The Just Digital Framework and an 18th SDG

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In the two decades since the establishment of the 2030 Agenda, the world has faced significant challenges to achieve the 17 Sustainable Development Goals (SDGs). Before COVID-19, the SDGs were not on track to be achieved, and disruptions in implementation resulting from the pandemic have had significant effects, turning back years of progress. The pandemic has highlighted the essential nature of digital technologies in advancing the SDGs, continuing education, including higher education, social, and commercial activities, as well as enabling people to participate in society, democracy, and the economy during crises. As humanity enters this new period and begins to reset after the 'great pause', it is imperative to reconsider how the digital revolution has affected progress, especially in realizing the SDGs. Digital inclusion and connectivity inform and are essential to achieve all of the Goals.

sustainable development | digital technologies | digital technologies in higher education | United Nations Sustainable Development Goals

1. Digital Capabilities

Digital capabilities are the skills deemed essential for driving digital transformation, supporting digital wealth, and sustainable development. Digitally literate citizens can benefit from the digital economy through accessing quality and safer information, e-government services, commercial products, media, and engagement with the global community. Conversely, digitally illiterate citizens can be victims of the digital economy, experiencing financial fraud and physical or other forms of exploitation and abuse. Consequently, equality in digital skills is vital to shared prosperity in the digital economy [1].

The need for employers and educators to move 'online' during COVID-19 highlighted the realities of the digital economy in both developed and developing nations. The pandemic has increased global dependence on digital technologies, and with this, the requirement for digital skills to participate in social, economic, and democratic aspects of society. Even the most developed countries found it challenging to guarantee that people had adequate skills to continue engaging in work and school activities. The situation was worse in less developed countries. As demonstrated in 2020, fewer than one in five people in the Least Developed Countries (LDCs) had the digital skills to use the internet, compared to four out of five in developed countries [2].

The distribution of digital literacy varies between the global North, global South, and within and between countries. Lack of Information and Communication Technology (ICT) skills is a significant barrier to accessing the digital economy, which is predicted to reach USD 23 trillion by 2025 [3]. The Broadband Commission for Sustainable Development recognizes this challenge and has set targets to ensure that 60% of youth and adults have minimum proficiency levels in digital skills by 2025 [3]. Even with these goals, there are disparities in skills. In 2019, the International

Telecommunications Union (ITU) reported that less than 50% of the population possessed basic computer skills, including sending emails with an attachment or copying a file. Less than 50% of people in 60 countries worldwide had 'standard' skills, such as using basic arithmetic formulae in a spreadsheet or downloading and installing new software. For advanced skills, only two countries reported that more than 15% of people had written a computer program using a specialized language in the last 3 months [4]. These statistics demonstrate the differences between those who have and those who do not have access to digital capabilities and the potential impact on achieving the SDGs. People who have digital capabilities are better served in modern society in terms of work (SDG 8) [5], health (SDG 3) [5], and education (SDG 4) [5], which reduces the risk of poverty (SDG 1) [4], and unequal access to society (SDG 5) [5].

Several OECD countries and some Latin American and Asian countries have guidelines for measuring digital skills and developing education and training courses. On the other hand, Africa does not have any of these frameworks. However, the World Bank's Digital Economy for Africa (DE4A) Initiative aims to make Africa digitally enabled by 2030 [1][6], recognizing that Africa's young people need to be digitally literate and have access to technology and markets. This access ensures that they can thrive in a world increasingly driven by the digitalized economy [6]. One of the most comprehensive and commonly used frameworks to measure general digital skills is the European Union's DigComp 2.0 and updated DigComp 2.1. These frameworks consist of 21 competencies within five areas: Information and data literacy, communication and collaboration, digital content creation, safety, and problem-solving. Each competency has eight proficiency levels [1][7].

Digital capabilities are essential, and there needs to be a more significant focus on increasing digital literacy alongside sustainable development. For example, innovation, reducing poverty, and decreasing inequalities depend on the employability of people. With the growth in automation of service roles and the expanding dependence on technology, it is necessary to provide all of society with access to basic and advanced digital skills. These include the capability to communicate effectively using technology, be represented in developing technologies, and stay connected to self and services with emerging technologies.

2. Digital Commodities

Digital commodities are the fundamental technologies and solutions which were the cornerstone to continuing normal activities during COVID-19 and are needed for full participation in society. These commodities are a means of increasing people's engagement in society, improving accountability and transparency, public service delivery, and inclusion. They include hardware, such as laptops, computers, mobile phones, and software, such as word processing applications, coding capabilities, and access to cloud computing. The pandemic necessitated integrating technological solutions to work, learning from home, and building and sharing medical support. The past 2 years have highlighted digital inequalities, in which there are clear socioeconomic and political divides in who has access to essential technology [8].

Digital commodities are central for employment, education, and innovation. Research shows that digital technologies facilitate financial inclusion, access to markets, mobile banking, microcredits, and remittances [9]. Specifically, ICTs contribute to poverty alleviation by highlighting the needs of vulnerable groups using real-time data and analytics and simultaneously enabling people to work in partnership and co-create solutions with diverse stakeholders. As it currently

stands, there is no SDG dedicated to ICT, and only four ICT related indicators appear in four of the Goals (SDGs 4, 5, 9, 17). However, the 2030 Agenda emphasizes technologies' essential role in achieving all of the 17 Goals [10]. In addition, more recently, the introduction of the six SDG Transformations, one of which is dedicated to digital technologies, demonstrates the importance of providing a framework to consider how the SDGs are affected by access to digital commodities [11].

An example of how access to technologies impacts the SDGs is evident in the growth in innovations in digital finance, e-commerce, and e-governance. These are increasing access to information and services. In China, e-governance has been seen to reduce the rural-urban divide through access to health, education, and the rising non-agricultural income-generating opportunities for rural areas. Furthermore, millions can now access financial services through social networks and e-commerce platforms, enabling marginalized and impoverished populations to save, invest, and build credit scores. In Bangladesh, iFarmer, a digital crowdfunding platform, allows the investors to offer capital to rural women cattle farmers and the e-commerce platform ekShop Shoron helps Rohingya refugees create livelihoods in Cox Bazaar [10]. These growths in e-commerce must be seen as more than an opportunity to shift from a traditional retail trade model to a more sustainable one, but also as an opportunity to use digitalization to advance this goal [12]. Without access to technologies that support engagement in these activities, these innovations do not serve the marginalized.

Although these examples in China and Bangladesh show how digital commodities empower these populations, there is a growing divide between urban and rural access to technologies. In China, rural areas still disproportionately lack access to technologies. Moreover, the cost of devices, data plans, as well as the speed and quality of connectivity are additional exclusionary factors. More than 70% of urban households have internet access in Bhutan compared to 29% of rural households [10]. COVID-19 has threatened to push nearly 71 million people into severe poverty due to a lack of digital commodities, which will most likely increase these divisions [9][10]. Commodities, infrastructure, and affordable services are necessary to mitigate this impact.

3. Digital Infrastructure

Digital infrastructures and services are essential for achieving several of the SDGs. In less than two decades, commercial internet has moved from innovation to a requirement for full participation in society. Although it might seem that the digital economy is a system in itself, several actors have invested in capital and operating expenditures, research, and development to construct and sustain the 'digital ecosystem' that facilitates the digital economy. Some of these actors include Communication Service Providers (CPSs), digital service and content providers, and hardware and software manufacturers. Moreover, governments are highly involved and act as policymakers, regulators, owners, and distributors of mobile networks. Non-Profit Organizations (NGOs), industry groups, and multi-stakeholders, such as the United Nations (UN) agency ITU, are crucial players. Collectively, these stakeholders are responsible for fixed and mobile networks, data centers, internet protocols, and technological equipment. As the number of people and companies that use the internet increases, companies invent more ways to service these needs, such as the Cloud, machine-to-machine communications, and the Internet of Things. This phenomenon makes good, working, digital infrastructure networks necessary for successful engagement in contemporary society [13].

A new face of inequality emerges when considering who has meaningful access to the technology and its associated infrastructure. While technologies, such as Artificial Intelligence (AI) and blockchain provide unique opportunities to people, they pose numerous risks, including exclusion [14]. Deputy Secretary-General Amina Mohammed stated that 'almost half the world's population… the majority of them women, and most in developing countries, are still offline' [14]. In 2016, more than 4 billion people in emerging economies did not have access to the internet, many living in rural or remote areas [15]. In India, a country with the second-largest online market, only 50% of the population has access to the internet [16]. Additionally, recent data demonstrate that 66% of Caucasians have access to high-speed internet at home compared to 49% of African Americans and 51% of Hispanics [15]. The rural versus urban divide also shows the increasing marginalization of communities living in rural or remote areas. Studies by large industries demonstrate that poor broadband is a significant obstacle to employment in rural areas. As underfunded national governments remain primarily responsible for these infrastructure systems, there has often been minimal progress in providing digital networks in rural areas [17].

Although there have been developments in promoting inclusive and sustainable industry, including investing in infrastructure and connectivity guided by SDG 9, industrialization in LDCs is still slow [5]. There is a substantial variance in levels of digital infrastructure in emerging markets. This is especially prevalent in Low-Income Countries (LICs), where there are frequently low levels of internet penetration and usage, gaps in coverage between rural and urban settings, and barriers in affordability, specifically for the mobile internet. The pandemic shows that digital connectivity is essential to business continuity and societal resilience. However, there is still limited data on the effect of COVID-19 on digital infrastructure in emerging markets. Most of the COVID-19 analysis concentrates on government interventions or infrastructure subsectors [18].

In emerging markets, digital infrastructure providers may see higher demand, in which a series of adverse shocks can counterbalance. These shocks can impact broadband operators and smaller companies, resulting in reduced competition, technological innovation, and availability of open-access broadband infrastructure. COVID-19 is causing a decrease in funding into emerging markets. As a result, significant support may be required from development finance institutions for financing of smaller or independent companies in the most impoverished economies to ensure competition, resilience, and the promotion of digital inclusion for the poorest [18].

Funding is also a challenge for universal digital inclusion. Many independent actors provide funding for these goals, but often do not work as a coordinated mechanism. Gaining access to this funding can require onerous processes that many governments and non-state actors lack the capacity to complete, such as feasibility studies. In some regions, there are high levels of investment for infrastructure. In others, funding is significantly lacking, especially in LDCs and countries afflicted by conflict, where connectivity could help decrease poverty. Although the private sector has access to finance, technology, and resources to fund digital connectivity and inclusion, there is a reluctance to invest in places that are considered to have associated risks, lack of collateral, and little short-term returns [8]. Access to working infrastructure in the form of internet connection, cloud computing, and operating systems that connect critical stakeholders at the country and local levels are fundamental to achieve a fair and equitable society for all. This relates to nearly all of the elements of the SDGs. Failure to consider who has access and how they access the digital world hinders the ability to ensure that everyone's basic needs are met, which allows them to flourish in a way they value.

4. Digital Governance

Ethical governance plays a significant role in ensuring specific protections in conjunction with digital inclusivity. The UN has stated that digital technologies are a primary supporter of sustainable development, making it even more essential for the ethical management of all things digital to create an ecosystem that supports the integration of digital technologies into people's daily lives in a fair and safe way [19]. This system must ethically promote social inclusion and ensure national policies protecting citizens' rights and confidentiality, while considering data infrastructure and ownership. One of the core challenges for digital transformation is the lack of coordination or mechanisms to create relevant policies supporting digital innovation and private enterprise [3].

Universally, digital wealth is inextricably linked to human rights. The strategies and policies to achieve this goal must reflect on human rights online and enhance capacities for cybersecurity. Alongside an acceleration in digital connection resulting from the pandemic, the human right protections, both online and offline, continue to deteriorate. There has been a decrease in internet freedom and increased internet shutdowns, as well as surveillance and privacy violations. These violations extend beyond government abuses, and if action is not taken, incidences of misinformation, hate speech, online violence, and sexual exploitation will continue to grow. However, the linkage between digital wealth and human rights is more than political rights. As COVID-19 illustrates, access to the digital sphere is crucial to accessing fundamental, economic, social, and cultural rights and critical to achieve the SDGs, such as access to education (SDG 4), employment (SDG 8), and health and wellbeing services (SDG 3) [8]. SDG 8 recognizes the right to work as a fundamental human right. Promoting decent work and economic opportunity through ensuring that everyone has access to digital commodities and capabilities is a cornerstone for success to SDG 8 and is critical to achieve progress in alleviating poverty (SDG 1) and in promoting health and wellbeing (SDG 3) [5].

While more attention is given to human rights in the digital sphere, there is a lack of cooperation and consensus around this topic, specifically among UN member states. The different approaches are challenges to digital security and safety, hindering a global approach to digital human right issues. The involvement of business and civil society groups to regulate online human right protections is also controversial [8].

Before the beginning of 2020, many governments tried to strengthen their strategic approach to digital transformation and focused on emerging digital technologies, such as AI, blockchain, and 5G infrastructure. In 2020, 34 OECD countries had a national digital strategy, and by mid-2020, 60 countries had a national AI strategy. Between 2017 and 2020, several OECD countries issued 5G strategies including, Australia, Austria, Colombia, France, Germany, Korea, Spain, the United Kingdom, and the United States. There is also increasing attention to blockchain and quantum computing strategies. Australia, the People's Republic of China, Germany, India, and Switzerland have policies, and France and Italy are developing them [20].

The ongoing cyclical relationship between digital innovation and digital transformation is crucial for new business strategies and markets, and digital technologies are playing a pivotal role in improving science and research systems that strongly influence countries' COVID-19 response and recovery. However, there is a growing awareness of how these technologies can challenge human-centred values, privacy, consumer protection, and security [21]. Countries need to respond to these issues when making policies. While these trends are encouraging, the pandemic shows that policymakers must adopt a whole government approach to digital transformation and governance [20]. Additionally,

governments need to use metrics to measure digital inclusion within this system to produce evidence-based policymaking and to ensure that no one is left behind [22].

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