2022 and the scale of difference between countries with different income and developmental status.

Figure 2:
International bandwidth usage per Internet user, 2015 and 2024 by income/development status
(kbit/s per subscriber)



Source: ITU statistics[44]

2. From fixed to mobile

The potential of mobile technology to transform communications was less anticipated at the time of WSIS (whose outcome documents include few references to mobile phones) than that of the Internet. Understanding of mobile's full potential grew rapidly after the Summit, however, as it became clear that mobile networks could be deployed more quickly and cheaply in developing countries that had historically poor or largely absent fixed communications networks, leading to rapid adoption by previously unserved communities. By 2014, CSTD reported, 86 per cent of telephone subscriptions worldwide were mobile, including 98 per cent in sub-Saharan Africa.[45] In a mere decade after WSIS, mobile phones had overturned almost a century of failure to build significant fixed telecommunications capacity in that region.

In the decade following WSIS mobile phones also became multipurpose digital devices, combining telephony with other functions (camera, radio, music player, data storage) including, crucially, access to the Internet, social media and a growing range of mobile apps. Telephony, the original purpose of the mobile phone, is now used far less frequently by most users than these other applications.

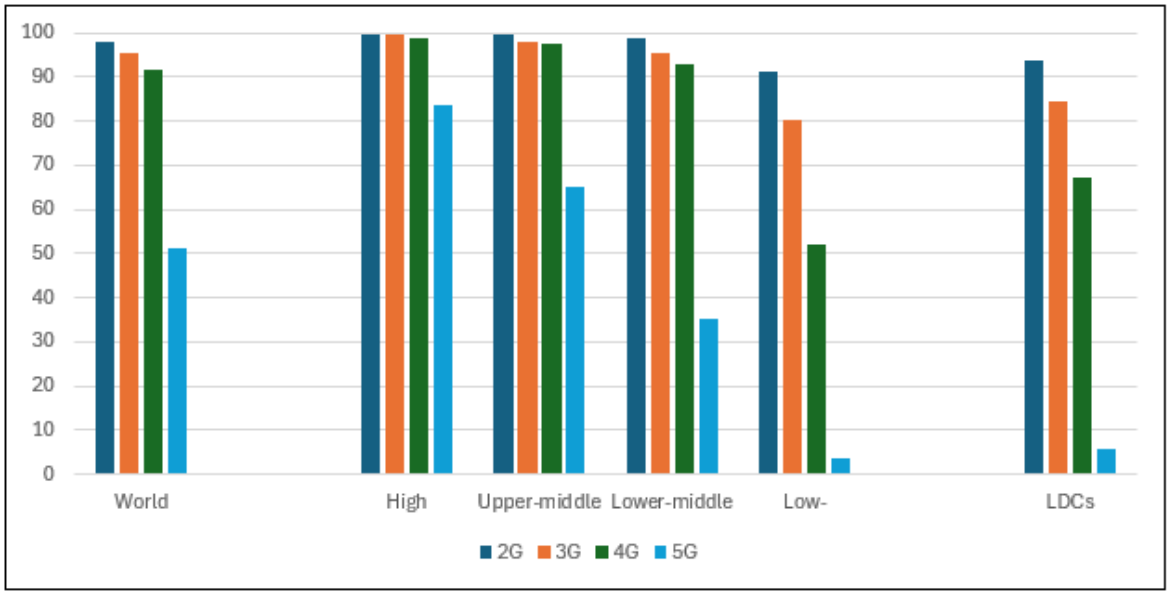
The pace of change in mobile communications has been driven by rapid evolution in technology and services. Second-generation (2G) mobile networks, of the kind that were prevalent twenty years ago, offered only limited bandwidth, comparable to that of dial-up fixed line modems. 3G technology, introduced in developed countries around the time of WSIS, enabled faster connectivity and the capability to access a range of online services including effective access to the Internet. Capabilities have increased further with 4G and 5G networks, allowing greater integration between telephony, Internet and social media, including the ability, rapidly and cost-effectively, to distribute images and stream audio and video.

National infrastructure has evolved rapidly thanks to improvements in technology and in synergy with rising demand. The proportion of the global population now covered by a mobile network has risen to 97.9 per cent; that covered by a broadband (3G or higher) network to 95.6 per cent, with only sub-Saharan Africa, at 84 per cent, still experiencing a significantly lower figure (especially in rural areas). By 2024, over 90 per cent of the world's population was covered by 4G

networks, with more than half within reach of 5G connectivity.[46] As shown in Figure 3, however, the distribution of these more advanced mobile generations is more geographically uneven. Developed country markets with large online populations, and urban centres with high volumes of business traffic, offer higher rates of return to network operators and so are more commercially attractive to infrastructure investors. People living in urban areas in Europe, for example, are almost twice as likely to be covered by 5G networks than those in rural areas (81 per cent against 46 per cent); those in urban areas in Africa twice as likely to be covered by 4G networks than those in rural areas (98 per cent against 49 per cent).[47]

Figure 3:

Deployment of mobile network generations by income/development status (Percentage of population covered by 2G, 3G, 4G and 5G networks or above, 2024)



Source: ITU statistics (as above)

3. Infrastructure networks

Although geographically inequitable, the growing profitability of new markets, offering a wider range of services, led to increased investment in international, regional and national networks in the years after WSIS, including networks on land, beneath the sea and in near-earth orbit. The privatisation and liberalisation of communications markets (see 'The enabling environment' in Chapter 2B) also led to greater competition between infrastructure and network providers to reach new markets and realise their profitability.

Submarine cables are responsible for the vast majority of international communications traffic.[48] The number of submarine communication cables active or under construction worldwide was estimated to have reached 650 by February 2025,[49] running for almost 1.5 million kilometres.[50] ITU estimates that the capacity of optical networks within these cables has been growing for a prolonged period at some 40 per cent each year.[51]

At the time of WSIS there were significant gaps in undersea networks serving certain regions, particularly Africa and the Pacific. The limited capacity and lack of competition arising from this dearth of infrastructure led to higher costs for connectivity than in other world regions,

constraining Internet usage and adversely affecting economic growth. These deficiencies in regional broadband connectivity, including that for LDCs and Small Island Developing States (SIDS), have been substantially addressed since WSIS. The first submarine cable around the whole coast of Africa was deployed in 2009, since when the construction of new cables has dramatically improved the continent's international connectivity, with international bandwidth growing from just 12 to 52 terabits per second between 2019 and 2023.[52] The Pacific region, however, still lags behind other regional groupings in international bandwidth with disadvantage to local economic development.[53]

Growing dependence of national economies on international connectivity has increased concern about submarine cable security and emphasised the importance of resilience and redundancy (the availability of surplus and back-up capacity) in international networks. Submarine cables are now supplemented by satellite technologies, which can be particularly useful in reaching remote regions and areas. Satellites have played a role in international communications infrastructure since the early 1960s. For most of the period since then the market has been dominated by geostationary (GEO) satellites, but considerable investment is now being made in low earth orbit (LEO) satellites that are capable of providing service to remoter areas on land and sea, and of maintaining coverage in the event of natural disasters or conflicts that disrupt terrestrial networks. The largest LEO network, Starlink, now has more than 7000 satellites in orbit and reported more than 4.5 million customers worldwide by the autumn of 2024.[54] Some concerns have been raised about the environmental impact of systems requiring very large numbers of satellites in near-earth orbit.[55]

Both international and national networks have been mostly financed through private investment, but international development funds have also supported the deployment of regional and national networks in areas that are less commercially viable. Universal service funds have been used to extend terrestrial networks in some countries, effectively cross-subsidising unprofitable from profitable areas, while innovative mechanisms such as community networks have helped to fill infrastructure gaps through local initiative and enterprise.

Backbone networks in almost all countries are now extensive with very few areas still unserved by at least basic communications services – though communications networks are adversely affected in many places, particularly rural areas, by limited complementary infrastructure, especially power networks. The expansion of network infrastructure since WSIS, nevertheless, means that lack of connectivity has become a less significant barrier to meaningful access for most individuals than affordability (see Chapter 2A). Attention has also increasingly been drawn to broader issues of digital public infrastructure, including applications operating over communications networks to enable public services.[56]

4. The cloud and data traffic

The data generated by digitalisation have enormous value, both for developmental purposes – where they enable more sophisticated analysis of problems and better targeting of public services – and for commercial exploitation – where they support more sophisticated business models including better targeting of advertising and commercial services. As indicated above, the volume of data generated by digitalisation has grown extraordinarily since WSIS and is expected to grow even more rapidly over the coming decade, as the number and capabilities of digital devices continue to grow and AI enables ever more sophisticated data analysis.

Cloud computing (which stores high volumes of data remotely rather than on individual devices) was, like mobile telephony, in its infancy at the time of WSIS, but has since become the principal means of data storage and management for government, business and corporate users. Many tasks that would at the time of WSIS have been undertaken in-house, using mainframe computers or local hardware networks, are now implemented through cloud services provided by global data corporations such as Amazon Web Services (the first major cloud provider, launched in 2002) and Microsoft Azure. Cloud services have become fundamental to the business models of e-government and e-commerce and have become the default means of data storage for many individuals who would previously have stored files on personal hard drives.

Despite its name, the 'cloud' consists of estates of data centres located around the world from which data are remotely accessed on demand by government, business and individual users. Hyperscale data centres have become critical parts of the world's communications infrastructure, integrated into the business models of global data corporations, particularly Amazon, Microsoft and Google. The number of hyperscale centres surpassed a thousand in 2024. Their global capacity is estimated to have doubled in the four years up to that point, with about half of that capacity being accounted for by the United States and a further third shared roughly equally between China and Europe.[57] While these massive data centres have been growing in number and capacity, there has also been substantial growth in smaller data centres located close to customers. The management and governance of the cloud economy poses new challenges of data governance which are discussed in Chapter 3.

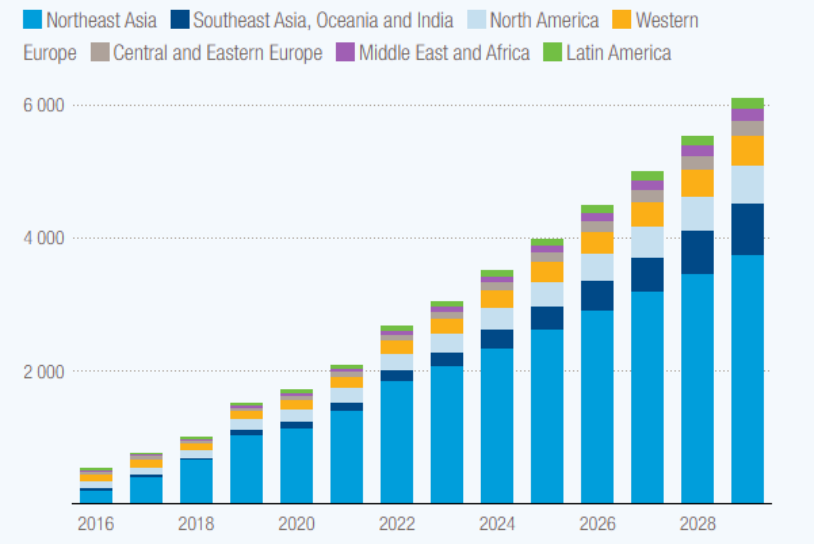
5. The Internet of Things

Data gathered online and managed in the cloud no longer only come from people. At WSIS itself in 2005, ITU suggested that the Internet of Things – or IoT – would be the next major development in evolution of the Internet.[58]

IoT incorporates data capabilities in hardware other than computers and communications devices, networking these with one another, so that they interconnect within home, office or factory environments, and enabling software updates, data management and interaction with device owners through the cloud. It began to play a significant part in the digital ecosystem of many users during the decade after WSIS and has gradually become more widespread since. As well as applications within industry, an increasing number of households, especially in developed countries, are establishing domestic networks that integrate equipment in their homes, from heating and lighting to refrigerators, televisions and other domestic appliances. Digital assistants – such as Apple's Siri and Amazon's Alexa – are now used to manage these domestic networks in growing numbers of households, particularly in developed countries. Alongside domestic equipment, some better-off consumers are adopting wearable devices such as digital watches and fitness trackers. Like improvements in earlier generations of household equipment, the popularity of IoT devices is driven by convenience and lifestyle choice as well as falling costs.

The number of connected IoT devices, illustrated in Figure 4 is estimated to have grown from some 600 million in 2015 to 6 billion in 2020 and more than 18 billion by the end of 2024, more than three times the number of smartphones currently in use. It is forecast to rise to over 40 billion by 2030.[59] The large majority of devices recorded in this chart are used in Asia.

Figure 4: Growth and projected growth in IoT devices with cellular connections



UNCTAD, Digital Economy Report, 2024, p. 37, derived from Ericsson Mobility Visualizer, November 2023[60]

The range and sophistication of IoT devices, and of the services they offer, is rapidly growing through technological development and competition between service providers. ITU has published guidelines for harnessing IoT applications in a variety of development sectors including healthcare, agriculture, energy and natural resource management.[61]

6. Automation and robotics

The automation of industrial processes began long before WSIS – in the industrial revolution of the eighteenth century, it could be said, or in the introduction of production lines in manufacturing a century or so ago. Automation improves productivity, helps to standardise product quality and tends to reduce the cost of goods produced, thereby growing markets and improving profitability. It also has significant impacts on employment.

Industrial robots – automated, programmable machines that carry out standardised tasks – were used in manufacturing long before WSIS, building on production line experience. The growing sophistication of digital technology has enabled them to carry out tasks that were previously done by human workers with greater precision and at greater speed, thereby reducing costs in manufacturing, warehousing and other areas of work. They can also be used in circumstances that would prove too dangerous for human employees, for instance toxic environments or handling explosive, radioactive and other hazardous materials. The global industrial robotics market was estimated to be worth some US$42billion in 2023, out of a total robotics market worth over US$71billion, and to be growing at around 15 per cent in value annually. As in other areas of advanced technology, the leading markets are in China, the United States and Europe. Similar growth is evident in the market for service robots, intended to support applications in areas such as healthcare, hospitality and cleaning.[62]

The digitalisation of fixed telecommunications networks from the mid-1990s is a powerful example of a sector that radically improved the quality and capabilities of telephone services through automation while drastically reducing the number of employees. Word processing and spreadsheet applications, initially managed through mainframe computers, latterly through networks of stand-alone PCs and now the cloud, have had similar effects on clerical and other

office roles. Further reductions in employment in office environments are thought likely to result from the widespread deployment of AI over the next decade (see Chapter 2D)

The WSIS outcome documents were primarily concerned with information and communications, and did not address the digitalisation of manufacturing and other industrial processes. The years since WSIS, however, have seen increasing integration between ICTs and industrial automation, not least because automated processes are managed through the cloud.

One area in which computer technology has substantially affected manufacturing is through the extensive use of computer-aided design (CAD) and growing use of 3D printing, or additive manufacturing, in which products are finished by adding material rather than removing it as in traditional manufacturing processes. The global 3D printing market was estimated to be worth almost US$20 billion in 2024 with a projected annual growth rate of more than 20 per cent.[63] 'Digital twins' – virtual representations of physical objects or systems to simulate real-world situations – have also become part of the range of instruments that can be used to predict outcomes and improve decision-making in industrial processes and smart systems.[64]

The use of one particular group of robots, aerial drones, has grown rapidly during the past decade for many different applications – for surveying land, monitoring food crops and natural ecosystems, power and transport networks, for instance, for responding to environmental hazards and natural disasters, for law enforcement and for personal leisure pursuits. Their use for military purposes has significantly changed the nature of conflict.

Very substantial investments have been made in the last decade to develop autonomous or self-driving vehicles, including taxis, private cars and commercial vehicles. Developers and manufacturers are experimenting with systems that use a complex mix of sensors, cameras, GPS and other technologies to comprehend the road and traffic environment. Although no fully autonomous vehicles are yet available, some real-world experience has been gained with self-driving taxis, and automation features short of autonomy are now incorporated in vehicles available for sale. Advocates believe that autonomous vehicles will prove to be safer than manually driven vehicles in most environments but safety in more complex road and traffic systems continues to prove challenging. The sharing of road space by manual and autonomous vehicles is understood to pose regulatory, law enforcement and insurance challenges.[65]

7. Smart systems

Digital technologies, including the cloud and IoT devices, have been increasingly used to manage complex systems within industry, business, administration and wider society during the period since WSIS. As with automation in manufacturing this is not new in itself. Rail networks and air traffic control, for instance, relied on automated management tools long before WSIS, but today's digital technology, with its ability to gather and analyse large data sets allows much more sophisticated, real-time management in many different areas of activity.

CSTD's WSIS+10 review drew attention to two areas in which what had by then come to be known as 'smart systems' were significantly deployed. A mix of digital technologies, including RFID (Radio Frequency Identification), GPS (Global Positioning System) and other geographic information systems, was by that time being used to expedite transit of goods along important trade routes and through ports and airports, improving efficiency, reducing transit times and thereby cutting costs to businesses and consumers. Smart grids were likewise being used to manage supply and demand in power networks and other utilities, reducing waste and potentially reducing GHG emissions. Road traffic management was another area in which sophisticated

data analysis and real-time automation were being brought together to relieve congestion and, thereby, alleviate pollution.

Combining multiple data sets and exploiting the predictive capabilities of AI have since enabled more sophisticated efforts to establish new or reconfigure existing urban centres, with the goal of creating 'smart cities' in which greater integration of digital systems in different areas of activity enables more efficient public services, better environmental outcomes and improved quality of life. Moves to build such environments in existing cities have been necessarily incremental, though the potential for developing new urban centres with smart city capabilities embedded in design and construction has also been evident.[66] Naturally, such initiatives are located mostly in countries with advanced digital ecosystems, but the wider development of smart city applications is supported by international development partners including the World Bank and ITU.[67] Critics of smart cities are concerned about their potential to facilitate surveillance, vulnerability to cyberattacks and the complex challenge of balancing the potentially competing needs of different groups within urban environments.[68] Guidelines for the application of AI in cities have been published by a consortium of United Nations agencies.[69]

The evolution of applications and services since WSIS

This evolution of technology has led to equally dramatic developments in the nature and range of digital services available to businesses, governments and individuals since WSIS. Smartphones and the IoT, described above, represent two ways in which ICTs have become pervasive in everyday life, at home and work, over the last twenty years for the majority in developed countries and high-income developing countries.

Trends which were already apparent before WSIS have continued and accelerated. Many office staff now work primarily at computers, communicating with colleagues and those outside their organisations through email, messaging services and videoconferencing, accessing and working on data in the cloud. The COVID-19 pandemic demonstrated how office work could continue, relatively easily, thanks to digital technology in circumstances that would have been at least highly disruptive if not impossible before the Summit. Businesses and government departments, hospitals and schools run their inventories, personnel management, accounts and other administrative functions through computer systems; connect online with customers and counterparts, patients and parents; develop marketing and business strategies using the cloud and its big data analytic capabilities; and monitor workforce performance and gather consumer data in real time. Digitalisation therefore affects the environment for all employees and service users in most countries, regardless of whether they personally use computers or the Internet.

The extent to which the everyday lives of individuals have been digitalised varies substantially, reflecting levels of both digital development and general prosperity. Digitalisation of daily life is generally most advanced in countries in Europe, North America and parts of Asia, least in low-income countries and LDCs; more advanced in cities than in rural areas; more pervasive for those with higher incomes and the young than for those with lower incomes and the elderly. The displacement of analogue with digital behaviour is growing, however, in all societies – both directly in the ways that people use personal devices and the Internet, and indirectly through the government, employment and business relationships that govern their societies and the work and leisure activities in which they participate.

The digital environment has evolved greatly since WSIS, not just in pervasiveness or speed of connectivity, but in the quality and range of services to which it offers access and the changes

that these have enabled in the ways that people organise their lives. This digitalisation of everyday life could be said to represent the Information Society in practice. Three developments in services and applications have been especially significant since WSIS.

1. The changing Internet

The *Tunis Agenda* described the Internet as 'a central element of the infrastructure of the Information Society.'[70] All of the WSIS outcome documents emphasised its crucial role in delivering the Information Society that they envisaged. As other aspects of digitalisation such as cloud computing and AI have grown in significance since WSIS, the Internet's central importance continues to be reflected today, not least in United Nations agreements such as the GDC.

The underlying technical structure of the Internet has remained consistent since WSIS, though there have been significant governance and technical developments.

- Internet governance, discussed in Chapter 2F , has continued to build on the multistakeholder engagement that preceded and was recognised by WSIS.
- The Internet Engineering Task Force (IETF) has remained the authoritative standards organisation for the Internet, overseeing standards concerned with the technical foundations of the Internet including the Internet Protocol suite,[71] while technical and other standards affecting online services have been developed by groups including the World Wide Web Consortium[72] and what become effective standards have evolved from business models of digital enterprises that achieve market predominance.
- A revised version of the Internet Protocol, IPv6, developed by IETF in order to increase Internet address space and accommodate the growing number of Internet-connected devices, became an Internet Standard in 2017 and now accounts for between 40 and 50 per cent of Internet users.[73]
- The IANA stewardship transition in 2016 transferred oversight of the Internet Assigned Numbers Authority, which coordinates critical Internet resources, from a contract between the United States government and the Internet Corporation for Assigned Names and Numbers (ICANN) to a multistakeholder model.[74]
- Developments in ICANN's work have included the introduction of a wider range of domain names, including internationalised names (IDNs) that make use of more diverse alphabets.
- The growing number of Internet Exchange Points (IXPs) – the physical locations at which networks exchange traffic[75] – has led to improved connectivity and lower costs for many Internet users, in line with hopes expressed in the *Tunis Agenda*.[76]
- Continued improvements have been made to protocols and standards for Internet security, including Domain Name System Security Extensions (DNSSEC), Transport Level Security (TLS) 1.3 and the growing use of Hypertext Transfer Protocol Secure (https).[77]

More visible to users than these technical and governance developments have been enhancements to the services the Internet now makes available. Web-based services have continued to improve through successive generations of computer operating systems and the evolution of the Web. Search engines, for instance, have become increasingly sophisticated gateways to online content. The dominant such service, Google, with some 90 per cent of the

global market in 2024,[78] now processes more than 100,000 searches every second and, like its competitors, has recently added generative AI to its applications.[79] Messaging services have increasingly displaced both voice telephony and email as the default means of remote communication for many users. Improved security has enabled many more transactions to be undertaken safely online.

Not all new online services are lawful or secure. Like other sectors, the Internet is vulnerable to abuse by criminals and others intent on exploiting vulnerabilities. A 'dark web' of private networks and services plays host to some of these activities.[80] Addressing cybercrime has become an important part of digital governance, (see Chapter 2B).

As already noted, most users, particularly in developing countries, now access the Internet on smartphones. Increased bandwidth has made it easier to transmit and receive more sophisticated content online including video, demand for which surged during the COVID-19 pandemic and which accounted for some 65 per cent by volume of Internet traffic in 2022.[81] Integrated cameras have encouraged sharing of photographs and personal videos, either individually, through messaging services, or through online platforms such as YouTube and TikTok.

2. Social media

Perhaps the most dramatic and extensive shift in the relationship between individuals and the Information Society since WSIS has been the rise of social media platforms that enable direct interpersonal communications and information sharing with other individuals, selected groups and all subscribers to those platforms. The first major social network, MySpace, was launched a few months before the first WSIS session in 2003; the most widespread today, Facebook, went online in 2004. The number of social media users is estimated to have grown from 4.5 per cent of the global population in 2005 to 13.4 per cent in 2010, 28.0 per cent in 2015, 47.2 per cent in 2020 and 63.9 per cent in 2025. [82] Facebook alone now has more than three billion monthly active users, approaching half the global adult population, while eight other social networks were estimated in April 2024 to have close to or more than one billion subscribers.[83] The leading platforms offer services throughout the world, while others are concentrated in individual countries or serve specific language groups. For many users these services have become the principal mode of interpersonal interaction as well as Internet use, and the most important source of news and other information.

Social media platforms vary in the types of service that they offer. Some, such as WeChat, developed by the Chinese company Tencent, are wide-ranging, offering access to messaging and social media, e-commerce and payment applications, games and other services. Others have focused primarily on messaging, like Skype and WhatsApp; on file-sharing and content creation, such as YouTube and TikTok; or on building interactive communities, like Facebook and Instagram. Microblogging platforms, particularly Twitter, launched in 2006 and rebranded as X in 2023, have become influential because of their extensive use by journalists, politicians and others, including governments, to both gauge and influence opinion. Experience has shown that the popularity of different platforms can change quickly, with some having particular appeal to younger users.

All of these platforms have been optimised for use with smartphones. They benefit from network externalities as their value to users increases with the number of people making use of them. Almost all rely on an advertising-based model of revenue generation, providing services free to

users while leveraging the data thereby captured to analyse their users' preferences and target advertising on behalf of other businesses. Network externalities tend to give commercial advantage to larger networks, leading to market consolidation, with the result that relatively few firms, based in few countries, predominate worldwide. Baidu, Alibaba and Tencent dominate the market in China in much the way that Meta and its associated services (Facebook, Instagram and WhatsApp) and YouTube, owned by Google, dominate markets in the United States and Europe. The fastest growing major platform in recent years has been TikTok, owned by the Chinese company ByteDance, which is now serving more than two billion subscribers worldwide.

3. Digital services and applications/apps

Other aspects of users' lives have also moved increasingly online since WSIS as the reach and capabilities of digital networks and devices have spread and digital services have taken the place of other information sources – though, as with so many of the changes described in this report, this experience has varied widely with levels of economic development and individual prosperity.

A wide range of mobile 'apps' has made access to many services much more flexible and convenient than they can be on computers, ranging from information services (for example, live updates to public transport schedules, real-time mapping of traffic routes, opening times for shops and public services), through applications for official documents (such as passports and driving licenses) and transactions (such as online banking, mobile money and e-commerce), to interactive engagement with public policy development.

One of the most popular digital sectors since before the time of WSIS, particularly among children and young adults, has been gaming, initially though console devices and computers, more recently online. More than a billion people are estimated to play online games today, with the online market estimated to be generating approaching US$100 billion by 2025.[84]

Some previously analogue types of content and services have moved online where they can be more conveniently and flexibly accessed by users. The gambling sector, for instance, was an early adopter of online services and online gambling is now estimated to be worth some USD$100 billion annually, and to be growing at about 10 per cent each year.[85] Pornography is another sector that has been transformed by the Internet, enabling much more widespread and anonymous access to users. The online 'adult entertainment' industry is now estimated to be worth some USD$75billion annually, growing at around 7.5 per cent each year.[86] In both these cases, the Internet and the anonymity that it allows have enabled users to bypass legal, regulatory and normative constraints on access they would otherwise experience at national level.

Some analogue businesses have proved highly vulnerable to digital displacement, enabling individual users to dispense with analogue intermediaries. Travel agencies, for example, have been substantially displaced by businesses offering online bookings for air travel and hotel accommodation. Traditional taxi services have been opened up to competition from online competitors – some global like Lyft and Uber, others nationally or locally based. Streaming services have largely replaced physical formats such as CDs, cassettes and DVDs for distributing music and films. Print newspapers have seen their circulations plummet as readers, particularly the young, have chosen to source news from free online alternatives. These changes can adversely affect some portions of the population. Banks in many countries have closed branch offices, for instance, encouraging their customers to make use of online and mobile banking, leaving many traditional consumers feeling less well served than hitherto.

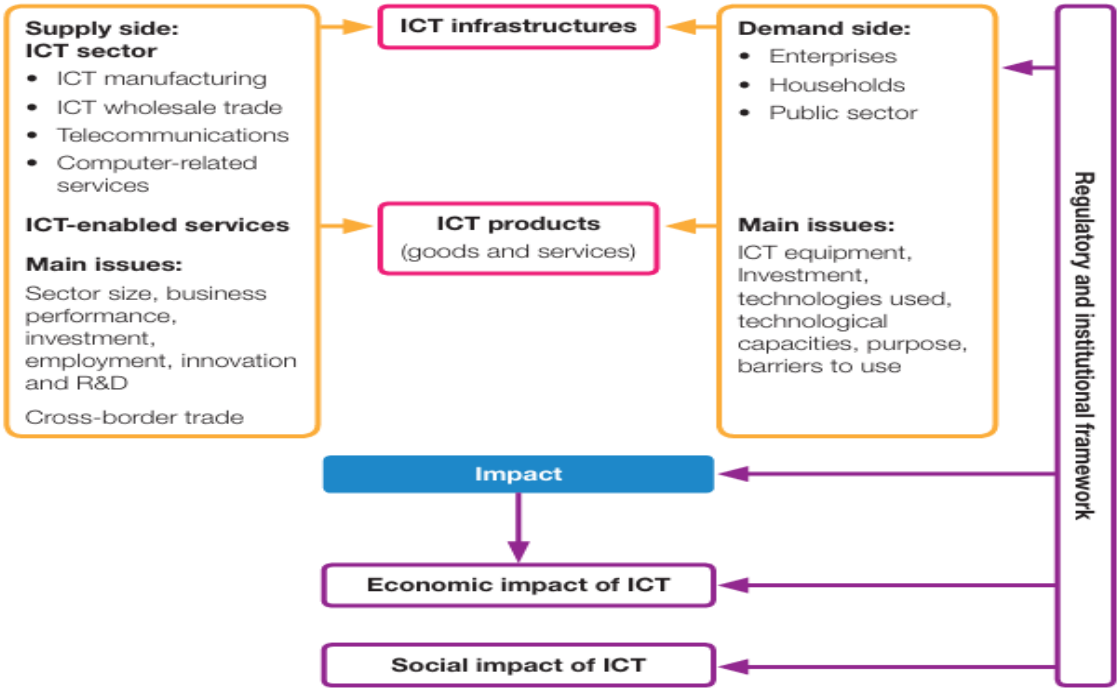
Experience since WSIS has shown that consumers respond quickly to changing service offerings, often in ways that surprise both policymakers and service providers. Online dating, for instance, is reported to have become the most common means for people to start relationships or meet life partners in the United States.[87] The crowdsourced online encyclopaedia Wikipedia has largely displaced print encyclopaedias in the majority of countries where it is available, but is now thought potentially vulnerable to AI-generated search. The lifecycle of new apps and business models can, however, prove relatively short. The market for route planning hardware that blossomed around the time of WSIS, displacing paper maps has dissipated as a result of competition from online services such as Google Maps.

The digital economy

The two decades since WSIS have seen the digital sector grow very substantially in real terms and as a share of the global economy as digitalisation has become an essential element in almost all areas of economic activity. The information and communication sector itself, once primarily concerned with telecommunications, has been transformed since WSIS through the changes in technology and services described above, with the emergence and growth of new business segments around social media, data management and innovations in automation and AI. At one end of the scale, global data corporations are now among the world's most valuable and powerful companies. Along with equipment manufacturers, concerned with semiconductors and other components as well as finished devices, and network operating companies that provide infrastructure and access services, these data corporations manage the foundations on which other companies within the burgeoning digital economy rely to implement their business models. At the other end of that scale, many thousands of small businesses now form part of the digital economy, some at the cutting edge of innovation, others providing basic support services to end-users, many more in a growing range of other activities that exploit new technology and markets.

There is no universally agreed definition of the digital economy. At the time of WSIS, the Organisation for Economic Co-operation and Development (OECD) proposed the conceptual model of the digital economy illustrated in Figure 5. This reflected the relationship between the supply side that produces ICT goods and services and the demand side that makes use of them, as well as recognising the impact that ICTs have on the wider economy within which it was then set.

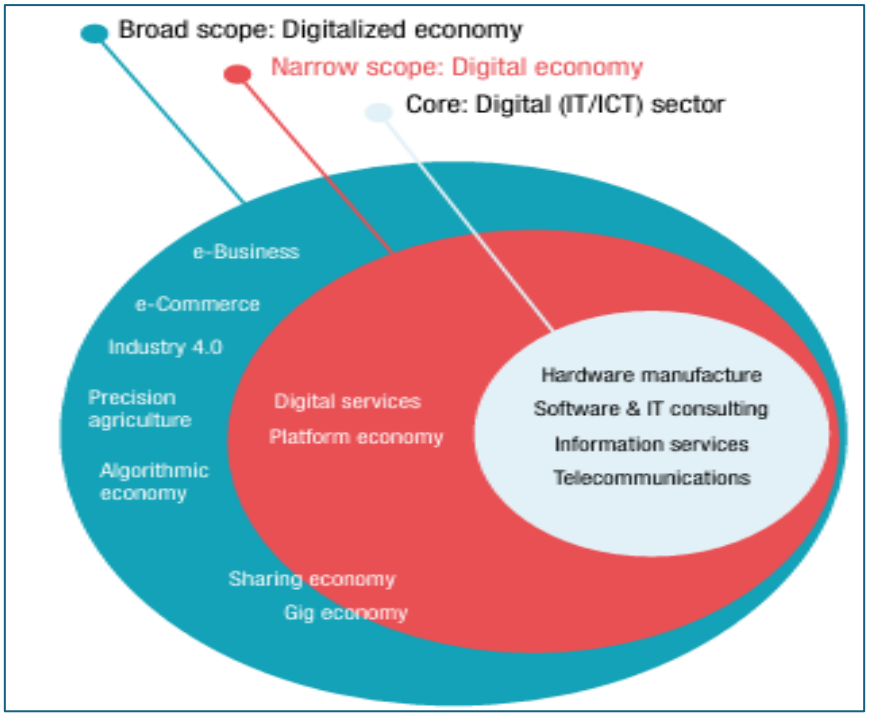
Figure 5: Building blocks of the digital economy



Source: UNCTAD,Manual for the Production of Statistics on the Digital Economy, 2020,[88] *adapted from OECD, Guide to Measuring the Information Society, 2005*[89]

In its 2019 *Digital Economy Report*, UNCTAD adopted a simplified model, illustrated in Figure 6, based on work from the University of Manchester. This identifies three broad types of digital activity, made up of a) core businesses directly involved in the supply of digital resources (such as those concerned with infrastructure, hardware and software), b) businesses within the digital economy itself (such as digital platforms, mobile applications and payment services that are dependent on core digital technologies) and c) a wider range of businesses within what it describes at the 'digitalized economy' (including e-commerce and ICT-enabled sectors such as finance and media, transport and tourism).[90]

Figure 6: A model of the digital economy



Source: UNCTAD, Digital Economy Report 2019, drawn from R. Bukht & R. Heeks, 'Defining, Conceptualizing and Measuring the Digital Economy', University of Manchester Developing Informatics Working Paper no. 68, 2019

A very wide array of businesses is encompassed in this depiction, some (principally in the first group) entirely on the supply side of digitalisation; some on the demand side but very substantially dependent for their operations on digital resources and/or offering exclusively or overwhelmingly digital services to end-users; others again providing both digital and analogue services. The range of ICT- and Internet-enabled services within this model includes, for instance, those developing software, websites and online services for other businesses and individual consumers; call centres and accommodation agencies; financial sector businesses such as mobile money providers; and e-commerce businesses. While a few of the continually expanding range of firms involved in the digital economy achieve global or regional scale, the majority are SMEs and micro-businesses serving national or local markets. All are in a state of continual evolution as the technology and services that they exploit evolve around them.

This map of the digital economy can be supplemented by including businesses that are wholly on the demand side, that use digital products and services to improve the effectiveness of the goods and services they sell themselves, manage their logistics and administration, and interface with their suppliers, employees and customers.

The use of digital resources is now integrated in almost all economic activity, crucial to the operation of all large businesses, almost all medium sized enterprises, the large majority of small businesses in developed countries and many small businesses in developing countries – though fewer in the informal sectors that are especially significant in LDCs. Digital supply chains also involve businesses that, at first sight, appear to be outside the ICT sector itself. Most digital products, for instance, require scarce minerals obtained through mining while significant volumes of electronic waste are sent to developing countries, for dumping or extraction of recyclable materials.

The digital economy is in constant development as technology and services evolve and businesses respond to new opportunities and new modalities for doing business. Two of the most powerful drivers of the digital economy in recent years have been platformisation and the growing importance of data flows in influencing value creation.[91] Both present challenges for public policy, not least in terms of competition, consumer protection and distributional effects.

CHAPTER 2

THE IMPLEMENTATION OF WSIS OUTCOMES

Chapter 1 of this report described some major developments in digital technology and services since WSIS.

Chapter 2 considers the extent to which these digital developments have enabled the international community to achieve the goals set out in the WSIS outcome documents. It begins with a summary of the broader context for digital development since WSIS. It then reviews the extent to which progress has been made towards the 'people-centred, inclusive and development-oriented Information Society' envisaged at WSIS through six sub-chapters in the light of the framework of commitments made in Geneva and Tunis, including the WSIS Action Lines. These are concerned with:

A. digital inclusion
B. the digital ecosystem
C. the digital economy
D. sustainable development
E. human rights and
F. digital governance.

The six sub-chapters also reflect priorities within these outcome areas that have been identified in the wider literature and consultation inputs for this report.

Chapter 3 is concerned with issues that have come to the fore since WSIS and with priorities for future development of the WSIS agenda, including those addressed in the *Global Digital Compact*.

A. The context for digital development

The dramatic changes in the digital environment described in Chapter 1 have taken place within the context of other global developments. The impacts that ICTs have had on digital and wider economic, social and cultural development have not resulted from digital development alone but from their interaction with broader trends in the global economy and international relations, the extent to which progress has been made towards achieving sustainable development, and the global environment for human rights, peace, security and international governance. These have also changed significantly since WSIS.

A fundamental development in global policy and practice, midway between WSIS and the current review, was the adoption by the General Assembly of the *2030 Agenda for Sustainable Development*, which incorporates the SDGs.[92] This established an ambitious and comprehensive programme of goals and targets for development to be achieved by 2030 at both national, regional and international levels. Although none of the seventeen SDGs was concerned directly with ICTs, the *Agenda* recognised that 'the spread of information and communications technology and global interconnectedness has great potential to accelerate human progress … and … develop knowledge societies,' and urged the international community to 'strive to provide universal and affordable access to the Internet in least developed countries by 2020.'[93] The interaction between ICTs and SDGs has become increasingly central to sustainable development since the latter's adoption. The General Assembly's WSIS+10 review recommended that the

twenty-year review should be an input to the review process for the *2030 Agenda* to be held in five years' time.

As mentioned above, two global crises have disrupted progress in digital and sustainable development since WSIS.

The financial crisis of 2007-2009 was a major setback for progress towards achieving the Millennium Development Goals that were then in place. It temporarily suppressed investment in network infrastructure and growth in demand for digital services as incomes fell in many countries, reducing business profitability and confidence. While the recession's overall impact may have been less in digital than other sectors, it slowed the adoption of digital services and the development of e-commerce.[94]

More recent and, at present, more significant has been the impact of the COVID-19 pandemic between 2019 and 2022 which severely disrupted economic activity and required drastic interventions by governments, including lockdowns that restricted economic and social activity, before it was brought under control. However, the extent to which digital resources had become embedded in economic and social structures by 2019 enabled employment and business activity to continue more effectively than would previously have been the case. There was a notable boost to some digital market segments, such as teleconferencing and e-commerce, whose impact has continued to be felt in both developed and developing countries since the pandemic. This experience during the COVID crisis demonstrated both the potential for digital resources to enhance resilience to external change and the consequences of inequalities in digitalisation between different countries and groups of employees.

The pandemic adversely affected progress towards achieving the SDGs which is now, the UN has acknowledged, 'severely off track'.[95] This challenge to the SDGs has been compounded by conflict, economic difficulties and the climate crisis. Together with increased understanding of the potential impact of ICTs, these have intensified belief that ICTs must play a prominent, or central, part in revitalising progress towards the SDGs.

Poverty and inequality remain at the heart of these challenges. While the overall numbers living in extreme poverty fell during the first two decades of the 21st century, the pandemic curtailed that progress. The World Bank estimates that almost 700 million people – some 9 per cent of the global population – still live in extreme poverty, with particularly high proportions in sub-Saharan Africa and South Asia.[96] It adds that inequality within countries has been growing recently, and is particularly marked in some developing countries.[97] The *Declaration on Future Generations*, adopted by the General Assembly alongside the *Pact for the Future* draws attention to the UN's central goal of 'eliminating the intergenerational transmission of poverty and hunger, inequality and injustice,' drawing particular attention to inequalities experienced by women and marginalised groups within societies.[98]

Humanitarian crises continue to preoccupy the United Nations and other international organisations, including those resulting from longstanding international disputes and instability in individual countries. These exacerbate the impact of poverty, disrupt economic activity and social welfare, and adversely impact the availability of infrastructure and the resources people need to access digital services that can help to keep them safe. Conflicts have seen digitalisation and digital assets used both to increase military effectiveness, for instance by deploying drones and other automated weapons systems, and to threaten the cybersecurity of digital and other

infrastructure. ICTs can also be used positively, however, to monitor conflict, help to protect the safety of non-combatants and support post-conflict reconstruction.[99]

The growing climate crisis is of particular significance within and beyond the SDGs. Rising temperatures and extreme weather events have been particularly marked in 2023 and 2024, as greenhouse gas emissions (GHGs) have continued to grow, leaving, according to United Nations estimates, just a 14 per cent chance of limiting global warming to the maximum of 1.5°C that was adopted as a global goal in the 2015 Paris Climate Agreement.[100] The risks posed as a result of climate change, including rising sea levels and weather patterns that reduce the viability of established human settlements, have profound implications for both human welfare and global security, including the likelihood of increased migration and the risk of conflict over land and scarce resources. ICTs can play a part in reducing these impacts, through monitoring, mitigation and adaptation, but they also contribute to increased energy consumption and thereby to GHGs. Other environmental challenges, including overconsumption of scarce resources, pollution and loss of biodiversity, also have implications for digital and sustainable development.

The UN Secretary-General reflected on these challenges and the consequential need to reinvigorate international cooperation posed by poverty and inequality, sustainable development and conflict resolution, gender equity, human rights and trust in public institutions in his 2021 report *Our Common Agenda*.[101] Debates initiated by that report led to the General Assembly's adoption in 2024 of the *Pact for the Future*, which reinforced goals for sustainable development, including finance, peace and security, technology and innovation, opportunities for future generations, and global governance.[102] The *Global Digital Compact* was adopted by the General Assembly as an integral part of the *Pact*.

B. WSIS goals, targets and Action Lines

WSIS' overall goals were set out in the *Geneva Declaration of Principles*, which envisaged progress towards a 'people-centred, inclusive and development-oriented Information Society,' consistent with sustainable development and human rights. The Geneva and Tunis outcome documents initiated a number of monitoring and governance mechanisms to support these goals.

The *Geneva Plan of Action* included ten targets, mostly concerned with connectivity including that of schools, medical facilities, libraries and local government, for the ten-year period following the Summit.[103] These were qualitative rather than quantitative targets. More substantive indicators for them were developed by the Partnership on Measuring ICT for Development in 2010[104] and progress towards achieving these was assessed by the Partnership in the *Final WSIS Targets Review*, published ahead of the WSIS+10 review in 2014.[105] New targets were not established in their place during that review, though broad targets for aspects of connectivity have since been adopted amongst others by ITU, through its Connect 2020 and Connect 2030 agendas,[106] and the Broadband Commission (see Chapter 2F).

The Geneva outcome documents established eleven Action Lines representing aspects of digital development to be pursued through multistakeholder cooperation. These Action Lines, which remain in place and are reviewed annually at meetings of the WSIS Forum, are listed in Table 1. With mandates set out in the *Plan of Action*, they provide a framework to support discussion of specific themes within and between governments and other stakeholders but have no independent funding or decision-making role. Policies and programmes concerned with digital

development are the responsibility of governments and international organisations including UN entities and development partners, and of other stakeholders.

Table 1 – the WSIS Action Lines

Action Line no.	Action Line title	Chapter
C1	The role of governments and all stakeholders in the promotion of ICTs for development	2F
C2	Information and communication infrastructure	2A & 2B
C3	Access to information and knowledge	2A & 2D
C4	Capacity building	2A & 2B
C5	Building confidence and security in the use of ICTs	2B
C6	Enabling environment	2B
C7	ICT applications	2C & 2D
C8	Cultural diversity and identity, linguistic diversity and local content	2E
C9	Media	2E
C10	Ethical dimensions of the Information Society	2E
C11	International and regional cooperation	2F
Action Line C7 has eight subsidiary Action Lines which are concerned with:		
C7a	E-government	2D
C7b	E-business	2C
C7c	E-learning	2D
C7d	E-health	2D
C7e	E-employment	2D
C7f	E-environment	2D
C7g	E-agriculture	2D
C7h	E-science	2D

Source: Tunis Agenda for the Information Society, Annex

The *Tunis Agenda* established a number of governance arrangements concerned with the coordination of United Nations and international activity in support of WSIS outcomes, Internet governance, financial investment and the monitoring and measurement of digital development.

These outcomes, including developments within Action Lines, are reviewed in six subsidiary chapters below:

- Chapter 2A is concerned with connectivity and digital inclusion;
- Chapter 2B with the digital ecosystem;
- Chapter 2C with the digital economy;
- Chapter 2D with other aspects of sustainable development;
- Chapter 2E with human rights and the ethical dimension of digital development; and
- Chapter 2F with digital governance.

It is not possible to discuss all of these issues comprehensively within this report. The summaries below focus on the most significant developments in each area since WSIS, including initiatives that have drawn inspiration from the WSIS outcome documents. More substantial reports made by UN agencies and Action Line facilitators in response to consultations for this report and for ITU

can be found online.[107] Discussions in this chapter also consider priorities identified for future development within the consultation process for this report and wider literature.

A special focus is paid below to developments to date and priorities for the future in three areas addressed in the WSIS Action Lines – e-governance, the digital economy and the environment – and to cross-cutting assessments of the impact of digital development since WSIS on women and on children. In addition to the published literature and consultation inputs these sections draw on achievements, challenges and priorities identified in expert group discussions organised by CSTD as part of preparatory work for this report.

CHAPTER 2A – DIGITAL INCLUSION

including Action Lines C2, C3 and C4

The *Geneva Declaration* asserted that the Information Society should be 'people-centred' and 'inclusive', with the aim of bringing connectivity and online services to all. This chapter considers the development of digital inclusion since the Summit. Priorities for further progress towards universal connectivity are also summarised in Chapter 3.

The scale and scope of access, including the quality of connectivity and the type of services available to users, have changed enormously since WSIS. It is widely recognised in the consultation and wider literature that their growth represents one of the major achievements of digital development since the Summit, but immense challenges remain in fulfilling the objective identified at WSIS and reiterated in the *Agenda for Sustainable Development* to achieve 'universal and affordable access to the Internet'.

Concern about the inadequate reach of communications services began long before WSIS, in the mid-1980s, before mobile telephony, when the Independent Commission for World-Wide Telecommunications Development (the Maitland Commission) identified an 'immense disparity' – what is now often called a 'digital divide' – between developed and developing countries, with the majority of the world's population living in countries which then had less than one telephone per hundred people.[108] The need to address 'digital divides' between and within regions and individual countries has been stressed in every international agreement on the Information Society since WSIS, including the Summit's outcome documents, the ten-year review conducted by the General Assembly, annual resolutions on WSIS implementation, and the *Global Digital Compact* agreed in 2024. It has also featured in broader development agreements including the *2030 Agenda* and the *Pact for the Future*.

Mobile telephony

Mobile telephony had begun to improve the reach of connectivity by the time of WSIS, though its presence was still low in most developing countries. Much less attention was paid to mobile phones in the WSIS outcome documents than to the Internet which was then expected to be delivered primarily through fixed networks. By 2005, ITU estimated that there were around 19.1 fixed and 33.9 mobile phone subscriptions for every hundred people worldwide, but those figures were as low as 0;9 and 5.0 per cent in LDCs, where access to a public (fixed line) phone within reasonable proximity was still the main objective in strategies for universal access.[109]

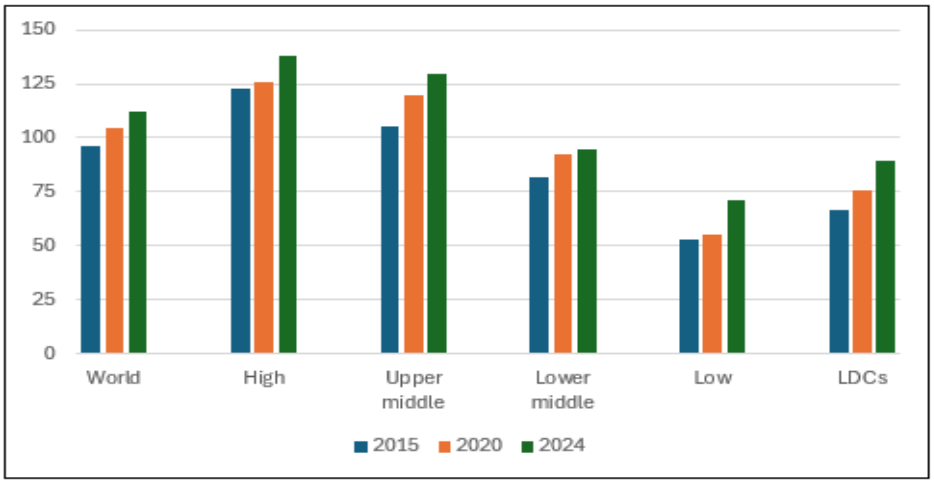
Access to mobile telephony has grown enormously since then, with ITU's estimate of the number of mobile cellular subscriptions worldwide rising from that figure of 33.9 per hundred people in 2005 to more than one per person by 2017 (partly the result of many people holding more than one subscription) and 112.1 per hundred in 2024. Just under 95 mobile subscriptions per hundred people are now estimated to be broadband, enabling full, if not always reliable, connection to the Internet – compared with 4 per hundred in 2007, the earliest year for which ITU currently publishes an estimate, just under 45 per hundred in 2015 and just over 75 per hundred in 2020.[110]

Inequalities – or digital divides – between regions and countries, however, remain very substantial. The average figures for mobile cellular and mobile broadband subscriptions in sub-Saharan Africa reported by ITU in 2024 were 97.5 and 51.5 per hundred population respectively;

in low-income countries, they were 71.0 and 40.1 per cent. Figures 7 and 8 show growth in mobile phone subscriptions by ITU region (since 2005) and development status (since 2015, the earliest date for which ITU data on this metric are currently available).[2]

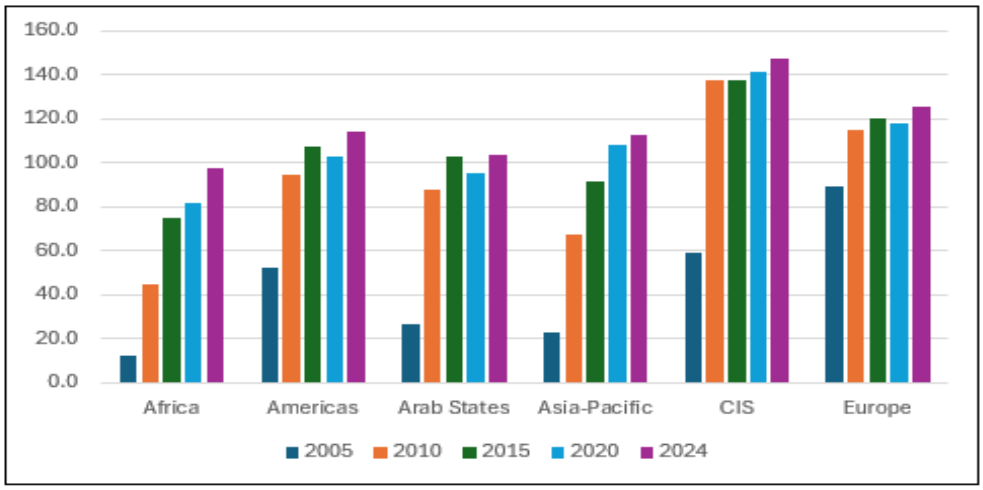
Data on the number of individuals owning a mobile phone are more difficult to obtain than the number of subscriptions, and ITU estimates are only available from 2019. These indicate that the proportion of people aged ten or over owning a mobile phone worldwide had reached 79.7 per cent by 2024 (up from 70.9 per cent in 2019, ranging from 96.1 per cent in high-income countries and 95.3 per cent in Europe to 66.2 per cent in sub-Saharan Africa and 56.2 per cent in low-income countries. In some countries, the figure remained under 40 per cent last year.[111] Figure 9 illustrates the level of mobile phone ownership in 2024 by development status and ITU region.

Figure 7 – Growth in mobile phone subscriptions per 100 people, 2015-2024, by income/development status



Source: ITU statistics, as above

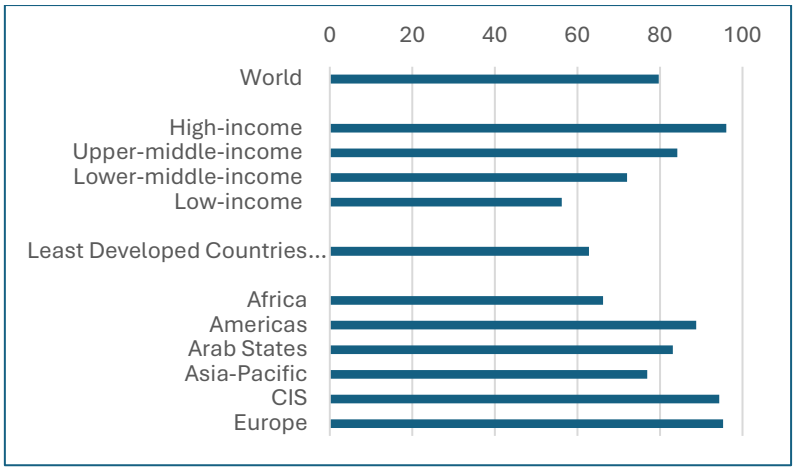
Figure 8 – Growth in mobile phone subscriptions per 100 people, 2005-2024, by ITU region



[2] It should be noted in reference to this and other charts derived from ITU statistics that ITU regions differ from those used in other UN and World Bank data sets, and so cannot be directly compared with these.

Source: ITU statistics, as above

Figure 9 – Mobile phone ownership per 100 people aged 10 and above, 2024



Source: ITU statistics, as above

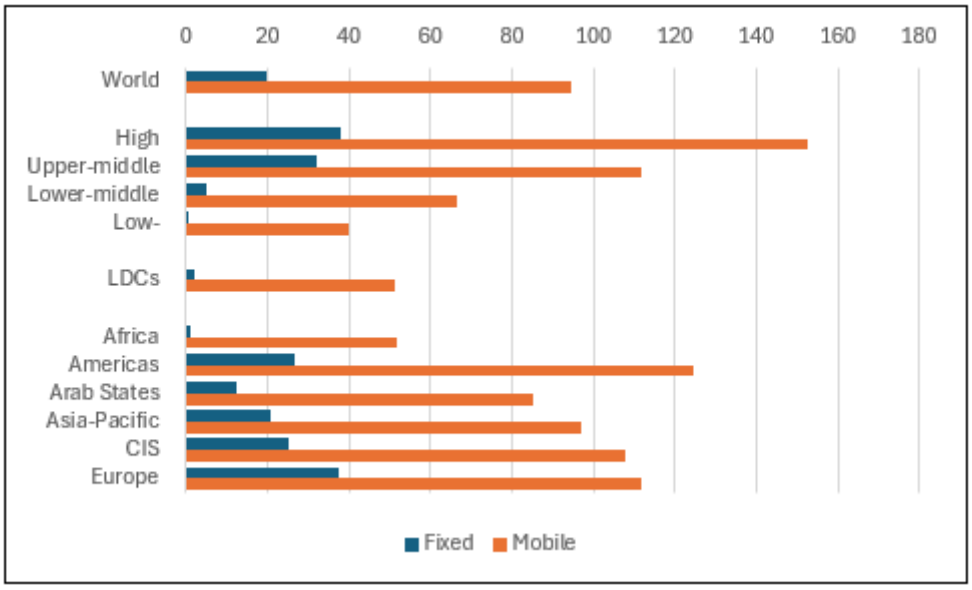
A critical factor in the growth of mobile take-up has been the burgeoning capabilities of mobile devices. Traditional telephony is now just one of many applications (and, for most users, no longer the most important of these). Mobile phones have become multipurpose digital devices, provide a very high proportion of users with their primary gateway to the Internet, and offer access to a burgeoning range of apps that connect with public services, information resources, social media, e-commerce, broadcasts, music and other kinds of entertainment. Devices that were seen as luxuries by most people at the time of WSIS are now considered indispensable by many (and in many countries most) citizens.

Fixed telecommunications and personal computers

As they have become so pervasive and so capable, mobile devices have increasingly displaced personal computers (PCs) and fixed telephones for managing personal interactions.

ITU statistics show the global number of fixed telephone line subscriptions (primarily for voice telephony) falling from 19.1 per 100 inhabitants in 2005 to 14.1 per cent in 2015 and just 10.3 per cent in 2024. A fall is recorded in all development/income categories and all ITU regions, for example from 43.9 to 28.5 lines per 100 inhabitants in Europe and from 1.5 to 0.6 in sub-Saharan Africa, where there has never been extensive household use of fixed phone lines.[112] The number of fixed broadband subscriptions has grown, however, rising from an estimated 3.4 per hundred inhabitants worldwide in 2005 to 11.3 in 2015 and 19.6 in 2024. Fixed broadband subscriptions are even more markedly differentiated by region and income/development status than those for mobile broadband, as shown in Figure 10.

Figure 10 – Fixed and mobile broadband subscriptions per 100 inhabitants, 2024, by income/development status and ITU region



Source: ITU statistics, as above

Global shipments of PCs rose between 2008 and 2011 from approximately 290 million to approximately 365 million units annually, but have since tailed off, falling to some 245 million in 2023 – though they did rise during the two years of the COVID-19 pandemic when they peaked at just over 340 million in 2021.[113]

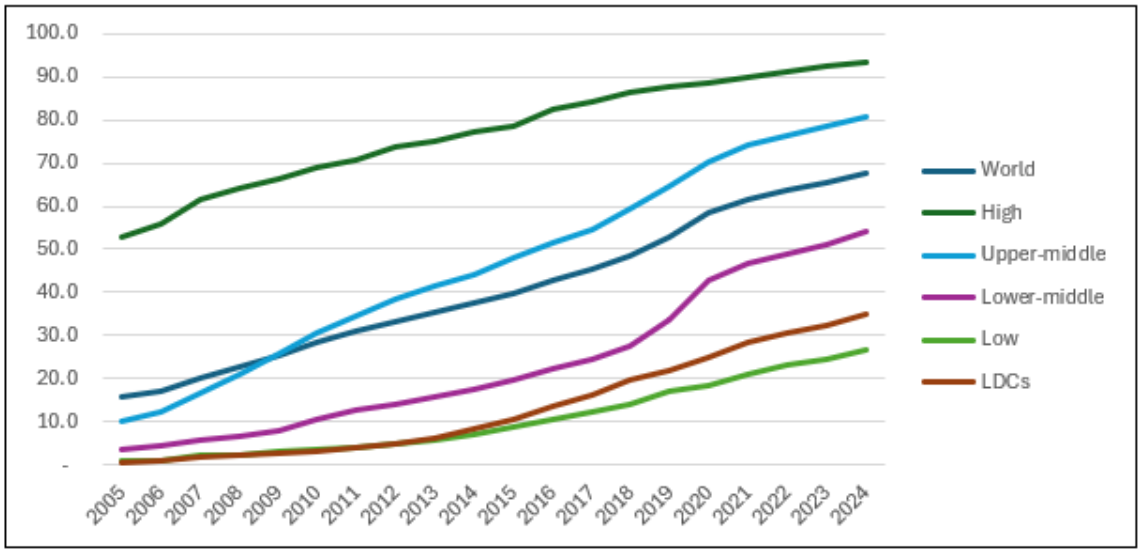
Internet access and usage

Internet access has grown more slowly than access to mobile phones, partly because it depends on more sophisticated networks, which are not universally available, and more expensive terminal devices, and for a variety of social and economic reasons including the need for digital skills and the availability of content considered relevant by potential users. The growth in Internet usage worldwide since WSIS is shown in Figure 12 below. In 2005, ITU estimated, around 15.6 per cent of the global population accessed the Internet at least once every year. By 2015 that had increased to 39.8 per cent obtaining access at least once in every three months, and that indicator is now estimated to have reached 67.6 per cent.[114] While providing an overall figure for Internet access and basic usage, this indicator in itself does not provide the granularity that is required for understanding 'meaningful access' (see below).

As with mobile telephony, very substantial differences remain in levels of access to the Internet between different regions and, within these, between countries in different development and income categories. ITU data suggest that the proportion of Internet users per hundred people in high income countries in 2024 (93.4 per cent) was three and a half times that in low-income countries (26.5 per cent); that in Europe (91.2 per cent) almost two and a half times that in sub-Saharan Africa (37.5 per cent). A few individual countries recorded figures below 20 per cent.[115] These differences are illustrated in Figures 11 and 12.[3]

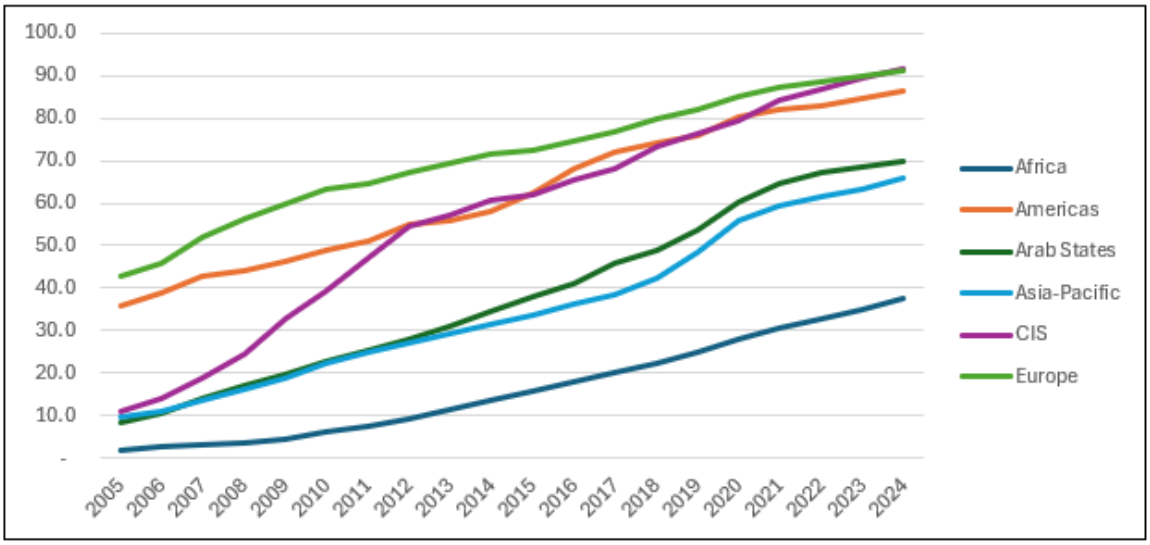
Figure 11 - Growth in Internet usage, 2005-2024, by income/development status (Internet users per hundred population)

[3] It should be noted that figures for Internet and mobile usage in these paragraphs are not directly comparable, as the former include all inhabitants, the latter only those aged 10 and over.



Source: ITU statistics, as above

Figure 12 – Growth in Internet usage, 2005-2024, by ITU region (Internet users per hundred population)



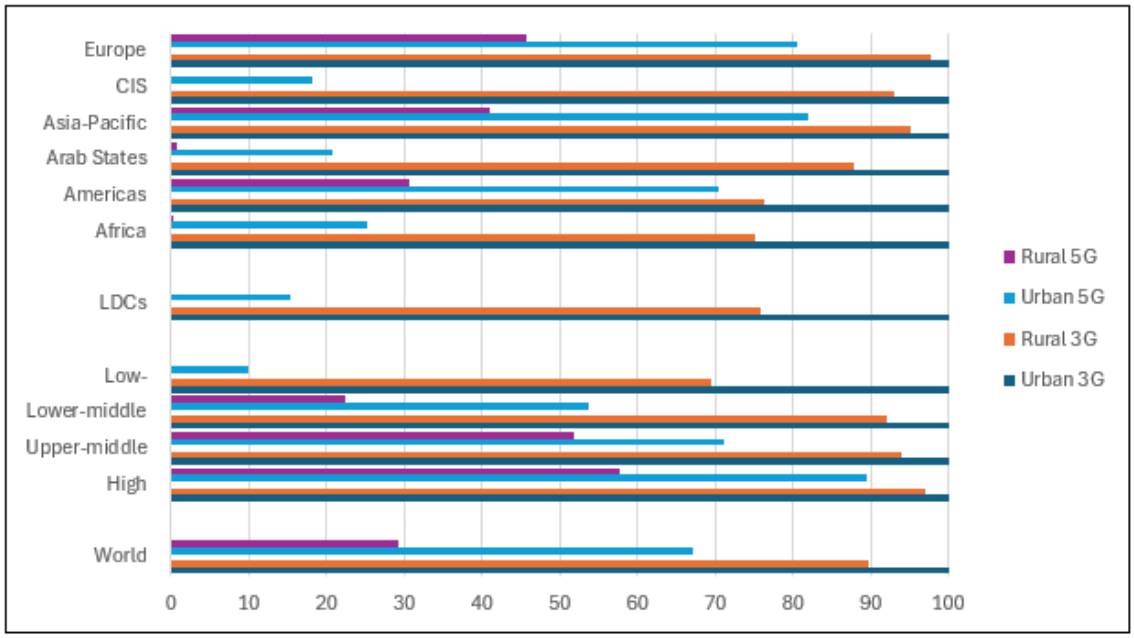
Source: ITU statistics, as above

Differences in levels and frequency of Internet access also vary substantially within countries. While access many times a day has become the norm for the large majority of users in developed and high-income developing countries, intensive usage is less frequent, on average, among Internet users in lower-income countries. This results from a number of factors, including the lack of sufficient bandwidth to access more sophisticated services (especially in remote and rural areas with less advanced mobile networks), and the costs of digital devices and data access relative to Gross National Income per head (GNI *p.c.*) and to disposable income.

Digital divides within societies

Rural districts, as illustrated in Figure 13, are generally less well connected than urban areas, especially in developing countries. ITU data suggest that, while people living in urban areas are in practice universally covered by 3G networks, that was still, in 2024, the case for less than 90 per cent of those living in rural areas worldwide, and only around 75 per cent of those in rural areas of sub-Saharan Africa and LDCs. The proportion of the population accessing the Internet in urban areas across the globe was estimated to be 82.9 per cent in urban areas, but only 47.5 per cent in rural areas. The difference was relatively small in Europe (93.1 per cent against 85.8 per cent) but much more substantial in Africa (57.1 per cent against 22.7 per cent) and low-income countries (45.8 per cent against 16.1 per cent).[116]

Figure 13 The urban/rural divide in digital inclusion by income/development status and ITU region[4] (Proportion of population covered by at least 3G and 5G mobile networks, 2024)



Source: ITU statistics, as above

Other digital divides within societies reflect socio-economic characteristics within populations. Social groups that are considered likely to experience relative digital disadvantage in both developed and developing countries include the elderly, those with disabilities, ethnic and linguistic minorities, indigenous communities, refugees and migrants. The disadvantages of individuals and social groups that have remained offline are often intersectoral, those most marginalised being affected by multiple causes of disadvantage and experiencing greater marginalisation as digital access becomes the norm for more and more public and private services.

Gender digital divides

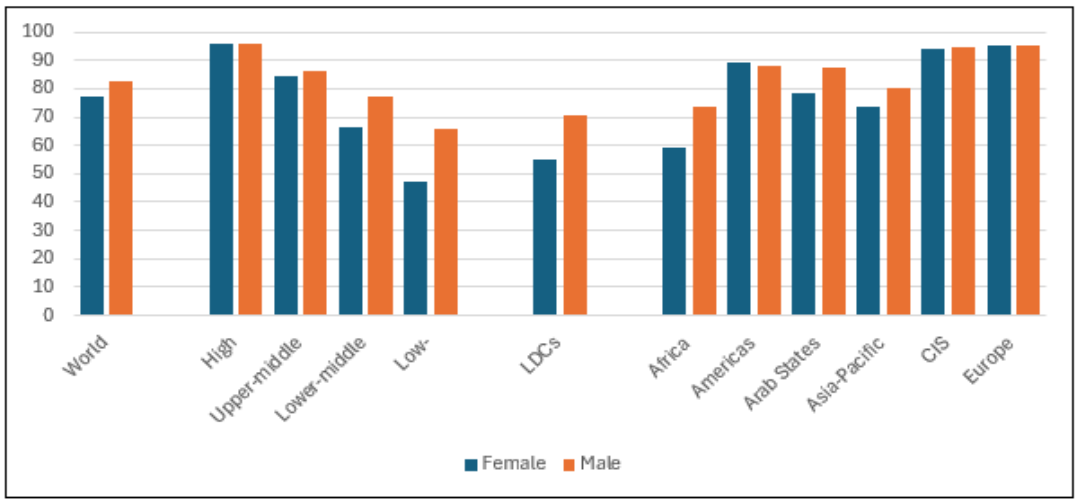
Gender digital divides have been of particular concern in international discussion of inclusion since WSIS.[117] ITU data suggest that the proportion of women aged 10 and over using a mobile phone worldwide (77.0 per cent) is significantly lower than that of men (82.4 per cent), and, again,

[4] 5G data unavailable for CIS region, low-income countries and LDCs.

that this discrepancy is more acute in some regions than others. Reported figures for both mobile ownership and usage in Europe and the Americas are almost equal between women and men, while those reported for sub-Saharan Africa (59.3 per cent against 73.4 percent in mobile ownership and 31.4 per cent against 43.4 per cent in Internet usage) and in low-income countries (47.2 per cent against 65.7 per cent and 20.9 per cent against 31.9 per cent) are much more substantial. These ITU data are illustrated in Figures 14 and 15.

Figure 14

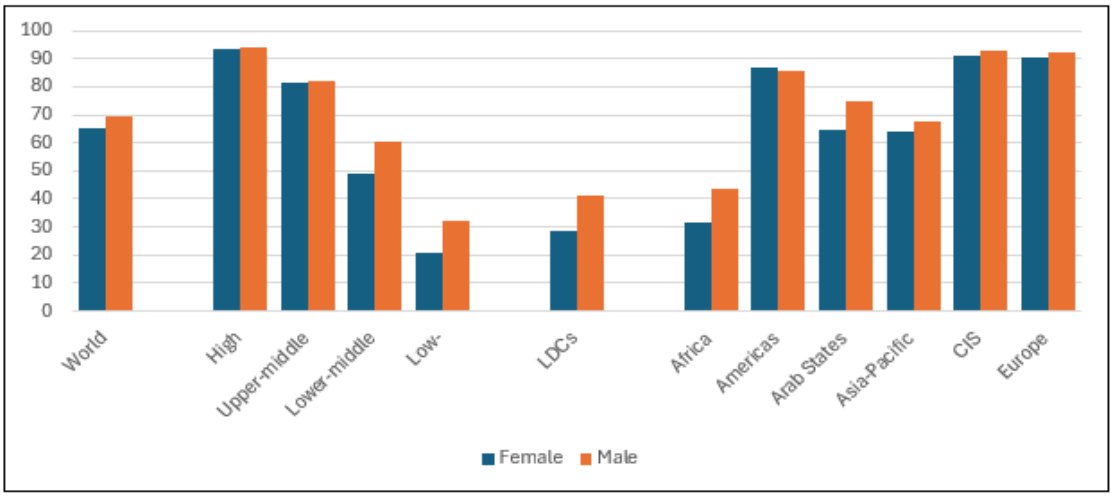
Percentage of female and male population aged 10 and over owning mobile phones, 2024



Source: ITU, Facts and Figures, 2024

Figure 15

Percentage of female and male population using the Internet, 2024



Source: ITU, Facts and Figures, 2024

GSMA reports regularly on trends in the mobile gender gap in low and middle-income countries (LMICs). Its figures show that progress towards greater equality in these countries, which was occurring in the period before 2020, was reversed by the COVID-19 pandemic and has only

recently recovered to pre-pandemic levels. It suggests that the mobile gender gap in LMICs in 2024 was some 15 per cent.[118]

These discrepancies are associated with broader gender inequalities, including discrepancies in access to education and income earning opportunities. Cultural barriers to gender equality are also cited in some countries. The gender digital divide and other issues concerned with women's experience of digitalisation are discussed further in Chapter 2E.

Age and other demographic groups

Data gathering on other social aspects of digital inclusion – such as age group, disability and language capabilities – is challenging, and both quantitative and qualitative research are particularly limited in LDCs. Comprehensive household surveys add greatly to the depth of understanding of communications markets in some developed countries.[119] Similar studies undertaken by business associations such as GSMA and research consortia such as the After Access group of research institutes[120] have contributed greatly to the development of policy and business models where they can be undertaken, but independent research requires development finance if trends in longitudinal data are to be reliably gathered and analysed.

ITU has, since 2020, published estimates for use of the Internet by the age category internationally defined as 'youth' (18-24), which suggest that this age group is considerably more engaged with the Internet than the general population both worldwide (78.5 per cent against 65.6 per cent in 2024) and in all regions and development categories (98.4 per cent against 90.5 per cent in Europe, 53.0 per cent against 33.6 per cent in Africa, 42.6 per cent against 22.7 per cent in low-income countries).[121] Comparable data for other age groups are not readily available, though those aged 65 and above are generally understood to be relatively low users of the Internet even in developed countries. Research in the United Kingdom in 2021-22, for instance, found that almost 30 per cent of people aged 75 and over had no access to the Internet, while very few of those aged under 65 remained offline.[122]

Studies have also shown lower levels of Internet engagement within age groups by those experiencing other forms of economic or social exclusion, who may disproportionately lack operational skills (including literacy and knowledge of international languages) and sometimes have less positive attitudes towards the Internet, expecting it to offer little in the way of benefit to them to compensate for perceived risks such as exposure to cybercrime and harassment.

Persons with disabilities

The UN Convention on the Rights of Persons with Disabilities, adopted in 2006, includes specific reference to the right of access, on an equal basis, to 'information and communications technologies and systems, including the Internet' and to the need for these to be designed, developed, produced and distributed so that they are accessible to those with disabilities 'at minimum cost'.[123]

GSMA's study of *The Mobile Disability Gap* in 2021 found that persons with disabilities were less likely to own a mobile phone than non-disabled persons in every country studied, the gap being as high as 55 per cent in Bangladesh, and that they were less likely to own a smartphone or access the Internet.[124] Many persons with disabilities experience additional disadvantages, including low incomes, which also affect their ability to access online services.

Overall needs of those with disabilities have been addressed by digital stakeholders through standards, guidelines and other interventions.[125] Hardware and software, websites and online

content can be and have been designed and made available in ways that enable users with a variety of disabilities, including visual and hearing, motor and cognitive impairments, to access and use them effectively on as near as possible to equal terms with other users. Examples of relevant design include text-to-speech modes and voice-activated commands that assist those with visual and hearing impairments. Evolving technology and services, including AI, will provide further opportunities to enhance accessibility, but, as with other innovations, these are likely to be more readily available in developed countries and to those who can afford more expensive handsets and equipment.

Digital, social and economic inequalities

Discrepancies in access to digital resources are particularly important because evidence shows that inequalities in access to ICTs do not merely reflect the disadvantages experienced by under-represented groups but can also increase their relative exclusion from both digital and wider social and economic services. Within all countries, more prosperous individuals and communities are more able to afford mobile phones and Internet access than those that are less prosperous, while those that are more highly educated are able to make more effective use of online services. Concerns have been increasingly expressed as a result – not least within the consultation process for this report – that, rather than reducing social and economic inequalities as had been hoped at WSIS, ICTs may be contributing towards them, improving access to resources for those who are more advantaged in society without adequately addressing the needs of those who are less advantaged.[126]

As early as 2016, the World Bank recognised the risk that 'rapid technological change will end up increasing inequality and leaving many behind – blunting the digital dividends' that the Bank was concerned to promote.[127] An extensive study of access and use of Internet in Africa in 2018 concluded that 'without complementary policies, new digital technologies and Internet-based services simply amplify existing inequalities.'[128] The *Pact for the Future* likewise recognised that 'science, technology and innovation can perpetuate and deepen divides, in particular the gender gap and patterns of discrimination and inequality within and between countries and adversely impact the enjoyment of human rights and progress on sustainable development.'[129] Research into the links between digital, social and economic exclusion has led to stronger understanding that policy interventions concerned with digital inequality need to address social and economic equality/inequality, and *vice versa*.[130]

Meaningful and affordable inclusion

The growth of connectivity and personal access to mobiles and the Internet since WSIS has led to a shift in the focus of access policy from basic service provision to concepts such as "meaningful connectivity", that reach beyond the availability of online services to people's ability to make use of them in ways that add value to their lives, for instance, by increasing opportunity, facilitating access to public services and reducing transaction costs. This was described during the consultation for this report as a shift in understanding of the primary challenge in digital divides from the supply side of the Internet and digital resources to the demand side – from connectivity to usage and from inputs to impacts.

Although there is no single definition of "meaningful connectivity", discussion of it has generally focused on five main elements:

a. the availability of networks offering 3G or higher capabilities;
b. the affordability of access and services in relation to income for the average (potential) user;

c. the availability of content and services that respond to (potential) users' priorities and needs;
d. the extent to which these are accessible through diverse languages; and
e. the capabilities and resources that individuals require to make effective use of services that are available, including literacy and information literacy.

Responding to the first of these elements, efforts to address risks of digital exclusion have included interventions aimed at providing broadband connectivity in locations that are commercially unattractive to network operators – through innovative mechanisms such as community networks and by maintaining public access facilities such as those in schools and libraries at a time when commercial telecentres, which were growing more numerous at the time of WSIS, have declined in number.

Affordability is particularly critical to enabling access. In 2011, the Broadband Commission set a target that broadband data services should be available for less than 5 per cent of average GNI *p.c.* each month.[131] In 2018, it reduced that target to 2 per cent of average GNI *p.c.*[132] While this had been achieved in most higher-income countries by 2023, only a minority of LMICs had yet achieved it, and within them, services were effectively out of reach for the many individuals with below-average incomes. The average price of a 2GB data-only mobile broadband basket estimated by ITU in 2024 had fallen to 1.1 per cent of GNI *p.c.* worldwide but was still as high as 4.2 per cent in Africa, 4.6 per cent in LDCs and 7.4 per cent in low-income countries.[133]

The cost of handsets, particularly smartphones, is identified by GSMA as a further barrier to the use of mobile Internet, exacerbated in recent years by reductions in disposable income experienced during the COVID-19 pandemic. Device manufacturers can make products to meet the needs of different markets, from low-cost handsets that are affordable to those with limited disposable income, particularly in developing countries, to high-specification high-cost handsets with up-to-the-minute features that are preferred by wealthier customers in developed countries and elsewhere. Recent innovations have driven down the cost of the former while raising the latter's capabilities and costs. GSMA has published recommendations to manufacturers, service providers and governments that include developing handsets to meet diverse end-user needs, incentivising local production and offering more accessible financing mechanisms for potential users with limited or variable incomes.[134]

Research indicates that lack of awareness of potential benefits, lack of relevant content and skills, and fear of potential risks of Internet use are also important barriers to Internet engagement among those who are unconnected or make very limited use of Internet.[135] Perceptions that the costs and risks of Internet access outweigh potential benefits tend to be most acute, and most resistant to change, in vulnerable social groups and those that feel marginalised within their wider societies. A shift to providing public and other services online, sometimes to the exclusion of offline provision, has in some cases run the risk of reducing rather than improving access to vulnerable and under-represented groups.[136]

Overcoming digital divides derived from these barriers is challenging because constant improvements in the capabilities of networks and devices, which make new and more sophisticated digital resources more available to those with the required funds and skills, mean that those with lower incomes and more limited resources continue to lag behind those who are better resourced. The extent to which online activity pervades different societies and reaches different groups within them, is therefore seen to vary substantially, with significant consequences for its impact on economic activity and development and on the potential for digital resources to diminish the impact of social and economic inequalities.

Access to information and knowledge (Action Line C3)

Access to much broader information sources was identified from the start of the WSIS preparatory process as one of the principal benefits of digital technology, recognised as an enabler of a broader range of human rights and developmental opportunities. One of the core objectives for the Information Society identified at the Summit was that it should extend 'the ability for all to access and contribute information, ideas and knowledge,' building on the rights of access to information and freedom of expression articulated in Article 19 of the International Covenant on Civil and Political Rights.[137] Measures should be taken, the *Geneva Declaration* urged, to remove barriers and enable equitable access to information of value to individual and societal development, including public domain information. As well as connectivity through individual access, which was limited at the time of WSIS, libraries and other public facilities were identified as crucial intermediaries, or gateways, to information.[138]

There has been significant development since WSIS in some more technical aspects of information access addressed in Action Line C3. (Aspects concerned primarily with rights are discussed in Chapter 2E.)

Many underlying technologies in the digital environment, for instance, have remained open source, and principles of openness have been widely applied elsewhere, for instance in the reach of open educational resources[139] and in the use of more open forms of intellectual property (IP) such as creative commons licences.[140] The World Wide Web, the cloud and social media, meanwhile, have greatly expanded the ability of governments and government-funded programmes to make information accessible to business and individual users, while improvements in computing have enabled much more sophisticated analysis of data sets.

UNESCO has played an important part in strengthening access to information and fostering an environment conducive to its implementation, including capacity building and technical assistance. It reported in 2022 that 114 countries out of 123 responding to a survey indicated that they now have legislative or constitutional guarantees for access to information, a figure that it now reports has grown to 140,[141] while a smaller number are reported to have enacted freedom of information legislation enabling organisations, journalists and citizens to request unpublished data.[142]

While the opportunity to access much greater volumes of content online has had great benefits within society, it has posed challenges to some established business sectors. The ability for individuals to bypass copyright and other intellectual property restrictions by downloading content (such as music and video) online, for instance, has undermined the viability of some creative sector businesses and led to innovation in the ways that content is delivered, including new approaches to copyright, licensing and publication. The exploitation of existing online content to train large language models without the explicit consent of content creators has posed fresh challenges to traditional regulation of intellectual property.

Finally, the Action Line addressed the availability of online resources for those without their own access devices through libraries and other community facilities – a goal which also featured in the list of WSIS targets. At the time of the Summit many, even in developed countries, accessed online information through telecentres, but the commercial viability of these has diminished as personal ownership of mobile phones (and their capacity to access the Internet) has grown. Libraries and other government-owned or -managed facilities have therefore become more important gateways to information for those who are not personally online – not just in countries

with low take-up of mobile Internet but also in those where information on, for instance, welfare benefits and job opportunities has largely moved online. The International Federation of Library Associations (IFLA) has developed guidelines and resources to support the role of libraries as information hubs.[143]

CHAPTER 2B – THE DIGITAL ECOSYSTEM

The WSIS outcome documents and Action Lines address both the supply side of the Information Society – the infrastructure, enabling environment, investment and other requirements for digital development – and the demand side – the uses of digital resources to support the goals of government and business, sustainable development and human rights. This chapter assesses progress in outcomes concerned with the supply side. Chapters 2C and 2D are concerned with demand side impacts.

Achieving 'universal, ubiquitous, equitable and affordable access to ICT infrastructure and services' would, the *Geneva Declaration* asserted, require the deployment of networks and services, both internationally and in individual countries. This would in turn require financial investment and an enabling environment to foster innovation and investment.[144]

The Information Society was already undergoing rapid development at the time of WSIS: indeed, that rapid development, and the new opportunities that it presented, were among the reasons for ITU and the United Nations to launch the WSIS process. The decade preceding the Summit saw major changes in the structure of the telecommunications industry, including the digitalisation of fixed telephone networks, the privatisation of state-owned network operators, the liberalisation of national telecoms markets, the introduction of mobile phone services, and the expansion of what had previously been primarily voice networks into data services including Internet.

These developments, which opened markets to competition and increased their potential profitability, facilitated two further developments in communications markets that were taking place around the time of WSIS: greatly increased investment in international, regional and national networks, much of it financed by international private sector businesses; and the introduction of national regulatory agencies charged with promoting fair competition within national communications markets. A number of international initiatives explored the potential for these changes to enhance social and economic development before the Summit, including a Global Digital Divide Initiative within the World Economic Forum (WEF), the Digital Opportunities Task Force (DOT Force) initiated by the G8 group of countries, and a UN ICT Task Force which considered ICT development between 2001 and the midpoint of the Summit process in 2004.[145] There was, therefore, considerable momentum for change in and beyond the communications sector when the Summit's preparatory processes began in 2001, which fed into the discussions and conclusions that resulted.

Financial investment (*Tunis Agenda*, paras 3-28) and ICT infrastructure (Action Line C2)

The transition from state-owned telecommunications operators to liberalised communications markets, and the advent of mobile operators, that occurred around the time of the Summit represented a major shift in investment finance for telecommunications from state funding, which was often restricted by public sector budgetary constraints, to private sector funding motivated by the goals of rapid returns on investment, competitive advantage and profit maximisation. While network investment grew rapidly in the period after WSIS, it tended to focus on geographic areas and services most likely to achieve these commercial goals.[146] Geographic areas with lower potential returns, particularly those thought to be commercially unviable, received much less investment and, where new infrastructure was deployed, this often provided lower capacity and capabilities than were available in more profitable areas. The lasting impact

of differential investment patterns can be seen in the disparities between urban and rural connectivity described in Chapter 2A.[147]

The need for further financial investment in telecommunications, particularly in developing countries and in areas that were commercially less attractive, was reviewed by a Task Force on Financing Mechanisms (TFFM) between the two sessions of WSIS. Its recommendations for 'improvements and innovations', which were adopted in the *Tunis Agenda*, focused on what were then identified as critical priorities for investment, including regional broadband infrastructure, connectivity in LDCs and SIDS, and capacity-building for regulators and policymakers concerned with communications.[148]

The scope and scale of investment in ICT infrastructure has grown enormously since WSIS as a result of expanding markets, new technological capabilities requiring greater capacity, and new types of service requiring additional types of infrastructure. The focus of investment has changed over time as technology has evolved, with fluctuations in the relative importance of international and national, fixed and wireless, terrestrial, undersea and satellite infrastructure and the growing importance of data centres alongside transmission networks.

Some developments in infrastructure, such as hyperscale data centres and research and development in aspects of AI, require very high levels of investment that have proved only feasible for companies with global scale. Alongside this, however, there has been an immense amount of innovation by small-scale businesses, from start-ups at the cutting edge of innovation to local businesses providing ICT support to stakeholders in their communities, which have required investment capital at smaller scale. Government departments, businesses in every sector and other organisations have invested heavily in ICT hardware, software and professional staff as their dependence on these for managing their work has grown.

The expansion of international submarine cable networks, which dominate provision of international connectivity, was described in Chapter 1, along with the emerging market for low earth orbit satellites. National backbone and local access networks have seen high levels of investment since WSIS across the world, as demand for increased capacity has been fed by growing volumes of data traffic. Continuing improvements in the capabilities of hardware and software have facilitated network upgrades to meet increased demand, including successive generations of mobile technology.

Many national and local markets that were considered commercially unviable in the days of fixed networks proved to be profitable for mobile operators in the years following WSIS, with rapid take-up of mobile services leading quickly to more extensive investment in mobile networks. Around US$400 billion was reportedly invested in developing countries' telecommunications by the private sector between 2003 and 2009.[149] High levels of investment by the private sector have not, however, been sufficient to meet requirements in all areas, particularly those where the costs of network deployment are likely to be high (because of difficult terrain) and usage low (because they have small populations or populations with low incomes). The TFFM recognised the importance of concessional and other finance from development partners in bridging these investment gaps in digital infrastructure. Investment in complementary infrastructure, particularly power networks, has also been important in enabling deployment of communications infrastructure.

Since 2005, funding from development banks and other international financial institutions has contributed to infrastructure development in developing countries through loans, grants and

technical assistance. The World Bank, for instance, provided US$4.2 billion in the years between 2003 and 2010 to support projects in the ICT sector (though not all of this was concerned with infrastructure).[150] A review of the Bank's ICT activities in 2011 concluded that its most notable contributions in the years following WSIS, in addition to sector reforms, had been in 'private investments for mobile telephony in difficult environments and in the poorest countries.'[151] The Bank subsequently focused on scaling up affordable access to broadband and supporting the emergence of competitive ICT-enabled innovation.[152] Its current strategy promotes universal broadband access and investment in data infrastructure and services for development, alongside work concerned with digital safeguards (cybersecurity), climate change and employment.[153]

Infrastructure and other ICT-related projects have also been supported by regional development banks and by members of the OECD's Development Assistance Committee (DAC). The African Development Bank, for example, has played a part in mobilising financial support for international submarine connectivity, regional backbones and cross-border infrastructure enabling landlocked countries to connect with submarine networks, and assisting the development of national backbones in a number of countries on its continent.[154] The Asian Development Bank has supported digital infrastructure in the Pacific island region, including submarine cables and national broadband networks, as well as the deployment of digital technology in public services, agriculture and other sectors.[155] Several of the UN's Regional Economic Commissions (RECs) have drawn governments within their regions together to promote infrastructure development within regional initiatives, including successive 'eLAC' plans supported by ECLAC,[156] Arab digital agendas and strategic plans endorsed by ESCWA and the League of Arab States,[157] and the Asia-Pacific Information Superhighway initiative of ESCAP.[158]

While major infrastructure investments by the private sector and development partners have extended access into most locations, small-scale investment has been needed to reach topographically challenging areas and communities that have proved commercially unattractive to established network operators, in remoter parts of developed as well as developing countries. One notable approach to addressing these, particularly in the last decade, has been the establishment of community networks, which respond in a variety of ways to the particular contexts and requirements of the communities they serve.[159] The availability of supportive regulatory frameworks is crucial to their viability.[160]

Data centres that enable cloud services have been a major growth market for investment by the private sector in the last decade, increasingly led by hyperscale data centres owned and managed by major global corporations. The global data centre market was valued at more than US$240 billion in 2023 with a projected annual growth rate of over 11 per cent. Hyperscale centres accounted for about a quarter of global market value in the sector, but that share was predicted to grow rapidly as AI generates increased data traffic.[161]

Investment in future technology is fundamental to the trajectory of the Information Society. Major trends for infrastructure development anticipated by ITU in the period following the WSIS+20 review include the development of 6G mobile and increased deployment of LEO networks, more extensive interconnected smart infrastructure (such as smart cities) enabled by more sophisticated IoT, and enhancements to fibre optic networks through innovative technologies such as quantum communication.[162]

Technology companies need to invest heavily in research and development if they are to remain competitive as technology evolves. Very high levels of capital investment are now made in R&D

for frontier technologies, including competition to bring advanced AI to business and consumer markets. Business investment in AI R&D is concentrated in just two countries, the United States and China, which, UNCTAD reported, accounted for 70 per cent of the world's top AI researchers in 2021.[163] Concern has been expressed that this concentration of investment in advanced technologies may result in limited focus on the different circumstances and priorities of developing countries from which lower returns on investment can be expected, at least in the short term.

The enabling environment (Action Line C6)

The *Geneva Declaration* recognised that 'The rule of law, accompanied by a supportive, transparent, pro-competitive, technologically neutral and predictable policy and regulatory framework reflecting national realities, is essential for building a people-centred Information Society.'[164] Governments were encouraged in the *Plan of Action* to develop national strategies for ICTs (or 'e-strategies') 'to make public administration more transparent, efficient and democratic.'[165]

ITU reported as early as 2010 that a majority of countries had established some form of national strategy for ICTs.[166] Experience has shown the need for the focus of such strategies to change over time as digitalisation has become more pervasive and integrated into national economies and governance, digital services have been mainstreamed in public policy areas such as health and education, and impacts on broader development goals such as those concerned with poverty and inequality have been better recognised. According to ITU data in 2023, 'half of all countries worldwide have [now] adopted digital strategies covering multiple economic sectors,' but the translation of these into 'digital policy, legal and governance frameworks' is still weak, with 'only nine countries ... currently equipped with mature national frameworks for digital markets geared at transformational development of digital economies and societies.'[167] The pervasive scope of digital transformation suggests that governments will need to take a more systems-based approach to digital development, integrating policy and regulatory frameworks across multiple economic sectors.[168]

The *Geneva Declaration* was also concerned about the responsibility of governments to promote an enabling regulatory environment for digital development. 'Governments,' it said, 'should intervene, as appropriate, to correct market failures, to maintain fair competition, to attract investment, to enhance the development of ... ICT infrastructure and applications, to maximize economic and social benefits, and to serve national priorities.'[169]

Governments were encouraged in the *Plan of Action* 'to formulate conducive policies that foster entrepreneurship, innovation and investment.'[170] Digital businesses have benefited from more relaxed regulation of innovation than many other economic sectors. Many technologists and digital entrepreneurs have advocated an approach to regulation that seeks to minimise restrictions on the development and deployment of new services in the belief that this will lead to more rapid innovation with beneficial outcomes for business, public services and citizens.

This more relaxed approach contrasts with the precautionary principle, which emphasises the need to prevent harm when outcomes are uncertain, that has been more common in other sectors, for example with respect to public health and the environment.[171] It is credited by many in the digital sector and some other stakeholders with accelerating the pace at which the Information Society has evolved. There has, at the same time, been growing concern in recent years about the risk of unexpected outcomes from future innovations adversely affecting

economic, social and political development before they are properly understood and regulations can be identified and deployed in order to protect the common good.[172] The search for balance between an enabling environment that fosters innovation and the desirability of safeguards has become more insistent in the last decade, particularly in recent discussion of AI.[173] The *Global Digital Compact*, responding to this, calls for 'a balanced, inclusive and risk-based approach to the governance' of AI, including assessment of 'the potential impact, opportunities and risks of artificial intelligence systems on sustainable development and the well-being and rights of individuals.'[174]

Economic regulation, usually through arms-length government agencies, expanded greatly in the telecommunications sector in the decade before WSIS as a necessary concomitant of privatisation and liberalisation, focused on promoting competition and stimulating new investment. Regulators' responsibilities included licensing and spectrum management, challenging market dominance (especially by incumbent fixed operators) and the promotion of user-friendly markets through mechanisms such as price controls and requirements for interconnection between competing networks. The scope of regulators' responsibilities has grown since WSIS along with the growing extent and capabilities of digitalisation, first addressing convergence between telecommunications and broadcasting, then the growth of data networks and online services as the Internet and data communications became as important as traditional telecommunications, and more recently addressing a wider range of issues concerned with consumer rights, data protection and content management.

Almost every country and territory now has a regulatory body concerned with communications and the wider digital economy, though the responsibilities of these agencies vary, as does their degree of autonomy from national governments. Some also have responsibilities for managing content on digital platforms. As digitalisation has reached more pervasively into economies and societies, they have needed to work more closely with regulatory bodies concerned with sectors that are deeply affected by it, such as financial markets, in order to ensure consistency.

A principal goal of regulation, and digital governance more generally, has been to promote investment, innovation and connectivity in ways that foster inclusion and adoption of digital services across national communities. Regulatory mechanisms for this have varied between different jurisdictions. Universal access/service funds, which utilise revenue derived from profitable districts to finance network investment in less profitable or unprofitable areas were widespread in the period around WSIS, their role diminishing over time as mobile networks and usage have spread throughout communities.[175]

The globalisation of digital business has made the role of regulation more challenging for smaller countries which have limited regulatory capacity to match that of the global businesses that operate networks and provide services within their jurisdictions. This has led to increased interest in regional and global cooperation. The sharing of experience and expertise, training and financial support for regulatory capacity-building have been supported by the ITU, particularly through its annual Global Symposia for Regulators,[176] by regional regulatory associations and by development partners including the World Bank and members of the OECD Development Assistance Committee (DAC).

The need for regulatory frameworks that facilitate the digital economy has become crucially important in enabling businesses to take secure advantage of the productivity and other benefits that can accrue from digitalisation. Priorities have included legislation and enforcement of regulations concerned with online transactions, data protection and data privacy, digital

signatures and consumer rights. Progress towards achieving universal coverage of these has been patchy but is receiving considerable attention.[177] UNCTAD's Global Cyberlaw Tracker reports that only 71 per cent of countries for which data are available currently have legislation for data protection and data privacy, including only 48 per cent of LDCs, and that only 81 per cent have e-transaction laws.[178] WTO reported in 2022 that around 60 countries have established their own laws and standards concerning digital signatures.[179] Growing threats to cybersecurity, including data and identity theft, are raising demand for stronger legal and regulatory frameworks in these areas.

Over time the reach of regulatory capacity-building has extended to accommodate new technological developments. Recent ITU Global Symposia for Regulators have focused on themes concerned with what ITU has called 'next generation regulation for sustainable digital transformation,' shifting the focus of regulation from market players to networks and services, with greater collaboration between regulatory authorities in different sectors and across regional borders.[180]

Capacity-building (Action Line C4)

The Geneva outcome documents identified three main areas in which capacity-building was essential for the Information Society to develop: the acquisition of the skills and knowledge required for full participation by the general public; technical skills required by those involved in the development of ICT-enabled systems; and understanding and appropriate skills for those responsible for decisions in government and public service related to digital public policy and the use of ICTs in public services.

There is a degree of overlap between this Action Line and that concerned with education (Chapter 2D) and the two Action Lines have been coordinated in the WSIS Forum. Basic educational and digital skills are required for every individual to benefit fully from the Information Society. These are acquired through both education and experience, and require continual updating as technology and services evolve, as many jobs within the economy become more ICT-enabled or ICT-dependent. Additional skills are required by those using computers and digital resources at work. The nature of these skills, too, has been changing with technology and services. AI-enabled analytical tools, for instance, are now displacing traditional computer-based office applications in much the same way that those applications (word processing, databases, spreadsheets) displaced their analogue predecessors.

More specialist skills are required by those concerned with the design, development and maintenance of hardware and software. WSIS called for specific training programmes to be introduced at different levels to address these technical skills – in schools and universities, in workplaces and through distance learning.[181] Considerable emphasis has been placed since then on education in science, technology, engineering and mathematics (STEM subjects), including the teaching of ICT-specific skills (such as coding) and ICT-enabled skills (such as the use of spreadsheets).

Enhancing STEM education has been easier in developed countries and developing countries with strong higher-education and technology sectors than in lower-income countries, potentially widening the gap between wealthier and poorer regions in digital innovation and entrepreneurship. The largest numbers of STEM graduates today, however, are emerging from colleges in China and India which are among five countries in which they make up more than 30 per cent of total graduates.[182] There has been particular concern about ongoing gender

inequality in student numbers in these skills, particularly in higher education, where women make up only 35 per cent of STEM graduates,[183] in ICT-sector employment and especially in management. The need to redress this gender imbalance was emphasised in consultation inputs to this report.

A number of United Nations organisations have pointed out that the pace of technological change can render capacity development efforts obsolete if they do not keep pace with the latest technological developments, as existing jobs are rendered obsolete and new job opportunities potentially created.[184] As in more general employment, AI is expected to continue substituting for human jobs in areas of STEM work such as coding, suggesting need for further evolution in the emphasis of adult education and training.

One area of capacity-building to receive increased attention recently is the professional development of policymakers and practitioners responsible for decisions about the digital sector itself and the use of digital resources in public policy. Technical dimensions of digitalisation are complex. Decisionmakers in government need sufficient understanding of ICTs, the Internet and AI to integrate them effectively into public policy processes, while technologists and digital entrepreneurs need to understand the intricacies of delivering public services when designing systems that are intended to facilitate them. Respondents to the consultation recognised the challenges involved in developing a common approach across these different disciplines. Much work has been done by ITU and other international organisations to build capacity and share experience among regulators. The IGF and WSIS Forum have paid attention to the needs of political decision-makers. UNESCO is currently focusing attention on building digital awareness and understanding among civil servants and the judiciary.[185] Demand for programmes of this kind is expected to increase.

Building confidence and security in the use of ICTs (Action Line C5)

The *Geneva Declaration of Principles* stressed the need to build confidence and security in the use of ICTs, emphasising that 'Strengthening the trust framework' is 'a prerequisite for the development of the Information Society and for building confidence among users of ICTs,' without which businesses and individuals would feel unable to take full advantage of the opportunities on offer.[186] The *Plan of Action* called for governments to build confidence and security in the use of ICTs, to remove risks to network and information security from criminal and other hostile actors and to protect users from fraud and abuse by other users which would prove barriers to trust in online services.[187]

The challenges posed for cybersecurity and in combatting cybercrime and other abuse have become much more complex since WSIS, with potentially more serious consequences because of the pervasiveness of ICTs and the extent of data held on individuals and organisations. The Internet's protocols and ways of working were originally intended to enable the exchange of data within small computer networks, rather than the global network that it has become today. As a result, in the words of ICANN, 'security was not a primary consideration' in the original design of critical resources such as the domain name system.[188] As the Internet has grown, inherent vulnerabilities have been exposed and exploited in ways that undermine confidence in the security of networks, the data held on computers, and thereby the organisations and individuals that make use of them. Stronger security measures such as the secure version of the hypertext transfer protocol (https) and Domain Name System Security Extensions (DNSSEC)[189] have been added to the Internet's critical resources over the years since WSIS to improve resilience and protect against cyberattacks.

There was particular concern at the time of WSIS about spam deteriorating online experience, the potential for cybercrime, and risks to the integrity of national communications networks. The volume of spam has remained high – it is estimated to account for as much as 45 per cent of email traffic[190] – but the threat of cybercrime – rendered more profitable by the increase in the number of individuals online and the growing sophistication of malware and hacking techniques – and potential threats to national infrastructure have both broadened and intensified since WSIS. Criminals and other hostile actors have proved as capable of digital innovation as mainstream businesses, governments and other stakeholders seeking to use digital resources to promote access to information and achieve developmental goals, and have been able to exploit vulnerabilities in digital systems and personal security to attack businesses, governments and individuals. Cyberattacks and cybercrime cause financial and reputational harm to businesses and individuals and undermine the trust in digital systems that is needed if users are to take full advantage of them. New threats are constantly arising from new technological developments, requiring continual updating of cybersecurity responses. The cybersecurity company Crowdstrike warns in its 2024 *Global Threat Report* of intensified threats arising in the near future, not least from the potential of generative AI to lower the barriers of entry to launch sophisticated criminal attacks.[191]

Threats to security arising in the Information Society are not confined to cybersecurity but also intersect with the UN's core mandate to maintain international peace and security. The period since WSIS has seen the widespread adoption of digitally-enabled assets such as drones in weapons systems. The militarisation of digital resources has been the subject of intergovernmental discussions, including an Open-Ended UN Working Group (OEWG) on 'developments in the field of information and telecommunications in the context of international security.'[192]

Cybersecurity and action against cybercrime have become major priorities for international cooperation and national security in all countries since WSIS. 'Resilience,' in ITU's words, 'now involves safeguarding a wide range of physical infrastructures such as submarine cables, satellites, and terrestrial networks, alongside implementing robust cyber resilience.'[193] One of the critical challenges identified by the OEWG in 2021 was the risk of 'potentially devastating security, economic, social and humanitarian consequences of malicious ICT activities on critical infrastructure … and critical information infrastructure … supporting essential services to the public.'[194] International submarine cables are vulnerable to physical disruption while digital networks and those concerned with power, water, transport and other utilities, health services and financial markets, are vulnerable to cyberattacks, including hacking, ransomware and distributed denial of service (DDoS) attacks[195] by domestic or external actors. Governments are also concerned about the risk of interference with electoral processes and the manipulation of public opinion through both cyberattacks and targeted disinformation.[196]

The risk of cyberattacks is equally threatening to commercial businesses. Sophisticated criminal organisations, often based outside national borders, have used DDoS attacks to disable the digital networks of businesses, governments and other organisations,[197] exploited vulnerabilities in computer and online systems to hack data on business activities, employees and consumers, and installed malware that disrupts victims' computer systems, denying them data access or encrypting data in order to demand ransoms for their reinstatement. ITU estimates that the number of cyberattacks is increasing by some 80 per cent each year and that the cost of cybercrime has risen from some US$400 billion in 2005 to an estimated US$8 to US$11 trillion in 2024.[198] Half of British businesses and around a third of British charities reported experiencing

some form of cybersecurity breach affecting their operations during a twelve-month period in 2023-2024.[199] More than 80 per cent of organisations in the Philippines were reported to have suffered negative impacts from a cybersecurity breach within their supply chain in 2024.[200]

Risks of cybercrime to individuals have also become increasingly important, exploiting weaknesses in personal data security amid growing use of online and mobile banking and e-commerce. Online fraud, including identity fraud, has burgeoned with the growing capabilities of digital technology and increased criminal sophistication.[201] Fraud – more than 80 per cent cyber-enabled – now represents over 40 per cent of crime recorded in England and Wales (which make up most of the United Kingdom) with an estimated 3.5 million incidents experienced by adults in a twelve-month period in 2023-2024.[202] The provision of regularly updated anti-virus and anti-malware software has become a major global business, estimated now to be worth more than US$4 billion a year,[203] but the deployment of online security requires continual attention by users and significant levels of digital literacy.

Governments and businesses have taken increasingly sophisticated measures to protect themselves against cyberattacks and cybercrime. The ITU and other international agencies have provided technical assistance and supported capacity building, particularly for CERTs (Computer Emergency Response Teams) – groups of information security experts that focus on the prevention and mitigation of data breaches, DDoS and other cyberattacks by raising awareness, providing guidance to those affected and supporting research into improvements in security. The Forum for Incident Response and Security Teams (FIRST) now has more than 750 member teams in over a hundred countries.[204]

Although many businesses and other organisations now deploy sophisticated security systems, they remain vulnerable, not least because of human error. Developing responses has been challenging because of the extra-territorial nature of many cyberattacks and the use of encryption and other sophisticated techniques by criminals in order to avoid detection. This has raised legal and regulatory challenges at the boundaries between technical, privacy and security considerations, for instance concerning encryption which is a core component in enabling cybersecurity but is also exploited by cybercriminals to conceal their activities from law enforcement.

The Council of Europe adopted a Convention on Cybercrime, known as the Budapest Convention, in 2001, before WSIS, which set out guidelines concerning the definition of cybercrime, potential legislation and procedural powers for law enforcement agencies, and a legal basis for international cooperation. By 2025, 76 governments were parties to the Convention, including many outside the Council of Europe area.[205] Other regional initiatives include the African Union Convention on Cyber Security and Personal Data Protection (the Malabo Convention).[206] In 2024, following five years of negotiation, the UN General Assembly adopted a Convention against Cybercrime which addresses a range of issues including the illegal access and exploitation of electronic data, money laundering and other criminal activity including child sexual exploitation, and calls on signatories to share evidence and collaborate in intercepting the proceeds of cybercrime. This Convention opens for signature in 2025 and will come into force when ratified or approved by 40 Member-States.[207]

One final area of concern in the context of this WSIS Action Line has been growing levels of abuse of digital resources by individuals, and sometimes organisations, to harass or abuse other individuals or communities. A number of different types of abuse have concerned governments and other stakeholders, including the vulnerability of children (particularly the proliferation of

child sexual abuse images online and the grooming of children for sexual and other exploitation), the spread of hate speech directed at women and at racial and social minorities, sexual and racial harassment, bullying and the use of disinformation to influence public opinion, distort democratic processes or promote violence. While some abusive activities (such as child sexual abuse and exploitation images and the sharing of hacked data) are illegal in almost all jurisdictions and take place substantially on the 'dark web', other forms of abuse and harassment which are not illegal have become widespread on social media platforms, raising new questions about freedom of expression and its relationship with other human rights and leading to demands for stronger platform regulation.[208] These issues are discussed further in Chapters 2E and 3 below.

CHAPTER 2C

THE DIGITAL ECONOMY (Action Line C7b)

The structure of the digital economy was briefly outlined in Chapter 1. This chapter looks at the development of that economy since WSIS, in the context of the Action Line for e-business in the *Geneva Plan of Action*, and considers priorities for the future identified in the consultation process, including an expert group discussion convened for this report by CSTD, as well as wider literature.

The development of the digital economy since WSIS

The WSIS outcome documents envisaged the development of an Information Society in which digitalisation contributes positively to economic growth and to prosperity for peoples in all countries. The *Geneva Plan of Action* urged governments, international organisations and the private sector to 'promote the benefits of international trade,' e-business, and 'the use of e-business models in developing countries and countries with economies in transition.' It encouraged the adoption of an enabling environment to 'stimulate private sector investment, foster new applications, content development and public/private partnerships.' If also favoured support for micro-, small and medium-sized enterprises in the ICT sector.[209]

Computerisation and automation in manufacturing had already done much to transform the nature of business and employment in developed countries by the time of WSIS but had by then had only limited impact in most developing countries, notably LDCs. Growth since then has been particularly strong in advanced industrial countries and in developing countries with major ICT businesses including China and India. OECD estimates that the ICT sector grew about three times faster than the total economy in its member states in the period between 2013 and 2023, with an average growth rate of 6.3 per cent and five countries in Europe seeing growth rates above 10 per cent during the latter year.[210] The World Bank estimates that the total value added of the ICT sector exceeded US$6.1 trillion in 2022, equivalent to around 6 per cent of global GDP, with the value added growth rate of IT services – around twice that of the rest of the economy – surpassing all other sectors in the two decades since the first session of WSIS.[211] The digital sector's share of the total economy is expected to continue rising with the development and deployment of AI.

Not surprisingly, this has been accompanied by wholesale changes in the businesses that supply and exploit digital hardware, software and services. At one end of the scale, a small number of economically powerful corporations serving global markets have achieved dominant positions in market segments concerned with infrastructure, components, manufacturing and services. At the other, national digital economies have seen the proliferation of small businesses, from those innovating at the forefront of new technology to those offering niche services in local markets.

At the time of WSIS, computing and telecommunications businesses were the most powerful firms in the ICT sector. These included companies producing network equipment, components and computer hardware; laying and operating infrastructure networks on land and in the oceans; operating telecommunications networks, both fixed and (increasingly) mobile; and manufacturing end-user communications devices such as telephones, modems and (increasingly) mobile phones. All of these market segments were globally competitive at the time of WSIS with the exception of national telecommunications operating networks. While state-

owned monopolies had been liberalised in many countries, fixed networks remained monopolies in public ownership in others, including many developing countries. Hardly any such monopolies remain today.[212]

Many new market segments have emerged and/or grown substantially since WSIS. The number of smartphones sold annually around the world, for instance grew from just under 300 million in 2010 to over 1.5 billion between 2017 and 2019 (though it is since thought to have dropped to around 1.3 billion),[213] with market shares for different manufacturers rising and falling as businesses have competed to chase technology and lifestyle trends. The introduction of the Apple iPhone in 2007, with its innovative touch screen and multimedia applications, proved a catalyst for the transition from feature phones to smartphones. At the time of WSIS there was competition to provide consumer access to the Internet in most countries between a range of small Internet Service Providers (ISPs). ISP markets have since concentrated in many cases, with network operators often holding the largest market shares.

Two companies in the ICT sector – Microsoft and AT&T – were listed as being in the world's top ten companies in 2005. By 2015 that had risen to half, and by 2025 to as many as eight, including companies primarily concerned with semiconductor manufacturing and AI.[214] The most dramatic shift in online business markets has been the emergence and rapid growth of digital media platforms, particularly those in search, social media and e-commerce. The leading e-commerce platforms, Amazon and Alibaba, were established in the 1990s but have expanded enormously since WSIS. Google also began to operate as a search engine in the 1990s and expanded rapidly in the new century, becoming very dominant in online search. The first major social media platform, MySpace, was launched in 2003, followed by the largest such platform today, Facebook, in 2004. Facebook's owner, Meta, now owns three of the top four leading platforms. In recent years, these major e-commerce and social media platforms have reached out from their original focus to address other markets in the digital value chain, including network infrastructure, data centres and the growth in cloud computing and cloud-based applications for managing business and other systems (Software as a Service, Platform as a Service, *etc*.) that has occurred since 2010. Other companies play a dominant role in specific hardware, software and service markets, such as Samsung and Apple in smartphone manufacturing. All major digital businesses are now competing to develop AI applications and bring these speedily to market in the hope of building market share and securing first/early mover advantage.

The concentration of digital business, and associated research and development, is geographic as well as commercial. In 2021, two countries, the United States and China, accounted for half the world's hyperscale data centres and 94 per cent of all funding of AI start-ups in the previous five years.[215] This commercial and geographical predominance has been reinforced by the growing levels of capital investment required to establish competitively viable enterprises in infrastructure and advanced technologies. While larger countries such as India and Brazil have generated substantial digital business sectors serving domestic and export markets, entry into established international markets has proved very challenging for businesses in lower income developing countries and countries with smaller domestic markets.

Small and medium sized enterprises (SMEs) in the ICT sector have been able to thrive, however, in almost every country, whether innovating at the margins of technological development or, more commonly, providing services to other small businesses and individual consumers. Web design and the tailoring of software to meet business needs have provided a constant stream of opportunities for technically competent small businesses and freelancers as online participation has grown. Entrepreneurs trained in computer science and software development have filled

niche markets serving more sophisticated IT needs, while some innovative start-ups have been enthusiastically bought up by major data corporations. Collaborative centres of digital enterprise have emerged in developing countries, from large-scale concentrations of digital businesses in cities such as Hyderabad to dynamic hubs of smaller-scale enterprises in countries such as Kenya and Nigeria. Innovative companies in smaller markets have proved well suited to fill niches that are commercially unattractive to global competitors and/or where local expertise gives them a competitive advantage. UNCTAD and its partners, including the International Trade Centre and the Universal Postal Union, have fostered small-scale digital enterprise, especially in LDCs and with a particular focus on female entrepreneurs, through the eTrade for All initiative, an extensive series of eTrade Readiness Assessments and annual eCommerce Weeks.[216]

The viability of particular niche markets has varied over time as technology and services have evolved. Telecentres and cybercafés, which offer Internet access to those without personal means of access, were a dynamic part of the digital economy in many local communities at the time of WSIS but, as noted above, have seen markets shrink as the number of their customers with personal smartphones increased. Customer service outsourcing, which was commercially attractive to developing countries with low labour costs in the years following WSIS, has become much less attractive as businesses in developed countries have moved to automate customer services in their home territories. The agility to move with changing times has therefore been a crucial factor in enabling governments and businesses to take advantage of the digital economy.

It is not possible in the limited space of this report to give a comprehensive account of developments in that economy. Three examples – international trade, e-commerce and financial markets – have been chosen below to illustrate these complex economic trends.

ICTs and international trade since WSIS

ICTs have had a major impact on international trade in both physical goods and services since WSIS.

Exports of ICT goods – defined by UNCTAD and the UN Statistics Division as those that 'primarily fulfil or enable the function of information processing and/or communication by electronic means, such as transmission or display'[217] – account for some 15 per cent of merchandise imports, rising from a value of around US$1.5 trillion in 2015 to almost US$2.8 trillion worldwide by 2021, boosted in that year by the COVID-19 pandemic, before falling again to around US$2.5 trillion in 2023.[218] The share of ICT goods in merchandise imports is highest in highly-digitalised Asian economies (over 20 per cent), but much lower in Africa (5 per cent) and LDCs (3 per cent).[219]

Trade in ICT products, including computers, software and telecoms equipment, has been facilitated since 1996 by the WTO Information Technology Agreement which seeks to eliminate tariffs where such goods are concerned. The Agreement was expanded in 2015 and includes 82 countries representing 97 per cent of world trade in those products that it covers.[220]

Trade in digitally-deliverable services – defined as trade in services that can be delivered remotely over computer networks – is growing faster than other trade sector today and was valued in 2023 at some US$4.5 trillion.[221] These services, which include information technology consulting, financial services, creative industries and telecommunications, are, however, highly concentrated in developed countries. Although digitally deliverable services represent some 56% of services exports worldwide, and the value attributable to developing economies exceeded US$1 trillion for the first time in 2023, they accounted for less than 20 per cent of services exports from LDCs.[222]

ICTs have played an important role in trade facilitation since WSIS, as they have been deployed to manage transport and port logistics, automate customs procedures including tariffs and phytosanitary inspections, and expedite transactions. Reduced transit times and logistic barriers have had positive onward impacts on the cost of imports which, in turn, have encouraged trade both within regions and across the globe. Examples of ICT-enabled enhancements include more precise targeting of inspection arrangements on potential risk consignments, and the development of 'single window' procedures that use standardised digital documentation to expedite transport routes as well as customs and other port and border post procedures.[223] UNCTAD's Automated System for Customs Data (ASYCUDA), implemented in over 102 developing countries, illustrates such benefits.[224] UNECE has played a central role in developing standards for international trade facilitation using ICTs.[225]

E-commerce

E-commerce, defined by OECD as 'the sale or purchase of goods or services, conducted over computer networks by methods specifically designed for the purpose of receiving or placing of orders,'[226] has become one of the most visible aspects of the digital economy during the past two decades. It includes transactions between businesses (B2B), those between businesses and individual consumers (B2C), and those between governments, businesses and citizens (G2B, G2C). Some transactions are international (such as those undertaken through global platforms such as Amazon and Alibaba, or through regional intermediaries such as Jumia in Africa and Mercado Libre in Latin America); others national, undertaken through wholesalers' and retailers' own online domains; others again local transactions between individual MSMEs and customers. Peer-to-peer platforms enabling transactions between individuals, such as eBay, have also been significant. While orders are generally placed online, payments and delivery may be either online or offline.

E-commerce was expected to grow quickly after WSIS because of its ability to extend consumer choice and potentially reduce customers' costs. In practice, growth was more gradual than enthusiasts had first anticipated until the COVID pandemic, different countries experiencing different rates of growth as a result of different economic structures and levels of online participation. The share of global retail trade attributable to e-commerce was estimated by eMarketer to have risen from 10.4 per cent in 2017 to 14.1 per cent in 2019 and is now predicted to reach 21.0 per cent in 2025.[227] China and the United States have for some time been the largest markets;[228] Alibaba and Amazon the largest businesses (and among the largest businesses in any sector by market capitalisation). Participation figures in e-commerce are substantially lower in developing countries where fewer people are online – or frequently online – and where potential users have lower average disposable incomes.[229]

Some economic sectors, for both goods and services, have been radically transformed by e-commerce platforms since WSIS. Streaming services have largely displaced physical media for distributing music and are increasingly displacing them for films and other video.[230] Local taxis, fast food deliveries, travel agencies and short-term accommodation lettings have been complemented and, in some places, displaced by online platforms, some global (such as Uber and Airbnb) and others local.

A major step-change in e-commerce occurred during the COVID-19 pandemic, when lockdowns prevented or restricted retail businesses in many countries from serving customers at physical shops. This boosted the role of e-commerce platforms and encouraged businesses that were not already offering online sales to do so, and customers to use them. The African platform Jumia

saw an increase of over 50 per cent in the volume of transactions during the first six months of 2020, as compared with the same period in 2019.[231] Food delivery services and platforms streaming games and online entertainment saw very substantial increases in business, while retail outlets that failed to offer online sales were severely disadvantaged. Experience during the pandemic led many previously occasional customers to become more regular users of online retail and to remain so subsequently.[232]

Financial services

Internet banking first emerged in developed countries in the 1980s as a premium service. Since WSIS it has been increasingly widely used in many countries, often now through mobile apps rather than PCs. Cybersecurity has been essential to enabling trust in digital payments, and intermediary financial platforms such as PayPal have joined traditional banks in offering enhanced security. The convenience of payment using credit and debit cards and mobile apps has seen a move in some societies away from cash, with some shops and services only accepting digital transactions. While convenient for many, this has raised concerns that those who have less access to credit and digital devices may be left behind.

Mobile money services, in which financial services are offered by mobile network operators in competition or conjunction with traditional banks, developed in the period around 2010, initially following the introduction of the M-Pesa service in Kenya in 2007,[233] and have proved successful in bringing financial services to the unbanked majority in a significant number of lower-income countries. In particular they have been credited with helping those on marginal or unpredictable incomes to manage budgets, facilitating remittances and enabling small businesses to secure better access to capital, including micro-loans, and to financial services such as insurance. By the end of 2023, GSMA estimates, there were some 435 million mobile money accounts active on a monthly basis around the world, up 9 per cent on the previous year (with 14 per cent growth in the value of transactions). Some 85 billion mobile money transactions were recorded with a total value of around US$1.4 trillion. More than 300 operators were providing services, around half in sub-Saharan Africa, which accounted for more than 70 per cent of transaction volume and 65 per cent of transaction value.[234]

Change at a rather different scale has come about through the emergence of cryptocurrencies – digital currencies based on blockchain technology that operate through computer networks without involvement of a central bank or government. The use and development of cryptocurrencies, whose value has been highly volatile, has been controversial since the launch of Bitcoin in 2009. Some see them as important innovations with the capacity to transform global financial markets, and there has been increasing interest in them, and in regulating crypto markets, by governments and central banks. The European Union, for example, has introduced a Markets in Crypto-Assets Regulation to establish a harmonised licensing structure and rules for trading in cryptocurrencies, aimed at improving transparency, preventing market abuse and protecting consumers.[235] Critics of cryptocurrencies are concerned about price volatility and their potential for destabilising conventional money markets, their use by speculators and for criminal activity, and negative environmental impacts on power consumption, GHG emissions and e-waste resulting from the 'proof of work' data-mining methodology used by cryptocurrencies like Bitcoin.[236]

Other impacts from digitalisation have affected international equity and money markets. The dynamics of money markets have been changed, for instance, by the ways in which financial technology has enabled superfast trading of shares, commodities and other financial

instruments, which have potential impacts on their stability and pose new challenges for financial regulators seeking to promote inclusion, improve access to capital and maintain economic stability.[237]

The trajectory of the digital economy

The *Global Digital Compact* points out that 'Equitable and meaningful inclusion in the digital economy requires tackling existing concentrations of technological capacity and market power.'[238] It recognises the importance of policy, legal and regulatory frameworks that not only support innovation but also 'protect consumer rights, nurture digital talent and skills, promote fair competition and digital entrepreneurship, and enhance consumer confidence and trust in the digital economy.' Commitments resulting from this include the exchange of knowledge and best practice to support 'local technological solutions' and support for micro-, small and medium-sized enterprise to increase the number of start-ups in developing countries. [239]

The digital economy today is both complex and fluid. Discussants in the expert group discussion convened by CSTD for this report emphasised the reconfiguration of value chains and impacts on labour markets and skill requirements arising from the virtualisation of some product markets (such as that for recorded music), the digitalisation of financial transactions and the monetisation of data. While the digital economy is clearly growing, or accelerating, in all countries, its depth varies greatly between developed and developing countries and within both groups Likewise, while large and medium-sized businesses are increasingly digitalised, discussants suggested that many smaller businesses are making insufficient use of digital resources to achieve significant productivity gains, as a result of poor infrastructure, the relatively high cost of data, lack of trust and limited digital literacy. Micro-businesses in Latin America and the Caribbean were reported to have limited Web presence, while surveys have shown low levels of smartphone adoption and use by micro-businesses in Africa.[240] A very high proportion of small and micro businesses in some countries are in the informal sector and thereby disadvantaged in accessing capital to digitise their enterprises.

These digital divides within the digital economy lay the foundations for priorities suggested in consultation responses and the expert group discussion. At the global level, contributors referred to the need for more consistent governance of digital goods and services, including ways of facilitating participation in new market opportunities by businesses from developing countries. National governance priorities were understood to include improvements in the legal and regulatory frameworks for business formation and innovation, data management, digital transactions and cybersecurity, together with strengthening of the skills required by digital entrepreneurs through education and business extension services. Governments, it was suggested, could help to stimulate local business activity by digitising services such as taxation, through approaches to procurement and by supporting enterprises seeking to serve local and regional niche markets. Better access to financial services was widely mentioned, as well as efforts to ensure that data derived from local markets could be leveraged as effectively by local as by international businesses. Particular emphasis was placed by commentators on the need to support women entrepreneurs who have often found it more difficult to establish businesses and obtain access to capital. UNCTAD and its partners in the eTrade for All initiative have pioneered work within the UN system to share expertise and to support digital SMEs in developing countries, with particular emphasis on those led by women.[241]

The need for more consistent data gathering and analysis was emphasised by experts on the digital economy. As in other areas, UNCTAD's eTrade Readiness Assessments have confirmed

that the level of preparedness for the digital economy is much higher in developed than in developing countries, particularly LDCs. Data availability is highly variable with data deficiencies on both e-commerce and the use of ICTs by businesses perceived to hamper analysis and policymaking by governments and businesses in many developing countries. Priorities for future data gathering and analysis identified by UNCTAD and discussants in the expert forum include more effective collection of indicators on the ICT sector itself, data on the take-up and usage of particular digital services by small and micro businesses, and the development of guidelines on measuring the value of e-commerce.

CHAPTER 2D

SUSTAINABLE DEVELOPMENT

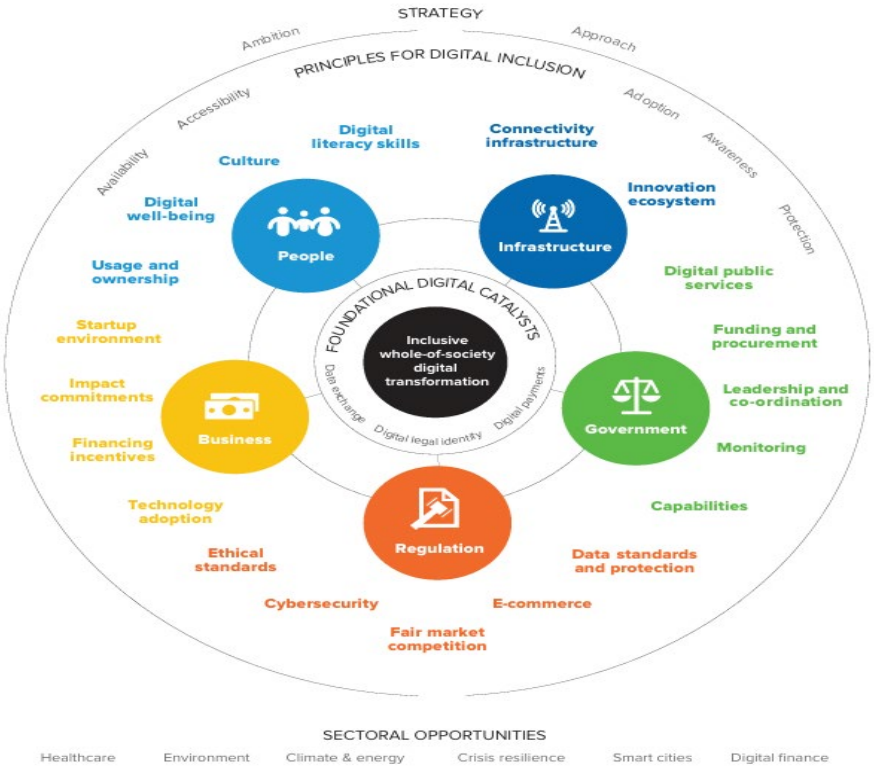
The *Geneva Declaration* agreed that the Information Society should be 'development-oriented', and that its outcomes should be consistent with sustainable development, defined at that time by the Millennium Declaration. The adoption of the SDGs in 2015 established a more comprehensive framework for sustainable development, all of which, the General Assembly declared in its WSIS+10 review, could be accelerated through the use of ICTs.[242] The need for ICT support for SDG implementation has been further emphasised since the COVID-19 pandemic set back progress towards achieving many of the Goals. It is intrinsic to the *Pact for the Future* and the *Global Digital Compact*.

The impact of digitalisation on development sectors since WSIS has been substantial, sometimes profound, and often unexpected. Some impacts have arisen from direct government programmes, or interventions by international funders. Many of the most substantial, however, have resulted from changing business practices that take advantage of digital opportunities and from the adoption of new resources by citizens to meet the needs they have identified themselves. This was evident in the early stages of mobile connectivity, for example, when uptake of mobile phone subscriptions in developing countries greatly exceeded the initial expectations of operating companies because they enabled cost-effective substitutes for travel, ways of maintaining links with family members, accessing financial and other support, and organising small business activities. Other examples have included the rapid adoption of mobile banking, the use of social media platforms for marketing and customer relations by small businesses, and the widespread adoption of services such as online dating.

Digital development – the use of ICTs to enable development in general and the SDGs in particular – has become increasingly important in the strategic visions of international development partners. The World Bank, for example, has described digitalisation as 'the transformative opportunity of our time,' building its approach to development support around infrastructural foundations (broadband connectivity, data infrastructure and the ICT sector) and digital accelerators (concerned with trust and security, digital public infrastructure and capabilities) to demonstrate the value of digital transformation in development sectors such as financial services, agriculture, trade and healthcare.[243]

The UN Development Programme (UNDP) likewise regards digital technology as 'a fundamental force for change …, reshaping economies, government, and civil society [and] impacting almost every aspect of development,' requiring 'global leadership to reimagine development in a digital age.' It launched its first digital strategy in 2019, building its second, for 2022-2025, around guiding principles concerned with inclusivity and human rights, open digital standards and open data, local digital ecosystems that recognise the need for 'a whole-of-society approach' (illustrated in Figure 16 below), and strategic partnerships across the range of development stakeholders. It seeks to embed digitalisation across its whole programme portfolio, as well as playing 'an integrator role in the UN System.' [244]

Figure 16 - UNDP's 'whole-of-society' approach to digital transformation



Source: UNDP, Digital Strategy 2022-2025, p. 22

Several of the WSIS Action Lines are concerned with themes that are also priorities within the *2030 Agenda for Sustainable Development*, including eight subsidiaries of Action Line C7 (see Table 1 above). A matrix relating WSIS Action Lines to SDGs has been developed and maintained by ITU.[245] The following paragraphs summarise developments in the Action Lines that are concerned with some of these aspects of sustainable development.

There are important relationships between Action Lines concerned with the digital ecosystem, sustainable development and human rights. The ability of digitalisation to achieve positive impacts on sustainable development depends on the availability of infrastructure and of a framework of legislation and regulation that fosters trust in digital resources and enables governments, businesses and individuals to take advantage of them to achieve societal, commercial and individual goals (see Chapter 2B). Access to information, including the much broader range of information sources available online, was identified from the start of the WSIS preparatory process as one of the principal benefits that digital technology could bring to both individuals and societies, an enabler of a broader range of developmental opportunities as well as human rights. The contribution which access to information makes to specific areas of sustainable development is considered in this chapter; its contribution to human rights in Chapter 2E.

E-government (Action Line C7a)

The *Geneva Plan of Action* set three goals for the deployment of ICTs in public administration: the development of national strategies for e-government, the implementation of digital services 'adapted to the needs of citizens and business, to achieve a more efficient allocation of resources

and public goods,' and improved cooperation between governments to enhance transparency, accountability and efficiency.[246] ICTs were seen at the time of the Summit as having great potential to improve service delivery, particularly for underserved communities, to reduce corruption and to increase public participation in decision-making. In recent years, increased attention has been paid to the role of digital public goods and digital public infrastructure as critical enablers of e-government.[247]

The *Plan of Action* identified the development of national e-strategies, with multistakeholder input, as priorities for integrating digital resources into government. The proportion of countries with national e-government strategies reported to DESA has grown to 96 per cent in 2024, of which 90 per cent were reported to be aligned with overall national development strategies.[248]

The scope of these has grown with the growing potential of digital services, reinforcing the need for regular updating to address changing circumstances. DESA conducts biennial surveys of the evolution of e-government which provide the evidence for its E-Government Development Index (EGDI) and, since 2018, its Local Online Services Index. These draw on indicators concerned with the availability of online services, telecommunications infrastructure and human capital. Findings show that there has been a steady growth in the digitalisation of government relationships with populations, beginning with information services, on the World Wide Web and mobile applications, but gradually becoming more interactive and transactional. Overall performance against the EGDI has shown gradual improvement in each biennial survey. The proportion of countries registering 'very high' performance on the Index has risen steadily, from 13 per cent in 2014 to almost 40 per cent in 2024; that registering 'low' or 'middle' performance fallen from almost 55 per cent to less than 30 per cent.[249]

These improvements reflect the changing scope and nature of online information and transaction services. In the run up to WSIS, DESA believed that less than half of UN Member States had a national government website, with only 17 of 190 offering online transaction services.[250] The proportion of governments with a substantive Web presence has risen over time since then. Every national government that responds to the survey now reports extensive use of websites and mobile apps to provide public information and access to services, and DESA's surveys report the spread of digital services from national to local government. Developed countries and many developing countries now offer citizens the opportunity not just to find information but to pay their taxes, obtain welfare benefits, apply for official documents and participate in consultation processes online.

As in other sectors, digitalisation has proceeded more rapidly in developed countries and high-income developing countries than elsewhere. At one end of the scale, countries like Estonia[251] and the Republic of Korea[252] have placed high emphasis on the digitalisation of society and governance. Countries with near-universal access to the Internet have seen online and mobile services become the default means of access for many public services, improving their accessibility to the majority of citizens, but raising some concerns about the risks of social exclusion for marginalised individuals and groups that lack digital resources. DESA's 2024 survey found that the proportion of the world's population living in countries that are lagging in digital government – and so less able to access services digitally - has halved since 2022, though this still left 1.9 billion people 'on the wrong side of the digital divide,' mostly in Africa.[253]

The growth of digitalisation in local government has been slower, more recent and mostly based in urban areas. As with national e-government, DESA's surveys have found strongest growth in European cities, while African metropoles lag behind those in other world regions. Among 193

cities analysed, the most recent survey found that 151 had an online presence, with many showing significant growth in the intensity of that presence since 2022.[254]

As the range of digital services has expanded, governments have paid more attention to integrating and ensuring interoperability between those established by different government departments. The last decade has seen particular interest in the development of digital identity (digital ID) systems that can both facilitate citizens' access to services and improve the efficiency and coordination of their administration. The introduction of such systems has been supported by development partners, including the World Bank,[255] as a means of ensuring the inclusion of all citizens in public services, addressing problems faced by the 850 million people around the world that are estimated to lack legal identity documentation (a target of SDG16). In 2023 the African Union adopted an Interoperability Framework for Digital ID designed to provide a common standard through the continent that would 'enable all African citizens to easily and securely access the public and private services they need, when they need them, … independently of their location.'[256]

A distinction can be drawn here between foundational ID systems – which are intended to provide proof of identity for public and private transactions – and functional ID systems – in which digital ID is used as the basis for more specific purposes such as voter registration and taxation.[257] Estonia[258] and India[259] have pioneered extensive digital ID programmes in which single personal IDs have become essential gateways to public services, necessary to enable full participation in society. Moves towards extensive levels of digital ID have been resisted in some countries because of concerns that they may challenge rights to privacy, pose risks of surveillance and exclusion, and be vulnerable to cyberattack. Much more limited digital tracing applications played a part in monitoring infections during the COVID-19 pandemic.[260]

Another significant area of development in countries with high levels of digital capacity has been the deployment of 'smart systems' that use live data to enable automated management of public infrastructure, such as transport and power networks, in real time, with the aim of achieving both more efficient outcomes and cost savings (see also Chapter 1). The potential for 'smart cities' that maximise the role of data and online connectivity to run multiple coordinated services has been promoted by the UN's United for Smart Sustainable Cities initiative.[261] Smart cities depend on the gathering and analysis of very large volumes of real-time data, and the rapid growth of AI capabilities is likely to increase the scope and scale of initiatives during the next decade. Concerns have been expressed that smart systems are vulnerable to cyberattack and that exploitation of data may enable surveillance or adversely affect the right to privacy.[262]

Automation and remote monitoring have helped governments to plan to meet risks associated with natural disasters and enable humanitarian assistance at times of crisis. The likelihood of natural disaster is understood to have increased in recent years and be likely to increase further as a result of climate change. Digital sensors, satellites and the data generated by mobile phone and data networks have enabled more precise meteorological forecasting, more effective risk reduction before and more responsive intervention during humanitarian crises, including better targeting of resources. The Emergency Telecommunications Cluster is a global network of organisations that work together to support communications services in humanitarian crises, alongside governments and development partners.[263]

In addition to other consultation processes, CSTD organised an expert group discussion on the development of e-government as a contribution to this report. Contributors to the consultation and discussants in the expert group acknowledged the substantial progress made in developing

and deploying e-government services since WSIS but also recognised that equitable delivery of services has been hampered by digital divides, particularly in countries or communities where access is constrained by poor connectivity and lack of affordability. Some social groups, such as those with disabilities and linguistic minorities, have benefited where services have been deployed in ways that make them more accessible but can lose out if their specific needs are not included in design. The ability to extend government services more effectively in remote and rural areas is felt to have improved the quality of life for those living in marginalised communities, but low levels of digital literacy also restrict the ability of some citizens to navigate online services, requiring the maintenance of analogue alternatives.

Challenges in managing e-government were also identified during the consultation. Because data gathered to enable digital services can be misused DESA emphasises the need to strike a balance between providing efficient services and safeguarding personal information. Experience has shown the need for complex legal and regulatory frameworks, accompanied by capacity building within bureaucracies. Care is also needed to ensure that disproportionate or unrepresentative data in automated systems do not skew outcomes in favour of some communities or social groups at the expense of others. Systems need regular maintenance and upgrading to ensure that they remain effective and interoperable, requiring current as well as capital expenditure, and to ensure that they continue to be secure against cyberattack. The opportunities and risks associated with these factors are constantly evolving alongside change in digital technology.

Discussants in the expert group felt that recent years have seen a maturing of e-government practice, moving away from top-down service provision aimed at securing cost savings and greater efficiency to a more user-centric model driven by citizens' expectations and demands. In some cases public services have moved towards provision that is 'digital by default'. Citizen participation in design was felt to be crucial to successful deployment of such services, in order to ensure that they leave no-one behind, build public trust and meet the particular needs of disadvantaged groups such as those with disabilities for whom tailored services might be required. Discussants also emphasised the value of government working in partnership with private sector partners.

As in other development sectors, digital divides were thought to be substantial barriers to maximising returns on investment in e-government. Building resilient public digital infrastructure, both physical and administrative, in which citizens feel trust, was considered critical. Discussants suggested a number of practical measures required for this above and beyond improving 'last mile' connectivity and affordability, including appropriate local digital ecosystems (particularly meeting diverse language needs and enabling access with low-cost devices). They also emphasised the importance of coherent policy and service deployment, ensuring that different government departments' systems are integrated and easy to use (for example through common interfaces). They stressed the importance of capacity building of civil servants, contractors and local government officials responsible for implementing e-government services, including competence in procurement to ensure that hardware and software cost-effectively meet actual requirements. Appropriate legal frameworks and safeguards for data protection were also considered vital in ensuing trust and protection against cyberattack.

In its 2024 report DESA introduced a Digital Government Model Framework, based on principles of good governance, inclusivity and security, to provide a roadmap for the planning, implementation and assessment of digital government initiatives as part of efforts to address these challenges.[264] As in other development sectors, AI is seen as potentially game-changing,

likely to lead to improvements in administrative efficiency and to cost savings, contributing substantially to the effectiveness of service delivery, but also posing risks of bias derived from historic data using for training AI systems. Some commentators in the expert group suggested that AI will substantially improve the quality of users' experience by making government less intrusive, while others were concerned that it may make government seem less participative and more remote.

Learning and education (Action Line C7c)

Access to information is limited in value if citizens lack the skills to benefit fully from it. The *Geneva Declaration* declared that 'Each person should have the opportunity to acquire the necessary skills and knowledge in order to understand, participate actively in, and benefit fully from, the Information Society and the knowledge economy.'[265] As well as fundamental skills including literacy and numeracy acquired through primary education, these include the skills to identify, research and analyse information that is relevant and to discriminate between information that is authoritative and content that is unreliable (including what is now described as misinformation and disinformation).

Digitalisation has impacted education at schools and in further education, enabling new modes of teaching and administration as well as access to a much wider range of educational materials for both teachers and students.[266] The *Geneva Plan of Action* set targets 'to connect universities, colleges, secondary schools and primary schools with ICTs' and 'to adapt all primary and secondary school curricula to meet the challenges of the Information Society, taking into account national circumstances.'[267] Connectivity became an effective prerequisite in higher education relatively quickly, aided by the widespread use of mobile phones and acquisition by students of personal laptops. It is now the norm in primary and secondary schools in developed countries and higher income developing countries but is still far from universal elsewhere. Giga – a partnership launched by ITU and UNICEF in 2019, aims to connect every school in the world to the Internet by 2030. It reported in 2024 that about half the world's schools still lack an Internet connection.[268]

The Transforming Education Summit convened by the United Nations in 2022 included ICTs within a broader frame of educational investment and reorientation and identified three 'keys of digital learning': connectivity, capacities, and content. While 'the digital revolution could be one of the most powerful tools for ensuring quality education and transforming the way teachers teach and learners learn,' it noted that it could also 'exacerbate inequalities and undermine learning outcomes,' a risk emphasised by experience during the COVID-19 pandemic when students with personal computers were much more able than their peers to benefit from remote schooling.[269]

How Internet connections and digital devices are used is also crucial to delivering on WSIS goals. The World Bank emphasises the importance of integrating technology into teaching practice, supplementing rather than substituting for traditional learning. Educational technology, or 'edtech', seeks to maximise the value of engagement with technology in the classroom and wider learning environment, and enable students to leverage online resources to support personal learning, but experience is varied and the World Bank has emphasised that it does not provide a panacea for failing educational provision.[270] Schools in LDCs typically have much lower levels of funding per child than those in developed countries, and are less able to invest in higher tech equipment. This has limited the extent to which they have been able to use ICTs in classroom teaching or include teaching about ICTs within curricula. The World Bank advocates five principles for designing and implementing edtech interventions including ensuring that they have

a clear and valid purpose, designing for scale, and empowering (rather than displacing) teachers.[271] UNESCO has developed ICT and, more recently, AI competency frameworks for teachers, including teacher training needs, to facilitate this integration.[272]

The Internet has enabled teachers and students to access a much wider range of content than was previously available, for both formal teaching and more informal learning. There has been significant growth in the availability of open educational resources (OER) which are publicly accessible and free to use, in online and distance learning, and in new ways of delivering educational curricula and training such as massive open online courses (MOOCs) which are also free to use. This growth in learning resources has increased the importance of developing the research and analytical skills, including critical thinking, that enable students to assess the quality and reliability of information they encounter, particularly as misinformation and disinformation have become increasingly significant online. While digital resources add value to students' experience, the use of mobile phones has become more controversial, with some educational authorities and schools encouraging their use by students while others see them as distractions from learning and potential sources of bullying and classroom disruption.[273]

The advent of generative AI platforms has added to the opportunities and challenges of digitalisation in education. Generative AI applications such as ChatGPT are being used by both teachers and students as primary sources of material for learning and assignment-preparation. They can be helpful to both teachers and students, for example in summarising subjects under study, but there is growing concern that their overuse will reduce the quality of critical thinking skills on the part of students and that reliance on content generated by large language models, rather than students' own work, will undermine assessment systems for qualifications that are based on marked assignments. UNESCO has led work within the UN system on policies and guidance for the use of AI within national education contexts.[274]

Health (Action Line C7d)

The *Geneva Plan of Action*'s mandate for e-health focused on international cooperation to address global health challenges, including capacity building, knowledge-sharing and research. It included commitments to disease prevention and health promotion, including sexual and reproductive health, the monitoring of communicable disease, the development of international standards for the exchange of health data and the strengthening of health care for vulnerable populations and in humanitarian crises.[275] The World Health Assembly in 2005 recognised the potential of ICTs to improve health interventions and urged Member States to develop the necessary infrastructure for e-health, including an overall strategic approach.[276] These priorities were reinforced in subsequent World Health Assembly resolutions and in WHO's *Global Strategy on Digital Health* which covers the period from 2020 to 2025.[277]

The scope for ICTs to improve health services was recognised before WSIS but has grown since then with the evolution of technology. Budgetary constraints are, however, critical in determining the extent to which these opportunities can be exploited in developing countries with many development priorities. Three aspects illustrate the types of intervention that have been enhanced.

Public health information, on issues such as personal hygiene, reproductive rights and protection against communicable diseases, has become more widely accessible to members of the public through the World Wide Web and mobile apps as well as traditional media such as radio. The use of these media by health authorities and clinicians has proved particularly helpful during

epidemics, including the COVID-19 pandemic.[278] Its reach depends on potential beneficiaries having meaningful access to connectivity and online services. The most effective interventions, it is suggested, have used multiple media channels to maximise their reach to vulnerable individuals and communities, including the least digitally connected. Public health outcomes are also affected by the quality of information that can be found online, and the ability of individuals to distinguish between reliable and unreliable information. Recent years have seen the proliferation of misinformation and disinformation, particularly on social media, for instance on the safety and efficacy of vaccines, which has adversely affected take-up of some health services.[279] Online platforms have also been used to market products of dubious clinical value.

Much was made around the time of WSIS of the potential for remote diagnosis to support local health workers in areas with few fully qualified health professionals, for improved monitoring of patients in hospital care, and for remote surgery that could enable specialists to operate on patients at a distance. The more straightforward of these interventions have shown substantial benefits in cost as well as patient welfare. More effective online clinical support can be provided, for example, to primary health workers in underserved communities in real time, improving diagnosis and early intervention. Patients can be reminded to take medications through their mobile phones, improving the effectiveness of treatments. Monitoring of patient health has been enhanced by more effective record-keeping and data analysis. While digital technologies have brought important benefits to clinical practice across the board, interventions in high-end medicine require high-quality, reliable power and digital infrastructure, suitably qualified local personnel, who are not always available, and investment in specialist equipment that can divert resources from areas of medicine affecting larger populations in under-resourced areas.

As in other sectors, technological developments are constantly improving the potential for both large- and small-scale health interventions. Digitalisation has enormously increased the capacity to gather healthcare data and to analyse these at individual, local, national and global levels. This has allowed better data analysis to monitor the health of individuals and populations, including the spread of communicable diseases, facilitating better targeting of resources, stronger epidemiology, better understanding of the impacts of health conditions and more precise assessment of the efficacy of drugs and other interventions. Recent advances in AI promise to take this analytical capacity to a new level, for example by enabling more comprehensive modelling and more precise assessment of the effectiveness of new drugs in treating many different conditions.[280]

A major challenge for global health systems was posed by the COVID-19 pandemic in 2020-2022. Digital applications were extensively used, sometimes controversially, to help reduce transmission of the COVID virus by tracking and tracing the whereabouts and encouraging or enforcing isolation of those suffering infection.[281] Data analysis played an important part in the early identification of vaccines which brought the pandemic under control more rapidly than would otherwise have been the case. The opportunity to work from home and to maintain social relationships through online platforms enabled many people to maintain incomes and reduce the risks to mental health from isolation.[282] Lessons learnt during the COVID crisis demonstrated the value of real-time monitoring and management of infectious diseases which should enable faster response to the risk of similar crises that may arise in future. The value of interoperability and systematic exchange of data between national health systems was also demonstrated during the pandemic, while raising challenges of data privacy.

Finally, datafication has enabled more effective analysis of health conditions and priorities at national level and altered models of health provision. National e-health strategies have been

advocated by WHO since WSIS,[283] and strategic approaches have proved valuable in addressing the need to balance investment in potential benefits between public health applications that could reach under-served populations and more capital-intensive hospital-based care. WHO has monitored developments through its Global Observatory for eHealth since 2005.[284] It published a toolkit for the development of national e-health strategies in 2012 and reported that more than 120 countries had developed strategies by 2021.[285]

In addition to promoting national strategies, WHO's current *Global Strategy on Digital Health* focuses on promoting global collaboration and knowledge-sharing, strengthening the governance of digital health at both international and national levels, and advocating 'people-centred health systems' that focus on the needs of patients and healthcare workers. It stresses the need to strengthen equality, including gender equality, by ensuring that 'the introduction of digital health technologies does not aggravate [inequalities] and that access for specific population groups is guaranteed,' moving beyond reactive towards community-based care.[286] The *Global Strategy* is supported by a Global Initiative on Digital Health, launched in 2023, aimed at coordinating support for country-led health initiatives.[287]

Employment (Action Line C7e)

The *Geneva Plan of Action* envisaged the emergence of new types of employment and 'new ways of organising work and business' which would improve productivity and offer increased opportunities for disadvantaged groups within the workforce.[288] The period since WSIS has seen a number of substantial changes in business models and practices that have had significant effects on the nature of employment. These have accelerated with the growing capabilities of ICTs to undertake a variety of tasks more cheaply and efficiently than human workers and are expected to accelerate further as a result of growing exploitation of AI.

The global workforce was estimated in 2023 at around 3.6 billion,[289] but unemployment is a substantial problem in many countries, particularly developing countries with growing populations.[290] The comparability of employment data between countries is, however, complicated by the fact that a high proportion of work in many developing countries is undertaken in the informal sector, largely unregulated and undocumented, with individuals engaged in a variety of activities to make ends meet. There is little available analysis of employment impacts from digitalisation in this informal sector.[291]

A number of significant changes have taken place in the work experience of many employees since WSIS as a result of digitalisation and automation, following similar experience in earlier periods of technological development.[292] Automation to improve productivity was a central element in the industrial revolution and the emergence of industrial factories during the eighteenth and nineteenth centuries, in the introduction of assembly lines in the first half of the twentieth century, and in the adoption of mainframe computers and word processing in later decades. Digitalisation has had comparable impacts on clerical and administrative workplaces since WSIS. Office-based work has become dominated by the use of computers, with professionals now personally performing tasks (such as typing) that would previously have been done by clerical staff. Email and videoconferencing have replaced memos, telephones and, in many cases, physical meetings at the heart of office work. Routine administrative tasks, such as human resource management, are often outsourced to specialist providers and are increasingly being automated. Employers and digital platforms have, in some cases, automated monitoring of employee performance and digital activity, reducing privacy in efforts to improve productivity.

The value of digitalisation in enabling alternative patterns of formal employment was demonstrated during the COVID-19 pandemic. The potential for telecommuting – working from home rather than in offices – had been heavily promoted at the time of WSIS, partly because of perceived (but uncertain) environmental benefits, but had failed to take off substantially until it was required by pandemic lockdowns. During the crisis it proved highly effective in many countries in allowing businesses and public services to continue operating, making national economies more resilient than would have been the case before digital platforms were available, though the extent to which workers could take advantage of such opportunities varied substantially because of the differing degree of digitalisation in different occupations. While many employers have permitted homeworking to continue since the pandemic, others have insisted that employees return to offices on most or all work days.[293]

One significant area of employment growth arising from digitalisation has been in digital labour platforms through which individuals provide services – virtual, manual or clerical – as freelances (sometimes called 'gig workers').[294] The World Bank estimated in 2023 that at least 154 million workers – around 4.5 per cent of the global workforce – derived their income mainly from such work while a further 280 million or so derived secondary income from it.[295] This growth in freelance employment is particularly notable in areas such as domestic help, short-term manual work, taxi and delivery services, IT support, web development, data input and content moderation. Companies operating platforms have argued that they provide flexible working environments that are valued, not least by women, while critics argue that they have diminished the quality of work and employment rights, including benefits such as minimum pay rates, sick pay and pensions of the kind provided or required in traditional employment.[296] Increased attention has been paid by ILO and other stakeholders in recent years to the regulation of employment on digital platforms, including the impact on public services of increased job insecurity and the loss of sickness, retirement and other social welfare aspects of employment.[297]

Policymakers since the time of WSIS have noted that rapidly changing labour markets – partly but not entirely as a result of digitalisation – mean that the 'jobs for life' which many people expected in the past, at least in developed countries, are no longer available, with individuals now changing jobs and requiring retraining for different skill requirements several times during their working lives. More importance has been placed as a result on the inclusion of digital skills in school curricula, the growth of higher education courses in STEM subjects, adult learning and retraining.

The long-term impact of digitalisation on overall employment levels is controversial and uncertain, some commentators being optimistic about the future, others pessimistic. The World Bank estimates that employment in the ICT sector as a whole has increased since WSIS as a share of total employment because of the rapid growth in ICT services[298] including software/app development, web design and e-commerce. Assessments of the future impact of digitalisation are complicated by the complex interplay between digital and non-digital jobs (for example, in e-commerce and traditional retail) and uncertainties about new types of employment that may become available. Estimates of digitalisation's impact on future employment numbers vary widely, from the loss of a few million to hundreds of millions of jobs worldwide. The consultancy McKinsey, for example, anticipates that 'depending upon various adoption scenarios, automation will displace between 400 and 800 million jobs by 2030, requiring as many as 375 million people to switch job categories entirely.'[299] ILO, however, suggests that the important trend today and into the future may not be 'job destruction or job creation but rather a change of the way we work and the tools we use that constitute the challenge.'[300] Impacts, in any case have varied and are

likely to continue doing so over time and between countries with different economic structures. Countries that are highly industrialised or in which service sectors are predominant will be affected differently from those that are primarily producers of mineral and agricultural commodities.[301]

The increasing use of automation, robotics and autonomous devices such as drones is expected to have impacts on manual work comparable with those in clerical and professional work, both in terms of numbers employed and the tasks done by employees. Robots and drones are highly efficient at completing routine physical tasks that are repetitious or hazardous, displacing jobs on the one hand while improving health and safety on the other. Estimates of jobs at risk vary widely here, too, because of different expectations of technology development. The capabilities of autonomous vehicles to replace human drivers, for example, are still unclear, likely to vary between countries with different geographies and subject to regulations required for hybrid environments in which manual and autonomous vehicles share national road networks.

Anxieties concerning long-term impacts on employment have become more widespread with the advent of AI, which has the capability to displace not just manual and clerical work but also professional jobs, such as those in the legal and medical professions, that depend on familiarity with high volumes of standardised information and routine processes.[302] Advocates of AI suggest that, as in previous industrial revolutions, new types of work will emerge to replace lost jobs, enhance the quality of work required from employees (improving their work experience), foster the labour market in areas less susceptible to automation such as caring and creative roles, and enable individuals to devote more time to leisure activities. Others are more pessimistic about employment outcomes as robotics and AI push further into areas that were previously thought to be immune from automation. A 2023 study for ILO, which suggests that generative AI is more likely to augment jobs than displace them, anticipates that the proportion of total employment in high-income countries potentially exposed to the automating effects of technology is ten times higher than that in low-income countries (5.5 per cent of total employment as opposed to 0.4 per cent) and that female employment is twice as vulnerable as that of men, because of the different distribution of male and female workers between sectors and types of work.[303]

The Information Society and the environment (Action Line C7f)

This section looks at the relationship between the Information Society and the environment, drawing on the published literature, consultation inputs and an expert group discussion organised for this report by CSTD.

The *2030 Agenda for Sustainable Development* includes goals for environmental sustainability alongside those for economic prosperity, social welfare and human rights. SDG12, in particular, is concerned with achieving progress towards sustainable consumption and production, including the most efficient use of natural resources and of energy, reductions in waste through reuse and recycling, better environmental information and more effective measurement and monitoring of environmental impacts.[304] The two decades since WSIS have seen increased attention paid to environmental sustainability in global policymaking. The risks associated with climate change resulting from greenhouse gas emissions (GHGs) have become increasingly evident, with urgent action required if global warming is to be restricted to a rise of 1.5°C above pre-industrial levels adopted at the Paris Climate Change Conference in 2015, exceeding which will increase the risk of extreme weather events, disrupt agricultural production, threaten coastal areas and destabilise established population centres.[305] Other environmental challenges facing the world community include over-exploitation of natural resources, loss of biodiversity,

deforestation (which contributes to climate change) and pollution of air, land and sea by industrial processes and commercial and household waste. Recent United Nations agreements, including the *Pact for the Future*,[306] have adopted the concept of a more circular economy to describe the desired restructuring of consumption and production in favour of sustainability.

While the WSIS outcome documents established sustainable development within the WSIS vision, they made only limited reference to environmental sustainability. The *Geneva Plan of Action* included three specific goals concerned with 'e-environment', reflecting different ways in which ICTs intersect with the environment: to 'use and promote ICTs as an instrument for environmental protection and the sustainable use of natural resources'; to support sustainable production and consumption and the safe disposal of what is now referred to as e-waste; and to establish monitoring systems for 'natural and man-made disasters'.[307]

The impact of ICTs on the environment has become much more prominent in discussion of the Information Society since WSIS. UNEP's vision of 'harnessing digital technologies for a sustainable future' defines two areas of focus which it describes as 'digitalisation for sustainability', concerned with maximising opportunities, and 'sustainable digitalisation', concerned with minimising harms.[308] This dual approach is also represented in the GDC, which states that digital development should not 'exacerbate existing inequalities or impede the full achievement of sustainable development.'[309]

UNEP has identified five main pathways through which digitalisation can support environmental sustainability, which are concerned with:

- efficiency, optimisation and tracking and tracing of natural resources;
- planetary-scale data and analytics for decision-making by stakeholders;
- sustainability innovations and insights gained from digital applications;
- the substitution of digital products for those that have historically taken physical form; and
- empowering people to identify and select more sustainable products and services.[310]

The ability to monitor changes in the environment over time through remote sensors, satellites and other digital resources has added significantly since WSIS to the capacity of governments and international organisations to anticipate and mitigate environmental risks. Systematic improvements have been made, for instance, to meteorological and oceanographic monitoring, both internationally and in individual countries. The World Meteorological Organisation (WMO) has developed systems for global observation and information-sharing concerned with climate, weather and water data.[311] These and other initiatives have improved the quality and accuracy of environmental protection services, including early warning systems for those liable to be affected by adverse weather conditions. Improvements in longer-term forecasting, at planetary and national levels, have informed forward planning to address the impact of climate change. As in other areas, such as health, foresight analysis is improving rapidly through exploitation of the huge volumes of data that are now routinely gathered and capable of ever more sophisticated AI analysis, though these data remain skewed towards developed rather than developing countries.[312]

Interventions that make use of data, such as these, have enabled more effective targeting of resources in reducing and mitigating environmental risks occurring at national and global level. Behavioural adaptations derived from increased use of ICTs, such as remote working and the use of online shopping platforms, have also been promoted as potentially reducing energy consumption. However, the impact of productivity improvements such as these is difficult to

measure because of rebound effects: if greater efficiency leads to lower costs, for example, it may increase consumption of energy and or manufactured goods, while remote working may increase domestic power consumption and leisure travel even as it reduces energy consumption in and travel to traditional workplaces.

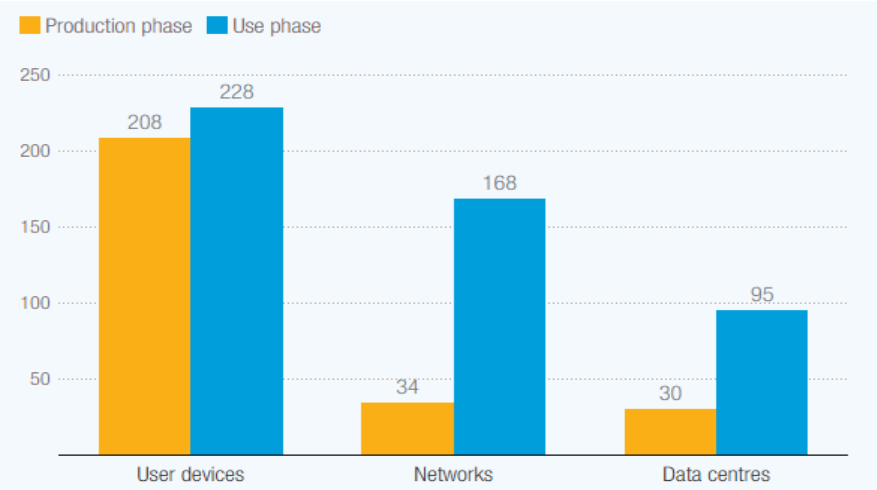
This positive potential of digitalisation for sustainability sits alongside negative environmental impacts arising from digitalisation itself. Three impacts have become increasingly important as digitalisation's footprint has grown.

Most concern has been raised about growing GHG emissions from the ICT sector. Precise estimates of the growth in carbon emissions arising from digitalisation are hard to establish, as a result of varying definitions of what should be included and different calculation methodologies. Estimates for life cycle emissions cited by UNCTAD in its 2024 *Digital Economy Report* ranged between 1.4 and 2.2 per cent of global GHG emissions in 2015 and 1.5 and 3.2 per cent in 2020.[313] What is clear, however, is that energy consumption by the digital sector has increased significantly since WSIS, both quantitatively and as a proportion of total consumption, and is expected to grow further as a result of the increased power requirements associated with IoT products and AI applications.[314]

By 2023, four ICT sector companies were among the twenty highest corporate consumers of electricity – the only companies within that group outside traditional heavy industry and utilities.[315] The growth in energy consumption arising from digitalisation includes direct impacts from the manufacture and use of ICT networks and devices and indirect impacts resulting from changes in business models and users' behaviour. Emissions arise throughout the digital value chain, from mineral extraction and manufacturing as well as network transmission, data management and the use of digital devices. They have been driven by a number of factors, including growth in the number of users, devices and services, and growth in the data analysis and computational requirements of more sophisticated applications (particularly those involving big data and AI).

Data published by UNCTAD in 2024, illustrated in Figure 17, indicate that lifecycle GHG emissions from the production of user devices are considerably more substantial than those arising from networks and data centres. The manufacture of digital products was identified as particularly problematic during the expert group discussion for this report because of the high rate of churn in equipment resulting from rapid technological improvements.

Figure 17 – Lifecycle GHG emissions (megatons of CO2 equivalent, 2020)



Source; UNCTAD, Digital Economy Report, 2024[316]

In 2020, ITU and industry partners established a target for the ICT sector to reduce GHG emissions by 45 per cent over the next ten years in order to contribute to international targets aimed at limiting global warming to 1.5ºC.[317] Particular attention has been paid, in relation to such targets, to the growth in numbers and capacity of data centres described in Chapter 1 of the report. Electricity use by thirteen of the world's largest data centre operators more than doubled between 2018 and 2022.[318] While data centre operators have moved towards greater use of renewable energy, their overall energy consumption affects supply and demand for renewables in wider national and regional economies. Data centres also require large volumes of water for cooling and have sometimes been located in areas of water scarcity, affecting the viability of other economic sectors.

The energy consumption requirements of cybercurrencies have come under particular scrutiny because of very high energy use by the crypto-mining business model that powers currencies such as Bitcoin, whose energy consumption rose from 14 terawatt-hours in 2017 to 69 terawatt-hours in 2020 and 120 terawatt-hours in 2023.[319] The International Energy Agency estimated that crypto-mining and data centres accounted for 2 per cent of world electricity demand (and almost 1 per cent of global GHG emissions) by 2022, and that this would rise to 3.5 per cent by 2025.[320]

A second environmental challenge arises from the consumption of scarce resources. The manufacture of digital equipment and devices requires a number of minerals that are in short supply, some of which are also required by green technologies,[321] and this has led to intense competition to secure supply between corporations and countries with leading roles in manufacturing for these two technologies. The exploitation of scarce minerals has also been associated with human rights abuses, dangerous employment practices and civil conflicts.[322] Because of the growing costs of mineral extraction and the growing volumes of materials required, recovery from waste sites could become increasingly cost-effective in comparison with traditional mining operations.

Digital equipment and devices typically have short lifecycles, requiring upgrading or replacement more frequently than other equipment because of rapid improvements in the capabilities of digital technologies and the technical requirements of new applications. This generates a high volume of waste, including toxic waste that falls within the remit of the Basel Convention which is concerned with the control of transboundary movement and disposal of hazardous waste.[323]

Measuring the volume of e-waste is even more challenging than measuring ICTs' contribution to GHG emissions. The Global E-Waste Monitor, established by a group of UN agencies, suggests that the volume of the most measurable elements of e-waste increased globally by 30 per cent between 2010 and 2022, with much faster rates of increase (48 per cent against 11 per cent) in developing countries than in developed countries, where markets are more mature.[324] The United Nations Environment Management Group established a UN System-Wide Response to Tackling E-Waste in 2017, followed by an E-Waste Coalition of responsible agencies in 2018,[325] but current levels of recycling are poor.

A significant proportion of digital waste created in developed countries is sent to developing nations, where formal collection and recycling systems are often inadequate. Critical problems concerned with e-waste include the lack of reliable data on recycling and disposal, low levels of recycling of components, some of which are toxic, and unsafe working conditions in (often

informal) recycling locations, especially in developing countries. Some digital services, notably e-commerce, have also had impacts on the generation of non-digital waste as a result of business models that encourage higher consumption.[326]

These three challenges have implications not just for environmental sustainability but also the long-term economic viability of digital development. This has led to growing interest in ways of achieving the goal of sustainable consumption and production articulated in the *Agenda for Sustainable Development*.[327] One approach that has received growing attention is the concept of a circular digital economy, built around efforts to minimise energy consumption and carbon emissions, improve the efficiency of mineral extraction and manufacturing processes, reduce churn in digital equipment and devices, and maximise reuse of devices and recycling of scarce materials. This approach, noted in the *Pact for the Future*, has been championed by UNEP[328] and by UNCTAD, whose 2024 *Digital Economy Report* suggested that a more circular approach could generate economic and employment opportunities in developing countries.[329] Discussions of a circular economy also suggest the need for restraint – sometimes called 'sufficiency' – on the part of consumers where both digital and other products are concerned, at least in countries with high levels of consumption.[330]

One approach to achieving greater circularity, and reducing adverse environmental impacts, involves the inculcation of sustainability requirements in the development of technology standards, products and services. A related approach, regarded with enthusiasm by contributors to the expert discussion organised by CSTD, has been the introduction of digital product passports (DPPs) that track product's origins, environmental impact and recycling or disposal. The European Union began to implement regulations requiring DPPs for relevant products in 2024.[331]

Addressing these impacts of digitalisation on sustainability was emphasised as a critical priority for the future development of the Information Society in many contributions to the consultation process for this report and in the expert group discussion that was organised by CSTD. Discussants noted that there is much greater awareness of environmental challenges today than at the time of WSIS, and that improvements in digital technology now enable much greater understanding, at both global and local levels, of environmental impacts of all kinds. As in other fields, however, they were concerned that different levels of data gathering and understanding of environmental impacts in different countries are likely to lead to variable responses. Priority should be given, it was suggested, to developing consistent statistical approaches to the measurement, monitoring and management of data concerned with environmental sustainability, including impacts attributable to ICTs themselves, and to governance mechanisms to maximise the value of resulting data.

Another suggested area of priority arose from a perceived lack of integration between green and digital policies and discourse. UNEP has warned that 'environmental fora [and agreements] are not systematically including digital technologies as enablers of their goals or considering negative impacts from digital technologies,'[332] while the goals of national development, environment and digital strategies are often poorly integrated. Discussants felt that these two fields of sustainable development ought to be 'desectoralised', with an emphasis on building the capacity and competence of policymakers and practitioners in both to identify and implement initiatives for a combined 'green digital future'. This would, it was suggested, require greater international coordination and some rethinking of existing international agreements such as the Basel Convention.[333]

The Coalition for Digital Environmental Sustainability (CODES) – a multistakeholder partnership which includes UNDP, ITU and UNEP – developed its *Action Plan for a Sustainable Planet in the Digital Age* in 2022 in support of the Secretary-General's *Roadmap for Digital Cooperation*.[334] It calls for global cooperation in pursuit of three principal goals – aligning the vision, values and objectives of the digital age with sustainable development, mitigating the negative environmental and social impacts of digitalisation, and accelerating innovation efforts towards digitalisation for sustainability. This seeks to align goals for environmental and digital development in what has been described as a 'green digital revolution'. CODES suggest that progress towards this could be supported by a clearing house to co-define standards for digital sustainability and a network of digital sustainability innovation hubs.[335]

Agriculture (Action Line C7g)

Agriculture is one of the economic sectors that is most affected by environmental change. Its role is fundamental to key objectives of the *Agenda for Sustainable Development*, particularly Goal 2 which seeks to 'end hunger, achieve food security and improved nutrition and promote sustainable agriculture.' The sector is diverse, its stakeholders ranging from massive global food corporations and industrial-scale production of products that are traded globally, to small tenant and subsistence farmers eking out a living in remoter rural areas. The mandate of the WSIS Action Line was limited, concerned with public-private partnerships at the larger scale and information sharing for smaller scale producers.[336]

The focus of many international initiatives to promote digital agriculture in the years following WSIS was on efforts to increase income-earning opportunities for small-scale and subsistence farmers.[337] Rural communities in developing countries, before the time of WSIS, generally had very limited access to telecommunications. The deployment of mobile networks and adoption of mobile phones in such communities from around the time of the Summit, where available and affordable, offered a number of benefits to small-scale farmers. Access to information on market prices enabled them to optimise the value of their produce and play a more active role in food supply chains.[338] Online extension services improved their access to information and advice on farming practice. Access to real-time weather information helped them with crop management, while mobile financial services have helped them to monetise their businesses and gain access to small amounts of capital required to smooth cash flows and to invest. As FAO acknowledges in its contribution to the review, however, the ability of farmers in remote and rural areas to gain these benefits has been and remains constrained in many rural areas of developing countries by poor infrastructure, low incomes and limited digital literacy.

At the other end of the scale, ICTs have enabled high-end interventions in agricultural practice including precision agriculture that uses analysis of data gathered from GPS, remote sensors and other data-gathering assets to improve the efficiency and cost-effectiveness of resources, reducing input costs and scheduling production cycles in order to maximise returns in both produce and revenue. Crop performance can be monitored in detail, allowing fertilisers and pesticides to be targeted precisely both in time and in location. Milk production can be automated and herd productivity optimised through analysis of individual cows' yields, likewise supported by targeting of feeds, antibiotics and veterinary care.[339]

FAO has led UN initiatives to promote digital agriculture, focusing on knowledge-sharing, capacity-building, policy support and technical assistance, with increased emphasis in recent years on institutional capacity. It established an e-Agriculture Community of Practice to support information-sharing immediately following the Summit, and published an e-Agriculture Strategy

Guide with ITU in 2016 to help governments develop national strategies aimed at ensuring food security and reducing hunger and malnutrition.[340] It recognises that, while e-agriculture has achieved much, from precision agriculture to digital extension, market information and financial inclusion, progress continues to be hampered, particularly among small farmers, by weaknesses in connectivity, digital adoption and digital literacy.

FAO emphasises the importance of a human-centred approach to e-agriculture, including tools that are easy to use and tailored to the needs of diverse user groups and support for community-based organisations. While AI has 'the potential to provide innovative solutions,' it believes, 'it also presents new challenges, including capacity building, technology dependence, AI ethics, data governance, and job displacement,' which need to be considered carefully in order to avoid negative impacts.[341] There is concern that a move to high-technology agriculture may harm the prospects of small-scale farmers in both local and international food markets.

Science (Action Line C7h)

Science and technology are naturally integral to the development of an Information Society. Although many digital technologies, including the Internet, originated in government projects or with government funding, their evolution in the run-up to WSIS and since has been led primarily by digital businesses seeking to take advantage of commercial opportunities arising from scientific advance. As discussed elsewhere in the report, an innovation-oriented culture, built around relatively open approaches to research and development, has driven technology forward, often in unpredictable directions, in ways that have often exceeded expectations at the time of WSIS. This has been especially facilitated by the almost exponential growth in data gathering and analysis that has taken place during the last two decades.

The WSIS *Plan of Action* addressed a range of issues concerned with scientific research and collaboration, data collection, publication and dissemination of findings.[342] The use of ICTs and exploitation of big data have become central to research and development in almost all scientific fields, from astronomy to microbiology, allowing scientists to explore increasingly complex problems using analytical methods and computational capabilities that reach far beyond what was foreseen at the time of WSIS. Digitalisation has increased the scope for scientific collaboration in international networks involving government research institutes, commercial businesses and academia. AI and machine learning have extended the reach of scientific analysis to such an extent that the rationale underpinning findings cannot always be readily explained by the scientists and technologists that are working with them.[343] The further development of AI and emergence of quantum computing will exacerbate this gap between digital and human analytical capabilities, raising ethical concerns about the opportunities and risks involved.

As in some other areas of digital development, recent years have seen changes at both ends of the scale in scientific work. On the one hand, digitalisation has democratised scientific investigation, enabling individuals to make use of analytical capabilities that would have been beyond their reach in previous generations, fostering the development of what has been called 'citizen science' and the use of crowdsourced data in research.[344] The *Geneva Plan of Action* was particularly concerned to maintain open standards and support innovation, an approach that has also been promoted by UNESCO, whose 2021 *Recommendation on Open Science* promotes a common definition, shared principles and standards for open science.[345] There has been growing support for new models of scientific diffusion and debate and for more open publication of

scientific papers. Several UN agencies have sponsored arrangements for access to publications for academic institutions in developing countries.[346]

At the same time, the high capital costs of investment in advanced equipment have led to a concentration of research and development capabilities in a relatively small number of countries. Small businesses with promising innovations in AI are often acquired by larger businesses that can access the capital required to invest rapidly, establish strong market positions and gain sufficient return on their innovations.

Research funding and academic research in AI are dominated by the United States, China and the European Union, followed by Japan, India and the UK.[347] Thirty per cent of academic papers in advanced AI published between 2014 and 2023 originated in the United States, with a further 18 per cent originating in China, which has overtaken the United States since 2019. Most of the remainder were published in the European Union, India and the United Kingdom. Very low participation rates by developing countries other than China and India, and particularly by LDCs, have raised concerns that AI development will focus primarily on meeting needs and market opportunities in developed countries rather than addressing problems in lower-income regions. This concern lies behind some of the initiatives on AI proposed by the Secretary-General's High-Level Advisory Body on AI and in the GDC (see Chapter 3).

CHAPTER 2E

HUMAN RIGHTS AND ETHICAL DIMENSIONS

The *Geneva Declaration* stressed the importance of ensuring that the Information Society should respect and uphold rights and freedoms established by the Universal Declaration of Human Rights (UDHR). It noted the interdependence and indivisibility of rights within the international rights regime and drew particular attention to the Universal Declaration's Article 19, which is concerned with access to information and freedom of expression, and Article 29, which is concerned with the legitimacy of derogations from individual rights.[348]

The *Geneva Action Plan* states that 'All stakeholders should increase their awareness of the ethnical dimension of their use of ICTs, and 'promote the common good.' It specifically refers to privacy and data protection and to the prevention of 'abusive uses of ICTs.'[349] While human rights are fundamental to this mandate, a wider range of ethical concerns has been raised in discussions of digitalisation since the Summit, particularly since the emergence of AI and other frontier technologies. Some contributors to the consultation process stressed that ethical priorities should be reflected across the range of Action Lines, rather than treated as a separate thematic issue.

Human rights and ethical dimensions of the Information Society (Action Line C10)

The Internet and other recent digital developments are not directly referenced in the principal international rights agreements, all of which had been adopted by the international community before WSIS. They have, however, become increasingly important to the realisation of rights and the full participation of citizens in their societies. In 2012, the General Assembly recognised 'the global and open nature of the Internet as a driving force in accelerating progress towards development' and called on all States to promote and facilitate access to it.[350] The Office of the UN High Commissioner for Human Rights (OHCHR) described access to the Internet in 2022 as 'an indispensable enabler of a broad range of human rights,' and as 'central to the realisation of the rights to education, to freedom of association and assembly, to participate in social, cultural and political life, to health, to an adequate standard of living, to work and to social and economic development,' as well as freedom of expression.[351]

All rights are affected to some degree by digitalisation, including those set out in the International Covenants on Civil and Political (ICCPR)[352] and on Economic, Social and Cultural Rights (ICESCR),[353] and those in the conventions concerned with the rights of women and children and with racial discrimination (CEDAW,[354] CRC,[355] ICERD[356]). Some ICESCR rights, such as those relating to health, education and employment, are related to specific SDGs and WSIS Action Lines. Rights in different regions are also guided by regional rights agreements such as the European Convention on Human Rights[357] and the African Charter on Human and People's Rights,[358] and in individual countries by national constitutions and laws.

In 2012, the UN Human Rights Council (UNHRC) and the General Assembly affirmed 'that the same rights that people have offline must also be protected online.'[359] This principle of equivalence has been reiterated in subsequent General Assembly resolutions.

Rights within the international rights agreements are generally understood to be interconnected. Article 29 of the UDHR establishes the principle that 'the exercise of rights and freedoms shall be subject only to such limitations as are determined by law solely for the purpose of securing due

recognition and respect for the rights and freedoms of others and of meeting the just requirements of morality, public order and the general welfare in a democratic society.'[360] International rights bodies including the OHCHR have clarified three fundamental principles for determining the legitimacy of such derogations: that they should serve a legitimate purpose, be proportionate to that purpose, and derive their authority from an established national law.[361]

The GDC asserts that 'All human rights, including civil, political, economic, social and cultural rights, and fundamental freedoms, must be respected, protected and promoted online' and adds that its signatories will seek to 'harness digital technologies to advance all human rights, including the rights of the child, the rights of persons with disabilities and the right to development.[362] The GDC also calls on the private sector to apply the UN *Guiding Principles on Business and Human Rights*. These urge governments to 'set out clearly the expectation that ... business enterprises ... [should] respect human rights throughout their operations' and ensure access to remedy against business-related violations, and urge business enterprises to respect human rights, exercise due diligence including assessing actual and potential impacts on them and take action to prevent and mitigate adverse impacts.[363]

Most attention concerning the impacts of digitalisation on rights since WSIS has focused on two articles of the ICCPR and their relationships with other rights: Article 17, which briefly states the right to privacy; and Article 19, which is concerned with opinion, expression and access to information. The following paragraphs focus on these two Articles. Broader ethical issues, including those concerned with the development of AI, are considered in Chapter 3.

Privacy

Article 12 of the UDHR and Article 17 of the ICCPR briefly state that 'No one shall be subject to arbitrary or unlawful interference with his [*sic*] privacy, family, home or correspondence.' The OHCHR considers this a key enabler of other rights, particularly 'the free development and expression of an individual's personality, identity and beliefs, and their ability to participate in political, economic, social and cultural life.'[364]

Digitalisation has transformed the gathering, management and analysis of information, including personal data. The accumulation of these data has great potential value, as the experience in sustainable development described above has shown, in extending the ability of governments and international organisations to design and implement improvements in public services and to monitor and manage risks to human welfare. It also has great value to commercial organisations, which have used increasingly sophisticated algorithms to micro-target marketing initiatives and respond directly to perceived consumer/user preferences and interests. The range of data gathered is continually expanding as online activity increases and as more devices are connected to the cloud. AI and big data analysis allow data to be drawn together from many different data sets, enabling much more comprehensive and sophisticated understanding of individuals and communities.

As well as enabling positive outcomes for citizens and consumers, the gathering and analysis of much greater volumes of personal data than was previously possible is recognised as posing significant new risks to privacy, including intrusion and surveillance. Behaviour which would previously have been private – including personal relationships – is automatically captured on digital platforms and thereby open to analysis by big data and AI. The routine gathering of data on personal behaviour by social media and other online services and platforms – described by critics as 'surveillance capitalism'[365] – has given commercial businesses a deeper understanding of

individuals than that of all but their most intimate friends and relations. Fears are widely expressed about the potential for exploitation of these data by commercial businesses and of surveillance of individual and group activity by government agencies using data they have gathered along with that from platforms operating in their jurisdictions. If personal data are insufficiently protected, they may also be hacked and exploited by criminals. This has led to calls for stricter regulation to restrict data exploitation to legitimate commercial, administrative and law enforcement goals, to anonymise data used for policy analysis and statistics, and to control who can obtain access to personal data.

Basic data protection laws have become crucial to enabling trust in e-commerce and other online platforms, particularly where transactions or personal ID are involved. In 2013, the General Assembly adopted a resolution on the right to privacy in the digital age, which recognised that 'the rapid pace of technological development ... enhances the capacity of governments, companies and individuals to undertake surveillance, interception and data collection, which may violate or abuse human rights.'[366] A subsequent OHCHR report on *The Right to Privacy in the Digital Age* noted the need for more effective legislation, oversight and procedures to address the way that digitalisation was already transforming the parameters of privacy within societies.[367]

UNCTAD estimates that 137 countries – 71 per cent of the total – now have data protection and data privacy legislation, and 158 – 81 per cent – laws governing electronic transactions.[368] Some governments have also appointed commissioners or agencies responsible for information regulation. More sophisticated legal instruments have been introduced in some jurisdictions to protect users against over-exploitation of personal data by commercial businesses, notably the European Union's General Data Protection Regulation (GDPR) which stipulates that data may only be collected for 'specified, explicit and legitimate purposes and not further processed in a manner that is incompatible with those purposes.' [369] GDPR provisions apply to companies headquartered outside as well as within the European Union and have therefore influenced governments and businesses in other regions.

The parameters of digital privacy continue to change as a result of the immense increase in data volumes gathered by an ever-wider range of digital services and of greater technological sophistication in data analysis. AI and big data analysis have enormously increased the capacity of commercial businesses, governments, researchers and others to make use of data for official or commercial purposes (and the risk that they will fall into the hands of criminals). At the same time, more sophisticated encryption techniques, blockchain and other technologies have enabled more proficient forms of data protection, whether in support of cybersecurity or to avoid external scrutiny.

The capabilities of encryption have, in recent years, raised policy challenges concerning the boundaries between privacy, the transparency required for accountability in government and business, the protection of citizens against criminality, and the legitimate requirements of law enforcement.[370] Sophisticated encryption is essential for cybersecurity, including the protection of personal data, but is also exploited by criminals and others who may be thought by governments to violate 'the rights and freedoms of others' or undermine 'morality, public order and the general welfare in a democratic society' along the lines set out in Article 29 of the UDHR. Some law enforcement agencies have sought the introduction of 'backdoors' in software that would enable them, when they think necessary, to override encryption standards. Opponents have argued that this would undermine cybersecurity, give opportunities to hackers, and raise risks of heightened surveillance.[371]

The OCHCR believes that data-intensive technologies including AI 'contribute to creating a digital environment in which both States and business enterprises are increasingly able to track, analyze, predict and even manipulate people's behaviour to an unprecedented degree,' posing 'very significant risks for human dignity, autonomy and privacy,' and therefore requiring effective safeguards.[372] Issues concerning AI are considered in Chapter 3.

Access to information and knowledge (Action Line C3)

Access to information was understood at WSIS to require not just connectivity but the wider range of assets now encompassed by the term 'meaningful connectivity', including affordability, capabilities (including digital literacy), the availability of relevant content, and the absence of restrictions (beyond those allowed by human rights agreements) on accessing that content arising from constraints imposed by governments or commercial gatekeepers. Digital resources, particularly the Internet, were seen as democratising access to much greater volumes of information thanks to the capacity of digital networks to store and disseminate both legacy material and new types of content generated in the digital environment. They have also enabled individuals to publish their own content at little or no cost, thanks initially to the World Wide Web and more recently through social media and other platforms.

Issues relating to inclusion covered by this Action Line are discussed in Chapter 2A. The following two sections are concerned with aspects concerned with rights to access information derived from Article 19 of the ICCPR which is concerned with access to information/content and freedom of expression.

Overall access to content and information has increased greatly since WSIS because of growth in the volume of information available online including online publication of content that would previously have only been available in print, the development of the World Wide Web and the app economy, the massive expansion that has taken place in user-generated media, the retention of content as data in the cloud, and falling costs of data access. 'Meaningful access' is, however, still constrained by digital divides in connectivity and capabilities and therefore unequal between and within different societies. The marginalisation of some communities and individuals described in relation to connectivity in Chapter 2A extends to their experience of information access.

A distinction may be drawn between 'content' and 'information' in this context. 'Content' can be taken to encompass all readable (including machine-readable) material that can be found online. 'Information' may be more narrowly defined (to exclude, for instance, abusive content) or more broadly (to include, for instance, metadata). Although 'information' itself is not defined in the *Geneva Declaration*, 'equitable access' is said to be required for 'information for economic, social, political, health, cultural, educational, and scientific activities,' which will thereby support quality of life and engagement in societal development.[373] UNESCO built on this its aspiration to move beyond Information Societies towards Knowledge Societies that transform information and evidence into applicable knowledge, enhance the understanding of the whole community and enable decision-making that will advance sustainable development.[374] First elaborated at the time of WSIS, the Knowledge Societies approach was further developed by UNESCO in the light of changes in the digital environment ahead of the WSIS+10 review.[375]

The ICCPR restricts the grounds on which access to information may be legitimately constrained by governments to circumstances that are 'provided by law and … necessary … for respect of the rights or reputations of others [and/or] for the protection of national security or of public order, …

public health or morals.'[376] International rights frameworks require such constraints to be relevant, proportionate and based in law. In its 2021 resolution on 'the promotion, protection and enjoyment of human rights on the Internet,' the UNHRC called on States to refrain from 'measures in violation of human rights law that prevent or disrupt an individual's ability to seek, receive or impart information online, including Internet shutdowns and online censorship.' In the same resolution, it endorsed the principle known as 'net neutrality'. calling on States 'to prohibit attempts by Internet access service providers to assign priority to certain types of Internet content or applications over others for payment or other commercial benefit.' [377]

The number of Internet shutdowns – when the Internet is intentionally disrupted or suspended, usually by a government – has increased in recent years, with more than 930 instances reported in 74 countries between 2016 and 2021, a further 201 reported in 40 countries in 2022 and 283 in 39 countries in 2023.[378] UNHRC considers blanket shutdowns disproportionate, and therefore incompatible with international rights agreements, as well as damaging to economic and social welfare and to public services, but says that 'targeted shutdowns of a … service provided through the Internet may be deemed proportionate and justifiable' in 'the most exceptional circumstances' when this is consistent with Article 19 of the ICCPR.[379] The General Assembly urged governments to refrain from introducing shutdowns and other measures that target Internet access in the GDC.[380]

As the volume of online content has increased, controversies have grown around the extent and nature of content moderation. Not all content is accurate or intended to be so; much is intended to influence, some to misinform. No piece of information is complete, and few are free of interpretation. The recommendation algorithms used by online platforms to direct their users towards material those algorithms calculate will interest them, and so maximise engagement, act as gatekeepers to the vast array of content that is now available.

UNESCO identified a number of the challenges arising from this in an Action Line report ahead of the WSIS+20 review. There has been, it said, 'a disproportionate increase in incomplete, false, and misleading information as well as the overload of unverifiable information, presented in culturally and linguistically inappropriate manner, [without] a commensurate increase in the availability, visibility, prominence, and engagement with verified information itself. The multiplication of sources of information (noise),' it added, 'as well as the emergence of new technologies powered by artificial intelligence, have intensified the consequences of disinformation. In an algorithmic system based on mass opinions, the use of bots distorts human perception of values, historical realities, products, or even governments and institutions.'[381] These challenges are discussed in the section concerned with information integrity in Chapter 3 of this report.

Freedoms of information and expression

The *Geneva Declaration* calls for 'the use of ICTs and content creation [to] respect … the right to freedom of thought, conscience, and religion in conformity with relevant international instruments.'[382] It affirms the freedoms of information and expression set out in Article 19 of the ICCPR and asserts that 'Everyone, everywhere should have the opportunity to participate' in the benefits of the Information Society.

Article 19 of the ICCPR declares that 'Everyone shall have the right to hold opinions without interference' and 'the right to freedom of expression,' including 'freedom to seek, receive and impart information and ideas of all kinds, regardless of frontiers, either orally, in writing or in print,

in the form of art or through any other media of … choice.' It adds, in line with Article 29 of the UDHR, that 'The exercise of [these rights] carries with it special duties and responsibilities' and may therefore be subject to 'certain restrictions', so long as these are 'provided by law and are necessary a) for respect of the rights or reputations of others; [or] b) for the protection of national security or of public order … or of public health or morals.' (Similar constraints are included in Articles 21 and 22 of the ICCPR which are concerned with rights of assembly and association.) As noted above in relation to rights in general, the OHCHR clarifies that derogations along these lines must be based in law, and be both relevant and proportionate to their stated purpose.

Some specific restrictions on expression are included in Article 20 of the ICCPR, which states that 'propaganda for war' and 'any advocacy of national, racial or religious hatred that constitutes incitement to discrimination, hostility or violence' shall be prohibited by law. ICERD requires its States Parties to make the 'dissemination of ideas based on racial superiority or hatred, incitement to racial discrimination' and incitement to acts of violence against ethnic groups 'punishable by law,'[383] while the CRC requires them to take measures to prevent 'the exploitative use of children in pornographic performances and materials.'[384]

Like other WSIS outcomes, freedom of expression is affected by digital divides. Not all online users have access to all content or the ability to use social media and other online services for self-expression. Poor connectivity, limited funds and language competencies restrict the extent to which lower-income customers in many countries can engage with the full range of online content or express themselves online. Some international platforms are unavailable in some countries because of official restrictions, their place in these national markets generally taken by local platforms offering comparable services. Some forms of content are likewise restricted, for a variety of reasons, in different countries, affecting both expression and access to information.

The Internet and other online services – initially the World Wide Web and more recently social media – have greatly expanded opportunities for expression, enabling individuals to publish information, opinion and other content cheaply (in effect, at zero marginal cost), with the ability to reach not only personal contacts but wider closed communities (for instance WhatsApp groups or Facebook contact lists) and much larger national or global audiences.

The extensive use of social media to coordinate activity with others means that freedom of expression online has become associated with freedom of association – the right to cooperate with others in pursuit of common goals which is established in Article 22 of the ICCPR. In particular it has facilitated the coordination of activities and sharing of information and experience within like-minded groups of individuals, including marginalised social groups, the organisation of protest and other political activity.

Some 95 per cent of Internet users are now estimated to make use of one or more social media platforms at least once a month.[385] While the majority of these provide opportunities for user-generated content, many users only read content that has been posted by others. The type of user-generated content on platforms also varies. The volume of user-generated posts on Facebook, the largest social media platform, is particularly high with some 3 billion monthly and 2 billion daily active users sharing some 4.74 billion items each day, mostly oriented towards communities of users.[386] WeChat, based in China, which offers a variety of services, had almost 1.4 billion users in 2023.[387] TikTok, which has emerged more recently and become particularly popular with younger users, focuses on short user-generated videos. Twitter, rebranded X in 2023, began in 2006 as a microblogging platform enabling very short messages to be addressed to its whole userbase, but now features longer messages and associated content including text,

audio and video. User preferences amongst these and other social media platforms differ between countries and generations. Some early platforms have fallen out of use while others have come onstream to take their place.

These and similar platforms have given those who wish to produce content many more opportunities to do so. Many different organisations have taken advantage of this opportunity, as well as individuals: businesses use social media to advertise and market products and services, for instance, and political parties and religious organisations use it to spread their messages, reaching and seeking to influence larger audiences than could be reached by traditional media.

The reach of user-generated content for individuals is highly variable. Businesses have emerged that seek to influence both search results and social media engagement on behalf of clients seeking maximum exposure. While some content 'goes viral', reaching huge audiences in individual countries or worldwide, the vast majority reaches only a small number of other online users. A significant number of individuals, sometimes called 'influencers', have acquired very large followings online that they have used to spread personal, social or political opinions, market products and services and gain income. The vast majority of those posting online, however, communicate only with relatively small groups of acquaintances and like-minded individuals.

As well as enabling expression, this abundance of content has given greater resonance to content that attracts attention, encouraged by the algorithms used by social media platforms to direct users towards content that is likely to maximise engagement (thereby generating advertising revenue). Together with search engines, these recommendation algorithms have become critical gateways to content for the majority of users. Critics of social media argue that their focus on maximising engagement has led users to focus on content that reinforces rather than challenges their preferences and views, narrowing rather than broadening the range of opinion to which they are routinely exposed, and suggest that this has contributed to polarisation of political opinion. Concern has also been expressed about the potential for algorithmic bias, intended or unintended, to affect the formation of public opinion, including political opinion, especially during election periods, and about the potential of social media platforms to spread misinformation and disinformation, raising questions concerning platform accountability and intermediary liability.

Some kinds of abusive behaviour were identified in the *WSIS Plan of Action*, which urged 'All actors in the Information Society [to] ... take appropriate actions and preventive measures, as determined by law, against abusive uses of ICTs such as illegal and other acts motivated by racism, racial discrimination, xenophobia, and related intolerance, hatred, violence, all forms of child abuse, including paedophilia and child pornography, and trafficking in, and exploitation of human beings.'[388] Other types of content that have caused concern since WSIS include online misogyny and bullying of women, children and minorities, defamation, threats of violence against individuals, and the promotion of terrorism.

There has been growing debate about the role of content regulation (by governments) and content moderation (by platforms) during the decade since the WSIS+10 review. Some types of content, such as child sex abuse images and incitement to racial violence, violate specific clauses in international rights agreements. In other cases, governments have sought to establish legal and regulatory constraints, including measures to protect 'the rights of others' or in relation to issues considered relevant to 'national security, ... public order ,,,, public health or morals' as set out in Article 19 of the ICCPR. Such measures have proved controversial at both national and international levels, and have sometimes been challenged by digital businesses and rights

advocacy groups. Implementation challenges have arisen because modes of expression online and offline differ in a number of respects, including the use of encryption, anonymity and pseudonymity online, the potential for content to 'go viral', and the fact that content creators are often located outside the legal jurisdiction of those affected by their content. Recent issues concerned with information integrity and platform regulation are discussed in Chapter 3.

Cultural diversity and identity, linguistic diversity and local content (Action Line C8)

The *Geneva Plan of Action* recognised that, for access to information to be equally available to all, the Internet and other digital resources need to be culturally and linguistically diverse and enable access to content that is relevant to the circumstances of potential users. The mandate for Action Line C8 included an extensive list of potential interventions concerned with policy development, libraries and cultural institutions, cultural heritage, language and expression (with particular reference to indigenous cultures), local content creation including educational curricula, and the needs of women and under-represented communities.[389]

The sense some people have that the Internet has little to offer them personally has continued to act as a barrier to ensuring that 'no one will be left behind' in the digital environment. Lack of awareness of potential benefits is reportedly accentuated by anxiety about something that is unfamiliar and perceived to carry risk, by unfamiliarity with international languages, and by the perception that there will be little content of relevance to people's lives and interests. For some, particularly isolated individuals, those in older and more vulnerable groups and those with limited disposable income, the potential benefits are outweighed by risks and costs.

The volume of content online, including local content, has massively increased since WSIS. In 2005, it was estimated that the World Wide Web provided access to some 65 million websites, rising to just over 200 million in 2010 and 1 billion in 2014, after which the number of sites seems to have stabilised. However, less than 20 per cent of these websites are reported to be active.[390] Most organisations of significance in almost all countries now host websites that publish information relevant to their citizens (if governments), consumers (if businesses) and communities (if civil society organisations). As discussed above, the Web is now accompanied by user-generated content, including information shared by local organisations and within local communities.

The sustainability of cultural diversity and heritage within the WSIS framework is championed by UNESCO. The capacity for content to be published online at little or no cost is seen to have supported minority cultures and their heritage and to sustain indigenous knowledge, 'diffusing original national and local cultural content ..., reducing technological and linguistic biases and discrimination.'[391] Specialist websites and social media platforms, most recently including TikTok, have given creative artists new opportunities to reach wider audiences, especially with music. The digitalisation of content has also brought new challenges, however. The ease with which content such as video and music can be downloaded in violation of copyright protections, and the displacement of physical CDs and DVDs by streaming services, have undermined the pre-digital financial base for many artists and musicians. The multiplication of broadcasting and online media platforms offers new opportunities for content localisation but also increases competition for local content from media created in dominant global cultures. Many creative artists are also concerned about the exploitation of their work, within or outside established intellectual property arrangements, to train generative AI models, and the potential impact of AI-generated content.

Lack of linguistic diversity was recognised at WSIS as a barrier to an inclusive Information Society. At the time, English, spoken by just over 15 per cent of the world's population, was predominant on the Internet, with the proportion of Web pages in English estimated at around 45 per cent (down from a much higher figure in the Web's first years).[392] English remains by far the most used language on the Web, estimated to be present on just under half of websites (though often alongside other languages) compared with just over 5 per cent for the most seen other languages.[393] The online encyclopaedia Wikipedia, which has multiple language editions, was reported to have almost 7 million articles in English in early 2025, compared with just under 3 million in its next most popular edition (German), some 1.5 million in Chinese and around 1.25 million in Arabic.[394] Social media posts, other user-generated media and local information services (including those accessed through mobile apps) are more likely to use other international and local languages. Nevertheless, a high proportion of Internet content is only available to those who are literate in English and other international languages, predominantly – outside countries where it is the dominant spoken language – those who are more highly educated.

A number of initiatives have been taken since WSIS to extend the range of languages available within the Internet's technical structure, for instance ICANN's extension of the range of character sets that can be used in Internationalised Domain Names,[395] while online services such as Google Search and Wikipedia have expanded the number of languages in which they can be used. The most significant development in language accessibility since WSIS, however, may be the development of automatic translation which has become increasingly accurate as the volume of online content has increased and machine learning techniques have been applied – though its reliability is still variable, particularly where voice recognition is employed. The widely used Google Translate service supported 249 languages and language varieties by January 2025.[396]

UNESCO notes that the rise of AI is poised to reshape the creative landscape further in the next few years. Generative AI, it believes, has drastically reduced the cost of producing realistic creative content including images and video, which provides new opportunities for cultural creativity but also raises questions concerning authenticity and the unlicensed use of copyright material, 'the sustainability of the cultural value chain' and 'market concentration in the hands of large tech companies.'[397]

Media (Action Line C9)

The WSIS outcome documents reflected established UN principles in respect of media development, particularly commitments to freedom of expression and diversity of media ownership.[398] The GDC commits the international community to 'promote diverse and resilient information ecosystems' and to strengthen 'independent and public media.'[399]

The extent to which new media would disrupt traditional media was not widely anticipated at the time of the Summit but has been substantial, particularly since the growth of social media platforms. On the one hand, new types of media and information gathering have changed some of the characteristics of newsgathering. On the other, many countries have seen substantial reductions in consumption of print newspapers and mainstream broadcast channels, with implications for the range and quality of professional journalism and the formation of public opinion.

The proliferation of content available online and the ease with which content can be created and published by non-professionals have given journalists access to more sources of information

and, particularly in contexts such as conflicts, protests and humanitarian crises, allowed them to take advantage of user-generated images and video to substantiate or corroborate stories written at a distance. Specialist investigative journalism, in particular, has benefited from this diversification of material. Verification of such content is difficult, however, as the same publication platforms used for disseminating genuine material can be and have been used by those uploading misleading, inaccurate or fabricated content.

The advent of generative AI is likely to intensify these media developments. It can, on the one hand, help journalists (like other professionals such as lawyers) sift large volumes of source material, reducing research time and helping to uncover unexpected stories. On the other, generative AI is already being used to produce fabricated ('deep fake') and misleading images, audio and video. AI has begun to be used in some newsrooms to replace human journalists, initially in less contentious areas such as sports and financial reports, but with the potential for it to be used in more contentious areas such as political news.[400]

Newspaper readership has been in precipitate decline in many countries in the two decades since WSIS. In the United Kingdom, for example, daily sales of national weekday newspapers have fallen from more than 12 million (one for every 5 people) in 2005 to 7.3 million (one for every 8.9) in 2015 and an estimated 2.5 million (one for every 28) in early 2025.[401] Digital broadcasting has also seen a proliferation of television channels, sometimes politically partisan, which has undermined the market share of traditional public service and mainstream commercial broadcasters, particularly those focused on news rather than entertainment.

Much of the shift in news consumption has been to non-professional sources such as social media. Research by the British communications regulator Ofcom in 2023 found that some 70 per cent of British adults now say they access news online, either alongside or in place of traditional media, with just over half citing social media platforms. Young people in particular appear to have moved towards online content as their principal source of news.[402] Although newspapers and broadcasters have moved their content online as well as offline, generally updating websites as news stories develop, they have struggled to retain financial viability in this new media environment. Local newspapers and broadcasters have been particularly vulnerable to the loss of readers and advertising revenue, leading to the closure of many titles or the substitution of local by generic content.[403]

Gender equality and women's rights

The *Geneva Plan of Action* did not establish a separate Action Line concerned with gender. Gender equality has, however, been a central theme for United Nations work for many decades, reinforced by the outcomes of the four World Conferences on Women, held in Beijing between 1975 and 1995,[404] the Convention on the Elimination of All Forms of Discrimination against Women (CEDAW), adopted by the General Assembly in 1979, and by Goal 5 of the SDGs which is concerned with gender equality and empowerment.

There has been more substantial recognition of the need to mainstream gender equality in digital development in international agreements since the Summit. In its ten-year review of WSIS, for instance, the General Assembly expressed particular concern about the gender digital divide in connectivity and online participation.[405] The EQUALS Global Partnership was formed by ITU and UNWOMEN in 2014 to 'create a platform for advancing women's meaningful engagement in ICTs and their role as decision-makers and producers within the sector,' building stakeholder coalitions on access, leadership, skills and research.[406] Broadband Commission working groups

on challenges related to gender reported in 2013 on ways to enhance the inclusion of women and girls in the Information Society and issued recommendations in 2017 on ways to address gender digital divides.[407] The GDC includes specific commitments to 'mainstream a gender perspective in digital connectivity strategies' that will 'address structural and systematic barriers to meaningful, safe and affordable connectivity for all women and girls,' and to target and tailor capacity building initiatives to the needs of women and girls, along with other groups that are under-represented in digital activity.[408]

The following paragraphs draw on published literature, consultations for this report including input from UNWOMEN and from CSTD's Gender Advisory Board, and an expert group discussion convened by CSTD to explore the impacts of digitalisation to date and future priorities concerned with gender equality and women's rights.

Gender digital divides, evidence concerning which can be found in Chapters 1 and 2A, remain a fundamental concern. As shown by statistics concerned with mobile phone ownership and mobile phone and Internet usage that are summarised there, along with more extensive data published by, among others, ITU, GSMA and Research ICT Africa, there are still significant gaps in digital participation between men and women, particularly in LDCs and other low-income countries. GSMA reports that women in lower- and middle-income countries are some 15 per cent less likely than men to own mobile phones, and those that do are less likely to own smartphones that enable effective Internet access.[409] A number of factors feed into these disparities, including systemic inequalities within societies (concerned with education, employment and incomes), cultural norms and expectations that constrain women's rights and opportunities, and anxiety about the risks posed to women online. It is understood that efforts to address gender digital divides therefore need to recognise both digital and wider social and economic inequalities and address the underlying reasons for them.[410]

Digital inclusion is seen in consultation inputs and wider literature as valuable in presenting opportunities for women to bypass constraints that limit their lives or experience – for instance, by providing access to information on reproductive rights that is poorly available in their communities, or by facilitating access to employment and income through working from home alongside childcare and domestic responsibilities in societies where these are disproportionately undertaken by women.[411] Experience of the introduction of mobile money services, for instance, is felt to have been positive for women, making it easier for them to control their own income and finances, to obtain capital and services such as micro-insurance for their own businesses, and to manage budgets more effectively and independently.[412]

As well as opportunities and improvements in service delivery, however, the years since WSIS are also felt to have increased challenges to women's safety and security, in particular through a rise in online misogyny and technology-facilitated gender-based violence – including stalking, bullying, sexual harassment, defamation, hate speech, exploitation and threats to life.[413] UNESCO suggests that a majority of young women and girls worldwide have experienced sexual harassment on social media.[414] The threat of gender-based violence online is thought to have grown recently with the advent of generative AI, which has made it easier to produce realistic fake images and videos, including sexual content. The rise of racial and gender-based hatred online has been one of the most important drivers of current debates around content moderation and the relationship between freedom of expression and other human rights.[415]

It has been recognised since the Summit that women are under-represented in education in STEM subjects (science, technology, engineering and mathematics) at school and university, in ICT

sector employment and, particularly, ICT sector leadership. While international organisations, governments and digital businesses have made commitments to improve gender inclusion, these inequalities have persisted in most countries through the period since WSIS. Women were reported in 2024, for instance, to make up only around 30 per cent of all STEM workers and of those working on AI, to comprise less than 20 per cent of graduates from doctoral programmes on AI, and less than 15 per cent of authors of AI research papers.[416] This under-representation of women in the ICT industry and its governance, it has been suggested, has contributed to under-representation of women's needs and interests in the design, development and marketing of digital resources and services.[417] Recommendation no. 40 to CEDAW, on the equal and inclusive representation of women in decision-making systems, adopted in 2024, includes a number of measures aimed at achieving progress towards parity in digital decision-making.[418]

Contributors to the consultation suggested that experience since WSIS has shown the value of a 'gender lens' facilitating coordination and policy coherence across ministries responsible for different areas of sustainable development, with more opportunities for gender equality and women's rights being realised where synergies are recognised and understood, fewer where this is not the case. While mainstreaming gender within development sectors, including digital development, has been important, it was suggested, it has also proved necessary to implement standalone policies and programmes that address challenges that women specifically face within different societies, such as unequal access to finance for digital business ventures. Specific measures to enhance opportunities for women along these lines have been supported by various United Nations agencies, including UNCTAD's work to promote women entrepreneurs in the ICT sector.[419] Greater coherence, it was suggested, would enable digital and non-digital ministries in governments to develop more holistic approaches to women's needs online, including connectivity and inclusion, rights and freedom from abuse and violence, access to information, employment, skills and digital literacy, and participation in decision-making processes.

Particular concern was expressed during the consultation about the need to improve data on women's experience of digitalisation, with more disaggregation, greater granularity and more evidence of trends that might illustrate the effectiveness of different policies and business models. The under-representation of women in data sets used for training AI systems was also considered problematic. It has been clear from the early days of AI development that biases in training data are likely to lead to biases in the outcomes generated by AI systems which, in the words of CEDAW Recommendation 40, risk 'a rollback in gender equality gains and new forms of structural discrimination.'[420]

A significant number of contributors to the consultation felt that the WSIS framework would benefit from a standalone Action Line on gender, which might address the priority issues discussed above holistically, through a gender-specific lens, in addition to the more siloed approach represented by existing Action Lines.

Children's rights and welfare

Children are defined in the Convention on the Rights of the Child (CRC), which was adopted by the General Assembly in 1989,[421] as those below the age of 18, though legal definitions vary in different countries. The Convention sets out the rights of children within the framework of human rights established in the UDHR (which recognised the need for special attention to childhood),[422] ICCPR and ICESCR, and establishes the principle that 'the best interests of the child shall be a primary consideration' in all actions concerning children, whether undertaken by governments or

other parties.[423] It commits States Parties to take legislative, administrative, and other measures to implement rights recognised in the Convention.

The *Geneva Declaration* commits the international community to 'ensuring that the development of ICT applications and operation of services respects the rights of children as well as their protection and well-being.'[424] The Action Line concerned with capacity-building (C4), whose mandate encompasses that for education, is primarily concerned with the social value of education and training rather than with child development and welfare. Other references to children in the *Plan of Action* include them, alongside older people, those with disabilities and other vulnerable groups, as a group that should be recognised in national e-strategies and the design and production of hardware and services. The *Plan* also includes 'child abuse, including paedophilia and child pornography' alongside other abusive uses of ICTs against which States should take preventive action.[425] The GDC commits to 'Strengthen legal and policy frameworks to protect the rights of the child in the digital space' in line with the CRC.[426]

Since the adoption of the CRC, and particularly since WSIS, the internet and other digital resources and services have become central to very many children's lives, with at least a third of internet users being children today.[427] The evolving digital environment affects the context in which children are brought up within their families and communities; the ways in which they interact with their societies, including education (Chapter 2D); how they learn and play; how they share experiences with peers; and their future employment and other opportunities. Digital devices and online services have enabled children to acquire more independence from their parents – whether finding information that is valuable to them (for instance about reproductive rights) or exploring content that would previously have been unavailable (including content that may be harmful).

These themes have become increasingly prominent in the wider literature concerned with the impact of digital development on children's rights and welfare, featured extensively in consultation inputs and were the subject of an expert group discussion convened by CSTD for this report.[428] Consultation responses and discussions recognised that, while children's experience of the growing Information Society reflects and illustrates many of the impacts taking place in societies overall, attention needs to be paid to particular ways in which the digital environment affects children's rights and welfare that require specific public policy attention.

Children's access to digital content and resources is unequal both between countries with different economic circumstances and within societies as a result, among other factors, of the economic, social and digital divides described in Chapter 2A. Unequal access to digital resources can exacerbate inequalities within societies, including disadvantages experienced by children.

Digital services and platforms present both opportunities and risks for children. These can be immensely enriching and empowering, giving children opportunities to develop skills and knowledge and facilitating engagement with their communities and with global society and cultures in ways that were unavailable to previous generations. They also present risks including predatory behaviour by adults, exposure to harmful content, and risks to privacy and personal data.

Children today are often more familiar with digital technology and content than their parents, creating a generational divide in which parents are frequently unfamiliar with children's experience and less equipped to offer guidance. Discussants suggested that this has, for many,

significantly altered dynamics within families and friendship groups, and that this reshaping of relationships and communications with family and friends has reduced time spent in offline play and social interaction.

Children themselves report very varied experiences. While some have gained greater confidence and fulfilment, others report impacts on mental health or reduced sensitivity to risk. Some have been able to build stronger links and gain support from communities that share common circumstances, including marginalisation, while others feel they have become more isolated. Available evidence suggests the importance of understanding the varied circumstances of children in different contexts, both national and domestic. The digital experience of children in societies with limited connectivity differs from that of those who enjoy high levels of 'meaningful and affordable connectivity'; that of those living in poverty from that of those in wealthy families. Girls often experience the Internet and other digital resources differently from boys. A child's experience also changes over time, not just as s/he grows up but because of changes in technology, connectivity and services.

General Comment 25 to the Children's Rights Convention, published in 2021, sets out a framework for recognising, protecting and promoting children's rights and welfare in the digital age, and the obligations and responsibilities of States, businesses and other parties in relation to these.[429] It recognises that the digital environment 'was not originally designed for children, yet ... plays a significant role in children's lives,' and urges governments (and, by implication, other stakeholders) to consider, when developing policies (and, by implication, business models), 'the best interests of the child, ... including their rights to seek, receive and impart information, to be protected from harm and to have their views given due weight.'[430]

The General Comment addresses the full spectrum of children's rights. It draws attention to the benefits that children can derive from digital resources, describing the digital environment as 'a unique opportunity for children to realize the right to access to information,' which offers 'significant scope [for them] to express their ideas, opinions and political views,' provides 'valuable opportunities to meet, exchange and deliberate with peers' and with decision-makers, and 'can greatly enable and enhance ... access to high-quality inclusive education' and support learning and participation in extra-curricular activities.[431] It recognises that children have the right to access information and express themselves, to associate with their peers and to participate in society, but that these rights require additional measures to ensure that they can be enjoyed by children in safety and security. It advises that 'States parties should require the integration of privacy-by-design into digital products and services that affect children', while ensuring that 'Privacy and data protection legislation and measures should not arbitrarily limit children's other rights, such as their right to freedom of expression or protection.'[432]

Particular concerns have been raised in recent years about the protection of children's data and identity, in relation both to lawful use by governments and companies and from the risk of cybercrime. Children are often seen as particularly vulnerable in this context, with limited access to legal recourse and remedies if their rights are violated. Participants in the consultation noted the need for greater transparency and more child-friendly information on the part of digital platforms and service providers. Children's data are also often shared by others, including parents, schools and social welfare agencies, raising issues of consent and control by children over personal information.

A great deal of attention has been paid since WSIS to issues of child protection. The ease with which content can be created and distributed online has enabled substantial growth in the

distribution of child sexual abuse material and challenged the adequacy in responding to this of legal and judicial structures that were established when such material was primarily offline. While providing opportunities and enjoyment to children, their extensive use of social media has also put them at greater risk of harassment and abuse by both adults and their peers, posing specific risks to children's health and welfare. These risks and potential harms have led to some parents discouraging children from taking advantage of what the Internet has to offer. In some countries they have led to calls to enforce age restrictions on access to particular platforms or to the Internet or social media in general. The GDC commits its signatories to monitor and review digital platform policies and practices concerned with child sexual abuse material and potential sexual offences, and calls on digital technology companies to provide online safety resources and safe and secure reporting mechanisms for children.[433]

Discussants in the expert group discussion, as in the wider literature, were concerned about the need to ensure child protection while also enabling children to take advantage of the opportunities afforded by the Information Society. It was felt that one reason for restrictive legislation being proposed has been that digital products and services have not been designed with children's needs and experience in mind, putting them at greater risk, and that insufficient attention had been paid to accountability of platforms and their algorithms. Designing products and services with more attention to impacts on children, would, it was felt, promote the important opportunities made possible by digital products and services while reducing vulnerability.

Global standards or guidelines in areas including privacy, safety and participation, it was suggested in the consultation and expert discussion, could help to achieve more proactive, less restrictive outcomes provided they are tailored to regional and national circumstances. Other suggestions in the consultation included the desirability of including the voices of children and those with expertise in children's rights and welfare in the development of products and services; relevant training for engineers and service developers; stronger accountability procedures for service providers; legal, regulatory and normative frameworks on issues such as age-appropriate design and verification consistent with the CRC; and the development of more applications explicitly designed to provide information, content and opportunities for children. Concern was expressed about the need to anticipate trends in technology and services to ensure that necessary provisions are in place ahead of time to stimulate positive and prevent or mitigate adverse effects on children's lives.

Some work towards cooperation along these lines is undertaken by UN and other international organisations, including UNICEF and ITU, UNESCO's work on digital education and digital literacy, the WeProtect Global Alliance and ECPAT International on child online protection,[434] and the European Commission's funding of Safer Internet Centres.[435] Issues concerned with educational technology are discussed in Chapter 2D above.

CHAPTER 2F

DIGITAL GOVERNANCE

The growing complexity of the Information Society since WSIS has raised increasingly complex issues of digital governance at a variety of levels – global, regional, national and transnational. Its growing pervasiveness has led to more complex interactions between digital governance and governance in other areas of public policy.

Multistakeholder participation and international and regional cooperation (Action Lines C1 and C11 and *Tunis Agenda*, paras 83-110)

The *Geneva Declaration* asserted that 'Building a people-centred Information Society is a joint effort which requires cooperation and partnership among all stakeholders.'[436] WSIS established the principle of multistakeholder participation as a central element of digital governance, drawing on experience in the technical governance of the Internet. This innovative approach in international governance sought to build on the diverse range of expertise in different stakeholder communities (including the specialist knowledge of the technical community) in order to improve representation, promote consensus-building and improve the quality of decision-making.

The WSIS outcome documents identified several major categories of stakeholder concerned with Internet governance – the governments of sovereign States that have 'policy authority for Internet-related public policy issues,' the private sector, in both business and technical fields, civil society, intergovernmental and other international organisations, as well as academia and the technical community.[437]

Multistakeholder participation has since become the norm in international fora concerned with digital governance, complementing and supplementing the multilateral framework for intergovernmental cooperation within and beyond the UN system, with substantive input from all countries, not just those most heavily invested in digitalisation. It has also become more common within individual countries as a means of enabling more inclusive policy debate and broader consent to innovations in the digital environment.[438]

The General Assembly reaffirmed 'the value and principles of multi-stakeholder cooperation and engagement' in the WSIS process in its WSIS+10 review in 2015.[439] That commitment has been carried forward in the GDC which asserts that the goals of the Compact 'can only succeed with the active engagement of the private sector, technical and academic communities and civil society, whose innovations and contributions to digitalization are fundamental and irreplaceable.'[440]

Non-governmental actors now play significant roles in the work of many UN and other international and intergovernmental fora concerned with digital policy issues. Multistakeholder participation is a core component of both the WSIS Forum and the IGF. ITU's expanded sector membership now includes some 900 companies, universities and international organisations alongside Member States.[441] Membership of ICANN's Governmental Advisory Committee has grown to include 184 member governments and 39 observer organisations.[442]

Many discussions since WSIS have explored the evolving role and dimensions of multistakeholder engagement, including themes of inclusiveness, diversity, collaboration, flexibility and accountability.[443] An IGF Best Practice Forum, for example, considered ways of

strengthening multistakeholder participation mechanisms around the time of the WSIS+10 review.[444] UNESCO included multistakeholder participation as one of the four broad principles of its framework of Internet Universality in 2013, developed subsequently in its Internet Universality Indicators, and has published recommendations for multistakeholder approaches to the Internet.[445] The NetMundial and NetMundial+10 conferences in 2014 and 2024 included guidelines for multistakeholder consensus-building and decision-making in their concluding Statements, aimed at making multistakeholder participation more inclusive and accountable.[446]

The principle of multistakeholder participation was endorsed by many contributions to this review, from all stakeholder groups. The evolution of the Information Society since WSIS has led to calls for renewed consideration of ways in which multistakeholder participation can evolve to become more inclusive, in order to contribute most effectively to the development of policy and practice, respond in good time to rapidly evolving technology and services, and foster the culture of accountability implicit in the GDC.

One concern within and beyond the WSIS framework, expressed before as well as since the Summit,[447] has been the need to build more substantial and more equal participation in international digital policy and standard-setting by developing countries, particularly LDCs whose requirements and priorities can differ substantially from those of developed countries. Many responses to the WSIS+20 consultation drew attention to this, and to the difficulty that smaller developing countries and other stakeholders with limited resources face in trying to participate in the multiplicity of digital decision-making spaces that have emerged since WSIS. It was noted that many countries now have more limited resources to participate in international decision-making fora than large data corporations.

Many contributions to the consultation urged governments and international organisations to avoid duplication of discussions that could exacerbate this under-representation as well, it was suggested, as risking confusion about the responsibilities of different bodies and potentially leading to competing outcomes where common global standards would be more sustainable.[448] The desire to build on existing institutions, including those established through the WSIS process, was acknowledged in the GDC.[449]

Secondly, it was noted that the multistakeholder community concerned with digital governance has grown broader and more diverse since WSIS. The pervasive impact of digitalisation across all areas of economic and social life means that international organisations and government departments concerned with every aspect of governance, from public health to public transport, are now engaged, or feel the need to be engaged, alongside those directly concerned with digitalisation. Civil society organisations of all kinds – religious organisations and trades unions, those concerned with human rights and social welfare – now address digital outcomes that they once thought marginal to their work. The range of private sector businesses has likewise expanded, as technology and services have evolved. It has seen the growth of global data corporations into powerful economic actors, the emergence of e-commerce platforms and businesses, new types of enterprise supplying digital products and services and/or those that are enabled by ICTs – as well as businesses on the demand side of the digital economy that primarily make use of ICTs in other business sectors. Some contributors to the consultation emphasised the need for multistakeholder dialogue to engage more fully with these businesses and emerging market actors, in particular addressing the relationship between technological development and broader goals within societies.

A third issue raised in the consultation is the perceived need to strengthen interaction between decision-making processes in digital and other areas of international governance, in order to achieve complementary rather than potentially contradictory outcomes. UNEP, for example, identified three challenges in implementing the Action Line on the environment in this context: that 'environmental fora (*e.g.* multilateral environmental agreements) are not systematically including digital technologies as enablers of their goals or considering negative impacts from digital technologies,' that 'national strategies for digital transformation and digital public infrastructure are not considering environmental opportunities and risks in a systematic manner,' and that there is 'a lack of international standards for measuring digital environmental sustainability, disclosing impacts and sharing environmental data.'[450]

Coordination in the UN system

The *Tunis Agenda* requested the Secretary-General to establish a UN Group on the Information Society (UNGIS) within the Chief Executives Board (CEB) to facilitate implementation of WSIS outcomes.[451] UNGIS was established in 2006, and currently includes 27 UN agencies with chairs and vice-chairs drawn from ITU, UNESCO, UNDP, UNCTAD and the UN Regional Commissions. It meets regularly and provides input to global UN fora such as the High-Level Political Forum on Sustainable Development as well as individual agreements like the GDC.[452] UNGIS published a draft matrix linking WSIS Action Lines with the SDGs and outcomes of the GDC in 2025 (see below).[453] A number of consultation inputs reflected on ways of strengthening the role and coordination of UNGIS following the present review.

All United Nations entities have made increasing use of ICTs within their areas of responsibility. They have drawn on data gathering and analysis to improve understanding of global, regional and national trends, stimulated the use of ICTs in policy development and the targeting of public services, encouraged the development of national ICT sectors to generate prosperity and employment, fostered mobile telephony and the Internet to empower individuals and marginalised communities, and addressed specific needs in field such as agriculture, health and education. Much of this work is referenced elsewhere in this report, and more detailed accounts by individual UN agencies are published online by CSTD.[454] Contributors to the consultation process emphasised the importance of UN agencies working together, and collaborating with other development partners, including regional organisations, to achieve coherent implementation of programmes at global and national levels.

A wide range of fora have considered diverse public policy dimensions of digital development and the Internet since the Summit. United Nations entities have been particularly concerned with issues relating to international security, for instance in the Open-Ended Working Group on security of and in the use of ICTs, which has sought to develop principles for responsible state behaviour in cyberspace,[455] and in the development of the Convention against Cybercrime which was adopted by the General Assembly in 2024.[456] UN entities have sponsored many conferences and published many reports concerned with aspects of digital development within their mandates, from ITU which organises the WSIS Forum in conjunction with UNESCO, UNDP and UNCTAD, as well as AI for Good Summits and a wide range of other technical and specialist discussions concerned with specific aspects of the Internet; through UNESCO's Internet Universality Indicators, conferences on platform regulation and digital transformation in the public sector; UNCTAD's eWeeks which focus on e-commerce; and wide-ranging interventions in development by UNDP and e-government by DESA as well as work by specialist agencies and other UN fora. UN Regional Economic Commissions (RECs) undertake extensive work on the development and impact of digital development within their regions (see below), as do other

international organisations, including OECD, the African Union and the Council of Europe within their communities.

Strengthening 'effective multilateralism', including the UN's ability to fulfil its mandates for peace and security, development and human rights, was a central theme in the Secretary-General's report *Our Common Agenda*, developed across the different themes of the *Pact for the Future*. The GDC points to the need for 'further strengthening of system-wide coordination … to enable the United Nations to realize the inclusive platform for digital cooperation set out in [the] Compact.'[457]

The Office of the Secretary-General's Envoy on Technology (OSET) was established in 2021 to support digital cooperation across the UN family. It led the process of implementing the Secretary-General's *Roadmap for Digital Cooperation* amongst UN agencies, played a leading role in the development of the GDC, and began development of an Implementation Plan for the Compact in cooperation with other UN entities. At the beginning of 2025 it transitioned into a new Office for Digital and Emerging Technologies (ODET), with responsibilities across five strategic areas – to serve as an advocate and focal point for digital cooperation in the UN system, to facilitate multistakeholder policy dialogue on digital and emerging technologies, to advise the UN's leadership on trends in new technology, to strengthen system-wide cooperation on those issues, and to follow up the GDC.[458]

A Working Group on Digital Technologies, chaired by the Secretary-General, has been established under the Steering Committee for implementation of the *Pact for the Future* to support the actions outlined in its chapter on science, technology, innovation and digital cooperation, as well as the tasks assigned to the Secretary-General and the UN system within the GDC. The Working Group has undertaken the development of a GDC implementation map, which is expected to be presented in 2025.

Regional coordination

The *Geneva Declaration of Principles* emphasised the importance of regional integration within development of the Information Society, building on the role of regional dialogue and support for national digital development.[459] The *Plan of Action* encouraged regional partnership across its Action Lines, while the *Tunis Agenda* called for financial support for regional backbone infrastructure, and declared that 'strong cooperation within and among regions is indispensable to support knowledge-sharing' and the fulfilment of WSIS goals. It invited UN Regional Commissions (RECs) to organise follow-up activities in collaboration with other regional and sub-regional organisations and to develop regional strategies to follow-up the WSIS outcomes.[460]

The five RECs have all played a significant part in regional coordination of WSIS implementation throughout the past two decades. Detailed accounts of their work have been submitted in annual reports to CSTD and in summary reports ahead of the WSIS+20 review which are published online.[461] Consultation fora were also held in collaboration with RECs for this report.[462]

As requested by the *Tunis Agenda*, RECs have formulated regional strategies for digital development and, since 2015, the interaction between digital development and SDGs. Since the time of the Summit itself, ECLAC has coordinated biennial ministerial conferences that have agreed a succession of two-year Digital Agendas for Latin America and the Caribbean (eLACs). The current iteration, eLAC2026, focuses on meaningful connectivity, governance and digital security, and innovation, and emerging technologies for sustainable development.[463] ESCWA has worked with the League of Arab States to develop the Arab Digital Agenda 2023-2033 built around

five clusters of activity concerned with digital strategies, infrastructure and regulation, the digital economy, e-government, and culture and media.[464] ECA is working with the African Union to implement its Digital Transformation Strategy for Africa, which seeks 'to promote Africa's integration, generate inclusive economic growth, stimulate job creation, break the digital divide, and eradicate poverty for the continent's socio-economic development and ensure Africa's ownership of modern tools of digital management.'[465]

Developing effective strategies requires a stronger understanding of the evolving digital environment, and RECs have been concerned about the weaknesses of underlying data on digital development, particularly in lower-income countries in their regions. One way of addressing this has been to establish regional observatories or other data-sharing mechanisms. ECLAC, for example, has established a succession of observatories whose latest iteration, the Digital Development Observatory, seeks to 'produce, gather and analyze relevant data and information to identify trends, evaluate progress and support policy formulation and implementation on digital transformation' in its region.[466]

All of the UN's regions include countries at markedly different levels of digital development, and RECs have been concerned to support the improvement of infrastructure and address digital divides between and within countries in their regions. The Asia-Pacific region, for instance, includes some of the world's most digitally developed countries as well as a number of LDCs and SIDS with very low digital participation rates. ESCAP's Asia-Pacific Information Superhighway project seeks to establish cooperation to improve regional broadband connectivity and progress towards a cohesive land- and sea-based fibre network that will increase bandwidth for the region's developing countries.[467] As in other regions, this focus on infrastructure is accompanied by efforts to encourage the use of data for sustainable development.

Regional integration, involving a wider range of regional associations, extends beyond infrastructure into broader development and economic goals. UNECE has played a critical role within the global community through its UN Centre for Trade Facilitation and Electronic Business (UN/CEFACT), which promotes standardisation and harmonisation of trade flows through ICTs,[468] and work on environmental monitoring such as the regional Aarhus Convention on environmental information, decision-making and participation.[469] ECLAC has promoted a regional digital market in Latin America and the Caribbean, in association with sub-regional economic associations.[470] The African Union's *Digital Development Strategy* envisages the development of an African Digital Single Market intended to smoothe data-sharing and e-commerce within the continent.[471] Initiatives such as these have attracted the support of international development partners including the European Union.

RECs have also been engaged, alongside other regional bodies, in research and analysis, leading to publications that reflect regional priorities and seek to build coordinated regional action to take advantage of digital opportunities, use digital resources to address regional problems and mitigate regional risks. ESCAP's 2024 *Digital Transformation Report*, for example, focuses on *Digital Innovation for Smarter Climate Action*.[472] The same year, ECA published reports on African digital identity and on digital payment systems while ECLAC published *A Digital Path for Sustainable Development in Latin America and the Caribbean*, reported on fifth-generation networks, the measurement of the Internet economy and data governance in the public sector, and presented preliminary results from the region's first artificial intelligence index.[473]

RECs shared many observations and priorities in their contributions to the consultation for this report. All regional bodies were concerned about digital divides between countries within their

regions, and the need to overcome these in order to maximise the value of digital opportunities for their region as a whole, its sub-regions and individual countries. Some felt that these inequalities are growing, in spite of efforts to alleviate them, because of the very rapid pace of change in technology of which more developed countries can take advantage more quickly and extensively. Ways of counteracting this risk of greater inequality, through improved infrastructure – regional, cross-border and national – and policy approaches that would facilitate greater regional integration, were seen as priorities.

Participants in the consultation were also concerned about weaknesses in regional and national capacity to leverage the benefits of new technology for economic growth. Specific points raised concerned institutional weaknesses in policymaking, lack of consistent legal and regulatory frameworks for digital trade and economic development (including those for data management), and limited policy coherence between countries and between government departments within countries. A further common challenge concerned the weakness of data available to monitor and measure developments. Conflicts within regions were, in some cases, seen to undermine the capacity to build integrated regional development approaches.

RECs, like many other contributors to the consultation, generally felt that the WSIS framework had been helpful in building understanding of the value of digital development and regional harmonisation, though substantial challenges were felt to remain, particularly concerning digital divides, which the pace of new technological development might well exacerbate. Several contributors to regional consultations felt that the WSIS framework needed to be reinvigorated and updated to deal with this evolving digital landscape, particularly the challenges arising from artificial intelligence, and with the convergence between digital development and other fields in which regional cooperation is particularly significant, such as climate change, the transition to green energy and disaster preparedness and management. There was strong support for the WSIS review to facilitate coherent and coordinated action towards achieving digital and developmental goals, including alignment between WSIS and the GDC, and for better linkages between digital and other development processes at regional level.

Implementation and follow-up (*Tunis Agenda*, paras. 103-122)

The *Tunis Agenda* made several arrangements for WSIS follow-up, concerned with coordination in the UN system, assessment of progress on the mandates for the Action Lines and monitoring, measurement and review of WSIS outcomes. The Summit requested ECOSOC to oversee the system-wide follow-up of WSIS outcomes within the UN system. It has implemented this through the CSTD's annual reviews, for which the Secretary-General presents a report to the CSTD. The same report was presented at the ECOSOC and the General Assembly to keep both apprised,[474] The CSTD's annual reviews are reflected in annual resolutions submitted to the ECOSOC for adoption, on which and the General Assembly often build its annual resolutions. Contributions to the Secretary-General's annual reports from UN and other agencies are published online.[475] CSTD also prepared comprehensive five-year and ten-year reports on WSIS outcomes in 2010[476] and 2015,[477] along similar lines to this twenty-year report, as well as a briefer fifteen-year report in 2020.[478]

The *Tunis Agenda* requested the General Assembly to make an overall review of the implementation of WSIS outcomes after ten years. This ten-year review reaffirmed the values, principles and approaches that had been agreed at WSIS.[479] In addition to CSTD's report, major contributions were made in the run-up to the review by ITU, which coordinated negotiation of a document that, *inter alia*, reviewed progress on individual Action Lines,[480] and UNESCO, which

hosted a global conference 'Towards Knowledge Societies for Peace and Sustainable Development' in 2013.[481] The General Assembly's WSIS+10 resolution required that a further review should follow in 2025 and recommended that this should constitute an input to the review of the *2030 Agenda for Sustainable Development* that will take place in 2030.[482]

Internet governance (*Tunis Agenda*, paras 29-82)

The governance of the Internet was one of two major themes, alongside financing mechanisms, of the Tunis phase of WSIS. Following work by an intersessional Working Group on Internet Governance (WGIG), [483] it adopted a broad definition of Internet governance as 'the development and application by governments, the private sector and civil society, in their respective roles, of shared principles, norms, rules, decision-making procedures, and programmes that shape the evolution and use of the Internet.'[484] This included both technical issues concerned with the working of the Internet itself and public policy issues concerned with the impact of the Internet on societies, economies and cultures.

The international management of this global resource, the *Tunis Agenda* added, should be 'multilateral, transparent and democratic,' with the full involvement of governments, the private sector, civil society and international organizations.'[485] This commitment to multistakeholder governance of the Internet built on experience of its early development through collaboration, particularly within the technical community. Two specific initiatives were agreed in the Tunis phase of WSIS to build multilateral and multistakeholder cooperation in Internet governance: a 'process of enhanced cooperation' and the establishment of an Internet Governance Forum (IGF) to facilitate multistakeholder discussion of Internet -related issues.[486] The General Assembly reaffirmed in its most recent resolution on ICTs for sustainable development that Internet governance should continue to follow the provisions set out in the WSIS outcome documents.[487]

The core architecture of the Internet is widely seen to have provided a successful platform for the incorporation of new technologies, services and innovations since WSIS. There have been significant developments in the structure and operations of some Internet governance bodies since the Summit. One of the major issues discussed during the second phase of WSIS was the role of ICANN, the Internet Corporation for Assigned Names and Numbers, which maintains some critical Internet resources including functions that concern Internet Protocol address space and the domain name system. The IANA stewardship transition, completed in 2016, saw the transfer of oversight of the Internet Assigned Numbers Authority by ICANN from a contract with the United States government to a multistakeholder governance model.[488]

Technical standards within the Internet continue to be developed through collaboration amongst technical experts from the private sector, academia and private and public research centres through the Internet Engineering Task Force (IETF)[489] and in entities such as the World Wide Web Consortium (W3C).[490] Evolving technical standards have extended the range of services provided through the Internet and strengthened online security since WSIS. As noted in Chapter 1, significant technical developments have included expansion in the range of generic domain names overseen by ICANN and Regional Internet Registries, the introduction from 2010 of Internationalised Domain Names, incorporating non-Latin alphabets, in a move to facilitate multilingualism online, and the continuing development of cybersecurity to protect both critical resources and the welfare of Internet users. Resilience and redundancy in both physical and technical infrastructure has improved security, reliability and speed with which online services can be delivered. Other important developments in the structure of the Internet have included the increasing deployment of a revised version of the Internet Protocol (IPv6)[491] and the

introduction of Domain Name System Security Extensions (DNSSEC), which protect users from abuse of the domain name system.[492] while Internet Exchange Points (IXPs) have played an increased role in facilitating interconnection between Internet Service Providers (ISPs).

The technical framework of the Internet is global, enabling communication and thereby content sharing between devices located anywhere in the world. Concerns have been expressed in recent years about the possible erosion of this common or universal underlying framework, risking the potential 'fragmentation' of the Internet into smaller networks with different rules and norms that would inhibit interconnection between networks and thereby the exchange of data and content between users. The GDC has committed the international community to 'prevent, identify and address' such risks,[493] reinforcing international commitment to Internet universality. An IGF Policy Network has also addressed the issue.[494]

Other multistakeholder fora that have contributed to wider discussion of Internet development and governance since WSIS have included expert groups such as the Global Commission on Internet Governance established by the Centre for International Governance and Chatham House in 2014, which commissioned independent research on Internet-related aspects of public policy ;[495] open global events such as the annual RightsCon summits organised by the civil society partnership Access Now;[496] and the multistakeholder NetMundial and NetMundial+10 conferences held in Brazil in 2014 and 2024. The latter adopted the Sao Paulo Multistakeholder Guidelines on strengthening Internet governance and digital policy processes, emphasising the management of the Internet as a global public interest resource through principles including strengthened multistakeholder engagement, transparency, accountability and coordination between different governance initiatives.[497] A number of international Schools on Internet Governance have been established to support capacity development of those engaged in the field.[498]

The need to engage governments and other stakeholders from all countries has been a consistent theme in international discussions about digital development since before the Summit and was emphasised by many participants in the consultation process for this report. The globalisation inherent in the way that movement of data is not constrained by national boundaries in the same way or to the same extent as that of physical goods has blurred boundaries between national and international governance. Decisions taken in international fora, by global corporations and governments of larger economies have impacts across the world, in countries at different levels of development, with different demographic characteristics, histories, governance structures and priorities for national development. The importance of reflecting diverse circumstances and priorities was recognised in the GDC which recognised the United Nations' role in providing 'a critical platform for the global digital cooperation we need,' which it said should 'be agile and adaptable to the rapidly changing digital landscape.'[499]

Enhanced cooperation

The need to strengthen global cooperation on the Internet was emphasised in the *Tunis Agenda*. 'All governments,' it said, 'should have an equal role and responsibility for international Internet governance and for ensuring the stability, security and continuity of the Internet,' developing public policy 'in consultation with all stakeholders.' The *Agenda* recognised the 'need for enhanced cooperation in the future, to enable governments, on an equal footing, to carry out their roles and responsibilities, in international public policy issues pertaining to the Internet, but not in the day-to-day technical and operational matters, that do not impact on international public

policy issues, and invited the Secretary-General to initiate discussions concerning this involving all stakeholders.'[500]

A number of formal processes to discuss the implementation of enhanced cooperation in the context of the *Tunis Agenda* have been undertaken since WSIS, including consultations by ECOSOC in 2010[501] and working groups coordinated by CSTD in 2013-2014 and 2016-2018.[502] In its most recent resolution on ICTs for sustainable development, the General Assembly welcomed 'the good progress made by the Working Group in many areas and the fact that consensus seemed to emerge on some issues, while significant divergence of views in a number of other issues persisted.' It noted 'the need for continued dialogue and work on the implementation of enhanced cooperation as envisaged in the Tunis Agenda.'[503]

The GDC recognised that Internet governance should 'continue to be global and multi-stakeholder in nature, with the full involvement of Governments, the private sector, civil society, international organizations, technical and academic communities and all other relevant stakeholders in accordance with their respective roles and responsibilities,' and reaffirmed that 'Internet governance should continue to follow the provisions set forth in the outcomes of the summits held in Geneva and Tunis, including in relation to enhanced cooperation.'[504]

The Internet Governance Forum (IGF)

The *Tunis Agenda* invited the Secretary-General to establish an Internet Governance Forum to provide a space for open, multistakeholder discussion of public policy issues related to Internet governance.[505] The Forum's initial mandate was renewed by the General Assembly for a further five years in 2010 and ten years in 2015, and its further renewal will be considered by the Assembly in 2025.

A global meeting of the IGF has been held annually, in different locations, since 2006, providing space for wide-ranging discussions among stakeholders about both technical and public policy dimensions of the Internet. These meetings have been attended by several thousand participants, both in-person and online. Although it has no decision-making powers, the Forum publishes 'IGF Messages' which seek to encapsulate consensus views emerging from each annual meeting.[506] These, and the discussions that inspire them, have increasingly reached beyond the Internet itself to explore broader issues of digital governance, including the emergence of AI and the relationship between digital and sustainable development.

The Forum has evolved over the twenty years since WSIS into an extensive ecosystem which, by early 2025, included 111 national, 23 regional and 39 youth IGFs, collectively known as NRIs, with comparable multistakeholder participation;[507] and a range of intersessional activities including Policy Networks, 'Best Practice Forums' and more than 30 autonomous 'Dynamic Coalitions' that focus multistakeholder discussion on specific topics ranging from accessibility and digital health to the domain name system and the measurement of digital inclusion.[508]

The IGF is supported by a Multistakeholder Advisory Group and, since 2022, a Leadership Panel appointed by the Secretary-General to promote its work, with a small secretariat based in Geneva. Several initiatives have sought to build the capabilities and inclusiveness of the IGF during the twenty years since WSIS, including a working group of the CSTD[509] which reported in 2011 and two expert fora organised by UN DESA which took place in 2016 and 2022.[510] Proposals emerging from these have focused on the need to broaden participation to include more representation from developing countries and from under-represented groups, to build stronger

relationships with other digital discussion fora, and to enable more substantive outcomes that can achieve greater impact.[511]

Strong support for the IGF has been expressed in many international statements, including the GDC, which describes it as 'the primary multi-stakeholder platform for discussion of Internet Governance issues,' and which commits to support it, 'including through continued efforts to increase diverse participation … and the provision of voluntary funding….'[512]

The role and value of the IGF were praised in many consultation responses, from all stakeholder groups, as a unique forum for the multistakeholder discussion of Internet and Internet-related issues that has facilitated dialogue on Internet governance themes including the IANA transition and the impact of the Internet on the environment and human rights.[513] The continuation of the Forum's mandate beyond 2025 was supported in these, with some responses proposing that it should become a permanent body within the UN system. Many responses reflected points made in previous discussions about the development of the Forum. The extension of the IGF process to NRIs was particularly welcomed as this was seen to have fostered multistakeholder dialogue and participation at national level. Some respondents felt that there was scope for the IGF to broaden its mandate to become a more extensive digital governance forum, building on its existing work on issues such as cybersecurity and artificial intelligence, and to play a role in monitoring implementation of the GDC.

Concerns were expressed in the consultation about the need to continue diversifying multistakeholder participation through stronger engagement by developing countries, more involvement from under-represented groups within and beyond the digital sector, and stronger interaction with other international fora and decision-making bodies that are concerned with digital policy and with development sectors that are particularly impacted by digitalisation. While there was a widespread desire for the IGF to deliver more substantive outcomes, contributors to the consultation felt that it could lose its unique nature if it were to become a negotiating rather than discussion forum. It was noted that resources available to the Forum secretariat are limited. Many IGF stakeholders echoed the desire to secure additional funding, either through voluntary mechanisms as suggested in the GDC, or through more formal government commitments.

The WSIS Forum

The annual WSIS Forum has become an established feature of WSIS implementation, addressing the broad range of development and other issues addressed in the Summit's Geneva outcome documents and subsequent technological and policy developments. It is not mandated in the WSIS outcome documents, like the IGF, but developed in the early years after the Summit through the clustering of meetings to facilitate the WSIS Action Lines. First constituted as the WSIS Forum in 2009,[514] it has since been an annual event, held in Geneva, which attracts several thousand participants on-site and online to plenary and workshop sessions covering many issues of digital development, comparable with the IGF's role in relation to the Tunis outcomes concerned with Internet governance.

Like the IGF, the work of the Forum was praised by many respondents to the consultation for this report as a valuable opportunity for information sharing and networking amongst stakeholders, particularly from across the developing countries. Meetings include ministerial and high-level sessions and provide an important space for dialogue across continents and between stakeholder communities, for capacity building and for the development of collaborative initiatives. In 2024 and 2025 meetings of the Forum have been structured to provide input to the

WSIS+20 review and aligned with the ITU's separate AI for Good event which showcases the potential of AI to support developmental goals.[515]

A number of initiatives led by ITU have been associated with annual meetings of the Forum. Its Stocktaking Database, initiated between the two phases of WSIS, provides a continually updated compendium of contributions towards the use of ICTs,[516] and it has maintained a matrix concerned with the relationships between WSIS Action Lines and SDGs since the SDGs were agreed in 2015.[517] Forum meetings also feature the award of WSIS Prizes marking conspicuous achievements in the use of ICTs to further WSIS goals.[518]

WSIS Action Lines

The WSIS Action Lines were established at the Geneva session of the Summit in 2003 and reflected priorities identified by governments and other stakeholders during the preparation of that session, including both digital policy issues and developmental impacts. Consultation responses indicate that the themes adopted in the Action Lines have provided a useful framework for multistakeholder consideration of these issues, alongside more substantive work undertaken by relevant international organisations (including UN entities) and in other international fora. They could provide a framework for developing WSIS contributions to the review of *2030 Agenda for Sustainable Development* that will take place in five years' time, in light of the request in the General Assembly's WSIS+10 resolution to relate the WSIS+20 review to that of the SDGs.

Consultation responses reflected the way in which developments since WSIS have greatly expanded the scope and scale of issues addressed within the Information Society. It was easier twenty years ago to consider aspects of the Information Society in separate silos, independently of one another. Interactions between these different aspects are now much more substantial. The scale and nature of opportunities presented by digitalisation and of risks posed by its misuse have expanded, raising topics that are not covered by the mandates agreed in 2003. Some themes – such as gender, children's rights and international security – have gained much greater resonance in international discourse on digital issues since WSIS, while some development sectors – such as financial services – have become much more dependent on digitalisation. The proliferation of other international fora on issues covered by the Action Lines has also altered the role that Action Lines play, given their lack of independent resources. A variety of views were expressed during the consultation on the development of Action Lines. While some contributors prefer to maintain the existing framework and mandates, others have suggested that additional Action Lines could be established to foster discussion on particular themes – in particular, gender and artificial intelligence which are not separately represented in the *Plan of Action* – and/or that the mandates of existing Action Lines could be updated to reflect changes in technology, applications, opportunities and risks in today's digital environment.

Monitoring and measurement

A limited set of 'indicative targets [to] serve as global references for improving connectivity and access in the use of ICTs' was included in the *Geneva Plan of Action*.[519] These were generic (for example, 'to connect villages with ICTs and establish community access points') rather than quantitative and were intended for assessment after ten years. A statistical framework for assessing them was developed by the Partnership on Measuring ICT for Development in 2010, including 52 quantifiable indicators to monitor progress towards the WSIS targets. This was used in preparing the *Final WSIS Targets Review*, published in 2015 at their end of their scheduled term.[520]

These WSIS targets were not replaced during the WSIS+10 review, while only seven of the 169 SDG targets agreed in 2015 referred to ICTs. However, other targets and indicators have been developed since then by a variety of UN and other international agencies, some of which have been translated into indices to facilitate international comparison.

The Partnership on Measuring ICT for Development was formed by a group of UN and other international entities between the Geneva and Tunis phases of WSIS. It has helped to coordinate data gathering and defined a core list of ICT indicators, first published in 2005 and subsequently updated, concerned with infrastructure and connectivity, household, individual and business usage, the ICT sector, trade in goods, education and e-government.[521] In 2019, the Partnership proposed a thematic list of ICT indicators related to the SDGs.[522] ITU has published several editions of a manual on assessing ICT access and use by households and individuals,[523] while UNCTAD has published handbooks on statistical measurement of the digital economy and digital trade.[524]

ITU maintains extensive data resources on connectivity and the adoption of digital services, derived from national statistical sources, on its DataHub and website.[525] These are complemented by private sector organisations like GSMA, which publishes extensive information on mobile connectivity and usage. For a decade from 2009 ITU compiled an ICT Development Index, published in annual *Measuring the Information Society* reports, which included indicators concerned with digital access, use and skills. A revised methodology for this index was adopted in 2023, reflecting change in the digital environment and adding additional dimensions concerned with affordable and meaningful connectivity.[526] ITU also publishes longitudinal data on connectivity and usage on its website.[527]

ITU and the Broadband Commission have specified targets for connectivity and access, which have also been updated over time. ITU's Connect 2030 Agenda, adopted in 2020, includes quantified targets within strategic goals concerned with growth and inclusiveness in digital participation, sustainability (including targets concerned with cybersecurity, e-waste and GHG emissions), as well as qualitative goals for innovation and partnership.[528] The Broadband Commission's advocacy targets – for achievement by 2025 – are concerned with the adoption of national broadband plans or strategies in all countries, affordable entry-level broadband (defined as below 2 per cent of monthly GNI p.c. in developing countries), increased broadband usage (defined as 75 per cent of population worldwide, 65 per cent in low and middle income countries and 35 per cent in LDCs), digital skills development and increased use of digital financial services, bridging the gender digital divide and the inclusion of micro, small and medium-sized businesses.[529]

ITU and OSET established a set of aspirational targets for 2030 following publication of the Secretary-General's *Roadmap for Digital Cooperation* in 2020. These include universal adult usage and household and business access to the Internet, targets for gender parity and digital skills, for bandwidth both in general and in schools, and for affordability.[530] Other international organisations have developed different methodologies and approaches to assessing digital development and its impacts. OECD's *Going Digital Measurement Roadmap*, for instance, 'identifies ten actions to enhance the capacity of countries to monitor digital transformation and its impacts.'[531]

Individual UN agencies have devised quantitative assessment frameworks concerned with ICT readiness, development and impact within their mandates, including UNCTAD's indicators for the digital economy, DESA's biennial E-Government Survey and ITU's Global Cybersecurity Index.[532]

RECs and other regional associations, such as the Southern African Development Community (SADC), have established a variety of mechanisms to monitor and measure digital development within their regions, including statistical observatories. Other organisations and partnerships within and beyond the UN system have sought to measure aspects of national digital readiness, or to monitor specific issues such as the accumulation of e-waste. [533]

Some of these indicator frameworks use a small number of indicators that can be taken as proxies for broader developments in order to establish a performance index that can be used for international comparisons. UNESCO's Internet Universality Indicators, first adopted in 2018 and updated in 2024, are more complex, including a range of qualitative as well as quantitative measures to support national policy development (concerned with rights, access, the enabling framework for technological development, multistakeholder engagement and a variety of cross-cutting factors such as gender and the environment) rather than international comparison. They have been used in some 40 countries.[534]

Experience has shown that there are substantial challenges in making detailed assessments of digital development and its impact. In its latest report, the Partnership on Measuring ICT for Development notes that there is still 'a disconnect between policies for digital development and the availability and quality of official statistics needed to establish a baseline, monitor progress and evaluate impact.'[535] Regular updating of indicator frameworks and data gathering has proved essential because of the rapid changes taking place in technology, connectivity and usage. National statistical offices in many, particularly developing, countries have limited capacity, rely on operating companies rather than independent regulators for data on connectivity and are insufficiently resourced to undertake independent research, such as household surveys, on patterns of user behaviour or economic and social impacts of the kind that are undertaken by statistical offices and regulators in some developed countries.[536] Research projects undertaken by business associations such as GSMA[537] and independent research centres (such as the After Access surveys covering some countries in Africa, Asia and Latin America)[538] add valuable additional evidence where they have been undertaken. Data sets are also affected by the digital divides within societies and require careful assessment and adjustment to redress the ways in which these may make findings unrepresentative and potentially misleading if extrapolated to entire societies. Data analysis needs to be kept up to date, in a context of rapid change, to ensure that policymakers respond to current market conditions and developmental impacts rather than those that are no longer relevant.

Data on the use and impact of the Information Society are not just derived from official statistics. Commercial businesses gather immense volumes of data on the ways in which their services are used, which can provide much more detail and granularity than official data gathering. These, too, have proved valuable tools for policymakers where businesses are prepared to make them available, though some have been reluctant to do so for reasons of commercial confidentiality. Anonymisation is generally required to protect data privacy, and data gathering and analysis need to comply with relevant data protection principles, such as those in the European Union's GDPR, that limit the purposes for which data can be used to those that have been notified to data subjects.

Digitalisation enables more effective monitoring and measurement in many areas of the economy, society and the environment. In doing so, it facilitates improvements in the efficiency of public services and the ability of governments and other agencies to target resources, in normal times and during natural emergencies. The value of this has been widely recognised in recent years. Governments and international organisations have increasingly gathered and

analysed data for development, using it to monitor changes in economy and society and to design, deploy and manage development interventions. These include both data that are primarily concerned with the digital environment itself, including connectivity and usage, and data that are primarily concerned with other areas of public policy, including the impact on them of digitalisation. The increased capabilities of AI promise to enable deeper and more intensive analysis of data for development.[539]

The role of data in addressing the challenges faced in meeting the SDGs was emphasised in the UN's 2024 *SDG Report*. As well as measuring progress, it pointed out, 'Data help identify challenges, formulate solutions, monitor implementation and make needed course corrections.' This is true at both national and international levels. There has been considerable progress in building data for development since the SDGs were agreed in 2015. All SDG indicators now have agreed methodologies, and 'Good trend data are available for 51 per cent of the indicators ... in more than half of all countries,' but substantial deficiencies remain, particularly in gender equality, climate change and peace, justice and institutional development.[540]

More extensive data gathering and analysis are therefore seen to be required if the value of ICTs for sustainable development is to be maximised. The *SDG Report* identifies some of the critical factors that are needed to bring this about: the combination of traditional data-gathering with ICT-enabled monitoring through remote sensing and citizen science; more open data-sharing between countries; the strengthening of national statistical offices, including financial support to enhance data gathering and analytical capacity in developing countries.

Common standards and metrics that allow comparisons over time and between countries are often cited in this context. Many contributions to the consultation for the WSIS+20 review commented on deficiencies in current data gathering and analysis, including the lack of common definitions and data-gathering standards, leading to inconsistencies between data gathered in different countries. Discussants in the environment expert group discussion, for instance, noted the importance of data in enabling access to funding for developmental and environmental intervention, describing it as 'the currency to access finance' and suggested that the divide in data gathering could further marginalise those countries and communities in greatest need.

The GDC recognises these deficiencies in monitoring and measuring the Information Society. It commits signatories to 'strengthen efforts to collect, analyse and disseminate relevant, accurate, reliable and disaggregated data for better monitoring and policymaking to accelerate the achievement of the SDG Agenda,' aiming for 'a 50 per cent increase' in the data available for monitoring the SDGs, disaggregated to enhance understanding of differences within societies.[541] Specific commitments are included in the *Compact* to 'develop and strengthen targets, indicators and metrics for universal meaningful and affordable connectivity,' building on existing work and integrating this into international and national development strategies, to establish national digital inclusion surveys, and to set targets for particular aspects of the Information Society such as developing the competence of public officials and institutions.[542]

There has been some discussion within the consultation for this report and elsewhere about whether new targets could be established in the WSIS+20 review, to harmonise data gathering, support data analysis and contribute towards assessing the role of ICTs and more general development outcomes within the SDG review in 2030. These might include quantitative targets in areas such as connectivity and cybersecurity, as well as more qualitative targets concerned with development and human rights. They could complement existing indicator frameworks such as ITU's ICT Development Index, DESA's e-government index, UNCTAD's measurement of the

digital economy and UNESCO's Internet Universality Indicators. Such targets, if adopted, it is suggested, would need to reflect the diversity of national experiences rather than merely calculating global averages. Some commentators stressed the importance of focusing targets on improving national development policy and outcomes rather than on international comparisons that can seem competitive rather than cooperative.

CHAPTER 3

THE CONTINUING DEVELOPMENT OF THE INFORMATION SOCIETY

Chapter 2 of this report has illustrated how the Information Society has evolved since WSIS. The aspirational goals that were expressed at the Summit have now become realities for many individuals and pervasive in many areas of government and business. The number of individuals online, at least occasionally, has grown from approximately 1 billion in 2005 to more than 5.5 billion in 2025, from around 15 per cent of the global population to not far short of 70 per cent.[543] The digital economy is estimated to have grown significantly faster than the global economy as a whole.[544] Digitalisation has become the norm in many aspects of human activity, and its prevalence and pervasiveness are considered certain to continue growing rapidly in future. This growth has not, however, been equally distributed. One third of the world's population remains offline, and the uneven distribution of access to resources and services resulting from that inequality is now understood to feed wider social and economic inequalities. The rapid growth of the Information Society has also brought with it new risks to sustainable development and human rights.

Chapter 3 of the report looks to the future development of the Information Society in the context of the WSIS vision and of subsequent international agreements including the *2030 Agenda for Sustainable Development*, the *Pact for the Future* and the *Global Digital Compact*. It begins with an overview of the role of WSIS in digital development to date, drawing on previous chapters, and priorities for the future, drawn from CSTD's consultation and the wider literature. It then looks at a number of issues that have become prominent in recent years, including some that were not reflected substantively at the time of WSIS, drawing again on inputs to the consultation process for this report and wider literature.

The place of WSIS in digital development

It was generally agreed in consultation inputs that the WSIS outcome documents have played a central part in the evolution of international decision-making on the Information Society and digital development since their adoption two decades ago. Subsequent international agreements and initiatives concerned with digital development have referred back to them, often reaffirming their central vision of 'a people-centred, inclusive and development-oriented Information Society' and adopting multistakeholder participation processes that draw on those established by the WSIS outcome documents. WSIS set out a frame of reference that has been highly influential in international discourse and stimulated national strategic planning for ICTs themselves and for their interaction with other aspects of development.

Many respondents to the consultation referred to this catalytic role of WSIS, which they felt has complemented, reinforced and supported other trends within the Information Society. From a policy perspective, WSIS is seen as having provided a platform for dialogue and sharing of experience that has facilitated resource mobilisation, encouraged the development of national digital strategies and helped governments and other stakeholders to formulate constructive policies and practical interventions. Some government respondents, in particular, described ways in which the WSIS outcomes have provided guiding principles for digital strategies and regulations and helped to improve national economic and social, as well as digital, development.

This catalytic role of WSIS within international and national policy development has responded to broader trends in the development of networks, products and services that have taken place over the past two decades, which have been driven by advances in technology and rapidly evolving business models. These technological and business innovations, together with investment by the private sector, have accelerated the dynamic development of digital products and services that have become far more capable and sophisticated than those expected at the time of WSIS, many of which – such as the explosive growth of mobile devices, cloud computing and social media – were not then anticipated. Consumers have also played a dynamic role in the adoption of new services, enthusiastically taking advantage of mobile telephony, the Internet, social media and online services.

Progress towards the achievement of WSIS goals, as seen in consultation responses, has come about through the response of governments and other stakeholders to the WSIS vision and this dynamic of digital development through technological advances, changing business practice and the behaviour of citizens and consumers. The Summit's overall goal and vision – encapsulated in its commitment to a 'people-centred, inclusive and development-oriented Information Society,' consistent with sustainable development and human rights – has remained resilient throughout these changes, while specific goals and targets have evolved and new challenges emerged over two decades of rapid digital development.

Today's Information Society is far broader in scope and scale than was envisaged at the time of WSIS, and different goals and targets have emerged during the past two decades. The critical challenge posed in the *2030 Agenda for Sustainable Development*, of ensuring that 'no one will be left behind' in any aspect of development, has not been achieved to date, and is itself a moving target because of the rapid evolution of technology and services, raising continuing questions about inclusion and equality. Other challenges identified at the time of WSIS, such as cybersecurity, have become more complex, while outcomes that were not anticipated or whose scale was underestimated at the time, such as environmental impacts and challenges to information integrity, have become increasingly apparent. A new wave of digital development is now taking place, centred on AI. All of these factors were reflected in consultation inputs and international discussions including those leading to the GDC.

Priorities for the future

The majority of respondents to CSTD's consultation for this report felt, in summary, that substantial progress has been made towards achieving WSIS goals. The pervasiveness and increased reliance of human activity on digital technologies and services were seen as a fundamental change in the Information Society since WSIS, and the root of wider economic and social changes that could be seen as facilitating sustainable development and were often described as moving towards digital transformation. Positive economic and social outcomes identified in the consultation included increased access to resources and opportunity through the deployment of e-government and enhancement of public services, the growth of the digital economy as a catalyst for innovation and economic growth, as well as new opportunities in education, telemedicine and financial inclusion. There was, however, still, the strong sense that there is a considerable way to go, particularly in promoting inclusive access and 'meaningful' participation, digital literacy, and achieving international cooperation to optimise progress towards achieving global development goals.

The pace of change in technology was regarded as both an opportunity and a challenge, offering the prospect of new ways of addressing long-established problems in society and the economy,

while adding to the complexity of forward planning for governments in both digital and non-digital contexts. A number of specific policy challenges were identified as having remained or become substantial during the period since WSIS, in particular:

- the growing need to achieve meaningful and fully inclusive connectivity;
- the need for more financial resources for investment in infrastructure and developmental applications;
- the affordability of digital equipment and data for users of online services;
- inadequate digital skills and digital literacy;
- cybersecurity;
- data governance, data protection and data privacy;
- issues of information integrity, including misinformation, disinformation and abusive behaviour online;
- environmental impacts, including climate change;
- the growing concentration of economic and decision-making power;
- the relationship between digitalisation and national sovereignty; and
- the need for greater international cooperation, including stronger participation by developing countries.

A number of priorities were advanced during the consultation process to build on these achievements and address these weaknesses. As in all development sectors, steps to overcome digital divides and enable all citizens to benefit from public information and services were considered paramount: a matter not just of connectivity but also of digital literacy and awareness. There was a widespread perception in written responses and at consultation meetings that inequalities in digital access and development are growing, rather than diminishing as had been hoped at the time of WSIS, that the kind of digital divides between regions and countries that were previously evident in connectivity and usage are now becoming evident in data and in artificial intelligence, and that this risks breaching the fundamental goal of the *2030 Agenda for Sustainable Development* that no-one, and no country, should be left behind.

The following particular priorities for future progress towards achieving WSIS outcomes emerged from the consultation.

- Continued efforts to close digital divides, including the gender digital divide, through infrastructure investment and maximising the use of networks, targeted efforts to improve access and affordability for marginalised communities, and initiatives to build digital capabilities and literacy.

- The need to foster a safe and secure digital environment, including improved cybersecurity and work to improve trust and confidence in the value and integrity of digital resources.

- The development of regulatory frameworks to address challenges of data governance and privacy, AI ethics, and the responsibilities and accountability of digital stakeholders in contexts such as information integrity, technological inequalities and biases, environmental sustainability and human rights.

- Efforts to accelerate the deployment of new technologies, including AI, to achieve the SDGs, with particular reference to the digital economy, financial inclusion, health, education, environmental protection and disaster preparedness.

- Greater policy coherence at national level, developing holistic strategies for the achievement of WSIS goals and SDGs that bring together digital and non-digital stakeholders within and beyond government, including the pursuit of digital public infrastructure and digital public goods.
- Stronger collaboration at international level, emphasising the need for greater inclusion of developing countries in decision-making, monitoring trends and sharing best practices, and addressing the needs for regulatory harmonisation and financial investment.

Two themes frequently raised within the consultation, which are increasingly frequently discussed in wider international discourse, concern the desirability of building digital public infrastructure and digital public goods.

OECD defines digital public infrastructure (DPI) as 'shared digital systems that are secure and interoperable and that can support the inclusive delivery of and access to public and private services across society.' Key components of DPI include 'digital identity, payments, data sharing, digital post, and core government data registries.'[545] Developing DPI requires cooperation between governments and the private sector, the adoption of consistent, generally open technical standards, and enabling policy frameworks. UNDP identifies four central characteristics of DPI – that it should be interoperable, forming the underlying infrastructure for a variety of applications, have open standards, operate at a societal level (rather than in silos) and have robust enabling rules and regulations, not least in facilitating security and preventing misuse).[546]

The GDC defines digital public goods (DPG) as resources that, like DPI, 'do no harm, empower societies and individuals to direct digital technologies to their development needs and can facilitate digital cooperation and investment' – including, in particular, 'open-source software, open data, open artificial intelligence models, open standards and open content.' It considers DPG and DPI to be 'key drivers of inclusive digital transformation and innovation,' promotes relevant investment and knowledge-sharing, and encourages the formation of multistakeholder partnerships that leverage DPG and DPI to support progress towards achieving the SDGs.[547]

The advent of AI was widely seen in the consultation as an opportunity, but one that carries significant risks that need to be addressed by the international community. Hopes were expressed about the potential value of AI in improving the efficiency of government and public services and in enabling more effective responses to critical challenges of development, more effective interventions in health and other areas of social policy, and more effective responses to humanitarian crises. Fears were expressed both about the unpredictability of impacts of AI and other frontier technologies, the risk that they could increase inequality between and within countries, and the possibility that they could make the Information Society less 'people-' or 'human-centred'.

The WSIS framework

The framework for review and implementation of the WSIS outcome documents was set out in the *Geneva Plan of Action* and *Tunis Agenda*. As described in Chapter 1 of the report, the WSIS outcomes included a broad vision of the future Information Society, a commitment to multistakeholder engagement in the development of digital policy and practice, a set of targets with an end-date of 2015, eleven Action Lines (one subdivided into eight subsidiary Action Lines), arrangements for institutional coordination within the UN system, and a framework for Internet governance including the IGF. The Partnership for Measuring ICT for Development was

established between the two sessions of the Summit, while the WSIS Forum, drawing together facilitation of the Action Lines, was added in 2008. CSTD was invited to review implementation on behalf of ECOSOC following the Summit and has prepared annual resolutions for its consideration. The General Assembly conducted a comprehensive review of the implementation of WSIS outcomes in 2015, to which the CSTD contributed a major input. It will conduct a second such review in 2025..

The implementation of these institutional arrangements since 2005 is described in Chapter 2F, along with suggestions concerning their future development arising from the consultation process for this report and wider literature. The evolution of the WSIS framework will be considered by the General Assembly during the 2025 review, in the context of other international agreements, including the GDC, inputs from Member States and UN entities (including this report), and the run-up to the SDG review which is to be held in 2030. Roadmaps towards the WSIS+20 review have been published by CSTD,[548] ITU[549] and UNESCO,[550] and contributions made through a variety of media by many other stakeholders, including UN agencies and Action Line facilitators, international organisations, governments, business associations, civil society organisations and the technical community.

The Pact for the Future and the GDC

The Pact for the Future, adopted by the General Assembly in 2024, seeks to reinvigorate international cooperation in critical areas of UN activity, including peace and security, sustainable development and human rights. It includes a chapter on science, technology and innovation, including digital cooperation, which focuses both on their role as enablers of sustainable development and the need for responsible management of the potential risks that they may pose. It states the international community's determination to realise the potential of digital and emerging technologies, including AI, for sustainable development, and to manage risks, 'through enhanced international cooperation, engagement with relevant stakeholders, and promoting an inclusive, responsible and sustainable digital future.' It promotes 'an open, fair and inclusive environment for scientific development,' commits Member States to strengthen the science, technology and innovation capacities of developing countries, improve international cooperation and ensure consistency between innovation and human rights.[551]

The GDC forms an integral part of the Pact. It reiterates the General Assembly's commitment to the WSIS outcome documents and sets out specific goals for five areas of digital policy and governance in the light of subsequent developments, which are addressed in Chapter 2 and in the following sections of this chapter:

- closing digital divides and accelerating progress towards the SDGs;
- expanding inclusion in and benefits from the digital economy;
- fostering an inclusive, open, safe and secure digital space that respects, protects and promotes human rights;
- advancing responsible, equitable and interoperable approaches to data governance; and
- enhancing 'international governance of AI for the benefit of humanity'.[552]

The General Assembly has agreed to conduct a high-level review of the GDC at its 82nd session in 2027, with multistakeholder input, through a progress report from the Secretary-General and contributions from CSTD, the IGF and WSIS Action Line facilitators.[553] In its resolution on the GDC, the General Assembly invited those involved in the WSIS+20 review it to identify how WSIS processes and forums could support implementation of the Compact.[554] A number of

contributions to the consultation for this report, particularly in regional consultations, stressed the importance of the alignment of WSIS, SDG and GDC objectives and noted the potential contribution that CSTD could play in contributing towards this.

Closing digital divides

Many of the aspirations for the Information Society that were expressed in the Summit's outcome documents have been achieved, and some exceeded, while technological developments have created new aspirations that were not envisaged then. For many people, the Information Society has become daily reality. Not yet for all, however. As described in Chapter 2A, the goal of universal, affordable access to ICTs expressed in the *2030 Agenda for Sustainable Development* has not yet been achieved. While the impact of digitalisation has expanded opportunities for those with more money and resources, particularly in developed and higher income developing countries, it has not become sufficiently available or affordable to do the same for those on lower incomes, and there remain many, especially in LDCs, who are unable to take advantage of digital opportunities.

Limited engagement with digitalisation is not just a disadvantage for individuals' access to information, but also for the potential improvements to public services that can be offered by e-government and digital public infrastructure. It had been hoped and expected at the time of WSIS that the Information Society would reduce economic and social inequality between and within societies. In an age of increasing digitalisation of public services, however, it is now widely felt – particularly in developing countries – that unequal access to digital resources has exacerbated disparities in access to other social and economic resources, and that digital inequality may therefore increase rather than decrease social and economic inequality, both between and within countries.

This is not inherently surprising. Countries, communities and individuals with more financial resources, more developed networks and higher levels of educational attainment are better placed to take advantage of new opportunities. Doing so is likely to widen inequalities between them and other countries, communities and individuals. As a result, while the additional information resources available through digitalisation can empower people to achieve things that were previously beyond their reach, they may nevertheless increase the power imbalance between them and those that are already more advantaged. The continuing evolution of technology and services means that this process of relative inclusion and exclusion is continuous, making it difficult to bridge digital divides.

This risk was highlighted at the midway point between WSIS and the current review by the World Bank in its *World Development Report* in 2016, which described 'widening income inequality' as 'perhaps the biggest risk from technological change,' not least because disruption in labour markets might favour higher skilled jobs while reducing demand for those with lower skills.[555] The Bank stressed that, for countries to achieve maximum benefit from digitalisation, their governments need to invest in what it described as 'analog complements', including education and a supportive environment for business investment and innovation.

Consultation responses for this report demonstrated widespread recognition that meaningful and affordable connectivity is fundamental to achieving positive outcomes from digitalisation for whole populations, and thereby developmental gains consistent with the SDGs in areas such as e-government and the digital economy. Consultation responses also placed great emphasis on the need for capacity building and digital literacy to complement digital infrastructure. This was

seen as essential not just for individual welfare but for national prosperity in an increasingly digital global economy.

The GDC reiterates commitments from the WSIS outcome documents in three broad areas concerned with addressing digital divides and approaching meaningful connectivity:

- to improve connectivity by developing funding mechanisms and promoting investment in infrastructure for areas that have proved hard to reach;
- to foster digital literacy, skills and capacities; and
- to promote digital public goods and public infrastructure.[556]

The GDC's commitments recognise that improving the quality and affordability of connectivity will require additional funding for both connectivity and DPI, including 'innovative and blended financing mechanisms and incentives,' as well as investment in diverse and resilient infrastructure at local, national and international levels and in space.[557] They recognise that capacity development is needed alongside infrastructure and connectivity to 'ensure that people can meaningfully and securely use the Internet and safely navigate the digital space' – commending national digital skills strategies, including relevant educational curricula and training for and in the future work environment.[558]

The GDC also places emphasis on the development of technical competencies of public officials and institutions 'to enact, develop and implement strategies and policies' for digital development. The Broadband Commission's working group on AI capacity building has published a framework for building the capacity of public officials in AI and digital transformation.[559] UNESCO is among agencies that have prioritised building digital competencies in professional communities, such as teachers and, in its current programmes, civil servants and the judiciary.[560]

The consultation drew attention to the need for continued efforts to include other demographic groups that are currently under-represented in digital participation.

Addressing the gender digital divide was a priority for many respondents, as it is in many countries. Contributors to the consultation stressed the interconnectedness of disadvantages experienced by women online, from affordability and other barriers to connectivity, through skill requirements and opportunities for digital employment and the biases arising from databases used in the training of AI, to harassment, abuse and threats of violence online that diminish women's experience of the Information Society and, for some, deter their full participation.

The importance of addressing the interests of young people and, especially, including them in discussions about digital development has been emphasised in many international fora concerned with digitalisation. Young people are, in almost all countries, more frequent users of the Internet and online services than other age groups,[561] and are naturally invested in the role that digitalisation will play in their future lives. Youth IGFs form a prominent group alongside national and regional IGFs in the Internet Governance Forum's extended programme of activity. Responses to the consultation reflected the importance of this, but noted the need also to draw less digitally engaged groups into the development of future policy, including the elderly and persons with disabilities. As in other areas, lack of data was cited as a barrier to the design of appropriate policy interventions, particularly for the most marginalised groups within societies experiencing multiple forms of disadvantage.

Sustainable development

Consultation responses and the GDC recognise that digital divides – not just in connectivity but also data and the capacity to adopt new technologies including AI – have impacts on national as well as personal and community development. Societies that are less connected or have less access to developmental data, it was generally recognised, are less able to leverage the opportunities for improvements in economic prosperity and social welfare that can be achieved through digital resources. Health services, for example, miss out on ways of promoting public health; schools have more limited access to educational materials; governments have less information available to target limited financial resources. Economies that are less connected have smaller markets for local digital entrepreneurs and face more barriers exporting goods and services in regional and global markets than those that are more integrated in the digital economy. Countries that are less connected are likely to be less resilient to the impact of natural disasters or pandemics.

The goal of addressing digital divides is therefore also fundamental to sustainable development, not just in specific development sectors – such as agriculture, health or education, impacts on which are included in the WSIS Action Lines – but in its entirety. The *Agenda* that was adopted by the General Assembly in 2015 seeks to achieve 'sustainable development in its three dimensions – economic, social and environmental – in a balanced and integrated manner,' addressing the needs of individual countries' diverse circumstances within a framework of 'integrated and indivisible' universal goals and targets.[562] It is acknowledged by the United Nations, in the consultation and more generally, that 'current progress falls far short of what is required to meet the SDGs,'[563] particularly since the COVID pandemic, and that much greater use of digital resources must play a major role in accelerating progress in the half decade remaining before the end date for the Goals.

Although WSIS was held a decade before the *2030 Agenda* was adopted, the principles of sustainable development have been United Nations priorities since the Conference on Environment and Development (usually known as the Earth Summit) took place in 1992 and the broad goal of sustainable development was therefore incorporated in its vision statement.[564] In 2015 the General Assembly agreed that the outcome of its WSIS+20 review should be 'an input into the review process for the *2030 Agenda for Sustainable Development*, which includes the SDGs, at the end of its mandate period in 2030.[565] The GDC also seeks to 'accelerate progress across the Sustainable Development Goals' and, particularly, to 'expand inclusion in and benefits from the digital economy for all' within the renewed commitment to the SDGs set out in the *Pact for the Future*.[566]

Contributors to the consultation for this report commented on the importance of linking digital and sustainable development, stressing the need to draw together environmental and digital priorities in order to maximise the use of scarce resources required for both green and digital transitions. Achieving sustainable development would require enhanced understanding of the intersection between these two transitions and stronger understanding of the impact of each upon the other. Digitalisation provides means to advance sustainable development, it was suggested, but did not offer solutions in itself: approaching these would require substantive policy development and international cooperation, built around expertise in different fields, identifying the resources – digital and non-digital – required to bring about sustainable improvements in economic and social welfare, peace and security and human rights.

Human rights

The *Geneva Declaration of Principles* expressed the commitment of governments and other stakeholders to respect and fully uphold the Universal Declaration of Human Rights (UDHR).[567]

Developments in the Information Society since WSIS concerning human rights are discussed in Chapter 2E. Almost all rights set out in international rights agreements have been impacted to some degree by digitalisation. Particular attention has been paid to impacts on the right to privacy, which is considered to be challenged by increased data gathering and analysis, with associated risks of surveillance by governments and commercial businesses; access to information, which has expanded with growing volumes of content online; and freedom of expression, opportunities for which have increased as it has become much simpler and easier for individuals to publish user-generated content. Other civil and political rights significantly affected by digital developments include the rights of assembly and association, the right to a fair trial and the right to participate in public life. Concern has grown significantly over recent years about the extent of abusive content, misinformation and disinformation online, raising issues of information integrity, including the responsibilities of governments and businesses that arise from international rights agreements and the extent to which these require or legitimate content moderation and platform regulation.

Respect, protection and promotion of human rights forms an integral part of the *2030 Agenda for Sustainable Development*. Impacts related to economic, social and cultural rights are in many cases associated with relevant SDGs. Rights concerned with the welfare of particular groups within societies are included in the instruments concerned with women (CEDAW), children (CRC) and racial equality (ICERD).

The United Nations has, since 2012, recognised that rights within the international rights regime apply equally online and offline. Digitalisation has, however, changed the ways in which rights can be both exercised and threatened, as a result of new modes of expression, data gathering and analysis and the cross-border nature of the Internet and data management. These new modalities have posed challenges for governments and other stakeholders seeking to enable rights, including law enforcement, which have been addressed by UN Special Rapporteurs, in reports of the Human Rights Council and supportive documents such as General Comment 25 to the Children's Rights Convention.

The protection and promotion of human rights were raised as priorities by many contributors to the consultation process for this report. Particular emphasis was placed by civil society and other stakeholders on issues concerned with data privacy and freedom of expression, as has been the case throughout the period since WSIS. The rights of women, children and minority populations also received attention, as did the overarching relationships between human rights and sustainable development, and the role of accountability and transparency on the part of governments and businesses in assuring human rights. Contributors recognised the complexities arising from growing challenges to information integrity and from the increasing sophistication of cyberattacks. It was widely felt that the rapid evolution of AI posed significant risks as well as opportunities where rights were concerned and that these would need to be addressed by all stakeholder communities.

The GDC commits governments to ensure that national legislation concerning digital technologies complies with international law, including human rights law, to 'Refrain from imposing restrictions on the free flow of information and ideas that are inconsistent with' those legal obligations, and to establish 'appropriate safeguards to prevent and address any adverse impact on human rights arising from the use of digital and emerging technologies and protect

individuals against violations and abuse of their human rights in the digital space.' It also calls on technology companies and developers to apply 'human rights due diligence and impact assessments throughout the technology life cycle' and to adhere to the *UN Guiding Principles on Business and Human Rights*,[568] including rights to redress.[569]

Information integrity

The *Geneva Declaration* stated that 'strengthening the trust framework … is a prerequisite for the development of the Information Society and for building confidence among users of ICTs.'[570] At the time, this was primarily understood with reference to cybersecurity and data protection. Increasingly, however, governments, businesses and users have become concerned about trust in content, particularly challenges to information integrity such as misinformation and disinformation and about the misuse of online services to harass, abuse and threaten individuals and particular communities, including women, children, ethnic and other minorities.

As described earlier in the report, the volume of content available through the Internet has massively increased since WSIS. The fact that public information can be made available much more extensively and rapidly than was previously feasible has proved highly beneficial to governments and other users. Digitalisation has reduced the cost of publishing content – through websites and social media – close to zero, effectively democratising publication of opinion and expression. Civil society organisations and businesses, large and small, have taken advantage of the Internet to reach out more effectively to users, to mutual advantage.

The benefits for sustainable development and human rights arising from this growth in access to information were enthusiastically welcomed at the time of WSIS and have continued to be welcomed since, not least in many contributions to the consultation for this report. Increased access to reliable information is seen to have facilitated improvements in decision-making by both individuals and organisations. However, as has become increasingly apparent, not all content is equally benign. Like other media, online resources are open to exploitation by actors seeking to influence opinion and behaviour, whether through legitimate activities such as advertising and political lobbying or for manipulative purposes including hate speech, criminality and propaganda. The immediacy of online communications and the scale of social media networks mean that content – whether reliable or unreliable, intended to inform or misinform – can now spread exceptionally rapidly ('go viral') before it can be verified or challenged.

The integrity of the information ecosystem, and of information in that ecosystem, have become increasingly serious concerns as abusive content and misinformation have grown in volume and influence. The vision of the Information Society, in the eyes of many, including many ordinary users, has been corrupted in recent years by the spread of misinformation – factual error – and disinformation – false content that is deliberately intended to mislead. This is perceived to be particularly problematic where it is exploited by those seeking to influence political events, such as elections, foster social conflict or social disharmony, or adversely affect social welfare, for instance by undermining confidence in public health initiatives. Many commentators have blamed it for the polarisation of political opinion and the spread of conspiracy theories, to the detriment of political discourse and public welfare.

Many respondents to the consultation were concerned about these issues of information integrity and the risks that they felt misinformation and disinformation pose to trust in the digital environment and the achievement of potential developmental gains. The regulatory challenges involved were understood to be complex and difficult but crucially important in enabling the

sustenance of human rights and the achievement of sustainable development. Some contributors paid particular attention to the promotion of digital literacy, recognising that this requires long-term investment in both formal and adult education. Others emphasised the power to influence opinion that is vested in ownership and management of the algorithms that underpin social media and other platforms, and the need for that to be exercised responsibly and in the public interest.

The GDC asserts that 'Access to relevant, reliable and accurate information and knowledge is essential for an inclusive, open, safe and secure digital space,' but also recognises that 'digital and emerging technologies can facilitate the manipulation of and interference with information in ways that are harmful to societies and individuals,' adversely affecting human rights and sustainable development. It commits governments to work together 'to promote information integrity, tolerance and respect in the digital space, [including] the integrity of democratic processes, ... to address the challenge of misinformation and disinformation and hate speech online and mitigate the risks of information manipulation in a manner consistent with international law.' It specifically endorses efforts to promote digital literacy, maintain media and information diversity, support 'independent, fact-based [information sources] to counter misinformation and disinformation,' and assess the impact of the latter on achievement of the SDGs.[571]

Social media platforms now play an important part in shaping public opinion and influencing individuals' behaviour. They have been seen as dynamic extensions of public discourse, extending freedom of expression and building public debate where these have previously been constrained. Their ability to provide vehicles for political dissent and for the expression of minority perspectives has been facilitated by the use of anonymity and pseudonymity by those posting online. As well as broadening discourse, however, this is understood to have created openings for more widespread expression that violates social norms or legal constraints, including racial, misogynistic and other hate speech and incitement to violence.

Content platforms act as intermediaries between the authors of content and its readers, in ways similar to those of publishers and newspaper editors offline, but with the ability to convey vastly more content than print media. Since the early days of the Internet, to varying degrees in different jurisdictions, online platforms have been treated differently from offline publishers, enjoying substantial immunity from intermediary liability, *i.e.* legal liability for harms arising from content published on their platforms. Principles of network (or net) neutrality, requiring ISPs to treat all Internet communications equally, have also played a part in the evolving relationship between content producers, intermediaries and users of the Internet. As noted in Chapter 2B, the UNHRC called on States in 2021 'to ensure net neutrality, subject to reasonable network management, and to prohibit attempts by Internet access service providers to assign priority to certain types of Internet content or applications over others for payment or other commercial benefit.'[572]

The relationship between content platforms and their users has changed over the years since WSIS as they have become more popular and as the algorithms that direct users towards content have become more sophisticated. Most people have limited time to explore the vast range of content now available and rely on the intermediary role of search engines and the algorithms through which platforms recommend content to them. Critics of social media platforms point out that their algorithms seek to maximise engagement in order to increase users' exposure to the advertising from which they derive revenue, argue that this has prioritised more extreme or controversial content (sometimes referred to as 'clickbait') and suggest that this has fostered social and political polarisation, the spread of disinformation and 'conspiracy theories'. Some

have warned that platform owners could use algorithms to promote particular political or business objectives, much as newspaper proprietors and editors have done in the past, but with greater reach than earlier media.[573]

Concern about these challenges has been exacerbated by the emergence of generative AI, which is increasingly incorporated in the operating systems, search engines and platform algorithms that are gateways to digital content. The most popular search engine, Google, for instance, now heads its responses to many user queries with an AI-generated 'overview'.[574] Because this draws on very large volumes of online content, it may be more nuanced than individual sources highlighted by search engines, but is also liable to distortions, such as the incorrect or misleading results (so-called 'hallucinations') encountered in AI-generated content (see below).[575]

AI programmes that enable users to create and disseminate realistic images, audio and video content are also felt to pose a threat to information integrity because of the risk that they will be used to generate disinformation. 'Deep fakes' – realistic but false image, audio and video content generated by AI – have already become significant problems in relation to sexual abuse and are increasingly evident in other contexts including fraud and political disinformation. Increasingly sophisticated technology and more experienced authorship are making deep fakes more difficult to detect over time.[576]

Governments, businesses and other commentators, including contributions to the review, worry that these challenges to information integrity are undermining trust in reliable, evidence-based information across the board, and fostering a culture in which disinformation and conspiracy theories can thrive at the expense of information that has been substantiated and authenticated. Such an outcome, it is suggested, would be detrimental to the achievement of sustainable development which draws on public support for policies and programmes derived from sophisticated data analysis.

These problems of information integrity raise complex issues concerning freedom of expression, 'respect for the rights and freedoms of others' and the protection of 'morality, public order and the general welfare' referred to in Article 29 of the UDHR and Article 19 of the ICCPR. Some forms of content, such as child sex abuse images, fraud and incitement to violence, are considered illegal in most or all jurisdictions, but the boundaries between lawful and unlawful content are difficult to clarify and vary significantly between countries. The proliferation of content challenging those boundaries, lawful or otherwise, can also have significant impacts on wider society and the protection of individuals and social groups, for instance where sexual and racial harassment are concerned.

The GDC calls on digital technology companies and platforms to enhance the transparency and accountability of their systems, including content moderation processes, and to 'develop solutions ... to counter potential harms, including hate speech and discrimination, from artificial intelligence-enabled content.'[577] Individual platforms have developed a variety of content moderation mechanisms to address issues of disinformation and abusive content, and abuse of intellectual property. These have included measures to remove accounts that are abusive, spread disinformation or seek to undermine democratic processes in other countries, and fact-checking services that seek to validate reliable information, correct misinformation and remove disinformation. The volume of user-generated content is so large, however, that it is impossible for platforms to address these comprehensively through human moderation, and they are increasingly drawn to AI-enabled moderation algorithms. Some platforms have recently cut back on professional fact-checking services in favour of a crowdsourcing approach by platform users.

The GDC is also concerned with countering 'all forms of violence, including sexual and gender-based violence, … hate speech and discrimination, … cyberbullying and child sexual exploitation and abuse.' It calls for the adoption of 'common standards, guidelines and industry actions' to promote online safety, urges technology companies and platforms to provide safety-related training materials to users, and to establish reporting mechanisms to report abuse.[578]

UNESCO published *Guidelines for the Governance of Digital Platforms*, following extensive consultation, in 2023, with the stated aim of 'safeguarding freedom of expression and access to information through a multistakeholder approach.' These *Guidelines* set out principles for transparency and accountability in content curation and moderation.[579] More specific measures have been included in legislation by the European Union, whose Digital Services Act requires platforms to disclose how algorithms work to regulators, provide users with explanations for content moderation decisions, implement controls on targeted advertising and provide protections against harassment and bullying.[580] The rapid evolution of new forms of content, particularly those enabled through generative AI, suggests that these and other guidelines will require frequent updating.

Alongside regulatory interventions along the lines, the GDC and the EU's Digital Services Act both emphasise the value of empowering users to manage the content that they see on platforms. Digital literacy – the skills and knowledge that users need to interact safely and critically with online content – is considered critical to this empowerment. Individuals have always needed literacy, research and critical thinking skills in order to find and make judgements about the quality and relevance of content in traditional media, but the challenge in today's digital environment is greater because so much more information is available, and most digital content is filtered to users through algorithms that are designed to maximise engagement. Promoting these skills through school curricula and outreach towards the wider adult community have been advocated by agencies, including UNESCO, throughout the period since WSIS.

Data management and governance

Growth in the volume of data generated, stored and used by digital systems since WSIS has seemed almost exponential, driven by the growing capabilities of digital networks, devices and services, numbers of users and the ever more complicated and sophisticated ways in which both governments, digital businesses and other stakeholders can exploit data to improve service delivery and profitability. Data generated by digital systems have enormous value, both commercially and for sustainable development, which raises significant challenges of data governance. Three priorities in this area emerged from consultation inputs and the wider literature.

The first concerns the need for more systematic and comprehensive gathering and analysis of data that are critical for evidence-based policy development and for targeting resources where they are most needed. Although the Information Society enables much deeper analysis of data underpinning all aspects of development, there are substantial limitations in the quality of data concerning digital development itself, its impact on individuals and societies. Weaknesses in available data – from data-gathering to data-sharing and analysis – have been raised in connection with many Action Lines, as indicated in Chapter 2. Weaknesses in the accuracy and comprehensiveness of data sets are particularly evident in developing countries with poorly resourced national statistical systems.

Digital systems are more pervasive in some societies than others. More data are generated in those societies, and, within them, by individuals who are more digitally active. Data gathered through digital systems alone can therefore be unrepresentative of the communities from which they are drawn. Biases and inaccuracies in historic data sets can also distort results generated through algorithms, not least where gender differences are concerned. AI systems trained on such data are vulnerable to perpetuating historic biases.

Many contributions to the consultation pointed to these deficiencies in data sets available for understanding the impacts of digital development and building positive evidence-based responses to developmental challenges. Respondents cited the need for improvements across the range of data gathering and analysis – more regular, systematic and disaggregated data gathering, with more consistent standards, definitions and methodologies between countries, international agencies and development sectors; better arrangements for sharing data that reflect the requirements of data security as well as commercial confidentiality; more timely data analysis, particularly focused on impacts, undertaken on a neutral basis by researchers independent of vested interests; and better funding and training of analysts in national statistical offices and research centres in developing countries.

Maximising the value of data for development also requires data-sharing between countries and stakeholders, including data held by commercial businesses. Interoperability of data was seen as critical in this context, requiring common definitions and standards for data, metadata and data analysis, to enable both aggregation for global development policy and comparison between different national contexts.

The GDC commits its signatories to 'strengthen support to all countries to develop effective and interoperable national data governance frameworks,' increase financing for data and statistics from all sources and 'build capacity in data and related skills.' It asserts the goal of achieving a 50 per cent increase in data available to monitor the SDGs, 'disaggregated by income, sex, age, race, ethnicity, migration status, disability and geographical location and other characteristics relevant in national contexts.' It emphasises the value of common data standards and interoperable data exchanges in maximising the contribution of data to sustainable development and preventing bias and discrimination.[581]

The second priority area addressed in many consultation inputs concerns data privacy and protection. Digital devices and applications gather continual streams of data concerning individuals' lives and behaviour. These data have considerable direct and resale commercial value, can be used for political as well as commercial influence, can be exploited for surveillance by governments and other stakeholders, and are vulnerable to hacking by criminals seeking to defraud users or hold data managers to ransom. Here too, the emergence of AI represents a step change in the capabilities of data analysis and exploitation. The combination of many different data sets has led to much more detailed and comprehensive understanding of individuals' interests and behaviour than was previously possible, increasing the granularity with which algorithms reflect users' preferences (which may be welcomed by them) but also increasing risks of surveillance and exploitation (which may jeopardise trust in online data systems).

Measures to protect citizens and businesses against adverse exploitation and abuse of data have become increasingly important in the period since WSIS. As well as those concerned with cybersecurity, these include policies and regulations limiting the gathering and exploitation of data by both governments and commercial businesses. Data protection legislation, which is critical to ensuring trust in online financial transactions and e-commerce, was not widespread at

the time of WSIS but has now been enacted in the majority of jurisdictions – though it is still less common in developing countries and present in only half of LDCs.[582] More sophisticated protection of individuals' data, including rights to restrict data use by businesses, have been introduced in some jurisdictions, most notably the European Union whose General Data Protection Regulation (GDPR), introduced in 2018, has come to exercise considerable influence on the regulatory approaches taken in other jurisdictions.[583]

The scope of exemptions from data controls for law enforcement and other government agencies has been controversial. Encryption has become much more sophisticated during the period since WSIS. It is regarded as an essential tool for protecting sensitive data, including transactions, from hacking and criminality. It has, however, also been exploited by criminal organisations to conceal their own activities. This has raised complex issues concerning the balance between law enforcement and privacy rights which have not been resolved.

The third priority area to be stressed in consultation inputs concerns cross-border data flows and data sovereignty. Cross-border data flows are described in the GDC as 'a critical driver of the digital economy.'[584] They are difficult to measure but have become increasingly important with the growth in data volumes and the central role of data corporations and hyperscale data centres in data management. Effective cross-border data flows depend on the interoperability of data systems and on trust between stakeholders along digital value chains which requires compatible data protections.[585] Some governments have been keen to retain data derived from national populations and business environments within their own jurisdictions, subject to national regulation, for national security or other reasons. Others have preferred the cost and security that can be provided by global data businesses. The concept of 'data free flow with trust', advocated by OECD and other international bodies, aims to promote the free flow of data in ways that ensure trust in privacy, security and intellectual property rights.[586] The GDC recognises the desirability of strengthening cooperation 'to enable data to flow with trust within and between countries to mutual benefit, while respecting relevant data protection and privacy safeguards and applicable legal frameworks.'[587]

There is concern that divergent approaches to data governance may adversely affect developmental outcomes. Three broad models for data governance, including the management of cross-border flows, have emerged during the past decade. As summarised in UNCTAD's 2021 *Digital Economy Report*, one approach has focused on management/oversight of data by the private sector, another on management/oversight by the government while a third has sought to increase the control of data by service users (data subjects).[588] The interplay between these different governance models affects the extent to which data can be shared between different jurisdictions. Some international agencies, including UNCTAD, have suggested that the importance of data flows requires the development of new institutional frameworks 'with the appropriate mix of multilateral, multi-stakeholder and multidisciplinary engagement.'[589]

The GDC recognises that 'responsible and interoperable data governance is essential to advance development objectives, protect human rights, foster innovation and promote economic growth.' It notes the potential for AI 'to amplify risks in the absence of effective personal data protection and privacy norms,' and calls for urgent efforts to strengthen cooperation in data governance, with a particular role for the United Nations in promoting capacity-building in developing countries. Particular attention is drawn to the need for the development of common data standards and interoperable data exchanges, to managing cross-border data flows with trust, and to the interoperability of national, regional and international data policy frameworks.[590]

In its resolution on the GDC, the General Assembly requested CSTD to 'establish a dedicated working group to engage in a comprehensive and inclusive multi-stakeholder dialogue on data governance at all levels as relevant for development.' The working group is expected to consider recommendations on fundamental principles of data governance at all levels as relevant for development; proposals to support interoperability between national, regional and international data systems; considerations of sharing the benefits of data; and options to facilitate safe, secure and trusted data flows, including cross-border data flows in the context of development.[591] It should commence discussions in April 2025 and report on progress to the eighty-first session of the General Assembly in 2026.

Artificial intelligence

Although the concept of artificial intelligence was understood at the time of WSIS, the development of significant AI frameworks and applications was then a distant prospect. In the last decade, however, major scientific and technological advances have been made in AI, and, although capabilities remain uncertain, it is now expected to play a major part in all areas of economic and social development in future, alongside innovations in advanced robotics, autonomous vehicles and other areas of new technology.

Since the launch of ChatGPT in 2022, there has been a surge in generative AI applications that enable individual citizens as well as businesses and organisations to make use of AI capabilities to produce text, images and videos on demand, effectively democratising AI in much the way that graphical user interfaces democratised the World Wide Web a generation earlier. These applications, known as large language models (LLMs),[592] are empowered by machine learning derived from massive data sets – such as those available on the Internet – without requiring detailed instructions from their users.

The extent to which AI will transform aspects of human life remains uncertain and there are different views about the opportunities and risks involved.

Accelerating growth in the deployment and capacity of AI and machine learning offers tremendous opportunities for improvements in public services, for example in the allocation of resources and the early identification of diseases, and for the introduction of 'smart systems' to improve the management of complex environments such as 'smart cities'. Many governments and other stakeholders are highly optimistic about its potential to bring about improvements in scientific and medical knowledge, agricultural productivity and other areas of economic activity that could resolve underlying problems of sustainable development and bring about a more prosperous lifestyle for all. Many of these opportunities are highlighted in ITU's annual AI for Good events, and some are related to the Action Lines are referenced in Chapter 2.

Others are more sceptical about the potential of AI to achieve gains on this scale, or are more concerned about the potential risks posed by the rapid changes it may bring about in social structures and the ways in which it may be used by governments, businesses and individuals. Particular concerns have been expressed about potential impacts on employment, the risks associated with surveillance, and the potential use of AI-enabled weapons systems. Some, including some AI pioneers, have suggested that the possible development of artificial general intelligence, with cognitive capabilities beyond those of humans, poses a more existential threat to human agency.

These hopes and fears are reflected in many of the consultation inputs made to this review, and in discussions about the prospects for AI within the UN system. Four themes underpin much of this discussion.

First, the capabilities of existing AI systems, in some cases, already reach beyond the understanding, and to some extent control, of their developers. This means that they can address problems that were too complex for pre-AI analysis, but also that the reasoning behind conclusions reached is not readily explicable to project managers and is less susceptible to human validation. Explicability is especially important for enabling trust in systems whose decisions affect human welfare, such as those concerned with access to public services and benefits. The significance of this is heightened because LLMs do not 'understand' the data from which they infer conclusions but generate these from likelihoods in data patterns, with the result that outputs may be incorrect, misleading or even invent 'information' that does not actually exist, an outcome described as 'AI hallucination'.[593]

A second area stressed in consultation inputs concerns the impact that AI systems will have on aspects of current economic and social life, which is likely to prove both dynamic and challenging. On the positive side, AI is already proving valuable in expediting scientific analysis, such as the identification and development of more effective pharmaceuticals for specialist conditions. The most prominent cause of anxiety has been the potential for automated systems to displace employment in clerical, professional and other areas of work in much the way that robotics is displacing certain manual jobs (see Chapter 2D). Education is another field in which AI is proving disruptive in ways that are both positive and challenging. Students are using AI chatbots, for example, to generate summaries of information about subjects which they are studying, which can facilitate and expedite their learning, but are also using them to complete assignments in ways that potentially undermine examination and qualification standards.

Some critics also fear that AI systems may be used to cut administrative costs at the expense of accountability to users and that outcomes generated by automated systems will be subject to insufficient scrutiny and accountability.

Another area of concern expressed in consultation inputs arises from the pace of change. Technological change today can be so rapid that it has impacts on society, including impacts that are irreversible, before governments and other stakeholders can put in place legal and regulatory frameworks to shape them in the public interest. While many of these impacts will be beneficial, some will be unexpected and some detrimental. Global data corporations are competing against one another to bring new AI products and services to market as rapidly as possible, in order to gain first-mover advantage over their commercial rivals. The risk that innovation will lead to irreversible outcomes before their impact on sustainable development and human rights can be assessed, or appropriate governance arrangements put in place, feeds into anxieties that many feel about the future evolution of AI.

The fourth area of concern expressed in consultation processes has been the concentration of AI development in a small number of countries and corporations. UNCTAD reported in 2021 that the United States and China accounted for 94 per cent of funding for AI start-ups in the preceding five years and for 70 per cent of the world's top AI researchers.[594] The rate of adoption of AI is also, naturally, much faster in developed countries and in developing countries with advanced digital sectors than it is in other developing countries, particularly LDCs. Many contributors to the consultation from international agencies and developing countries felt that, unless addressed, this is likely to lead to the growth of an AI digital divide, exacerbated by the focus of AI businesses

on meeting demand in larger, more technologically advanced and more immediately profitable developed country markets.

There have been many attempts to establish ethical frameworks for AI development, consistent with sustainable development and human rights. These have generally sought to balance the desire to facilitate innovation that could benefit human development and welfare with concerns to maintain human control of future developments and sustain individual rights, often emphasising principles of transparency and accountability, privacy, security and reliability. OECD's AI Principles, for example, adopted in 2019, sought to shape 'a human-centric approach' to AI built around international cooperation and interoperability.[595] UNESCO's *Recommendation on the ethics of artificial intelligence* in 2021 sought to establish a universal framework of values and principles to guide States in formulating legislation and other policy instruments consistent with human rights and equitable access to knowledge.[596] The African Union's Continental AI Strategy considers ways of harnessing AI for African development, addressing infrastructure requirements, risks and governance.[597] Some concern has been expressed in consultation responses and the wider literature about the multiplicity, duplication and potential inconsistency among these ethical initiatives and the need for a more coherent global understanding of priorities. The scope of discussion around these themes has become more complex and diverse as the potentialities of AI across the spectrum of economic, social and cultural life have grown.[598]

An inter-agency working group on AI was established in 2020 to bring together expertise within the UN system under the joint leadership of ITU and UNESCO.[599] The Secretary-General appointed a High-Level Advisory Body on AI (HLAB-AI) to reflect on the opportunities and anxieties arising from AI in 2023. Its 2024 report, *Governing AI for Humanity*, [600] welcomed AI's 'tremendous potential for good, from opening new areas of scientific inquiry and optimising energy grids, to improving public health and agriculture' and promoting progress on the SDGs, but also warned of risks of inequality, bias and surveillance, potential risks to peace and security and increased energy consumption at a time of climate crisis. It described a 'global governance deficit' with respect to AI, including the limited accountability of 'fast, opaque and autonomous AI systems [that] challenge traditional regulatory systems,' warned against leaving their development to markets alone, and set out the case for 'a holistic, global approach cutting transversally across political, economic, social, ethical, human rights, technical, environmental and other domains.'[601]

The HLAB-AI's approach fed into the fifth core objective of the GDC, which declared 'the need for a balanced, inclusive and risk-based approach to the governance' of AI and commits its signatories to 'govern artificial intelligence in the public interest,' including building AI capabilities in developing countries. This, it argues, 'requires an agile, multidisciplinary and adaptable multi-stakeholder approach,' in which the United Nations should play an important role. It commits to several initiatives to guide future AI governance, the design stages towards which are now underway, including the establishment of a multidisciplinary Independent International Scientific Panel on AI, a multistakeholder Global Dialogue on AI Governance to take place within the margins of other UN events, and a potential Global Fund for AI development.[602]

Artificial intelligence is not the only frontier technology to have emerged since WSIS promising new opportunities and raising new challenges of governance. Other digital innovations, including blockchain, 3D printing and advanced robotics, have added to the potential of ICT and ICT-enabled technology to transform production processes, business models and public services since 2005. Major developments in other scientific areas, including green technologies, nanotechnology and gene-editing, have similar transformative potential and pose similar

challenges to legal, regulatory and normative frameworks designed for earlier generations of technology.[603] These innovations have benefited greatly from the enhanced analytical capabilities arising from digitalisation, and intersect with it in several ways, from common use of scarce resources to the difficulties of regulating to ensure public safety when technology advances very quickly. Like AI, these frontier technologies are heavily concentrated in developed countries and a small number of technologically advanced developing countries. UNCTAD's index ranking readiness to make use of frontier technologies, published in its biennial *Technology and Innovation Report*, suggests that few developing countries currently have the capacities needed to take advantage of them, but that this could change through investment in technical skills, innovation clusters and stronger alignment of policies concerned with STI, industry and the environment.[604]

Considerable attention has been paid recently to research into quantum computing, which would provide much greater computing power and very much faster computation than classical computing. This could be transformative in many ways, for instance supercharging the capacity of health researchers to analyse massive data sets, enable faster drug discovery and improve and personalise diagnostics and treatment methodologies. At the same time, its enormously enhanced computational capacity could jeopardise the security of current encryption systems.[605] Beneficial and detrimental outcomes alike will further outpace the present capability of legal, regulatory and other governance frameworks to oversee the impacts of technology on economic and social outcomes and on human lives.

As with other frontier technologies, this concern has increased interest in technology assessment and foresight analysis to inform strategic planning and investment strategies and to facilitate regulatory approaches that foster innovation while protecting human welfare. Debates in this field are concerned, *inter alia*, with the extent to which technology policy should seek to shape innovation, through investment and regulation, in ways that actively seek to sustain established norms and international goals, such as those concerned with human rights and sustainable development, address global challenges such as climate change, and ensure the full inclusion of developing countries alongside those at the forefront of new developments.[606]

CONCLUSION: THE EVOLUTION OF THE WSIS FRAMEWORK

The World Summit on the Information Society was an unusual global summit. It focused on rapidly developing information and communication technology and the services it could deliver, and saw in this renewed hope for international cooperation to address longstanding challenges of human development. The technology that it discussed was very new, and unevenly distributed between developed and developing countries, but it established the goal that this would become rapidly available to all, enabling opportunity and fostering prosperity.

The WSIS outcome documents set out a framework for the implementation, monitoring and review of WSIS outcomes which reflected the extent of digital development when they were agreed in 2003 and 2005. The evolution of the Information Society since then has been exceptionally rapid and, in many respects, the impact of the Information Society since WSIS has exceeded expectations. As described in Chapter 1, new technologies have emerged that were largely unanticipated at the Summit, greatly increasing the capabilities of digital resources, enabling sophisticated new services and applications, radically altering the structure of communications businesses, and posing new challenges of governance and regulation. Innovation has led to innovation, not just within technology but in its application, interacting with human activity in ways that have been profound and often unexpected. Digital technology and services have penetrated deep into almost every aspect of human existence, enabling dynamic changes in the ways that governments, businesses and citizens interact, and public services can be delivered. The relationship of these changes to the Action Lines and other goals set out in the WSIS outcome documents has been described in Chapter 2.

Not every consequence of the evolving Information Society has been so positive, however. The goal of universal connectivity and use of digital resources, most notably the Internet, has not been achieved, and in some countries still remains quite distant. There is growing concern that digital inequality is reinforcing social and economic inequality within societies. Digital and other infrastructure has proved vulnerable to criminal activity, raising the profile and necessity of cybersecurity. New and difficult challenges of governance have arisen in relation to data management and information integrity.

The pace of technological change today is equal to or even faster than in previous periods in ICT development, amounting to what has been described as a 'Fourth Industrial Revolution' to match those previously associated with the steam engine, electricity and the first wave of digitalisation based round computing and telecommunications. At the heart of this new wave of technology lie advances in artificial intelligence and machine learning, augmented and virtual reality, advanced robotics and genetic engineering, whose potential and impacts are expected to be profound but are also highly uncertain and unpredictable. This fresh wave of technological innovation is likely to transform human societies even more profoundly than the Information Society has done to date and to pose even greater challenges of governance, some of which are discussed in Chapter 3.

Most respondents to the consultation for this report regarded WSIS as a successful and important platform for an Information Society that fosters inclusion, sustainable development and human rights. The overall vision for a 'people-centred, inclusive and development-oriented' Information Society consistent with sustainable development and human rights, which it established, was generally felt to have remained valid, and indeed become a central goal for

wider discussions of digital development, facilitating international cooperation and providing a positive background for sometimes contentious negotiations in specific fields of digital development. It is widely included as a critical reference point in subsequent international agreements concerning digital development.

At national level, many respondents, particularly from developing countries, felt that the Summit focused attention on the emerging Information Society and its development potential in ways that would not otherwise have been achieved so quickly. The Action Lines, in particular, were seen to have provided a framework for the development of policy within governments, expediting the restructuring of communications sectors, including appropriate legal and regulatory frameworks, and the adoption of digital resources in sectors such as health and education. This has facilitated and accommodated the development of national digital environments that reflect diverse national circumstances and priorities within the universal technical framework that enables a globally interconnected Internet.

The principle of multistakeholder participation, which was pioneered at WSIS, has become a core feature of international discourse on digital development, endorsed in post-WSIS agreements including the General Assembly's WSIS+10 review and GDC, and widely commended in consultation responses for this report. Respondents recognised that the range of stakeholders involved in digital governance has expanded since WSIS because of technological progress and the growing impact which digitalisation now has on all aspects of society. This included calls for digital governance entities to become more open to new types of digital business and to those on the demand side of the Information Society that are primarily concerned with its impact and implications for other sectors, finding innovative ways to draw in experience and priorities from those that are affected by the Information Society but are currently under-represented.

The WSIS outcome documents also stressed the importance of full and effective participation by all countries in the development of the Information Society. Under-representation of developing countries, particularly LDCs, SIDS and other countries with limited representational capacity, is a longstanding concern in international governance[607] and was felt to have been exacerbated by the proliferation of international fora concerned with digitalisation arising from its growing prominence. Participation in so many fora has proved difficult for countries with limited resources, whose priorities often differ from those of larger, more developed countries. and of large corporations whose representational capacity now substantially exceeds that of many nation states. Without full participation, it was suggested, the development of new technologies and services is less likely to address the particular circumstances and challenges faced by governments, businesses and citizens in less digitally enabled and lower-income countries. The GDC recognises the need to increase participation from developing countries, for instance in the IGF, in data governance and in relation to AI.[608]

Six priorities for achieving future progress towards achieving WSIS outcomes that emerged from the consultation process for this report were identified in Chapter 3:

- Continued efforts to close digital divides, including the gender digital divide, through infrastructure investment and maximising the use of networks, targeted efforts to improve access and affordability for marginalised communities, and initiatives to build digital capabilities and literacy.
- The need to foster a safe and secure digital environment, including improved cybersecurity and work to improve trust and confidence in the value and integrity of digital resources.

- The development of regulatory frameworks to address challenges of data governance and privacy, AI ethics, and the responsibilities and accountability of digital stakeholders in contexts such as information integrity, technological inequalities and biases, environmental sustainability and human rights.
- Efforts to accelerate the deployment of new technologies, including AI, to achieve the SDGs, with particular reference to the digital economy, financial inclusion, health, education, environmental protection and disaster preparedness.
- Greater policy coherence at national level, developing holistic strategies for the achievement of WSIS goals and SDGs that bring together digital and non-digital stakeholders within and beyond government, including the pursuit of digital public infrastructure and digital public goods.
- Stronger collaboration at international level, emphasising the need for greater inclusion of developing countries in decision-making, monitoring trends and sharing best practices, and addressing the needs for regulatory harmonisation and financial investment.

Many consultation inputs for this report stressed the importance of improving international cooperation and coordination to ensure positive outcomes from the digital transformation that is underway. Strong support was expressed in the consultation for the institutional arrangements established in the WSIS outcome documents, particularly the IGF and WSIS Forum. WSIS, it was suggested, 'is an existing, well-functioning, multistakeholder UN mandated process for digital governance' and 'should be leveraged to avoid duplication and wastage of resources, especially in the context of other UN processes.'[609]

Points raised in the consultation concerning the development of WSIS implementation are described in Chapter 2F. There was strong support for the roles played by the IGF and WSIS Forum. A significant number of respondents called for the WSIS framework and Action Lines to be updated to reflect recent developments in the Information Society since 2005. Many inputs emphasised the need for integration between WSIS outcomes, the SDGs and the GDC, reflecting a sense of the WSIS outcomes as living processes that need to work in alignment with subsequent agreements.

As noted earlier, WSIS took place a decade prior to the adoption of the *2030 Agenda for Sustainable Development* but recognised the centrality of broad principles of sustainable development derived from the earlier Earth Summit. While ICTs were not extensively referenced in the SDGs, their growing importance was recognised when ITU and Action Line facilitators developed a matrix juxtaposing SDGs and WSIS Action Lines after the adoption of the *2030 Agenda*.[610] ITU also published a compendium of 'success stories' to illustrate SDG-related achievements from the areas covered by the Action Lines to coincide with the WSIS+10 review.[611]

The 2024 IGF Messages noted the potential for the GDC to 'transition from a vision document to an actionable framework, strengthening and aligning with existing structures' including the WSIS process, the IGF and the UN Science, Technology and Innovation Forum.[612] As well as recognising the centrality of ICTs to achieving the SDGs today, the GDC identified its approach to digital development as 'development-oriented and rooted in the *2030 Agenda*.'[613] Each GDC commitment is explicitly connected with one or more of the Sustainable Development Goals. Building on that, ITU has prepared a comprehensive draft matrix that relates GDC commitments to SDGs, WSIS Action Lines and structures, mechanisms and supporting activities associated with the WSIS framework.[614] ODET is also collaborating with the wider UN family to develop an

implementation map for the GDC ahead of the General Assembly's review of WSIS. Meetings of the IGF and WSIS Forum in 2025 will address themes and priorities for the WSIS review and those arising from the GDC.

While much has been achieved in implementing WSIS outcomes, this review, and the consultation process leading to it, suggest that much remains to be done to build on those foundations, and that more again is needed to ensure that future digital development fulfils the WSIS vision and the UN's broader goals for peace and security, development and human rights.

[1] 'Declaration of Principles - Building the Information Society: a global challenge in the new Millennium', https://www.itu.int/net/wsis/docs/geneva/official/dop.html, para. 1.
[2] Both documents can be found at https://www.un.org/sites/un2.un.org/files/sotf-pact_for_the_future_adopted.pdf
[3] *Tunis Agenda*, https://www.itu.int/net/wsis/docs2/tunis/off/6rev1.html, paras. 105, 111.
[4] General Assembly resolution A/RES/70/125, https://publicadministration.un.org/wsis10/Portals/5/N1543842_1.pdf
[5] These can be found through the CSTD website, https://unctad.org/topic/commission-on-science-and-technology-for-development. The 2023 report is at https://unctad.org/system/files/official-document/a79d62_en.pdf
[6] *Implementing WSIS Outcomes*, https://unctad.org/system/files/official-document/dtlstict2015d3_en.pdf. It also published interim assessments after five years (*Implementing WSIS Outcomes: Experience to Date and Prospects for the Future*, https://digitallibrary.un.org/record/710086?ln=ar&v=pdf, and after fifteen (*Fifteen Years since the World Summit on the Information Society*, https://unctad.org/system/files/official-document/dtlstict2020d1_en.pdf).
[7] https://unctad.org/system/files/official-document/dtlstict2020d1_en.pdf., p. 16.
[8] *Geneva Declaration of Principles*, https://www.itu.int/net/wsis/docs/geneva/official/dop.html, para. 1.
[9] https://data.one.org/analysis/official-development-assistance
[10] https://www.un.org/sites/un2.un.org/files/sotf-pact_for_the_future_adopted.pdf
[11] https://www.un.org/global-digital-compact/sites/default/files/2024-09/Global%20Digital%20Compact%20-%20English_0.pdf
[12] The texts can be found in https://www.itu.int/net/wsis/docs/promotional/brochure-dop-poa.pdf
[13] https://www.itu.int/net/wsis/docs2/tunis/off/7.pdf; https://www.itu.int/net/wsis/docs2/tunis/off/6rev1.html
[14] https://publicadministration.un.org/wsis10/Portals/5/N1543842_1.pdf, paras 1-3, 71.
[15] *Transforming Our World*, https://sdgs.un.org/sites/default/files/publications/21252030%20Agenda%20for%20Sustainable%20Development%20web.pdf
[16] The MDGs were set out in the Millennium Declaration, https://www.ohchr.org/en/instruments-mechanisms/instruments/united-nations-millennium-declaration
[17] *2030 Agenda*. para. 15.
[18] Objective 9.c
[19] https://www.itu.int/net4/wsis/sdg/
[20] ITU, *Fast-forward progress: leveraging tech to achieve the global goals*, 2017, https://www.itu.int/en/sustainable-world/Pages/report-hlpf-2017.aspx
[21] *GDC*, para. 1.
[22] See OECD, *The Impact of the Crisis on ICTs and their Role in the Recovery*, 2009, https://www.oecd.org/content/dam/oecd/en/publications/reports/2009/08/the-impact-of-the-crisis-on-icts-and-their-role-in-the-recovery_g17a1d20/221641027714.pdf
[23] See United Nations, *Sustainable Development Goals Report 2024*, https://unstats.un.org/sdgs/report/2024/,for illustrations of this across the range of SDGs.
[24] See *e.g.* UNCTAD, *COVID-19 and e-commerce: a global review*, 2021, https://unctad.org/system/files/official-document/dtlstict2020d13_en_0.pdf
[25] See *e.g.* https://www.imf.org/en/Blogs/Articles/2023/03/21/how-pandemic-accelerated-digital-transformation-in-advanced-economies; https://www.un.org/uk/desa/digital-technologies-critical-facing-covid-19-pandemic
[26] See International Panel on Climate Change, Global Warming of 1.5°C, https://www.ipcc.ch/sr15/; https://unstats.un.org/sdgs/report/2024/The-Sustainable-Development-Goals-Report-2024.pdf, section concerning Goal 13
[27] *GDC*, para. 8(e).
[28] *Pact for the Future*, p. 11.

[29] https://www.un.org/en/content/common-agenda-report/assets/pdf/Common_Agenda_Report_English.pdf
[30] . *Pact for the Future*, p.26.
[31] *GDC.*, paras 1-4.
[32] *Ibid*. para 7.
[33] *Ibid*. para 68.
[34] https://blog.adobe.com/en/publish/2022/11/08/fast-forward-comparing-1980s-supercomputer-to-modern-smartphone#:~:text=These%20days%2C%20our%20mobile%20devices,faster%20than%20the%20CRAY%2D2.
[35] UNCTAD, calculated from https://www.futuretimeline.net/data-trends/pdfs/cisco-2017-2022.pdf and https://www.applogicnetworks.com/hubfs/Sandvine_Redesign_2019/Downloads/2024/GIPR/GIPR%202024.pdf
[36] UNCTAD, *Digital Economy Report*, 2024, p. 32, https://unctad.org/system/files/official-document/der2024_en.pdf
[37] Moore's Law is the observation that the number of transistors in an integrated circuit has been doubling every two years or so for the last six decades, though the long-term continuance of this trend is thought likely to be limited by minituarisation.
[38] https://windowsreport.com/desktop-vs-laptop-market-share/
[39] *Implementing WSIS Outcomes*, 2010, https://digitallibrary.un.org/record/710086?ln=ar&v=pdf
[40] *Implementing WSIS Outcomes,* 2015, https://unctad.org/system/files/official-document/dtlstict2015d3_en.pdf
[41] *Geneva Plan of Action*, para. 9d.
[42] https://en.wikipedia.org/wiki/List_of_countries_by_Internet_connection_speeds (accessed 4 March 2025)
[43] https://www.broadbandcommission.org/advocacy-targets/1-policy/
[44] https://www.itu.int/en/ITU-D/Statistics/Documents/facts/ITU_regional_global_Key_ICT_indicator_aggregates_Nov_2024.xlsx
[45] *Implementing WSIS Outcomes: a ten-year review*, p. 73.
[46] ITU *Facts and Figures 2024*, https://www.itu.int/itu-d/reports/statistics/2024/11/10/ff24-mobile-network-coverage/.
[47] ITU *Facts and Figures 2024*, https://www.itu.int/itu-d/reports/statistics/2024/11/10/ff24-mobile-network-coverage/
[48] https://www.itu.int/en/mediacentre/Pages/PR-2024-11-29-advisory-body-submarine-cable-resilience.aspx#:~:text=The%20International%20Telecommunication%20Union%20(ITU)%20is%20the%20United%20Nations%20specialized,committed%20to%20connecting%20the%20world.
[49] https://www.statista.com/statistics/1421135/number-of-submarine-cable-systems-worldwide/
[50] https://blog.telegeography.com/how-many-submarine-cables-are-there-anyway#:~:text=TeleGeography's%20Submarine%20Cable%20Map%20recently,we%20study%20is%20constantly%20increasing (accessed 10 March 2025); https://www2.telegeography.com/submarine-cable-faqs-frequently-asked-questions#:~:text=How%20many%20kilometers%20of%20cable,kilometer%20Asia%20America%20Gateway%20cable (accessed 10 March 2025)
[51] https://www.itu.int/dms_pub/itu-t/opb/tut/T-TUT-HOME-2022-1-PDF-E.pdf, [. 4
[52] https://techcentral.co.za/growth-africa-subsea-bandwidth/237718/
[53] UNCTAD, *Digital Economy Report Pacific Edition 2022*, p. 16
[54] https://en.wikipedia.org/wiki/Starlink#cite_note-sn2674441-8 (accessed 4 March 2025)
[55] See *e.g.* https://esajournals.onlinelibrary.wiley.com/doi/10.1002/fee.2624
[56] See *e.g.* https://carnegieendowment.org/research/2025/02/digital-public-infrastructure-a-practical-approach-for-africa?lang=en
[57] https://www.srgresearch.com/articles/hyperscale-data-centers-hit-the-thousand-mark-total-capacity-is-doubling-every-four-years
[58] *ITU Internet Report 2005: the internet of things*, https://itu.tind.io/record/6354?ln=en

[59] https://buildops.com/resources/iot-connected-devices-worldwide/; https://iot-analytics.com/wp/wp-content/uploads/2024/09/INSIGHTS-RELEASE-Number-of-connected-IoT-devices-vf.pdf
[60] https://www.ericsson. com/en/reports-and-papers/mobility-report/mobility-visualizer, November 2023
[61] ITU and Cisco, *Harnessing the Internet of Things for Global Development*, 2016, https://www.itu.int/en/action/broadband/documents/harnessing-iot-global-development.pdf
[62] https://statzon.com/insights/global-robotics-market-growing-rapidly
[63] https://www.fortunebusinessinsights.com/industry-reports/3d-printing-market-101902
[64] See *e.g.* https://www.ibm.com/think/topics/what-is-a-digital-twin#:~:text=A%20digital%20twin%20is%20a,reasoning%20to%20help%20make%20decisions.
[65] For an assessment of this market, see https://www.forbes.com/sites/technology/article/self-driving-cars/
[66] See *e.g.* https://www.pwc.com/gx/en/sustainability/assets/creating-the-smart-cities-of-the-future.pdf
[67] See *e.g* https://sustainabilitymag.com/top10/top-10-smart-cities; https://u4ssc.itu.int/; https://www.worldbank.org/en/programs/global-smart-city-partnership-program/partners
[68] See *e.g.* https://pvcase.com/blog/are-smart-cities-feasible/#:~:text=A%20major%20concern%20for%20smart,to%20protect%20citizens'%20sensitive%20data; https://foreignpolicy.com/2021/04/17/smart-cities-surveillance-privacy-digital-threats-internet-of-things-5g/
[69] United 4 Smart Sustainable Cities, *Guiding Principles for Artificial Intelligence in Cities*, 2024, https://www.itu.int/en/publications/Documents/tsb/2024-U4SSC-Guiding-principles-artificial-intelligence-in-cities/index.html#p=14
[70] Para. 30.
[71] https://www.ietf.org
[72] https://www.w3.org
[73] https://en.wikipedia.org/wiki/IPv6; https://avsystem.com/blog/csp/ipv6-adoption-allocation-policy-part1#:~:text=According%20to%20the%20IPv6%20adoption,almost%2045%25%20at%20its%20peak.
[74] https://www.icann.org/iana-transition-fact-sheet
[75] https://www.internetsociety.org/resources/doc/2020/explainer-what-is-an-internet-exchange-point-ixp/
[76] Para. 50.
[77] https://www.icann.org/resources/pages/dnssec-what-is-it-why-important-2019-03-05-en ; https://en.wikipedia.org/wiki/Transport_Layer_Security; https://timelines.issarice.com/wiki/Timeline_of_HTTPS_adoption
[78] https://gs.statcounter.com/search-engine-market-share (accessed 4 March 2025).
[79] https://www.demandsage.com/google-search-statistics/#:~:text=8.5%20billion%20Google%20searches%20are%20made%20per%20day.,least%20three%20searches%20each%20day; https://blog.google/products/search/generative-ai-google-search-may-2024/
[80] https://en.wikipedia.org/wiki/Dark_web
[81] See Sandvine, *Global Internet Phenomena Report*, September 2023, pp 6ff, https://www.sandvine.com/hubfs/Sandvine_Redesign_2019/Downloads/2023/reports/Sandvine%20GIPR%202023.pdf
[82] https://datareportal.com/reports/digital-2025-sub-section-state-of-social
[83] YouTube, Instagram, WhatsApp, TikTok, WeChat, Facebook Messenger, Telegram, Snapchat: data from https://www.statista.com/statistics/272014/global-social-networks-ranked-by-number-of-users/
[84] https://www.statista.com/forecasts/270728/market-volume-of-online-gaming-worldwide
[85] https://www.mordorintelligence.com/industry-reports/online-gambling-market
[86] https://www.globenewswire.com/news-release/2024/12/16/2997285/28124/en/Online-Adult-Entertainment-Market-to-Exceed-118-1-Billion-in-Revenues-by-2030-Global-and-Country-Level-Analysis-by-Content-Monetization-Model-Interaction-Age-Group-and-End-User.html
[87] https://hdsr.mitpress.mit.edu/pub/i4eb4e8b/release/3#:~:text=Online%20dating%20has%20become%20the,et%20al.%2C%202020).
[88] https://unctad.org/system/files/official-document/dtlstict2021d2_en.pdf, p. 23

[89] https://www.oecd.org/content/dam/oecd/en/publications/reports/2011/07/oecd-guide-to-measuring-the-information-society-2011_g1g139a7/9789264113541-en.pdf, p. 13
[90] https://unctad.org/system/files/official-document/der2019_en.pdf, pp. 4-5. The original paper by Bukht and Heeks from which it is derived can be found at https://papers.ssrn.com/sol3/Delivery.cfm/SSRN_ID3431732_code1944854.pdf?abstractid=3431732&mirid=1
[91] See *e.g.* UNCTAD, *Digital Economy Report*, 2019.
[92]
United Nations, 2015, *Transforming Our World: the 2030 Agenda for Sustainable Development*, https://sdgs.un.org/sites/default/files/publications/21252030%20Agenda%20for%20Sustainable%20Development%20web.pdf
[93] Para. 15 and Goal 9.c
[94] See *e.g.* Maxwell Chanarika, 'The Impact of the Financial Crisis on the Telecommunications Industry in Africa,' https://www.diis.dk/files/media/publications/import/chanakira.maxwell.pdf.
[95] See *e.g.*United Nations, *The Sustainable Development Goals Report 2024*, p. 3, https://unstats.un.org/sdgs/report/2024/The-Sustainable-Development-Goals-Report-2024.pdf
[96] https://blogs.worldbank.org/en/opendata/september-2024-global-poverty-update-from-the-world-bank--revise
[97] https://worldpopulationreview.com/country-rankings/gini-coefficient-by-country
[98] *Declaration,* Guiding Principles, para.3
[99] See *e.g.* Tim Kelly & David Souter for the World Bank, *The Role of Information and Communication Technologies in Postconflict Reconstruction*, 2014, https://documents1.worldbank.org/curated/en/272631468335979445/pdf/The-role-of-information-and-communication-technologies-in-postconflict-reconstruction.pdf
[100] UNEP, *Broken Record: Emissions Gap Report*, 2023, p. XXII., https://wedocs.unep.org/bitstream/handle/20.500.11822/43922/EGR2023.pdf?sequence=3&isAllowed=y
[101] https://www.un.org/en/content/common-agenda-report/#download
[102] https://www.un.org/sites/un2.un.org/files/sotf-pact_for_the_future_adopted.pdf
[103] Para. 6.
[104] See ITU, *Monitoring the WSIS Targets: a mid-term review*, 2010, https://www.itu.int/dms_pub/itu-d/opb/ind/D-IND-WTDR-2010-SUM-PDF-E.pdf
[105] https://www.itu.int/en/itu-D/Statistics/Documents/publications/wsisreview2014/WSIS2014_review.pdf
[106] https://www.itu.int/en/mediacentre/backgrounders/Pages/connect-2030-agenda.aspx
[107] https://unctad.org/topic/commission-on-science-and-technology-for-development/wsis-20-year-review; https://www.itu.int/net4/wsis/forum/2025/Home/About#actionLines
[108] Its report, *The Missing Link*, can be found at https://search.itu.int/history/HistoryDigitalCollectionDocLibrary/12.5.70.en.100.pdf. Teledensity tables for that time can be found on p. 103.
[109] Data in this section are primarily derived from ITU, https://www.itu.int/en/ITU-D/Statistics/Documents/facts/ITU_regional_global_Key_ICT_indicator_aggregates_Nov_2024.xlsx (accessed 5 March 2025)
[110] *ibid*.
[111] See country data in ITU, *Measuring Digital Development: the ICT Development Index 2024,* Annex 2, https://www.itu.int/dms_pub/itu-d/opb/ind/d-ind-ict_mdd-2024-3-pdf-e.pdf
[112] Data in this section are primarily derived from ITU, https://www.itu.int/en/ITU-D/Statistics/Documents/facts/ITU_regional_global_Key_ICT_indicator_aggregates_Nov_2024.xlsx (accessed 5 March 2025)
[113] https://www.statista.com/chart/12578/global-pc-shipments/#:~:text=With%20more%20than%20340%20million,uncertainties%20not%20helping%20the%20situation; https://www.statista.com/statistics/273495/global-shipments-of-personal-computers-since-2006/

[114] Data in this section are primarily derived from ITU, https://www.itu.int/en/ITU-D/Statistics/Documents/facts/ITU_regional_global_Key_ICT_indicator_aggregates_Nov_2024.xlsx (accessed 5 March 2025). ITU changed the metric from once per year to once every three months in 2014: https://www.itu.int/dms_pub/itu-d/opb/ind/D-IND-ITCMEAS-2014-PDF-E.pdf
[115] See country data in ITU, *Measuring Digital Development: the ICT Development Index 2024,* Annex 2, https://www.itu.int/dms_pub/itu-d/opb/ind/d-ind-ict_mdd-2024-3-pdf-e.pdf
[116] Data derived from ITU, https://www.itu.int/en/ITU-D/Statistics/Documents/facts/ITU_regional_global_Key_ICT_indicator_aggregates_Nov_2024.xlsx (accessed 5 March 2025)
[117] Data in this paragraph are derived from ITU, https://www.itu.int/en/ITU-D/Statistics/Documents/facts/ITU_regional_global_Key_ICT_indicator_aggregates_Nov_2024.xlsx (accessed 5 March 2025)
[118] https://www.gsma.com/r/wp-content/uploads/2024/05/The-Mobile-Gender-Gap-Report-2024.pdf?utm_source=website&utm_medium=button&utm_campaign=gender-gap-2024
[119] See *e.g.* the surveys conducted by the UK regulator Ofcom: https://www.ofcom.org.uk/about-ofcom/our-research/about-ofcoms-research/; https://www.ofcom.org.uk/research-statistics-and-data/cmr/
[120] https://afteraccess.net/
[121] Data derived from ITU, https://www.itu.int/en/ITU-D/Statistics/Documents/facts/ITU_regional_global_Key_ICT_indicator_aggregates_Nov_2024.xlsx (accessed 5 March 2025)
[122] https://www.ageuk.org.uk/siteassets/documents/reports-and-publications/reports-and-briefings/active-communities/internet-use-statistics-june-2024.pdf
[123] https://social.desa.un.org/issues/disability/crpd/article-9-accessibility, Article 9.
[124] https://www.gsma.com/mobilefordevelopment/wp-content/uploads/2021/11/Mobile-Disability-Gap-Report-2021.pdf
[125] See, e.g.,the World Wide Web Consortium's Web Content Accessibility Guidelines, https://www.w3.org/WAI/standards-guidelines/wcag/
[126] See *e.g.* World
[127] *World Development Report*, *2026: Digital Dividends*, Chapter 2, https://www.worldbank.org/en/publication/wdr2016
[128] Research ICT Africa, *After Access*, 2018, https://researchictafrica.net/wp-content/uploads/2019/05/a-demand-side-view-of-mobile-internet-from-10-african-countries.pdf
[129] *Pact for the Future*, p. 20.
[130] For an analysis of the relationship between these inequalities, see Ellen Helsper, *The Digital Disconnect*, 2021.
[131] CSTD, *Implementing WSIS Outcomes*, 2015, p. 54.
[132] https://www.broadbandcommission.org/advocacy-targets/
[133] ITU *Facts and Figures 2024*, https://www.itu.int/itu-d/reports/statistics/2024/11/10/ff24-affordability-of-ict-services/
[134] https://www.gsma.com/solutions-and-impact/connectivity-for-good/mobile-for-development/wp-content/uploads/2024/10/Policy-Brief-Improving-handset-affordability-in-LMICs.pdf
[135] See *e.g.* GSMA, *The State of Mobile Internet Connectivity Report 2024*, https://www.gsma.com/r/wp-content/uploads/2024/10/The-State-of-Mobile-Internet-Connectivity-Report-2024.pdf?utm_source=website&utm_medium=button&utm_campaign=somic24
[136] See Helsper, *op. cit.*
[137] https://www.ohchr.org/en/instruments-mechanisms/instruments/international-covenant-civil-and-political-rights
[138] *Geneva Declaration*, paras 24-28
[139] https://www.unesco.org/en/open-educational-resources
[140] https://en.wikipedia.org/wiki/Creative_Commons_license
[141] Contribution to WSIS+20 review.

[142] https://unesdoc.unesco.org/ark:/48223/pf0000383160#:~:text=Such%20outreach%20is%20important%20as,progress'%20in%20adopting%20such%20guarantees.
[143] See its *Internet Manifesto*, 2024, https://repository.ifla.org/items/69397ea2-f4f3-49bc-a5ef-342260f7a54c
[144] *Geneva Declaration*, paras 19-23.
[145] https://en.wikipedia.org/wiki/United_Nations_Information_and_Communication_Technologies_Task_Force
[146] See *e.g.* World Bank, *Options to Increase Access to Telecommunications Services in Rural and Low-Income Areas*, 2009, https://documents1.worldbank.org/curated/fr/277671468330886996/pdf/518390PUB0REPL101Official0Use0Only1.pdf
[147] https://www.itu.int/en/ITU-D/Statistics/Documents/facts/ITU_regional_global_Key_ICT_indicator_aggregates_Nov_2024.xlsx
[148] https://digitallibrary.un.org/record/542687/files/off7.pdf?ln=en
[149] https://ieg.worldbankgroup.org/sites/default/files/Data/reports/chapters/chap3.pdf, p. 21.
[150] *ibid*.
[151] *Capturing Technology for Development*, 2011, https://ieg.worldbankgroup.org/sites/default/files/Data/Evaluation/files/ict_evaluation.pdf.pdf
[152] *ICT for Greater Development Impact*, 2012, http://documents1.worldbank.org/curated/en/105121468149370524/pdf/732360BR0SecM200disclosed0100150120.pdf
[153] https://www.worldbank.org/en/topic/digital/overview#2
[154] See *e.g.* https://www.afdb.org/en/topics-and-sectors/sectors/information-communication-technology/ict-initiatives#:~:text=A%20total%20of%20US%24%2055,the%20coordination%20of%20this%20initiative.
[155] https://www.adb.org/what-we-do/topics/digital-technology/overview
[156] https://conferenciaelac.cepal.org/9/en/news/elac-begins-new-stage-centered-concrete-actions-and-projects-approval-digital-agenda-latin
[157] https://www.unescwa.org/publications/arab-digital-agenda-2023-2033
[158] https://www.unescap.org/sites/default/d8files/event-documents/APIS%20Progress%20report%2020240909.pdf
[159] The role of community networks in Brazil is discussed in https://www.gov.br/anatel/pt-br/regulado/universalizacao/redes-comunitarias
[160] The Internet Society and the Association for Progressive Communications (APC) have advocated and supported community networks with support from development partners.
[161] https://www.fortunebusinessinsights.com/data-center-market-109851
[162] https://www.itu.int/net4/wsis/forum/2025/Files/actionlines/WSISActionLineC2-ITU.pdf
[163] *Digital Economy Report 2021*, p. 41, https://unctad.org/system/files/official-document/der2021_en.pdf
[164] Para. 39.
[165] Para. 13.
[166] https://news.un.org/en/story/2010/05/338192-most-countries-now-have-national-information-technology-strategies-un
[167] https://digitalregulation.org/national-digital-transformation-strategy-mapping-the-digital-journey/
[168] https://www.itu.int/net4/wsis/forum/2025/Files/actionlines/WSISActionLineC6-ITU.pdf
[169] Para. 39.
[170] Para. 13.
[171] https://en.wikipedia.org/wiki/Precautionary_principle
[172] See *e.g.* https://www.graphcore.ai/posts/ai-safety-summit-first-do-no-harm
[173] See *e.g.* https://www.sciencedirect.com/science/article/abs/pii/S0160791X2030751X
[174] Paras 50-51.
[175] https://en.wikipedia.org/wiki/Universal_Service_Fund
[176] https://www.itu.int/en/ITU-D/Conferences/GSR/Pages/GSR.aspx

[177] See https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4426146#:~:text=Graham%20Greenleaf,-Macquarie%20University%20%2D%20Macquarie&text=The%20Tables%20which%20document%20thes e,influence%20of%20the%20EU's%20GDPR.
[178] https://unctad.org/page/data-protection-and-privacy-legislation-worldwide; https://unctad.org/page/e-transactions-legislation-worldwide
[179] *The Promise of Tradetech*, 2022, p. 30, https://www.wto.org/english/res_e/booksp_e/tradtechpolicyharddigit0422_e.pdf
[180] https://www.itu.int/en/ITU-D/Conferences/GSR/Pages/GSR.aspx ; https://www.itu.int/net4/wsis/forum/2025/Files/actionlines/WSISActionLineC6-ITU.pdf
[181] *Geneva Declaration*, paras. 29-34; *Geneva Plan of Action*, para. 11.
[182] https://cset.georgetown.edu/article/the-global-distribution-of-stem-graduates-which-countries-lead-the-way/
[183] https://www.unesco.org/en/gender-equality/education/stem#:~:text=They%20are%20particularly%20under%2Drepresented,and%20conseq uently%2C%20in%20STEM%20careers.
[184] See *e.g.* UNCTAD, *The Impact of Rapid Technological Change on Sustainable Development*, https://unctad.org/system/files/official-document/dtlstict2019d10_en.pdf; https://www.unesco.org/gem-report/en/articles/unesco-issues-urgent-call-appropriate-use-technology-education; https://www.unesco.org/gem-report/en/technology
[185] https://www.unesco.org/en/artificial-intelligence/rule-law/mooc-judges#; https://www.unesco.org/en/digital-competency-framework
[186] Para. 35.
[187] Para. 12.
[188] https://www.icann.org/resources/pages/dnssec-what-is-it-why-important-2019-03-05-en
[189] https://www.internetsociety.org/deploy360/dnssec/basics/?gad_source=1&gclid=Cj0KCQiA-5a9BhCBARIsACwMkJ4AF7VPLtim-hAvX4YjhGOQIEwO93K-pZXTJ6Q0au88BjroE63GLKEaAiqZEALw_wcB
[190] https://www.statista.com/statistics/420391/spam-email-traffic-share/
[191] https://go.crowdstrike.com/rs/281-OBQ-266/images/GlobalThreatReport2024.pdf, Foreword.
[192] https://front.un-arm.org/wp-content/uploads/2021/03/Final-report-A-AC.290-2021-CRP.2.pdf
[193] https://www.itu.int/net4/wsis/forum/2025/Files/actionlines/WSISActionLineC5-ITU.pdf
[194] https://front.un-arm.org/wp-content/uploads/2021/03/Final-report-A-AC.290-2021-CRP.2.pdf, para. 18.
[195] https://www.cloudflare.com/en-gb/learning/ddos/what-is-a-ddos-attack/
[196] See *e.g.* https://www.ids.ac.uk/news/african-elections-under-rising-threat-from-online-disinformation/
[197] https://cybermagazine.com/cyber-security/how-are-ddos-attacks-impacting-businesses-and-services; https://ico.org.uk/about-the-ico/research-reports-impact-and-evaluation/research-and-reports/learning-from-the-mistakes-of-others-a-retrospective-review/denial-of-service/
[198] https://www.itu.int/net4/wsis/forum/2025/Files/actionlines/WSISActionLineC5-ITU.pdf
[199] https://www.gov.uk/government/statistics/cyber-security-breaches-survey-2024/cyber-security-breaches-survey-2024
[200] https://www.bluevoyant.com/press-releases/philippines-organisations-negatively-impacted-by-cyber-security-breaches
[201] https://www.thomsonreuters.com/en-us/posts/government/identity-theft-drivers/
[202] https://www.nationalcrimeagency.gov.uk/what-we-do/crime-threats/fraud-and-economic-crime
[203] https://www.thebusinessresearchcompany.com/report/antivirus-software-global-market-report#:~:text=Antivirus%20Software%20Market%20Size%202024,risks%2C%20government%20and%20regulatory%20compliance.
[204] https://www.first.org/members/map (accessed 5 March 2025)
[205] https://www.coe.int/en/web/cybercrime/the-budapest-convention
[206] https://au.int/sites/default/files/treaties/29560-treaty-0048_-_african_union_convention_on_cyber_security_and_personal_data_protection_e.pdf
[207] https://www.unodc.org/unodc/en/cybercrime/convention/home.html#:~:text=United%20Nations%20Co

nvention%20against%20Cybercrime;%20Strengthening%20International%20Cooperation%20for%20Combating,Full%20text%20of%20the%20Convention
[208] See *e.g.* https://childhelplineinternational.org/wp-content/uploads/2023/11/2023-OCSEA-Report.pdf; https://violenceagainstchildren.un.org/sites/violenceagainstchildren.un.org/files/documents/publications/a_safer_digital_environment_for_children.pdf.
[209] Para. 16.
[210] https://www.oecd.org/en/about/news/press-releases/2024/05/growth-of-digital-economy-outperforms-overall-growth-across-oecd.html
[211] *Digital Progress and Trends Report* 2023. pp. 25-26, https://bit.ly/Digital_Progress_and_Trends_Report_2023
[212] See Russell Southwood, *Africa 2.0: Inside a continent's communications revolution*, 2022.
[213] https://www.statista.com/statistics/263437/global-smartphone-sales-to-end-users-since-2007/; UNCTAD, *Digital Economy Report.* p. 35.
[214] https://www.youtube.com/watch?v=Z93yWXb9Tb0; https://companiesmarketcap.com/#google_vignette
[215] UNCTAD, *op. cit.*,, pp. xv-xvi.
[216] https://etradeforall.org/ ; https://unctad.org/publication/fast-tracking-etrade-readiness-assessment-implementation-snapshot-unctads-support
[217] UNCTAD, *Trade in ICT goods statistics*, https://unctad.org/system/files/official-document/tn_unctad_ict4d20_en.pdf
[218] *Ibid.*; https://unctadstat.unctad.org/datacentre/dataviewer/US.IctGoodsValue
[219] UNCTAD, *op. cit.*
[220] https://www.wto.org/english/tratop_e/inftec_e/inftec_e.htm; https://unctad.org/system/files/non-official-document/wgecde2024_p01_unctad.pdf
[221] https://unstats.un.org/bigdata/events/2024/measuring-digital-economy/presentations/day2/3.%20Measuring_digitally_delivered_trade_revised.pdf; https://www.oecd.org/en/topics/sub-issues/measuring-digital-trade.html;
[222] https://unctad.org/news/developing-economies-surpass-1-trillion-mark-digitally-deliverable-services-exports; https://unctad.org/system/files/non-official-document/wgecde2024_p01_unctad.pdf
[223] Discussion of potential impacts in Africa can be found in World Bank and African Development Bank, 2012, https://documents.worldbank.org/curated/en/262421468007776410/pdf/882310WP0Box380dIntegration0summary.pdf
[224] https://asycuda.org/en/
[225] https://unece.org/trade/uncefact/introduction
[226] https://goingdigital.oecd.org/en/indicator/72
[227] UNCTAD, *COVID-19 and E-Commerce*, 2021, p.19, https://unctad.org/system/files/official-document/dtlstict2020d13_en_0.pdf; https://www.emarketer.com/content/worldwide-retail-ecommerce-forecast-2024
[228] https://www.business.com/articles/10-of-the-largest-ecommerce-markets-in-the-world-b/
[229] https://www.statista.com/chart/32159/revenues-in-the-e-commerce-segment-by-country/; https://unctad.org/system/files/official-document/dtlecde2024d3_en.pdf
[230] See *e.g.* https://journals.sagepub.com/doi/10.1177/17499755211019974
[231] UNCTAD, *COVID-19 and E*-Commerce, p. 31.
[232] See *e.g.* https://www.sciencedirect.com/science/article/pii/S1757780223005012
[233] https://en.wikipedia.org/wiki/M-Pesa
[234] GSMA, *The State of the Industry Report on Mobile Money, 2024*, https://www.gsma.com/sotir/wp-content/uploads/2024/03/GSMA-SOTIR-2024_Report.pdf, pp. 7-11
[235] https://www.esma.europa.eu/esmas-activities/digital-finance-and-innovation/markets-crypto-assets-regulation-mica
[236] For a summary, see https://en.wikipedia.org/wiki/Cryptocurrency#Impacts_and_analysis.
[237] Regulatory issues are discussed in World Bank and International Monetary Fund, *Fintech: the Experience So Far*, 2019, https://documents1.worldbank.org/curated/en/130201561082549144/pdf/Fintech-The-Experience-so-

Far-Executive-Summary.pdf, and World Bank, *Fintech and the Future of Finance*, https://thedocs.worldbank.org/en/doc/11ea23266a1f65d9a08cbe0e9b072c89-0430012022/related/FoF-Full-Report.zip

[238] Para. 8(f)

[239] Paras 19-21.

[240] https://researchictafrica.net/2024/02/02/back-to-basics-the-state-of-digital-technology-use-for-african-microenterprises/; https://researchictafrica.net/ria-small-and-micro-business-report-2019/

[241] https://unctad.org/topic/ecommerce-and-digital-economy/etrade-for-all; https://unctad.org/topic/ecommerce-and-digital-economy/etrade-for-women

[242] https://publicadministration.un.org/wsis10/Portals/5/N1543842_1.pdf, para. 12

[243] https://thedocs.worldbank.org/en/doc/b16e2ba1cb754ab47a2dd1b214dd374e-0400062023/original/DigitalDevelopmentBrochure.pdf

[244] UNDP, *Digital Strategy 2022*-2025, https://digitalstrategy.undp.org/documents/Digital-Strategy-2022-2025-Full-Document_ENG_Interactive.pdf

[245] https://www.itu.int/net4/wsis/sdg/

[246] Para. 15.

[247] GDC paras 14-17.

[248] *E-Government Survey 2024*, p. 27,

[249] *ibid.*, p. 37.

[250] *Benchmarking E-government: a global perspective*, 2002, https://desapublications.un.org/file/790/download

[251] https://e-estonia.com/story/

[252] https://www.mois.go.kr/eng/sub/a03/digitalGovInnovation/screen.do

[253] *E-Government Survey 2024*, pp. 93-94

[254] *ibid.*, p. 138

[255] https://thedocs.worldbank.org/en/doc/413731434485267151-0190022015/render/BriefonDigitalIdentity.pdf

[256] https://au.int/sites/default/files/documents/43393-doc-AU_Interoperability_framework_for_D_ID_English.pdf

[257] https://id4d.worldbank.org/guide/types-id-systems#:~:text=Because%20the%20purpose%20of%20foundational,e.g.%2C%20people%20eligible%20to%20vote%2C

[258] https://e-estonia.com/solutions/estonian-e-identity/id-card/

[259] https://en.wikipedia.org/wiki/Aadhaar

[260] See *e.g.* https://www.adalovelaceinstitute.org/event/ethical-uses-of-data-driven-technology-fight-against-covid-19/

[261] https://u4ssc.itu.int/#:~:text=The%20United%20for%20Smart%20Sustainable,Women%2C%20UNWTO%2C%20and%20WMO

[262] See *e.g.* https://www.opengovpartnership.org/stories/navigating-the-risks-and-rewards-of-digital-id-systems/

[263] https://www.etcluster.org/

[264] *E-Government Survey 2024*, Chapter 1.

[265] Para. 29.

[266] An assessment by the World Bank and African Development Bank of opportunities and limitations in Africa seven years after WSIS illustrated debates around this that were current at that time: https://blogs.worldbank.org/en/education/eTransformAfrica

[267] Para. 6.

[268] https://www.itu.int/hub/2024/07/giga-connecting-schools-to-the-internet/#:~:text=Giga%2C%20an%20initiative%20launched%20by,a%20part%20in%20the%20process

[269] https://www.un.org/sites/un2.un.org/files/2022/09/sg_vision_statement_on_transforming_education.pdf, p. 5

[270] https://www.worldbank.org/en/topic/edutech#:~:text=Digital%20Technologies%20in%20Education,the%20learning%20process%20more%20broadly
[271] https://www.worldbank.org/en/topic/edutech#2
[272] https://www.unesco.org/en/digital-competencies-skills/ict-cft; https://www.unesco.org/en/articles/ai-competency-framework-teachers
[273] https://en.wikipedia.org/wiki/Mobile_phone_use_in_schools
[274] See *e.g.* https://unesdoc.unesco.org/ark:/48223/pf0000376709
[275] *Geneva Plan of Action*, para. 18.
[276] https://iris.who.int/bitstream/handle/10665/20378/WHA58_28-en.pdf?sequence=1&isAllowed=y
[277] https://apps.who.int/gb/ebwha/pdf_files/WHA66/A66_R24-en.pdf WHO, *Global Strategy on Digital Health, 2020*-2025, https://www.who.int/docs/default-source/documents/gs4dhdaa2a9f352b0445bafbc79ca799dce4d.pdf
[278] See *e.g.* https://www.sciencedirect.com/science/article/pii/S2214782920301160; https://journals.sagepub.com/doi/full/10.1177/09732586231172045
[279] See *e.g.* WHO, *Tackling COVID-19 Misinformation*, https://www.who.int/docs/default-source/coronaviruse/vaccine-misinformation-toolkit_desktop1.pdf
[280] See *e.g.* https://bmcmededuc.biomedcentral.com/articles/10.1186/s12909-023-04698-z
[281] See *e.g.* WHO. (2020c, June 4). Digital tools for COVID-19 contact tracing. WHO (report). Retrieved February 22, 2023, from: https://www.who.int/publications/i/item/WHO-2019-nCoV-Contact_Tracing-Tools_Annex-2020.
[282] ITU. (2020). *Pandemic in the Internet Age: communications industry responses*. ITU (report). Retrieved September 11, 2023, from: https://reg4covid.itu.int/wp-content/uploads/2020/06/ITU_COVID-19_and_Telecom-ICT.pdf
[283] WHO, *Global Strategy.* p. 4;
[284] https://www.who.int/observatories/global-observatory-for-ehealth
[285] *Ibid.*; WHO and ITU, *National e-Health Strategy Toolkit*, https://iris.who.int/bitstream/handle/10665/75211/9789241548465_eng.pdf?sequence=1
[286] *Ibid.*, p. 27
[287] https://cdn.who.int/media/docs/default-source/digital-health-documents/who_brochure_gidh_web.pdf?sfvrsn=479ad67b_3&download=true. Further details of WHO's work in this area can be found in its contribution to the consultation for this review.
[288] Para. 19.
[289] https://www.mckinsey.com/featured-insights/sustainable-inclusive-growth/charts/a-massive-global-workforce
[290] On current employment developments, see ILO, *World Employment and Social Outlook Trends 2025*, https://www.ilo.org/sites/default/files/2025-01/WESO25_Trends_EN_WEB5.pdf
[291] On the informal sector, see https://ilostat.ilo.org/topics/informality/#elementor-toc__heading-anchor-1
[292] See *e.g.* Deloitte, *Digital Workplace and Culture*, https://www.ilo.org/sites/default/files/2024-06/Cook%20and%20Rani%20SCIS%20WP%202023.pdf
[293] See *e.g.* https://www.imf.org/en/Blogs/Articles/2023/03/21/how-pandemic-accelerated-digital-transformation-in-advanced-economies
[294] See ILO, *Platform Work in Developing Economies*, https://www.ilo.org/sites/default/files/2024-06/Cook%20and%20Rani%20SCIS%20WP%202023.pdf
[295] World Bank, *Working Without Borders: the Promise and Peril of Online Gig Work*, 2023, https://openknowledge.worldbank.org/bitstreams/81a1bf93-26b7-41e9-903f-4542687ad5db/download
[296] See *e.g.* Mark Graham *et al.*, *The Risks and Rewards of Online Gig Work at the Global Margins*, Oxford Internet Institute, https://www.oii.ox.ac.uk/wp-content/uploads/2017/06/gigwork.pdf
[297] *World Employment and Social Outlook: The role of digital labour platforms in transforming the world of* work, https://www.ilo.org/sites/default/files/wcmsp5/groups/public/%40dgreports/%40dcomm/%40publ/documents/publication/wcms_771749.pdf;

https://www.ilo.org/sites/default/files/wcmsp5/groups/public/%40dgreports/%40ddg_p/documents/presentation/wcms_819793.pdf
[298] https://bit.ly/Digital_Progress_and_Trends_Report_2023, p.28.
[299] https://www.iotforall.com/impact-of-artificial-intelligence-job-losses
[300] https://www.itu.int/net4/wsis/forum/2025/Files/actionlines/WSISActionLineC7_E-employment-ILO.pdf
[301] https://www.ilo.org/publications/platform-work-developing-economies-can-digitalisation-drive-structural
[302] See *e.g.* Daniel Susskind, *The Future of the Professions*, 2015.
[303] *Generative AI and Jobs*, https://www.ilo.org/sites/default/files/2024-07/WP96_web.pdf; https://www.ilo.org/resource/news/generative-ai-likely-augment-rather-destroy-jobs
[304] https://sdgs.un.org/2030agenda
[305] https://unfccc.int/process-and-meetings/the-paris-agreement
[306] Page 18.
[307] Para. 20.
[308] https://www.unep.org/topics/digital-transformations/digitalization-sustainability
[309] Para 11(e)
[310] https://www.itu.int/net4/wsis/forum/2025/Files/actionlines/WSISActionLineC7_E-environment-UNEP.pdf
[311] https://community.wmo.int/en/climate-data-and-monitoring
[312] See *e.g.* https://www.climateforesight.eu/interview/artificial-intelligence-climate-science/
[313] UNCTAD, *Digital Economy Report 2024*, p. 16.
[314] See *e.g.* https://www.unep.org/news-and-stories/story/ai-has-environmental-problem-heres-what-world-can-do-about
[315] ITU and WBA, *Greening Digital Companies 2023*, https://www.itu.int/en/ITU-D/Environment/PublishingImages/Pages/Greening-Digital-Companies-2023/Greening%20digital%20companies%202023%20report%20FINAL.pdf, p. 6.
[316] https://unctad.org/publication/digital-economy-report-2024
[317] https://www.itu.int/en/mediacentre/Pages/PR04-2020-ICT-industry-to-reduce-greenhouse-gas-emissions-by-45-percent-by-2030.aspx
[318] *Digital Economy Report 2024*, p. 77.
[319] *ibid.*, p. 93.
[320] https://www.imf.org/en/Blogs/Articles/2024/08/15/carbon-emissions-from-ai-and-crypto-are-surging-and-tax-policy-can-help
[321] https://www.iea.org/reports/the-role-of-critical-minerals-in-clean-energy-transitions/executive-summary
[322] See *e.g.* https://www.weforum.org/stories/2024/08/critical-minerals-are-the-key-to-21st-century-tech-heres-the-trilemma-that-defines-how-to-mine-them/#:~:text=The%20transition%20to%20renewable%20energy,as%20the%20%E2%80%9Cbig%20six%E2%80%9D.
[323] https://www.basel.int/
[324] *Digital Economy Report*, p 108-109. The measure concerned is SCSIT - screens, computers and small IT and telecommunication equipment.
[325] https://unemg.org/our-work/emerging-issues/innter-agency-issue-management-group-on-tackling-e-waste/
[326] UNCTAD, *Digital Economy Report 2024*, Chapter V; https://www.sciencedirect.com/science/article/pii/S2210539523001451#:~:text=Furthermore%2C%20packaging%20is%20largely%20made,%2C%20&%20Yang%2C%202021).
[327] Goal 12.
[328] https://www.unepfi.org/pollution-and-circular-economy/circular-economy/
[329] *Digital Economy Report 2024*, Chapter IV.
[330] See *e.g.* Digitalisation for Sustainability, *Digital Reset*, https://www.oekom.de/ebookdownload/D292DB23C6BCCBF8DA8D11235CBF8DA8D5C90C9E1F094/PDF/T; https://link.springer.com/article/10.1007/s12243-022-00914-x

[331] https://data.europa.eu/en/news-events/news/eus-digital-product-passport-advancing-transparency-and-sustainability
[332] https://www.itu.int/net4/wsis/forum/2025/Files/actionlines/WSISActionLineC7_E-environment-UNEP.pdf
[333] https://www.basel.int/
[334] https://wedocs.unep.org/bitstream/handle/20.500.11822/38482/CODES_ActionPlan.pdf?sequence=3&isAllowed=y
[335] https://www.unep.org/news-and-stories/press-release/global-digital-coalition-presents-plan-green-digital-revolution
[336] *Geneva Plan of Action*, para. 21.
[337] See *e.g.* https://researchonline.lshtm.ac.uk/id/eprint/4673296/1/Choruma-etal-2024-Digitalisation-in-agriculture.pdf
[338] See *e.g.* J. Aker & C. Ksoll, 'Can mobile phones improve agricultural outcomes?', 2015, https://www.unep.org/news-and-stories/press-release/global-digital-coalition-presents-plan-green-digital-revolution; https://www.sciencedirect.com/science/article/pii/S0313592624001188
[339] https://en.wikipedia.org/wiki/Precision_agriculture; https://www.mediresonline.org/article/evaluating-the-use-of-ict-tools-in-precision-agriculture-for-efficient-pesticide-management; https://www.sciencedirect.com/science/article/pii/S2667096824000867
[340] http://www.fao.org/3/a-i5564e.pdf
[341] https://unctad.org/system/files/non-official-document/wsis20_c09_fao_en.pdf
[342] Para. 22
[343] See *e.g.* https://builtin.com/artificial-intelligence/ai-right-explanation
[344] https://unesdoc.unesco.org/ark:/48223/pf0000379949.locale=en ; https://www.turing.ac.uk/research/research-projects/crowdsourced-and-citizen-science
[345] *ibid*.; https://www.itu.int/net4/wsis/forum/2025/Files/actionlines/WSISActionLineC7_E-science-UNESCO.pdf
[346] See *e.g.* https://www.research4life.org/
[347] https://www.digital-science.com/tldr/article/research-on-artificial-intelligence-the-global-divides/
[348] *Geneva Declaration*, paras 1-5. The UDHR can be found at https://www.un.org/en/about-us/universal-declaration-of-human-rights.
[349] *Geneva Plan of Action*, para. 25.
[350] http://daccess-ods.un.org/access.nsf/Get?Open&DS=A/HRC/20/L.13&Lang=E
[351] https://daccess-ods.un.org/access.nsf/Get?OpenAgent&DS=a/hrc/50/55&Lang=E
[352] https://www.ohchr.org/en/instruments-mechanisms/instruments/international-covenant-civil-and-political-rights
[353] https://www.ohchr.org/en/instruments-mechanisms/instruments/international-covenant-economic-social-and-cultural-rights
[354] The Convention on the Elimination of All Forms of Discrimination Against Women, https://www.un.org/womenwatch/daw/cedaw/cedaw.htm
[355] The United Nations Convention on the Rights of the Child, https://www.unicef.org.uk/wp-content/uploads/2016/08/unicef-convention-rights-child-uncrc.pdf
[356] The International Convention on the Elimination of All Forms of Racial Discrimination, https://www.ohchr.org/en/instruments-mechanisms/instruments/international-convention-elimination-all-forms-racial
[357] https://www.echr.coe.int/documents/d/echr/convention_ENG
[358] https://au.int/sites/default/files/treaties/36390-treaty-0011_-_african_charter_on_human_and_peoples_rights_e.pdf
[359] http://daccess-ods.un.org/access.nsf/Get?Open&DS=A/HRC/20/L.13&Lang=E
[360] https://www.un.org/en/about-us/universal-declaration-of-human-rights.
[361] These principles are set out in relation to freedom of expression in OHCHR, General Comment 34, https://www2.ohchr.org/english/bodies/hrc/docs/gc34.pdf
[362] Para. 8(c)
[363] https://www.ohchr.org/documents/publications/guidingprinciplesbusinesshr_en.pdf

[364] https://www.ohchr.org/en/special-procedures/sr-privacy#:~:text=Privacy%20enables%20the%20enjoyment%20of,economic%2C%20social%20and%20cultural%20life
[365] The term originates in Shoshana Zuboff, *The Age of Surveillance Capitalism*, 2018.
[366] https://digitallibrary.un.org/record/764407/files/A_RES_68_167-EN.pdf
[367] https://docs.un.org/en/A/HRC/27/37
[368] https://unctad.org/page/data-protection-and-privacy-legislation-worldwide
[369] https://gdpr-info.eu/, Article 5.
[370] https://www.internetsociety.org/resources/doc/2018/encryption-brief/
[371] See *e.g.* https://www.tandfonline.com/doi/full/10.1080/09615768.2024.2444720#d1e121and https://www.justsecurity.org/94918/software-backdoor-is-a-wakeup-call-for-cybersecurity/
[372] https://www.ohchr.org/en/privacy-in-the-digital-age#:~:text=However%2C%20data%2Dintensive%20technologies%2C,behavior%20to%20an%20unprecedented%20degree
[373] Para. 25
[374] See UNESCO, *Towards Knowledge Societies*, 2005, https://unesdoc.unesco.org/ark:/48223/pf0000141843
[375] https://unesdoc.unesco.org/ark:/48223/pf0000224531
[376] Article 19.
[377] https://digitallibrary.un.org/record/3937534/files/A_HRC_RES_47_16-EN.pdf?ln=en, para. 11-12.
[378] https://www.ohchr.org/en/documents/thematic-reports/ahrc5055-internet-shutdowns-trends-causes-legal-implications-and-impacts; https://www.accessnow.org/internet-shutdowns-2023/
[379] https://docs.un.org/en/A/HRC/50/55, para. 13.
[380] Para. 29.
[381] https://www.itu.int/net4/wsis/forum/2025/Files/actionlines/WSISActionLineC3-UNESCO.pdf
[382] Paras 4, 58
[383] https://www.ohchr.org/en/instruments-mechanisms/instruments/international-convention-elimination-all-forms-racial, Article 4
[384] https://www.unicef.org.uk/what-we-do/un-convention-child-rights/, Article 34.
[385] https://datareportal.com/social-media-users
[386] https://www.socialpilot.co/facebook-marketing/facebook-statistics#:~:text=On%20average%2C%20350%20million%20photos,by%20Facebook%20users%20each%20day (accessed 5 March 2025)
[387] https://www.demandsage.com/wechat-statistics/#:~:text=1)%201.38%20Billion%20People%20Worldwide%20Use%20WeChat&text=Besides%2C%20the%20monthly%20active%20users,growth%20between%202019%20and%202020 (accessed 5 March 2025)
[388] Article 25.
[389] *Geneva Plan of Action*, para. 23.
[390] https://www.digitalsilk.com/digital-trends/how-many-websites-are-there/#:~:text=In%202005%2C%20the%20number%20of,Pinterest%20were%20launched%20that%20year; https://siteefy.com/how-many-websites-are-there/#How-Many-Active-Websites-Are-There (accessed 5 March 2025)
[391] https://www.itu.int/net4/wsis/forum/2025/Files/actionlines/WSISActionLineC8-UNESCO.pdf
[392] UNESCO, *Twelve Years of Measuring Linguistic Diversity in the* Internet, 2009, p. 25, https://web.archive.org/web/20150403145133/http://www.unesco.org/new/en/communication-and-information/resources/publications-and-communication-materials/publications/full-list/twelve-years-of-measuring-linguistic-diversity-in-the-internet-balance-and-perspectives/
[393] https://www.statista.com/statistics/262946/most-common-languages-on-the-internet/ (accessed 6 March 2025)
[394] https://en.wikipedia.org/wiki/List_of_Wikipedias (accessed 6 March 2025).
[395] https://www.icann.org/resources/pages/idn-2012-02-25-en#:~:text=Internationalized%20Domain%20Names%20(%20IDNs%20)%20enable,allowed%20by%20relevant%20IDN%20protocols.

[396] https://en.wikipedia.org/wiki/Google_Translate#:~:text=The%20Google%20Translate%20app%20for,in%20%22augmented%20reality%20mode%22

[397] https://www.itu.int/net4/wsis/forum/2025/Files/actionlines/WSISActionLineC8-UNESCO.pdf

[398] *Geneva Declaration*, para. 55

[399] Para. 35

[400] For a response by journalists, see https://rsf.org/sites/default/files/medias/file/2023/11/Paris%20Charter%20on%20AI%20and%20Journalism.pdf

[401] Calculated from https://en.wikipedia.org/wiki/List_of_newspapers_in_the_United_Kingdom_by_circulation; https://themediaangel.co.uk/the-decline-of-newspaper-circulation/

[402] https://www.ofcom.org.uk/siteassets/resources/documents/research-and-data/tv-radio-and-on-demand-research/tv-research/news/news-consumption-2024/news-consumption-in-the-uk-2024-report.pdf?v=379621

[403] See *e.g.* https://en.wikipedia.org/wiki/Decline_of_newspapers#:~:text=in%20political%20polarization.-,The%20decline%20of%20local%20news%20has%20also%20been%20linked%20to,local%20politics%20via%20national%20politics.

[404] https://www.un.org/en/conferences/women/beijing1995#:~:text=The%20Fourth%20World%20Conference%20on%20Women%20in%20Beijing%2C%20China%20was,legal%20advances%20aimed%20at%20securing

[405] Para. 27

[406] https://www.equalsintech.org/about; https://www.equalsintech.org/history-and-governance

[407] http://www.broadbandcommission.org/Documents/working-groups/bb-doubling-digital-2013.pdf; htpps://broadbandcommission.org/wp-content/uploads/dim_uploads/2021/02/WGDigitalGenderDivide.pdf

[408] Paras. 11, 13.

[409] https://www.gsma.com/r/wp-content/uploads/2024/05/The-Mobile-Gender-Gap-Report-2024.pdf?utm_source=website&utm_medium=button&utm_campaign=gender-gap-2024, p. 5

[410] See *e.g.* https://researchictafrica.net/2022/11/01/assessing-the-gender-dimensions-of-digital-inequality-for-policy-action/; https://researchictafrica.net/research/gender-gap-global-south/

[411] See *e.g.* https://www.undp.org/asia-pacific/stories/women-and-digital-pathways; https://www.unwomen.org/en/digital-library/publications/2020/08/discussion-paper-the-digital-revolution-implications-for-gender-equality-and-womens-rights

[412] https://www.gsma.com/solutions-and-impact/connectivity-for-good/mobile-for-development/blog/unpacking-womens-use-of-mobile-money/

[413] See *e.g.* See *e.g.* UNESCO, *"Your opinion doesn't matter, anyway": Exposing Technology-Facilitated Gender-Based Violence in an Era of Generative AI* , 2023, https://unesdoc.unesco.org/ark:/48223/pf0000387483; https://www.icrw.org/wp-content/uploads/2018/07/ICRW_TFGBVMarketing_Brief_v8-Web.pdf; https://www.europarl.europa.eu/RegData/etudes/STUD/2023/743341/IPOL_STU(2023)743341_EN.pdf

[414] https://www.unesco.org/en/articles/your-opinion-doesnt-matter-anyway

[415] See *e.g.* UNESCO, *op. cit.*

[416] https://docs.un.org/en/CEDAW/C/GC/40, para. 9

[417] See *e.g.* https://www.turing.ac.uk/sites/default/files/2021-03/where-are-the-women_public-policy_full-report.pdf; https://unesdoc.unesco.org/ark:/48223/pf0000389406?posInSet=1&queryId=0d896ebf-236b-4fed-8be5-88bdab134723

[418] https://docs.un.org/en/CEDAW/C/GC/40

[419] https://unctad.org/topic/ecommerce-and-digital-economy/etrade-for-women

[420] https://docs.un.org/en/CEDAW/C/GC/40, para. 9

[421] https://www.ohchr.org/en/instruments-mechanisms/instruments/convention-rights-child; https://docs.un.org/en/A/RES/44/25
[422] Article 25
[423] Preamble and Articles 3 & 4;.
[424] Paras 9,11, 25.
[425] Action Lines C4, C2 and C10.
[426] Para. 23
[427] https://www.unicef.org/northmacedonia/press-releases/more-175000-children-go-online-first-time-every-day-tapping-great-opportunities
[428] CSTD acknowledges the support of Professor Sonia Livingstone and Dr Kim Sylwander of the London School of Economics and the Digital Futures for Children project in organising this discussion.
[429] https://www.ohchr.org/en/documents/general-comments-and-recommendations/general-comment-no-25-2021-childrens-rights-relation
[430] Para. 13
[431] Paras 50,58, 64, 99.
[432] Paras 70, 74
[433] Para. 31-32.
[434] https://www.itu.int/en/ITU-D/Cybersecurity/Pages/COP/COP.aspx; https://www.weprotect.org/; https://en.wikipedia.org/wiki/ECPAT
[435] https://digital-strategy.ec.europa.eu/en/policies/safer-internet-centres
[436] Para. 20.
[437] *Geneva* Declaration, para. 49; *Tunis Agenda*, paras 35-36.
[438] For examples from the Philippines and Kenya, see https://www.internetsociety.org/resources/doc/2019/multi-stakeholder-model-in-ict-policymaking-philippines/ and https://www.apc.org/en/kenya-ict-action-network-kictanet
[439] Para. 3
[440] Para. 65.
[441] https://www.itu.int/hub/membership/our-members/directory/?myitu-industry=true&request=sector-members
[442] https://gac.icann.org/ (accessed 6 March 2025)
[443] https://en.wikipedia.org/wiki/Internet_multistakeholder_governance#cite_note-:0-1
[444] https://intgovforum.org/en/filedepot_download/55/27790
[445] https://wayback.archive-it.org/10611/20170505142323/http://www.unesco.org/new/fileadmin/MULTIMEDIA/HQ/CI/CI/pdf/news/internet_universality_en.pdf; https://www.unesco.org/en/internet-universality-indicators/background; https://unesdoc.unesco.org/ark:/48223/pf0000259867
[446] https://netmundial.br/wp-content/uploads/2014/04/NETmundial-Multistakeholder-Document.pdf ; https://netmundial.br/pdf/NETmundial10-MultistakeholderStatement-2024.pdf
[447] See *e.g.* UK Dpartment for International Development, *Louder Voices: Strengthening developing country participation in international ICT decision-making*, 2002, https://www.comminit.com/dfid/content/louder-voices-strengthening-developing-country-participation-international-ict-decision-
[448] This risk was expressed, for example, in the NetMundial+10 Multistakeholder Statement, section 2.3.
[449] Para. 5.
[450] https://www.itu.int/net4/wsis/forum/2025/Files/actionlines/WSISActionLineC7_E-environment-UNEP.pdf
[451] Para. 103
[452] https://www.itu.int/net4/wsis/ungis/
[453] https://www.itu.int/net4/wsis/ungis/Articles/View/2239
[454] https://unctad.org/topic/commission-on-science-and-technology-for-development/wsis-20-year-review
[455] https://disarmament.unoda.org/open-ended-working-group/
[456] https://www.unodc.org/unodc/en/cybercrime/convention/home.html
[457] GDC, para. 72.

[458] https://www.un.org/techenvoy/content/press-release-new-un-office-digital-and-emerging-technologies
[459] Para. 62.
[460] Paras 86, 101.
[461] https://unctad.org/publications-search?f[0]=product%3A667&__cf_chl_tk=C0yToRHINbaS3nDT_7rxRMMF4uMa5w6OCvjT29k1OaI-1742248564-1.0.1.1-LE8gO7bZmMBYIY_JNQs62zhWghTJF.fgy_IRVwPeVNk
[462] https://unctad.org/system/files/official-document/dtlstict2015d3_en.pdf.
[463] https://www.cepal.org/sites/default/files/pr/files/2401144e_cmsi.9_proposed_digital_agenda_8_nov.pdf
[464] http://www.unescwa.org/sites/default/files/pubs/pdf/arab-digital-agenda-2023-2033-english_0.pdf
[465] https://au.int/sites/default/files/documents/38507-doc-dts-english.pdf
[466] https://www.cepal.org/en/pressreleases/eclac-launched-digital-development-observatory-contribute-latin-america-and-caribbeans
[467] https://www-unescap-org.webpkgcache.com/doc/-/s/www.unescap.org/sites/default/d8files/event-documents/Action%20Plan%20for%20Implementation%20of%20the%20Asia-Pacific%20Information%20Superhighway%20%282022-2026%29.pdf
[468] https://en.wikipedia.org/wiki/UN/CEFACT
[469] https://unece.org/environment-policy/public-participation/aarhus-convention/text
[470] https://comunidades.cepal.org/elac/sites/elac/files/2019-01/CEPAL%20-%20Regional%20Digital%20market%20-%20Strategic%20Aspects%20%282018%29%20-%20S1800569_en.pdf
[471] https://acetforafrica.org/research-and-analysis/insights-ideas/articles/a-balanced-au-eu-partnership-is-the-key-to-a-successful-african-digital-single-market/
[472] https://repository.unescap.org/rest/bitstreams/95991d3a-149c-4dcf-ae2b-9250c5c04614/retrieve
[473] https://unctad.org/system/files/official-document/a79d62_en.pdf
[474] https://unctad.org/topic/commission-on-science-and-technology-for-development/wsis-20-year-review
[475] Those for 2024, for instance, can be found at https://unctad.org/publication/2024-report-secretary-general-progress-made-implementation-and-follow-outcomes-world
[476] https://digitallibrary.un.org/record/710086?ln=ar&v=pdf
[477] https://unctad.org/system/files/official-document/dtlstict2015d3_en.pdf
[478] https://unctad.org/system/files/official-document/dtlstict2020d1_en.pdf
[479] https://publicadministration.un.org/wsis10/Portals/5/N1543842_1.pdf
[480] https://www.itu.int/net/wsis/implementation/2014/forum/inc/doc/outcome/362828V2E.pdf
[481] https://unesdoc.unesco.org/ark:/48223/pf0000224604
[482] Para. 71
[483] https://www.wgig.org/docs/WGIGREPORT.pdf
[484] *Tunis Agenda*, para. 34.
[485] Para. 29, 34. The core functions of these different stakeholders were defined in para. 35.
[486] *Ibid.*, paras. 66-78.
[487] https://docs.un.org/en/A/RES/79/194, p. 6
[488] https://www.iana.org/help/pti-transition
[489] https://www.ietf.org/
[490] https://www.w3.org/
[491] https://www.internetsociety.org/deploy360/ipv6/?gad_source=1&gclid=CjwKCAiAzba9BhBhEiwA7glbaoWj5jKGxCYJksq5_T_LIBx4CU1w0Y3cl_INpnE11g5l2ulCiDeYjBoCkfQQAvD_BwE
[492] https://www.internetsociety.org/deploy360/dnssec/basics/?gad_source=1&gclid=CjwKCAiAzba9BhBhEiwA7glbarc7b18qROatlZw1CWnLpf1odTB9gL5yOBQ6QJdgtlzYphxBTYEpTRoCNFwQAvD_BwE
[493] Para. 29(c).
[494] https://intgovforum.org/en/filedepot_download/256/28579
[495] https://www.cigionline.org/people/global-commission-internet-governance/

[496] https://www.rightscon.org/about-and-contact/
[497] https://netmundial.br/wp-content/uploads/2014/04/NETmundial-Multistakeholder-Document.pdf ; https://netmundial.br/pdf/NETmundial10-MultistakeholderStatement-2024.pdf
[498] https://www.igschools.net/sig/
[499] Paras 5-6.
[500] Paras 68-71.
[501] https://docs.un.org/en/E/2009/92
[502] https://unctad.org/topic/commission-on-science-and-technology-for-development/wgec-2013-2014; https://unctad.org/system/files/official-document/ecn162014crp3_en.pdf; https://unctad.org/topic/commission-on-science-and-technology-for-development/wgec-2016-2018
[503] https://docs.un.org/en/A/RES/79/194, paras. 38-39.
[504] Para. 27
[505] The IGF's mandate can be found in the *Tunis Agenda*, para. 72.
[506] Those from the 2024 Forum are at https://intgovforum.org/en/filedepot_download/305/28526.
[507] https://intgovforum.org/en/content/national-and-regional-igf-initiatives
[508] https://intgovforum.org/en/content/thematic-intersessional-work
[509] https://digitallibrary.un.org/record/713816/files/A_66_67_E_2011_79-EN.pdf?ln=en
[510] https://www.intgovforum.org/en/content/igf-retreat-documents
[511] The most recent EGM report is at https://intgovforum.org/en/filedepot_download/8/28258
[512] *GDC*, para. 29(a).
[513] See *e.g.* DNS Research Federation, *Net Effects: an evidence-led exploration of IGF impact*, 2024, https://dnsrf.org/blog/net-effects--an-evidence-led-exploration-of-igf-impact/index.html
[514] https://anacom.pt/render.jsp?contentId=958975
[515] Outcomes from the 2024 meeting are at https://www.itu.int/net4/wsis/forum/2024/Home/Outcomes
[516] https://www.itu.int/net4/wsis/stocktaking/Home/About
[517] https://www.itu.int/net4/wsis/sdg/
[518] https://www.itu.int/net4/wsis/stocktaking/Prizes/2025
[519] Para. 6
[520] https://www.itu.int/en/itu-D/Statistics/Documents/publications/wsisreview2014/WSIS2014_review.pdf, p. 4
[521] https://unstats.un.org/unsd/statcom/doc09/bg-ictindicators.pdf
[522] http://www.itu.int/en/ITU-D/Statistics/Documents/intlcoop/partnership/Thematic_ICT_indicators_for_the_SDGs.pdf
[523] https://1f8a81b9b0707b63-19211.webchannel-proxy.scarabresearch.com/pub/D-IND-ITCMEAS
[524] https://unctad.org/system/files/official-document/dtlstict2021d2_en.pdf ; https://unctad.org/system/files/official-document/dtlecdc2023d8_en.pdf
[525] https://datahub.itu.int/; https://www.itu.int/en/mediacentre/backgrounders/Pages/data-statistics.aspx
[526] ITU, *Measuring Digital Development: The ICT Development Index 2024*, https://www.itu.int/hub/publication/D-IND-ICT_MDD-2024-3/
[527] https://www.itu.int/en/ITU-D/Statistics/pages/stat/default.aspx
[528] https://www.telecomreview.com/articles/reports-and-coverage/4957-connect-2030-agenda-five-strategic-goals-to-achieve-digital-transformation
[529] https://www.broadbandcommission.org/advocacy-targets/
[530] https://www.itu.int/itu-d/meetings/statistics/umc2030/
[531] https://www.oecd.org/en/publications/the-oecd-going-digital-measurement-roadmap_bd10100f-en.html
[532] https://www.itu.int/en/ITU-D/Cybersecurity/pages/global-cybersecurity-index.aspx
[533] Examples can be found in https://unstats.un.org/UNSDWebsite/statcom/session_55/documents/2024-29-ICT-E.pdf
[534] https://www.unesco.org/en/internet-universality-indicators
[535] https://unstats.un.org/UNSDWebsite/statcom/session_55/documents/2024-29-ICT-E.pdf, p. 2
[536] The UK regulator Ofcom's research and data gathering programme, for example, is described at https://www.ofcom.org.uk/about-ofcom/our-research/about-ofcoms-research/

[537] https://data.gsmaintelligence.com/
[538] https://afteraccess.net/
[539] See *e.g.* https://www.nature.com/articles/s41467-019-14108-y; https://sdg-action.org/can-ai-help-us-achieve-the-sdgs/
[540] https://unstats.un.org/sdgs/report/2024/The-Sustainable-Development-Goals-Report-2024.pdf, pp. 4-7
[541] Para. 45.
[542] Paras 11, 13.
[543] https://www.itu.int/en/ITU-D/Statistics/Documents/facts/ITU_regional_global_Key_ICT_indicator_aggregates_Nov_2024.xlsx
[544] https://www.worldbank.org/en/publication/digital-progress-and-trends-report#:~:text=Digital%20Services%20Sector%20Growth,value%20added%20in%20IT%20services; ttps://www.oecd.org/en/about/news/press-releases/2024/05/growth-of-digital-economy-outperforms-overall-growth-across-oecd.html
[545] *Digital Public Infrastructure for Digital* Governments, https://www.oecd.org/en/publications/digital-public-infrastructure-for-digital-governments_ff525dc8-en.html
[546] *Accelerating the SDGs through Digital Public Infrastructure*, https://www.undp.org/sites/g/files/zskgke326/files/2023-08/undp-g20-accelerating-the-sdgs-through-digital-public-infrastructure.pdf, p.4
[547] Paras. 14-17.
[548] https://unctad.org/system/files/information-document/cstd_briefing_wsis_3.03.2023_en.pdf
[549] https://publicadministration.desa.un.org/wsis20/Documents/WSIS%20%2B20%20Reviews%20by%20the%20United%20Nations%20System
[550] https://unesdoc.unesco.org/ark:/48223/pf0000386904.locale=en
[551] *Pact for the Future*, pp. 20-22.
[552] Para. 7
[553] General Assembly resolution A/RES/70/125, para. 71
[554] Para. 68
[555] *World Development Report,* 2016, *Digital Dividends*, p. 101, https://openknowledge.worldbank.org/bitstream/handle/10986/23347/9781464806711.pdf
[556] Paras 10-17
[557] Paras 11
[558] Paras 12-13
[559] https://www.broadbandcommission.org/download/6031/
[560] https://www.unesco.org/en/digital-competency-framework
[561] See data in https://www.itu.int/en/ITU-D/Statistics/Documents/facts/ITU_regional_global_Key_ICT_indicator_aggregates_Nov_2024.xlsx
[562] *2030 Agenda*, paras. 1-5.
[563] https://unstats.un.org/sdgs/report/2024/
[564] *Geneva Declaration*, paras. 1-3.
[565] Para. 71
[566] Para. 7
[567] Para. 1
[568] https://www.ohchr.org/Documents/Publications/GuidingPrinciplesBusinessHR_EN.pdf
[569] Paras 22-25.
[570] Para. 35
[571] Para. 32-36
[572] https://en.wikipedia.org/wiki/Net_neutrality; http://daccess-ods.un.org/access.nsf/Get?Open&DS=A/HRC/47/L.22&Lang=E
[573] See *e.g.* https://www.researchgate.net/publication/386347360_The_Role_of_Social_Media_Algorithms_in_Shaping_Public_Opinion_During_Political_Campaigns/citation/download?_tp=eyJjb250ZXh0Ijp7ImZpcnN0UGFn

ZSI6InB1YmxpY2F0aW9uIiwicGFnZSI6InB1YmxpY2F0aW9uIn19; https://www.ipsos.com/en/flair-collection/digital-extremism-how-algorithms-feed-politics-polarisation
[574] https://blog.google/products/search/generative-ai-google-search-may-2024/
[575] https://www.cjr.org/tow_center/we-compared-eight-ai-search-engines-theyre-all-bad-at-citing-news.php
[576] See *e.g.* https://www.techtarget.com/whatis/definition/deepfake
[577] Para. 36.
[578] Paras 8, 31-32
[579] https://unesdoc.unesco.org/ark:/48223/pf0000387921; https://unesdoc.unesco.org/ark:/48223/pf0000387339
[580] https://digital-strategy.ec.europa.eu/en/faqs/digital-services-act-questions-and-answers#:~:text=What%20is%20the%20Digital%20Services,simplified%20terms%20and%20conditions; https://en.wikipedia.org/wiki/Digital_Services_Act
[581] Paras 39-45.
[582] https://unctad.org/page/data-protection-and-privacy-legislation-worldwide
[583] https://gdpr-info.eu/
[584] Para. 46
[585] See *e.g.* UNCTAD, *Digital Economy Report*, 2021, https://unctad.org/system/files/official-document/der2021_en.pdf
[586] https://www.oecd.org/en/about/programmes/data-free-flow-with-trust.html
[587] Para. 46.
[588] *Digital Economy Report*, 2021, Chapter IV.
[589] *Digital Economy Report 2021*, p. xx
[590] Paras 37-49.
[591] Para. 48.
[592] https://en.wikipedia.org/wiki/Large_language_model
[593] https://www.ibm.com/think/topics/ai-hallucinations; https://en.wikipedia.org/wiki/Hallucination_(artificial_intelligence)
[594] *Digital Economy Report 2021*, p. xv.
[595] https://www.oecd.org/en/topics/sub-issues/ai-principles.html
[596] https://unesdoc.unesco.org/ark:/48223/pf0000380455
[597] https://au.int/sites/default/files/documents/44004-doc-EN-_Continental_AI_Strategy_July_2024.pdf
[598] See *e.g.* Forum on Information and Democracy, *AI as a Public Good*, https://informationdemocracy.org/wp-content/uploads/2024/03/ID-AI-as-a-Public-Good-Feb-2024.pdf
[599] https://unsceb.org/inter-agency-working-group-artificial-intelligence
[600] https://www.un.org/sites/un2.un.org/files/governing_ai_for_humanity_final_report_en.pdf
[601] Pages 7-8
[602] Paras 50-63.
[603] See *e.g.* UNCTAD, *Trade and Development Report* 2023, Chapter II, https://unctad.org/system/files/official-document/tir2023ch2_en.pdf
[604] https://unctad.org/tir2023
[605] https://www.internetsociety.org/resources/doc/2020/does-quantum-computing-put-our-digital-security-at-risk/?gad_source=1&gclid=Cj0KCQiA_NC9BhCkARIsABSnSTYo5GXTu3X0rbvs9BSusNRfjabbNRAUquqzyYYRBwvBBhsXLQ34aukaAnXHEALw_wcB
[606] These issues are explored in an issues paper on *Technology Foresight and Technology Assessment for Sustainable Development* presented at CSTD in 2024, https://unctad.org/system/files/information-document/cstd2024-2025_issues02_tfta_en.pdf
[607] See *e.g.* Commonwealth Telecommunications Organisation and Panos London, *Louder Voices: Strengthening Developing Country Participation in International ICT Decision-Making*, https://www.markle.org/wp-content/uploads/2022/03/686_cto_report.pdf
[608] Paras 29, 38, 61.
[609] https://unctad.org/system/files/non-official-document/cstd2024-25_isp_wsis_p01_gsah_en.pdf
[610] https://www.itu.int/net4/wsis/sdg/Content/Documents/wsis-sdg_matrix_document.pdf

[611] https://www.itu.int/net4/wsis/sdg/Content/Documents/wsis-sdg_booklet.pdf
[612] https://intgovforum.org/en/content/igf-2024-outputs, p. 13
[613] Para. 8
[614] https://www.itu.int/net4/wsis/ungis/Content/upload/gdc/UNGIS-CompiledMatrixOfLinkages-WSIS-GDC.pdf