SUMMARY
REPORT

UNDP GLOBAL CENTRE FOR
TECHNOLOGY, INNOVATION AND
SUSTAINABLE DEVELOPMENT

SINGAPORE

UNDP

2018 ———————• 2022

CONTENTS

Foreword

In its first four years of operations from 2018 to 2022, the UNDP Global Centre for Technology, Innovation, and Sustainable Development has witnessed unprecedented global crises. From climate change, the COVID-19 pandemic, to geopolitical conflicts. Each crisis has been monumental in scope and impact. But each has also reaffirmed and precipitated the need for new ways of thinking, working, and thriving.

Within this context, the UNDP Global Centre has worked as a hub for knowledge, policy, and learning, and as a laboratory for solutions to global challenges. These efforts have been wide-ranging in implementation and global in reach – from identifying and supporting applications of technology to tackle food insecurity and climate change, to collaboration to leverage open-source hardware and 3D-printing as a tool for COVID-19 response and recovery, as well as training and capacity building that has reached thousands around the world.

And this work is only continuing. The UNDP Global Centre's emerging focus on 'digital nations' explores the varied roles of technology and innovation in the context of policies and approaches to preserve national identity, culture, and heritage – and the importance of these tools in safeguarding the futures of countries in the context of climate change and other crises. Similarly, the focus on providing applied and agile policy and technical support continues to guide the digital and innovation journeys of countries around the world.

Throughout its work, the UNDP Global Centre has also leveraged Singapore's vibrant and dynamic ecosystem. This includes engaging with diverse government partners, and collaborating with small and large private sector and non-government entities to bring ideas and innovations to the places that need them most.

As the UNDP Global Centre begins the next iteration of its work, the Singapore Government and the UNDP remain strongly committed to our collaboration. The above challenges reaffirm the importance of partnership, the relevance of Singapore's development journey, and the role of innovators in Singapore and beyond. The Singapore Government looks forward to seeing how the successes and learning set out in this report are amplified and built upon – whilst UNDP is keen to deepen this important collaboration at such a critical moment.

The new phase of the UNDP Global Centre begins at the halfway point to the 2030 deadline for the Sustainable Development Goals. Recent years have seen the first increases in global poverty for more than two decades, whilst growing global turmoil has led to unprecedented reversals in human development progress in 90% of countries. And we are seeing human development reversing for a second consecutive year - constituting a backslide that we have never seen before. Now, more than ever, we need to be leveraging technology and innovation – the latter in its many forms: technological, economic, cultural—to respond to the known and unknown challenges that humanity will face.

FOO CHI HSIA
Deputy Secretary
(Southeast Asia and ASEAN)
Ministry of Foreign Affairs,
Government of Singapore

HAOLIANG XU
Under-Secretary-General and
Associate Administrator of the United
Nations Development Programme

Introduction

Innovation is not a modern concept. It has propelled human progress for centuries. In our own times, we can see its imprint in decades of striking development gains - leaving people healthier, wealthier and better educated, on balance, than ever before. Countries have emerged from poverty to become engines of economic dynamism, improving the lives of their own people and influencing patterns of trade, production and consumption around the world.

Innovation has been a constant theme in development success stories, whether longstanding ones such as Singapore, or newer examples like the Marshall Islands, which just became the first country to recognise digitally autonomous organisations with digitally encoded rules and governance. The willingness to think, create and act in new ways unspools "wicked" problems and takes humanity forward.

That capacity is needed now more than ever, at a moment when all countries are buffeted by constant, complex crises, from climate change to political upheaval to the economic devastation wrought by the pandemic. These have brewed what the 2022 Human Development Report termed an "uncertainty complex". To survive and surmount it, bold and innovative choices must be the order of the day. To that end, we are fortunate to have the enormous possibilities created by digitalisation and broader innovation. At the same time, technology is not an off-the-shelf answer to everything. True innovation, low-tech or high, starts with understanding real problems, and then defining the best paths to resolve them, in line with people's own choices and aspirations.

The COVID-19 pandemic demonstrated that going digital is both the future and an immediate imperative. The barriers to entry are lower than ever before, whilst the need has never been greater. The potential reach is greater, too, involving networks of people and points of innovation that span the globe, taking shape in diverse development contexts. However, the digital divide remains an acute concern - including its interplay along the lines of income, education, gender and other parameters. On one side is the latest technology spurred by high levels of digital literacy and investment in R&D. On the other side, digital tools are often out of reach. This slows development and exacerbates already sharp fractures in societies and economies.

Many innovative ways forward are already known. Others are constantly emerging. But to meet the challenges we face and ignite real momentum behind sustainable development, the best ideas and practices need to be not just mooted, but systematically tested, shared, elaborated and adapted to diverse needs. Learning must be continuous and applied. This process takes time and patience. It calls for collaboration. Most of all, it must not leave anyone behind.

The UNDP Global Centre for Technology, Innovation and Sustainable Development, a joint initiative by the Singapore Government and the UNDP, sits at the centre of a new kind of innovation: one committed to sustainable development and digital public goods. It connects policymakers, practitioners, think tanks, businesses and other vital stakeholders to push boundaries for the betterment of people and planet. It champions successes, with Singapore acting as a living lab for global sustainability solutions. And it both draws on UNDP's unique global development expertise and services and encourages a network of country offices to investigate and experiment with real-world solutions on the ground.

This report showcases how the UNDP Global Centre has collaborated with diverse developing countries in tapping into the possibilities of innovation and digitalisation over the last four years. The results are striking, such as faster and lower-cost access to essential COVID-19 technologies. A revolution is taking root in the use of technology in agriculture and urban planning. Whole-of-government digital readiness preparations are underway. Data is driving new ways of creating, working, and delivering. Businesses are stepping forward to contribute to achieving the global Sustainable Development Goals.

This report sketches a few highlights of the UNDP Global Centre's achievements. They are just a beginning, but a vital and inspiring one, on the road to innovation and sustainable development for all.

1

The importance of collaborating across innovation ecosystems

Complex and ever changing, an innovation ecosystem links people and systems. It sparks a constant flow of ideas that create other ideas, of solutions built on creative connections. Even a single ecosystem is powerful; imagine how much more so when ecosystems interact with each other.

Ecosystems make sense in an increasingly decentralised world, where development takes place in all directions and involves all actors. Development itself can be considered a 'distributed' network. Through innovation ecosystems, countries can create faster, more effective responses to pressing questions like: How can we diversify a small economy? What are the most expedient ways to tackle youth unemployment? How do we crack the complex problem of food insecurity?

Singapore itself offers a proof of concept. It is known for generating sustainable development solutions relevant for countries around the world. It is an ideal location for UNDP's Global Centre to source talent and inspiration, and to catalyse new collaborations. The UNDP Global Centre recognised this openness to learning and sharing in its shaping of a COVID-19 Open-Source Response and Recovery Toolkit, collating and amplifying key and proven digital tools in the global health and development ecosystem. In **Mauritius**, the Government used this to access an open-source tool for processing virus tests. The rapid application of an inexpensive solution saved precious time and money, over $4 million altogether. More importantly, it protected many lives.

The OpenELIS laboratory information system
©OpenELIS

Collective intelligence emerges from innovation ecosystems as individuals share knowledge, data and skills to solve pressing concerns. As one example of how this works, the UNDP Global Centre led a **multi-city challenge** in Africa to tackle urban issues. It involved five cities: Kano, Nigeria; Accra, Ghana; Kampala, Uganda; Mutare, Zimbabwe and Bahir Dar, in Ethiopia. A jumping-off point was training for public officials on open innovation methods, facilitated by The Governance Lab at New York University. An open innovation challenge followed, attracting over 350 submissions. Winning innovators worked with experts to source additional ideas and developed skills to engage with potential beneficiaries, part of ensuring that smarter cities are about people, not just technology. One innovator – leading a social enterprise recycling plastic waste into housing and building materials – was able to leverage this opportunity to crowd-source a further US$50,000 to accelerate his efforts.
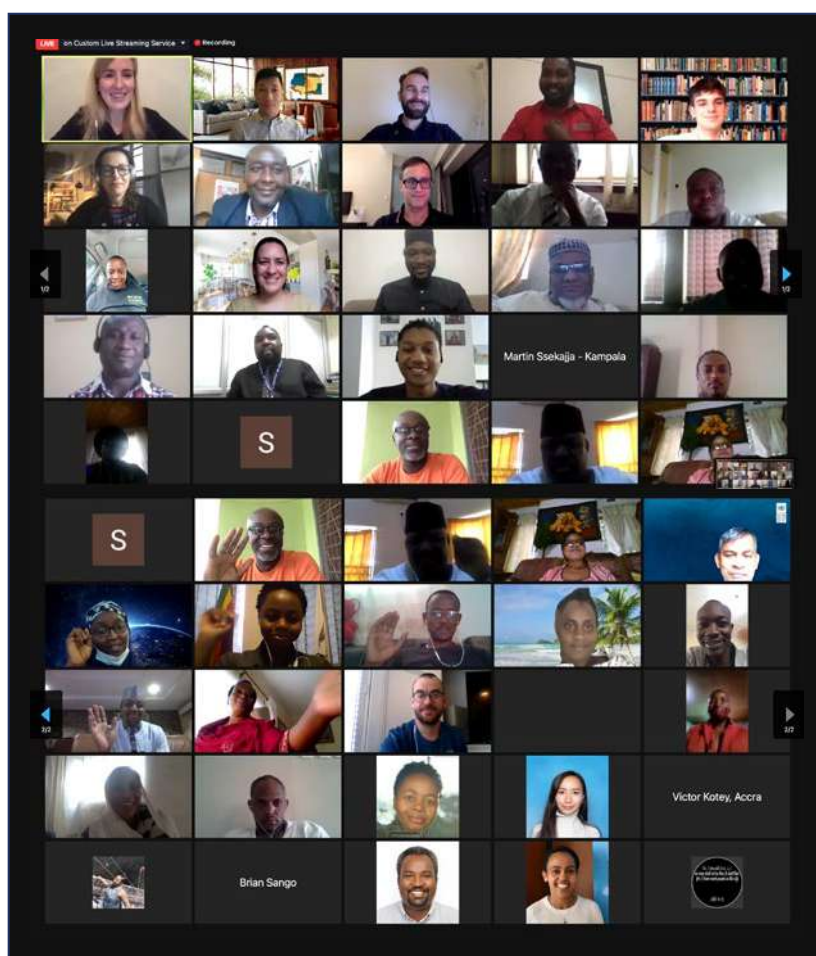
Participants from across the five African cities participating in the Multi-City Challenge

The Smart Urban Innovations Wheel, redefining 'smart cities' to focus on the interplay between citizens, local government, and the private sector (and the role of technology and broader types of innovation)

As a complementary resource, the UNDP Global Centre developed the **UNDP Smart Urban Handbook.** It's a global toolkit of urban innovations and applied insights into solving key challenges and tackling citizen priorities. Most importantly, it starts from the premise that truly 'smart cities' are not just about technology. They are about citizens and residents, lives and livelihoods. The Handbook unpacked a new paradigm – exploring the interplay between different city actors, technology types – from high-tech, to frugal innovation (and even no-tech and nature-based solutions) – and the differing types of data available to urban actors. These processes and case studies are now headlining the **City2City Platform**, where UNDP showcases urban solutions and engages with city officials worldwide.

Among the range of innovation ecosystems to date, those oriented around specific development sectors have sometimes struggled to scale in the same way as broader initiatives. The Singapore Food Agency's '30 by 30' agenda (to produce 30 per cent of Singapore's nutritional needs locally by 2030) inspired the UNDP Global Centre to undertake a global agriculture innovation challenge, known as **Cultiv@te.** It connected diverse entrepreneurs, start-ups, venture capital firms and R&D teams. Centred on a call for solving 11 obstacles to better and more sustainable agriculture, the challenge initially drew submissions from 202 teams comprising 674 participants from across 114 countries. 31 finalists went through a mini-accelerator and learning programme made possible through global tech partners including PALO IT, Microsoft, Accenture and Metabolic.

A select group of 11 finalists – from Armenia, Bhutan, Ecuador, Ethiopia, Gabon, Indonesia, Kenya, the Philippines, Singapore, Uruguay and Uzbekistan – piloted solutions rooted in data analytics, artificial intelligence and digital platforms. These solutions are helping small-scale agricultural producers that face challenges ranging from low productivity, to limited access to information, credit and markets. Initiatives include a research partnership to trial and advance the use of an environment-friendly biological pest control solution in **Ethiopia**, and the development of a bespoke digital precision livestock platform that aims to improve the productivity of small-scale livestock herders in **Uzbekistan** while supporting the sustainable management of pastures.

A design sprint in Uzbekistan, part of the Cultiv@te initiative

One of the winners, Farmz2U, is a social enterprise in **Nigeria.** It offers a software-as-a-service digital platform to provide agricultural extension services. The platform brings together open and proprietary data to help farmers decide what crops to grow, where to grow them, and which crops will sell best based on market demand. Tools include a digital wallet with affordable loans and quick connections with suppliers and wholesalers. According to Farmz2U's field trials, farmers have, on average, increased yields by 20 percent, reduced waste by 38 percent and significantly boosted income.

The experiences from the Cultiv@te challenge have filtered into UNDP's broader support to governments to manage the impact from COVID-19 and the crisis in food security. Links to a South Africa-based technology provider are helping Municipality B of Montevideo, **Uruguay** to pilot low-cost vertical hydroponic vegetable growing systems in community gardens as a step towards boosting urban nutritional security. Collaboration with the Monetary Authority of **Singapore** to help small and medium-sized enterprises to leverage digital technologies in accessing global value chains has expanded into opportunities to connect with Cultiv@te innovators on the Business Sans Borders global trade platform.

Despite the profound potential of innovation ecosystems to boost development, some challenges stand in the way. Short-term thinking and investment result in too much emphasis on pilots, and not enough on going to scale. Further, when ecosystems do not connect with each other, whether across countries or even sectors within a country, they lose opportunities for cross-pollination. The UNDP Global Centre recognised these challenges and led the drafting and development of major innovation ecosystem and digital economy analyses **for two countries**. Drawing on extensive stakeholder engagement, analysis, and research, these documents identified crucial national digital and innovation opportunities to ensure that no one in either country is left behind from this potential.

With demand growing for practical strategies to address development issues, it is more important than ever for ecosystems to talk to each other. This requires an intentional commitment and a clear rationale, backed by sound measurement to assess and demonstrate the benefits

Cultiv@te

Foreseeing the growing importance and relevance of technology and innovation for transforming agri-food systems, Cultiv@te was launched in 2019, with support from the Government of Singapore's Ministry of Sustainability and the Environment. Cultiv@te aimed at surfacing radical and transformative technologies and bringing together creative minds and passionate people to co-design innovative solutions to help address the toughest development challenges in the agri-food sector in 11 countries across Asia, Latin America and Sub-Saharan Africa.

Working with UNDP Country Offices, government partners, and agri-food experts – in an environment of COVID-19-induced global uncertainties – the UNDP Global Centre identified 31 promising technological solutions to address issues ranging from urban food security and sustainable aquaculture to tackling agriculture-linked deforestation and the low productivity of smallholder farmers. The UNDP Global Centre helped forge value-driven partnerships – between technology providers, policymakers, research institutions, and investors.

Agritech has witnessed a massive boom in recent years, with the space attracting record-breaking investments from the private as well as public sectors. Yet, despite the promise of technology in addressing the various agri-food sustainability challenges, solutions have often failed to scale. Cultiv@te highlighted the key issues inhibiting scalability of solutions including the lack of awareness about underlying technologies among key stakeholders, user-centricity in solution design, and suboptimal business models.

As one of the first truly global agritech innovation programmes in the agri-food sector, Cultiv@te also generated valuable insights on 'what works best' for fostering innovation – providing a blueprint for identifying global best practices and solutions, and applying and scaling them in local contexts. Some of these insights revolve around the need to get initial buy-in from key stakeholders, identifying and catering to the *real* needs of innovators, creating a strong knowledge-sharing community, and the enormous potential of taking an 'open' approach to solving problems through the use of open source, open standards, and open data.

Cultiv@te highlighted the context-specificity of agricultural interventions; the local nuances in agri-food systems in different countries cannot be ignored. While there is a need to scale proven solutions beyond national and international boundaries, innovation usually takes shape at the grassroots. There is a clear need for supporting innovation ecosystems in developing countries – including through the development of foundational infrastructure (physical and digital), human capital, and by strengthening the interlinkages between diverse stakeholders.

A young farmer member of the
Farmz2U programme - Farmz2U
was one of the innovations supported
through the Cultiv@te initiative

41

Wait for Response

Save as **Digital Skills**

All Responses

760

Split by Flow Result

Save as **Skill**

1	Other
396	364

Save Flow Result

Save
@(if(results.digital_skills_selec
tion = "","1 - Data
Analysis",results.digital_skills_
selection & ",... as Digital skills
selection

396

Split by Flow Result

2	Other
279	481

Save Flow Result

Save
@(if(results.digital_skills_sel
tion = "","2 - Digital
Marketing",results.digital_ski
_selection ... as Digital skills
selection

279

Split by Flow Result

6	Other
306	454

Save Flow Result

5   Other

2
Being driven
by data

More innovation means more data—a lot more.
Coming in many forms, data are big, lean, open,
thick. Used well, data hold enormous promise
to drive new ways of doing development. Their
potential to catalyse change was obvious during the
pandemic, when countries making social protection
and other payments based on digital ID and other
digital foundations reached 35 percent more
beneficiaries than countries without such assets.[1]

Innovative ways to apply data are core to UNDP's new Digital Strategy, aimed at 'digital by default' development programmes. The UNDP Global Centre is a key partner in putting this strategy into practice, helping to shape global thinking and policy around the many new forms and uses of data for development while devising tools and building skills for practical implementation. UNDP Global Centre initiatives included **helping to shape underlying data infrastructure**, since less than 20 percent of low- and middle-income countries have the foundations in place. Similarly, efforts also focused on **fostering data literacy** to ensure that people can both collect data and use them well.


Civil servants from the Government of Samoa participating in the 'Digital Analytics for Policymaking and Monitoring and Evaluation' training

1   World Bank

Through its Smart Cities initiative, the UNDP Global Centre has encouraged better data as a basis for better decision-making. This requires digital and data literacy, across UNDP and among municipal authorities. The Global Centre developed an ongoing **Smart City Training Series** with a series of expert partners, covering topics such as Big Data and how it can drive a better urban environment and Lean Data for actionable social measurement. Other sessions explore the importance of urban mobility, the need to create gender-inclusive smart cities and to prioritise sustainability, and the role of the circular economy in cities. These expert-led sessions were delivered to over 1,500 development professionals around the world.

Global data flows drive innovation and economic growth, accounting for 3 percent of global GDP. Keeping such flows smooth, productive and safe requires new forms of data governance, based on agreed norms, technical foundations and guarantees of inclusiveness. Regulation must catch up with rapid evolutions in data collection and use, such as how to balance privacy and transparency. Under the Digital Strategy, the UNDP Global Centre helps advance these elements, including by learning from models such as Singapore's Digital Economy Partnership Agreements. They help keep data protected and accessible while promoting data-driven innovation across borders.

In ASEAN, regional and international trade agreements have fostered cross-border data flows but generally without a clear technical underpinning for data privacy and cybersecurity (and other priorities). The UNDP Global Centre conducted a **major comparative study** considering these challenges as well as how cross-border data flows can best align with social and economic goals. It explored data transfer mechanisms and technical components, along with case studies of models like open banking.

Unpacking the policy, regulatory and technical drivers of enabling cross-border data flows in the ASEAN context
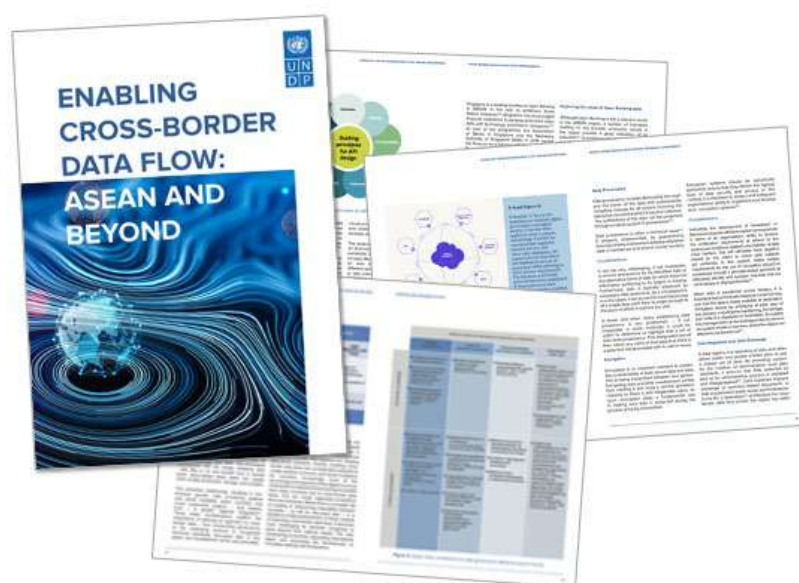
A series of recommendations on shaping a strong regional data governance framework highlighted critical steps such as greater convergence among national policies and a move away from protectionism, and highlighted the need for industry engagement. More recently, the UNDP Global Centre team has been sharing these insights with international policymakers attending the **Civil Service College** in Singapore.

For data to work for people and achieve social benefits, countries must make deliberate choices, such as extending digital infrastructure to reach the last mile. That's why the UNDP Global Centre supported UNDP **Colombia** to develop a digital data collection tool that can monitor community health status, specifically in rural areas. The tool captures multiple, complex risks, from health threats as well as natural disasters and socioeconomic shocks. It draws on the active participation of community members who learn to use the tool to collect and analyse data.

Globally, the UNDP Global Centre actively seeks new solutions to old data problems, like overcoming difficulties in gathering disaggregated data to get a better picture of issues faced by marginalised groups. It has supported the deployment of **geospatial technologies** that allow countries to harness spatial data to better understand complex challenges and devise successful policy responses. Nowhere is this more needed than in agriculture. Land records in many low and middle-income countries remain trapped on paper, complicating ownership claims and limiting a bigger-picture understanding of what crops are grown and where, and which areas are most vulnerable to disasters.

To bridge this gap, the UNDP Global Centre has shaped a prototype digital tool that draws on the increasing quality and frequency of geospatial data from satellites along with advances in Artificial Intelligence and machine learning. Designed to operate in line with national agricultural priorities, the tool supports tasks such as automatic field boundary delineation, crop mapping and yield predictions. Put together, the information generated could result in better outcomes on farms, from greater productivity to enhanced resilience to risks.

Cross-border data flows

In the ASEAN region, only a few countries have established data transfer mechanisms within their own jurisdictions to enable cross-border data flows with the purpose of stimulating innovation and economic growth. However, as technological transformation progresses, the collection and processing of data is accelerating. This transformation also increasingly relies on access to and use of high-quality data that often resides in more than one country.

In this context, there is a need to shape new models of data governance, whilst the crucial role of data in driving economic and societal development means that it should not be constrained by national or other geographic borders. This reality demands engagement with the requirements of enabling cross-border data flows.

There are significant positive multipliers of enabling cross-border data flows. Recognising this, all ASEAN countries – large and small; digital leaders and explorers – should contribute to this area. This will require effort on various fronts, from policies on internet access, data usage, and privacy (including avoiding data localisation or similar protectionist approaches) to the underlying technical architecture. It will also involve shaping a strong regional data governance framework to boost the above potential – and mitigate data-related risks and harm.

Collaboration is key. Of particular importance is the need for extensive industry engagement. Given the international nature of cross-border data flows, the role of multilateral organisations is also important to support coordination at an ASEAN level, build capacity and expertise, and drive collaboration and shape best practice. All of these efforts should be founded on working closely with existing initiatives.

How we manage cross-border data flows is an important aspect of national, regional, and global economic development – including driving progress toward achieving the Sustainable Development Goals. Similarly, leveraging the benefits of emerging and new technologies will demand looking outward – recognising that digitalisation, data, and innovation often do not recognise borders. This perspective will be crucial in seizing opportunities, as well as addressing shared global challenges in using data to drive policymaking, service delivery, and wider development.
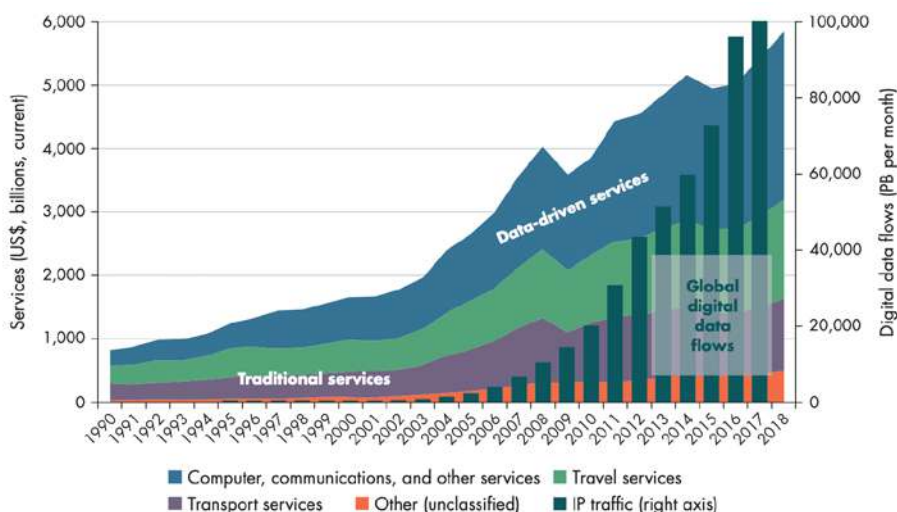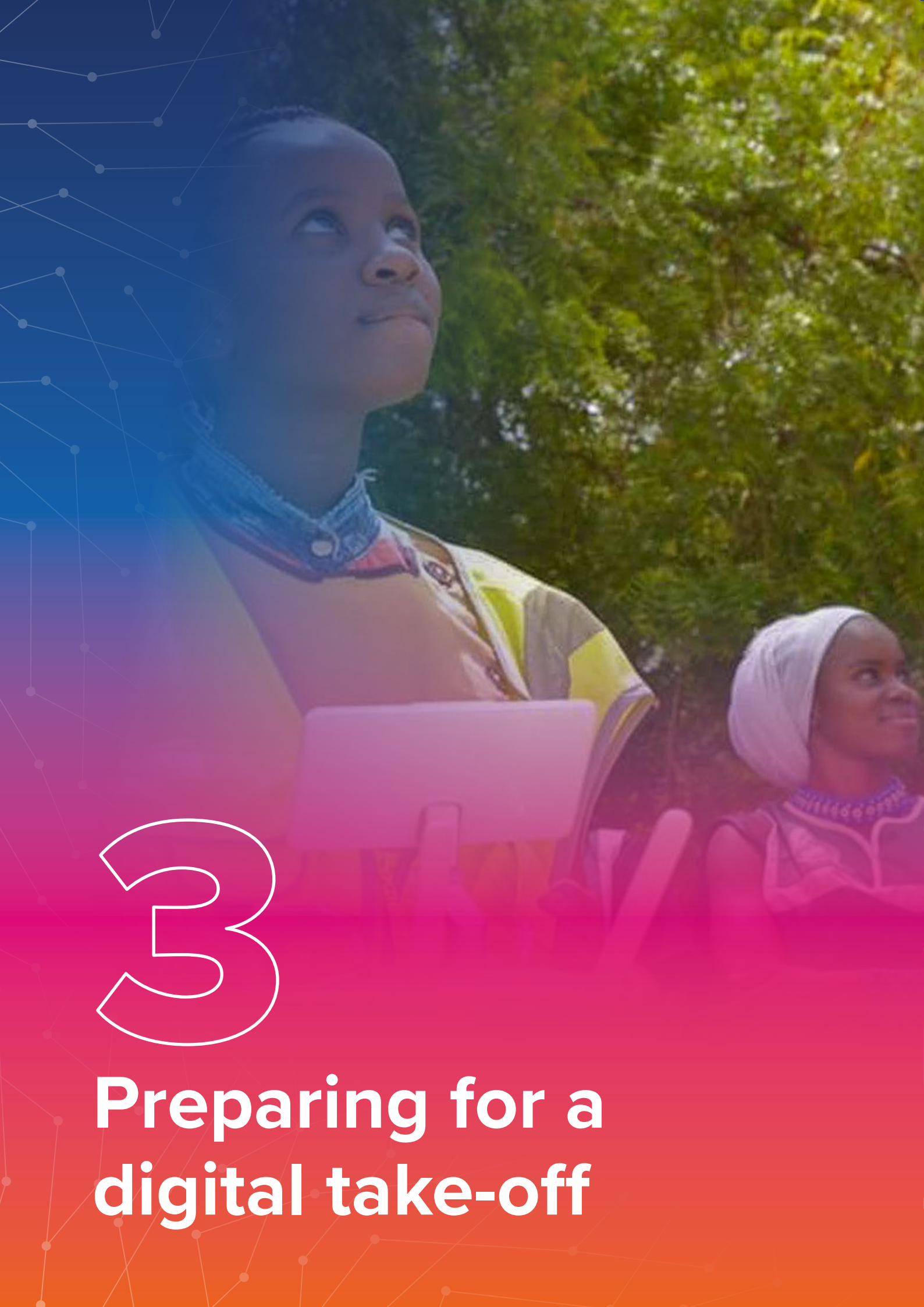

Since 1990, the global trade in data-driven services has grown exponentially and now constitutes half of trade in services (World Bank)

3

Preparing for a digital take-off

As one of the most significant innovations of the twenty-first century, digitalisation will shape every aspect of economies and societies. But building digital infrastructure and other foundations for digital transformation is complex. Many moving parts are involved, from the radio frequencies that enable mobile connectivity, to reliability and access, to ensure that anyone, anywhere can connect and benefit. While the affordability of data connections and devices is rapidly gaining ground, the digital infrastructure financing gap is wide and growing.

Catching up is critical, given a compelling potential return on investment. Among members of ASEAN, greater digital connectivity is expected to generate new products, services and apps that could transform how people live and work while boosting GDP by $1 trillion over the next decade. Getting to that point starts now. It depends on making the right choices in the right sequence, under a comprehensive, strategic approach. Recognising this, the UNDP Global Centre led a **major feasibility study to identify the role of digital in improving education outcomes in the region**. This identified a particular opportunity in the context of alternative education opportunities for out-of-school youth, and recognised the need for a blended approach – leveraging digital technologies (including smartphones, tablets, and computers) and offline venues such as community centres.
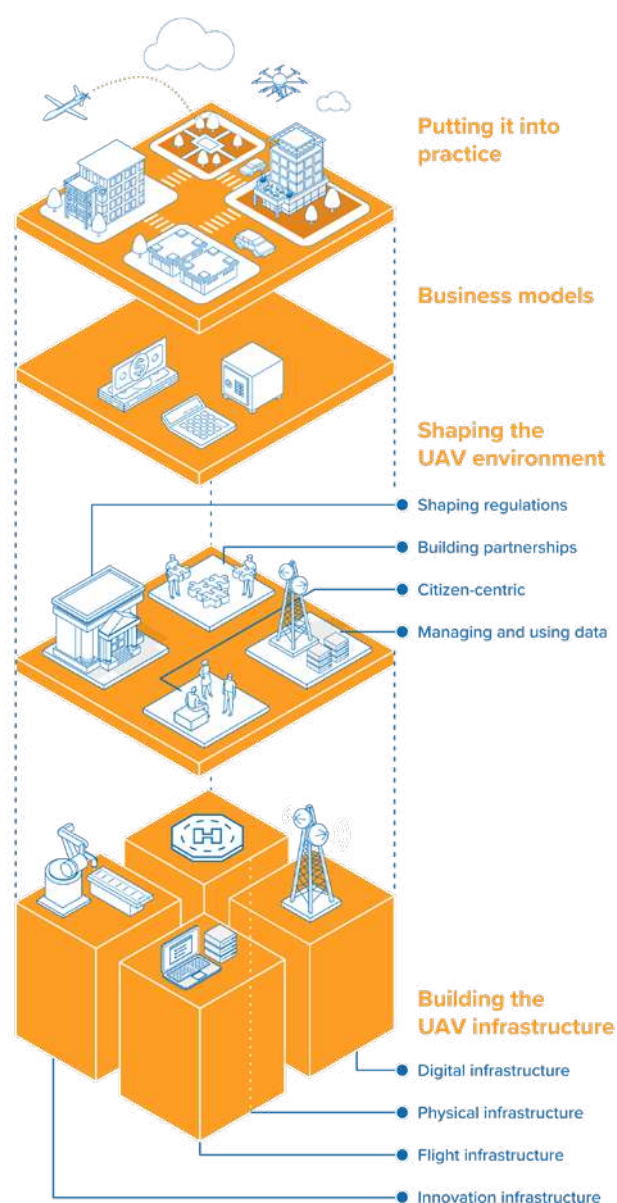
The UNDP Global Centre helps countries move forward by undertaking comprehensive, robust digital readiness assessments. Conducting rapid diagnostics of a country's digital progress, the assessments offer a jumping-off point to define priorities in developing digital and broader infrastructure – and other aligned pillars. One early emphasis has been on parliaments, after a lack of business continuity planning and limited uptake of digital technology paralysed many legislatures during the pandemic. The UNDP Global Centre worked with UNDP's Asia and Pacific Regional Hub to pilot digital needs assessments for three legislatures—in **Bhutan, Pakistan and Timor-Leste**. Research identified gaps and needs for foundational digital infrastructure, opportunities to develop skills among staff and politicians, and potential roles for open data and other tools. Focus groups with parliamentarians and officials in each country refined the findings and informed local digital action plans. The team have now expanded to digital nationwide assessments that identify the opportunities and challenges for digital within economies, societies, and governments. These have been conducted in over fifteen countries to-date. Other assessments have focused on accelerating **digital health** progress in one country, assessing **departmental digital strategic plans**, and a feasibility study for a **digital court solution** for one country's national Supreme Court.

The UNDP Global Centre puts a premium on connecting policymakers to the many possibilities for innovation in designing digital infrastructure. For instance, the team led the development of the **Dig Once** and **Public Sector Asset Reuse** 'model policies' in collaboration with the World Economic Forum's G20 Smart City Alliance. Working with over 20 cities to capture the best ideas on developing inclusive digital infrastructure as a foundation for smart cities, each policy offers a full menu of options to reduce disruptions and costs, cut barriers to service providers, lighten administrative workloads and sustain continuous services. It helps cities create and work through digital ecosystems that involve municipal authorities, private sector actors, citizens groups, providers of technology and public bodies overseeing highways and railroads, among others. The team also collaborated on shaping a number of other policies in collaboration with organisations such as the Open Contracting Partnership.

Higher-income cities, from New York to Singapore, are increasingly exploring UAVs (uncrewed aerial vehicles, colloquially known as 'drones') as potential digital solutions to provide and manage services. Amid rapid urbanisation, lower-income cities need these tools too—and can even pioneer their rapid development given less legacy infrastructure. The UNDP Global Centre aims to catalyse their efforts with a detailed handbook, **The Sky's Not the Limit**, designed specifically for lower-income urban areas. It provides guidance on how cities can use UAVs to improve urban planning, maintain and make infrastructure more responsive to public needs, optimise logistics and keep public spaces secure, among other goals. The handbook explores steps, including in governance, to ensure both innovation and oversight in using the technology. It maps how investments in innovation ecosystems and local capacity-building will help cities leverage the full potential of UAVs.

Putting it into practice

Business models

Shaping the UAV environment

- Shaping regulations
- Building partnerships
- Citizen-centric
- Managing and using data

Building the UAV infrastructure

- Digital infrastructure
- Physical infrastructure
- Flight infrastructure
- Innovation infrastructure

The urban drone 'stack'

Digital infrastructure is essential in sharing innovation across countries and achieving economies of scale. Multiple countries turn to the growing number of Global South open-source data sets as digital public goods that can drive better decision-making. A case in point is agriculture, where various open-source datasets – whose generation is enabled by digital technologies such as mobile phones, remote sensing, and the Internet of Things – are making precision agriculture accessible to even smallholder farmers around the world. The UNDP Global Centre's publication **Precision Agriculture for Smallholder Farmers** explores data-driven farming enabled by the rise of lower-cost digital solutions in developing country contexts.

Geospatial datasets, including publicly available high-resolution satellite imagery, are a promising category of open-source data with applications spanning across the realisation of all the SDGs – including those associated with agriculture. Digital tools leveraging geospatial data are making accessible timely and actionable information on crop and soil characteristics, weather, and climate threats to farmers – helping mitigate risks and improving productivity. To demonstrate the potential of geospatial data in advancing sustainable agriculture, the UNDP Global Centre **has developed a prototype tool** that uses open-source high-resolution satellite imagery to provide near real-time visibility of croplands to decision makers in agriculture and allied sectors – allowing them to monitor individual farm characteristics such as crop health and provide customised extension services to farmers in developing countries. The UNDP Global Centre is working towards developing additional functionalities into the geospatial platform through the integration of additional open-source datasets related to climate, hydrology, trade and markets as well as big data analytics capabilities to test and deploy the platform in collaboration with UNDP Country Offices and government partners.

More broadly, the role and importance of open-source is also being recognised in urban environments – allowing cities to accelerate their digital development through leveraging digital tools that have been proven in other contexts. This is the focus of an upcoming study led by the UNDP Global Centre to support cities on this journey: to drive local digital progress and development, and to catalyse an urban digital economy.

Digital Readiness Assessments

Facebook advert to encourage citizens to complete the Digital Readiness Assessment in Curaçao

In collaboration with the UNDP Chief Digital Office, and the UNDP Global SIDS Team, the UNDP Global Centre has been leading detailed digital diagnostics of Small Island Developing States (SIDS). These assessments, founded on the UNDP whole-of-society Digital Transformation Framework, aim to identify opportunities, learning, and bespoke recommendations for countries on their digital development journeys.

The **UNDP Digital Readiness Assessment** is a survey-based tool to provide rapid, high-level insights into a country's digital strengths and opportunities. It is intended to serve as an "entry point" for increased engagement between governments, UNDP Country Offices, a broad range of UNDP experts, and other international development partners.

The assessment has been designed to be used in conjunction with other tools and existing research. It is founded on a number of key principles: easy to complete, drawing on a mixed-method approach; providing real-time insights related to the 2030 Agenda, recognising that technology is a foundation and an enabler; providing iterative, tailored, and actionable results; and founded on inclusivity.

The Digital Readiness Assessment also aims to improve coordination and clarity to drive a whole-of-government and whole-of-society approach to digital transformation. This is crucial in achieving digital inclusion, ensuring that no one is left behind from the potential of digital, and enabling countries to leverage digital to achieve the SDGs.

The Assessment draws upon the above Digital Transformation Framework, centred around five pillars: infrastructure, government, regulation, business, and people. The UNDP Digital Transformation Framework helps stakeholders align on the key elements of inclusive digital transformation. The framework allows these actors to identify, structure, and prioritise national digital transformation efforts and agendas.

Each Assessment incorporates a mixed-methods analysis of each pillar (and sub-pillars) and its importance and relevance for national and inclusive digital transformation. This is then followed by a set of bespoke recommendations, to support the respective country in strengthening the digital progress made within each pillar – and building on this to progress the country's digital transformation journey.

4

Being powered by people

Innovation and technology are tools that work best when selection and design begin with the people who use them in mind. People make development solutions smarter and more creative, in line with their own hopes and preferences, their webs of relationship, and their ownership. Multiple possibilities can open by considering high-tech or low-tech or both, and Big Data as well as the 'Thick Data' insights from the nuance of daily lives.

Making people the starting point means deliberately pursuing human-centred design[2]. It requires closing feedback loops so benefits systematically flow back into solutions and make a meaningful difference. It calls for tapping talent, wherever it is discovered, and building capacities so everyone can benefit from the digital world. Widespread digital literacy is one element alongside skills for policymakers to leverage the potential of technology while mitigating any risks.

Such approaches were at work in **Uzbekistan** through a rapid innovation design sprint early in the UNDP Global Centre's Cultiv@te programme. Innovators, officials, farmers and development partners joined brainstorming sessions to formulate solutions to tricky issues, especially pressures from climate change. The process laid a viable and lasting foundation for better management of environmentally sensitive and economically important pasture lands – moving from research to developing a chatbot on Telegram, to support pastoral farmers with livestock management, over the course of 10 days. In **Asia and the Pacific**, the UNDP Global Centre convened leading agri-food investors and corporations to deliberate on findings from a recent report on applying blockchain for more efficient food delivery systems. Together, they identified the need for a forward-looking platform where multiple stakeholders can work together to ensure agri-food systems uphold both food security and sustainability.

----

2   See the 'Introduction to Human-Centred Design' short video series from the UNDP Global Centre and PALO IT here: https://www.undp.org/asia-pacific/stories/video-series-three-design-thinking-lessons-building-smart-cities

Soon after the COVID-19 pandemic began, UNDP and the Global Centre joined Hackster, the largest online open-source technology platform, as well as more than ten major tech organisations, in launching a global drive to tap the best minds for the most innovative solutions to the crisis. The **COVID-19 Detect and Protect Challenge** mobilised hardware and software developers, product designers, scientists, hackers, makers, innovators and inventors to generate cost-efficient ideas for the pandemic response in developing countries.
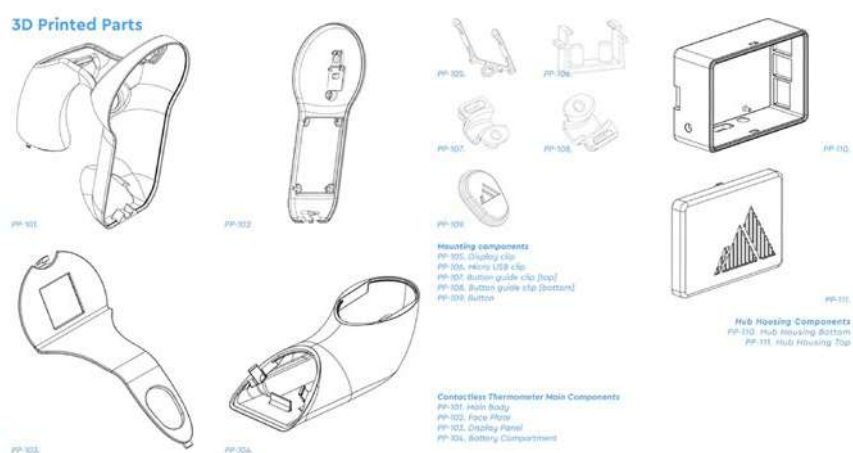

3D printing in Kenya, as part of the UNDP COVID-19 Detect and Protect initiative
©UNDP KENYA ACCELERATOR LAB / IHUB

Over 350 submissions came from more than 50 countries, with a selection of 10 'Grand Prize' winners. Many innovations cost less than $50 to build, with some as little as $10; most use globally available and easily sourced components. They included touchless water and soap dispensers, social distancing gadgets, 3D-printed smart face shields, contactless thermometers, face mask disinfection devices and low-tech health-care robots. Adam Benzion, co-founder of Hackster, noted that the company has run innovation challenges for some of the biggest names in technology but that the UNDP Global Centre challenge stood out as *"our most successful initiative ever".*

An online platform collected all **350 ideas** with instructions on how to build them, ensuring the widest possible access. In parallel, to kickstart implementation, the partnership with Hackster supplied equipment and materials to UNDP Country Offices through UNDP's network of 60 Accelerator Labs, which cover 78 countries. 3D printers, components, microcontroller units and more supported testing, rapid learning, experimentation and scale-ups, helping local innovators and 'makers' to build winning solutions.


A 3D-printable temperature scanner and WiFi hub, designed and made available as an open-source innovation as part of the UNDP COVID-19 Detect and Protect initiative
©KARAKORAM

In **Tanzania**, the UNDP country office collaborated with the national 'makers community' to support hubs using 3D printers to produce intubation boxes and face shields costing 80 percent less than imports and ventilator parts, all tested by national labs. Public and private hospitals across the country quickly began ordering the new supplies, with over 2,000 made and shipped out by early June 2020. Meanwhile, in other countries, a low-cost platform built by other innovators piloted the use of clinical sensors and ultra-long-distance Internet-of-things radios to generate emergency real-time health data.

Separately, people-centred solutions in The Gambia have engaged municipal officials, tech experts and local market vendors to resolve longstanding shortfalls in tax collection. While local governments provide basic services and infrastructure, they often struggle to mobilise revenues to pay for them. Under a UNDP Global Centre pilot, the local UNDP Accelerator Lab collaborated with the city council in Banjul, the capital, to probe issues hindering tax collection. A first step was surveying and generating data on experiences among nearly 2,000 market vendors. Collaboration with the University of the Gambia analysed the findings to define how digital solutions might help. This led to the selection of a local firm to work with the Banjul City administration to introduce QR codes for vendor stall identification and registration, which reduced human error. Subsequent digitisation of tax collection made it easier and more transparent. Smart digital kiosks begin providing accessible market information and improved communications. With these digital solutions in place, tax collection soared by 25 per cent.

Small and medium enterprises are the engines of most economies but many owners and entrepreneurs struggle to leverage digital tools and skills to enter the digital economy — and to demonstrate credit worthiness. The UNDP Global Centre has teamed up with the Monetary Authority of Singapore, IFC, Singapore University of Social Sciences, the Global Fintech Initiative and private sector partners to launch an online **one-stop platform** with courses, resources from leading organisations and networking among peers and clients, all specifically geared towards smaller enterprises. One aim is to use the knowledge gained through this platform as a proxy demonstrator of financial credibility, improving financial and digital inclusion of SMEs.
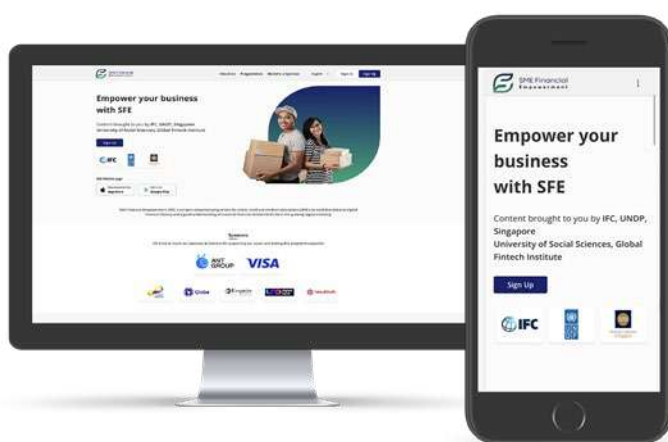
The SME Financial Empowerment platform aims to improve the financial and digital literacy of small business owners

Some of the most underappreciated entrepreneurs are those in government. Many work against long odds to introduce innovations that can improve lives across entire societies, such as through better public services. Encouraging their entrepreneurial zeal and inspiring others to join them is the purpose behind one of the UNDP Global Centre's newest initiatives, the **Future of Government** awards — delivered in partnership with Apolitical and the Amazon Web Services Institute. With more than 140 nominations from over 50 countries, it is clear that governments around the world have recognised the importance of people-centred digital innovation.

The 'Future of Government Awards' received nominations from more than 40 countries

The UNDP Global Centre worked closely with the UNDP Gambia Accelerator Lab to explore a smart approach to the city's administration. This involved the use of QR codes for vendor stall identification and registration; digitising rate collection by market staff; and, using smart digital kiosks as information management systems.

The firm identified to support implementation was locally sourced and shed a much-needed spotlight on the innovation capabilities of The Gambian tech ecosystem. The Theory of Change was simple – by introducing these interventions would increase efficiency in the council. Specifically, by using QR codes for stall management, there could be scope to reduce human error and issue marketspace, and manage market data better and faster. Secondly, with the rate collection system digitised, market rate collection could be done more transparently and quicker. Finally, with the information management system, market information could be more readily available, and communications could be made easier.

An open-minded and forward-thinking council made the rollout of these interventions a success. Once the UNDP The Gambia Country Office was selected for the Smart Cities Pilot initiative, as an implementing partner to work with the UNDP Global Centre, The Gambia Accelerator Lab quickly regrouped to commit resources to the project and get an early start. Researchers from the University of The Gambia collected data on the market dynamics and surveyed Council staff for the project. Once this process was completed and partnerships with the council formalised, a detailed scope of work was drawn up, allowing recruitment of a very suitable local implementing partner firm.

In June 2022, Aissata De, the UNDP Resident Representative of The Gambia, was joined by the Lord Major of Banjul, Rohey Malick Lowe, for the launch of the Smart Cities Pilot project. Local media were invited to the event, which was hosted at the heart of the oldest market in Banjul, Albert Market. So far, the results have been promising. Rate collection has increased by 25 per cent and three of the five market zones where the pilot was introduced, have all been migrated to the new registration system. The digital kiosks also show promise with the council currently planning a campaign to promote advertisement space for hire.

KÒRSOU TA KLA PA TRANSFORMASHON DIGITAL?

Kompartí bo opinion:
gobiernu.cw/enkuesta

Un proyekto di Ministerio di Maneho di Gobernashon,
Planifikashon i Servisio Públiko huntu ku UNDP.

5
Partnerships for a transforming world

Digital technologies and innovation have broadened
opportunities for development—and the people
and partnerships involved, both public and private.
Multiple people working together unleashes
collective intelligence and resources, propelling
digital transformation so it becomes a truly global
endeavour. The UNDP Global Centre has pioneered
new partnership configurations linking forward-
looking individuals, institutions and countries in
the Global South and North. UNDP Country Offices
increasingly turn to the UNDP Global Centre to source
expertise as well as new forms of collaboration.

In 2022, the World Cities Summit became a platform for the UNDP Global Centre to
convene its network of partners and leading digital and green experts in a **flagship
event,** Digital for a Green Recovery. Participants strongly affirmed that digital is no longer
optional, recognising the far stronger pandemic responses in countries with digital
foundations. Highlighting links between digitalisation and sustainable, resilient national
development, the event stressed the need for all states, small and large, to prioritise
digital solutions that put people and the environment at the centre. It highlighted the
need to strengthen collaboration among innovation ecosystems and to ramp -up efforts
to build data capacities and close digital divides.

'Digital for a Green Recovery' - the UNDP Global Centre (Singapore) flagship event at the 2022 World City Summit

A variety of UNDP Global Centre partnerships are already acting on these issues. A major **collaboration with Intel,** for instance, brings the company's cutting-edge technical expertise on artificial intelligence, blockchain and other emerging technologies to government data scientists and leading policymakers in **India.** The aim is to accelerate the transition to a digital economy and enhance national competitiveness through more informed policymaking. A series of webinars demystified technologies, demonstrated practical actions and framed plans to reach digital transformation goals. Sessions covered topics such as using blockchain to ease supply chain constraints and deploying artificial intelligence to fight financial crimes. More than 2,000 policymakers have joined these live sessions.

Improving the emerging technology knowledge of policymakers in India

Seeking to better connect the world of private finance to sustainable development, the UNDP Global Centre entered into partnership with the Silicon Valley venture capital firm Draper University, resulting in the launch of a health-tech venture accelerator. While UNDP has previously launched venture accelerators in eight countries and supported over 150 enterprises from 20 countries, the Draper accelerator was the first with a global vision and service offering, and aimed to prove the value to scaling-up business-based solutions to attain the SDGs. It worked with both growth-stage and established businesses offering innovative technology solutions and transformative business models, services and products. These tackled challenges in health care, markets, sustainable development and economic recovery.

With climate change and the war in Ukraine straining global food supplies, a UNDP Global Centre partnership with Microsoft in Asia and the Pacific previously sought ways to bump up production, sustainably, through innovative technologies. The Microsoft Azure Virtual Hackathon galvanised nearly 1,200 artificial intelligence and machine learning enthusiasts to put forward ideas, such as using algorithms to detect pests and diseases and improve urban farming. Collectively, they foregrounded an array of new technologies that UNDP brought to 31 agri-tech start-ups under the Cultiv@te initiative.

On this note, and with agri-food tech a rapidly evolving sector attracting growing investments, the UNDP Global Centre has collaborated with SGInnovate to create **The Digital Feed**. Through this multi-episode YouTube series, industry experts delve into trends in food value chains and how they will impact the future. Recent episodes explored urban and vertical farming and highlighted public-private partnerships in fostering agri-food innovation ecosystems. This was part of a broader and ongoing collaboration with SGInnovate that aims to broker non-traditional partnerships and discussions within and beyond the Singapore innovation ecosystem.

Exploring trends in food value chains and agritech innovation

Finally, the need for partnership crosses sectors - and crosses borders. The UNDP Global Centre was delighted to host virtual and in-person learning sessions, convenings, and delegations. This included hosting His Excellency Abdulla Shahid, then-President of the **76th United Nations General Assembly**.

The UNDP Global Centre also facilitated a High-Level South-South Learning Mission to Singapore by the **Government of the Seychelles**. The 14-person delegation included the Honourable Mr. Naadir Hassan, the Minister of Finance National Planning and Trade, and the Honourable Mrs. Devika Vidot, the Minister of Investment, Entrepreneurship and Industry. The ministers were accompanied by technical staff from their ministries, the Ministry of Foreign Affairs, the Ministry of Education, the Central Bank, the Chairperson of the Seychelles Chamber of Commerce and Industry, and three technical staff from the UNDP Seychelles Country Office.

The 'SDGInnovate' event series, in collaboration with SGInnovate

Digital for a Green Recovery

The 'flagship event' of the UNDP Global Centre – held on the sidelines of the 2022 World Cities Summit in Singapore – demonstrated the need for partnerships and collaboration in driving a 'green recovery' from the COVID-19 pandemic. Speakers from the public and private sectors, civil society, and international development highlighted how digital – if applied thoughtfully, inclusively, and sustainably – can ensure that people and the planet prosper together.

The event highlighted three priorities for an inclusive and green digital transformation.

- First, we must put people at the centre of innovation. This includes ensuring the availability of foundational digital infrastructure so that everyone can benefit. We must also ensure that the technical standards and explorations of emerging technologies are 'human-centred', founded on the local needs and aspirations of populations, but also 'environment-centred'.

- Second, we need to strengthen collaboration between innovation ecosystems. Innovation doesn't happen in a vacuum. It requires an enabling ecosystem comprising policies and regulations, investors, incubators and accelerators; and educational institutions. Digital can be a potent enabler for connecting dispersed national and global innovation ecosystems in pursuit of sustainability.

- Third, data is the lifeblood of digital transformation and could be an important equaliser for countries in accelerating their efforts towards the Sustainable Development Goals. However, a number of countries lack even foundational data infrastructure, such as data centres, communication networks, and energy grids. We need to accelerate efforts to build data capacity to ensure that existing digital divides are not widened.

Digital is an indispensable enabler for driving a green and inclusive recovery. But it is truly a 'whole-of-society' endeavour. As a platform to showcase innovation, best practice, and to foster partnerships, the UNDP Global Centre for Technology, Innovation, and Sustainable Development will continue to convene global discussions, support and align innovation ecosystems around the world, and guide governments in leveraging the potential afforded by digital. Through driving the experimentation, adoption, and scaling of digital, we can shape a Green Recovery that works for both people and planet.

6

The need for leadership

Digital and broader innovation needs to be founded on the needs, realities, and aspirations of people – but it also demands leadership across government, the private sector, and civil society. The path of digital transformation and leveraging innovation is not simple, guaranteed, or necessarily linear. It requires engagement with complexity, ambiguity, setbacks, and failures – as well as celebrating and building on successes.

When the COVID-19 crisis hit, for example, **Singapore** modelled the possibilities of open-source technology and open data. Particularly critical for countries with limited resources, these provide economies of scale and reduce asymmetries in R&D and investment capacities. As one of the first developers of a digital COVID-19 contact tracing application, Singapore quickly made the source code available to other countries. Recognising this open-source leadership, the UNDP Global Centre has been working with **Singapore's GovTech agency** to recognise a number of these products and services as 'digital public goods'. Such accreditation provides governments around the world with further access to Singapore's proven solutions, which they can explore and implement based on their local needs in order to accelerate digital development.
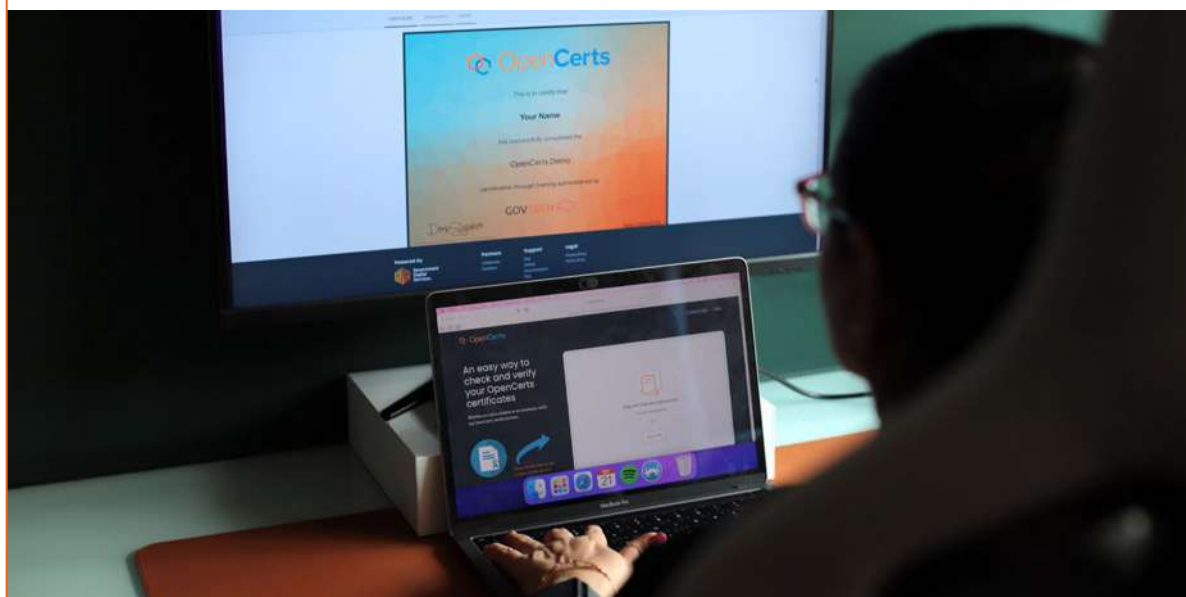
OpenCerts - one of several GovTech Singapore innovations recognised as Digital Public Goods
©GOVTECH SINGAPORE

Leadership is also about learning from what does and doesn't work. The UNDP Global Centre has led a number of analyses and comparative 'deep dives' to share learning within and between cities and countries – allowing governments and innovators to accelerate their ways of working and thinking. The team have led **comparative studies** for countries exploring the digital economy, telehealth, smart cities, urbanisation, and technical and vocational education. The UNDP Global Centre have also used these insights to mentor start-ups and other leaders, including participating in the inaugural cohort of the **Bluetribe initiative**, a unique and intensive 6-month startup incubation scheme led by UNDP Cambodia.


©UNDP CAMBODIA

The sheer scale and opportunity afforded by digital also requires leaders to take the path less travelled. This includes in the context of the wide-ranging and non-traditional partnerships highlighted earlier. But leaders should also identify the role of these partnerships in achieving key outcomes. For example, the UNDP Global Centre worked with one local government to identify how they could collaborate with a global private sector actor in **implementing an e-bike initiative** to improve mobility and air quality.

Leadership is also crucial in the context of policy and broader thinking. The UNDP Global Centre is a strong advocate for 'thought leadership' to ensure that no one is excluded from the potential that digital and innovation can offer. This work has included making emerging technologies more accessible to policymakers and development professionals around the world. From reports on **blockchain technology for food traceability** and **precision agriculture,** to the regular email Bulletin that shares with more than 3,000 subscribers the potential of new and emerging innovations.

Finally, leadership also needs to be agile; it cannot be static. Recognising the fast-evolving nature of digital and innovation, leaders must remain alert to the shifting realities, priorities, and opportunities offered by these tools and initiatives. The UNDP Global Centre is committed to supporting them, to ensure that their populations and partners can benefit.
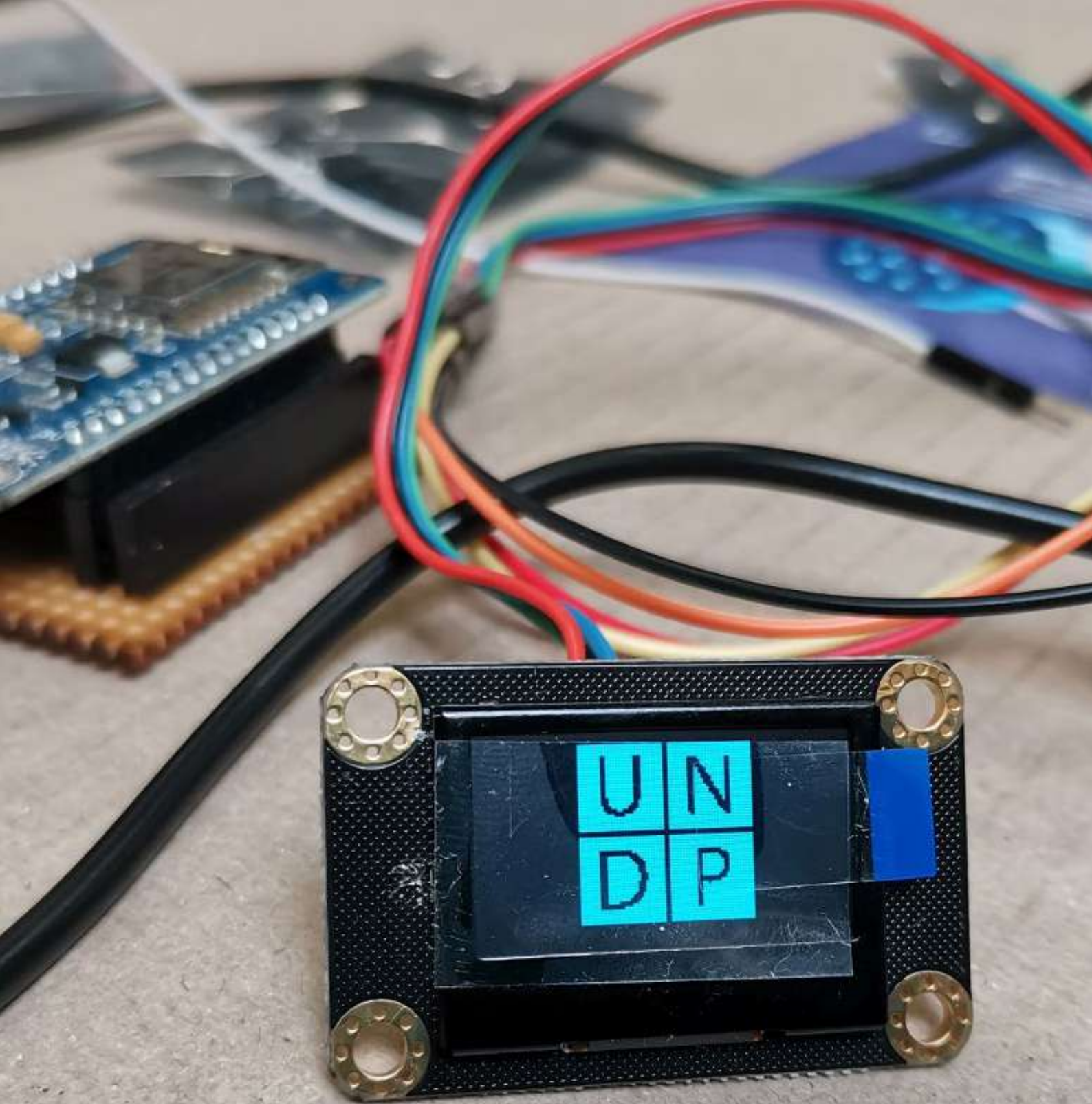
Innovators exploring open-source hardware innovation, as part of the UNDP COVID-19 Detect and Protect initiative

©UNDP SOUTH AFRICA ACCELERATOR LAB

Small Island Developing States

Small states take the path less travelled. They face challenges unfamiliar to many: scarce resources, smaller economies and the real impact of climate change. However, small states are also able to leverage assets in ways that large states often cannot. As an example, Singapore has learned how innovation and digital can accelerate development.

Small states are not passive actors in traditional development or innovation trajectories. They have exciting power and agency to steer innovation in new directions. This includes forging a new age of global innovation leadership – defining and setting global standards and innovation priorities, and shaping a small states comparative advantage in the context of innovation.

For many developing countries, leveraging digital potential starts with building the basics of domestic data infrastructure, including tools and techniques to collect meaningful data, and data literacy within and beyond government. The UNDP Global Centre, for instance, has supported a 'one-stop' source of information and analytical tools for small island developing states known as the **SIDS Data Dashboard.** It compiles data to inform policymakers, academia, donors, UN organisations and the general public on sustainable development progress and challenges faced by this unique set of countries.

The team has also focused on supporting domestic data collection. In **Curaçao** and **Trinidad and Tobago**, the UNDP Global Centre built a dashboard to share the results of the two countries' digital readiness assessments with the general public, a model that will be explored as part of its work on delivering assessments in other countries. More widely, the UNDP Global Centre has been leading a global survey of young people in SIDS – learning more about their hopes, concerns, and aspirations in the context of all things digital. The team built a survey chatbot – running on WhatsApp, Facebook Messenger, and Telegram – in order to reach more than 5,000 young people across 40+ countries.

The UNDP Global Centre has also collaborated with the UNDP SIDS team, UNCDF and ITU to devise a bespoke online course on digital transformation for SIDS policymakers. It covers topics including digital infrastructure and inclusion, and approaches to shaping an innovation ecosystem. It serves as an entry-point to broader collaboration with UNDP, including on digital transformation strategies. To broaden its impact, the course is also offered as a 'thank you' to young people completing the SIDS youth survey, in order to build the digital skills of the next generation. In addition, the UNDP Global Centre – in collaboration with the United Nations University International Institute for Global Health – delivered a week-long course on Digital Analytics for Monitoring and Evaluation to civil servants in Samoa.

Finally, SIDS are leading the exploration of many new innovations. New and technology-enabled methods of agricultural production such as vertical, indoor and controlled-environment farming offer a way for SIDS to transform their agri-food systems towards greater sustainability. These can help overcome some of the inherent developmental challenges historically faced by SIDS including the scarcity of land, water and other natural resources, high dependence on food imports, and nutritional insecurity – while creating new opportunities for economic growth and livelihoods generation for local youth. The UNDP Global Centre is supporting SIDS around the world in shaping pathways for the adoption and scaling of novel farming systems through policy support, capacity building, and technology transfer.

What comes next

Digital technologies are transforming lives and livelihoods globally. The COVID-19 pandemic has accelerated the pace and scale of this transformation. On one hand, digital technologies present tremendous opportunities to improve lives and livelihoods, and advance the SDGs. Digital technologies play an increasingly important role in improving access to health and education, driving economic integration and interconnectedness, and supporting efforts to mitigate and adapt to climate change.

At the same time, the digital divide between and within countries is widening, and many developing countries face the risk of being left behind. Around 3 billion people still lack internet access. Many developing countries face difficulties in equipping their people with the necessary skills and literacy to leverage the potential of digital technologies. The risks and challenges of technology and innovation are also more likely to affect developing countries, due to the lack of safeguards and policy measures in place to manage such risks.

The UNDP launched two important roadmaps for the four-year period of 2022 to 2025. First, the organisation's new Strategic Plan (2022-2025), which aims to help countries tackle the toughest global development challenges, structured around UNDP's six signature solutions. The plan recognises, however, that achieving the desired results will only be possible if development efforts are powered by enablers and accelerators including digitalisation. Second, the UNDP Digital Strategy (2022-2025), which guides the organisation in its efforts to support countries to build inclusive, ethical, and sustainable digital societies by leveraging technology and innovation, while rapidly scaling-up its capacity and capability to support its partners to do so.

Within this context, and in partnership with the Singapore Government and drawing on its unique ecosystem, the next phase of the UNDP Global Centre aims to become the key platform to support UNDP and its 170 country partners to achieve transformative sustainable development by leveraging digital technology and innovation. This next iteration will seek to build on the learnings and successes of previous generations. It will drive more expansive global thought leadership and increased practical explorations of digital innovations. It will also build on and expand the two central strands of the current model: a hub for knowledge and policy, and a global platform to study and showcase best practices and examples of digital innovation and partnerships to achieve sustainable development. We look forward to collaborating with you on this journey.

GET IN TOUCH

Check out
www.undp.org/sgtechcentre

For partnership opportunities or other
queries:
registry.sg@undp.org

@UNDPtech