Toolkit on Digital Transformation for People-Oriented Cities and Communities

4

Module 4:
Connectivity, Digital Divide and Digital Inclusion

Jointly developed by: ITU, UN-Habitat, UNDP

Module 4 – Connectivity, Digital Divide and Digital Inclusion

- This Module of the ITU Toolkit on Digital Transformation for People-Oriented Cities and Communities focuses on connectivity, digital inclusion and the digital divide, including accessibility aspects in smart sustainable cities and communities.

- Cities and communities that are starting on their digital transformation journey will find the resources highlighted within this Module useful toward deploying IoT and smart systems in their city to ensure inhabitants' inclusion and accessibility to services.

- This Module is also useful for cities that have already made some headway into their digital transformation process but would like to validate the efficacy of smart systems and applications in their city for these purposes.

Module 4 – Connectivity, Digital Divide and Digital Inclusion

This Module will cover the following topics:

1. Digital Divide Challenge Facing Cities and Communities
2. Barriers to Accessibility
3. Solutions for Addressing the Digital Divide
4. Steps to address the digital divide
5. Key Tools for Narrowing the Gap on the Digital Divide
    - Tool #1 Assessing the Digital Divide
    - Tool #2 Best Practices for Addressing the Digital Divide
    - Tool #3: Connecting rural and remote areas
    - Tool #4: Digital Inclusion Toolkits

1. Digital Divide Challenge Facing Cities and Communities

The Digital Divide

The gap between those who have access to and use information communication technologies (ICTs) including internet connectivity, digital literacy skills, and internet-enabled devices, and those who do not.

While every community is different, the digital divide consistently reflects and amplifies existing social, economic and cultural inequalities such as gender, age, race, income, and ability. Access is multidimensional and includes the physical, spatial, cultural, demographic and socioeconomic conditions of accessibility.

The Digital Divide

Under half the world's population do not use the internet.
Despite adding over 1 billion new internet users over the last five years.

Worrying gaps in connectivity and internet access persist in rural areas.
Globally, 72% of households in urban areas has access to internet, only 38% in rural areas.

Connectivity in developing countries is especially serious.
17% of rural population lives with no mobile coverage, and 19% only covered by a 2G network.

Digital Divide and Beyond

Digital divide and inequality are fundamentally linked to a region's patterns of growth, and contribute to income inequality, low productivity, and low economic growth.

Access to ICTs including internet connectivity, internet-enabled devices and digital literacy skills are fundamental for communities to establish a robust and sustainable connection to the digital world, particularly as **fundamental pillars** of society such as **education, workforce development and innovation**.

Why Digital Inclusion Matters

The Internet has fundamentally transformed how we connect to the institutions that serve us and to each other. Industries fundamental to society like education, workforce development, finance, government, innovation and even community building now have online analogs that can provide greater convenience and opportunities to connect to critical information and services online.

- Education
- Workforce development
- Financial Inclusion
- Participation in digital services and e-government
- Innovation
- Representation
- Community building and collective action

The Value of Connectivity

1. Internet connectivity can have a tremendous impact on **equity, innovation and economic development**

2. Because so many fundamental aspects of society are now tied to internet access, **accessible internet infrastructure has become an essential standard of living** similar to water, energy and housing

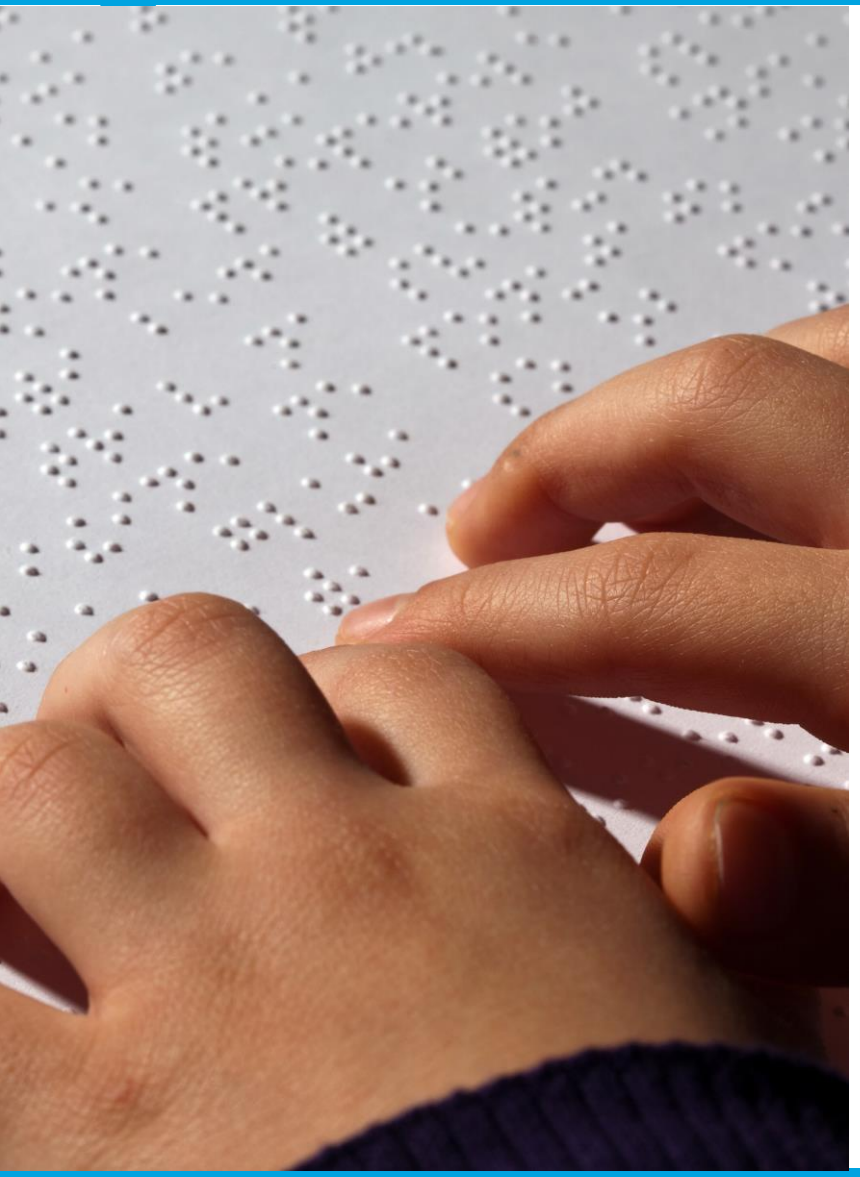
3. COVID-19 pandemic has taught us that **internet connectivity is no longer a luxury, but instead a cornerstone of resilient communities.**

The ‘Costs’ of Connectivity

1. Cost of mobile phone and broadband internet access remain unaffordable. Four of the UN’s six regions have Internet costs that exceed the Broadband Commission’s affordability target.

2. Globally, 28% of urban households lack internet connectivity, and 37% do not have Internet access to a computer.

3. In 40% of countries reporting data, less than 40% of individuals reported being able to carry out a digital activity considered as a ‘basic’ **Information Communication Technology** (ICT) skill.



Who Experiences the Digital Divide?

Who experiences the digital divide is the fundamental question of a digital divide study. Global trends show several groups that are systematically excluded from internet connectivity.

Women and Girls	**Older People**	**Indigenous Communities**
Children and Youth	**Urban and Rural Poor**	**People with Disabilities**

Marginalised communities, minorities and people on the move

2. Understanding the Digital Divide

Understanding the Digital Divide

There are many dimensions of the digital divide, which can vary from the physical to the psychological. But any city can display a combination of them. In order to take steps to study the digital divide and ultimately attempt to resolve some of its effects, it is important to have a fundamental awareness of the many ways that the digital divide can occur:

Understanding the Digital Divide

1) The connectivity divide: Intra-urban and urban vs. rural

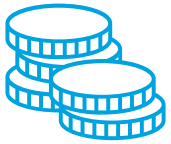
The gap in connectivity between urban and rural areas is a global phenomenon. The digital divide is not limited to the urban/rural split however and does occur in an intra-city context. The digital divide manifests within cities particularly in low-income areas with substantially lower broadband adoption rates. Such low-income areas often correlate to neighborhoods and districts with higher populations of marginalised groups.

2) The infrastructural divide: Infrastructure and access

A connectivity divide can occur when it's politically, strategically or structurally challenging or less profitable to build infrastructure in a given location. Therefore the "infrastructure divide" does not only follow urban/rural lines, but also reflects political and economic choices.

Understanding the Digital Divide

3) The socioeconomic divide: Affordability



As previously mentioned, the cost of connectivity remains a barrier for much of the world, in both urban and rural areas. The price of connectivity includes not just the ability to afford subscription access to the internet, but also the ability to devote the time and resources needed to acquire digital literacy skills.

4) The demographic divide: Gender, ethnicity, age and disability

Internet connectivity remains elusive for many women, marginalised groups, the elderly and those with a disability. For a significant portion of immigrants, refugees and people on the move worldwide, language barriers impede access to local public information and government services.

Understanding the Digital Divide

5) The cultural divide: Motivation and social acceptability

Despite the internet's utility in providing access to information, education, opportunities and resources, a large segment of the offline population lacks compelling reasons to go online. Motivational, cultural, and occasionally, religious barriers to internet adoption include lack of awareness of the internet, lack of cultural acceptance, lack of demonstrated value and a lack of relevant (localised) content and services.

6) The literacy divide: Awareness and education

Digital literacy is one of the most pervasive barriers to internet connectivity. Women, the elderly, disabled populations and rural residents have characteristically low digital literacy rates globally. For those lacking digital literacy skills, today's job market is largely inaccessible due to both an inability to locate jobs on online platforms, and possess the necessary qualifications to obtain them.

The Gender Divide

Gap in access and use of the Internet

Gap in digital skills and use of digital tools

Gap in participation in science, technology, engineering and math fields

A gap in tech sector leadership and entrepreneurship

4. Key Tools for Narrowing the Gap on the Digital Divide for Cities

Introduction to Tools for Connectivity, Digital Divide and Digital Inclusion

Tool #1
Assessing the Digital Divide

Tool #2
Best Practices for Addressing the Digital Divide

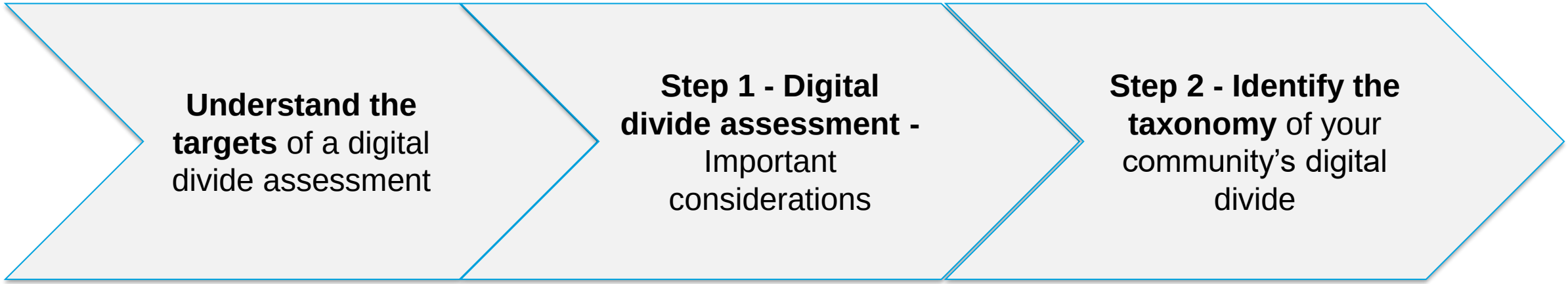
Tool #3:
Connecting rural and remote areas

Tool #4:
Digital Inclusion Toolkits

Tool #1

Assessing the Digital Divide

Assessing the Digital Divide



Targets of a Digital Divide Assessment

The first step towards establishing a plan to reduce or eliminate the digital divide is to study the contours of the problem locally.

- **Hyperlocal "grassroots" data** is critical for the design and implementation of successful digital inclusion programming.
- Appropriate **methods to survey community** members using inclusive survey design, transparency, qualitative data and testimony
- Administer surveys paying **special consideration to the nuances of their community.**
- Identify three targets of a digital divide assessment: **gaps, location** and **roots**.

Targets of a Digital Divide Assessment

- **Connectivity**
- **Digital literacy**
- **Access to devices**

Gaps

are the indicators or symptoms of the digital divide

- **Political boundaries**
- **Addresses**
- **Geo-coordinates**
- **Administrative boundaries**

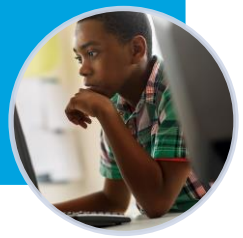
Location

refers to where residents are experiencing the effects of the digital divide.

- **Geospatial conditions**
- **Infrastructure accessibility and availability**
- **Socioeconomic conditions**
- **Demographic experiences**
- **Cultural practices**
- **Education**

Roots

are the causes of the digital divide and address *why* some experience the effects



STEP 1 - Digital Divide Assessment

1. Identify gaps in existing data
2. Structure your survey using gaps, location, and roots
3. Administer your survey with key considerations
4. Reverse engineer the digital divide
5. Analyse and visualise your data “as-a-service”

Consider how to provide this data in a useful way while respecting resident’s privacy.

Data-as-a-service or DaaS, refers to data that is offered on-demand, typically over an internet network. Data collected by local governments should be supported by a data governance policy for the local government that creates standards for data ownership, privacy, security and overall management.

Important Considerations of a Digital Divide Assessment

Possibly the greatest challenge for a digital divide assessment is that you cannot obtain reliable results by conducting the survey exclusively online. An assessment of the digital divide must be done both in person and online, introducing some important key considerations that should be addressed by anyone attempting a successful survey.

Data on the digital divide is a public service, a digital public good.

Important Considerations of a Digital Divide Assessment

Boots on the ground	Indigenous/ native communities	Bias and equity	Familiarity with digital	Build trust
• A successful digital divide survey assessment must be done in person.	• Consider opportunities to partner with organizations that serve these communities in order to include representation from these groups in your survey.	• The demographics (age, gender, race, income) of survey respondents should mirror those of the city's entire population.	• Residents who are not familiar with the digital realm are precisely those that need to be surveyed.	• Providing a clear explanation of the data that will be collected and how it will be used, and where it will be stored

Important Considerations of a Digital Divide Assessment

Disability	Language	Reverse engineer the digital divide	Analyse and visualise your data “as-a-service”
• Expand who can participate in your survey by making accommodations for deaf, blind and alternatively abled groups	• Conduct your survey in an easy to understand language that respects regional dialects.	• You can do this by mapping the use of digital services and identify where the majority of residents accessing those services live.	• The data you gather from your survey assessment is a critical resource for your community.

STEP 2 - Digital Divide Taxonomy

Once you've completed your assessment, you should be able to identify the gap, location, and root of the digital divide experienced by your community.

This is your **digital divide taxonomy.**

Keep in mind there may be more than one of each. By mapping out your digital divide taxonomy you can begin to visualise the conditions of your community's unique situation.

Digital Divide Taxonomy

The connectivity divide: Intra-urban and urban vs. rural

- The digital divide is not limited to the urban/rural split however, and does occur in an intra-city context. The digital divide manifests within cities particularly in low-income areas with substantially lower broadband adoption rates. Such low-income areas often correlate to neighborhoods and districts with higher populations of marginalised groups.

The infrastructural divide: Infrastructure and access

- A connectivity divide can occur when it's politically, strategically or structurally challenging or less profitable to build infrastructure in a given location. Therefore the "infrastructure divide" does not only follow urban/rural lines, but also reflects political and economic choices.

The socioeconomic divide: Affordability

- The price of connectivity includes not just the ability to afford subscription access to the internet, but also the ability to devote the time and resources needed to acquire digital literacy skills.

Digital Divide Taxonomy

The demographic divide: Gender, ethnicity, age and disability

- Internet connectivity remains elusive for many women, marginalised groups, the elderly and those with a disability. For a significant portion of immigrants, refugees and people on the move worldwide, language barriers impede access to local public information and government services.

The cultural divide: Motivation and social acceptability

- A large segment of the offline population lacks compelling reasons to go online.
- Motivational, cultural, and occasionally, religious barriers to internet adoption include lack of awareness of the internet, lack of cultural acceptance, lack of demonstrated value and a lack of relevant (localised) content and services.

The literacy divide: Awareness and education

- Women, the elderly, disabled populations and rural residents have characteristically low digital literacy rates globally.
- For those lacking digital literacy skills, today's job market is largely inaccessible due to both an inability to locate jobs on online platforms, and possess the necessary qualifications to obtain them.

Tool #2

Best Practices for Addressing the Digital Divide

Addressing the Digital Divide

Designing and executing digital inclusion efforts is challenging.

Cities lacking budget, capacity and sometimes expertise, often struggle to build digital inclusion processes that are feasible, equitable and effective.

This tool includes:

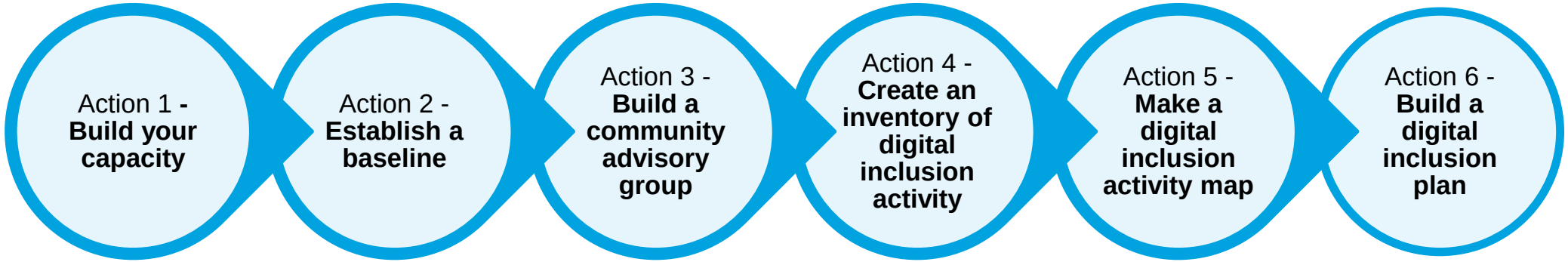
- Best practices principles for a digital inclusion plan
- Six key actions to co-create a digital inclusion plan

Best Practices Principles for a Digital Inclusion Plan

Center the community	Escape silo thinking	Leverage data	Maximise the ecosystem	Prioritise equity	Know your opportunities & constraints
Leverage existing service infrastructure	Pilot & pivot	Create metrics to evaluate progress	Strive to be technology neutral	Adopt standards	Assign Roles for Enforcement

CO-CREATE A DIGITAL INCLUSION PLAN

Six key actions



Co-Create a Digital Inclusion Plan

Action 1 :**Build your capacity**

Determine what financial, staffing, or infrastructural resources are required to be successful.

- Identifying and accumulating the necessary resources that will make digital inclusion work successful. This includes several aspects of programme development.
- Build an office or team to coordinate the digital inclusion plan.
- In most cases, local governments should act as stewards of digital infrastructure plans, and be the primary stewards of community engagement that drives improved services and

Co-Create a Digital Inclusion Plan

Action 2: **Establish a baseline**

Your baseline is formed from all the existing research including your digital divide assessment

- It frames the current digital divide landscape in detail and is formed from all existing and related research including:
  - Your digital divide assessment
  - Existing data and research from other service providers, local area governments, non-profits, or NGOs
  - Regional, national and global data sets that inform your local context

Co-Create a Digital Inclusion Plan

Action 3 **Build a community advisory group**

A community advisory group convenes leadership from stakeholders in digital inclusion to inform digital inclusion plans, policies and projects.

- In a digital inclusion plan, the role of a community advisory group is to:
  - Provide guidance, feedback and possibly approval regarding the plan's development
  - Lend resources to achieve strategic outcomes of the plan
  - Commit to roles and responsibilities defined by the plan
  - Provide redundancy in the event that administrative priorities change within local government
  - Define a shared vision on a pragmatic timeline

Co-Create a Digital Inclusion Plan

Action 4: **Create an inventory of digital inclusion activity**

Compile known services, programs, or projects that develop digital inclusion in your community.

- Important information to identify about the any digital inclusion services that already exist in your community includes:
  - What the digital inclusion activity is
  - What organization is delivering the service, and their type (private, non-profit, volunteer, church etc.)
  - The target audience of the service or project
  - Partnerships that support the service or project
  - Performance measures used to evaluate the service or project
  - Funding sources for the service or project
  - Location of the service or project (gather an address, or geolocation i.e., latitude/longitude)
  - The timeline of the service or project (is it ongoing or has a projected termination date)

Co-Create a Digital Inclusion Plan

Action 5 **Make a digital inclusion activity map**

Your digital inclusion activity map shows the geographic distribution of existing services and projects and the known digital divide

- Broadly, a map of local digital inclusion activities should include:
  - Service locations and known digital inclusion projects
  - Data from your digital divide assessment, particularly internet connectivity rates
  - Identify redundancies, gaps in service or other opportunities

Co-Create a Digital Inclusion Plan

Action 6 **Build a digital inclusion plan**

A digital inclusion plan is developed with the community and service providers and sets forth guiding principles, definitions, activities, roles & responsibilities and funding for reaching a shared vision of digital inclusion.

- The plan should include:
  - Guiding principles
  - Shared definitions
  - Priorities
  - Goals, outcomes
  - Timeline
  - Roles & responsibilities
  - Cost of the plan and funding
  - Performance measures
  - A transformative kick-off project

Tool #3

Connecting Rural and Remote Areas

Broadband Development and Connectivity Solutions for Rural and Remote Areas

Reasons for lacking connectivity

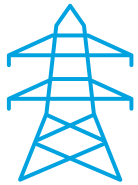
Rugged terrain

Lack of investment

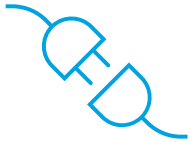
High ICT infrastructure installation costs

ITU-D Question 5/1 – Annual deliverable 2019-2020: Broadband development and connectivity solutions for rural and remote areas

Backbone Infrastructure

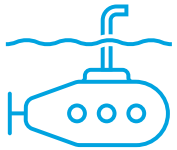


Wireline communication infrastructure

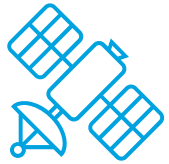


Fibre-optic cables

Wireless technology



Submarine cables

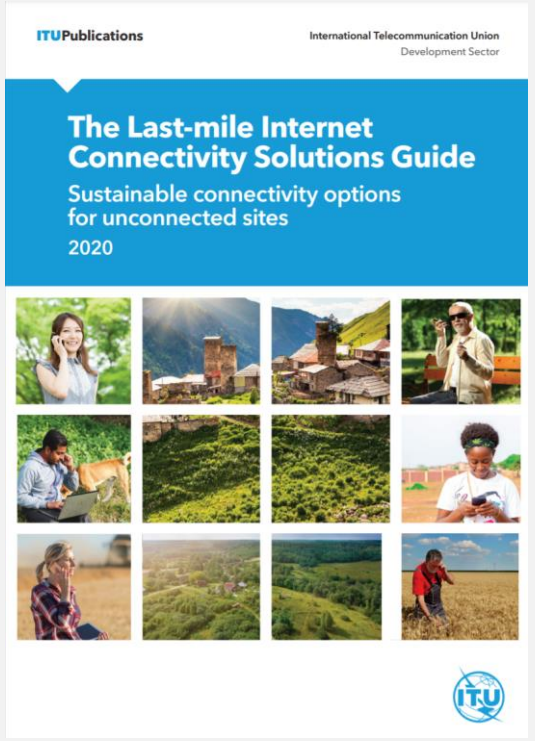


Satellite telecommunications

Last-Mile Connectivity New Trends

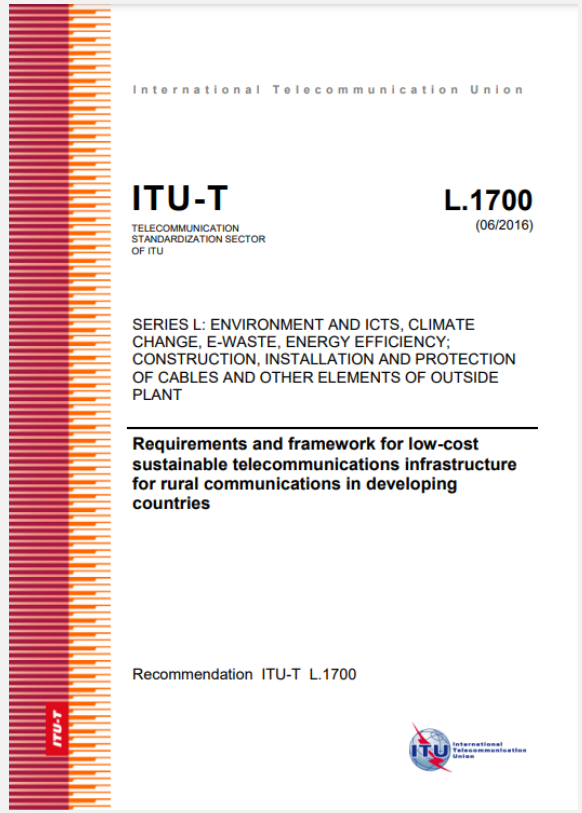
Wi-Fi and LAN

HAPS and UAVs



Low-Cost Sustainable ICT for Rural and Developing Countries

1. **Affordability**
   both CAPEX and OPEX
2. **Reliability**
   time between failures to repair
3. **High Data Rate**
   with sufficient upgradability
4. **High Flexibility**
   In coverage area, number of users, bandwidth
5. **High Scalability**
   In coverage area, number of users, bandwidth
6. **Energy-Efficient**
   Power feed architecture and solutions
7. **Environmentally Friendly**
   Lifecyle



Use Case for TV White Space to Build Affordable Digital Inclusion in Rural Kenya

The USAID Global Broadband, the Innovations (GBI) Program and Microsoft's 4Afrika initiative supported the implementation of a ubiquitous, affordable and widespread technology: TV white spaces (TVWS).

TVWS takes advantage of unused spectrum bands previously used for television broadcasting at a rate of just a few dollars per month, supported by solar power stations.

The Mawingu pilot project showcases the possibility of extending connectivity to areas without energy infrastructure, relying solely on solar powered stations, and is able to connect the local population to streaming services, emails, video conferencing, and high speed VPN services.

Use Case for Technology in Nepal

ITU-T L.1700 provides for an adaptable network architecture design because the cables can easily be physically rerouted between buildings and other locations within any community.

Such rerouting would be cost-prohibitive if a deployer used traditional fiber cablesMoving traditional cables is labor and machine intensive and limited by terrain and weather.

A low-cost, simple, DIY solution can transform entire communities. Cable and computing device installation jobs will appear, technical trainers will be required, local businesses will have access to markets beyond their limited borders.

Tool #4

Digital Inclusion Toolkits

Digital Toolkits

Digital Inclusion Toolkit

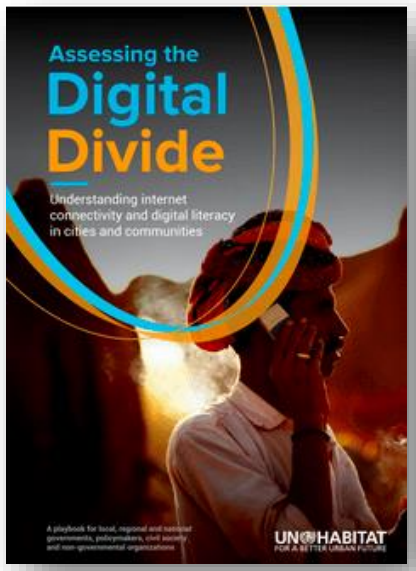
Digital Inclusion Toolkit

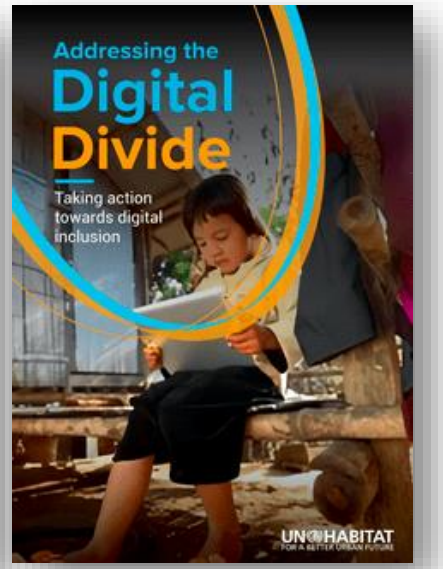
DIGITAL INCLUSION
START-UP MANUAL

Guidance

Digital Inclusion Evaluation Toolkit

The Evaluation Toolkit is a collection of resources designed to help any organisation looking to evaluate a Digital Inclusion project.





Module 4 – Connectivity, Digital Divide and Digital Inclusion

Thank you for completing this Module of the ITU Toolkit on Digital Transformation for People-Oriented Cities and Communities.

We hope that you found the information in this Module useful toward planning and initiating your city or community's digital transformation process.

Please review the resources highlighted within for further details, including valuable real-world use cases, on how to get started on – and optimize from the onset – your city or community's digital transformation journey.

Toolkit on Digital Transformation for People-Oriented Cities and Communities

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