

IEEE Connecting the UNCONNECTED™

An IEEE Future Networks Program



2022 WINNING PROJECTS



The IEEE Connecting the Unconnected Challenge is a competition program started in 2021 by the IEEE Future Networks Initiative (FNI). It seeks to reward and spotlight innovative, early-stage work to address one of society's most pressing issues: that Internet access remains elusive for nearly half the world's population.

Having an Internet connection is a lot more than being able to surf the Web. It means having direct access to goods and services around the world and the payment systems that facilitate that commerce; it means an exponential increase in access to educational opportunities; and it means a 24/7 connection to information that can keep people safe and informed.

In our second year, IEEE honored 16 teams from six continents for their innovations across three categories: Technology Applications that increase broadband access or otherwise enable connectivity where it never existed, Business Models that result in increased affordability for internet access, and Community Enablement solutions to convince populations to adopt available broadband access.

Competitors could choose from these categories in two primary tracks: the Proof-of-Concept track, for teams or individuals who had a demonstrated (but early-stage) solution with measurable results; and the Concept Only track, for teams or individuals with a novel idea that had not yet been tested.

Please join us in congratulating this year's winners. In these pages you'll discover a wealth of innovation and inspiration that points a way forward for humanity to fulfill the promise of the Internet: to connect everyone.

Sudhir Dixit
Ashutosh
Dutta

IEEE Connecting the Unconnected Co-Chairs

BEST OVERALL WINNERS

Best Overall Proof-of-Concept

Scaling the Seattle Community Network with dAuth and the "Teaching Network"

Kurtis Heimerl, Esther Jang, Spencer Sevilla & Matt Johnson (USA)

In 2021, the ITU estimated that while 95% of people globally are covered by a wired or wireless mobile broadband network, just 62.5% are on the Internet. This gap, which can be attributed to factors such as culture, cost, and business models, illustrates how the dream of universal Internet connectivity requires much more than simple coverage. In fact, in our own city of Seattle, a central hub of the tech world, 5% of the adult population remains offline, mostly from marginalized or low-income groups. Numerous teams have been working to address this gap by providing new models of connectivity that change foundational business elements and assumptions. We focus on Community Networks (CNs), which are Internet access networks operated by community members, often in cooperative form, that provide specifically tailored access to locals. While largely successful when deployed, CNs have yet to see large-scale adoption due to myriad technical and non-technical issues including limited unlicensed spectrum, expensive/bespoke technologies, and a difficulty in scaling non-technical partners. To address these limitations, this team has been leveraging new advances in private cellular networks ("Private LTE") and shared spectrum ("CBRS", the Citizens Broadband Radio Service) to develop and deploy new cellular access models that are capable of scaling beyond individual community partners and connect the unconnected.



PROJECT IMPACT

To date, they have deployed eight access networks throughout their home region of the Puget Sound (Seattle and Tacoma), and are providing broadband Internet to a growing group of dozens of low-income and marginalized people throughout the lower-income parts of the city and among the unhoused. In these deployments, they have engaged with partner community organizations in a number of ways: from digital literacy curriculum development and instruction to digital stewardship and technician-style vocational training. Their theory of change is that the coupling of core technical advances in access technologies to place power and control in the community and capacity building that bolsters the community's ability to manage and sustain those technologies will produce sustainable innovations that impact both technical industries and on-the-ground communities. They believe this holistic vision will dramatically reshape the local telecommunication ecosystem and improve connectivity wherever people are without Internet access.

Best Overall Concept

Mobile Based Food Supply

Mark Matovu & Dianah Kaseeta (Uganda)

Established and incorporated in 2018 as a Limited Liability Company (LLC), Nampya Farmers Market operates a mobile-based business to business food supply platform for retail outlets, kiosks, and market stalls in Uganda. The company enables retailers to order food supplies from rural farmers using its platform. It supplies bananas, pineapples, tomatoes, and more. In Uganda, over 80% of Ugandans are smallholder farmers facing uncertainty of prices for their commodities. They depend on the heartless brokers for pricing of their produce. A key hassle for food retailers (80 of whom are women in the age range or 22-39) is that they get access to supplies from third parties at high prices. Urban dwellers pay high price points (often to 200% on average) to retailers for food that's hardly fresh. As that's true, a staggering 40-45% of marketable quality food is lost to waste due to massive delays and poor handling in the hands of third parties, and the cost of the wasted food is pushed on to end consumers in terms of inflated food prices.

With a reliable and simple tech-enabled supply chain & logistics solution that is not only able to disrupt the informal food market, but also shift the way informal markets buy & sell fast-moving consumer goods (FMCG), Nampya enables green grocers, hotels, restaurants, schools and hospitals to order better-quality and better-priced food supplies directly from the farm gate at fair prices compared to informal rates. The company also provides the logistics to link farmers to retailers, combined with immediate digital payments to farmers upon pickup or delivery of their produce, ensuring produce meets retailer specifications and provides the retailers with the ability to trace the source of the crops they are purchasing. This enables farmers and retailers to build confidence in the food market, gaining the ability to plan ahead and invest in improved production and more robust trades.



**NAMPYA
FARMERS
MARKET**
HELPS FARMERS
TO MEET RETAILERS

PROJECT IMPACT

Two thirds of Africans depend on agriculture for their livelihood, but many farmers live far from markets and they lack the resources or transport to access these markets -- farmers and buyers are disconnected. Middlemen have filled this gap, often creating inefficiencies and barriers for producers and buyers, forcing farmers to take whatever price they are offered given the limited options.

Nampya Farmers Market believes that the missing key to unlocking the full potential of the African agricultural system is connectivity, using the internet to fairly and effectively connect smallholder farmers to the buyers that make up the formal agricultural market. The raw potential already exists to do this via the internet. They just needed to develop the vehicle to make the connection.

As such, they have created an innovative web and mobile enabled platform to increase smallholder farmer incomes through integrating them into sustainable markets in Sub-Saharan Africa. They nick named "We source", and in 2021 used it to connect over 2000 rural farming households who typically have no more than five acres of land to over 300 retailers- all based out in Kampala- Uganda.

Their team of on-the-ground uses the platform to bring together the supply power of thousands of smallholder farmers to meet the demand of green grocers, hotels and restaurants.

According to the UN Environment Programme, 500 million small farms provide up to 80% of food consumed in the developing world. However, they receive a very little share of the value generated by their production. Instead, most if it is captured by intermediaries in the supply chain between them and final consumer. These last years have seen an increasing demand from consumers for fresh and ethical products. Thus, there's a very huge opportunity for developing transparent and fair distribution models which can put back farmers' livelihoods at the center of the equation. Cutting out intermediaries and enabling a more direct access to market for smallholder farmers can

directly increase economic security for rural communities to assure food production for local and global markets.

This is exactly what Nampya Farmers Market is doing by connecting smallholder farmers to markets they could never attain on their own. In the process, they cut out several middlemen and redistribute this value to the consumer, retailer and the producer. The retailer's order of outstandingly quality and fresh produce is delivered with the story of the farmer's region attached so they know exactly where food comes from.

FIRST PLACE CATEGORY

WINNERS: PROOF OF CONCEPT

Technical Proof-of-Concept 1st Place

Solar Powered Distributed Cloud Infrastructure

Henri Nyakarundi (USA – deployed in Africa)

Today in Africa there are over 100 million Small and medium-sized businesses that are not participating in the digital economy and the main reason is the high cost of storage and computing infrastructure that is out of reach for most SMEs. When we talk about connectivity we only talk about the internet; however, we forget the importance of storage and computing infrastructure that is the backbone of the internet.

When studying the digital gap in Africa, it was realized that most of the storage and computing infrastructure that was used was located outside the continent of Africa.

Additionally less than 1% of global data centers are built in Africa. The main reason is the high cost of electricity, high demand for freshwater, and cooling system limiting where you can build those infrastructures on the continent.

The only solution is to provide an infrastructure that is scalable, green, and affordable to everyone

SMEs can now build any type of digital application on the same infrastructure, providing serverless services using edge technology would be the most efficient and sustainable way to solve the digital infrastructure gap.

The diagram is divided into two main sections: "Operating System stack" and "General system architecture".

Operating System stack:

- Containers:** A purple box containing a 3x3 grid of application boxes:
 - Row 1: Distributed storage, Payment processing, Video camera with AI integration for analytics
 - Row 2: App store, Crypto mining, Content management (syncing client)
 - Row 3: Captive portal landing page, ..., ...
- Base OS:** A blue box containing:
 - Docker engine
 - OpenVPN, OpenSSH, hostapd, Hardware Health Monitor
 - Zabbix client, Update client, CoovaChilli, chrony
 - systemd
- Linux kernel**
- Bootloader (GRUB)**

General system architecture:

- Smart Solar Kiosk n** and **Smart Solar Kiosk n-1** connect to a **Cloud**.
- The **Cloud** contains:
 - Source code repositories
 - CICD runner
 - RADIUS server
 - Zabbix server
 - VPN server
 - Update server
- Communication:**
 - Smart Solar Kiosk n connects to the Cloud via an **encrypted VPN tunnel**.
 - The Cloud communicates with the **Smart Solar Kiosk 1** via **HTTP communication** and **VPN connection**.
 - The Cloud sends **Update OS and containers** to the Smart Solar Kiosk 1.
- Smart Solar Kiosk 1** contains:
 - Firewall**
 - CoovaChilli**, **Zabbix client**, **VPN client**, and **Update client**
 - OSM / Ethernet communication** connects the clients to the **Docker daemon**.
 - remote SSH access** connects the **VPN client** to an **SSH server**.
 - The **Docker daemon** manages **Docker containers** (Client service 1, Client service 2, Client service 2, Client service ...).
 - The **SSH server** connects to **WiFi AP** and **Hardware health monitor**.
 - The entire kiosk runs on the **Yocto Project Operating System**.

PROJECT IMPACT

The social and environmental impact of such technology is massive:

For Users: Due to the size of the infrastructure, it allows for effortless spread across different low-income areas. As a result, more people can access a plethora of services and applications (education, health, government, etc) of their choosing offline. This allows the digital gap to be reduced drastically.

For SMEs: A lot of African countries are passing laws that mandate institutions to store their collected data on local infrastructure. However, there are limited options for choice and the available selections are incredibly expensive because they are being employed by governmental organizations and well-established businesses. With the existence of this technology, SMEs can digitize without worrying about high costs and low availability of accessible infrastructure.

Ecological: Traditional data centers utilize a surfeit of fresh water and excessive electricity. Due to our system being distributed, the company is not restricted. We do not require cooling systems because one mini-server is allocated to one location and every mini-server is powered by solar panel energy. InterGram is an eCommunity center that utilizes high-speed broadband as a medium to deliver a variety of relevant services in the areas of education, financial services, agriculture, e-commerce and healthcare to rural populations in India. InterGram is a cost-effective amalgamation of advanced technologies such as virtual reality (VR/AR), Web sensors (IoT), cloud signage and artificial intelligence (AI/ML). It boosts the local economy by stimulating

job creation, increasing household income, improving digital skills and expanding general awareness.

Business Model Proof-of-Concept 1st Place

PAYGO FITH In LatAm's Barrios

**Emiliano Mroue, Gustavo Lorenzo, Marcos Rodriguez & Nahuel Vara
(Colombia)**

The urban poor in LatAm's peripheries are left behind broadband internet connectivity driven by - lack of a formal address, an ID, a formal service (e.g., electricity), unstable income that deter households committing on yearlong contracts. This in turn deters traditional telcos of addressing the poorest people in the barrios, leaving 40M households in LatAm without broadband internet access. They built the last mile fiber optic network in two of Corrientes' (Argentina) poorest neighborhoods. Once done, they went door by door offering high speed internet connectivity (FTTH). Those that said yes (75%) were connected to the internet for free and given a two week free trial. When the free trial is over, they can go to any third party cash collection point (there are thousands) and pre-pay internet days (7, 15 or 30), depending on the amount of liquidity they have at that particular time. They're looking to test the same concept in Colombia's poorest neighborhoods, as this will enable access to high speed internet, reduce costs and eliminate many of the formal barriers there are out there to access to fixed broadband.



PROJECT IMPACT

Their mission is to connect the poorest urban households in Latin America to the digital world- as this is a meaningful step to narrow LatAm's endemic social gap and inequality. Internet use is driven by access, and hence have designed a business model that help enhance that access in LatAm's poorest barrios- where there are over 40M households without access to fixed broadband internet.

Fibrazo's product and its key innovations are:

- i. Fast Speed: Fiber to the home, high speed internet in the poorest neighborhoods in LatAm
- ii. Cost effective: Unlimited data (vs. metered data from mobile solutions)
- iii. Fractioned: Pay per 7, 15 or 30 days (vs. fixed monthly fees of other Telcos)
- iv. No commitment: No contract, or commitment (if they do not pay, they don't incur any debt)
- v. No barriers: No installation costs (vs. \$10-20 of others, if any)
- vi. Eliminate info asymmetry: nothing like trying it by yourself, so they provide a two-week free trial, to eliminate any info / knowledge asymmetry.
- vii. Adaptable: No need to provide an ID or proof address, they can just send a location pin via WhatsApp. In many cases, Fibrazo becomes their first ever formal residential

service opening additional services to them

viii. Flexible: borrow internet days, interest rate free, and pay back in the next purchase (in case the household suffered a short-term drop of income / delay in receiving a salary – something fairly common within this segment)

ix. No bank account: households can pay using a digital solution (e.g., MercadoPago) or in cash in a cash collection point in their barrio (e.g., Pago Facil, Supergiros).

x. Communication: timely communication with patrons.

Community Enablement Proof-of-Concept 1st Place

Semilleros de Redes Comunitarias para Aplicantes al Programa Roberto Arias

Jésica Giudice, Saira Asua, Marcela Juarez & Nicolás Echaniz (Argentina)

The Community Network(CNs) Seedbeds are collective learning experiences with special participation of groups with presence in the territory, of "living forces". They cover theoretical, socio-political, technical and practical contents. The basis of learning is each Internet NC project and its infrastructure deployment by the people who will inhabit each project.

AlterMundi has been transforming the way of accompanying these processes by nurturing collective knowledge. At the beginning of the pandemic, thanks to the seedbed, 11 new community networks were born in one semester; now we are going for 15 more in 7 provinces of the country! In 2022, the seedbed adds an axis on the first exclusive funding for community networks IN THE WORLD, granted by ENACOM.gob.ar through the Roberto Arias Program (PRA).



PROJECT IMPACT

The work axes of this ongoing seedbed are:

- Training a group of people from each CN project.
- Deployment of its initial network -4 nodes-, including materials, tools and equipment.
- Accompaniment in the presentation of the expansion project to the PRA.

Some outstanding aspects of this training device are:

- Transversal feminist perspective, focus on the inclusion of women and the family.
- Pedagogy inspired by popular education, learning by doing, sharing and teaching, consistent with the previous processes of each network. In other words, AlterMundi and the communities learn and teach at the same time, each one based on their own experience.
- Applied open hw technology -LibreRouter- and free sw -LibreRouterOS firmware and LimeApp. There are no equivalent plugs&play devices in the market, besides being built from and for community networks.
- Training material and tutorials with CC-BY-SA license with focus on the global south (es-en-pt).
- Articulation with grassroots, rural and indigenous organizations.

Why are the seedbeds important?

The main problem is the lack of an appropriate model of internet connectivity in some communities and neighborhoods due to the geographic conditions, rurality or economic

precariousness they suffer. It is obvious that state and commercial models do not manage - sometimes they do not even try- to work on this clear inequity.

In this context, the empowerment of these communities and the process we design to accompany them becomes relevant: the Seedbeds.

From AlterMundi we seek to attack this complex problem from different aspects:

- Facilitate information for technological appropriation.
- Providing training through seedbeds. In 2022 edition, we also provide the necessary information to submit to PRA.
- Develop software and hardware for sustainable networks.
- Promote articulations and actions to include CNs as an actor in the telecommunications of the country and public policies. The PRA is a clear result in this area.
- Communicate and collaborate with the visibility of the country's CNs.

The seedbeds accompany the communities to provide themselves with a solution to their telecommunications needs. This solution is designed through training, through their community internet network project and the deployment of their own infrastructure, in tune with their worldview, idiosyncrasy, dynamics, and resources.

FIRST PLACE CATEGORY

WINNERS: CONCEPT

Technical Concept 1st Place

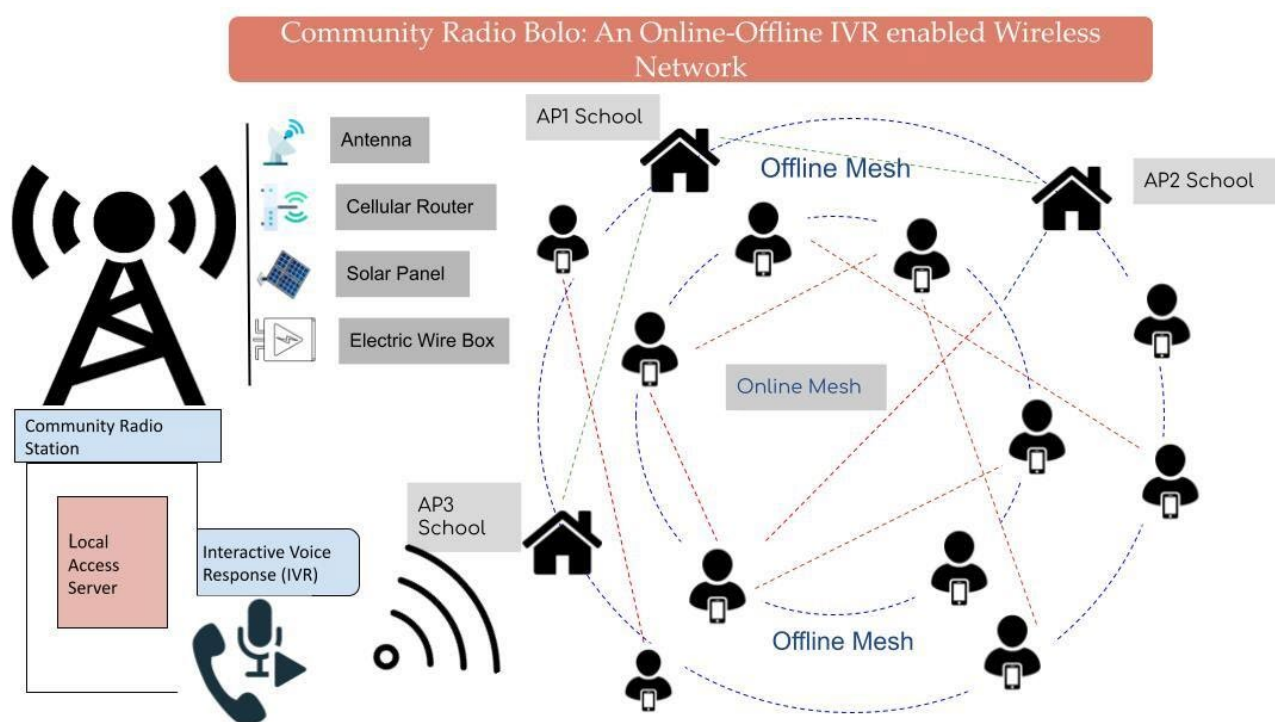
Community Radio Bolo: An IVR Enabled Online-Offline Wireless Mesh Network enabling local D2C communication for SHGs in rural Orissa

Ritu Srivastava, Omar Pervez & SK Mohd Niyaz (India)

Community Radio Bolo is a cost-effective wireless-network hybrid model (online and offline mesh network) specifically designed for community radio stations where broadband internet is either not available or scarcely accessible. At the CR station, the cellular router is set up utilizing the height of the CR tower which further established a wireless mesh network providing internet connectivity to the region.

The CR Bolo project is currently deployed as a proof-of-concept at CR station - Radio Bulbul located in Bhadrak district of Orissa, India in 2021. Funded by the Internet Society, this PoC is a collaborative effort and deployed by Jadeite Solutions Pvt. Ltd, Young India and Radio Bulbul. The main objective of this PoC is to leverage CR stations to bring the last mile connectivity services and digitize the local knowledge in online and offline servers. Phase 1 of the CR Bolo project connects three primary schools in a hybrid wireless mesh network with Radio Bulbul. In the second phase, CR Bolo will integrate a Plug-in and Play interactive voice response (IVR) system with a CR station and with three access points set up in schools. The project will also establish a

federated multi-channel approach for connecting three Self-Help Groups (intermediary financial committees managed by local women), engaging them to utilize the existing established CR Bolo Network for their digital financial services.



PROJECT IMPACT

Despite having community radios have a stronghold with community members, the research identified two major challenges –

1. Unreliable internet connectivity not only to share, upload or broadcast their programs but to reach out to a wider audience/users was the need of the current scenario.
2. Lack of economic sustainability

Understanding the essence of connectivity and access to information, Jadeite Solutions and Radio Bulbul collaborated to address these challenges. Leveraging the existing infrastructure (such as tower height, local server setup, etc.) available at CR station, Jadeite Solutions established a hybrid wireless mesh network at the station in 2021. Known as Community Radio (CR) Bolo, the network operates both on online and offline servers. This was the first kind of project where CR station is itself exploring the use of connectivity not only for their CR activities but to establish the connectivity within their regions.

Community Radio (CR) Bolo is a cost-effective wireless network hybrid (online-offline

mesh network) model designed explicitly for CR stations located in rural and remote regions where broadband connectivity is either not available or scarcely accessible. CR Bolo is enabled with three features – 1) Wireless mesh network enabling local network and internet as per need of the community; 2) Plug-in-Play IVR (Interactive Voice Response) coupled with the network and CR stations 3) Development of localized D2C (Direct to Customer) platform on the local network. The project aims to leverage community radio stations' infrastructure for bringing the last mile connectivity and creating a local knowledge ecosystem for rural communities.

Business Model Concept 1st Place

Rural Malawi Connectivity

Barros Mweso, Waliko Nkhoma & Richard Chisala (Malawi)

Fast Networks, a northern region based wireless broadband internet service provider, is in charge of the Community Sponsored Digitization (CSD). One of Fast Networks' objectives is to assist rural communities in becoming "digital" through the use of broadband internet and portable computers in order to equally distribute educational content, enhance teachers' ability to teach ICT skills, and provide access to affordable and long-lasting educational, entertainment, and commercial content. The CSD project is one of the organization's large-scale educational intervention initiatives, where the group collaborates with community members and the private sector to bring broadband internet, ICT equipment, and capacity training for residents of rural villages. By combining internet connectivity, capacity building, and other strategies, Fast Networks seeks to increase access to high-quality education via Airfibre, television white spaces technology (TVWS), Microwave and Vsat. .

This idea was devised to end digital development dependence and handouts while also levelling the playing field for schooling. The goal is to provide disadvantaged children in rural areas with the same high-quality educational materials that wealthy city students receive in prestigious institutions. Given the chance, students from wealthy towns and rural areas alike ought to be allowed to take the Cambridge exams regardless of their circumstances.

Overview of the solution The idea of connecting the rural communities came during the Covid 19 crisis where the underdeveloped countries were extremely exposed to digital inequalities. Malawi was no exception with 85% unconnected communities.



PROJECT IMPACT

Rural digital education

Fast networks implemented digital learning skills by promoting the usage of digitized Malawi curriculum in partnership with Malawi Learnership Program in Chigumula Blantyre (MLP) using the following features

1. Digital lesson planning by teachers

2. Interactive video learning session
3. Learners accessing lesson via standard affordable smart phones

This was initiated as corporate digital social responsibility to the Communities of Songwe at School called Kangindwa Primary School bordering Tanzania and Malawi, this program was targeting schools in districts with poor or lack of telecommunications infrastructure.

Adult digital education

Kwacha digital is a platform offering digital skills to adults bearing in mind that adults offer more social security and confidence to young people once knowledge is passed to them. Adult digital literacy helps to safeguard children exposure to social media ills like cyber bullying , child pornography and many more.

Other activities are already in place At Ipyana Primary where Fast Networks is volunteering in training young people both from public and private schools using UNLOCKING TALENT iPads that have numeracy and literacy applications.

Community networks

They encourage community members to become custodians of digital services programs and manage them to improve the community members lives. Fast Networks' role is to build and maintain broadband infrastructure in the communities and provide internet capacity.

Localized content

One of the core businesses of Fast Networks is to push for local content. The reason for pushing decentralized content is;

1. It's expensive to access information because of the international gateways we go through in absence of local google cache servers and CDN
 2. International gateways fees are quite high for indigenous ISP
 3. Their research on social media behaviorism indicates that 70% of content is local.
 4. Fast Networks plan to build infrastructure that can push localized content to everyone at an affordable price.
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Community Enablement Concept 1st Place

Affordable Internet Access Devices Through E-Waste Recycling

Edwin Mugume, Dorothy Okello & Ronald (Uganda)

The Uganda Vision 2040 identifies Information and Communication Technology (ICT) as a key enabler to “transform the economy and people’s lives” through job creation and increased productivity. Over the last decade, the government has prioritized ICT connectivity and access across the population. However, some underserved communities

are set to be left behind due to poor connectivity and lack of appropriate devices for Internet access.

As more Ugandans embrace digital technologies, there is increased proliferation of computers and other electronic devices among the population. At the end of their useful life, these devices become electronic waste (e-waste). E-waste is potentially hazardous to human life and the environment if not handled appropriately. However, most components in e-waste are often still in good working condition. Safe recovery and recycling of such components reduces environmental pollution, protects human life, leads to the creation of green jobs, and promotes the principles of a circular economy.

This project proposes to exploit e-waste from desktop computers, laptops, and related devices by harvesting useful components and reusing them to create computers in good working condition. These computers will be repackaged and branded for reuse in communities that require affordable computers for Internet access.



PROJECT IMPACT

This project aims to enhance internet access in rural schools and other underserved settings by assembling low-cost access devices from electronic waste (e-waste). There is abundant e-waste in Uganda from desktop computers, laptops and other related

electronic devices. At the end of their life or upon developing technical faults, electronic devices are usually abandoned and replaced with new ones. As a result, most e-waste often gets discarded alongside solid waste into landfills where it endangers human health and the environment [1]. However, most components in e-waste are often still in good working condition. The e-waste management policy for Uganda encourages the recovery of such materials for recycling or repair to minimize the generated e-waste [2]. The need for internet access in schools has been heightened by the recent COVID-19 pandemic which led to the closing of schools in Uganda for nearly 2 years [3]. While some students continued studies at home through online platforms, the majority, especially in rural and underserved communities, were not able due to lack of computers and internet access. Only 11% of households in Uganda own a computer, with the majority of these living in wealthy urban areas [4]. The lack of devices for internet access and ICT literacy programs is a major driver for the digital divide in Uganda. The Uganda Communications Commission (UCC) has focused on targeting students by setting up computer labs in public schools to minimize this growing digital divide [5]. However, the coverage is still minimal given the large number of schools and budgetary constraints. Our low-cost solution exploits computer e-waste to develop and repackage computers for schools located in underserved areas to enhance internet access and ICT literacy. Targeting school-going children is a good strategy that has also been adopted by UCC.

This team already demonstrated that it is possible to create good computers from e-waste. The project needs to scale sustainably by formulating sustainable e-waste collection streams, acquiring tools to test, harvest and assemble the computers, and to create partnerships with other stakeholders in this space.

SECOND PLACE CATEGORY

WINNERS: PROOF OF CONCEPT

Technical Proof-of-Concept 2nd Place

Power to Power Connectivity

Richard Thanki, Nils O'Hara, Samson Rinaldi, Anna Hickman, Heather Morris, Chris Punt, John Cleasby & Veer Ramjoorawon (United Kingdom)

Jangala began as a volunteer project during the acute EMEA refugee crisis of 2015, when their founders met and combined their experience in experimental wireless networking, humanitarian assistance and emergency design processes to build a Wi-Fi network to serve the Calais Jungle refugee camp. The network proved transformational, for residents as well as for the organizations delivering services. In 2016, they developed the first Big Box prototype to efficiently serve demand from Europe and further afield. In 2018, Jangala was established as a charitable technology organization, dedicated to

developing humanitarian technology that enables meaningful connectivity for education, health and community resilience projects.

Big Box - a powerful internet delivery device that can combine the backhaul from its twin 2G/3G/4G modems and up to 30 additional sources to create high-quality, reliable and scalable Wi-Fi that can connect thousands of simultaneous users. Unlike any competitor Big Box is made using wholly open source technology, and integrates privacy by design. It is rugged, versatile and needs no technical expertise to deploy or use. Big Box dramatically reduces the costs of deploying internet connectivity where it's needed the most.

A key area of Big Box deployment is in education and healthcare in the Global South, both in formal institutions as well as informal learning settings. In many of these locations, infrastructure, power arrangements and often low digital literacy levels don't allow for the equitable and cost-effective distribution of internet services.



PROJECT IMPACT

A lack of easily deployable, capable internet access is one of the biggest barriers to the delivery of key services such as education and healthcare in low income communities and countries, and especially so among marginal communities such as displaced people. Jangala's Big Box presents an innovative solution to this challenge. The easy-to-use system combines powerful performance with simplicity, offering an answer to digital

divides in hard-to-reach and challenging contexts, including emergency teams in the field, remote schools and clinics, and even refugee camps with thousands of residents.

With 70+ prototype Big Box deployments, Jangala has demonstrated success in connecting some of the most remote communities, such as in the Democratic Republic of Congo, where two Big Boxes have travelled thousands of miles through the rainforest to schools in the Uvira region. Residents of Uvira are vulnerable to forced recruitment into armed gangs, and more than 70% of youth here have never used digital tools such as computers, phones or tablets, with the nearest access opportunities being 12km away.

Scalability is built into Big Box's design. The system can be used on any content thanks to its two global modems, and each one can connect hundreds of users, but when used as the center of a larger network in addition to off-the-shelf radios, around 3000 users can be connected simultaneously.

Business Model Proof-of-Concept 2nd Place

Sarantaporo.gr Non Profit Organization

Vassilis Chryssos, Giorgos Klisiaris & Achilleas Vaitis (Greece)

Sarantaporo village in Elassona, Greece did not have any internet connectivity options back in 2010, being an isolated rural area in mountainous Greece. It was not profitable for the telecommunications companies to invest in infrastructure. As a group of young people with close ties to the area we decided to do something about it. The challenge was two-fold: establish an infrastructure to provide access to the internet for the locals and visitors and train the inhabitants on the use of the internet. Both were tough, especially since the locals initially thought that they would not have any use of the internet.

The solution implemented was based on the model of community networks. Local leaders who were willing to engage were identified, applied for a grant to get the first wireless equipment (mesh routers), designed the basic network architecture and launched a local campaign to obtain buy-in to our community from locals. The first installation was successful and soon, by word of mouth, people from other villages approached them to do the same for them. Within a period of three years they had 12 villages in their community network. Community involvement is an innovative aspect that the telcos cannot implement, as it requires close relationship and trust building.

The model is based on sharing the resources with our local community and engaging our members. Basic connectivity is available to all in public spots in the villages. Members who host community equipment in their homes (node-owners) enjoy a faster connection. The cost of running the infrastructure is shared among the node-owners.

The Sarantaporo.gr NPO provides some additional funding through EU-funded and other programs.



PROJECT IMPACT

The first profound impact of our work was that the doctors who visited the villages once per week were able to prescribe medicine for their patients using the public online platform. Soon we realized, though, that the impact was much bigger than that. Young people would come and visit their parents and grandparents more often, since now they could stay connected, students were able to keep in touch with their peers from the town (no schools in the villages), farmers could discover new markets for their products and suppliers for raw materials and spare parts.

To bridge the digital gap in the area we do training workshops for infrastructure maintenance and expansion, internet usage, basic computer skills and others. These are open to all our community members. Moreover, in each village we have a few people who are part of the technical team and provide support to their community. We are using a Telegram group to provide support and do troubleshooting.

Today, even if there are available alternative connectivity options in the area, our members remain in the community valuing the relationships, the knowledge and experience they acquire and the freedom to decide how they want to expand their infrastructure

Community Enablement Proof-of-Concept 2nd Place

StreamSpot+

Sophia Grifferty & Daniel Becerra (United Kingdom)

BuffaloGrid deploys StreamSpot+ content-as-a-service Hubs to remote areas and refugee camps in developing regions. These Hubs enable free access to solar powered mobile device charging units that offer regionally relevant offline streaming and digital services. The solution addresses the main barriers to Internet adoption in four ways:

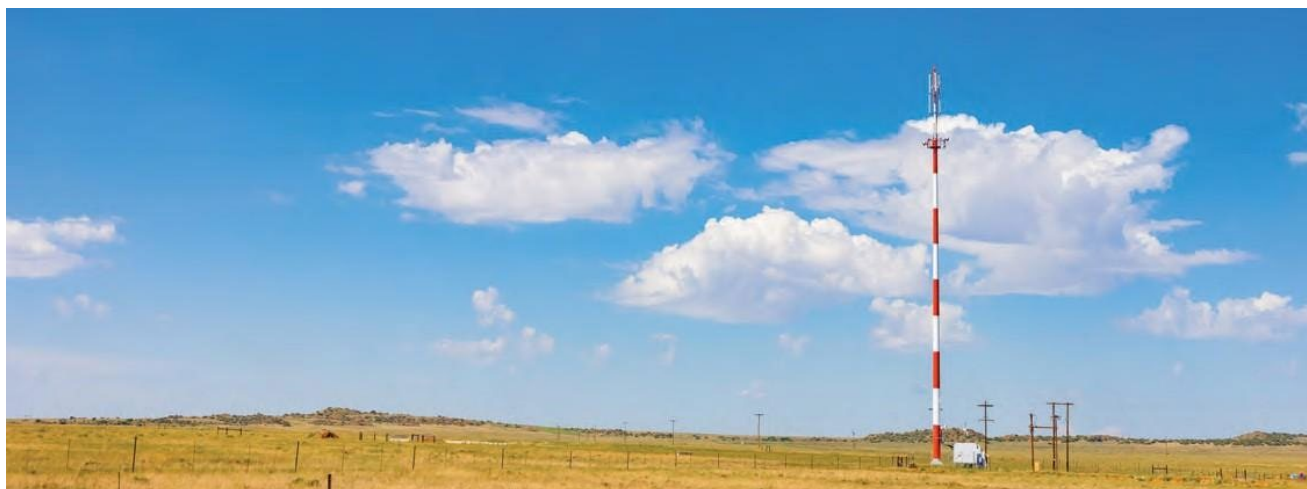
1. Provide free power to charge mobile devices.
2. Introduce and support digital skills.
3. Provide thousands of hours of preloaded locally and regionally relevant content. From education, (financial literacy and national curriculums) and health and entertainment and sport.
4. All done at zero cost of data or minutes for the users.

The Hubs operate like a local network and update using a SIM card from their partner Mobile Network Operators. Users can then stream offline and download using our StreamSpot App. Hubs are highly scalable, laptop-sized and durable to any environment while the services are extremely low cost and user friendly.

The digital content is locally curated and cloud updated using a local mobile network. Educational content includes national curriculums, business, banking, farming, health and digital literacy. Users access partners' content, including Khan Academy, Sesame Workshop, Waterbear Network, Nigerian Professional Football League and more.

The 2019 trials in India proved their mission to improve quality of life is possible. The Hub offers an opportunity to increase footfall and revenue to local shops and communities where it has been installed. They consistently saw an increase of 50% in revenues of agent shops where Hubs were stationed. These same trials provided over a quarter of a million phone charges to almost 100,000 unique users.

They have also pledged to bridge the digital gender divide by committing to deploy most Hubs to women owned or run small businesses, cooperatives and key locations.



PROJECT IMPACT

In terms of competition, no other service that they have identified provides both power and digital services to our users completely free of charge. Several power and Internet providers exist, but they allow customers a flawless content experience without the need for Internet connection. Internet providers are limited to places with access to wired Internet to create powerful enough WiFi to serve multiple users, so they do not reach the frontier users.

A solution unique beyond connectivity:

1. Business Model: collaborated with Mobile Network Operators, which allows them to provide free charging. Users receive free device charging and content streaming for education and health, and a subscription freemium model to download entertainment and sport for \$1/month. They can also white-label the solution for MNOs or co-brand.
2. Hardware Ownership: They retain ownership of all hardware, can invest in high quality components and have greater control over EoL to combat eWaste.
3. Village Approach: Their units serve communities, not just individual households, unlike competitors. Often in shops, Hubs can service up to 1000 users.

Their current objectives are to scale services, expand customer base in current and new regions, raise investment and meet potential partners. They are currently active in Bangladesh and obtaining user metrics. Next they will expand to Nigeria, then onto East Africa refugee camps in Uganda and Kenya.

SECOND PLACE CATEGORY

WINNERS: CONCEPT

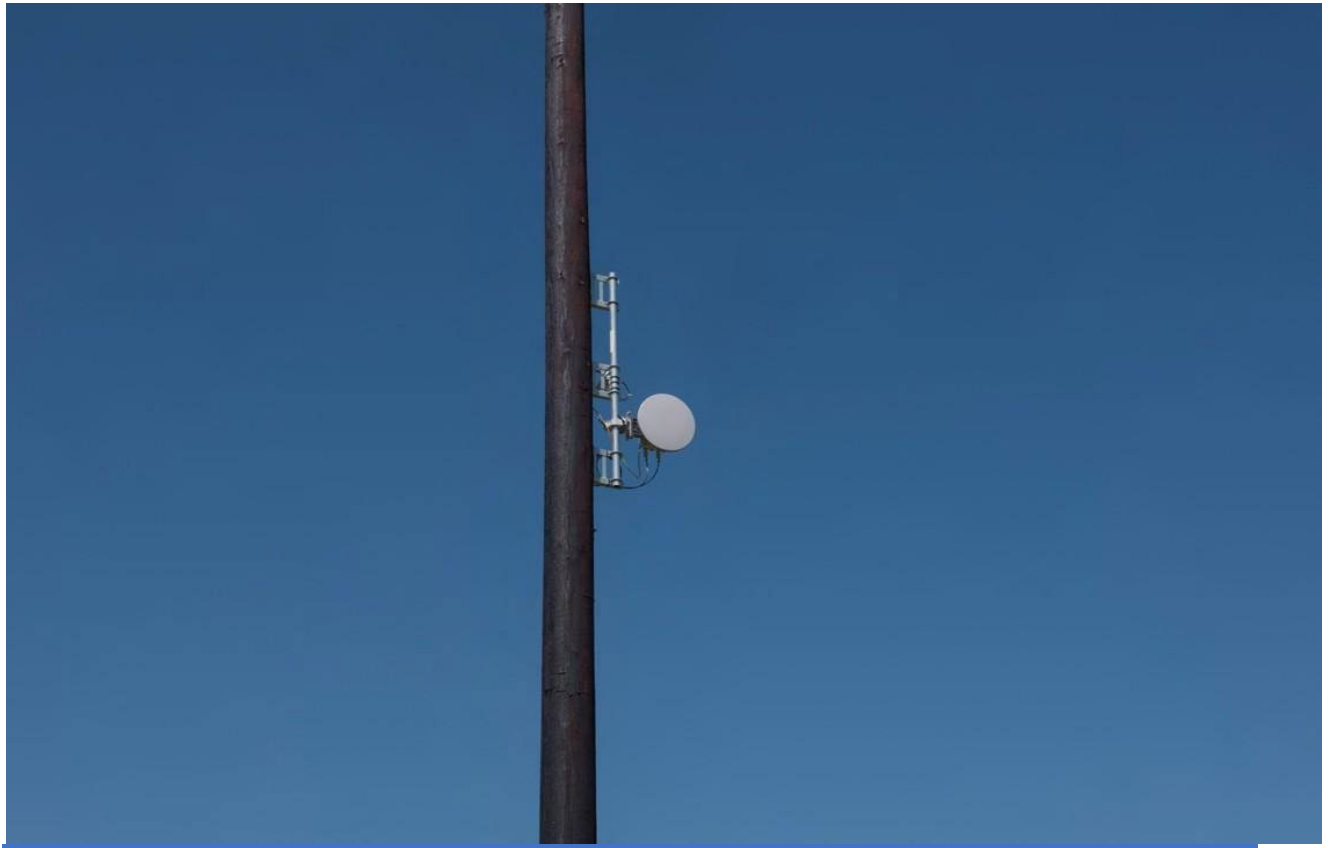
Business Models Concept 2nd Place

Swarm Network for Education and Learning in Papua New Guinea (SNEL PNG)

Nawi Mabo & Ben Mansell (Papua New Guinea)

The Internet is "the largest repository of information ever amassed in human history". Almost all essential services are now dependent on it. Without it, the devastation of COVID-19 would have been far more severe. Because of the level of dependency by modern life, tremendous developments continue to be made through innovation and scale to make internet services available in all corners of the globe. But even in all the developments, it has been realized, based on current data that a staggering number of people who mostly live in rural and remote regions of developing countries and in underserved regions of developed countries still lack access to the Internet.

The above prediction cannot be more realistic than current observation in the Asia-Pacific Region. Despite the all-inclusive satellite broadband from Kacific 1, a large percentage of the region's 28 million people who mostly live in rural and remote places are still unable to have access to the Internet. In PNG alone, only 12 % of the population are using the internet, "making this one of the lowest rates in the world". The cause of this, as largely identified in most settings is affordability. Solutions like WIFI hotspots that enable digital inclusiveness are comparably expensive to install and sustain in disadvantaged communities. This is attributed, in greater retrospect to the lack of sufficient income and means to pay for installation and to cover ensuing costs in running residential, business or community WIFI hotspots. As this resonates, the far-reaching impact of this key development is yet to be realized in places of greatest need like last line communities. Access to the internet is proven to improve earning potential and income generating opportunities so without it people aren't able to earn enough to afford WIFI and so the cycle continues.



PROJECT IMPACT

It currently costs US\$93 as the minimum for a VSAT installation to be “live” in a month and provide a WIFI hotspot. At each hotspot, proprietors resell data voucher bundles to people to access the internet through the WIFI - a service that is critically essential for students, ordinary people, and institutions. The revenue generated from the earnings is then used to offset the monthly operational costs in addition to sustaining the voucher service. While these expenses can easily be recouped in urban settings, it is very difficult to passably regenerate in low-income communities. To overcome this disparity, VSAT installations will be managed collectively as a consortium and not standalones for the purpose of capitalizing the earnings of profitable hotspots in commercial settings to top-up the deficit of low earning sites. For example, if an urban hotspot generates US\$186, twice its monthly costs, the extras will be used to pay up the short fall of a rural hotspot that could not earn pass its monthly expenses. This pre-emptive arrangement is the pinnacle of this model to overcome difficulties incumbering online educational opportunities and other prospects in low-income communities.

To test the concept, a VSAT unit will be installed on a hotel rooftop in a shopping area in a major town to target guests, diners, shoppers, and staff. The choice of initialing setting up in a commercial area in contrast to a charitable rural setting is nevertheless

to determine the average amount of additional revenue that can be generated in a month from an urban hotspot to use in sustaining a rural hotspot as envisioned in this concept. This is a crucial variable to determine the viability of the business model. In addition, the project cost is within the grant limit we can apply for in the current track for just this single setup. If granted, we plan to scale up the project through the larger IEEE track grants, or through other donors to construct more hotspots primarily in low-income communities and sustain their connectivity through this business model.

Community Enablement Concept 2nd Place

Digital Skills for Population in Remotest Areas.

Tebogo Mosalakatane & Tebogo Mokoena (Botswana)

Their business approach for bridging the digital divide gap centers around empowering the communities in remotest areas with basic computer skills as the majority of the population are not educated and their geographical location disadvantages them, they are far from vital resources such as a public library, internet cafes, shops and healthcare services.

The project solution involves setting a mobile ICT skills training center which also acts as a internet café housed in a shipping container and powered by solar energy as most these communities are off-grid. The size of the container is 12meters/40feet which can fit 20 computers and accommodate 20 students, a printer, fax machine, wireless internet router, solar panels on the roof to power the PCS. The basic skills that will be taught to dwellers include Introduction to computers focusing on the following aspects: computer components, Microsoft word, Microsoft power point, Microsoft Excel.

The motivation to start this project was after living in remotest settlements and observed how these communities are cut from the rest of the world as they have no access to the internet which has resulted in lack of digital skills amongst the general population. The solution fills a community need in the following ways: 1) provides access to online knowledge and resources ICT skills which its hard for these communities due to their geographical location and lack of infrastructure.2) provides basic IT training skills which are needed for one to participate in the global digital revolution.

It will increase digital literacy and human computer interaction which is at its lowest in remotest areas of Africa as majority reside in these areas, are not connected to the internet and do not own a computer. Internet connectivity and internet enabled devices for remotest dwellers are unaffordable hence the need for their solution which gives everyone regardless of age, educational background the opportunity to learn and acquire digital skill which will go a long way in preparing them for the jobs of the future that will require ICT skills.



PROJECT IMPACT

This solution will empower and transform remotest communities that are isolated by distances with access to internet services which is a vital tool in the digital world of today. With this initiative they intend to provide affordable access to internet to the rest of the community as well as basic computer training skills. The solution focuses on closing the digital divide for remotest population by providing them with reliable internet access so they may benefit from the global economy and virtual opportunities and reap the benefits of new economic and social opportunities of ICT, including employment and access to money. With this initiative they aim able to provide wireless solar powered internet access with high speed connectivity in hard to reach extreme long distances in remotest areas and our solution reduces the cost of internet access as a single connection can be shared by many villagers when they visit the mobile internet café. The skills they will be trained on are introduction to computers, computer components, Microsoft word power point, Microsoft excel and other additional skills may include how to use YouTube, opening a skype account, how to browse the internet for information as majority has never even used the internet.

HONORABLE MENTION WINNERS

Technical Applications

Antenna MiMo 5Ghz

David Aguirre, Sol Giacobbe, Carolina Perez & Pablo Bustos (Argentina)

This project is motivated by the desire of spreading a community internet network over their territory, born from the need for access to communication, which has been very limited due to the costliness and non-viability of the services from local providers.

During this construction process within the community, they have been discovering the network technology and realizing the need to create an easily replicable antenna to make the connection more accessible; in other words, that people without pre-existing technical knowledge can install effortlessly.

That is how continuing with the work that AlterMundi has been developing, they have created a collective workspace where they built a MiMo 5Ghz directional waveguide antenna, convertible into sectorial with a parabolic dish created for this purpose.

Their initiative is aimed toward fostering the values of technological autonomy with the highly-replicable, simply maintainable open hardware. This project promotes the improvement of the regional economy through the purchase of local manufacturing instead of importation.



PROJECT IMPACT

We are going through a phase in which countries are recognizing community networks as entities capable of making use of the right to communication and providing resources and regulations to empower their advancement. These communities are generally characterized by low resources, lack of access to communication, and are located in disadvantaged areas. This project takes advantage of this movement, getting actively involved in the labor market and the development of internet networks in the area, generating work for the local population. They are generating a product that allows all the members of the communities to take ownership of the process of construction of their inputs in a self-managed way, being able to intervene in the designs and developments as in any other FLOSS project. This is why the procedure to build their antennas is simple, and they chose materials that could be obtained in hardware stores in any territory. Their work takes place in a workspace built in a rural context, with tools and devices for the construction of antenna prototypes.

Business Models

eduroam on a go to extend service to the unconnected R&E community of Uganda

Hellen Nakawungu, Brian Masiga, Fahadi Muhumuza, Caroline Tuhwezeine, Brenda Namuli, Derrick Ssemanda, Catherine Atuhairwe, Arthur Tumwesigye, Ben Kyemba & Daniel Kawuma (Uganda)

eduroam (education roaming) is a worldwide trusted, secure, and free Wi-Fi network for students and staff of education and research institutions. When a user attempts to log on to the wireless network of a visited eduroam-enabled institution, the authentication request is routed to the user's home institution. This is accomplished using a hierarchical system of RADIUS servers. The user's home institution verifies the user's credentials and sends the result to the visited institution (via RADIUS servers).

Before the COVID-19 pandemic, RENU, the National Research and Education Network (NREN) in Uganda, deployed eduroam only within the institutions connected to the RENU network. This kind of deployment can now be referred to as campus eduroam. Campus eduroam can only be accessed by users only when one is within the confines of the premises of the institution.

However, at the onset of the COVID-19 pandemic in March 2020, students and staff were forced to go home leaving eduroam locked up inside the campuses, with institutional bandwidth capacity very under-utilized or not utilized at all. This meant that several students, staff, and researchers had to find other solutions for connectivity and Internet access off-campus. As expected, a huge majority of students, found the available off-campus connectivity solutions very expensive, unreliable, inadequate, and if not non-existent.

Internet penetration in Africa still lags behind other parts of the world (39% in Africa versus 58% in the rest of the world), and while the rest of the world moved their

classes online, millions of students and researchers on the African continent were disconnected and could not access online resources and e-learning solutions. To try and address the off-campus connectivity challenges, RENU took an action and rolled out eduroam in the metropolitan areas in different cities of Uganda. This initiative extended a secure and trusted internet connectivity beyond campus boundaries referred to as Metro eduroam. However, it is important to note that this does not reach the rural/unconnected areas with no or unreliable electricity. Also, the access points are deployed in specific areas meaning a researcher is required to move to these specific metro locations in order to connect to the free and secure Wi-Fi network.

The “eduroam On The Go” solution allows students, staff, and researchers to remain connected to the secure, trusted, and free Wifi network whenever they go regardless of the geographical area.

This solution runs on a portable MiFi device that has an inbuilt rechargeable battery. With these devices, students, staff, and researchers can conveniently connect to a free, secure, and trusted Wi-Fi network regardless of their location.

At RENU, we believe that research and education are the backbone of community development and are a catalyst for reducing the digital divide in our part of the world.



PROJECT IMPACT

The off-campus limitations of eduroam were most glaring when Uganda's education section was locked down during the COVID-19 pandemic. As a solution, RENU introduced Metro eduroam in September 2020. For the first time in Africa, it was possible for students, university staff and researchers to access eduroam off-campus, wherever there was an eduroam hotspot.

While this facilitated the continuation of learning despite the lockdown- it still tied users to particular urban center locations. After all, one could only connect to eduroam where there was a hotspot. RENU launched Metro eduroam with just 300 hotspots spread out across only Kampala, Entebbe and Mukono. Anyone outside of these areas thus couldn't use the service.

Even the 98 new hotspots deployed across 14 other towns throughout Uganda in early 2022 still aren't sufficient to ensure that members of the research and education community can connect to eduroam anytime and anywhere.

eduroam On The Go's inception came as a solution to the challenges that Metro eduroam presented as well as increasing the usage of eduroam by expanding it to regions outside campus and metropolitan areas as well as bringing eduroam closer to the users since with this solution eduroam becomes mobile and available from anywhere at any time.

Since it is a pocket-size router, it enables continuous connection to eduroam even off-campus and outside the reach of Metro eduroam hotspots other designated places, the eduroam On The Go service has been introduced to extend the reach of the legacy eduroam service to users regardless of where they are and at anytime.

The provision of mobile devices that provide the eduroam On The Go service to the users will improve connectivity and consistent collaboration for citizens in the education and research community hence improving the education standards in the country as a whole.

Since the devices are to be mobile, connectivity/internet is brought closer to the end users as well as increasing the coverage of the eduroam service.

Community Enablement

Inclusive Ethical and Equitable Community-developed Digital Town Square

Clara Listya Dewi, Alissa Stern, Putu Eka Guna Yasa & Budi Utami (Indonesia)

"The internet is becoming the town square for the global village of tomorrow." – Bill Gates

Digital town squares, like their brick-and-mortar counterparts, require more than creating an architectural frame, accessible entrances, a mix of uses, and a beautiful

environment: they need to serve the needs of multiple constituents and ultimately improve the well-being of communities and the lives of people who live within them. And that requires involving the people the digital town square serves in its design, testing, evolution, and development in an inclusive, ethical and equitable way.

To quote Dr. Francine Berman, President Obama's National Council on the Humanities appointee, University of Massachusetts computer science professor, and the Marconi Society Fellow, "...there is growing disparity with respect to who benefits from technology and who is at risk for exploitation... If we want to thrive as humans in a socio-technical world, equity, ethics, and the public interest need to be a core part of the equation."

Easier said than done, especially in developing countries where the public may not yet have the experience or expertise to participate in designing, evaluating and improving digital public participation systems or the culture of using them even when Internet access is available.



PROJECT IMPACT

In Indonesia, a 2016 study from McKinsey explains that Indonesia "presents a curious paradox: its digital denizens are among the world's most active...Indonesia's connected citizens are tech savvy, but Internet penetration is low. In short, Indonesia has a long way to go in the digital age." Many Indonesians use the Internet for entertainment and personal communication, but not as well as their peers in other countries for news, research, advocacy, coalition-building, public communication and civic engagement. This solution aims to develop an ecosystem which engages Indonesian youth – along with government, private sector, civil society and academia -- to have the motivation, skills, and experience to participate in the development, evaluation and improvement of a digital public participation platform to improve the wellness of their communities and the lives of community members. Our platform has been used by close to 3 million in Bali, Indonesia and we are now replicating in South Sulawesi

2022 SELECTION COMMITTEE JUDGES



Aaron Deacon

Aaron Deacon is the founder and managing director of KC Digital Drive, a nonprofit civic organization with a mission to make Kansas City a digital leader and help cities adapt to disruptive technology change. He works with mayors, entrepreneurs and civic leaders in Kansas City and around the world to help build ecosystems that connect infrastructure, emerging technology and social impact. He combines a high-level strategic approach with boots-on-the-ground project implementation and management in smart cities, civic tech, digital inclusion, digital health, and education.

Through KC Digital Drive, Aaron helps to lead the Code for KC Brigade, the Health Innovation Team, and the KC Coalition for Digital Inclusion. Aaron is a founder and producer of the Gigabit City Summit, an annual conference on how cities build value on technology infrastructure. He also leads Kansas City's participation in a number of global initiatives including US Ignite, NIST's Global City Teams Challenge, the IEEE Smart City Initiative and the MetroLab Network.

Aaron's work in cities and technology began as an instrumental leader in helping Kansas City prepare to be the first market for Google Fiber. He created and led a variety of community engagement initiatives around broadband deployment, including Building the Gigabit City and Give Us a Gig. He continues to help cities develop community playbooks to take advantage of ultra high-speed broadband.



Adnan Abu-Dayya, Ph.D.

Since 2009, Adnan has been serving as the Founding Executive Director of the Qatar Mobility Innovations Center (QMIC). It is one of the first technology innovation institutions in the Middle East focused on translating R&D and technology innovations into scalable digital platforms and solutions in the field of Intelligent Mobility and Smart Cities. From 2007 to 2008, Adnan served as the Chairman of the Electrical Engineering Department at Qatar University.

Before moving to Qatar in 2007, Adnan worked for 10 years at AT&T Wireless in Seattle, USA where he served in a number of management positions covering emerging products & technologies, systems engineering, product realization, and intellectual property management. Before that, Adnan worked as a Senior Manager at Nortel Networks in Ottawa, Canada in the advanced technology group, and as a Senior Consultant at the Communications Research Centre in Ottawa, Canada.

Dr. Adnan serves as the Chairman of the Advisory Board of the Electrical & Computer Engineering Department of Texas A&M University at Qatar, he is a member of the Steering Committee of the Smart Grid Research Center at Texas A&M University at Qatar, is a member of the Advisory Board of the Computer Engineering & Science Department at Qatar University, and is a member of the Advisory Board of the Qatar Auto Museum.

He received his PhD in Wireless Communications (Electrical Engineering) from Queens University, Kingston, Canada in 1992. He has 10 issued patents, and more than 100 referred publications.



Benedikt Signer

Benedikt Signer is a Program Coordinator in the Disaster Risk Finance and Insurance Program, housed in the Finance, Competitiveness, and Innovation Global Practice. Benedikt has supported over 20 countries to more actively manage the potential losses from climate and disaster shocks and launched multiple new initiatives including the Global Risk Financing Facility (GRiF), a \$280m program to support resilience to shocks, a training program reaching over 10000 people in 35 countries. He has judged innovation competitions around the world, including for the Singapore Fintech Festival and Innovate UK, Britains national innovation agency. He is also on the global advisory board of PLACE, a new organization to radically change the way mapping data is made available to governments around the world. He has a Master's degree in Global Politics from the London School of Economics.



Bill Woodcock

Bill Woodcock is the executive director of Packet Clearing House, the international non-governmental organization that builds and supports critical Internet infrastructure, including Internet exchange points and the core of the domain name system. Since entering the Internet industry in 1985, Bill has helped establish more than three hundred Internet exchange points. In 1989, Bill developed the anycast routing technique that now protects the domain name system. In 2007, Bill was one of the two international liaisons deployed by NSP-Sec to the Estonian CERT during the Russian cyber-attack. In 2011, Bill authored the first survey of Internet interconnection agreements, as input to the OECD's analysis of the Internet economy, and conducted follow-on surveys in 2016 and 2021, with participation from more than 27,000 Internet service providers in 192 countries. Bill served on the Global Commission on the Stability of Cyberspace, and the Commission on Caribbean Communications Resilience. He chairs the board of the Quad9 Foundation, he's on the board of directors of the M3AA Foundation, and was on the board of the American Registry for Internet Numbers for fifteen years. Now, Bill's work focuses principally on the security and economic stability of critical Internet infrastructure.



Christopher Mitchell

Christopher Mitchell is the Director of the Community Broadband Networks Initiative with the Institute for Local Self-Reliance (ILSR) in Minneapolis. Mitchell is a leading national expert on community networks, Internet access, and local broadband policies.

Mitchell built MuniNetworks.org, the comprehensive online clearinghouse of information about local government policies to improve Internet access. Its interactive community broadband network map tracks more than 600 such networks. He also hosts audio and video shows online, including Community Broadband Bits and Connect This!

Public Knowledge presented Christopher with its Internet Protocol award in 2021, which honors those who have made significant contributions to Internet policy. In 2019, the Coalition for Local Internet Choice gave Mitchell its "Indispensable" Award and the Blandin Foundation of Minnesota presented him with a "Courageous Leadership" award. In 2015, the White House used Mitchell's research as building blocks in a National Economic Council report encouraging community networks. He was honored as one of the 2012 Top 25 in Public Sector Technology by Government Technology, which honors the top "Doers, Drivers, and Dreamers" in the nation each year. Christopher helped to found Next Century Cities and served as Director of Policy for its first five years.



Hani Shannak

Mr. Shannak served as the Senior Information and Communication Technology Advisor of Partnerships and Humanitarian Response at UNICEF for over thirty years. He held title as the chief ICT at UNICEF in the cross-cultural, multilingual, and international environments of UN interagency ICT bodies, INGOs and among both public and private sector partnerships, in which he enabled optimal ICT humanitarian response. His current position as a Senior ICT Consultant is crucial for continued implementation of expanding connectedness worldwide through ICT strategy by ensuring standards, capacity building, and global response capacities while boosting the overall regional cohesion and alignment.

Throughout his extensive work contributing to UNICEF's global ICT strategy, Mr. Shannak has obtained significant education and training including a Diploma in Senior Leadership Development from University of Cambridge, an MA in Leading Innovation & Change from York St. John University and a bachelor's degree in CIS. Hani's pursuit for higher learning has

exposed him to institutions of education among the UK, Switzerland, South Africa, Jordan, Thailand, Kenya and the US.



Harri Saarnisaari, Ph.D.

Harri Saarnisaari received his Ph.D degree from the University of Oulu in 2000, where he has been with Centre for Wireless Communications since 1994. He is currently an adjunct professor. His research interest cover signal processing techniques like synchronization, network time synchronization, antenna arrays, signal detection. He is also involved into system design aspects. Currently, his research interest include remote area connectivity, especially in the Arctic areas but also globally. He has led projects in this area focusing in connectivity problems and solution architecture, and finding societal viewpoints to the problems and benefits once connectivity problems have been solved. In 2020 he led the 6G white paper writing group about "remote area connectivity" that was published in 6G channel.com. Harri is the chair of IEEE Finland section joint communication and information theory chapter.



Huguetta Diakabana

Founder of Luminous Sana | Co-founder of the African Alliance of Digital Health Networks| Senior Fellow Aspen Institute New Voices| Former Co-Chair WHO Digital Health Technical Advisory Group

Huguetta is a global health and digital transformation practitioner focused on connecting people to quality healthcare and life-saving technologies. She has deployed technology-based solutions in education, community development, and global health in over 20 countries throughout Africa and Latin America. She is the outgoing Co-Chair of the WHO Digital Health Technical Advisory Group.

She currently works with organizations and governments to leverage data to enhance the quality of health services. She is also a Senior Fellow at the Aspen Institute's New Voices

program and a faculty member at the Harvard Medical School's Executive Program teaching team.

Last, Huguette mentors students and young professionals interested in collaboration and leveraging appropriate, sustainable, and cost-effective technologies to make a difference in their communities.



Humphrey Muhindi

Humphrey is an IP Provisioning Manager at [SEACOM Kenya Limited](#) with 16 years' experience in the telecommunications industry, 11 of which have been in leadership positions. He leads a team of IP Engineers responsible for delivery and implementation of customer services and resource management on the SEACOM Global IP network. His main role is overseeing overall implementation operations while optimizing SEACOM's processes to maximize revenue and manage costs working with cross-functional teams and diverse individuals in a multicultural environment.

He developed and implemented standards, procedures, processes, and training programs that improved business functionality with emphasis on Quality Assurance aligned to ISO 9001:2008 at our company. In February 2021, graduated from the Bullet Proof Manager Program by Crestcom which is a 12-month program focusing on all aspects of leadership delivered by Subject Matter Experts.

An Electrical and Communications Engineering graduate with various CISCO, ITIL, Agile Project Management and CISA Certifications. He is a Registered Graduate Engineer with the Engineer's Board of Kenya (EBK), Registered Class A Telecommunications Technical Personnel with the Communications Authority of Kenya (CA) and member of the Project Management Institute.



Jabhera Matogoro, Ph.D.

Jabhera Matogoro holds Masters of Science in Computer Science and Bachelor of Science in Computer Science from the University of Dodoma and University of Dar es Salaam respectively. Mr. Matogoro is a teaching staff at the Department of Computer Science and Engineering of the College of Informatics and Virtual Education. Mr. Jabhera Matogoro is the Founder and Chairperson of Tanzania Community Networks Alliance (www.tzcna.or.tz), an umbrella organization for community networks in Tanzania. Mr. Matogoro is the recipient of Open Internet Engineering Mozilla Fellowship for the year 2019 – 2020. Jabhera Matogoro is working to scale-up community owned cooperative societies in Tanzania aimed in making cooperative attractive for youth and young girls in Tanzania at the same time addressing challenges associated with broadband Internet access. Mr. Matogoro initiated Tanzania Victory Garden as a way to empower women and youth economically so that they can afford to pay for their communication services which is sporadically available and sometime expensive for ordinary citizen to afford. Mr. Matogoro is an active member to many forums in Africa and beyond.



Jeff Evans

Jeff Evans is a Principal Research Engineer in the Information & Cyber Science Directorate (ICSD) at the Georgia Tech Research Institute (GTRI). Mr. Evans has over 34 years of research in the communications field with particular interest in broadband wireless network implementations, emerging mobile communications services, and the delivery of applications and services to communities and underserved areas. He has also directed research programs for numerous DoD programs involving advanced mobile network technologies, including battlefield communications on the move, asymmetric threats, and related areas of communication technologies.

Mr. Evans served as an advisory member and judge for the inaugural IEEE Connecting the Unconnected Challenge in 2021. He is also a member and Vice Chair of the National Spectrum Consortium (NSC) Executive Committee. The NSC is an OTA-based consortium that supports the Office of Secretary of Defense Research and Engineering in areas of dynamic spectrum sharing, mitigation of spectrum loss for commercial use, and implementation and analysis of DoD Use Cases for 5G deployments.

Mr. Evans holds a courtesy appointment for the Georgia Tech Center for Advanced Communications Policy, and participates and advises on numerous development efforts and programs to extend the Georgia Institute of Technology's research capabilities in emerging areas such as Health IT, Cybersecurity infrastructure, First Responder and Disaster response concepts. He is also the co-founder of the Center for the Development and Application of Internet of Things Technologies (CDAIT) where he serves as the Chair of the Advisory Board

and co-Director. This includes the convergence of digital technologies for future commercial applications and services, for which he was recently a member of the World Economic Forum's Global Agenda Council for the Future Digital Infrastructure. He also serves on the advisory board for the Georgia Tech Institute for People and Technology (IPaT). Mr. Evans has B.S and M.S. degrees in Electrical Engineering from Georgia Tech.



Jeff Abramowitz

Jeff Abramowitz is president and chief executive officer of PowerCloud Systems, a company he conceived while entrepreneur-in-residence at PARC. He is included in the Computer History Museum for his 20-year track record of piloting new technology transitions in the networking industry.

Widely known for driving market adoption of 802.11g while at Broadcom, Abramowitz has developed successful business initiatives involving performance, ease-of-use and technology integration. He also led the creation of industry-wide consortiums promoting interoperability and cooperation (WLANA and the Wi-Fi Alliance). His vision and leadership helped accelerate the technological direction of wireless networking and create the standards-based Wi-Fi market we have today, which includes co-authoring the original IEEE standard for Wi-Fi. Abramowitz also served as an executive at 3Com Corporation, Azimuth Systems, Intersil, and No Wires Needed. Abramowitz received a BSME from the University of Pennsylvania, an MSEE from the Massachusetts Institute of Technology, and an MBA from Stanford University.



Johnson Dickson

Having previously worked as a Project Manager and Regional Coordinator with International Non-Governmental Organizations, Johnson brought reputable project management experience and strong organizational leadership influence. With a bachelor's degree in Project Planning

Management and Community Development (PPM CD), he can excel in project initiation, implementation, and coordination.

For the 9 years working within community and project development sectors, he has aided additional skill sets of Monitoring and Evaluation, Budgetary constraints, Internet and School Connectivity Projects around 12 regions in Tanzania and connected more than 60 Public schools with the Internet as well as learning Platforms. Currently, he is serving as a Country Director with Maisha Outreach Therapy Organization (MOTO), Director of Project Management Office and Outreach with Tanzania Community Networks Alliance, and Programme Manager with African School of Storytelling (AFRISOS).



Josephine Miliza

Josephine Miliza is digital inclusion and community networks champion passionate about supporting communities to build resilient and scalable bottom-up connectivity models. She is among the pioneers of the community network movement in Africa and has co-founded TunapandaNET a community network in Kibera, Nairobi Kenya. Josephine serves as Africa policy coordinator for the Association of Progressive Communications-LOCNET project hosted by the Kenya ICT Action Network in Nairobi Kenya. This project aims to contribute to an enabling ecosystem for the emergence and growth of community networks and other community-based connectivity initiatives in the global south. Josephine is actively involved in promoting the community networks movement in Africa participating in organizing the Africa community networks summit, awareness building, capacity building and policy advocacy forums. Her current interests are in bottom-up sustainable connectivity models and creative approaches to an enabling environment that fosters resilience and innovation for communities in Africa.

Josephine Miliza is a network engineer and digital equity champion passionate about supporting communities to build resilient and scalable bottom-up connectivity models. Josephine is actively involved in promoting the community networks movement in Africa.



Joyce Dogniez

Joyce has over 15 years of experience with global non-profits to build, engage and mobilise communities; from people on the ground, Chapters to member and partner organisations. She ensures cross community collaboration to work on the real-world challenges that comes with connecting people to the opportunities the Internet has to offer.

She serves on the International Section Council of the American Society of Association Executives, has an Advisor role for NGO's led by youth and acts as a mentor and coach for young professionals.

She is also Past-Chair of the EQUALS global partnership for gender equality in the digital age. She is engaged in a number of local associations in Luxembourg and is founding member of the Luxembourg Chapter of Women4Cyber Foundation.

She speaks regularly at international, regional and national fora to promote the importance of an open, globally-connected Internet as well as to advocate for an inclusive and diverse community approach.



Julia Parker

Julia J. Parker has worked in both the public and private sector in community development and impact investing.

After stints working in the US Senate and with the City of Omaha, Julia started her nonprofit career at Building Bright Futures, a nonprofit incubator supporting organizations focused on educational outcomes for children experiencing the violence of poverty. She went on to start a nonprofit strategy consultancy, Park4029 that worked with small, high growth mission-based organizations. Julia then served as Executive Director of Omaha Small Business Network (OSBN) a community development entity. She worked on microfinance and business strategy for small businesses. She ran the OSBN Accelerator in a 50,000 sq/ft facility housing over 28

social enterprises, start-ups and small businesses and provided guidance to entrepreneurs including financial support ranging from grants to debt and equity. The accelerator supported 150 jobs and generated \$2.5M in annual revenue in a low wealth BIPOC community.

Julia has a passion for investing in BIPOC entrepreneurs and business owners which she did as Director of Economic Development at Dorchester Bay Economic Development Corporation a Boston area nonprofit. She focused on debt capital strategy, economic mobility, financial literacy and entrepreneurship for returning citizens. Julia previously served as Managing Director at The Crane Institute for Sustainability's Intentional Endowments Network. She focused on community investing and justice, equity, diversity and inclusion (JEDI) investing across asset classes for mission focused higher-ed endowments and foundations.

Julia holds a BA in Political Science and a BA in International Relations from Creighton University and a MS in Urban Studies from the University of Nebraska at Omaha. Julia has an MBA from Boston College Carroll School of Management focusing on Finance and Entrepreneurship.

In her spare time, Julia enjoys being a guest on Star Trek podcasts and doing pop culture reviews on You-Tube.



Julián Casasbuenas G.

Chemical Engineer, University of America 1984 - Bogotá Colombia, with more than twenty five years of experience in environmental and information and communication technologies - ICTs. Director of Colnodo (www.colnodo.apc.org), a non-profit organization established in 1993 with the main goal of facilitating the communications, the exchange of information and experiences among Colombian organizations at local, national, and international level.

Council member of the Association for Progressive Communications - Apc – (www.apc.org) and of the Executive Board. Former Chair of the Board 2003 - 2005 and 2015 - 2017.

Participant of the Internet Governance Forum – IGF Expert Group Meeting 2022.

Member of the Selection Committee and Mentor of LacNIC's Lideres 2.0 program since 2021

www.lacnic.net/5481/2/lacnic/lideres-20.

Active member of the Colombian Internet Government Forum initiative - Mesa Colombiana de Gobernanza de Internet, as civil society representative since 2011.

www.gobernanzadeinternet.co

Former member of the Internet Governance Forum IGF Multistakeholder Advisory Group (MAG), Board member of the Convergences Cooperative www.convergences.org.co 2014-2019.

Former board member of the Development Gateway Foundation - 2006 - 2014.

Evaluator of proposals of the second call of the CONFINE project of the European Commission 2013.

Member of the Internet Society since 1993 and Internet Governance Forum Ambassador for the Rio de Janeiro 2007 and Egypt Sharm el Sheikh 2009 Forum.
Member of the Civil Society Internet Governance Caucus.



Kennedy Ronoh, Ph.D.

Dr. Kennedy Ronoh is currently a Lecturer at the School of Computing and Engineering Sciences, Strathmore University. Previously, he was a Lecturer and Research Team Leader at the Department of Communication and Computer Networks at Technical University of Kenya. He holds a PhD in Computer Science from University of Nairobi (Kenya), an MSc. in Wireless Networks and Electronics from Linkoping University (Sweden) and BSc. in Computer Engineering (Moi University, Kenya). Dr. Ronoh also serves as an expert instructor for a number of courses for a number of courses including Mutually Agreed Norms for Routing Security (an Internet Routing Security course), Encryption, Building Wireless Community Networks, and Designing and Deploying Computer Networks. His current research interests include Dynamic Spectrum Access, TV White Spaces, WiFi6, Metaheuristic Algorithms, Digital Divide, Community Networks, Internet of Things. Ronoh is a member of IEEE.

He has won grants related to improvement of connectivity in Kenya. These include grants from ITU ("Covid-19 Recovery: Rebuilding Digital Inclusion for the Rural Counties of Kenya") and FCDO/DSA ("Enhancing Broadband Connectivity through Dynamic Spectrum Access"). Dr. Ronoh has been instrumental in the country studies on TV White Spaces and was part of the team that carried out the validation exercise and site surveys in the establishment of the Kenyan regulatory framework for TV White Spaces under a project known as "Development and Validation of TV White Spaces Regulatory Framework for Spectrum Sharing for Fixed Broadband Services in the UHF Band as a Demonstration of Dynamic Spectrum Access methods in Rural Kenya".

Ronoh has published over 10 articles in peer reviewed journals and IEEE conferences. He is a reviewer for some Scopus indexed journals and has previously been a programme committee member and reviewer of the IEEE AFRICON.



Mahesh Marina, Ph.D.

Mahesh Marina is a Professor in the School of Informatics at the University of Edinburgh, where he currently serves as the Director of the Institute for Computing Systems Architecture (ICSA). He is also a Turing Fellow at the Alan Turing Institute in London. Before joining Edinburgh, he had a two-year postdoctoral stint at the UCLA Computer Science Department. He received his PhD in Computer Science from the State University of New York at Stony Brook. He has previously held visiting researcher positions at ETH Zurich and Ofcom London. He is a Distinguished Member of the ACM and a Senior Member of the IEEE.



Mahesh Krishnaswamy

Mahesh Krishnaswamy leads Project Taara at X, Alphabet's moonshot factory. Taara is X's moonshot to bring affordable high-speed, high-capacity bandwidth to underserved communities around the world by using a new approach to wireless optical communication technology, or beams of light. Mahesh served as a judge on Africa50's Innovation Challenge in 2020 to discover innovative solutions to last-mile internet connectivity across the continent. Before founding Taara, Mahesh headed the manufacturing and supply chain for Project Loon, which used floating balloons in the stratosphere to deliver connectivity. Before coming to X, Mahesh worked at Apple managing a portfolio of strategic products from concept to launch, and a decade at Motorola as a product manager, where he brought WiMAX and LTE portfolio products to market. Mahesh holds a Bachelor of Science, a Master of Science in Electrical Engineering and an MBA from Northwestern Kellogg Graduate School of Management.



Marco Zennaro, Ph.D.

Marco Zennaro is a Research Scientist at the Abdus Salam International Centre for Theoretical Physics in Trieste, Italy, a Category I UNESCO Institute, where he coordinates the Science, Technology and Innovation Unit. He received his PhD from the KTH-Royal Institute of Technology, Stockholm, and his MSc degree in Electronic Engineering from the University of Trieste in Italy. His research interest is in ICT4D, the use of ICT for Development, and in particular he investigates the use of Internet of Things for Development (IoT4D). He acts as TinyML4D Chair and TinyML Academic Network Co-Chair, in the framework of the TinyMLEdu initiative. Over the years he has organized more than 30 training activities on IoT in Developing Countries. Marco is a Visiting Professor at Kobe Institute of Computing (KIC) in Kobe, Japan.



Marine Cavaille

Marine Cavaille manages Microsoft, Google and AWS partnership for Turing, an American unicorn company which provides customers with best Engineers, worldwide. Scientific (Neuroscience) by training, Marine has more than 8 years of business experiences with international IT consulting firm and National advertising company. She leads huge digital transformation projects for major accounts from the Energy, Life Science and Technology sectors by selling Data, Cloud and Engineering solutions. She puts people in center of all her actions while deeply considering inclusion, environmental and social impacts. In 2013, Marine and her team won the best female project at a national contest in France, les Entrep. She is based in San Francisco, she did live in UK while growing up in France and she loves hiking and networking.



Marja Matinmikko-Blue, Ph.D.

Marja Matinmikko-Blue is Research Director of the Infotech Oulu Institute and Director of Sustainability & Regulation at 6G Flagship at the University of Oulu, Finland, where she also holds an Adjunct Professor position in spectrum management.

Marja completed her Doctor of Science degree in communications engineering in 2012, and Doctor of Philosophy degree in industrial engineering and management in 2018 at the University of Oulu. She has been conducting multi-disciplinary research into the technical, business, and regulatory aspects of future mobile communication systems in close collaboration with industry, academia, and regulators for over two decades. Marja has coordinated several national research project consortia that have successfully demonstrated new technology including the world's first licensed shared access (LSA) spectrum sharing trials and the introduction of a new local 5G operator concept, which has become a reality in many countries. She has actively contributed to, and participated in, regulatory bodies at the national, European, and international levels. She also coordinated the preparation of twelve 6G White Papers at the 6G Flagship (the first White Papers on 6G in the world) and led the development of the White Paper on 6G Drivers and the UN Sustainable Development Goals. She has published 180+ scientific papers and prepared 160+ contributions to regulatory bodies.



Mark Rotter

Creating affordable access solutions for the unconnected

Mark develops innovative and affordable access solutions for organizations globally with a deep knowledge in Africa working with a variety of organizations including Vernonburg Group, Adaptrum, Microsoft, IDC and others. In Africa, Mark works with local operators, regulators and investors as well as innovation initiatives across Africa to help accelerate Africa's economic development and to improve effectiveness in achieving the goal of connecting the unconnected. We believe that African innovation should and does shape Africa's future. Mark has been responsible for commercial business functions such as business planning, operations and applying market insights in the IT and Telecommunications industries. Mark also has experience

in business performance management, managing large operating budgets, business consulting, management consulting, IT and technology management and strategy. In the ICT sector Mark has run projects in Telecommunications, Open Source, Software innovation, cloud and investment financing. In addition Mark has co-founded several startup organizations including a SME focused IT provider, a computer game marketing company and an IT solutions provider to local government.



Mei Lin Fung

Digital interdependence is reshaping human society and economies. Mei Lin works on ensuring people and stewarding our planet are at the center of the Internet which is becoming “the infrastructure that underlies all infrastructures.” As Chair of the People Centered Internet which she co-founded with Vint Cerf in 2015, she is building resilient communities with digital supply chains and finance, harnessing data so that all community members can thrive.

She served as Chair of the Core Planning Committee for Douglas Engelbart, the inventor of the Computer Mouse. As Socio-Technical lead for Federal Health Futures at the US Department of Defense, she served as a subject matter expert for Networked Communities.

She “god-mothered” the development of CRM, Customer Relationship Management first at Oracle under Tom Siebel’s leadership from 1989-1991, then as CRM thought leader with CRMTalk, an online community that grew from 0 to 300,000 in 1 year in the mid-1990s. Realizing current practices for tech were leading to increasing harm to her interest in the design of people-centered eco-systems led her to co-found the People-Centered Internet with Vint Cerf, building relationships with the IEEE, World Economic Forum, the World Bank, UN, Salesforce, Microsoft, Google, Amazon, MasterCard, SAP, and others.

Mei Lin is active as a Senior Member of the IEEE serving on the Executive Committee of the Humanitarian Activities Committee (HAC) and the Society for the Social Implications of Technology (SSIT) where she chairs the Sustainability Technical Committee. She serves on the advisory council of Govstack, a UN initiative to develop common technology building blocks for digital government services. Mei Lin is a Singaporean citizen who has lived in the US since 1982. She was recently named the Hasso Plattner Institute Fellow, distinguished recipients of this award include Angela Merkel, Vint Cerf, and Alan Kay.



Michael J. Oghia

Michael J. Oghia is a Belgrade-based consultant, editor, researcher, speaker, and ICT sustainability advocate working within the digital infrastructure, Internet governance, and media development ecosystems. He is a third culture kid (TCK) and a connector at heart with more than a decade of professional experience in conflict resolution, development, journalism & media, policy, and stakeholder engagement across five countries: The United States, Lebanon, India, Turkey, and Serbia. Michael also loathes referring to himself in third person.



Michel Castaldelli

Michel Castaldelli, Head of Connectivity Partnerships at Meta, has over twenty years' entrepreneurial experience launching his own companies, intrapreneurial experience driving innovation into the culture of large global organizations, and supporting start-ups. Being passionate about connecting the world, Michel has worked with the telecommunications industry practically from the beginning of his career, and presently drives partnerships and global business development activities with telecommunications vendors and system integrators for Meta Connectivity.

Prior to Meta he worked at Ericsson in different countries and roles as diverse as sales, business development, and strategy consulting; led start-ups (always telco-related) in Argentina, Brazil, Denmark, Mexico, and the US; headed the sales teams for Telecom Italia Mobile (TIM) value-added services group; and delivered many strategy consulting projects at KPMG Consulting and Edgecom AB (a Swedish telco strategy consulting boutique).

Michel's areas of expertise are business development, strategy, and financial modeling of telco-related business.

Based in the San Francisco Bay Area since 2014, during his free time, Michel enjoys hiking, biking, tennis, running multiple personal projects in home automation, IoT connectivity, data analysis using Python, stock trading and option hedging using technical analysis, cars and mechanics, photography, and playing the piano (poorly).



Mike Jensen

Mike Jensen co-started Canada's first non-profit internet service provider - [The Web](#) - in the mid 1980s, and helped found the Association for Progressive Communications (APC) in 1990. Mike is a nomadic South African who provides expertise in digital infrastructure technology and policy, having advised NGOs, governments and private companies on the deployment of internet infrastructure in over 45 countries in the last 30 years. In recognition of his contributions to the development of the Internet, he was inducted into the Internet Society's Internet Hall of Fame (IHOF) in 2017.



Mohamed-Slim Alouini, Ph.D.

Mohamed-Slim Alouini was born in Tunis, Tunisia. He received the Ph.D. degree in Electrical Engineering from the California Institute of Technology (Caltech) in 1998. He served as a faculty member at the University of Minnesota then in the Texas A&M University at Qatar before joining in 2009 the King Abdullah University of Science and Technology (KAUST) where he is now a Distinguished Professor of Electrical and Computer Engineering. Prof. Alouini is a Fellow of the IEEE and OPTICA (Formerly the Optical Society of America (OSA)). He is currently particularly interested in addressing the technical challenges associated with the uneven distribution, access to, and use of information and communication technologies in rural, low-income, disaster, and/or hard-to-reach areas.



Ramiro Jordan, Ph.D.

Dr. Ramiro Jordan is a scientist, innovator, educator, and entrepreneur. He is a member of the faculty of the Department of Electrical and Computer Engineering (ECE) at the University of New Mexico. Currently he is the Associate Dean of Engineering for Global Initiatives and Associate Chair of Electrical and Computer Engineering. His research activities include sustainability, Peace Engineering, smart grids, cognitive radio, multidimensional signal processing, and software development. He is the president of the International Federation of Engineering Education Societies (IFEES), and founder in 1990 of the Ibero-American Consortium for Science and Technology Education (ISTEC).



Revi Sterling, Ph.D.

Dr. Revi Sterling has worked for digital inclusion for 20+ years . Currently, she designs and manages gender and technology programs for USAID's Innovation, Technology, & Research Hub. Prior, Revi founded the first Information and Communications Technology for Development professional master's program in the United States at the University of Colorado Boulder. She also spent a decade at Microsoft Research, spearheading efforts in gender equity in computer science as well as working as a software engineer and program manager in the Emerging Technologies division. Revi holds a Ph.D. in Media, Technology, and Society from the University of Colorado at Boulder. She is the recipient of the Anita Borg Institute Women of Vision award for Social Impact and the 2019 Impact.Engineered Award for Women in Technology.



Rob McMahon, Ph.D.

Dr. Rob McMahon is an Associate Professor in the Media & Technology Studies Unit and the Department of Political Science in the Faculty of Arts at the University of Alberta in Canada. Prior to joining the University of Alberta in 2015, he worked as a postdoctoral researcher with the First Nations Innovation Project at the University of New Brunswick and co-founded the First Mile Connectivity Consortium (FMCC), a national nonprofit association of Indigenous technology organizations. In 2020, Dr. McMahon received the Killam Accelerator award from the University of Alberta. He is the co-director of the DigitalNWT project, which employs a co-creational approach to strengthen the foundation of community-based digital literacy in the Northwest Territories (NWT).



Satya N. Gupta, Ph.D.

An International expert in NGN technologies, Regulation, Interconnection and Broadband with 40 years' experience in all aspects of Telecom, including 25 years with Govt. and Regulator, Satya N. Gupta is publicly recognized as an Analyst, Author, Advocate and Advisor on ICT related Policies, Projects and Business. After his post-graduation from IISc. Bangalore, he joined ministry of Communication in 1981 and Ministry of railways in 1983 and arose to the level of Additional Secretary in the Govt. He is recipient of coveted Minister of Railways award for outstanding performance for the digitalisation project.

A triple master in Electronics Design Technology, IT Management and Telecom Policy and Regulation, he is globally known as "NGNguru" he is a trainer and coach for telecommunication technologies, policy and regulation and a Regulatory advocate. Author of "Everything over IP-All you want to know about NGN". He also authored a concept called "Job Factory- Converting Unemployment into Intrapreneurship". His recent research-based work, "Long Tail - Walking the Extra Mile on Rural Broadband Business", brings out the innovative business models for rural broadband connectivity. He has also established and mentoring a consulting startup named SAAM CorpAdvisors providing Govt. Affairs as Managed Service. He was also awarded Global Visionary Award by Vision World Academy in 2019 for his Mission for Rural Women Empowerment through

DigiGaon Job Factory Foundation, a Social Enterprise. Based on his above work on innovating a business model "Hotspots- as- Managed Service", he has been awarded PhD (HC) by Commonwealth Vocational University.

He is Honorary Secretary General of ITU-APT Foundation of India. Additionally, he is Vice-President and Trustee of PTCIF and Chairs BIF committee on Rural Digital Infrastructure. He founded NGN Forum in India to spread awareness and capacity building in the field of emerging technologies. As a member of Expert panel of Commonwealth Telecom Organisation, he conducts training programs in the areas of NGN Technologies, Broadband Policy and Regulation, Interconnection Costing in NGN Era, Spectrum Management, IPV6, Digital Transformation,, Blockchain and Blue-Ocean Strategy. He is first Indian recipient of IPv6 Hall of Fame Award-2019 by Global IPv6 Forum and also the Chairman of Bharat IPv6 Forum-Towards Atmanirbhar Connected Bharat.

Presently, he is working as Chairman, BLUETOWN, India & BIMSTEC, S. Asia to forge newer partnerships and "Making It Happen" the Vision of "Connecting the Unconnected people living in Rural areas of World".



Senka Hadzic, Ph.D.

Dr Senka Hadzic is a telecommunications engineer and ICT4D researcher with experience across multiple sectors including industry, academia, startups, and non profit organisations. She is a Senior Fellow at the Cape Town based think tank Research ICT Africa, and a Fellow with the CyberBRICS project hosted at the FGV Law School in Rio de Janeiro.

Dr Hadzic completed her PhD in Electronics and Telecommunications Engineering at the University of Aveiro (Portugal). Apart from her technical background and experience in telecom policy, her interests are ownership and business models for alternative connectivity solutions, their financial sustainability, and human centered approach to innovation.



Sharada Srinivasan

Sharada works at the Office of the Chief Economist, Infrastructure Vice-Presidency focusing on research at the intersection of digital technologies, public policy, and international development. She started at the Bank as a Young Professional supporting World Bank operations on digital infrastructure in South Asia and East Asia and the Pacific regions. In addition, she contributes to analytical and advisory work across Eastern Europe and Central Asia and Latin America and works on data governance issues globally. She has contributed to the World Development Report 2021 evaluating the effects of data infrastructure and on the enablers and safeguards for trusted data sharing. She is passionate about digital inclusion of women and marginalized communities more broadly, and is the co-author of the Digital Development Global Practice Gender Strategy.

Sharada Srinivasan joined the World Bank from the Center for Technology, Innovation and Competition, University of Pennsylvania where she served as a Research Fellow. At *1 World Connected*, a global research project, her research focused on the empirical validation of innovative initiatives that address supply-and demand-side challenges to improve broadband adoption globally. She has conducted fieldwork in rural Rwanda, India, and Vanuatu focused on understanding the link between digital infrastructure rollout and development outcomes. She was part of the EQUALS Research Coalition on Access, served on the IEEE Humanitarian Activities Committee's Assessment sub-committee and is part of the United Nations' Dynamic Coalition on Innovative Approaches to Connecting the Unconnected. In the past, she has engaged with regulatory barriers to Internet deployment in the developing world, cybersecurity and encryption policy in Europe, and debates around network neutrality and zero-rating while at the Global Public Policy Institute, Berlin, and the Centre for Internet and Society, Bangalore. She holds a Master of Public Policy from the National Law School of India University Bangalore, alongside an undergraduate degree in Electrical and Electronics Engineering.



Teddy Woodhouse

Teddy is the senior research manager for access and affordability at the Web Foundation and focuses his time on the Alliance for Affordable Internet's research program. He coordinates

A4AI's research projects, conducts original analysis and research to support the organisation's mission, and uses the team's insights as evidence for policy change.

He first joined the Foundation in early 2016 and has since helped co-author a number of publications, including the 2018–2020 Affordability Reports and From Luxury to Lifeline, A4AI's first study of device prices in low- and middle-income countries. Teddy holds an MA (Hons) in International Relations from the University of St Andrews and an MSc in Global Politics (Global Civil Society) from the London School of Economics.

CONNECTING THE UNCONNECTED VOLUNTEER CO-CHAIRS



Ashutosh Dutta

Ashutosh Dutta is senior scientist and 5G Chief Strategist at The Johns Hopkins University Applied Physics Laboratory (JHU/APL). He is also a JHU/APL Sabbatical Fellow and adjunct faculty at Johns Hopkins. He serves as the chairman for Electrical and Computer Engineering in the Department of Engineering for Professional Program at Johns Hopkins. IN)%%% &ELLOW, His career spans more than 30 years and includes positions as Director of Technology Security and Lead Member of Technical Staff at AT&T, CTO of Wireless for NIKSUN, Inc., Senior Scientist and Project Manager in Telcordia Research, Director of the Central Research Facility at Columbia University, adjunct faculty at NJIT, and Computer Engineer with TATA Motors.



Sudhir Dixit

Sudhir Dixit is a co-founder and Senior Fellow at the Basic Internet Foundation in Norway and heads its San Francisco office. He has more than 30 years of experience in computer networking and telecommunications and related fields. From 2015 to 2017 he was the CEO and Co-Founder of a start-up, Skydoot, Inc, in the cloud-based and collaboration space. From December 2013 to April 2015, he was a Distinguished Chief Technologist and CTO of the Communications and Media Services for the Americas Region of Hewlett-Packard Enterprise Services in Palo Alto, CA, and before that was the Director of Hewlett-Packard Labs India from September 2009. Prior to joining HP Labs Palo Alto, Dixit held a joint appointment with the Centre for Internet Excellence (CiE) and the Centre for Wireless Communications (CWC) at the University of Oulu, Finland. From 1996 to 2008, he held various positions with leading companies, such as BlackBerry, Nokia. From 1987 to 1996, he was at NYNEX Science and Technology and GTE Laboratories (both now Verizon Communications).

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