UK International Development

Partnership | Progress | Prosperity

Digital Development Strategy 2024-2030

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Foreword

We live in an age of connectivity. Mobile phones and the Internet are now an integral part of daily life for most people around the world. Digital technologies are revolutionising our lives in ways few would have predicted. They help power economies and drive forward ground-breaking scientific solutions to problems such as climate change and pandemics. Meanwhile new horizons continue to be explored, pushing back the boundaries of human progress in almost every way imaginable.

At the same time, the world is affected by a deep digital divide. 2.6 billion people still do not have access to the Internet, including about 65% of households in the least developed countries (ITU, 2023). Women are more likely to suffer from digital exclusion on average and are 19% less likely than men to access mobile connectivity (GSMA, 2023).

It is not only access to Internet, however, that hampers progress in vulnerable societies. Online connectivity exposes people to dangers and harms that need to be prevented, not least malicious disinformation on social media.

While we often like to talk about Artificial Intelligence (AI) in the future tense, this is already present in many aspects of people's lives. The impact of AI and other rapidly evolving technologies is only going to intensify, with the effects on society likely to be enormous, yet still uncertain.

These are some of the paradoxes and problems the Digital Development Strategy seeks to tackle, with a vision for inclusivity (leaving no one behind), responsibility (making it safe and secure), and sustainability (respecting the environment and managing climate change risks).

Our integrated approach takes into account both benefits and risks of the current technological direction of travel. It also highlights key trends that have either emerged or grown since our last digital development strategy, in particular AI for Development, Digital Public Infrastructure (for example for e-government and digital payment systems), Technology-Facilitated Gender-Based Violence (TFGBV), and a new theme of Digital Sustainability focusing on the environment and climate change.

But we will not lose sight of some of the key requirements to ensure basic digital access, such as Last-Mile Connectivity and broader Digital Inclusion. Our strategy also affirms the UK values of free, fair and secure digital ecosystems. We must promote digital democracy while at the same time combat the disinformation scourge that threatens it. Citizens should use the digital world to better participate in democratic processes and to have a voice.

The UK has a proud record on international development and a significant reputation for leading on digital innovation on the international stage. Our new Digital Development Strategy takes forward digital as a major driver towards development as set out in the White Paper for International Development.

The future is already here. The biggest breakthroughs are yet to come. But the march of technology must be as equal as it is unstoppable. It is now up to us and our partners to bridge the digital divide and drive forward the progress and prosperity every person around the world deserves.

Rt Hon Andrew Mitchell MP

Minister for Development and Africa

Executive Summary

Over the past decade, the world has become increasingly interconnected, with access to digital technologies like mobile phones and the internet now an integral part of daily life for the majority globally, and our default way of communicating, learning, and doing business together. Digital technologies play an increasingly important role in economic growth and skilled job creation, civic engagement and political participation, and in the delivery of basic social services and of development and humanitarian interventions.

As the development and adoption of digital technologies is revolutionising our world, it is vital that we ensure they accelerate the achievement of the SDGs. With this aim, as stated in the UK's White Paper on International Development, we need to drive *'digital development'*, which means *making digital transformation inclusive, responsible and sustainable*. We can do this by harnessing the power of digital for the good of people and planet, driving forward our shared prosperity while addressing emerging challenges.

This is why, through our new **Digital Development Strategy (DDS) 2024-2030** we will strive to achieve four interconnected objectives:

1. *Digital Transformation* – Catalysing the economy, government and society through digital technologies.
2. *Digital Inclusion* – Ensuring that no-one is left behind in a digital world.
3. *Digital Responsibility* – Enabling a safe, secure and resilient digital environment.
4. *Digital Sustainability* – Harnessing digital technologies in support of our climate change and environmental aims.

The DDS will deliver on four priority areas in digital development, to help achieve our objectives:

Last-mile Connectivity – Basic connectivity in remote, low-income areas is fundamental to ensuring that the most marginalised can benefit from digital technologies.

By 2030 we will have supported at least 20 partner countries to reduce their digital divides by an average of 50% (halving their connectivity gap).

Digital Public Infrastructure (DPI) – DPI is the technical term for society-wide digital services, such as e-government and national payment systems, and is a key enabler for digital transformation of both government and the private sector.

By 2030 we will have supported at least 20 partner countries to transform the delivery of digital services at a national level through improved DPI.

Artificial Intelligence – The rapid evolution of AI presents both opportunities and risks, especially for developing countries that risk being left behind due to their weaker digital foundations.

By 2030 we will have created or scaled up at least 8 responsible AI research labs at African universities and helped create regulatory frameworks for responsible AI.

Women & Girls – The gender digital divide limits women and girls' ability to benefit from digital development.

By 2030 we will have supported at least 50 million women and girls to participate safely and meaningfully in the digital world.

Chapter 1 – Introduction: Doing development in a digital world

1.1 Why do digital technologies matter for development?

Over the past decade, the world has become increasingly interconnected and access to digital technologies like mobile phones and the internet are now an integral part of daily life and our default way of communicating, learning, and doing business. Digital technologies play an increasingly important role in economic growth and skilled job creation, civic engagement and political participation, and in the delivery of basic social services and of development and humanitarian interventions.

Digital technologies are now widely recognised as critical, cross-cutting enablers and accelerators for the achievement of the Sustainable Development Goals (SDGs). Advances in digital innovation, such as Artificial Intelligence (AI), create new opportunities for achieving the SDGs. The UN states that digital technologies directly benefit 70% of the SDG targets (119 out of 169), across critical goals like climate action, education, hunger and poverty (UNDP, 2023).[1] This is now more important than ever, as the SDGs will remain out of reach by 2030, or even 2050, if there is no rapid improvement in current trends.

However, the benefits of digital transformation are not evenly distributed. There is a stark digital divide: 2.6 billion people[2] still do not have access to the Internet, which means a third of the world's population is offline[3] – and that is concentrated within the poorest and most marginalised groups. There is a lack of inclusive access to affordable and sustainable last-mile connectivity, digital literacy and basic skills, and locally-relevant digital content and services. This digital divide is worse for marginalised groups – including women and girls, and people living with disabilities.

Digital technologies also generate new threats and harms. The risks of digital engagement are even more acute in developing countries, resulting in a greater need to support online safety, combat disinformation and protect privacy and freedom of expression, while generating trust in the digital ecosystem through cybersecurity and cyber-resilience.

1.2 Why a new Digital Development Strategy, and why now?

The rapid changes in the pervasiveness and power of digital technologies will see international development happen within an increasingly important digital context. Whether digital innovation will lead to changes for the better or worse is something the UK, together with its partners and stakeholders, can influence. Digital change will happen anyway, and while we cannot fully predict what the online and offline worlds will look like in 2030, we envisage a future where digital is increasingly the default mode – so the role of the UK is to support developing and emerging countries prepare to maximise the opportunities and minimise the risks of this process.

The UK is well placed to do this, having a significant history of leading on digital innovation and having been the first bilateral donor to develop a comprehensive approach to 'Doing development in a digital world'[4] in 2018. Since then, we have further increased our experience and evidence from flexible and agile policy and programming work, which helps us adapt and stay relevant in a rapidly changing technological context.

The UK has much to offer through its own tech sector and innovation ecosystem, its regulatory and standard-setting capacity in telecoms and online content, its experience in government digital transformation, as well as its research and thought-leadership on broader digitalisation processes. There are great opportunities for knowledge sharing and international partnerships with developing and emerging countries, in support of their own digital development journeys.

This is the right time for the UK to step forward with a new approach to digital development in support of its partner countries and the international community.

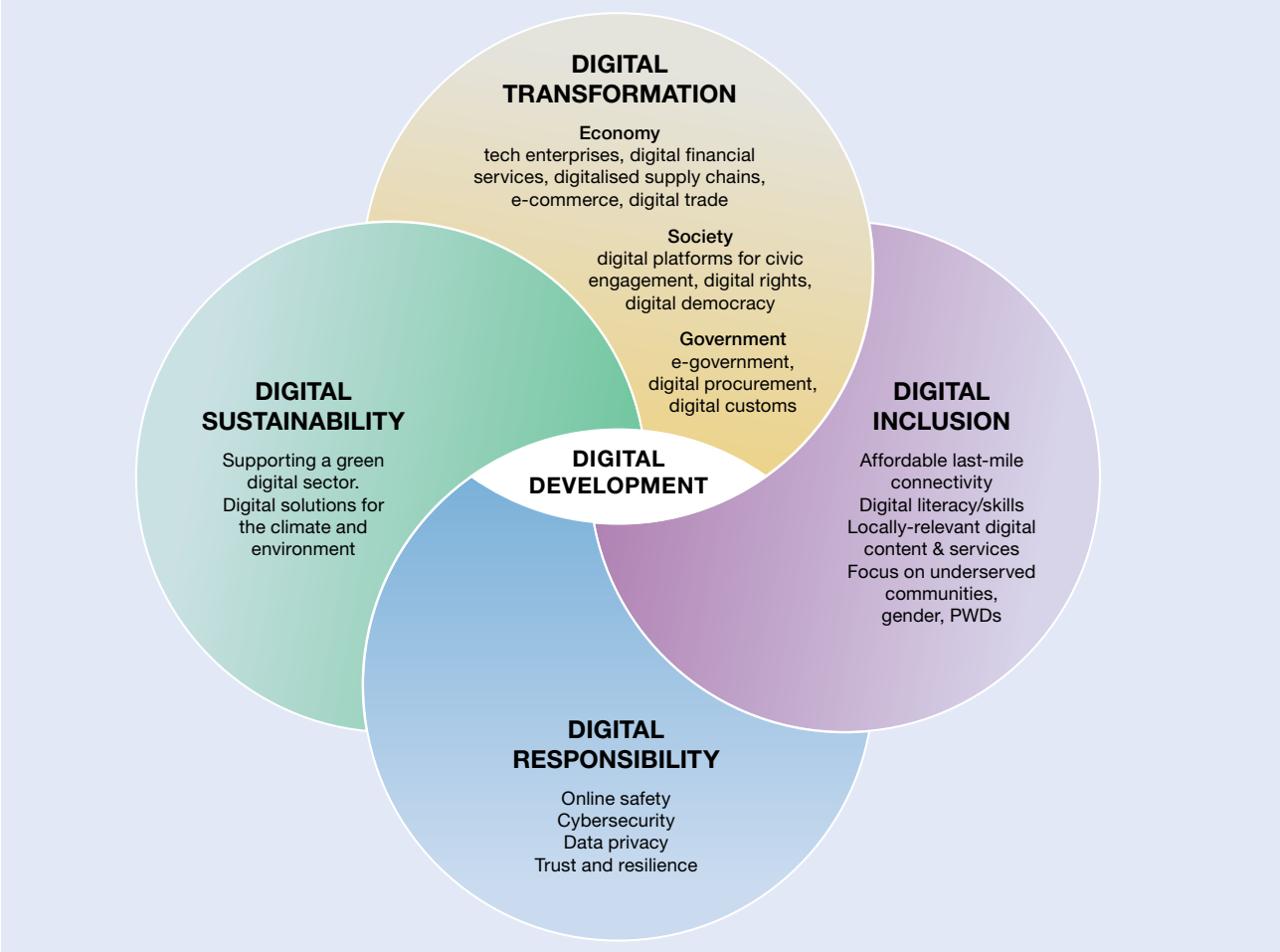
1.3 What will we do to harness the power of digital for development?

Our new **Digital Development Strategy (DDS) 2024-2030** sets out a positive vision for an *inclusive, responsible and sustainable digital transformation* in developing countries.

This means we will strive to achieve four interconnected objectives:

- *Digital Transformation* – Catalysing the economy, government, and society through digital technologies.
- *Digital Inclusion* – Ensuring that no-one is left behind in a digital world.
- *Digital Responsibility* – Enabling a safe, secure, and resilient digital environment.
- *Digital Sustainability* – Harnessing digital technologies in support of our climate change and environmental aims.

Figure 1.1: Digital Development policy framework



The DDS vision of inclusive, responsible and sustainable digital transformation in developing countries takes forward the approach on digital development set out in the White Paper on International Development[5] and is aligned with the International Technology Strategy,[6] the UK Cyber Strategy,[7] the National AI Strategy,[8] and the Integrated Review Refresh 2023.[9]

The DDS highlights our four priority areas in digital development. These contribute to all our policy framework objectives, and have either emerged or grown since our last strategy:

i. ***Last-mile Connectivity*** *– Basic connectivity in remote, low-income areas is fundamental to ensuring that the most marginalised can benefit from digital technologies.*

We will promote international collaboration on supporting affordable and sustainable connectivity in underserved communities, through policy and regulatory improvements, through scalable technology and business models and by supporting local solutions like community networks – including through our existing partnership with the International Telecommunication Union (ITU), by leveraging the UN Global Digital Compact process and by building on the success and investing in the regional amplification of the UK Digital Access Programme.

By 2030 we will have supported at least 20 partner countries to reduce their digital divides by an average of 50% (halving their connectivity gap).

ii. ***Digital Public Infrastructure (DPI)*** *– DPI is the technical term for society-wide digital services, such as e-government and national payment systems; and it is a key enabler for digital transformation of both government and the private sector.*

We will develop a new DPI project that shares the UK's experience on digitalisation of public services with partner countries. We will explore a high-level partnership with G20 members and other key stakeholders on the principles of good DPI and on ways to adapt DPI models to the local context.[10] The project will build on the work of the G20, and on the evidence and experience of our Digital Identity for Development programme.

By 2030 we will have supported at least 20 partner countries to transform the delivery of digital services at a national level through improved DPI.

iii. ***Artificial Intelligence (AI)*** *– The rapid evolution of AI presents both opportunities and challenges, especially for developing countries that risk being left behind due to their weak digital foundations* and because they are unable to fully harness AI solutions for development problems, or to prevent AI threats.

We will deliver our new flagship programme on AI for Development aimed at building local capacity to develop and apply AI responsibly, with an initial focus on Africa, alongside an uplift of investment in AI across our sectoral research portfolios. We will continue our collaboration with the Global Partnership on AI (GPAI), a key international forum hosted by the Organisation for Economic Cooperation and Development (OECD), and will help broaden the coalition, particularly amongst developing countries. We also recognise that the impact of AI will grow and change over the course of this strategy's implementation, so we will monitor new tools and models as they emerge, and we will adapt our work both to take advantage of their benefits and to mitigate risks.

By 2030 we will have created or scaled up at least 8 responsible AI research labs at African universities and helped at least 10 partner countries to create sound regulatory frameworks for responsible, equitable and safe AI.

iv. ***Women & Girls*** – *The gender digital divide limits women and girls' ability to benefit from digital development*.

We will support women and girls to access the Internet, build their digital skills and digital businesses, and stay safe online, including through our cross-HMG digital inclusion programming, the UK's Cyber Inclusion Campaign and the UK membership of the Global Partnership for Action on Online Gender-Based Harassment and Abuse.

By 2030 we will have supported at least 50 million women and girls to participate safely and meaningfully in the digital world.

In addition to the four priorities above, we will also focus on the following critical areas as foundations of our overall approach to digital development:

- ***Investment in the Digital Economy*** – *New investment in physical digital infrastructure (e.g. telecoms and data centres) and in digital innovation is critical to digital transformation.*

  We will build on existing infrastructure programming, and we will develop a new policy and programming package to help create better regulatory and business environments for public and private investment into digital infrastructure and the digital economy of partner countries, in partnership with British International Investment (BII) and other FCDO initiatives like Mobilist.

- ***Digital Democracy*** – *The UK supports inclusive participation in democracy through a free, open, secure and inclusive Internet.*

  We will promote the design, development and use of digital solutions that support fundamental freedoms and democratic values, and that are consistent with the rule of law and human rights, with a focus on Internet shutdowns and the role of digital in governance, mis/disinformation, elections, censorship and surveillance. We will actively contribute to the Freedom Online Coalition (FOC) and key international processes on digital democracy. We will bid to continue as a member of the FOC Steering Committee and as co-chairs of the Taskforce on Internet Shutdowns during the period 2024-2030.

- ***Cybersecurity*** – *Accelerating digitalisation also generates risks and potential harms. Secure and trusted digital infrastructure is critical to making digital transformation work well for all and withstand threats.*

  We will continue to support the cybersecurity capacity of governments, businesses and users in developing countries, and we will promote investment in critical digital infrastructure, as key enablers of the SDGs. We will invest in a comprehensive campaign linking cyber hygiene, gender, social inclusion and democratic values. We will advocate for change in the multilateral space and encourage development banks to help partner countries' increase their own investment in cybersecurity.

- ***Green Digital*** – *Digital technology has a climate and environmental cost, yet it can also be used to mitigate and adapt to climate change and nature loss*.

  We will develop a new Digital Sustainability Programme, which will include a focus on digital platforms for a sustainable economy, e-waste management, and renewable energy solutions for last-mile connectivity models. We will also promote a multi-stakeholder Community of Interest on digital sustainability.

Due to the rapid pace of change of digital technologies, we will take an **adaptive and flexible approach** towards achieving an inclusive, responsible and sustainable digital transformation in developing countries by regularly reviewing our strategic approach to ensure that we incorporate emerging lessons, best practice and evidence. We will build **patient and mutually respectful partnerships** with developing countries to support their plans for digital transformation. The UK will champion the voices of developing countries in international conversations on the future of digital technologies.

To implement the DDS, we will strengthen our **portfolio of programmes on digital development**. This includes a wide range of sectoral digital programmes that deliver development outcomes in specific verticals such as education, health, social protection, financial services, agriculture, trade, and humanitarian. We will build on these sectoral programmes to enable digital innovation and digital capacity building to solve critical development challenges. The portfolio also includes key strategic programmes that support digital development foundations, including those focused on digital inclusion, digital impact and digital identity:

- The **UK Digital Access Programme (DAP)** has so far directly reached over 10.2 million people[11] in Kenya, Nigeria, South Africa, Brazil and Indonesia, and helped reduce the average digital gap across these partner countries by 26%. We will deliver a new programme phase to share DAP evidence and innovations across other partner countries and international stakeholders (especially in Africa, the Indo-Pacific and Latin America), with regards to the sustainable expansion of affordable last-mile connectivity, the strengthening of digital skills, cybersecurity capacity and online safety, and the support to local digital entrepreneurship through our FCDO-DSIT **Tech Hubs** network. We will also continue to partner with **GSMA** through a new phase of the **Mobile for Development (M4D) programme**, which offers insights on digital innovations for development, and catalytic funding for local digital entrepreneurs.
- We will continue to promote digital identification systems to improve development outcomes while maintaining trust and privacy, including by working with the **World Bank** on the **ID4D (Identification for Development) Programme**.
- We will continue to work with key partners through the **Digital Impact Alliance (DIAL)**[12] to support digital solutions for development challenges, including open-source ones, promoting digital transformation strategies in partner countries, testing and developing digital public goods, and disseminating good practices and shared standards (including the 'Principles for Digital Development'[13]).

The FCDO will enhance its own **digital development capability** by including content on digital for development and relevant learning objectives in training offers for its staff and in the technical competency frameworks for existing expert cadres; by raising awareness and fostering knowledge exchange on digital development through engaging with external partners and thought leaders; by strengthening its core digital development structures; and by formalising and professionalising its network of digital development advisers across the organisation's policy and programme teams at headquarters and overseas.

Chapter 2 – Digital Transformation: catalysing the economy, government, and society through digital technologies

Digital transformation is increasingly recognised as a key element of the international development agenda. It is now well evidenced that the evolution of digital technologies and platforms "offer an unprecedented opportunity to revolutionise the global development system, change lives, transform entire economies, stimulate growth and, ultimately, end reliance on aid" (DFID, 2018).[14] Digital transformation significantly affects governments, economies and societies, generating both benefits and risks. This Digital Development Strategy (DDS) is therefore aimed at supporting partner countries' broad digital transition processes in a way that maximises development outcomes.

We define digital transformation as *the innovation and adoption of digital products, services, and processes to disrupt, transform and improve the ways in which economies, governments, and societies function*; and we focus on the following three workstreams:

- *Digital transformation of the economy:* This refers to the transformation of economies caused by digital technology, including through the core ICT and digital infrastructure sector, and the overall digital ecosystem. Digital transformation underpins rapidly changing digital technologies like AI. It entails several changes, e.g. the growth of specific sectors of the economy, shifts in operations and productivity at the firm level and along the value chain, growth of digital trade and e-commerce, impact on labour markets and the nature of work, and a growing role for local digital innovators and tech start-ups.
- *Digital transformation of government:* This refers to the transformation of government processes, systems and services, and the relationship and communication between government and citizens. As digital tools become more ubiquitous, there are new expectations placed on the 'whole-of-government' to take an active role in digital strategy and priority-setting, and in digitalising existing government processes and systems, as well as the online provision of public products and services.
- *Digital transformation of society:* This refers to fundamental changes in society resulting from digital technology, including: disruptions in trust and access to information; shifts in social structures, norms and relationships in the digital space; ways that technology influences citizens' voice, rights and democratic participation; as well as the ability to organise collective action in the digital age.

2.1 Digital transformation of the economy

Digital transformation of the economy describes both the transformation of existing processes and capabilities and the emergence of new ones across the market system. Digital transformation affects intermediary markets such as financial services and telecoms, as well as specific sectors such as agriculture and manufacturing. Additionally, digital transformation describes the availability of new kinds of data that form the basis of 'the digital economy', which UNCTAD describes as being "driven by the ability to collect, use and analyse massive amounts of machine-readable information (digital data) about practically everything."[15]

Over the past decade there has been a rapid rise in Internet and mobile use, growth in the digital economy and an increase in digital trade. Since 2011, the share of the population using the internet in Least Developed Countries (LDCs) has increased almost ten times, although the global digital divide is still significant.[16] Recent research shows that an increase of 10% in mobile broadband penetration leads to 2.5–2.8% GDP per capita growth in LDCs.[17] Increasing digital capacity and connectivity in developing countries and LDCs, strengthening their ICT[18] sector while also enabling the application of digital technologies in specific industries and along supply chains, is driving significant progress towards economic growth and stability, and can lead to better quality of life for all.

The digital economy[19] has grown 2.5 times faster than global GDP over the previous 15 years, with estimates of the size of the digital economy ranging from 4.5% to 15.5% of world GDP.[20] The digital economy almost doubled in size between 2000 and 2019.[21] This has positively affected mainly industrialised countries, while developing countries lag behind in benefiting from this trend.

Some of the risks generated by the digital transformation process are linked to the gaps in access and capacity leading to developing countries and communities being excluded. Oxford University's Pathways for Prosperity Commission found that: "The use of digital technologies will not automatically lead to the inclusion of the poor and marginalised…it [is] clear that a large proportion of society is being left behind by technological change."[22] One of the notable consequences of tech-driven growth acceleration is a possible increase in income inequality, a key barrier to inclusive, sustainable development.[23] It is therefore imperative that we work in partnership with developing countries and key stakeholders to make digital transformation of the economy as inclusive and equitable as possible.

From a different perspective, a failure to integrate digital technologies across all sectors of the economy risks failing to harness the full benefits of digital transformation and its potential dividends. To fully realise the benefits of digital transformation requires the integration of digital technologies and processes into extractive (minerals, raw materials) and primary production (agriculture), into secondary production (food-processing and manufacturing), and into the tertiary service and trade-based economy (e.g. financial services, commerce). A gap in digitalisation of existing products and services across these sectors may mean that they lag behind, do not deliver full returns and become hurdles in integrated supply chains.

The industries that are critical for developing countries and emerging markets, and shape the experience of citizens' everyday lives, also span hospitality and tourism, healthcare, retail, education, financial and professional services, and transportation. Digital is changing the way these industries work. Even where local enterprises do not have the capacity to digitalise themselves, they can now outsource some of their business processes to digitally-enabled BPO[24] companies to increase efficiency and competitiveness, introducing new opportunities and changing the daily lives of individuals.

For example, precision agriculture[25] is being enabled by digital technologies that transform the entire process, from production to consumption. This innovative transformation of the digital agricultural ecosystem places previously unaffordable and complex equipment into the hands of even the lowest-income farmers, and amortizes the cost across the entire value chain by selling on valuable data to distributors and buyers, allowing farming advisory services to be delivered in a bespoke fashion to farmers at no cost to them.[26] Digital transformation of these services has the potential to be profound, changing the way they are designed and delivered.

To support local digital ecosystems to thrive and to ensure digital transformation delivers inclusive and sustainable growth in the developing world, we will work in partnership with our partner countries to strengthen their *digital economy foundations* through our policy, programming and investment initiatives, by adopting a systemic approach:

- At the *firm* and *supply chain* level, we will help enhance digital and business skills needed by local tech start-ups, scale-ups, digitally-enabled MSMEs (medium, small and micro-scale enterprises), as well as logistics and business support services, for example through the UK Tech Hubs network as part of the Digital Access Programme (DAP).
- In key economic *sectors* prioritised by our partner countries based on their specific context and endowments, we will support sectoral diagnostics to explore the most proportionate and effective models and innovations for sectoral digital transformation, for example through the UK programmes focused on priority sectors such as agriculture and manufacturing in Africa.
- In the *financial services* market, we will build on the UK's leadership in digital financial inclusion, working with partners to demonstrate the viability of innovative digital finance solutions (especially in the green finance space) and support financial infrastructure, regulatory and policy change to help countries both encourage innovation and protect market actors and consumers, for example through our partner Financial Sector Deepening Africa (FSDA).
- With regards to *investment* in telecoms and digital infrastructure, we will work with existing infrastructure programmes as well as with British International Investment (BII), Mobilist and other initiatives in the British Investment Partnerships' toolkit, in order to encourage investment into digital infrastructure and contribute to closing the digital divide between and within countries.
- In the overall *business environment*, we will support the improvement of local digital ecosystems through reforms of relevant policies, legislation and regulations, and the capacity building of relevant institutions and stakeholders, for example through the Africa Technology and Innovation Partnership (ATIP) and the Digital Access Programme (DAP).
- In the digital *trade and e-commerce* space, we will help boost the trading capacity of partner countries by promoting their digital transformation, e.g. through partnering with UNCTAD[27] on supporting national e-commerce strategies and building on our partnership with BSI[28] on digital trade standards.
- From the perspective of digital transition of *labour markets*, we will work with our partner countries as part of their broader digital economy planning, to support horizon scanning and design risk management strategies with regards to the digitalisation and displacement of jobs, and to improve regulations as well as industry standards for the gig economy – for example by complementing the work of Oxford University's Internet Institute and GIZ on the FairWork Project.

Case study 2.1 – British International Investment (BII) and telecoms infrastructure in Africa

Safaricom: In 2021, BII partnered with the British company Vodafone, in the Global Partnerships for Ethiopia consortium, to foster better and more affordable access to digital services in Ethiopia. The telecoms network was switched on by Safaricom in October 2022, providing mobile services in 11 cities. The investment will improve quality and affordability of mobile services for 49 million users, and is estimated to boost Ethiopia's GDP growth by 4.6% by 2032.

Liquid Telecom: Liquid Telecom is Africa's largest independent fibre, data centre and cloud technology provider, with a network stretching more than 70,000km. In 2018, BII made a $180 million equity investment to Liquid Telecom, and in 2020, committed a further $40 million. These links are helping 17 million people have access to much faster and more reliable connectivity, at a lower cost.

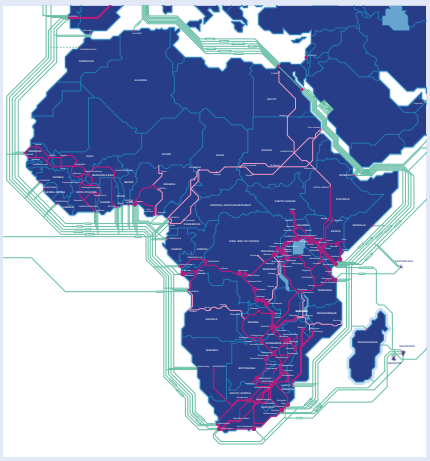


Image credit: Liquid Intelligent Technologies

Case study 2.2 – Strengthening local digital entrepreneurship through the UK Tech Hubs

The Digital Access Programme's UK Tech Hubs in South Africa, Nigeria, Kenya, Brazil and Indonesia support digital entrepreneurs, SMEs and tech start-ups across their respective local digital ecosystems. They find innovative solutions to local development challenges, driving the growth of the digital economy, and facilitating the creation of local skilled jobs, in particular for women, marginalised youth and PWDs. In 2023, the Tech Hubs collectively trained around 55,000 local tech entrepreneurs (80% of them women), supported and mentored around 10,000 digital SMEs, and engaged with almost 2,000 stakeholders to create opportunities for business partnerships and attract investment into the local digital enterprises of the five partner countries. They have also advocated for policy and regulatory reforms, in order to create a more conducive business environment for digital enterprises.

The Funder to Founder initiative supported by the UK-South Africa Tech Hub hosted pitching events for local founders.

Photo credit: Ventures 54

Case study 2.3 – Promoting standards for inclusive digital transformation with BSI

Our partnership with the British Standards Institution (BSI) supports developing and emerging economies to advance their digital transformation through the use of international standards. A 'standards-based digitalization toolkit' has been developed and rolled out in Kenya, Nigeria, Brazil and Indonesia, building digital trust and facilitating digital trade and e-commerce, also in collaboration with UNCTAD. The toolkit includes a digitalization needs assessment, in-country strategy sessions, capacity-building standards training and both policy and practical workshops, all tailored to the needs of each country and relevant institutions. Following the success of the project to date, the toolkit is being rolled out further in Vietnam.

Digital standards toolkit in action: capacity building training held in Brazil

Photo credit: BSI

Case study 2.4 – Partnering with ITU to promote digital inclusion

As part of the UK Digital Access Programme, our 'digital inclusion partnership project' with the International Telecommunication Union (ITU) promotes effective regulation, greater investment and innovative models for community-level and school connectivity in underserved areas within Brazil, Indonesia, Kenya, Nigeria and South Africa. The project includes four components: regulatory analysis, framework and tool development; promoting sustainable models; creating a more conducive environment for investment; and advancing digital skills. For example, we have supported the Kenyan telecom regulator and stakeholders on their Universal Service Fund through research and capacity building; in Brazil we have provided recommendations on inclusive connectivity that were captured in the National Strategy for Connected Schools; in Nigeria, we have assessed digital skills supply and demand, and provided a cost analysis study on telecom infrastructure; in Indonesia we have delivered regulatory analysis and capacity building for inclusive digital transformation; and in South Africa we have shared knowledge on 5G and spectrum management, as well as conducting research on sustainable connectivity and digital skills models.[29]

Telecoms stakeholder workshop in Kenya

Photo credit: ITU

Case study 2.5 – Building a conducive business environment for digital enterprises

The Africa Technology Innovation Partnership (ATIP) and our Research & Innovation Hubs, in collaboration with the Digital Access Programme's UK Tech Hubs in South Africa, Nigeria and Kenya, delivered a multi-country initiative in 2021-2022 to improve the digital ecosystem for local tech start-ups and digitally enabled MSMEs, through the promotion of the 'Start-up Act' legislation. This aims to make it easier for startups to establish, grow and scale. The project directly supported the local associations that represent the local entrepreneurship ecosystem, i.e. investors, incubators, accelerators, and founders, uniting to support local economic development by encouraging the adoption of policies that benefit high-growth start-up entrepreneurs.

Case Study 2.6 – Promoting inclusive digital finance through FSD Africa

Established in Nairobi (Kenya) in 2012 by the UK government, Financial Sector Deepening (FSD) Africa is a specialist development agency working across more than 30 African countries to address challenges stopping finance getting to where it is most needed, including by leveraging innovative solutions such as 'fin-tech' and digital financial services (DFS). FSD Africa has helped mobilise £2.7bn of capital, increased access to financial services for 12 million people and to basic services for 4.7 million. FSD Africa strengthens financial systems by facilitating core market infrastructure, like the Ethiopian Securities Exchange (ESX). Through its investment arm FSD Africa backs high-risk high-impact projects with finance ranging from start-up grants to scale-up investment capital. These include CaVex, the digital carbon exchange; and MFS Africa backing novel financial solutions that have lowered the cost of remittance flows.

A female farmer resident of the Orwu Community, Etche Local Government of Rivers State, Nigeria, spoke about the challenges she experiences due to lack of electricity. She welcomed the installation of a new solar mini-grid by Darway Coast Nigeria Ltd, a provider of digitally enabled off-grid solar and hybrid energy solutions, backed by UK Development through a green bond guaranteed by InfraCredit with technical assistance from FSDA.

Photo credit: InfraCredit

Case Study 2.7: Promoting health innovation through Artificial Intelligence

Artificial Intelligence (AI) is a promising tool to accelerate health R&D and reduce the cost of drug development. For example, the Drugs for Neglected Diseases initiative (DNDi) was one of the first collaborators with Google DeepMind, utilising AI to explore new drug targets for neglected tropical diseases (NTDs) such as leishmaniasis and chagas. They are partnering with Benevolent AI, Atomwise, and others to rapidly identify new compounds and pathways for treatment; and to look at the potential to repurpose existing drugs for diseases such as dengue. Similarly, the Medicines for Malaria Venture (MMV) is using AI tools to combat malaria. They developed the Malaria Inhibition Prediction (MAIP) tool, which is a free open-source learning model that predicts compound activities and increases the 'hit rate' from screening in drug development by 6-12 fold. MMV is working with various AI collaborators, including Iktos, Novartis, Ersilia, and AstraZeneca. MMV has also developed a novel strategy to deliver oral antimalarials with long human half-lives, which can be integrated into the AI design process. Additionally, MMV's Open Access human pharmacokinetic and dose prediction tool, MMVSola, offers an opportunity for AI drug discovery against any pathogen.

DNDi's Head of Drug Discovery in Latin America (on the right) with a researcher at UNICAMP lab in Campinas, Brazil, working on innovative drug discovery for leishmaniasis and chagas, including through AI.

Photo credit: Xavier Vahed/DNDi

Spotlight – Artificial Intelligence

Recent advances in the capability of Artificial Intelligence (AI), especially generative AI, have led to new opportunities and risks for developing countries. AI has the potential to increase the effectiveness with which a wide range of services are delivered. Generative AI could be disruptive in ways that earlier types of AI were not. Large Language Models (LLMs) are capable of a much broader set of tasks, and these capabilities are likely to improve rapidly. Many tasks that require the generation or understanding of language are going to be much cheaper and faster, creating the potential for a significant leap in the capability of service provision. Given how large the unmet demand for skilled tasks and services is in developing countries, this is potentially transformative.

AI is supporting doctors to diagnose disease faster and more accurately, and the discovery of new medicines and vaccines. AI technologies can support global health through better monitoring of air quality, environmental monitoring or water management. AI offers the promise of improved learning for children through digital personalised learning applications. LLMs, combined with speech technologies and image generation could provide information for people with visual disabilities or low literacy levels, e.g. videos and images accompanied by live narration.

However, the benefits of AI are not automatically evenly distributed across the world. Without rapid, careful and concerted policy efforts, the onset of AI could substantially exacerbate existing inequalities between and within countries. Developing countries risk being left further behind and unable to harness AI to accelerate the SDGs. Increased misinformation and disinformation could increase the chances of conflict, societal violence and unrest. In particular, gendered online harassment and abuse threaten women's participation in society and the economy.

The UK has been researching, piloting and scaling AI applications for international development for over ten years. We have supported the use of AI to develop better treatments for TB and malaria, predict air strikes in conflict areas, help people living with disabilities access education, enable climate modelling and weather forecasting, improve access to clean energy, and monitor misinformation during elections. AI is showing real potential to bring the best science to the most neglected, by accelerating drug discovery, contributing to the SDGs, and above all saving lives.

We will promote safe, secure, responsible and inclusive AI in our development work, including in partnership with the private sector.

We will continue participating and help broaden the Global Partnership on AI (GPAI) hosted by the OECD, in particular by supporting the participation of developing countries, to contribute to the international debate on 'AI for good' and on AI risks; and will collaborate with UNESCO on their work on AI for good.

We will implement a new flagship *AI for Development Programme*, aimed at building partner countries' capacity to develop and apply AI responsibly, initially focused on Africa, alongside an uplift of investment in AI across our research portfolio:

- The programme will support at least 8 responsible AI research labs at African universities, funding post-graduate training and fellowships in AI in African universities.
- It will help at least 10 countries create sound regulatory frameworks for responsible, equitable and safe AI, through fostering responsible AI governance to help African countries mitigate the risks of AI and adapt their economies to technological change.
- It will help bring down the barriers to entry for African AI innovators and invest in innovators building models with data that accurately represents the African continent, using home-grown skills and computing power.
- It will help African countries influence more directly how AI is used to further the SDGs.

2.2 Digital transformation of government

Digital tools are not only transforming markets – they are rewiring the relationship between citizens and the state, as well as changing the demands placed on governments seeking to operate effectively in a digital age. The definition of digital transformation of government has also evolved, as digital technologies have transformed processes and introduced new ways of conceiving governance and public services.

Digital transformation of government is more than just the digitisation of existing government services and the provision of public services online. The OECD describes a spectrum of digital use within government, with full 'digital government' transformation defined as "using digital technologies and data to rethink the design and implementation processes of public services and policies in order to achieve more citizen-driven approaches."[30]

The DDS is focused on two interlinked aspects of digital transformation of government:

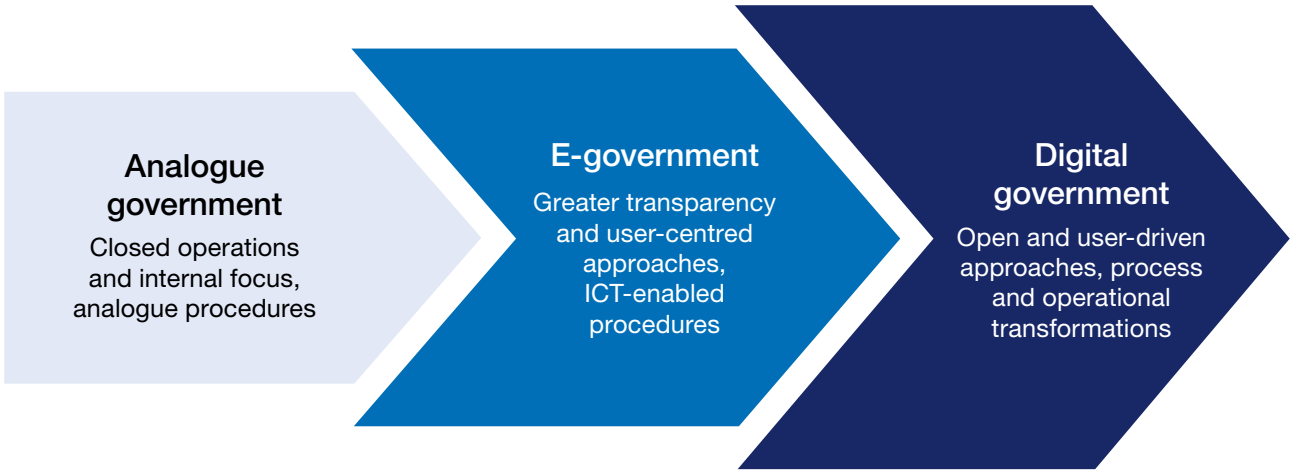
1) *The growing demands placed on governments to shape and foster an enabling environment that sustains rapid digitalisation across their countries, using a 'whole-of-government' approach.*

   Digital transformation in this context is not only about technology. It hinges on the scope, focus and quality of policies, regulations and standards, and on the capacity of relevant institutions to drive the adoption of digital tools and processes that enable government functions and the relationship with citizens and organisations. The crosscutting nature of digital transformation also challenges the established, siloed approach common to government, in which sectors such as the economy, health, agriculture, and education are dealt with by dedicated departments. Digital transformation instead demands a comprehensive, whole-of-government approach that is often a challenge to ingrained organisational structures and remits. In brief, governments play a critical role in digital transformation in two primary ways: (a) creating appropriate policy, legal, and regulatory frameworks; and (b) supporting both 'hard' and 'soft' digital infrastructure.

2) *The growth of 'digital government' and the ways that digital technology and systems are changing how governments function, in both delivery of services as well as in planning and decision-making.*

   Digital transformation of government involves both the digitisation of government processes and the provision of public services online. The public and businesses increasingly expect the services provided by government to be as easy to use, accessible and responsive as private digital services. Indeed, meeting this expectation – transforming government from analogue to digitised e-government to fully digital government – can offer huge benefits. By placing core services online – from drivers' licenses and tax collection to business registration – governments can streamline delivery and make services more responsive. However, digital transformation of government services has to take into account exclusion risks driven by digital divides, issues with accessibility for specific groups (e.g. people living with disabilities), as well as the need for context-specific user-centred design and prioritisation of digital tools and platforms.

Figure 2.1: Digital transformation of government



Source: adapted from OECD, 2020

Digital transformation is enabling governments to provide better services to their citizens including through innovative approaches such as *Digital Public Infrastructure (DPI)*.[31] This can improve the efficiency, effectiveness and transparency of key services such as social protection, voter registration or access to financial services.

Case study 2.8 – Supporting national digital transformation planning

In 2022, the UK Digital Access Programme partnered with the Nigerian Economic Summit Group to provide technical assistance for the Federal Ministry of Communications and Digital Economy and respective state governments on State-level Digital Economy Plans focused on digital transformation for women economic empowerment, job creation, and provision of education, health, social protection services. In alignment with the National Digital Economy Policy and Strategy 2020-2030, country stakeholders also received support for the Broadband Connectivity Expansion Strategy; and state government ministries benefited from tailored digital training and digital literacy campaigns through local CSOs and digital skilling providers.

Case study 2.9 – Creating an enabling environment for telecoms expansion

UK technical assistance to the Nigerian Communications Commission (NCC) and the Federal Ministry of Communications and Digital Economy since 2019 led to the launch of Nigeria's National Broadband Plan for 2020-2025 and the creation of digital policy frameworks focused on: increasing basic digital literacy and skills coverage (up to 70% by 2025 and 95% by 2030); closing the digital gender gap by 5% by facilitating digital access for more than 5 million women; extending digital access penetration to 70% of Nigeria's population with special consideration to people living with disabilities; and promoting internet affordability in line with relevant UN recommendations by 2027. The plan was designed to extend digital access for and promote digital literacy and employability among more than 87 million Nigerians. As part of the same programme, we supported the improved administration of Right-of-Way (RoW) regulation affecting digital access costs and viability of backbone expansion to underserved areas, working with NCC, the Nigeria Governors' Forum and local specialist firm Greenfields Law. The technical assistance and facilitation package delivered significant results, with six digitally-underserved Nigerian states announcing a reduction of between 90% and 100% of RoW charges in May 2020, telecom operators passing on those savings to customers through more affordable connectivity, and infrastructure investors attracted to those states where the business environment is more conducive.

Digital enablers of public services: social protection, education, health

One of the most significant public services to be transformed by digital technologies are the social safety nets that form part of state social protection systems, with the introduction of new information systems, financial services, and grievance and accountability mechanisms.

A key area of transformation in social protection provision is the increasing use of digital financial services, through the use of mobile phones and the Internet. Digital technologies and ICT can increase the efficiency and cost-effectiveness of social protection implementation, particularly at scale, and can offer more flexibility, improve access, and empower the disadvantaged, particularly women. There is a need to focus on access and provision for excluded groups, and on users' rights (including human rights). However, risk management needs to be built into the design; and the principle of 'do-no-harm' needs to be considered carefully in digital social protection initiatives.

As part of our effort to leverage digital transformation processes that enable and amplify social protection outcomes:

- We will continue to champion gender-responsive and disability-inclusive cash transfer and social protection programmes in low-income countries and humanitarian contexts.
- We will promote the use of gender and social inclusion analysis in social protection system design, to understand barriers and risks to individuals accessing and benefiting from digitalised social protection systems.
- We will continue to work closely with our government and multilateral partners to support and influence their approaches to social protection policy and programming, encouraging that, where digital approaches are used, they are designed to overcome gender and inclusion related barriers, including geography and digital literacy.

We will continue to support digital transformation of government and social services to enhance health and educational outcomes in our partner countries, through:

- Conducting research and drawing evidence to empower decision-makers in developing countries to plan and fund effective technology-enabled interventions that improve foundational learning for all children; and support the education system through inclusive school connectivity, digital transformation, and digital skilling of teachers and learners.
- Working in partnership with key stakeholders to identify top priorities, opportunities and challenges in the digitalisation of education and health sectors, with an emphasis on positive systemic change and on sustainable and scalable technology and organisational models in areas such as Ed-Tech, digital literacy, digital health services and telemedicine.
- Including digital policy and digital learning components in relevant health and education programmes, and using these as a platform for G2G (government-to-government) peer learning on policy and regulatory reforms and on public investment in digital transformation of health and education services.

Case study 2.10 – Enhancing digital health and telemedicine in Indonesia

Technical assistance delivered in collaboration with Oxford Policy Management, as part of the wider UK Digital Access Programme, supported the Government of Indonesia's reforms of the policy and regulatory frameworks for digital health services, working with the Ministry of Health, Ministry of ICT, and Indonesian experts. This was complemented by digital innovation capacity building from local telemedicine non-profit provider, Sehati, to improve access to healthcare facilities. They developed a TeleCTG device and application with telemonitoring features that connect with other digital systems to support foetal wellbeing diagnosis and early detection of maternal mortality risk factors. Sehati's standalone model application has been tested for 12 months in the Tangerang District community health centre. In that time, over 2,300 beneficiaries (pregnant mothers) were monitored and received consultations on pregnancy risks using the results from the digital application. This helped decrease the number of maternal mortality cases by 71%, increased the ability to detect risk factors by 88%, and supported early referral for 62% of the patients. The project was rolled out in 14 community healthcare centres, and its model has been replicated by other Indonesian organisations.

A midwife uses Sehati's TeleCTG digital device during an antenatal check-up in South Tangerang, Indonesia

Photo credit: Sehati

Case study 2.11 – EdTech Hub: leveraging digital transformation for educational outcomes

Education Technology (EdTech) is the use of digital, data or technology anywhere in the education system – be that at the ministry, in the classroom or at home. Careful use of EdTech (Education Technology) can transform education systems for marginalised children. However, this is not a silver bullet, and interventions need appropriate adaptation to the context. Initiated by the FCDO, EdTech Hub is a research partnership with the World Bank, Bill & Melinda Gates Foundation and UNICEF. Through research and policy organisations, EdTech Hub does research, supports innovation, and works with decision-makers by providing the evidence to make well-informed choices about technology solutions in education. For example, in June 2022, floods affected 33 million people in Pakistan. Requested by the Government of Pakistan, EdTech Hub conducted rapid research involving flood-affected parents and teachers to inform continuity plans for children's education. This showed that devices that communities already had access to, like basic mobile phones, were more effective in reaching students than laptops. It found the use of familiar social media platforms improves participation, psychosocial support, and access to learning content. EdTech Hub's findings guided the government's EdTech response, supporting 3.5 million children disrupted. EdTech Hub published a Global Public Good on EdTech deployment in climate catastrophes through the Global Digital Development Forum, cited in flood research by the Malala Fund and World Bank.

Bangladesh Sandbox project to test EdTech interventions

Photo credit: Agami/UNICEF/EdTech Hub

Spotlight – Digital Public Infrastructure

Digital Public Infrastructure (DPI) refers to solutions and systems that enable the effective provision of essential society-wide functions and services in the public and private sectors. This includes but is not limited to digital forms of identification and verification, civil registration, payment (digital transactions and money transfers), data exchange, and information systems (including sector-specific, i.e. health or education). A country's digital public infrastructure may include implementations of multiple proprietary and/or open-source solutions, including Digital Public Goods (DPGs).

Countries are increasingly turning to Digital Public Infrastructure (DPI) as an approach to improve efficiency, speed, flexibility, inclusion and transparency of public and private sector functions and services. However, there are also associated risks as DPI can increase the capability for surveillance, decrease privacy, undermine accountability and exacerbate exclusion of vulnerable groups. If suitably designed and implemented, DPI becomes an important component of inclusive, responsible and sustainable digital transformation, by creating a foundation for more effective delivery of public and private sector services.

DPI can also encapsulate tech values and standards supported by the UK and its partners, such as privacy, transparency and security. As government institutions grapple with the design and implementation of new forms of DPI for public service delivery, they are discovering that they face similar challenges with similar solutions. A DPG approach to DPI (e.g. based on open source, open data, open standards, open models) has emerged as a way of reducing costs and duplication, and increasing interoperability.

The UK is advocating for the use of DPGs in the development of inclusive, responsible and sustainable digital public infrastructure. We will continue to influence the international debate on DPI and their role in the achievement of the SDGs through fora such as the G20 and the UN, through our thought-partner Digital Impact Alliance (DIAL) and by contributing our insights and evidence as members of the Advisory Board of GovStack.

We will develop a new knowledge management project to share the UK's experience on digitalisation of public services, building on our programming experience of supporting digital transformation overseas, including in partnership with our Government Digital Service to promote a G2G learning approach with our partner countries.

Proving one's identity is essential for access to rights and services including banking, schooling, healthcare, government support and voting. Research estimated that there were around 850 million people globally unable to prove their identity in 2021; and an estimated 35% of women in developing countries do not have an ID, limiting their access to critical services and participation in economic and political life. On the other hand, 161 countries now have digital ID systems, reinforcing the need for robust privacy and data protection safeguards (World Bank, 2023).

The Identification for Development Programme (ID4D), implemented by the World Bank with the support of the UK and other international donors, is helping to address these issues. Through producing evidence and technical assistance on best practice, the ID4D initiative is enabling over 60 partner governments and regional organisations in developing and emerging countries establish, implement, and realise the development benefits of digital identification systems.

Having endorsed the *International Principles on Identification for Sustainable Development*, we will continue to promote inclusive and responsible digital identity solutions, for example through supporting the ID4D Programme and by helping disseminate its findings and tools in the partner countries where we implement digital development initiatives.

2.3 Digital transformation of society

The increased access to digital technologies, particularly mobile phones and the internet, allow individuals to express themselves and to participate in social, economic, and political life. Digital transformation has introduced new opportunities and challenges to the realisation of rights around the world.

We define *digital transformation of society* as the *fundamental changes to the structure and practices of social organisation and relations through the increasingly pervasive use of digital technologies and platforms to mediate social life*. Within this context, we focus on three related areas:

a) The new ways that individuals use digital tech to access information and shape their world view, as well as changes in their trust in information and institutions.

b) Digitally-mediated changes to social structures, relationships, and norms.

c) Shifts in the social contract, particularly about citizen demands, decision-making, and rights – including with regards to democratic participation.

Digital technology has disrupted traditional sources of information and how people access information, as well as trust in sources of knowledge and institutional authority. These shifts have implications for decision-making in politics and the electoral process, and key areas such as health, science, and the law. Digital technology has also led to increased vulnerability to misinformation and disinformation, belief in false science, and distrust in law and legal institutions. Digital transformation mediates social relations, changing how individuals interact and who they interact with, increasing exposure to different norms and values. More opportunities to interact with people who uphold different views can lead to more dynamic social norms and values, particularly on attitudes to issues such as gender and autonomy; but a reaction to these dynamics can also strengthen conformity to existing social institutions and generate resistance to inclusive practices and values.

Digital transformation is influencing society in deep and profound ways – from changes to news media consumption[32] to the way relationships are initiated.[33] The implications are also affecting the 'demand side' of developmental change: the formation of social movements and the changing relationship between citizens and the state, including opportunities for citizen voice in accountability and its impact on rights.

The concept of 'the network society' describes a situation where "the key social structures and activities are organized around electronically processed information networks", which modifies "the operation and outcomes in processes of production, experience, power, and culture".[34] The Internet has introduced new dynamics to social movements and the ability of civil society to self-organise for collective action. Digital transformation creates new opportunities for individuals and organisations to articulate their needs and raise their voices to have a say in how decisions are made that affect their lives. This has paved the way for participatory governance and accountability efforts, changing the way politics is done.[35]

Digital technologies also provide civil society and social activists with new ways to expand the speed and scale of their outreach to citizens, their capacity to organise and overcome collective action problems, and their ability to demand and access government data on service delivery, budgets and spending.

Challenges to the success of using digital technologies in participatory governance and social accountability are the need for citizens to be able to trust that their personal information is

collected and used in ways that are secure, transparent, and accountable, and that governing institutions demonstrate respect for fundamental human rights. Technologies have also become a source of government coercion and repression in many countries, and digital platforms play an ambivalent role in social and political discourse.

A further challenge to the role of digital in governance and accountability is the proliferation of fake news and disinformation. The Open Government Partnership, an effort to advance open approaches to government for example through the use of technology, notes that "challenges including fake news, biased systems and the growing assaults on privacy are gradually contributing to the erosion of democratic spaces".[36]

Through the implementation of the DDS, the UK is committed to support digital transitions of partner countries' societies that enable civic and democratic participation, promote access to trusted and locally-relevant information, amplify the voice of the marginalised, uphold human rights and strengthen the capacity of local civil society to leverage digital technologies to self-organise and address development challenges.

Case study 2.12 – Promoting citizen engagement in digital journalism in Kenya

Our partner Busara Centre for Behavioural Economics promoted citizen digital reporting ('citizen journalists') and technology-facilitated production of local news in Kenya, with the support of the UK Digital Access Programme. Busara conducted qualitative research and human-centred design to understand and assess user needs, and barriers to accessing locally relevant and accessible content in Kisii, Laikipia, Kirinyaga, and informal settlements in Nairobi. Busara held focus groups and conducted behavioural barrier mapping with local communities to identify and understand the challenges in accessing meaningful information online. The project published an analysis of "Locally-Relevant Digital Content for Underserved Communities in Kenya",[37] having tested and documented three models for sustainable creation and dissemination of development-oriented digital content, based on the assessments and stakeholder engagement, with relevant considerations for rural and national rollouts.

Busara field officers facilitating a mobile lab experiment in Kirinyaga County, Kenya

Photo credit: Busara Centre for Behavioural Economics

Case study 2.13 – Building inclusive digital skills with the British Council

The Skills for Inclusive Digital Participation (SIDP)[38] is a collaboration of FCDO with the British Council, as part of the wider UK Digital Access Programme (DAP). The project has created opportunities for digitally excluded individuals (PWDs, youth and women from disadvantaged backgrounds) to develop the skills they need to participate fully in the digital economy and society, including through promoting access to online resources for digital employability and entrepreneurship. Working with Community Level Trainers (CLTs), and with support from Expert Level Trainers (ELTs), SIDP provides basic and intermediate digital skills training in target locations in Indonesia, Kenya, and Nigeria. The training is based on bespoke materials, co-created with the ELTs from each country, tailored to the needs, interests, and preferences of the target groups and aligned with diversity and inclusion best practices in digital literacy. The materials have been disseminated to 157 local institutions (56 in Nigeria, 251 in Kenya, 40 in Indonesia), e.g. in schools, vocational training centres, digital stakeholders. By February 2024 in Indonesia, Kenya, and Nigeria, SIDP trained a total of 17,477 beneficiaries in basic and intermediate digital skills, supported by a pool of 542 specialist community level trainers and 287 grantees and downstream partners. In South Africa, the project supports digital guidelines development for schools. It has collaborated with government agencies in ICT, digital economy, and education to enhance digital transformation through policy reforms.

Youth and persons living with disabilities from Ambon City, Maluku Province, attending an intermediate digital skills training delivered by the SIDP project in Indonesia.

Photo credit: British Council

Spotlight – Digital Democracy

Increasingly, people exercise their rights, access and share information, express views and hold governments to account in the digital and online space.

The UK works with international partners to strengthen international norms on human rights and fundamental freedoms in the digital age; and to reinforce support for a free, open, interoperable, secure and pluralistic Internet that enables inclusive participation in democracy and where people can exercise their rights.

Internet shutdowns and restrictions undermine democracy, human rights and fundamental freedoms. In some developing country markets, technology dominance by authoritarian states has brought restrictive governance of crucial digital infrastructure.

We will help shape an international order in which all citizens are well informed, able to participate in democratic processes and enjoy their rights in offline and online public spaces, as well as freedom of expression; and we will promote an information ecosystem that supports accountability and inclusive deliberative democracy.

The UK commits to an open, free, global, interoperable, reliable and secure Internet; and to ensuring emerging tech supports, rather than erodes, the enjoyment of democracy, human rights and fundamental freedoms. Working collectively with international partners, civil society and the tech sector is critical in ensuring that the online world and technologies promote freedom, democracy and inclusion, and protect human rights and fundamental freedoms.

We will strengthen our collaboration in the multistakeholder spaces that support digital democracy. We will enhance our advisory support to the Freedom Online Coalition (FOC) and will bid to continue as a member of the FOC Steering Committee and to maintain our role as co-chairs of the Taskforce on Internet Shutdowns (TFIS).

We will support our overseas network to better understand the threat posed by information disorder through digital platforms. In doing so, we will identify international best practice and increase our understanding of information disorder in elections, independent media as well as gendered disinformation impacts on women's political empowerment and participation in electoral processes.

We will champion the importance of a vibrant, independent, and pluralistic civic space online and offline, where people can exercise their freedoms. We will work in collaboration with other donors, civil society, academia and the private sector to leverage the opportunities and mitigate the risks that digital transformation provides for civil society and civic space.

We will support open and accountable use of emerging digital technologies, especially the need for democratic and human rights safeguards. This includes grant support for the Open Government Partnership to help enable open and accountable use of emerging digital technologies by driving digital governance reforms in ten countries (Ghana, Indonesia, Kenya, Nigeria, Dominic Republic, Armenia, Colombia, Zambia, the Philippines and Ukraine), accelerating collective action and norm-raising on digital governance and increasing impact through better connection between global pledges and country action.

Chapter 3 – Digital Inclusion: leaving no one behind in a digital world

The benefits of digital transformation are not evenly distributed. A third of the world's population is offline, and that is concentrated within the poorest and most marginalised groups.

Leaving no one behind in a digital world is about ensuring digital inclusion for even the most marginalised and underserved communities. Access to digital technology is a necessary but not sufficient condition for being digitally included. Key factors that affect the potential for, or nature of, being digitally included are listed below:

- *Availability*: in terms of connectivity, coverage and quality. If the connection itself is poor or unreliable, it will limit the extent and nature of access and usage. It should also be noted that coverage does not necessarily mean access.
- *Affordability*: of connectivity, data and/or device costs, ensuring that low-income communities are not priced out of participating or made to pay a 'poverty premium' for lower data use.
- *Safety*: having an online environment that is (or perceived to be) safe, secure and open;
- *Skills*: having the necessary skills, both digital (functional, technical and behavioural) and literacy skills, needed to fully and safely engage in the digital world.
- *Content*: accessing content that is locally relevant and accessible (i.e. in local languages and where the needs of all types of users have been included in the design and delivery of digital programmes and services).
- *Norms*: gender and social norms which affect perceptions about who and how should operate online.

Underpinning the factors outlined above is the importance of a conducive enabling environment. This means having the appropriate digital policies, legislation, regulations, standards and capacity of relevant institutions to ensure market competitiveness and respect of rights, privacy, safety and security, as well as the necessary government platforms and services in place, to ensure citizens are digitally included.

Existing social and economic divides risk being amplified by uneven access to, and ability to make effective use of, digital tools and technology. Women and girls, people living with disabilities, the elderly, marginalised communities (for example due to ethnicity, class and/or race), rural populations, low-income urban communities, and those at the intersection of these groups, are most at risk of being left behind in a digital world.

Governments, the private sector, civil society, citizens and development partners all have a role to play in addressing these barriers and enabling more inclusive, safe and self-sustaining digital economies and societies. Digital inclusion requires a holistic approach to solving the problem – for example:

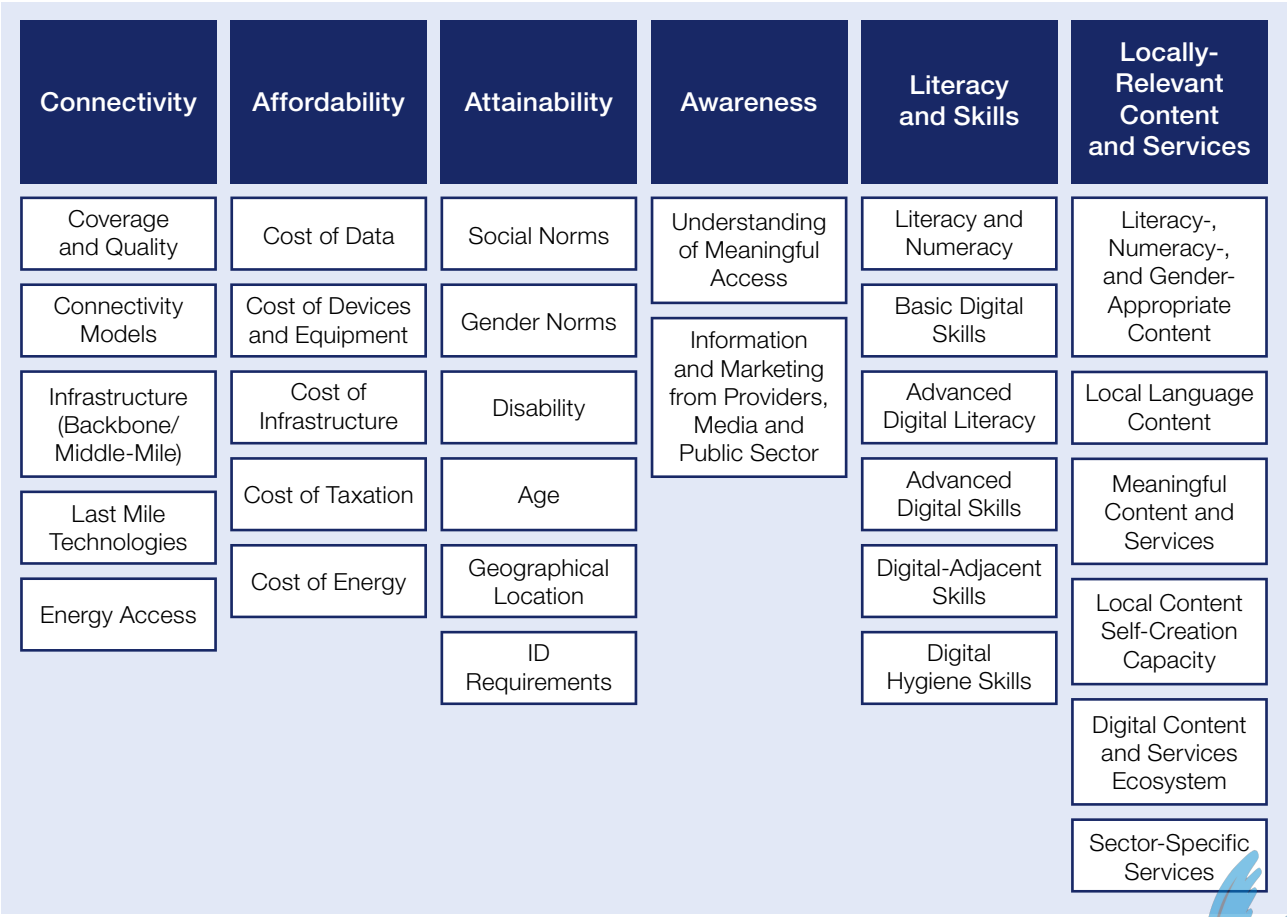
- The government can shape the digital enabling environment through establishing fair and progressive policy, regulation and legislation to govern rights, privacy, competition, safety, security as well as drive digital skills development. Universal Service Funds can help enable digital inclusion through infrastructure investments; and the digital transformation

of government can help rethink how government provides accessible and inclusive digital services to citizens.

- The private sector can utilise innovative, inclusive technology and business models to facilitate affordable last-mile connectivity, address issues relating to cost of data and devices, and accelerate digital skills and content development within a local tech ecosystem.
- Civil society can help support digital skills development, tackle harmful societal norms, and generate or facilitate locally-relevant digital content.
- Academia can help analyse and increase the understanding of digital exclusion drivers and possible solutions, sharing insights and evidence, and encouraging best practice; and the technical community can test models and share practical experience and guidelines to enhance effectiveness of digital inclusion initiatives.
- Development partners can ensure that all their work (and that of implementers) has a robust digital inclusion lens throughout the programme cycle, starting from identification and design of technology-related interventions.

The FCDO supports access to affordable and sustainable last-mile connectivity for everyone, digital literacy and basic skills, and locally-relevant digital content and services – through models that will last and can be taken to scale, and with a focus on marginalised groups (including women and girls, and people living with disabilities).

Figure 3.1: Key components of digital inclusion



Source: FCDO, 2021

Spotlight – Last-mile Connectivity

Digital connectivity is a key cross-cutting enabler of social and economic development. It underpins the achievement of all SDGs, going beyond SDG9's target on universal connectivity in LDCs. Inclusive connectivity is a foundational block of digital development, but the digital divide is real and persistent despite the progress made in recent years. It is estimated that the pandemic accelerated digital transformation by about 7 years, and countries became much more eager to find scalable solutions to the connectivity challenge. Partner countries are also paying attention to the quality of internet access, often adopting the international definition and targets of 'meaningful' connectivity – including measurement of coverage, access and use (by individuals, businesses and schools), affordability (less than 2% of GNI p.c.), quality of service (reliability, speed), digital skills, gender parity.

The world is still affected by a deep digital divide. Surprisingly, 2.6 billion people still do not have access to the Internet, including about 65% of households in the least developed countries (ITU, 2023) – with a high risk for underserved communities of being left further behind in a digital world. There is also a stark gendered digital divide, with women at least 19% less likely than men to access mobile connectivity (GSMA, 2023).[39] The connectivity gap is complex: it is not driven by only one single factor, therefore there is no one-size-fits-all solution. The divide is caused by a number of barriers and constraints: (i) lack of coverage in remote/low-income areas that do not attract investment; (ii) lack of affordability; (iii) limited digital literacy and skills; (iv) lack of cyber-hygiene/security and online safety; (v) social norms and physical barriers that prevent women, girls and persons living with disabilities from engaging in the digital world.

We need innovative models to reach communities that are excluded and underserved at the last mile, beyond the mainstream market frontier; and that combine connectivity with other elements of digital inclusion to enhance usage.

The FCDO is helping to close the digital divide gap by promoting inclusive, scalable and sustainable technology and business models for affordable last-mile connectivity and digital skills in partner countries, and by supporting policy and regulations and local capacity for digital inclusion. We will continue to adopt an integrated approach to promote last-mile connectivity:

a) *Supply-side*: connectivity technology and business models that are inclusive, scalable/replicable and sustainable (to address coverage and affordability). It is important to be technology-agnostic and consider different viable solutions (e.g. mobile broadband, last-mile technologies such as TV White Space, emerging satellite tech); and to consider context-appropriate business/organisational models, from mainstream operators to small-scale internet service providers (ISPs) to 'community networks'.

b) *Demand-side*: usage/adoption is driven by digital awareness, digital literacy and skills, cyber-hygiene and online safety practices; addressing social norms, reducing the gender digital gap; availability of locally-relevant digital content and services.

c) *Systemic level*: conducive telecoms policies, regulations, standards, licensing, 'dynamic' spectrum management, better use of Universal Service Funds; taxation of technology, infrastructure and devices, competition policies.

We will also adopt a multi-stakeholder approach, involving the public (international and bilateral) sector, the industry, organised civil society and research/innovation actors, as all these stakeholders are essential in closing the connectivity gap. It is particularly important to engage directly with government institutions (telecoms regulators, ICT authorities) and with the local and international private sector reaching the middle- and last-mile (large-scale operators, small-scale ISPs, community networks, local innovators) and energy providers (for off-grid and renewables solutions). The key question on the private sector side is what the business case is for operators to push their market frontier. Last-mile connectivity models need to make business sense, including in terms of profit, market expansion, social responsibility, sustainability objectives; and can be supported by strategic corporate partnerships. It is also critical to see local, community-based solutions like community networks as social enterprises that can achieve economic sustainability and serve last-mile users for the long-term. All of the above will help us deliver on our commitment to support at least 20 partner countries reduce their digital divides by an average of 50%, by 2030.

Case study 3.1 – Closing the digital divide through the Digital Access Programme (DAP)

Developing and emerging countries have often struggled to take advantage of the benefits of the digital economy because of limited or unaffordable connectivity, lack of digital skills, poor access to digital content and services, insufficient trust and resilience in the system, as well as limited capacity to foster digital innovations for development and social impact. The DAP, a UK cross-Government partnership, is working to address these constraints in partnerships with global and local organisations. It catalyses inclusive, affordable, safe and secure digital access for excluded or underserved populations in Kenya, Nigeria, South Africa, Brazil and Indonesia; and promotes digital ecosystems that stimulate innovations for local development challenges and create local skilled jobs. In July 2023 (latest Annual Review), the Programme had reached over 3,282 communities across 5 countries, and 10.2 million people had directly benefited from increased digital inclusion through scalable, sustainable interventions. The DAP facilitated 102 policy or regulatory reforms in crucial areas such as spectrum allocation, digital accessibility, and online safety; and has helped five partner country reduce their digital gap by over 26%. To date, 264 digital inclusion models have been tested and adapted to the local context. Amongst these, 'community networks' (fostered in collaboration with the Association for Progressive Communication,[40] a global non-profit organisation specialised in community-driven models for meaningful connectivity) have proved very effective in delivering affordable digital access in remote areas through low-cost, environmentally friendly, renewable-energy solutions.

A bamboo local telecoms tower for rural Internet access in Ciptagelar, Indonesia

Photo credit: Common Room

Spotlight – Women & Girls. Persons living with disabilities.

Digital inclusion of Women & Girls

Women and girls can benefit hugely from digital technologies – from female-led MSMEs turning to e-commerce to grow their businesses, to girls accessing new learning opportunities, to building movements that mobilise and amplify the voices of women and girls across the globe. Yet not everyone has these opportunities. Women in low-income countries are 12% less likely than men to have access to the internet rising to 33% in the least developed countries. Even if connected, women face affordability and social barriers, which means they are less likely than men to own their own mobile device, or regularly buy top-up data. The digital skills gap cause women to face barriers in navigating the internet and creating productive content, with men more likely to engage in political, social or economic activities online. Moreover women, girls and members of marginalised groups face staggering rates of technology-facilitated gender-based violence (TFGBV), which is a digital deterrent and causes harms to individuals and broader society.

The gender digital divide limits women and girls' ability to benefit from digital development and has wide-ranging impacts on cyber space and digital technologies for everyone. Diversity in the design, management and implementation of cyber space and digital technologies is essential to shape a fairer, safer and more prosperous world. Globally only 32% of data, tech and AI roles are estimated to be held by women. In developing countries, men are 2.7 times more likely than women to work in the tech sector and the broader digital economy. Without action on this gender bias, discrimination and exclusion will be further amplified through new and emerging technologies.

But gender digital divides are not inevitable.

We are committed to digital development interventions that are tailored to marginalised groups and underserved communities, for example: through supporting last-mile connectivity models, relevant content and services; by addressing social norms and behavioural barriers to digital inclusion; and by building women and girls' digital skills, online safety and cyber-hygiene awareness to facilitate their safe and secure participation in the digital world.

We will also redouble our efforts to promote digital employability of women, support female-led tech entrepreneurship opportunities, and generally facilitate women's participation in the digital economy and society, including through encouraging the relevant policy and regulatory changes that will create a more conducive business environment for gender digital equity.

Digital inclusion of persons living with disabilities (PWDs)

One in three people or more than 2.5 billion globally need at least one assistive product to lead productive, inclusive, and dignified lives. As the global population ages and the prevalence of non-communicable diseases increases, this figure will rise to 3.5 billion in 2050. However, access to assistive (including digitally-enabled) products can be as low as 3% in some low- and middle-income countries.

We will be a leading global voice on the inclusion of PWDs in digital development, supporting innovative Assistive Technology, digital accessibility standards, and inclusive, responsible AI.

We will deliver the commitments of the Disability Inclusion and Rights Strategy and the Global Disability Summits to provide greater voice, choice, and visibility for PWDs, to help them achieve their full rights and freedoms. This includes ensuring that PWDs have access to innovative, affordable assistive technology. We will share our experience on digital accessibility of government and private sector services for PWDs.

Chapter 4 – Digital Responsibility: enabling safe, secure, and resilient digital systems

A wide range of digital threats and harms can undermine development outcomes and put people at risk. The FCDO supports a safe, secure and resilient digital environment so that citizens, institutions and businesses in developing countries can manage down risks and challenges of an increasingly connected digital world. We want to increase trust in the use of digital technologies for social development and economic growth, through supporting online safety, combatting threats to data privacy, and developing confidence in the digital system through cybersecurity and cyber-resilience.

4.1 Online safety

Digitalisation has ushered in new ways to target and harm people, with greater speed, scale and reach. There is increased exposure to illegal and harmful online material and activity. Technology-facilitated harassment and abuse may cause psychological distress, trauma, physical and sexual violence, exploitation, and, in some cases, homicide or suicide. It impacts on how people engage at work, at school, and has a chilling effect on civic and political engagement. At the societal level, online harassment and abuse threatens our ability to build peaceful, open, prosperous and secure societies.

Large digital platforms tend to invest more resources in moderating content in Europe and the US, with fewer staff and AI models that can track and remove abuse that takes place in minority languages or in developing countries, heightening the risk of online harms for these populations. In developing countries, men are 2.7 times more likely than women to work in the tech sector and the broader digital economy, perpetuating biases and undermining a safety-by-design approach to addressing online harms. There may also be capacity gaps in the institutions or systems required to protect and support at-risk populations. The rapid pace of development of new and emerging technologies, such as new forms of AI, without sufficient guardrails, is of deep concern as these tools are being weaponised to increase the volume and ease of attacks.

Marginalised populations including women, children and LGBT+ persons are particularly at risk, as well as the communities that support them. An Economist Intelligence Unit report found 85% of women globally have witnessed or experienced online violence.[41] Children are exposed to a range of harmful online content and adult or peer contact. These include hate speech and violent content, sexual violence, cyberbullying, self-harm and suicide content, and exposure to or non-consensual sharing of intimate images by peers. Children's privacy is compromised as companies collect their data for marketing purposes. Of deep concern is the victimisation of children through the online production, distribution and consumption of sexual abuse material, or being groomed for sexual exploitation. A study across 13 countries in Africa and South-East Asia found up to 20% of children in some nations suffered from online sexual abuse.[42]

The FCDO is already supporting a range of initiatives and partnerships to actively promote online safety in developing countries. The UK's support for the Safe Online Fund seeks to make the Internet safer for children, part of our global response to tackling child sexual exploitation and abuse. The UK's Cyber Values Campaign is supporting the development of

an Early-Warning System for Violence Against Women Journalists, and the production of a Preliminary Landscape Analysis for the evidence on Technology-Facilitated Gender-Based Violence (TFGBV). Through the Conflict Stabilisation and Security Fund, the UK is supporting a project in Sri Lanka to better understand the drivers and impacts of online violence as a driver for conflict.

Despite the significant scale of the problem, technology-facilitated harms are preventable.

We will put a survivor-informed, inclusive, safety-by-design approach, together with the promotion and protection of human rights, at the heart of technological development.

We will improve users' digital skills, embedding online safety principles in our digital inclusion programming, alongside digitally-informed comprehensive sexual education, to help young users navigate risks and support ways to improve the reporting of incidences of harm, alongside putting in place survivor-victim support services.

We will partner with key stakeholders to strengthen the institutions and legislative and regulatory environments that promote a safe online world for all.

Digital responsibility and online safety interventions must be driven by an evidence-based approach. Online safety and technology-facilitated abuse is an emerging agenda in the context of rapid technological change. We will therefore continue to build an understanding of the issues, as well as what works to prevent and respond to the harms.

We will also work with key stakeholders to encourage greater transparency and access to data, including industry data for researchers, wherever they are based.

Spotlight – Technology Facilitated Gender-Based Violence

Technology-Facilitated Gender Based Violence (TFGBV) has severe consequences for individuals and our societies. It can cause women and girls to self-censor and withdraw from civic and political spaces, which weakens our democracies. It can push them to disengage from school or work and suffer setbacks to their careers. It can cause harm to their mental and physical health. The violence does not just stay online: 20% of women journalists participating in a UNESCO global survey said that offline attacks were directly linked to online violence targeting them.

TFGBV is recognised as a growing national security threat, both in escalating conflict dynamics and as a pathway to radicalisation and violent extremism, with gender-based hate often prevalent across violent extremist ideologies. Misogynistic discourse and hate speech promoted by influential figures alongside widespread viewing of violent pornography and abuse material, by young people whose brains are still forming, is worsening social and gender norms as well as increasing harmful sexual behaviours.

The UK joined the Global Partnership (Global Partnership) for Action on Gender-Based Online Harassment and Abuse when it was formally launched at the 66th Commission on the Status of Women in March 2022. The Global Partnership aims to develop and advance shared principles on TFGBV, increase programming in this space and strengthen access to reliable, comparable data and to the evidence base on TFGBV. The Global Partnership has now grown to 14 countries that together have committed to prioritise, understand, prevent, and address the growing scourge of TFGBV. The Global Partnership works with a multistakeholder Advisory Group composed of survivors, leaders, and experts from civil society, research and academia, the private sector, and international organisations.

In its first year, GP members coordinated to strengthen language on online gender-based violence across multilateral policy fora and to strengthen the evidence base for TFGBV, securing agreement at the recent UN Statistical Commission to make violence against women measurement surveys fit for purpose in the digital age. The UK's Cyber Values campaign funded a TFGBV preliminary landscape analysis,[43] commissioned by the GP. The analysis sets out the current state of the evidence of TFGBV for women and girls and LGBT+ communities, providing a useful global overview, and highlights research priorities in under-explored areas.

4.2 Data protection and privacy

As digital technologies play an increasingly important role in developing countries, the issue of data protection and privacy also becomes increasingly important. Good data protection regulation enables cross-border data flows that are essential for e-commerce and other digital services. It provides an important foundation for private sector innovation, and it protects citizens data from misuse such as identity theft, financial fraud and exploitation of their personal data.

The UK-supported ID4D Programme[44] has provided technical advice to over 30 countries for legal and institutional reforms on digital identity systems. In 2023, several countries have adopted legislation that has benefitted from this support, including Ethiopia adopting a new digital ID proclamation, Somalia enacting new ID and Data Protection legislation, Rwanda adopting a new ID law and Nigeria adopting a new General Data Protection Law.

We will continue to support developing countries to strengthen their data protection regulation, frameworks and governance in a way that meets their own needs.

4.3 Cybersecurity and digital development

Secure and trusted digital infrastructure is essential for economic development and achieving the SDGs. Secure digital transformation in developing countries also supports international trade and security objectives. Enhanced cybersecurity in developing countries can also serve to protect supply chains and detect and deter cybercrime.

Digital transformation involves increased cybersecurity risks, but developing countries tend to lack foundational cybersecurity capacities. Due to a lack of awareness, understanding of how to integrate it and concerns about dual use technologies, cybersecurity is often decoupled

from other development interventions. Cybersecurity instead needs to be treated as vital for digital transformation and be integrated into wider digital development initiatives.

Although cyber plays a significant cross-cutting role across all SDGs, there is no cyber or tech-specific SDG. However, cyber should be promoted as a key enabler for all SDGs. Mainstreaming cybersecurity into development will require a proactive approach, in order to bridge the cyber and development communities of practice. The UK has modelled an innovative, integrated approach to combining cybersecurity capacity building with wider digital development initiatives since 2018, with the diagnostic phase and design of its Digital Access Programme (DAP).[45] Identifying digital inclusion as well as cybersecurity gaps in the baseline capacity of partner countries helped to define and roll out a joint approach to supporting the inclusive and responsible digital transformation of developing and emerging partner countries. We will continue to build on the success of the DAP and promote collaboration across cyber and digital development projects and initiatives. The UK is also supporting cybersecurity capacity building work in partnership with the ITU.

The UK has become home to a strong, growing, and diverse ecosystem of organisations delivering international cybersecurity capacity building. Collaboration across sectors, particularly between companies, universities and think tanks, is now a regular feature of the UK's international cybersecurity capacity building activity.

We promote the use of data and evidence and are informed by the University of Oxford's Cybersecurity Maturity Model (CMM). 130 CMMs[46] have been delivered in 90 partner countries so far. A CMM review provides a baseline to measure progress and helps partner countries develop a 'roadmap' of initiatives as a tangible pathway for enhancing national cyber maturity and accelerating the achievements of the SDGs.

The UK is one of the leading international donors on cybersecurity capacity building and secure digital access with activities across the world, including in India, the Indo-Pacific and Africa. We have dedicated resources to scale up the work during the 2024-2027 period, with scope to deepen this investment further.

We will set up a dedicated campaign to promote secure digital transformation by investing in long-term cybersecurity adaptation, working with industry, academia and partner countries to advocate for cybersecurity as an enabler for the delivery of the SDGs, promoting the use of the CMM as an evidence-based and comprehensive 'whole-of-society' risk management approach and enhancing the use of cyber threat intelligence to strengthen law enforcement.

We will leverage our own procurement processes to incentivise trusted industry and development actors to promote the highest standards of cybersecurity, foster the use of verification mechanisms, and push for progress through multilateral fora, such as the World Bank, other development banks, and the UN, to encourage partner countries to invest in cybersecurity and other key national security capacities.

We will continue to integrate cybersecurity capacity building and cyber-hygiene awareness in the digital skills components of our digital development programming. We will also promote cybersecurity risk management capacity as part of broader digital transformation programmes. We will support the strengthening of state-level CIRTs (computer incident response teams) in developing countries, as a multiplier for sectoral, national and regional information sharing and mutual support. We will raise awareness on the importance of 'cybersecurity emergency response' as part of disaster response toolkits to protect vulnerable CNI (critical national infrastructure) and populations in times of crisis.

Case Study 4.1 – Supporting data protection in Brazil

Brazil's data protection legislation is relatively new, although the country has one of the largest online populations in the world. The data protection legislation was enacted in 2018, and since then the government of Brazil has begun setting up the relevant governance and implementation mechanisms. Through the 'Fostering a Stronger Data Protection Framework Project', under the Digital Access Programme, the UK partnered with the research and think-tank organisation ITS Rio to inform the debate on data protection in Brazil, supporting the adherence to international standards in the country's data protection legal framework, in order to make populations safer online and promoting citizen rights in a data-driven society. The project promoted a policy exchange between UK experts and Brazilian authorities to exchange learning and best practices. The project also included capacity building activities with civil servants from the judiciary, reaching 2,380 participants on promoting awareness of data protection standards on legal cases. The project also developed the app LGPDJus, which disseminates information about citizen rights on personal data protected by Brazilian legislation and provides access to remote assistance for citizens.

Case study 4.2 – Linking cybersecurity skills and digital inclusion in Africa

CyberGirls Fellows and the founder of the CyberSafe Foundation in Lagos, Nigeria

Photo credit: CyberSafe Foundation

Our local partner CyberSafe Foundation designed and delivered 'DigiGirls', an innovative digital empowerment project designed to enable women and girls (15-40 years old) with in-demand basic to intermediary employable digital skills needed to thrive in today's digital economy. Most importantly, the project systematically integrated cyber-hygiene awareness for users within all digital skills trainings, equipping women and girls to manage the risks and challenges of being online. The project trained over 70,000 women across 36 States in Nigeria, including at least 300 PWDs, and created more than 650 jobs and internship opportunities. The project inspired the design of the 'CyberGirls' Fellowship, a free 1-year program that equips girls and women aged 18–28 with globally sought-after cybersecurity skills, getting them certification-ready and positioning them to start a career in cybersecurity. This model is helping to bridge the gender disparity and skills gap in cybersecurity and improve the socio-economic well-being of girls and women living in underserved communities in Africa. Over 900 fellows have been accepted on the program so far, across 22 countries in Africa, and 100+ mentors have been linked with the fellows. 35% have already found employment in the cybersecurity industry.

Chapter 5 – Digital Sustainability: harnessing digital technologies for climate and the environment

Digital technology is being leveraged to mitigate and adapt to climate change and nature loss – yet its wider use and adoption have costs for the climate and environment.

The threats posed by climate change and biodiversity loss are existential. In the near term, the impacts are likely to fall disproportionately on the poorest. By 2030, climate change and biodiversity loss will have pushed millions into extreme poverty.

An increasingly digital world offers both risks and opportunities in tackling this challenge. The UK aims to promote a sustainable digital transformation. This involves supporting a *Green Digital* sector, which mitigates its climate and environment harms and risks; as well as a *Green with Digital* approach, harnessing the power of digital tools and technologies to combat climate change and biodiversity loss.

Figure 5.1: The Digital Sustainability framework

	Mitigation	Adaptation	Environment
Create a **Green Digital** sector	Reducing the emissions of the digital sector	Climate-proofing critical digital infrastructure	Reducing environmental impact of the digital goods lifecycle
Green with Digital	Using digital technology to reduce emissions and environmental harm in other sectors	Using digital technology to improve resilience and response to climate change and disasters	Improving monitoring of biodiversity and ecosystems using digital technology

Source: FCDO, 2023

5.1 Green Digital

There are three main categories of sustainability challenges for a 'green' digital sector:

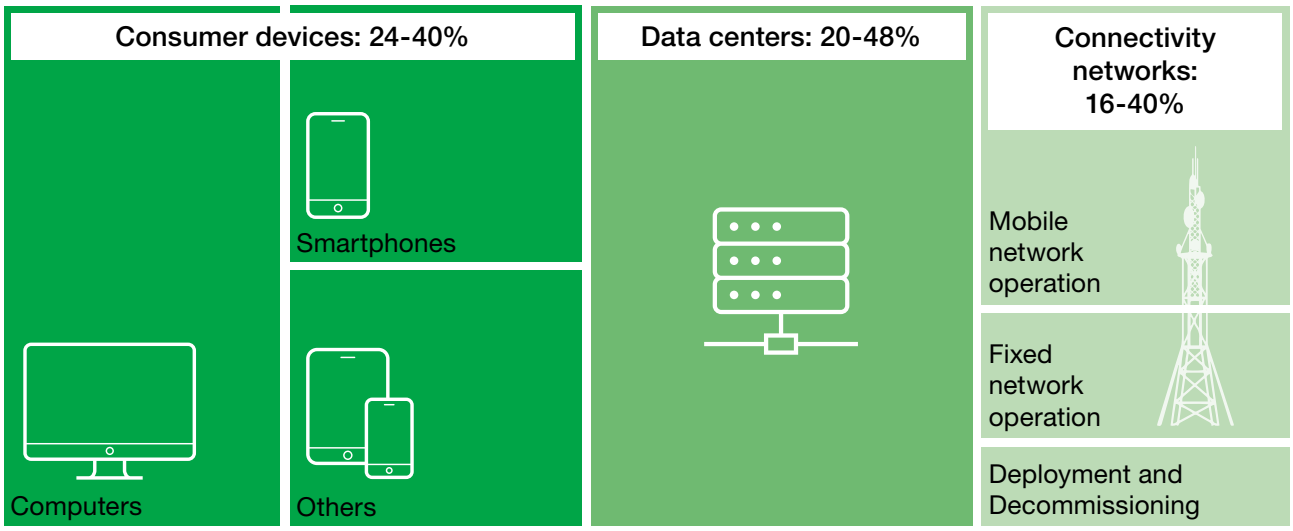
(i) With increasing production of hardware and device use, the **digital/ICT sector is a significant and growing contributor to greenhouse gas (GHG) emissions**. Estimates vary in terms of data, scope and methodology, but recent work suggests the sector contributes between 1.5% and 4% of global emissions,[47] a footprint comparable to that of aviation (1.9%) or the production of cement (3%).[48] Estimates of GHG emissions from major segments of the digital sector are shown below (Figure 5.2).

(ii) Digital infrastructure is increasingly critical to societies and economies. Its susceptibility to climate-related disasters (such as flooding, hurricanes, or extreme temperatures) therefore poses heightened risks and means **digital infrastructure requires appropriate climate-proofing.** While all countries are exposed to these risks, low-income countries are least able to afford their mitigation or recovery.

(iii) There are **environmental risks associated with the lifecycle of digital hardware**. The mining and extraction of raw materials for the production of digital goods contributes

to resource depletion, pollution of water and soil, and impacts on biodiversity. Greater consumption and short lifecycles of digital goods have seen the annual generation of global e-waste grow to 54 million metric tonnes in 2019, and it is predicted to grow by over a third by 2030. With less than 20% of e-waste currently collected and recycled, the potential for water, soil and food-chain contamination is rising. E-waste is the fastest growing solid waste stream in the world.[49]

Figure 5.2: Estimates of GHG emissions from major segments of the digital sector



Source: adapted from "Catalysing the Green Digital Transformation in LICs and MICs", World Bank, 2023

In response, we are **committed to digital sustainability within our own operations**. As of 2023 all new FCDO bilateral ODA spend, including on digital projects, is compliant and aligns with the Paris Agreement, and does no harm to nature.[50] We continue to improve the FCDO's own digital estate, with sustainability informing decisions on hardware and practices, and our ICT strategy aligning with HMG's Greening Government ICT and Digital Services Strategy.[51] HMG supports sustainability in the digital transformation of developing countries, e.g. through projects focused on environmentally-friendly last-mile connectivity solutions using renewable energy and infrastructure materials; and helping partner governments to mainstream sustainability in national digital economy plans. Despite the pace of digitalisation, there remains a lack of reporting on emissions from the digital sector. Several multi-stakeholder partnerships are exploring the way ahead, and we will advocate for the expansion of open, standardised reporting.

Our policy and programming seek to **mitigate risks along the digital product lifecycle**. Minerals and metals used in digital transformation play an important role in the extractive sector in Africa and elsewhere. We continue to push for the highest possible Environmental, Social and Governance (ESG) standards in the **critical minerals extraction** and processing industries that power hardware production, playing a leading role in international fora such as the G7, and as a founding member of the Minerals Security Partnership and the Sustainable Critical Minerals Alliance.

At the end of the digital product lifecycle, we are exploring and supporting **e-waste** business models, particularly in Africa. Research has highlighted lessons and best practice in the sector, while projects with local innovators have strengthened operations at e-waste

processing facilities and sought out innovative business models for the recycling of e-waste as well as the reuse and repurposing of digital devices.

5.2 Green with Digital

There are three main groups of opportunities for Green with Digital technologies:

(i) **Digital technologies are significantly reducing emissions and mitigating environmental impacts in other sectors**. They are optimising energy use in transport, buildings and appliances; helping transform the energy sector and integrate renewable capacity; and facilitating greater climate finance flows.

(ii) **Digital technologies are improving resilience and response to climate change and disasters**. Alongside making certain facets of society and the economy more resilient, they can power prediction and communication in Early-Warning Systems; improve information gathering, targeting and delivery of humanitarian assistance when needed; and bring smarter and more sustainable techniques and practices to more farmers and small-scale producers through digital advisory services.

(iii) **Digital technologies offer opportunities to better monitor the climate, biodiversity and ecosystems**, with an increasing abundance of data from cheaper sensors, and the computing power to interpret it.

Through our digital development research, policy and programming, we will seek to harness these opportunities to complement and augment the UK's wider work on climate change and the environment.

We will continue to support the **use of digital technologies to reduce emissions and environmental impact** in key sectors, including energy, cities, transport, and agriculture. For example, FCDO projects are creating and maintaining open-source digital modelling tools for developing countries to develop their own long-term energy and transportation planning; training officials in Vietnam to use digital modelling techniques that can improve building design and reduce energy use; and helping expand energy access through catalyst funding for smart green grids, research and testing on mini-grid digital innovations, and digitally-enabled business models that allow Pay-as-You-Go access to solar energy.

The FCDO's digital agricultural portfolio is **improving small-holder resilience to climate change** and propagating **sustainable practices that benefit the environment and increase yields, through digital advisory services**. Whilst evidence shows that digital farmer services can increase incomes by 20%-30%, adoption and active use remain low. Our programmes will facilitate user-centred access to Digital Climate Advisory Services for hundreds of thousands of smallholder farmers. For example, we will support the delivery of context-specific digital agriculture advisory services for farmers in Ethiopia through video-based and interactive voice recording channels; and partner with mobile and digital firms to test and scale sustainable business models for the digitisation of the agricultural value chain.

The UK is complementing this work through **support to digital platforms which facilitate climate finance**, such as the Odyssey platform which brokers mini-grids projects; or Cavex, a digital marketplace aimed at helping verify and monitor smaller climate projects, which might otherwise not have participated in carbon credit trading or accessed climate finance.

The UK is a champion for the **responsible use of digital technology** in improving **humanitarian readiness and responses to climate** (and other) **disasters**. We have consistently promoted digital improvements to Early-Warning Systems, including support for super-computers in East Africa to improve accuracy and timeliness of weather forecasts; and integrating mobiles and SMS messaging into Early-Warning Systems in East Africa. We have partnered with the World Food Programme to scale their use of drones in assessing damage caused by disasters, cutting the time taken from weeks to hours. We have supported the development and piloting of an image-recognition tool to diagnose and monitor child malnutrition in Senegal. And we are continuing to publish research on the digitalisation of social protection payments in crisis contexts. We will continue to invest in digital solutions and platforms that increase resilience and humanitarian responsiveness, in collaboration with partners and in support of the wider system.

FCDO projects are using and exploring the opportunities offered by **digital technologies** in improving **monitoring of biodiversity and ecosystems**. Pilot projects include the use of distributed sensors and population data to monitor and campaign on air quality; and using drones to monitor reforestation efforts to link them into climate financing. And we will learn from DEFRA[52] projects that are using digital platforms, AI and satellite imagery for monitoring of pollution, marine biodiversity and deforestation.

We will develop a new Digital Sustainability Programme focused on supporting the digital sector to tackle its climate and environmental impact, exploring work on issues such as reducing digital GHG emissions, tackling e-waste and promoting renewable energy solutions for last-mile connectivity. We will also promote a multi-stakeholder **Community of Interest on Digital Sustainability**.

Spotlight – Humanitarian

Over 300 million people need humanitarian assistance in 2024 (OCHA, 2024) – almost 4 times the number of people in need in 2015. Current trends indicate humanitarian demands will continue to rise, with increasingly complex and protracted emergencies overburdening capacity and testing traditional resilience-building and crisis response approaches. The UK aims to strengthen people's ability to recover from crises, and to prioritise and protect the most vulnerable people when they occur.

Digital technologies have a crucial role to play in this context. They can allow a more efficient, effective and people-focused approach. Direct cash transfers, for example, not only empower individuals to prioritise what is important to them, but also support local economies and communities that are vulnerable during crises. Digital technologies can support people in need of humanitarian assistance. They give them a voice, connect them to friends and family and provide them with access to critical information and services. Digital tools also bring ethical questions and responsibilities for humanitarian actors who hold sensitive data, and emergency responses must align with core humanitarian principles. These questions are set to become more pertinent as digital technology is increasingly used in the humanitarian space.

The UK is a champion for the responsible use of digital technology in humanitarian responses. Our world-leading rapid response capabilities rely on expert early warning and analysis to best prepare for and deliver fast, effective and principled responses. Our approach to research and innovation leverages UK and international expertise to deliver digital solutions. For example, collaborating closely with humanitarian partners:

- We averted an oil spill from a super tanker on the Yemeni coast which would have triggered a humanitarian and environmental catastrophe. Analysis leveraged satellite imagery and computational modelling to calculate the scale of the problem and inform the approach that the UK and partners including the US, UN and Netherlands should take.
- We are supporting innovative digital solutions that empower vulnerable communities. Our local partner NGO Naya Jeevan in rural Pakistan is strengthening digital inclusion and building community resilience by enhancing women's access to telemedicine and to livestock insurance and veterinary consultations.
- We are helping communities to recognise and manage acute child malnutrition. Working with the Fundación Acción Contra El Hambre, in partnership with the US, Canada and the Netherlands on the Humanitarian Grand Challenge, we supported the development and piloting of an image-recognition tool to diagnose and monitor child malnutrition in Senegal.

To support the humanitarian system to deliver more efficient, effective and coherent humanitarian responses:

- We will harness data, innovation, and digital technologies for more effective humanitarian responses by expanding our partnership with Elrha to support humanitarian actors to explore and learn from AI applications and use emerging technologies effectively and responsibly.

- We will enhance our capabilities in risk monitoring and Early-Warning Systems to better anticipate emergencies and spikes in need, drawing on the UK Met Office's world-leading expertise.
- We will leverage the UK-funded Humanitarian Innovation Platform to pilot how to harness AI in humanitarian contexts, including through predictive analytics, natural language processing, and image processing.
- We will also continue our partnership with GSMA on the Mobile for Humanitarian (M4H) Programme, which has reached 7m people so far, working to accelerate the delivery and impact of digital humanitarian assistance.

Chapter 6 – Our approach to delivering Digital Development

To achieve the positive vision for an inclusive, responsible and sustainable digital transformation in developing countries requires a flexible and adaptive delivery model that blends policy and partnerships, with programming, and internal capability building.

6.1 Building digital development partnerships

The UK will build robust multi-stakeholder partnerships, and will leverage the best technical and technological expertise, taking a long-term, patient approach and developing its capacity to deliver digital development policy and programmes that are flexible and adaptive, in order to keep up with the pace of change in digital technologies. We will build mutually respectful relationships with developing countries to support their plans for digital transformation. The UK will champion the voices of developing countries in international conversations on the future of digital technologies.

The UK works on digital development policy together with many international partners and with developing and emerging countries to build alliances and partnerships, to share knowledge and evidence, and to positively influence policy making for development.

We will invest in long-standing relationship building with key stakeholders, to facilitate systemic and sustainable change, while being cognisant of the rapid pace of transition in the fields of digital, data and AI – and of their geopolitical implications. Given the UK's robust track-record in digital development and its strength in the digital and tech sectors, international partners would like to see the UK ever more engaged in digital development. This means the UK contributing proactively to joint initiatives and speaking up on these in international fora.

By using the UK's convening influence in this space, we will promote increased coordination and synergy between key players in digital development. This includes governments, donors and civil society, the private sector (whose investments and R&D can unlock large-scale change), as well as multilateral partners and academic researchers.

Going forward, prioritising critical joint initiatives or highly rated country-level interventions, combined with time and expertise dedicated to sharing evidence and scalable models tested through programming, will contribute to more cohesive partnerships and joint impact – especially as the complex evolution of digital technologies, including AI, require timely alignment and action on emerging benefits and risks.

The UK will continue to work with key partners through the Digital Impact Alliance (DIAL), to promote digital solutions for development challenges, including open-source ones, supporting digital transformation strategies in partner countries, testing and developing Digital Public Goods, and promoting good practices and common standards, such as the Principles of Digital Development.[53]

A step-change will be delivered by a more proactive, agile and strategic approach to engaging directly with the digital and tech industry, in order to leverage its contribution to digital and AI for development. We will continue to engage with the private sector, by exploring strategic corporate partnerships in the digital economy, where appropriate. Our

long-standing partnership with the mobile industry via GSMA develops, applies and scales innovative mobile technologies to bridge the digital divide, through the Future Telecoms research initiative. We will expand our innovative collaboration with the industry association DSA (Dynamic Spectrum Alliance),[54] which provides advice on much-needed reforms on dynamic and shared spectrum management and builds telecoms regulators' capacity, enabling last-mile connectivity solutions to flourish and become sustainable.

We will build on existing collaborations with the private sector, working on pre-competitive, pro-development issues with industry associations such as GSMA and DSA, and leveraging the digital inclusion initiatives of ICT, telecoms and digital platform companies, which can complement and amplify our digital development efforts in partner countries.

Private sector investment is critical to expand the benefits of digital transformation in developing countries. While we will continue to work closely with partner country governments to enhance public sector investment (e.g. through a better use of Universal Service Funds) to extend connectivity to underserved areas, we will also enhance our strategic corporate partnerships with UK, international and local tech companies to encourage investments in inclusive digital transformation and the creation of a more conducive business environment through policy and regulatory reforms.

Case study 6.1 – Harnessing mobile technology to achieve the SDGs

The FCDO has partnered with the GSMA Mobile for Development Foundation (M4D) since 2013 to bring together the mobile ecosystem and the development sector to stimulate digital innovation and large-scale socio-economic impact for low-income people in the developing world. This is being achieved by unlocking mobile-enabled innovations which deliver on the SDGs, advocating for an enabling policy and regulatory environment for the mobile industry, engaging private sector players, building partnerships with humanitarian players, and producing unique insights and research. Over 10 years, the partnership has built resilience, leveraged new opportunities, and enhanced the livelihoods of 138m people, including 85 million women and 11 million people in humanitarian contexts. The programme has played a crucial role in supporting the scaling up of grantees' projects, having unlocked follow-on funding through its Innovation Funds.

Female business owner using mobile technology in Nepal

Photo credit: GSMA

6.2 Engaging internationally on digital development policy

Our engagement in the multilateral system as the UK Foreign, Commonwealth & Development Office – alongside other UK government departments, such as the Department for Science, Innovation and Technology – is essential to driving digital and AI for development objectives. We will leverage the UK's influence as a member of the Council of the International Telecommunications Union (ITU) and will continue to pledge support through our existing

digital development projects to the global Partner2Connect initiative.[55] We will continue to engage proactively in the UN Global Digital Compact process (to September 2024 and beyond). We see the UN Global Digital Compact as an opportunity to support the inclusive adoption of digital technologies for social and economic development through multistakeholder international collaboration.

Through the G20, we will work with the developing country presidencies of Brazil in 2024 and South Africa in 2025 to promote suitable models of Digital Public Infrastructure, support inclusive connectivity and ensure developing countries have access to G20 best practice to build local capacity in digital skills and talent. We will then seek to build on this progress and continue to deliver a robust digital development agenda through the United States and UK G20 Presidencies in 2026 and 2027.

We will continue to support the OECD Committee on Digital Policy, with the Global Partnership on AI (GPAI) and the Global Forum on Tech to help build the capacity of developing countries and representative organisations on connectivity and AI. We will keep promoting a multistakeholder approach for capacity development on digital transformation, within key fora such as the Internet Governance Forum (IGF), its Policy Network on Meaningful Access, the Internet Corporation for Assigned Names and Numbers (ICANN) and in the context of Standards Development Organisations. We will continue our engagement with the World Summit of the Information Societies (WSIS), and will support the WSIS+20 review to promote the role of digital technologies in the achievement of the SDGs.

We will also continue to engage developing countries through the Commonwealth on issues relating to connectivity, digital skills, cyber and AI. For example, the UK will continue its support to the Commonwealth Telecommunications Organisation (CTO) to identify best practice and share experience on digital transformation in Commonwealth countries.

6.3 Leveraging UK expertise in digital development

We will help build the UKDev (UK International Development) approach and brand by leveraging the UK's comparative advantage within both the public and private sectors. We will build first and foremost on existing successful partnerships, through which we share UK models and expertise to support digital transformation in partner countries. For example, through our collaboration with the British Standards Institution (BSI) we will expand our collaboration to build the capacity of partner countries in Africa and South-East Asia (including through ASEAN) on digital standards, working with local private sector and national standards-setting bodies.

We will strengthen our delivery of peer learning activities in collaboration with Ofcom, exchanging experiences and sharing the UK models on spectrum management, local networks and other technical areas with telecoms regulators in partner countries, building on the positive peer-learning experience with Kenya and South Africa.

We will collaborate with Government Digital Service (GDS) to share know-how with partner countries on digitalisation in the public sector, building on our advisory role in GovStack.[56] We will leverage the UK experience of DPI for public or regulated services (health, transport, banking, land registries, etc.) based on the significant demand for this expertise from developing countries and riding the momentum on DPI generated by the G20 India presidency of 2023.

6.4 Enhancing FCDO's digital development capability

The UK government will also enhance its own digital development capability to keep up with the pace of technological change, to be forward-looking and anticipate emergent benefits and risks of digital transformation. We will invest in new research on digital technologies and on their inclusive business models to build the global evidence base, share lessons learned and improve knowledge management through our portfolio of digital development and technology programmes, including the FCDO's new Technology Centre for Expertise (Tech CoE), which will complement and support our programming portfolio.

Since all sectors within international development are underpinned by digital technologies, we will ensure that digital development skills are mainstreamed across the FCDO. We will raise awareness and upgrade staff knowledge through new training opportunities on best practice in the complex and evolving area of digital development, through partnering with existing FCDO capability initiatives, i.e. the International Academy's Development Faculty, the Cyber Network and the International Technology curriculum.

We will also strengthen the FCDO's core structure leading on digital development policy and programming expertise and advice; we will establish a new Digital Development Advisers Network to enable FCDO staff and colleagues working on digital development across HMG to access peer learning and knowledge-sharing events; and we will work with relevant FCDO teams to establish an accredited professional advisory cadre in digital development.

Endnotes

[1] https://www.undp.org/press-releases/digital-technologies-directly-benefit-70-percent-sdg-targets-say-itu-undp-and-partners

[2] https://www.itu.int/en/mediacentre/Pages/PR-2023-11-27-facts-and-figures-measuring-digital-development.aspx

[3] https://www.itu.int/itu-d/reports/statistics/facts-figures-for-ldc/

[4] https://www.gov.uk/government/publications/dfid-digital-strategy-2018-to-2020-doing-development-in-a-digital-world/dfid-digital-strategy-2018-to-2020-doing-development-in-a-digital-world

[5] https://www.gov.uk/government/publications/international-development-in-a-contested-world-ending-extreme-poverty-and-tackling-climate-change

[6] https://www.gov.uk/government/publications/uk-international-technology-strategy/the-uks-international-technology-strategy

[7] https://www.gov.uk/government/publications/government-cyber-security-strategy-2022-to-2030

[8] https://www.gov.uk/government/publications/national-ai-strategy

[9] https://www.gov.uk/government/publications/integrated-review-refresh-2023-responding-to-a-more-contested-and-volatile-world

[10] DPI can support the achievement of the UN SDGs, and requires open, interoperable Digital Public Goods (DPGs).

[11] FCDO Annual Review data, July 2023

[12] The UK was a founding partner of DIAL alongside the UN Foundation, Gates Foundation, USAID and Sweden.

[13] https://digitalprinciples.org/

[14] Department for International Development, 2018, *DFID Digital Strategy 2018 to 2020: Doing Development in a Digital World*. https://www.gov.uk/government/publications/dfid-digital-strategy-2018-to-2020-doing-development-in-a-digital-world/dfid-digital-strategy-2018-to-2020-doing-development-in-a-digital-world

[15] UNCTAD, 2019, *Digital Economy Report 2019: Value Creation and Capture: Implications for Developing Countries*, UNCTAD/DER/2019. https://unctad.org/en/PublicationsLibrary/der2019_en.pdf

[16] Measuring digital development: Facts and Figures: Focus on Least Developed Countries – https://www.itu.int/hub/publication/d-ind-ict_mdd-2023/ . Digital divides and how to close the global gap in internet access are explored in Chapter 3 on Digital Inclusion.

[17] https://www.itu.int/dms_pub/itu-d/opb/ldc/D-LDC-BROAD_IMP.01-2019-PDF-E.pdf

[18] Ibid.

[19] The digital economy can be measured in terms of the value flowing from digital technology, extending to knowledge transfer, business innovation, and performance improvement within a company, across supply chains and amongst industries.

[20] Ibid.

[21] https://unctad.org/system/files/official-document/der2019_en.pdf

[22] Pathways for Prosperity Commission, 2019, *The Digital Roadmap: How Developing Countries Can Get Ahead*, Final Report of the Pathways for Prosperity Commission. https://pathwayscommission.bsg.ox.ac.uk/sites/default/files/2019-11/the_digital_roadmap.pdf

[23] Thomas Piketty, 2014, *Capital in the Twenty-First Century* (Cambridge Massachusetts: Harvard University Press).
DESA/UN, 2020, *World Social Report 2020: Inequality in a Rapidly Changing World*. https://www.un.org/development/desa/dspd/wp-content/uploads/sites/22/2020/01/World-Social-Report-2020-FullReport.pdf

[24] BPO = business process outsourcing

[25] Precision agriculture or 'Smart Farming' means that plants or animals get precisely the treatment or nourishment they need, determined with great accuracy thanks to the latest digitally-enabled technology, including GPS, sensors, ICT and robotics.

[26] As the UN Food and Agriculture Organisation (FAO) notes, "The rise of digital agriculture could be the most transformative and disruptive of all the industries, because digital agriculture not only will change how farmers farm their farms, but also will transform fundamentally every part of the agri-food value chain".
N. M. Trendov, S. Varas, and M. Zeng, 2019, *Digital Technologies in Agriculture and Rural Areas – Status Report*, FAO, Rome. Licence: cc by-nc-sa 3.0 igo. http://www.fao.org/3/ca4985en/ca4985en.pdf

[27] UNCTAD = United Nations Conference on Trade and Development

[28] BSI = British Standards Institute

[29] https://www.itu.int/en/ITU-D/Pages/FCDO/publications/default.aspx

[30] OECD, 2020, *Strengthening Digital Government*. https://www.oecd.org/gov/digital-government/strengthening-digital-government.pdf

[31] See Spotlight on Digital Public Infrastructure (DPI) within this section.

[32] Nic Newman et al., 2019, *Reuters Institute Digital News Report 2019*, Reuters Institute and University of Oxford. https://reutersinstitute.politics.ox.ac.uk/sites/default/files/2019-06/DNR_2019_FINAL_0.pdf

[33] Monica Anderson, Emily A. Vogels and Erica Turner, 2020, 'The Virtues and Downsides of Online Dating', *Pew Research Center*. https://www.pewresearch.org/internet/2020/02/06/the-virtues-and-downsides-of-online-dating/

[34] Manuel Castells, 2009, *The Rise of the Network Society*, 2nd edn, Wiley-Blackwell.

[35] Archon Fung and Erik Olin Wright (eds), 2018, *Deepening Democracy*, Verso; Andrea Cornwall and Vera Schatten Coelho, 2006, *Spaces for Change? The Politics of Participation in New Democratic Arenas*, Zed Books; Anuradha Joshi and Peter P. Houtzager, 2012, 'Widgets or Watchdogs?', *Public Management Review* 1, 4:145–162. https://www.tandfonline.com/doi/abs/10.1080/14719037.2012.657837

[36] Open Government Partnership (OGP), n.d., 'Strengthening Democracy and Protecting Civic Rights in the Digital Era'. https://www.opengovpartnership.org/strengthening-democracy-and-protecting-civic-rights-in-the-digital-era/

[37] https://sites.google.com/busaracenter.org/digitalaccessprogram

[38] https://www.britishcouncil.org/education/non-formal-education/current-programmes/skills-inclusive-digital-participation

[39] https://www.gsma.com/mobilefordevelopment/programme/connected-women/the-mobile-gender-gap-report-2023/

[40] https://www.apc.org/en

[41] Economist Intelligence Unit (2021). Measuring the prevalence of online violence against women, Economist Intelligence Unit. https://onlineviolencewomen.eiu.com/

[42] Safe Online

[43] https://www.gov.uk/government/publications/technology-facilitated-gender-based-violence-preliminary-landscape-analysis

[44] https://id4d.worldbank.org/

[45] GFCE (2021), https://thegfce.org/wp-content/uploads/Integrating-Cybersecurity-into-Digital-Development_compressed.pdf

[46] https://gcscc.ox.ac.uk/cmm-reviews#/

[47] World Bank, 'Green Digital Transformation: How to Sustainably Close the Digital Divide and Harness Digital Tools for Climate Action'. https://openknowledge.worldbank.org/entities/publication/6be73f14-f899-4a6d-a26e-56d98393acf3

[48] Ritchie, 2020 - https://ourworldindata.org/ghg-emissions-by-sector

[49] WHO, e-waste fact sheet, 2023 - https://www.who.int/news-room/fact-sheets/detail/electronic-waste-(e-waste)

[50] International development in a contested world: ending extreme poverty and tackling climate change https://www.gov.uk/government/publications/international-development-in-a-contested-world-ending-extreme-poverty-and-tackling-climate-change

[51] https://www.gov.uk/government/publications/greening-government-ict-and-digital-services-strategy-2020-2025

[52] UK Government's Department for Environment, Food & Rural Affairs

[53] https://digitalprinciples.org/

[54] https://www.dynamicspectrumalliance.org/

[55] https://www.itu.int/itu-d/sites/partner2connect/

[56] https://www.govstack.global/