



UiO  **Department of Technology Systems**  
University of Oslo

**Elektrofagdag OsloMet - 30Oct2020**

# **Digitaliseringens bidrag til en bærekraftig utvikling og klimautfordringer**

Prof. Dr. Josef Noll

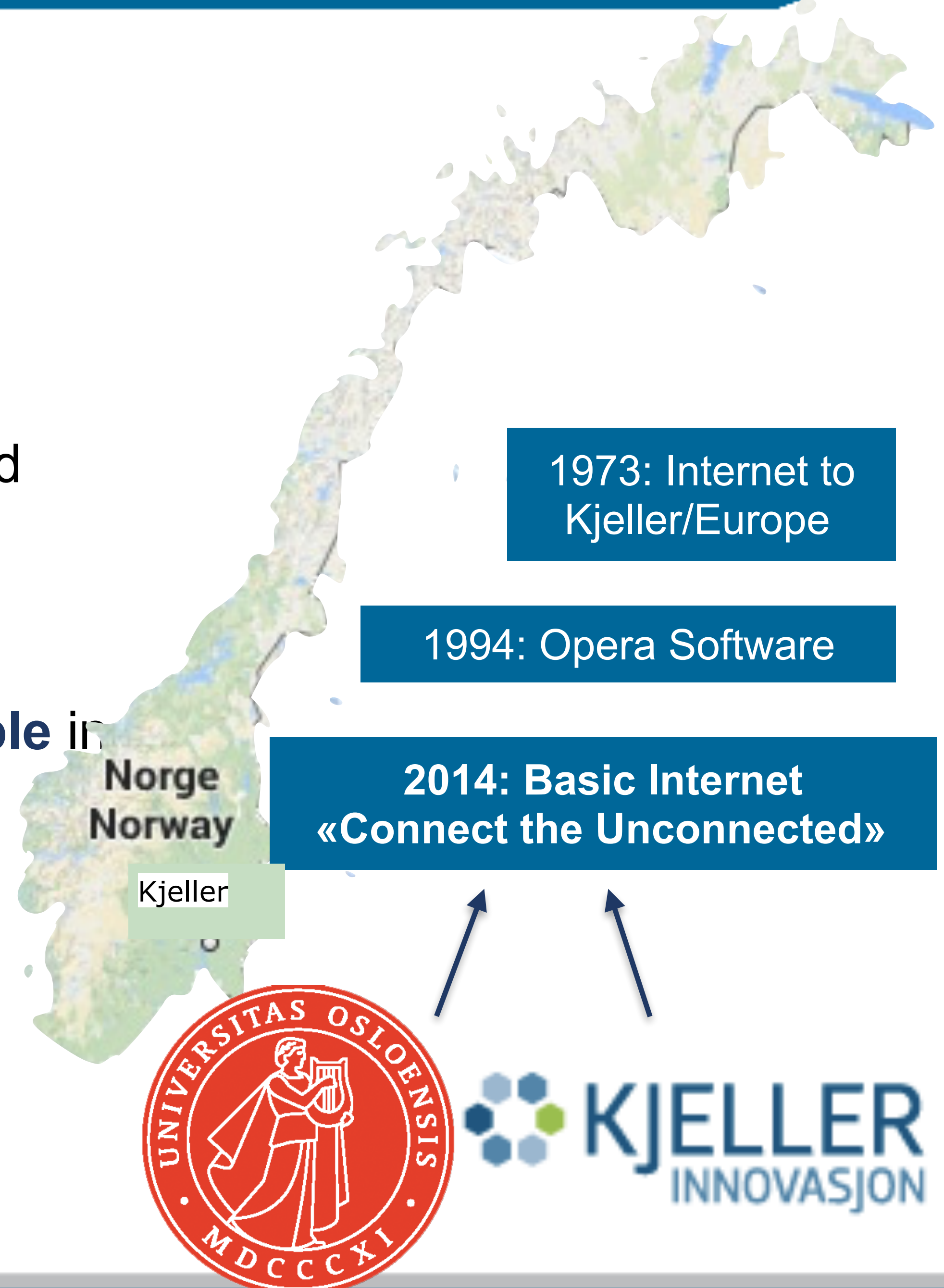
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# About the Basic Internet Foundation

- **Information** is the **basis** for **education, health** and entrepreneurship
- **Digitalisation** is the engine of **economic growth** and wellbeing of people
- Sustainable development requires **digital inclusion**, which necessitates Internet for all
- **Impact** lives of the **unconnected** 3.5 billions of **people** in world
  
- **University of Oslo (UiO/UNIK)** and **Kjeller Innovation** co-founded the Basic Internet Foundation
  - “**Internet Lite for all**”
  - free access to information for all



# United Nations Sustainable Development Goals

|   |  |   |  |   |   |
|---|--|---|--|---|---|
| <b>1</b> NO POVERTY<br>                    | <b>2</b> ZERO HUNGER<br>                       | <b>3</b> GOOD HEALTH AND WELL-BEING<br>                | <b>4</b> QUALITY EDUCATION<br>                        | <b>5</b> GENDER EQUALITY<br>                       | <b>6</b> CLEAN WATER AND SANITATION<br>                      |
| <b>7</b> AFFORDABLE AND CLEAN ENERGY<br> | <b>8</b> DECENT WORK AND ECONOMIC GROWTH<br> | <b>9</b> INDUSTRY, INNOVATION AND INFRASTRUCTURE<br> | <b>10</b> REDUCED INEQUALITIES<br>                  | <b>11</b> SUSTAINABLE CITIES AND COMMUNITIES<br> | <b>12</b> RESPONSIBLE CONSUMPTION AND PRODUCTION<br>       |
| <b>13</b> CLIMATE ACTION<br>             | <b>14</b> LIFE BELOW WATER<br>               | <b>15</b> LIFE ON LAND<br>                           | <b>16</b> PEACE AND JUSTICE STRONG INSTITUTIONS<br> | <b>17</b> PARTNERSHIPS FOR THE GOALS<br>         | <br><b>THE GLOBAL GOALS</b><br>For Sustainable Development |

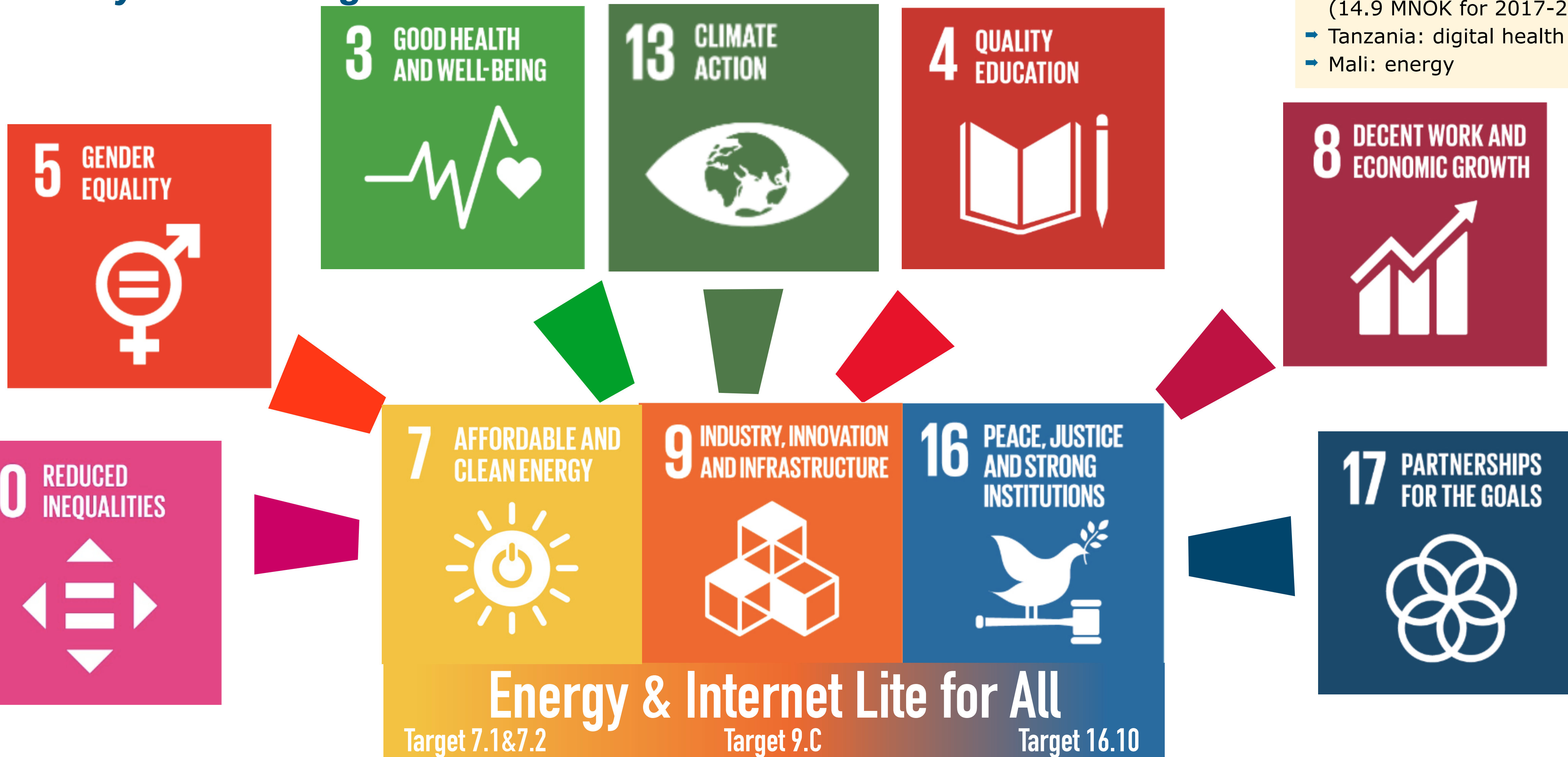


# Affordable Energy & Internet Lite for All

*the catalysts for the goals*

Showcase  
 “Non discriminating access”  
 project

- funded by RCN and Mfa/Norad (14.9 MNOK for 2017-2020)
- Tanzania: digital health
- Mali: energy





# SDGs addressed by B5G and 6G



## → SDG 9.C:

**Significantly increase access to information** and communications technology and strive to **provide universal** and **affordable access** to the Internet in least developed countries **by 2020**

## → SDG 16.10:

**Ensure public access to information** and protect fundamental freedoms, in accordance with national legislation and international agreements with

- 16.10.2 Number of Countries that adopt and implement constitutional, statutory and/or policy guarantees for **public access to information**.

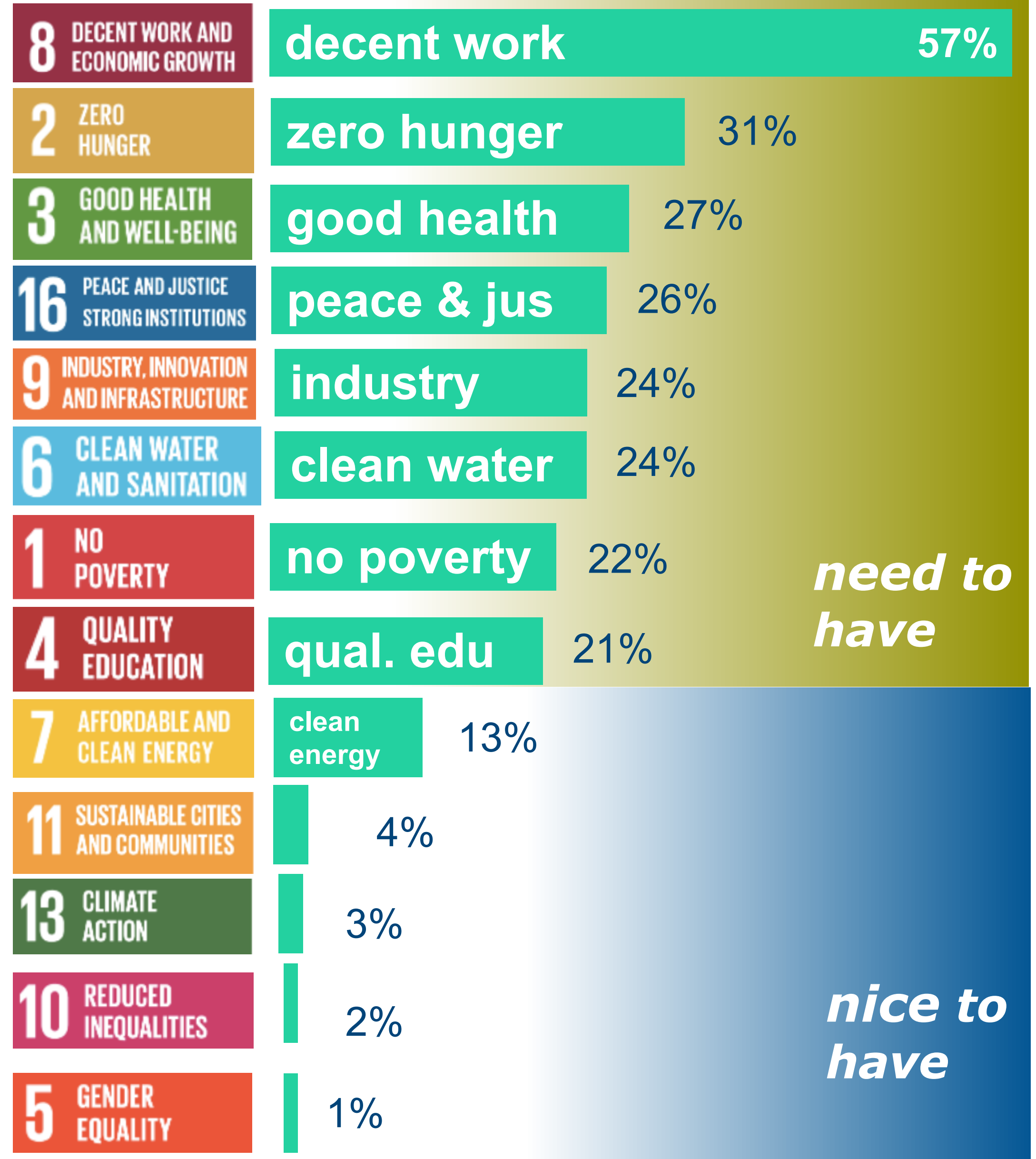
- SDG 7.1 By 2030, ensure **universal access** to affordable, reliable, and **modern energy** services
- SDG 7.2 Increase substantially the **share of renewable energy** in the global energy mix by 2030
- 7.b By 2030, expand infrastructure and **upgrade technology** for supplying **modern and sustainable energy** services for all in developing countries, particularly LDCs and SIDS



# Public Opinion on SDGs (afrobarometer.org)

→ Priorities by people in Africa

- decent work
- zero hunger
- good health
- ...





# Public Opinion on 5G

- 5G - opinion by people
  - convenience <-> privacy,
  - national competitiveness <-> national security
  - speed <-> price
- need to have? 0% ?
- nice to have? 5% ?
- Opinion: no contribution to SDGs

<https://www.politico.com/news/agenda/2020/02/25/poll-5g-what-do-people-really-w>

## The 5G World: What People Care About

The coming fast wireless network will require policy tradeoffs, from convenience to national security. In a new survey, we asked citizens what they really value.



Illustration by Sam Chivers | Graphics by Andrew McGill

By JOHN HENDEL

02/25/2020 04:30 AM EST



**A**round the world, 5G is a buzzword, a sales pitch—and, increasingly, a policy challenge.



# Reality of the Digital Divide

## → “Boys have the toys”

- digital divide in both devices
  - Example Smartphone ownership: 33% male, 16% female (Bangladesh)
- mobile broadband access

## → Costs of Access

- School connectivity (SDG indicator 4.A.1)
  - TZ: ~3% of schools are connected to Internet
- Digital Health for primary health facilities
  - <1% of primary health facilities have Internet (TZ)
- Community involvement/digital transformation

“Internet had the ability to dismantle the divide. Internet failed miserably, the divide is bigger than ever.”  
Kate Gilmore, Human Rights, UNO

CAPEX

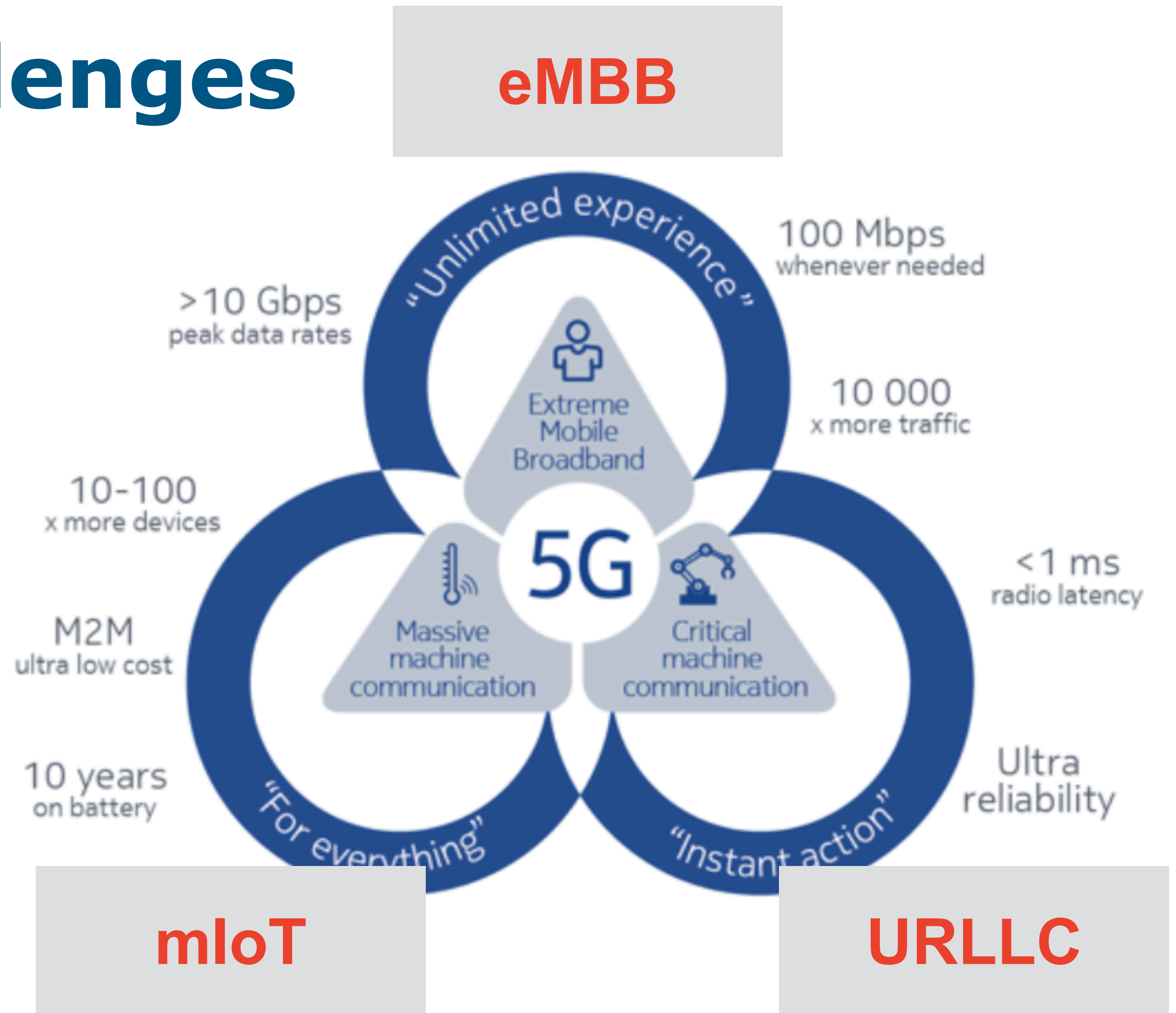
OPEX





# 5G: Industrial Challenges

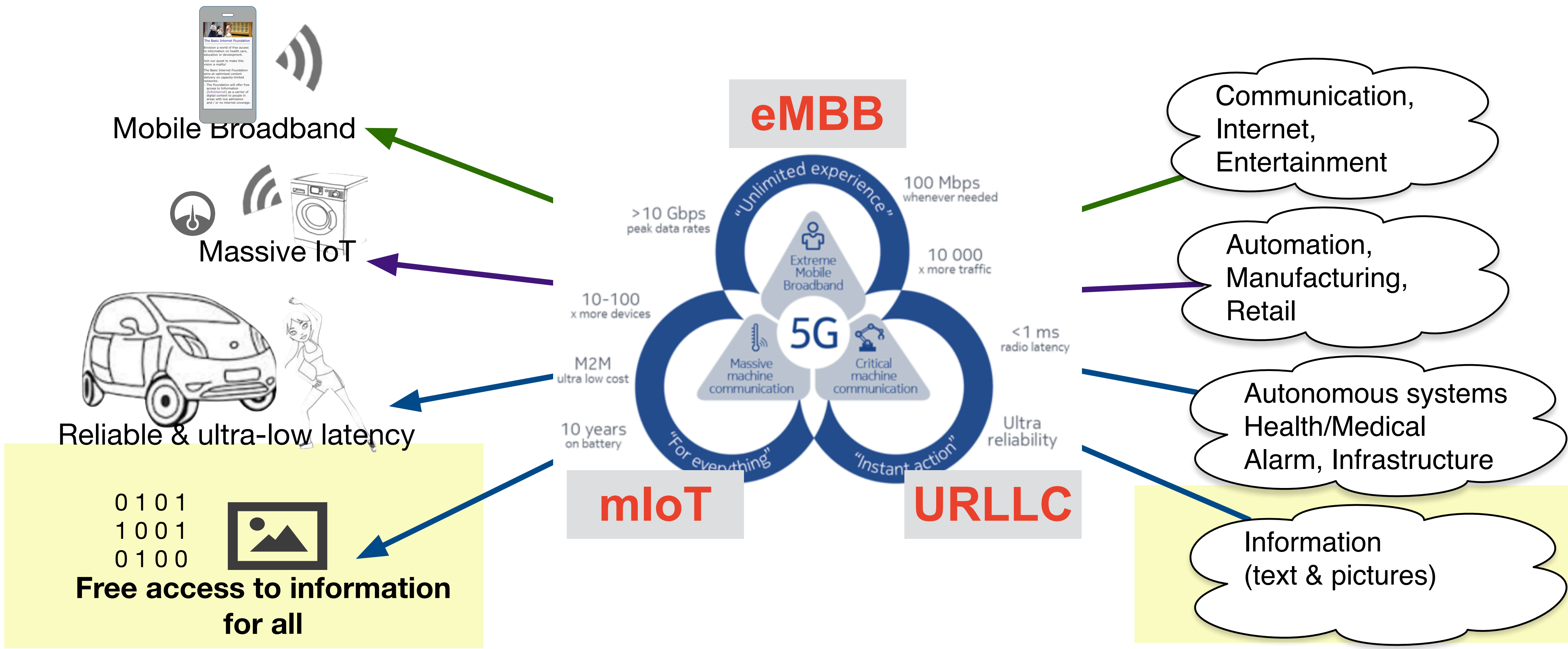
- enhances Mobile Broadband
- massive IoT
- ultra Reliable, Low Latency communication



[source: Nokia <https://networks.nokia.com/5g/get-ready>]



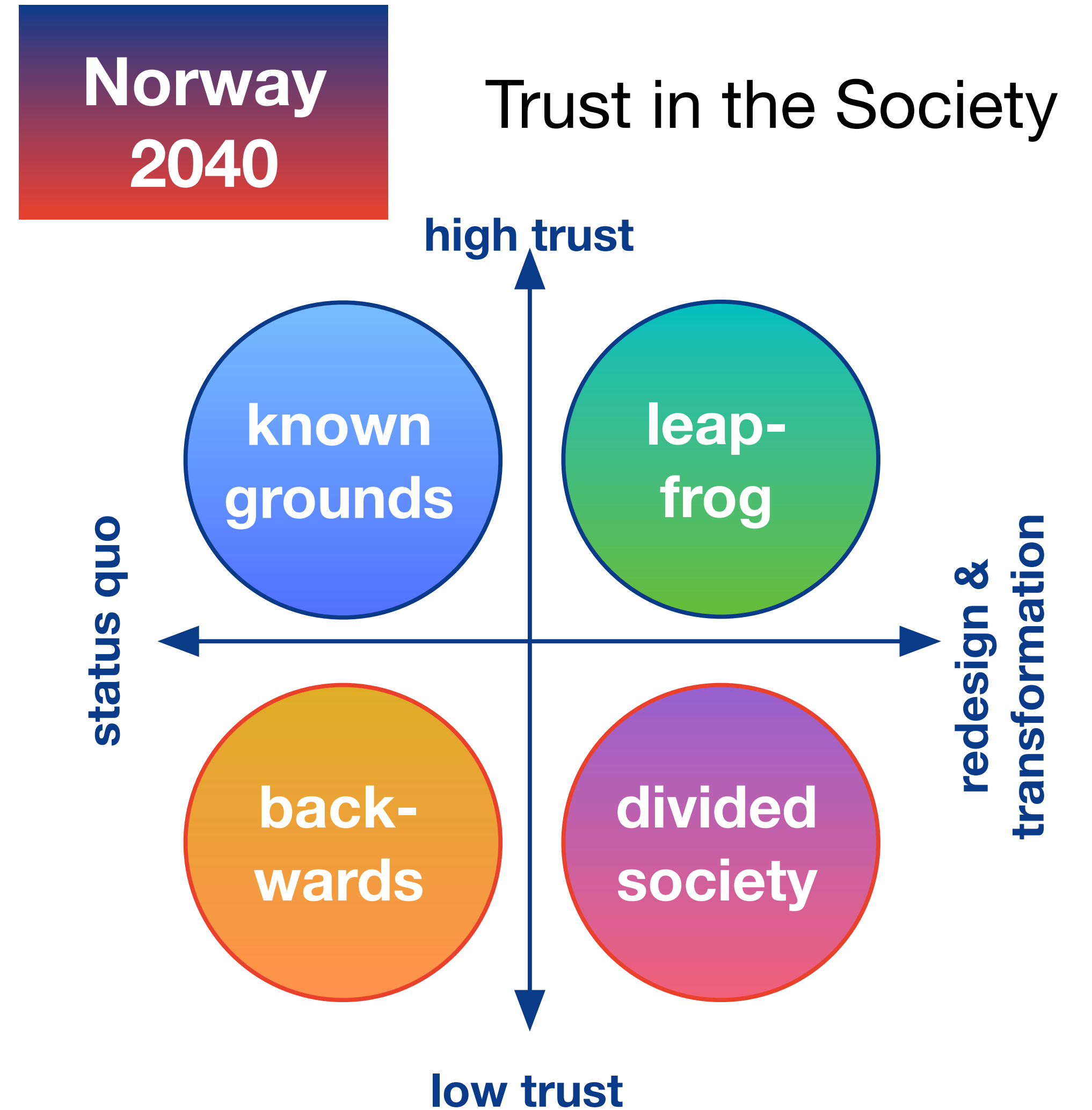
# 5G network slicing for Free Access to Information for All





## The main reasons for 6G

- Societal Security
- Trust in Society
- 6G and SDGs



6G

**Marja Matinmikko-Blue:** Overview of new 6G white papers

**Volker Ziegler:** 6G technology and architecture – unify experience across the worlds

**Josef Noll:** Digital inclusion and the freemium model for access to information for all

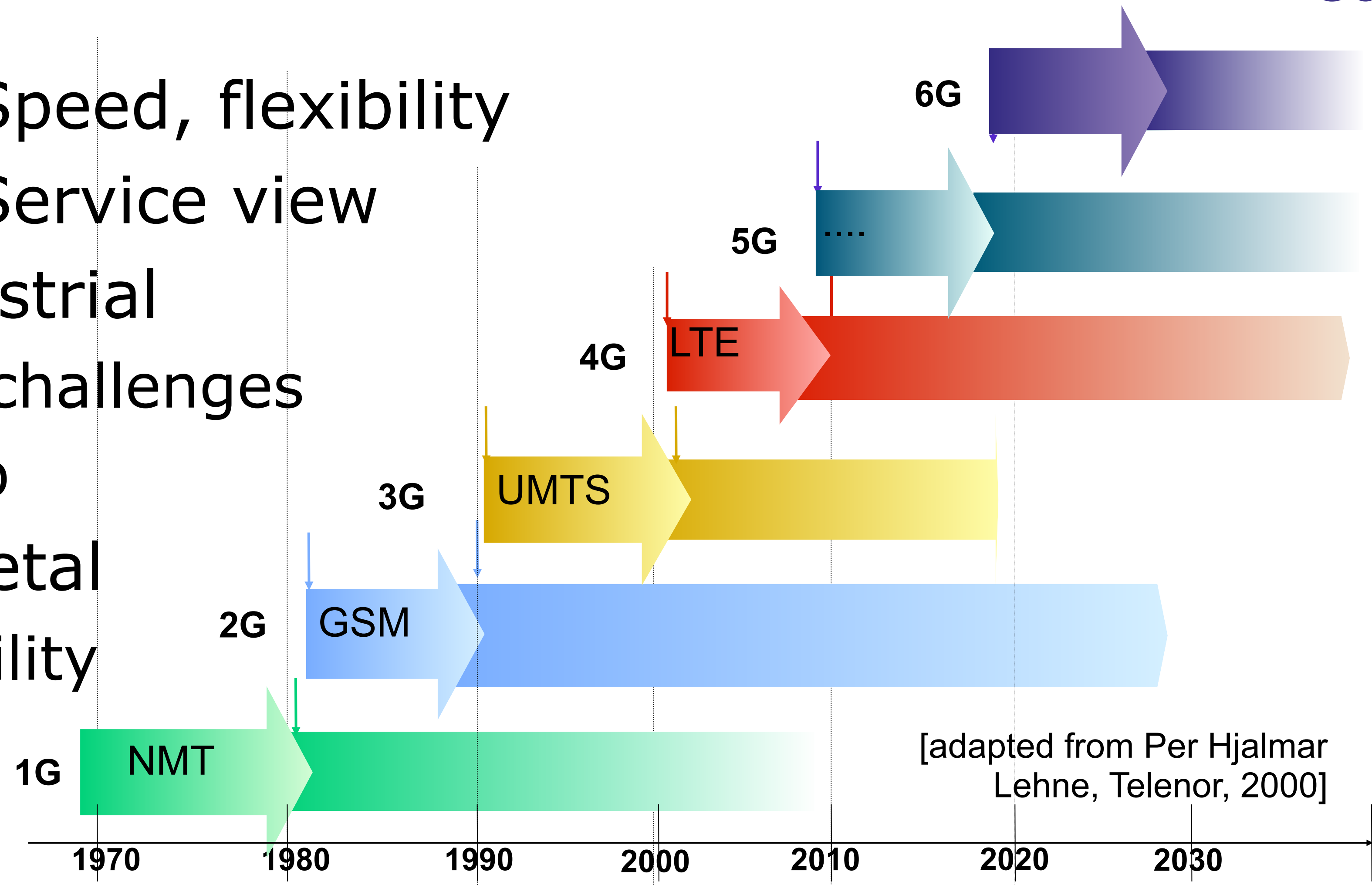
**Marianne Kinnula:** Megatrends shaping sustainable development of 6G

**Panos Kostakos:** Linking 6G and UN SDGs



# 6G: Digitisation of the Society

- 1G-3G: Speed, flexibility
- 3G-4G: Service view
- 5G: Industrial
  - Business challenges
  - ownership
- 6G: Societal
  - sustainability



## Services & Society

- Sustainability, SDGs  
Societal challenges
- Industrial challenges,  
IoT
- Mobile broadband  
services
- Web, Multimedia,  
Communications
- Mobile telephony, SMS,  
FAX, Data
- Mobile telephony





# Addressing the 3.5 billion people not connected to the Internet through 6G

- Government of Norway Report - **Priorities**
  - Access, skills, regulations, inclusion
- “Boys have the toys”
  - digital divide in both **devices**
  - and **mobile broadband** access
- **Costs** of Access
  - School connectivity (SDG indicator 4.A.1)
  - Digital Health for primary health facilities
  - Community involvement/digital transformation

Meld. St. 11 (2019–2020) Report to the Storting (white paper)

## Digital transformation and development policy

Access

Skills

Regulations

Inclusion





# Providing 6GforAll

- ➔ **Free access to Information** (Internet Lite)
  - 1) Access - one **Information Spot** per village
  - 2) Skills - Health, Education, Agriculture
  - 3) Regulations - Freemium model
  - 4) Inclusion -  
Free access for all #LeaveNoOneBehind
- ➔ Internet Lite & **Freemium** model for access
  - **free access to National Knowledge Portal** for all
  - **premium** access to **broadband**
  - sustainable solution

+18 dB  
>20 km

“Providing Internet to the basic of the pyramid isn't a question of affordability, but rather a question of sustainability”  
Internet Governance Forum, Panel, WIN

At least  
one Information Spot  
per village



# Societal areas of focus

- **Digital Knowledge portal** initiative
- Open source software and content (Pro-Digital Public Goods - DPGs)
- Multimedial content strategically tailored for target groups and communities
- Educational programs and trainings
- Empowering and fostering 21st century digital skills

**Societal goals: “leave no one behind” and social inclusion through digital -> mission.**

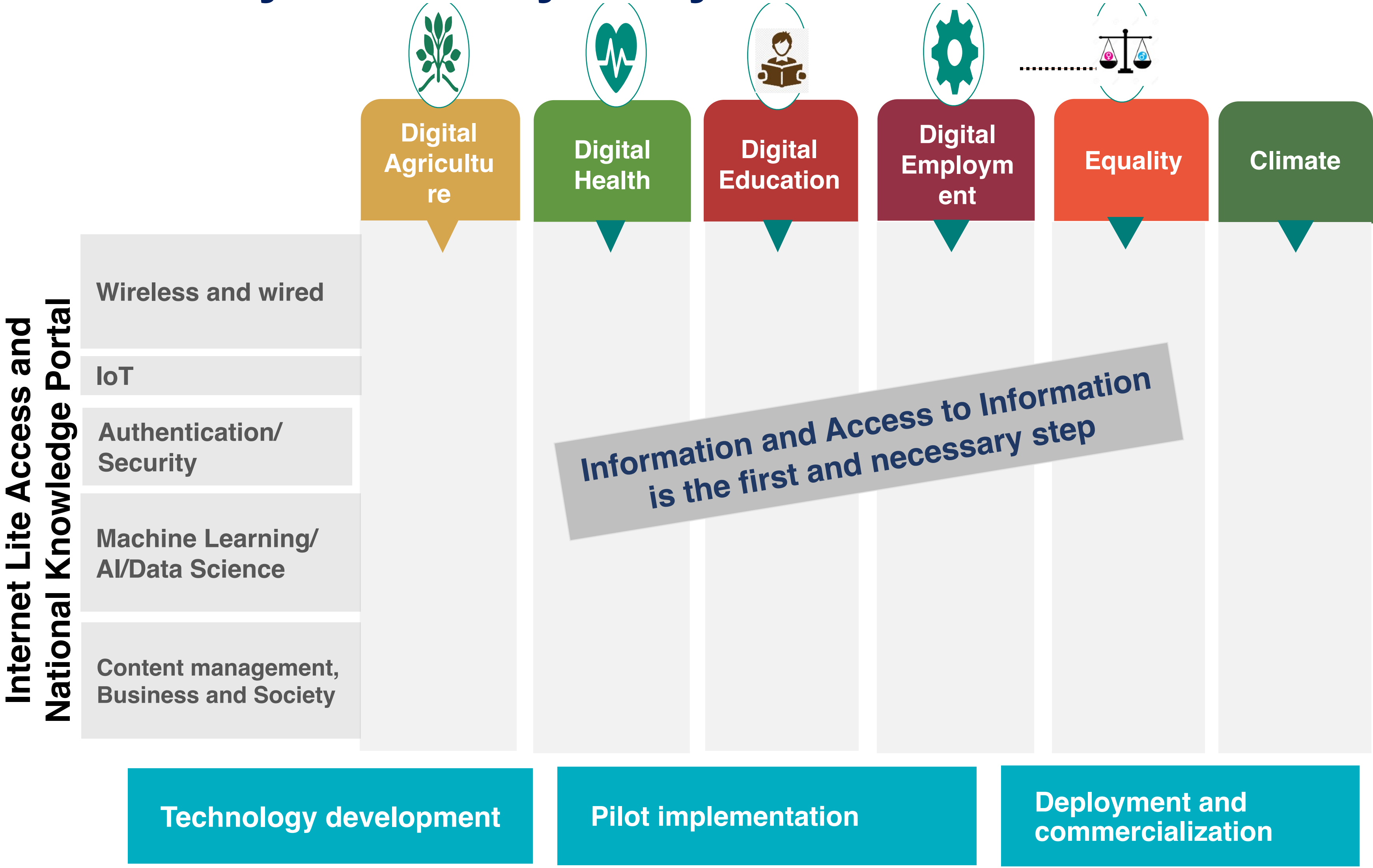
**We focus on:**

- - vulnerable groups, girls and women, bridging the gender gap
- - discriminated groups in the society
- empowering people in rural areas, semi-literates and illiterates,
- empowering women businesses





# Examples: Address real-world challenges of connectivity and access to information for everyone and by everyone



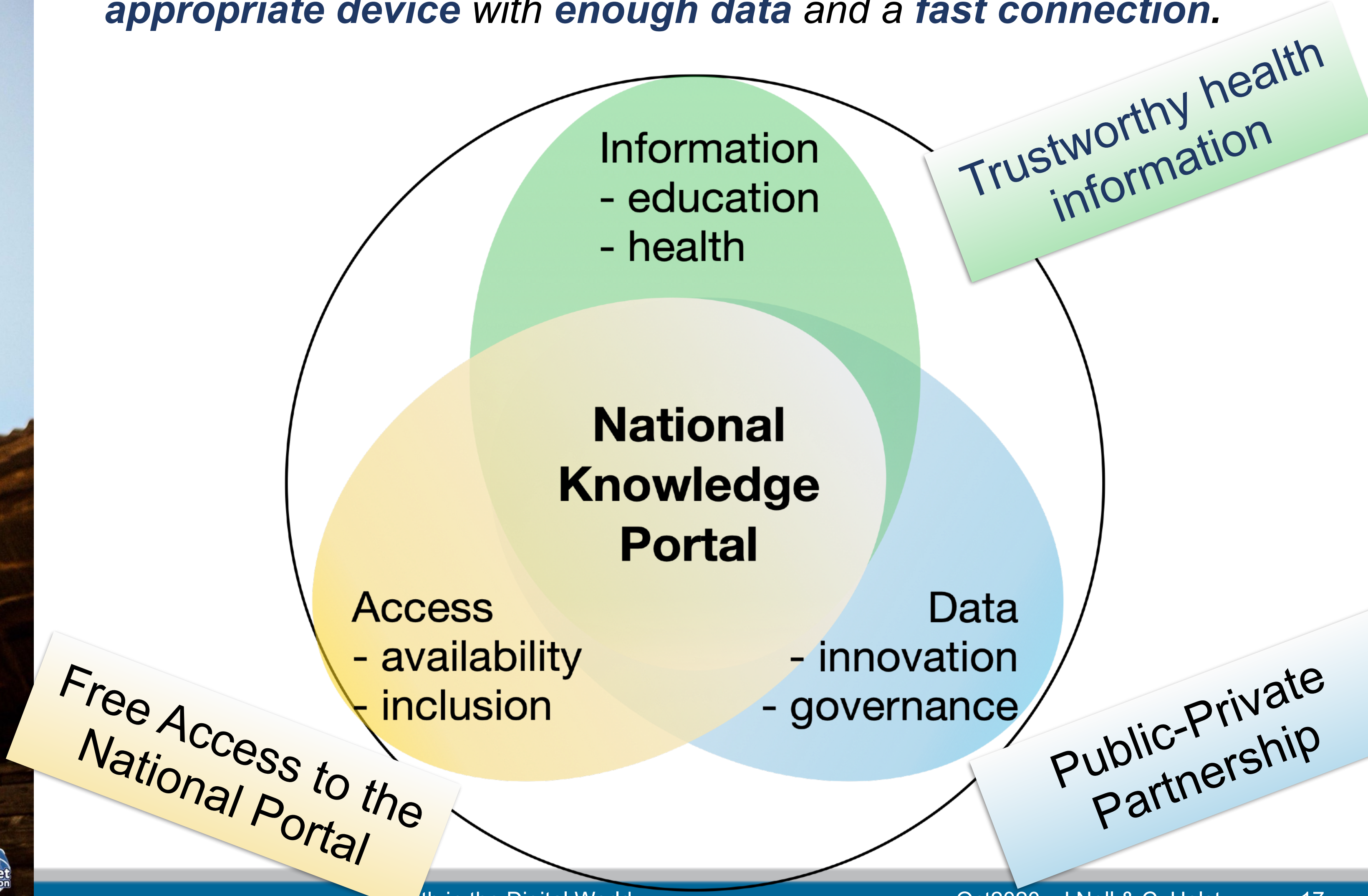
"interdisciplinary projects with social impact with sustainable business models"



# Free access to information as catalyst for the SDGs a Digital World through Innovations & Collaborations



*Meaningful connectivity to the Internet and skills for using an appropriate device with enough data and a fast connection.*





# Addressing Education 5.0 and Global Challenges

## → Cognitive skills

- literacy and numeracy
- critical thinking
- problem solving

*Edu 3.0*

## → Social and emotional skills

- empathy, teamwork
- leadership, cultural awareness
- fraternity & social friendship

*Edu 4.0*

## → Global challenges

- Climate, Sustainability (SDGs)

*Edu 5.0*



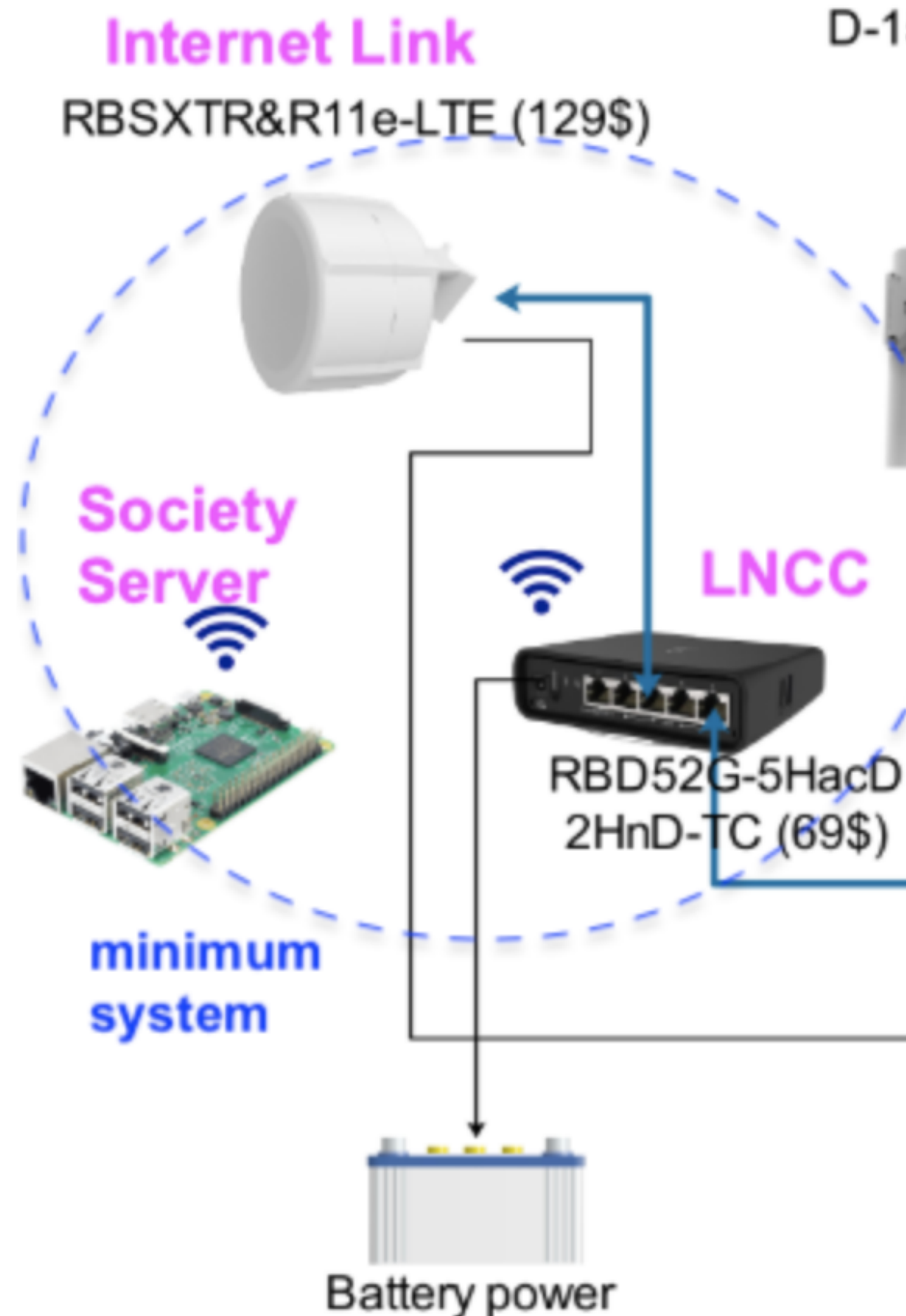


**It's easier than we think....**



# 1) Building an InfoSpot in every village

- ➔ Receive antenna
- ➔ Local network controller
  - “Internet Lite”
- ➔ Village Server
  - Raspberry Pi





## 2) Providing the information through animations

Snapshots from platform, HIV and Cysticercosis animations

Mwanzo Afya Kuhusu Wasiliana nasi Repoti- Videos- English Login

### Epuka Tegu

#### Kisababishi ya Tegu

Mnyoo bapa aitwae *Taenia solium*, husababisha binadamu kuugua vibaya sana. Binadamu hupata minyoo hao kwa kula nyama ya nguruwe mbichi au isiyoiva vizuri, yenye malengelenge ya minyoo (cysts). Ndani ya utumbo wa binadamu, malengelenge hayo hutoka katika nyama na kujishikiza kwenye ukuta wa utumbo na kufanyika minyoo ambao hukua na kutaga mayai.

#### Dodoso ya Tegu

Tafadhali jaza utafiti kuhusu Tegu

Jinsia yako ni ipi?

- A) Me
- B) Ke

Je, umewahi kusikia kuhusu minyoo aina ya tegu?

- A) Ndio
- B) Hapana
- C) Sijui

Je! Umewahi kusikia kuhusu minyoo ya tegu kwenye wanyama aina ya nguruwe?

- A) Ndiyo
- B) Hapana



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

[Source: Christine Holst, UiO (Nov2019)]



# 3) Provide "Internet Lite" and the Freemium Model free: Lightweight Protocols & premium: for broadband

<https://basicinternet.org/internet-lite-to-the-migoli-high-school/>

<https://basicinternet.org/internet-lite-to-the-migoli-high-school/amp/>

Basic Internet Foundation

MISSION PROJECTS ABOUT PARTNERS MEDIA

**Full Web experience**

## INTERNET LITE TO THE MIGOLI HIGH SCHOOL

By josef | 4 May 2019 | Uncategorized

The Migoli High School has 1271 pupils (Apr2019) and 35 full-time teachers. The high school is located about 3 km outside of Migoli in the Iringa district in Tanzania.



Basic Internet Foundation

**Internet Lite - AMP experience**

### Internet Lite to the Migoli High School

josef

8 months ago

The Migoli High School has 1271 pupils (Apr2019) and 35 full-time teachers. The high school is located about 3 km outside of Migoli in the Iringa district in Tanzania.

