# UNIVERSITY OF OSLO

Tanzania School of Community Networks (TZSCN 2022)

# Sustainable Internet Connectivity Approaches for Communities, Schools, and Healthcare Facilities in the 21st Century

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# Mission

## Framework Conditions

## Partnerships

# Africa



https://
www.mylifeelsewhere.com/
country-size-comparison/
tanzania/norway

# How can we "Connect The Future"?



Josef Noll @josefnoll · Jun 2
Amazing opening by @ITU @ITUSecGen Houlin Zhao, setting the scene for connecting every single human by 2030, and @meilinfung, addressing the history of the Internet and #NRENs to connect schools. We're in @CateKimambo @RosalynnMworia @UcsafT @AheriNet @cisskisumu @WSISprocess
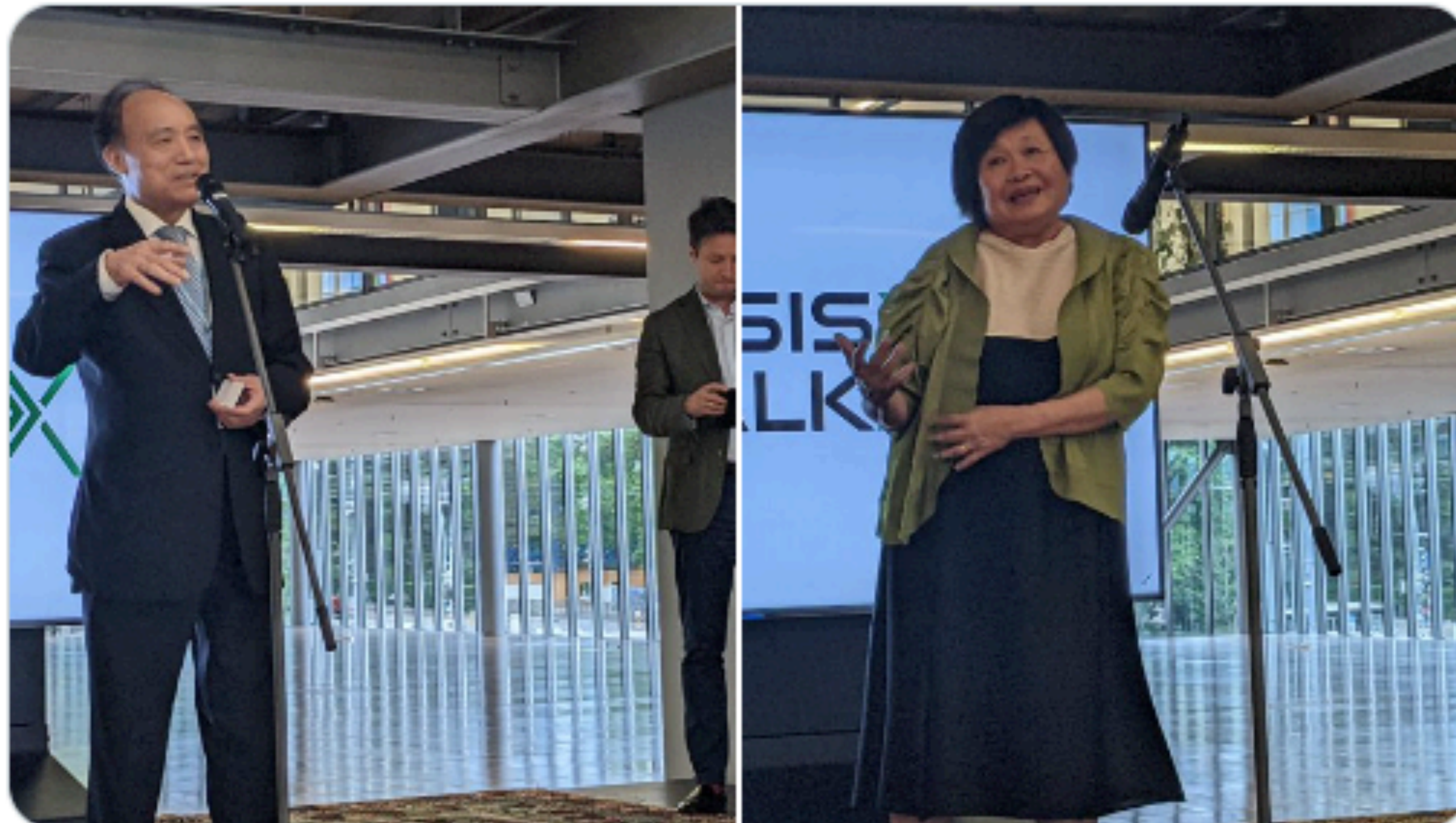
# Energy & Digital, enablers for the SDGs

**7 AFFORDABLE AND CLEAN ENERGY**

## People without electricity

SDG 7.1 calls for universal access to ···. energy by 2030

**1.2 billion** — 2010

**733 million** — 2020

**679 million** — 2030 (trend)

[WorldBank 2021]

https://www.worldbank.org/en/news/press-release/2021/06/07/report-universal-access-to-sustainable-energy-will-remain-elusive-without-addressing-inequalities

**9 INDUSTRY, INNOVATION AND INFRASTRUCTURE**

## People not using Internet

SDG 9c calls for universal, affordable internet access by 2020

**4.9 billion** — 2010

**2.9 billion** — *2021* — 96% in dev countries
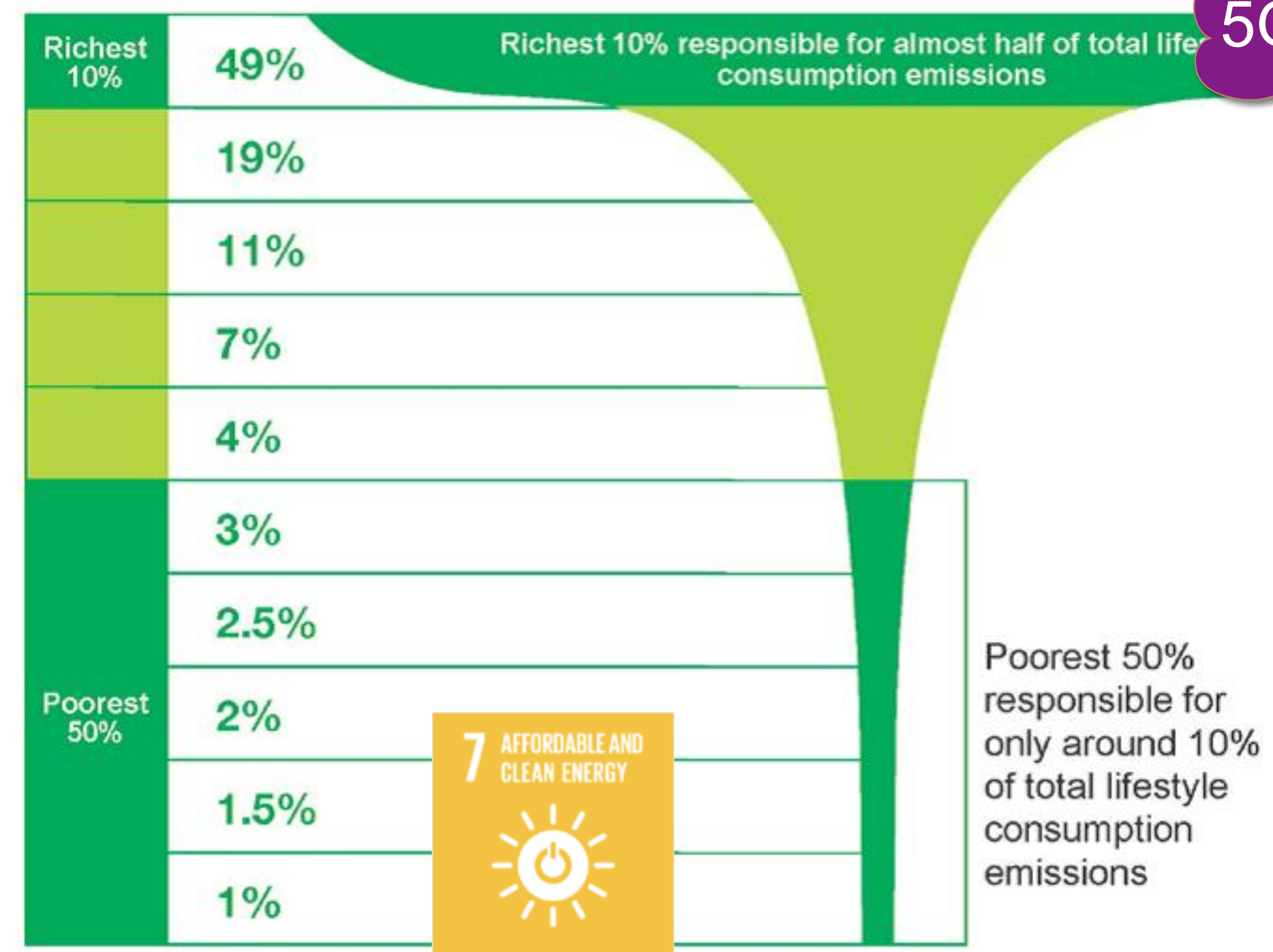
**0 billion** — 2030 (hope)

WSIS Forum 2022

[ITU 2010, 2021]

https://www.itu.int/hub/2021/11/facts-and-figures-2021-2-9-billion-people-still-offline/

# Inequality in Energy & Digital Access

## Percentage of CO₂ emissions by world population

World population arranged by income (deciles)

| Richest 10% | 49% | Richest 10% responsible for almost half of total lifestyle consumption emissions |
| | 19% | |
| | 11% | |
| | 7% | |
| | 4% | |
| | 3% | |
| | 2.5% | |
| Poorest 50% | 2% | Poorest 50% responsible for only around 10% of total lifestyle consumption emissions |
| | 1.5% | |
| | 1% | |

5G,6G

7 AFFORDABLE AND CLEAN ENERGY

[Source: Oxfam.org, 2015]

## 9% NATIONAL ASSESSMENT FOR MEANINGFUL CONNECTIVITY
(2021, BASED ON PILLARS' AVERAGE)

**3%** ESTIMATED TO HAVE 4G SPEEDS

**15%** ESTIMATED TO OWN A SMARTPHONE

**7%** ESTIMATED WITH UNLIMITED ACCESS

**10%** ESTIMATED TO HAVE DAILY INTERNET USE

9 INDUSTRY, INNOVATION AND INFRASTRUCTURE

[https://webfoundation.org/docs/2022/02/MC_Rwanda_FS_Screen_V1.pdf]

"Our mission is
to improve the life of **every human**
through **access to basic information** on the
Internet…."

"This mission is carrying us forward every single day.
We **solved** the **challenge of access**, and are focusing now the
**local Knowledge Portal** to **empower** individuals, societies and
nations. Through **free access** to the portal we address **access,
skills, regulations and inclusion**"

**Mission**

**Framework Conditions**

**Partnerships**

# The Game Changer

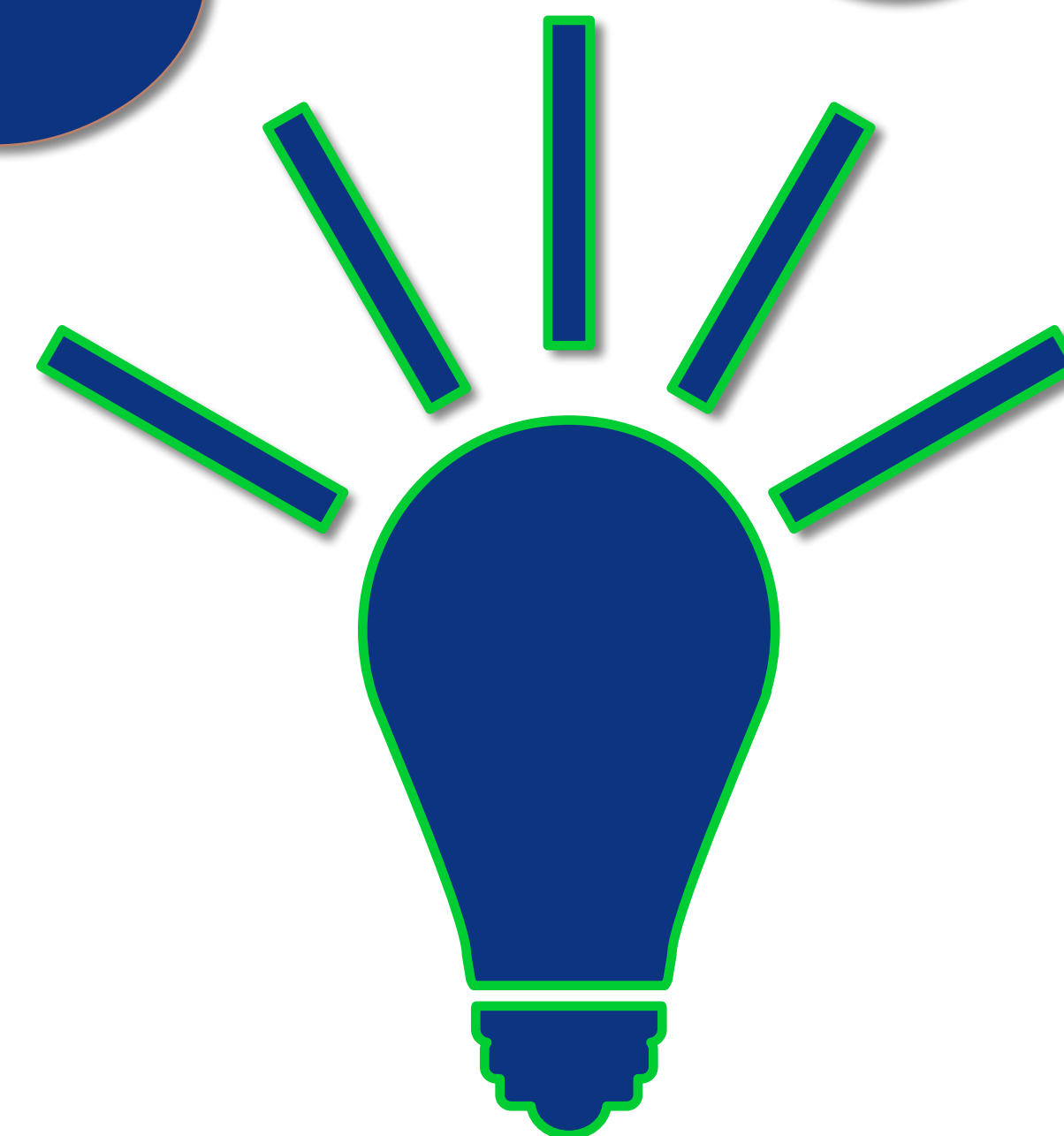105 schools

(Q2.2022)

77 632 students

(Q2.2022)

Participation in the Internet Society

Changing the lives of many

USD 1800 per school

ready installed

# Histories



"My mobile is more important than a weapon"

Head of Mbaash, TZ

Catherine R Kimambo connecting her first village

https://vimeo.com/368147538 - 2020

Mount Kenya - our cultural heritage

Usingo Secondary School, KE

# Scalable connectivity
## for meaningful access
## tailored towards the needs & capabilities

Self-actualisation
Entertainment

Empowerment, Work
Digital Transformation

Explore, Affection
Opportunities

Value creation
Trust & confidence

Mobile Broadband
20 USD/month/person

Community network
50-100 Mbps
200-500 USD/month

Narrowband
~5 Mbps
58 USD/month

InfoSpot
10 GB/month
<20 USD/month

# Framework Conditions
# - the Integrated Approach

## Access

## Skills

## Regulations

## Inclusion

- Wireless information spot
- Rural areas

- Decentralised Internet
- Local School Server
- Trusted information

- Authority contacts
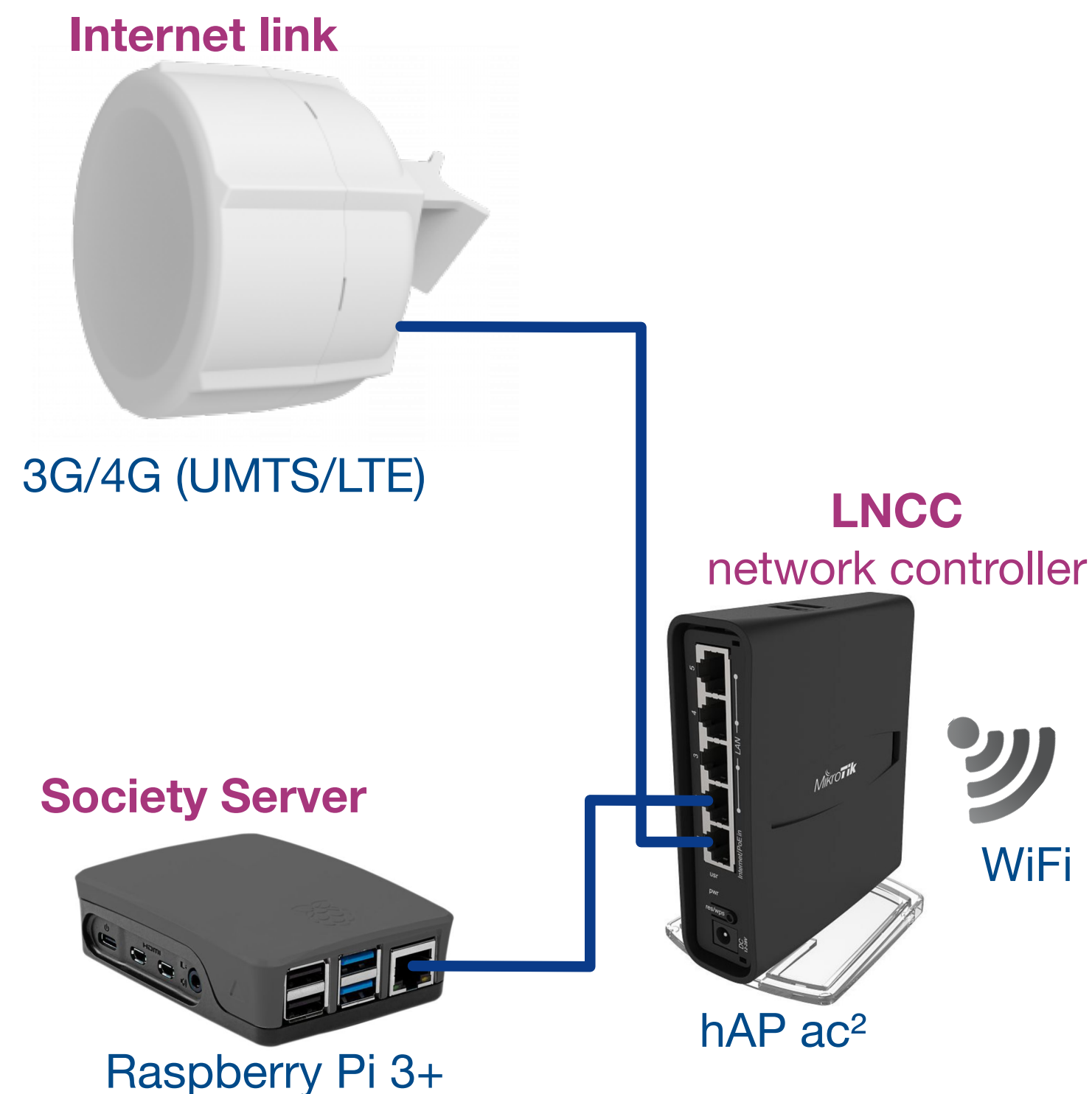- Internet Lite
- Freemium (free + premium) model

- Girls & women
- Special Needs

# Solving the Access

➡ wireless information spot (InfoSpot)

➡ Reaching out >20 km to mobile network

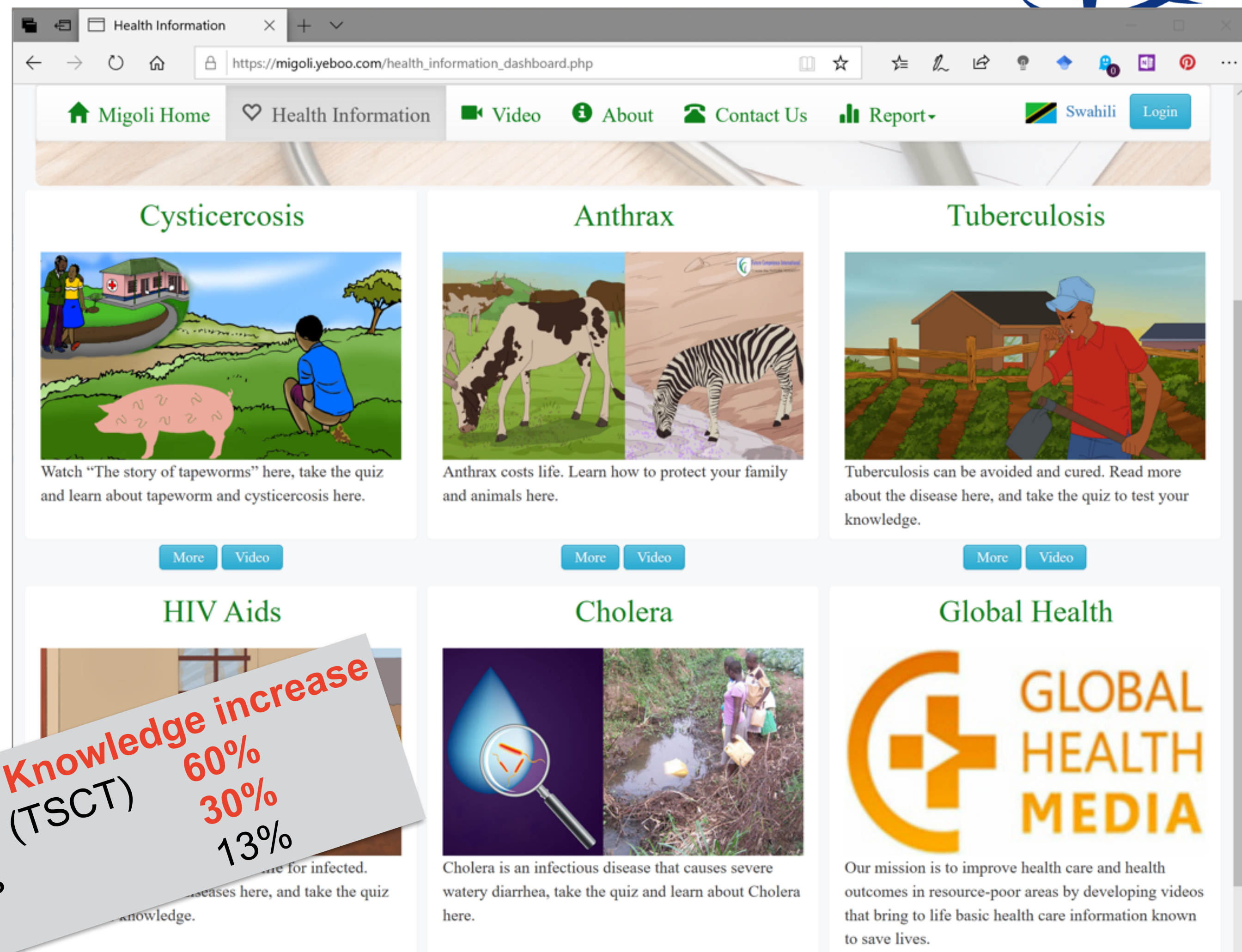➡ Affordable solution: OPEX <20 USD/ month

**Internet link**

3G/4G (UMTS/LTE)

**LNCC**
network controller

WiFi

**Society Server**

Raspberry Pi 3+

hAP ac²

# School server: yeboo.com
## Example: Health package

School server with locally stored information on health care etc.



Health Information

https://migoli.yeboo.com/health_information_dashboard.php

🏠 Migoli Home  ♡ Health Information  🎥 Video  ℹ️ About  ☎ Contact Us  📊 Report  Swahili  Login

**Cysticercosis**

Watch "The story of tapeworms" here, take the quiz and learn about tapeworm and cysticercosis here.

More  Video

**Anthrax**

Anthrax costs life. Learn how to protect your family and animals here.

More  Video

**Tuberculosis**

Tuberculosis can be avoided and cured. Read more about the disease here, and take the quiz to test your knowledge.

More  Video

**HIV Aids**

...re for infected. ...seases here, and take the quiz ...knowledge.

**Cholera**

Cholera is an infectious disease that causes severe watery diarrhea, take the quiz and learn about Cholera here.

**Global Health**

GLOBAL HEALTH MEDIA

Our mission is to improve health care and health outcomes in resource-poor areas by developing videos that bring to life basic health care information known to save lives.

Results in TZ: **Knowledge increase**
Cysticercosis (TSCT)    **60%**
Tuberculosis    **30%**
HIV/AIDS    13%

# Our Goal



2 000 schools
1 820 000 students
Q4.2024

1100 USD/installation
0.6 $/student

105 schools
77 632 students
Q4.2022

1800 USD/installation

55 schools
37 632 students
Q4.2021

2500 USD/installation
4 $/student

10 schools
10 131 students
Q1.2021

3 000 USD/installation
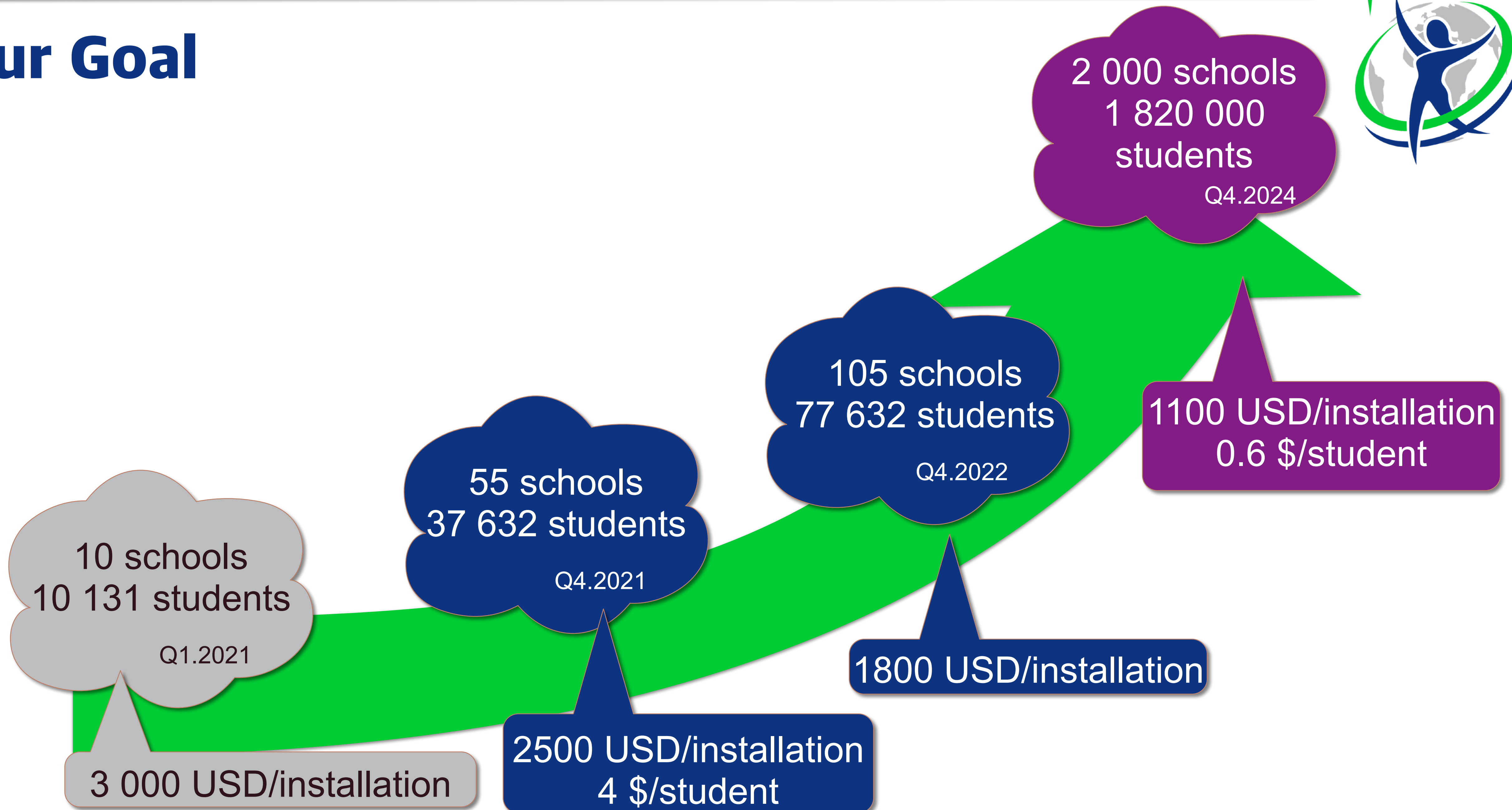
# Scale-up Tanzania
# Catherine connects schools



10 schools in Mar2021
10.131 students connected
427 teachers connected
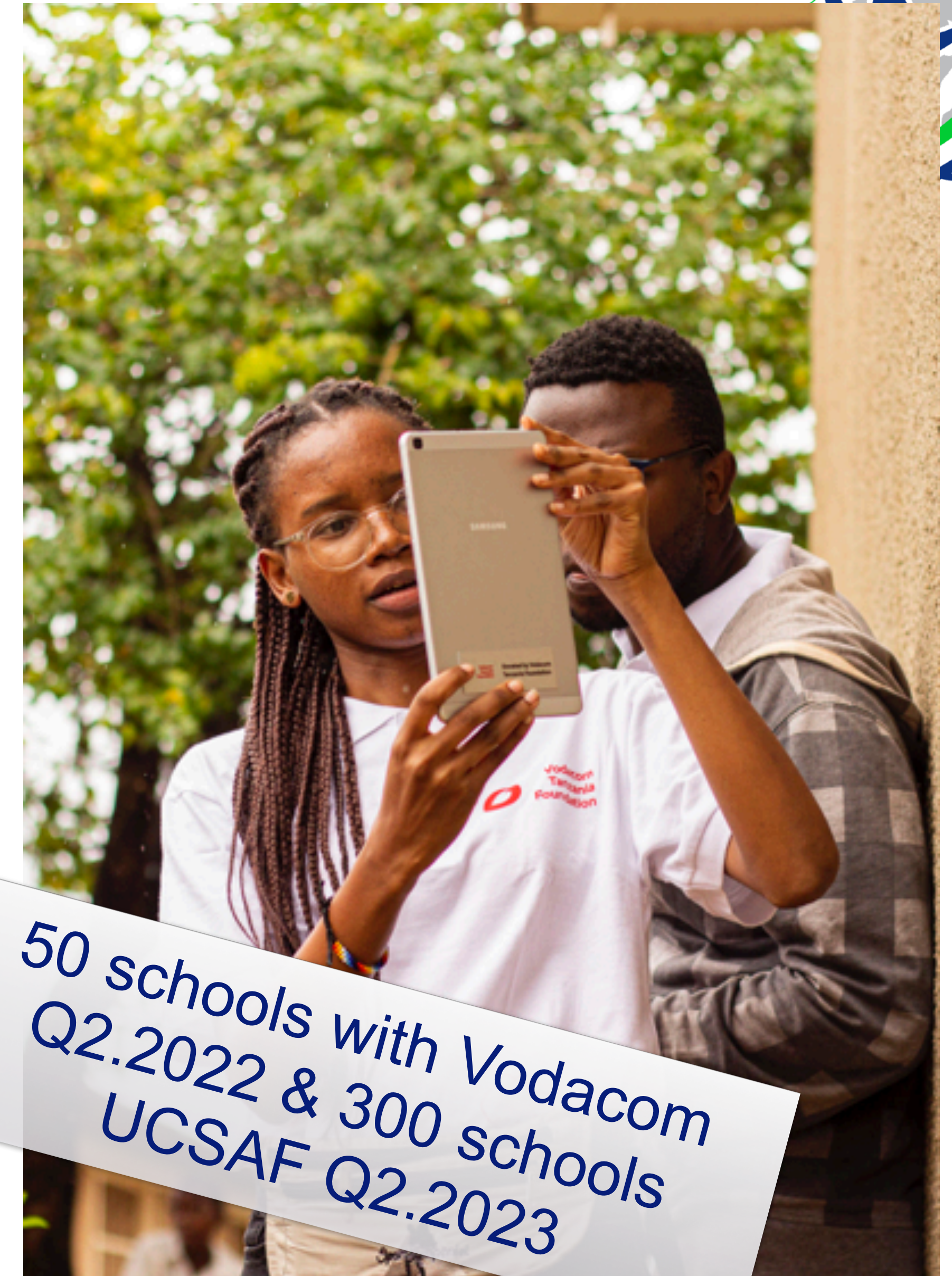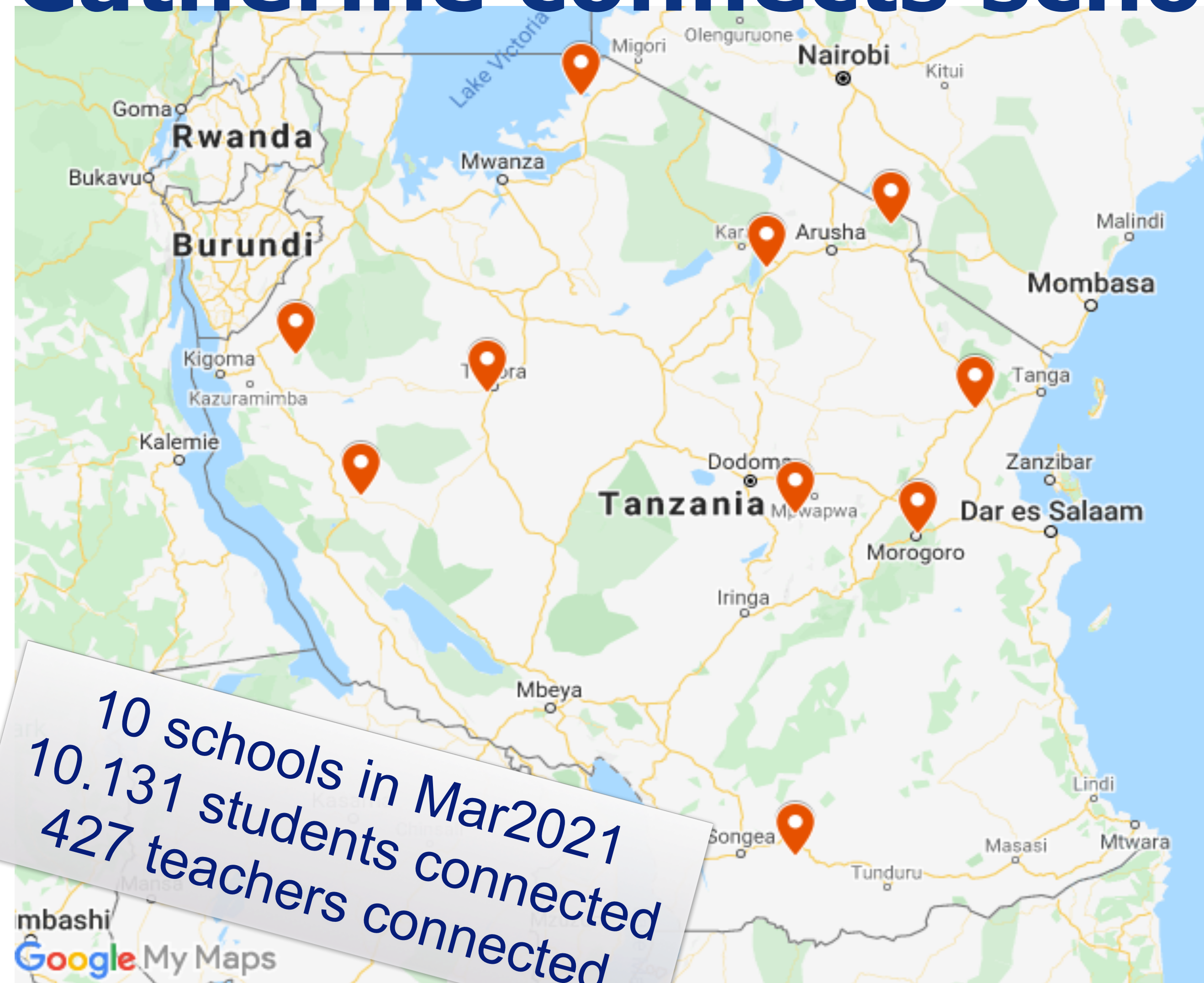
50 schools with Vodacom
Q2.2022 & 300 schools
UCSAF Q2.2023

# 14 countries in Africa



Ethiopia:
Koye Secondary School


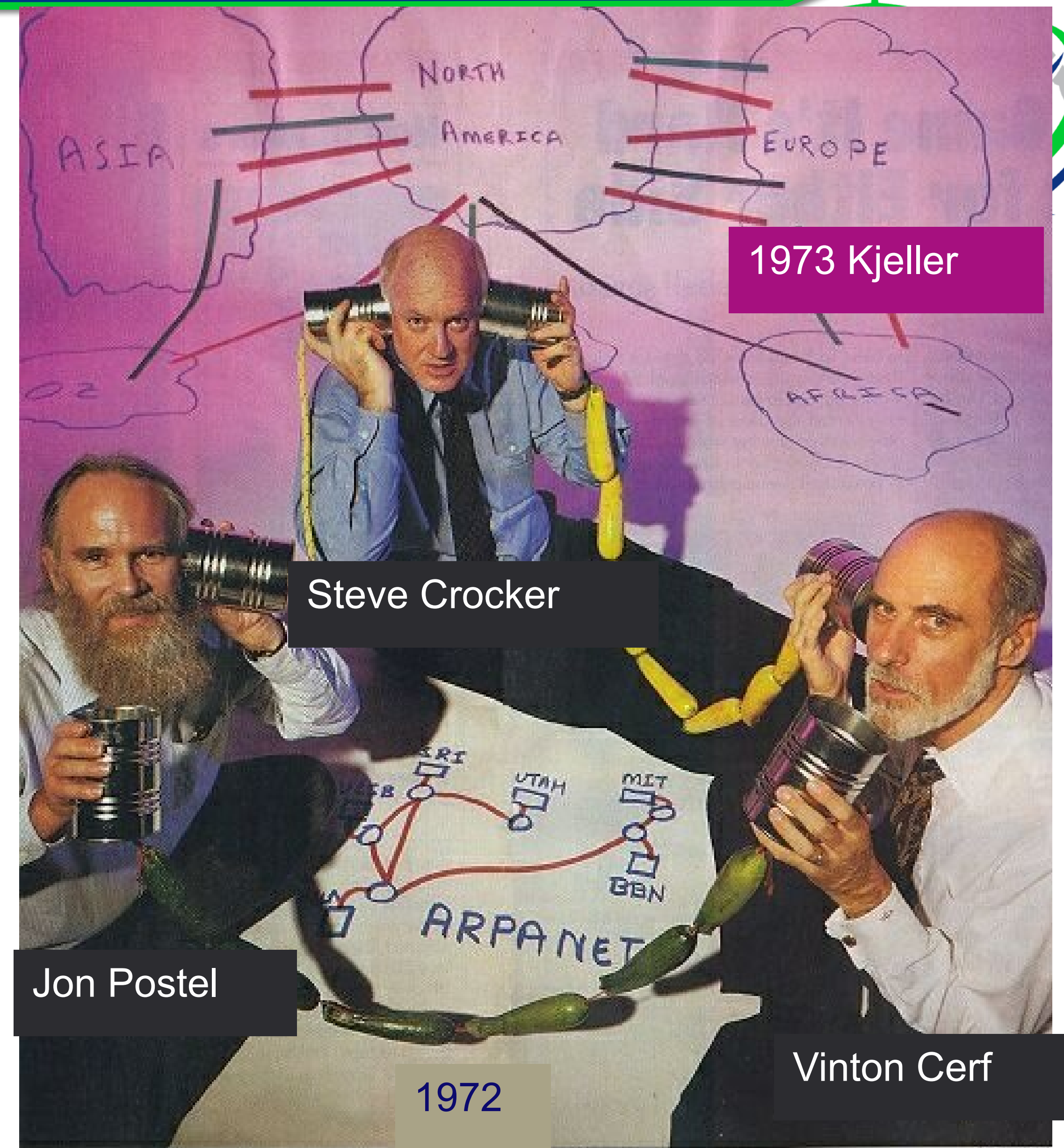
Tanzania:
scale up to
360 schools

# Sustainability Internet

➡ Stable equipment (and network provision)

➡ Affordable costs, value for money

➡ Trouble shooting: why is my network not working?
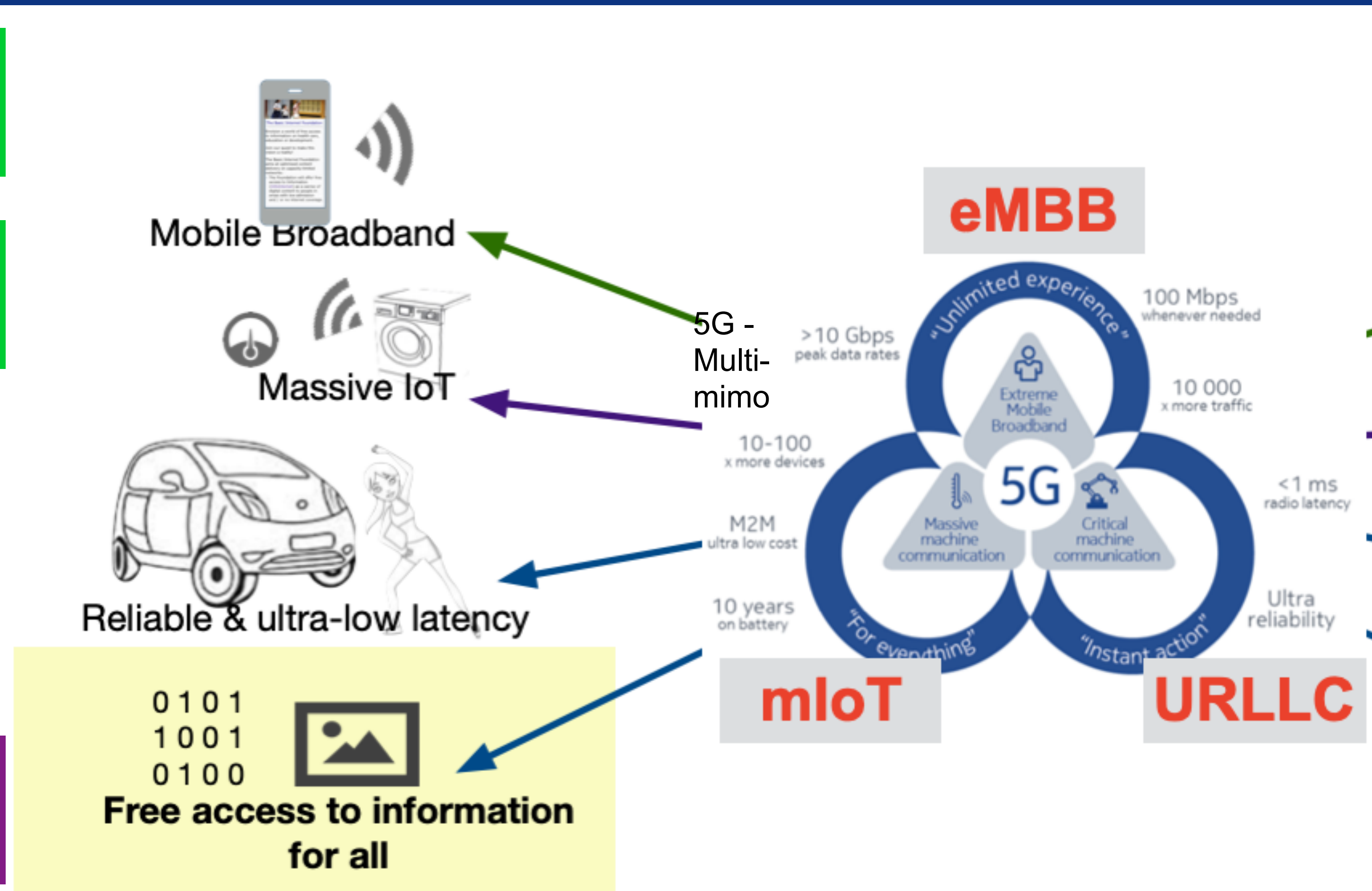
➡ Content locally available



Mouse, Keyboard

power - MicroUSB

HDMI

# An inclusive
# Next Generation Internet

1973 Kjeller

1973: Internet to Kjeller/Europe

**Yngvar Lundh**  **Pål Spilling**

Norge
Norway

1994: Opera Software

Kjeller

2014:

Basic Internet
FOUNDATION
Connect The Future

KJELLER
INNOVASJON

Steve Crocker

Jon Postel

Vinton Cerf

1972

Source: http://www.michaelkaul.de/History/history.html

# What do we need to change?

**Road model: pedestrians & cyclists**

**Internet: text & pictures**

**Internet Lite**

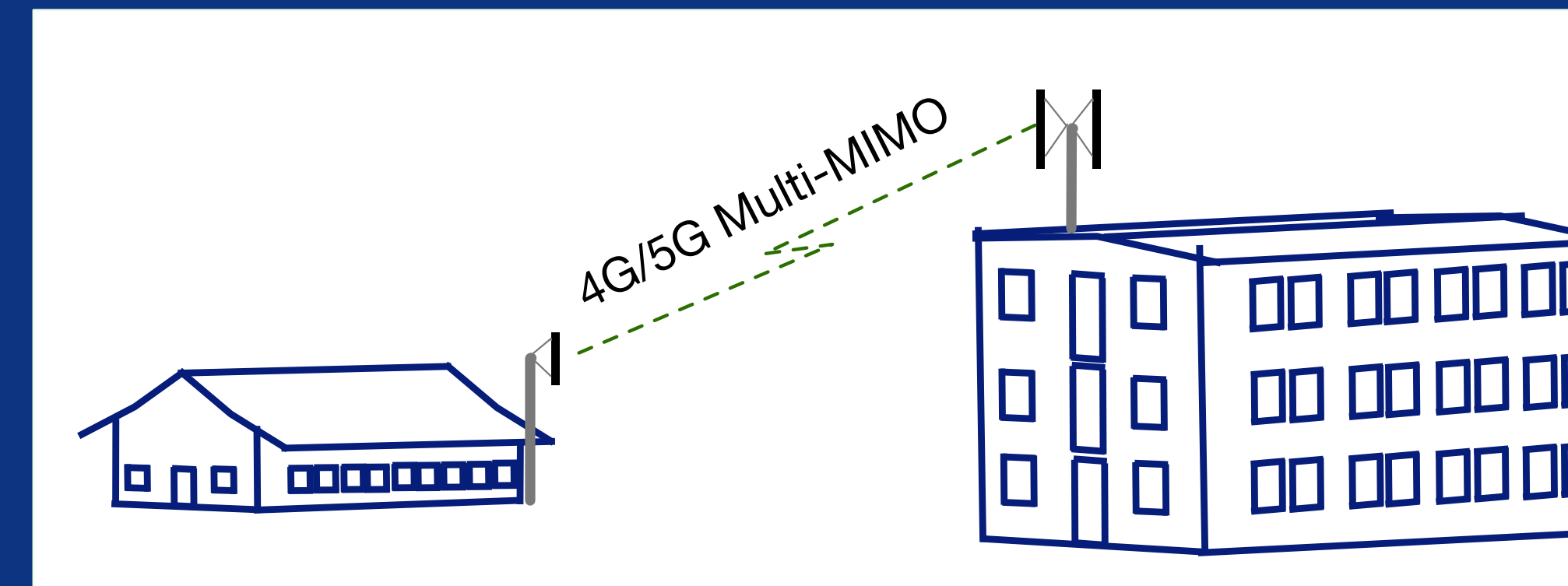# AfricaConnect3 and the role of Universities

UbuntuNet Alliance

WACREN

ASREN
Arab States Research and Education Network

GÉANT

- **Research for the (digital) Society**
- **Competence for the Digital Transformation**
- **Connect Schools & unconnected Communities practical experiences**
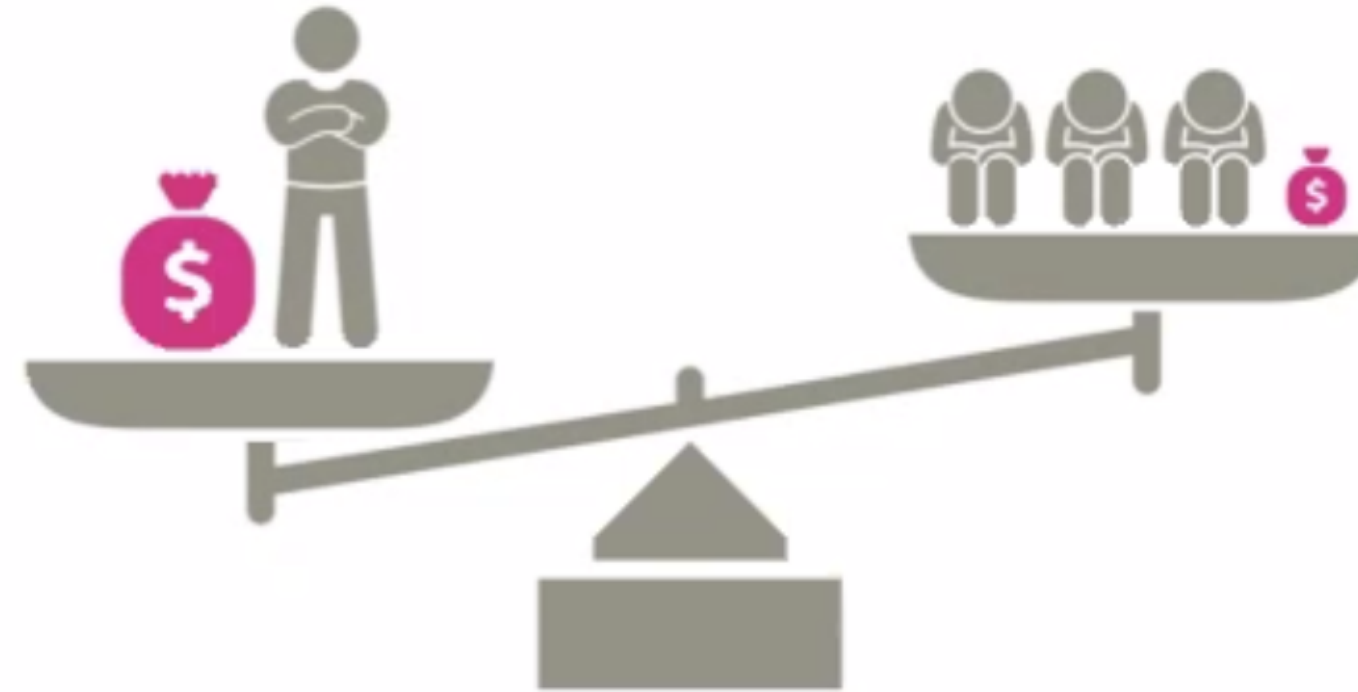- **Real world search based on needs from the communities**

4G/5G Multi-MIMO

# COVID-19 HAS LED TO THE
# FIRST RISE IN EXTREME POVERTY
# IN A GENERATION

AN ADDITIONAL **119-124 MILLION PEOPLE** WERE PUSHED BACK INTO **EXTREME POVERTY** IN **2020**

THE PANDEMIC IS LIKELY TO REVERSE PROGRESS MADE IN REDUCING INCOME INEQUALITY SINCE THE FINANCIAL CRISIS

— COVID-19 —
ESTIMATED TO INCREASE THE AVERAGE GINI FOR EMERGING MARKET AND DEVELOPING COUNTRIES BY 6%

The Sustainable Development Goals Report
**2021**

## THE PANDEMIC
HAS LED TO THE LOSS OF THE EQUIVALENT OF
**255 MILLION FULL-TIME JOBS**

ABOUT **4X** THE NUMBER LOST DURING THE GLOBAL FINANCIAL CRISIS (2007-2009)

— COVID-19 —
## HAS WIPED OUT 20 YEARS OF EDUCATION GAINS

AN ADDITIONAL **101 MILLION** OR **9% OF CHILDREN** IN GRADES 1 THROUGH 8 **FELL BELOW** MINIMUM READING PROFICIENCY LEVELS IN 2020

## ECONOMIC RECOVERY — IS UNDER WAY

GLOBAL REAL GDP PER CAPITA
(2017-2022)

2.2          -4.6          3.1

2017     2020  2021  2022
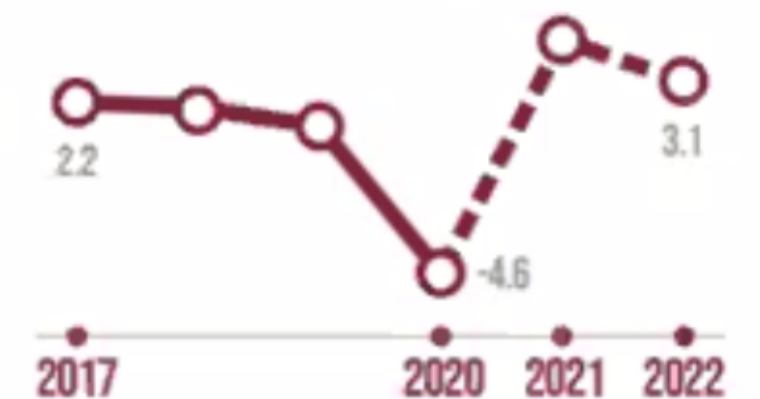
BUT FOR MANY COUNTRIES, ECONOMIC GROWTH IS EXPECTED TO RETURN TO PRE-PANDEMIC LEVELS ONLY IN **2022 OR 2023**

# Conclusion
# Partnership for Sustainable Internet Connectivity

**2 000 schools
1 820 000
students**

Q4.2024

➡️ Universities

- Real-world knowledge
- Decentralised, empower the communities
- Knowledge4Africa, 5GforPeople

➡️ Community Networks

- extension of NRENs?

➡️ Commercial actors

- Mobile operators: Research with 5G as backbone
- ISPs, satellite

➡️ Government, ITU, UNICEF, UNESCO, …

- Framework conditions (spectrum, Internet Lite)