

PNMA Repository (as of 11/2025)

2025 PNMA Connectivity Good Practices

Case C01 (2024 practice with 2025 updates):	ITU-D: ICT Promoting and Measuring Universal and Meaningful Connectivity
Location:	Global
Funding:	EUR 3 million funding from the EU Global Gateway program from May 2023 to February 2027
Responsible institutions / partners / people:	ITU-D/DKS/IDA (ICT Data and Analytics Division) / EU Commission (partner)
What is the problem?	Depriving vast swaths of humanity from the possibilities offered by the Internet is costly, deepens inequalities and undermines development. Over the past 30 years, the number of Internet users surged from a few million to 5.5 billion. Yet the potential of the Internet for social and economic good remains untapped: one-third of humanity remains offline, and many users only enjoy basic connectivity. Multiple digital divides persist across and within countries, between men and women, between youth and older persons, between cities and rural areas, between those who enjoy a fibre connection and those who struggle on a spotty 3G connection. UMC is the new imperative. To maximize its impact on society and the economy, digital connectivity must be universal and meaningful. “Universal connectivity” means connectivity for all. “Meaningful connectivity” is a level of connectivity that allows users to have a safe, satisfying, enriching and productive online experience at an affordable cost. The two dimensions are complementary: neither universal connectivity with poor quality nor meaningful connectivity for the few will yield significant, society-wide benefits. At the same time, the two dimensions obviously reinforce each other: more use can lead to more meaningful connectivity, and vice versa.
Which were the actions taken to address the problem(s)?	ITU and the European Commission (EC) have joined forces in the context of the project “Promoting and Measuring Universal and Meaningful Digital Connectivity”. Through advocacy at the global, regional, and country levels, the project aims to mainstream UMC and encourage countries and their partners to adapt their digital strategy from a narrow focus on infrastructure to a holistic approach that includes the other enablers of connectivity. The project will monitor and report on progress towards achieving the UMC targets. It will enhance the statistical capacity of countries to measure various aspects of UMC with greater accuracy, timeliness, and granularity. The project will also identify best practices and policy recommendations to accelerate progress towards UMC. Four workstreams are being implemented. Advocacy: - Sessions in UN system events, World Telecommunication Indicators Symposium (WTIS), G-20, IGF, and other global and regional events - Mentions of UMC in Global Digital Compact - G20 Guidelines on Measuring UMC - Creation of digital communication assets, social media campaigns - A UMC Data hackathon to uncover undeserved areas and populations using data science Data collection and dissemination - Aspirational targets for the UN SG Roadmap on Digital Cooperation - UMC website, including a UMC Dashboard

	• Online course on the collection and use of UMC indicators (in partnership with ITU Academy) • Manual on ICT price basket statistics and on measuring ICT skills • Exploratory use of secondary data sources to support UMC measurement 3. Capacity building: 8 regional workshops for users and producers of UMC statistics • A dialogue between users and producers of statistics. • A solid understanding of the concept of universal and meaningful connectivity. • Greater awareness of the critical role of data in policymaking and the ability to advocate for investment in data infrastructure and capabilities. • Improved capacity to produce reliable data on UMC. • One Summer School on Evidence-based Digital Policies organised. 4. Evidence-based research on effective interventions towards achieving UMC • Global Connectivity Reports 2025 and 2026 • Regional and thematic analyses
Results / Impact / Lessons learned (what worked / remaining challenges)	Results: • More than 500 professionals from around 160 countries' National Statistical Offices, ICT Ministries, and regulators have been briefed about the UMC policy principle and its measurement. It has been also communicated at international fora of statisticians, policymakers, diplomats, humanitarian NGOs. • Contacts between users and producers of ICT statistics to monitor progress towards UMC have been strengthened. The first Summer School on Evidence-based Digital Policies was organised with UNU-Merit (Univ. of Maastricht) • Guidelines for the statistical measurement of UMC have been established by joint work of the Brazilian G20 Presidency and the ITU, publicly available in the project web. The South-African G20 Presidency has highlighted the need for financing ICT statistics, in accordance with the Global Digital Compact. Lessons learned: • There is a need for sustainable dialogue between users and producers of ICT statistics at the national level, including on the financial resources that should be devoted. The capacity for using ICT statistics by policy-makers should be continuously increased. • Focusing the measurement debate in low-dimensional, composite indicators hides the many inequalities of meaningful connectivity within countries, as well as the different paths towards UMC that countries may adopt. Instead, a rich multivariate set of indicators covering the different dimensions of UMC can help better identify policy alternatives. • Regional cooperation multiplies the efforts, by establishing contacts, exchange of best practices and decreased data collection costs by sharing solutions. Remaining challenges: • A significant number of developing countries have weak statistical systems and low levels of connectivity. This is a vicious circle where lack of data hampers the design of efficient policies towards UMC. • The lack of skilled staff and financial resources are barriers to statistical development. There is no earmarked international funding for statistical systems on UMC.
2025 Update	
Has the problem been solved?	The problem of lack of statistical capacity is persistent in developing countries. This affects not only the capacity for producing, but also of using statistics. A proposal to finance digital inclusion surveys is being discussed with the World Bank. The problem of lack of meaningful connectivity is not directly addressed by the project, except indirectly by improving the evidence base for digital policies.
Did any new problems emerge during implementation?	The regional events have fostered demand for technical assistance by countries to improve their ICT statistics. This demand cannot be satisfied without additional resources.

Do 2023/2024 solutions still work to tackle the problem? New solutions needed to be developed?	Project resources have been reallocated to allow for more events to train producers and users of ICT statistics.
Was the solution scaled or localised to other regions? If so, please share examples	The plans for the remaining implementation period include three more training courses for users and producers of ICT statistics (in collaboration with UNU-Merit and CETIC Brazil).
New milestones:	-
New challenges:	The adoption of the Global Digital Compact by the UN General Assembly in 2024 opens an opportunity window as it sparks demand for ICT data for its monitoring and includes a commitment to strengthen the corresponding statistical systems. However, the financial resources much needed to implement household surveys on access and use of ICT – the scarcest source of data to monitor progress towards UMC - are not yet identified. Establishing a financial facility to support household surveys on digital inclusion in low-income countries would definitely improve the availability of statistical evidence in countries with serious gaps in achieving UMC.
Lessons learned:	(see above)
Next steps:	• Summer Schools on Evidence-based Digital Policies in 2026 (Maastricht, Bangkok) • 3 Regional events on Promoting and Measuring UMC in Africa • UMC Data Hackathon (UMC Data Hackathon - UMC) • Publication of Global Connectivity Report 2025 at the WTDC 2025. • Developing a proposal with the World Bank for financing digital inclusion surveys • Creating a dashboard on ICT statistics capacity • Strengthening the communication and research activities

Case C02:	Self-sustaining Financing Solutions for Community Connectivity
Location:	Global
Timeframe:	2024-Ongoing
Funding:	The development of this publication is part of the Meaningful Community-centered Connectivity project being implemented by APC and the LocNet initiative, with financial support from the Swedish International Development Cooperation Agency (Sida) and UK International Development (FCDO) through its Digital Access Programme.
Responsible institutions / partners / people:	- Fundação Getulio Vargas (FGV) - Association for Progressive Communications - Rhizomatica
What is the problem?	The primary challenge is the persistent digital divide that has left nearly one-third of the world's population offline particularly women, rural communities, and Indigenous peoples. To address this gap, community-centred connectivity initiatives (CCCI) have emerged as transformative solutions. Community networks (CNs), once grassroots experiments, have evolved into key instruments for advancing digital inclusion, human rights, and digital sovereignty. These networks embody the principle of “network self-determination” the right of communities to design, build, and manage their own digital infrastructure as a common good. Community-driven connectivity thus presents an economically viable and socially empowering alternative, diversifying the digital ecosystem beyond dominant corporate operators. The core problem addressed is: 1. Lack of financial sustainability for community connectivity/community networks (CNs). Many community-driven connectivity initiatives depend heavily on grants, donations, or short-term project funding, which is unpredictable, fragmented, and often tied to donor agendas rather than community needs. These funding sources are insufficient to support long-term operations, maintenance, infrastructure upgrades, and scaling. 2. Inadequate access to capital and mismatched financial instruments. Traditional financial mechanisms (e.g. loans, investment instruments, Universal Service Funds) are designed for large operators and infrastructure projects, not small-scale, bottom-up, community-led initiatives. Community networks struggle to access or adapt these instruments. 3. Regulatory and structural barriers. Regulatory regimes, licensing rules, spectrum access, and the design of Universal Service Funds often favour incumbents and exclude community actors. This compounds the financial challenge by restricting what CNs can legally do, making risk higher for investors and limiting revenue models. 4. Lack of rigorous evidence on cost-effectiveness, social impact, and investment-readiness. The movement needs better empirical data to show that CNs can deliver social value, cost-effectiveness, and returns (or acceptable social returns), to attract new types of financing (impact investment, blended finance, etc.).
Which were the actions taken to address the problem(s)?	Since this is a policy and research publication rather than a single project, the actions focus on analysis, framing, and developing practical models for sustainable community connectivity. 1. Typology and Mapping of CCCIs The publication looks at different types of community-centred connectivity initiatives. Some are fully owned and run by the community while others work with NGOs, governments or small private operators. They also use different kinds of technology from small Wi-Fi networks to licensed spectrum systems. This shows that financing and sustainability approaches need to fit the local context instead of using the same solution everywhere. 2. Case Studies from Asia, Africa, and Latin America

	Case studies from multiple regions reveal that CCCIs face high CAPEX costs which limit their growth. Despite this demand for connectivity is strong with 30–50% of local households adopting the services. Revenue generation varied across cases including user subscriptions, tiered pricing systems and subsidies or vouchers for low-income users. Some networks diversified their income by offering community Wi-Fi, digital training and local services. Beyond financial metrics the studies highlight that CCCIs generate significant social value. They enable communication and access to online services, foster social inclusion through education and health information, and contribute to broader transformation through local entrepreneurship, women’s empowerment, cultural preservation, and stronger community governance. In several cases the Social Return on Investment (SROI) exceeded 1:1, showing that the social and economic benefits outweighed the costs. However these impacts are not captured by traditional telecom indicators like subscriber numbers or revenue per user. 3. Analysis of the financial divide and barriers First most traditional financial instruments and investment models are designed for large telecom operators and cannot easily support small community networks. Loans and private investment are often unavailable or too expensive because funders see the initiatives as high risk due to small scale, unpredictable revenue streams, and limited collateral. Grants and donations can help cover initial costs but are unpredictable and usually short-term, creating sustainability challenges. Policy frameworks, licensing rules, and Universal Service Funds often favour large incumbents and make it harder for community networks to operate or scale. Even when community networks demonstrate clear demand and social impact, they face regulatory hurdles that increase perceived risk and limit investment options. 4. Proposals and frameworks for alternative financing models To address these barriers, the publication outlines several approaches and financing frameworks that could make community networks more sustainable. • One key idea is blended finance, which combines grants, concessional loans, and private investment to reduce risk and make projects viable. Impact investing is highlighted as a way to attract investors who care about social outcomes in addition to financial returns. • The report also explores community-based financial instruments such as community currencies or tokenization, where local value or digital tokens can help fund networks while keeping control within the community. Cross-subsidies and hybrid funding portfolios are proposed to balance revenue from paying users with support for low-income households. • Finally, the publication emphasizes redesigning Universal Service Funds to explicitly include community networks as eligible recipients, creating a more level playing field for access to funding. 5. Advocacy and Policy Guidance Financial sustainability alone is not enough for community networks to succeed in the long term. Regulatory and policy reforms are essential to create an environment where community-centred connectivity initiatives (CNs) can thrive. This includes integrating CNs into national digital inclusion strategies, adapting licensing and spectrum rules, and designing Universal Service Funds and other financing instruments to support community networks explicitly. Sustainability should be seen not just as technical or financial but also as legal, social, and rights-based. Community networks often serve marginalized populations, and their success depends on clear legal recognition, protection of spectrum rights, and supportive policy frameworks that allow them to operate and grow while remaining community-led.
Results / Impact / Lessons learned (what worked / remaining challenges)	Results / Impact • Demonstration of financial and social viability: case studies from Asia, Africa, and Latin America showed that many CNs could cover operating costs and deliver significant social value, even if full infrastructure cost recovery remained rare. Adoption rates of 30–50 percent among eligible users demonstrate real demand. • Evidence of social returns: Several initiatives had Social Return on Investment (SROI) ratios above 1:1, indicating that the social value created—through

	education, health, women’s empowerment, local business support, and community governance—exceeded the costs. Lessons Learned / What Worked • Combining grants, subsidies, user revenue, soft loans, and impact investments reduces risk and increases sustainability. • Measuring social impact alongside cost-effectiveness helps attract funders who care about both financial and societal returns. • No single model works for all contexts; financing, technology, and governance must be adapted to local conditions. • Enabling licensing, spectrum access, and inclusion in Universal Service Funds are key for scaling CNs and making them investable.
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Case C03:	Libraries Boosting Connectivity (LOC)
Location:	Cameroon, Nigeria, Namibia, Zambia, Kenya, Iraq, Lebanon, Chile (all counties/all provinces)
Timeframe:	Started in September 2024. Survey/data collection remains open until May 2025 but final report will be published in August 2025. Follow up activities to be planned for end of 2025 and 2026.
Funding:	Stitching IFLA Global Libraries
Responsible institutions / partners / people:	It is an IFLA project (The International Federation of Library Associations and Institutions) but we have partnered with the African Library & Information Associations & Institutions (AfLIA), the Goethe Institute in Cameroon, Library Aid Africa, and held some talks with ITU GIGA people for feedback and support. We have also partnered with the Universal Postal Union (UPU) as they are doing a similar project.
What is the problem?	Lack of connectivity and digital-related data on libraries. While IFLA has an online platform called Library Map of the World that includes some geolocation data on libraries and information about their resources and collections, the only data we have on connectivity is the amount of libraries connected per country. This means we do not have information on the type, quality or permanence of the connectivity, the community needs, or the staff's digital skills, amongst many others indicators. In essence, we need more information in terms of libraries' digital infrastructure, skills, and initiatives in order to be able to support them and connect them with other stakeholders or funding opportunities. Particularly with public and community libraries, in many cases these are the only entry points of connectivity in many rural and underserved areas, representing a free and unique access to information and devices for the people who live there.
Which were the actions taken to address the problem(s)?	• Launched call to actions on different regions and regional coordinators hires to be in contact with the national library associations and networks in each of these countries • Open and disseminated survey containing information on the status of library connectivity, geolocation, digital infrastructure, digital skills of staff, particular needs of community members and digital-related initiatives they might be implementing in their communities • Obtained prototype website from web design agency as a pilot resource to fill in the data once the report is finished. Opportunities and challenges will be assessed based on the pilot website and report to either collect more data in the pilot countries or annex other possible countries to keep growing the database • Prioritizing pilot countries and public and community libraries but the project welcomes any library that wants to participate as it was also disseminated via the IFLA website

Results / Impact / Lessons learned (what worked / remaining challenges)	Results: • Better understanding of digital related community needs at a local level • The results tell us a lot not only about libraries but also about the connectivity situation at regional and local levels • Very important to mention that we also surveyed unconnected libraries and we obtained very interesting data from this. It helped us understand the reason for their lack of connectivity that are often but not always related to infrastructure, high costs and/or electrical supply issues Impact: • Libraries look forward to the report and results as these will improve their capacity to collaborate locally to improve access to information. • At the same time it will provide IFLA with a solid base to design tailor-made support for each of the communities • It opened opportunities to partner with other stakeholders and organizations working on connectivity in surveyed countries (e.g. UPU). Lessons learned: • Complementing information with other actors working on connectivity at a local level would be useful • Connected libraries are essential for bridging the digital divide in rural and underserved areas, the people who live in these areas depend highly on them to access all types of information often related to education, employment, and other opportunities that may significantly affect economic growth in the region.
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2025 PNMA Digital Inclusion Good Practices

Case DI01:	The Mariwai Project
Location:	East Sepik Province, Papua New Guinea (PNG)
Timeframe:	2021-2024
Funding:	Self-funding, with charitable contributions and generated art sales.
Responsible institutions / partners / people:	• The Mariwai Project • Felix Trust for Art • Shiva Burgos, Founder / International Representative for Arts And Culture (National Cultural Commission), Special Envoy for Arts (PNG)
What is the problem?	• Digital Inclusion • Digital Rights • Cultural Protocols • Technology Access
Which were the actions taken to address the problem(s)?	• Community observation • Canvassing the needs and desires for digital technology • Working with village chiefs and community leaders • Recording intergenerational balance of power disruptions based on digital access • Evaluating the effects and vulnerabilities of misinformation • Observing stressors to adapt to a money economy to have access to smartphones, education and connectivity
Results / Impact / Lessons learned (what worked / remaining challenges)	• The Mariwai Project operates within a complex landscape of digital inclusion challenges that reflect broader patterns of Indigenous digital exclusion globally. While digital technologies offer powerful tools for cultural preservation and international engagement, their effective implementation requires careful attention to infrastructure limitations, gender and educational disparities, and sophisticated cultural protocols. • The experiences of First Nations communities in Australia provide valuable guidance for developing culturally appropriate digital frameworks, particularly regarding restricted cultural materials and community controlled access systems. Academic research demonstrates that successful digital inclusion initiatives must be community-led, culturally responsive, and attentive to the intersection of digital access with broader social and economic inequalities. • For The Mariwai Project to fully realize its potential as a model for traditional cultural preservation through digital inclusion, continued investment in community capacity building, culturally appropriate technology infrastructure, and collaborative governance frameworks will be essential. The project's success will ultimately depend on its ability to leverage digital technologies while maintaining Indigenous cultural sovereignty and appropriate protocols for sacred and sensitive materials. • Full project portfolio: Bridging Access and Protection

Case DI02:	<u>WanBel Global Exhibition Legacy</u>
Location:	Worldwide, focused on Papua New Guinea (PNG)
Timeframe:	September 2025 - ongoing
Funding:	Government, charitable contributions and grants
Responsible institutions / partners / people:	• The Mariwai Project • HELUX Foundation • PNG government • Shiva Burgos, Curator / International Representative for Arts And Culture (National Cultural Commission), Special Envoy for Arts (PNG)
What is the problem?	• Digital Inclusion and Digital Repatriation • Safeguarding digital disaster preparedness and resilience • Benefits for PNG and Local Populations • Developing a system to classify digital assets for preservation of culture, art, and language
Which were the actions taken to address the problem(s)?	• Community observation • Communicating the needs and benefits to leadership • Working with village chiefs and community leaders • Working with museum and institutional partners • Leveraging AI and algorithms to develop frameworks • Regular transparent reporting and risk management
Results / Impact / Lessons learned (what worked / remaining challenges)	• The WanBel Global exhibition is a pioneering initiative advancing digital inclusion, digital repatriation, and ancestral Futurism for Papua New Guinea (PNG). Curated by Shiva Lynn Burgos, the project returns cultural heritage to PNG through digital platforms, overcoming physical and social barriers. The exhibition fosters community-engaged reinterpretation of ancestry and culture, facilitating access, cultural pride, and intergenerational learning. It underscores the importance of a Digital National Archive (DNA) to consolidate, preserve, and share PNG's dispersed museum collections as an accessible, sustainable cultural resource. The initiative exemplifies leadership in restorative digital heritage stewardship, enhancing education, creativity, and cultural identity for PNG and its diaspora. Previously unknown assets have been successfully shared via screenings at major public events such as stadiums, the National Art Exhibition, and social media as well as a dedicated website: wanbelglobal.com • Protecting intangible heritage with data protection and privacy compliance by creating culturally appropriate, accessible digital frameworks foregrounds the creation of DNA. • Securing long-term educational and cultural access is feasible using the models of proven systems in museology archiving systems. We have the benefit of access to our nearly 50 participants in WanBel Global. • A model for traditional cultural preservation through continued investment in culturally appropriate technology infrastructure, and collaborative governance frameworks will be essential. A government owned archive database requires the co-operation of multiple Ministries. Long-term financial investment and local capacity building are essential for sustainability. • Full project impact and governance report: WanBel Global Exhibition and Proposed Digital National Archive

Case DI03:	<u>Reclaiming Indigenous Languages in the Digital Era</u>
Location:	Rapa Nui (Easter Island, Chile) and Indigenous communities in South America (particularly Mapuche communities in Chile)
Timeframe:	The initiative began in 2023 with the launch of the project <i>Internet for Everyone: Towards Removing the Language Barrier for Underrepresented Languages on the Internet</i> .
Funding:	• Internet Society reserve funds. • Internet Society Foundation through the BOLT (Building Opportunities/Leveraging Technologies) grant program.
Responsible institutions / partners / people:	• Centro Nacional de Inteligencia Artificial (CENIA) in Chile (lead institution). • Estudios Aplicados Antropología UC (EAA). • Indigenous institutions supporting the project.
What is the problem?	Although there is Internet access, most Indigenous languages (including Rapa Nui and Mapudungun) are not represented online, which creates an invisible digital barrier. This absence results in digital exclusion, limiting access to education, healthcare, administration, and participation in the online world.
Which were the actions taken to address the problem(s)?	• Development of a specialized online translation engine designed for language inclusivity. • Enhancement of the largest open-source translation engine to include 204 languages. • Close collaboration with Indigenous communities and institutions to ensure translations are culturally authentic. • Testing of the tools in Rapa Nui and Mapuche communities, enabling everyday use in education, public services, and family life. • Release of the tool as open-source software, allowing replication and adaptation for other underrepresented languages globally.
Results / Impact / Lessons learned (what worked / remaining challenges)	Results / Impact: • The translation tools have already had a positive impact in Rapa Nui and Mapuche communities. Teachers, public officials, and families can now access education, healthcare, and administrative resources in their native languages. The translator is helping to revitalize endangered languages, encouraging daily use, and engaging children and youth with their cultural heritage. It also acts as a bridge for non-speakers, allowing broader society to connect with Indigenous languages and cultures. • By being open-source, the project created a replicable model that other low-resource languages can adapt worldwide, amplifying its global reach. Lessons learned: • Community participation is essential — involving native speakers ensured cultural authenticity and greater acceptance of the tools. • Open-source strategy provided sustainability and scalability, making the project more than just a local effort. • The project showed that AI and translation technologies can be applied beyond efficiency or automation, becoming powerful tools for cultural preservation and inclusion. Remaining challenges: • The crisis of language endangerment remains: revitalizing Rapa Nui and Mapudungun requires long-term, sustained use beyond digital tools. • Continuous improvement is necessary: feedback from native speakers showed that the translator still needs refinement to capture nuances. • Scaling globally requires additional funding, institutional support, and adaptation to each community's specific cultural and linguistic context.

Case DI04:	<u>Offline Internet Consortium</u>
Location:	Tempe, Arizona – USA
Timeframe:	2018 – ongoing
Funding:	Arcadia Fund and support for 20+ consortium members from many sources
Responsible institutions / partners / people:	• Ann Okerson, Director, Offline Internet – OLI • James O'Donnell, Arizona State University (steering committee member) • Stéphane Coillet-Matillon, CEO, Kiwix (steering committee member)
What is the problem?	• Global connectivity gap ○ People with no broadband access ○ People in network-adverse circumstances (censorship or political constraint, unable to afford broadband, need support for education, healthcare, refugee status, natural disasters etc.)
Which were the actions taken to address the problem(s)?	• Bringing together 20+ mainly local/regional organizations that do “offline internet” work with challenged populations ○ Facilitate coordination and communication ○ Connect people with needs to appropriate service providers and content ○ Raise awareness ○ Fundraising
Results / Impact / Lessons learned (what worked / remaining challenges)	• Results: ○ Increased awareness ○ Facilitated cooperation ○ Thought leadership • Impact: ○ Many specific local/regional stories from Africa, South America, Pacific islands, Ukraine, especially focused on primary and secondary education ○ List of Partners • Lessons learned and biggest challenge: widespread assumption that magic technology solutions will make universal broadband a reality very soon ○ A White Paper produced by OLI documents the ways in which forms of access to information make up a continuum tailored to specific needs and use cases: The Power of Offline Internet