UiO : Department of Technology Systems
University of Oslo

Plaksha Tech Leaders Contribution, 11Jan2021

Societal Empowerment through Energy and Information

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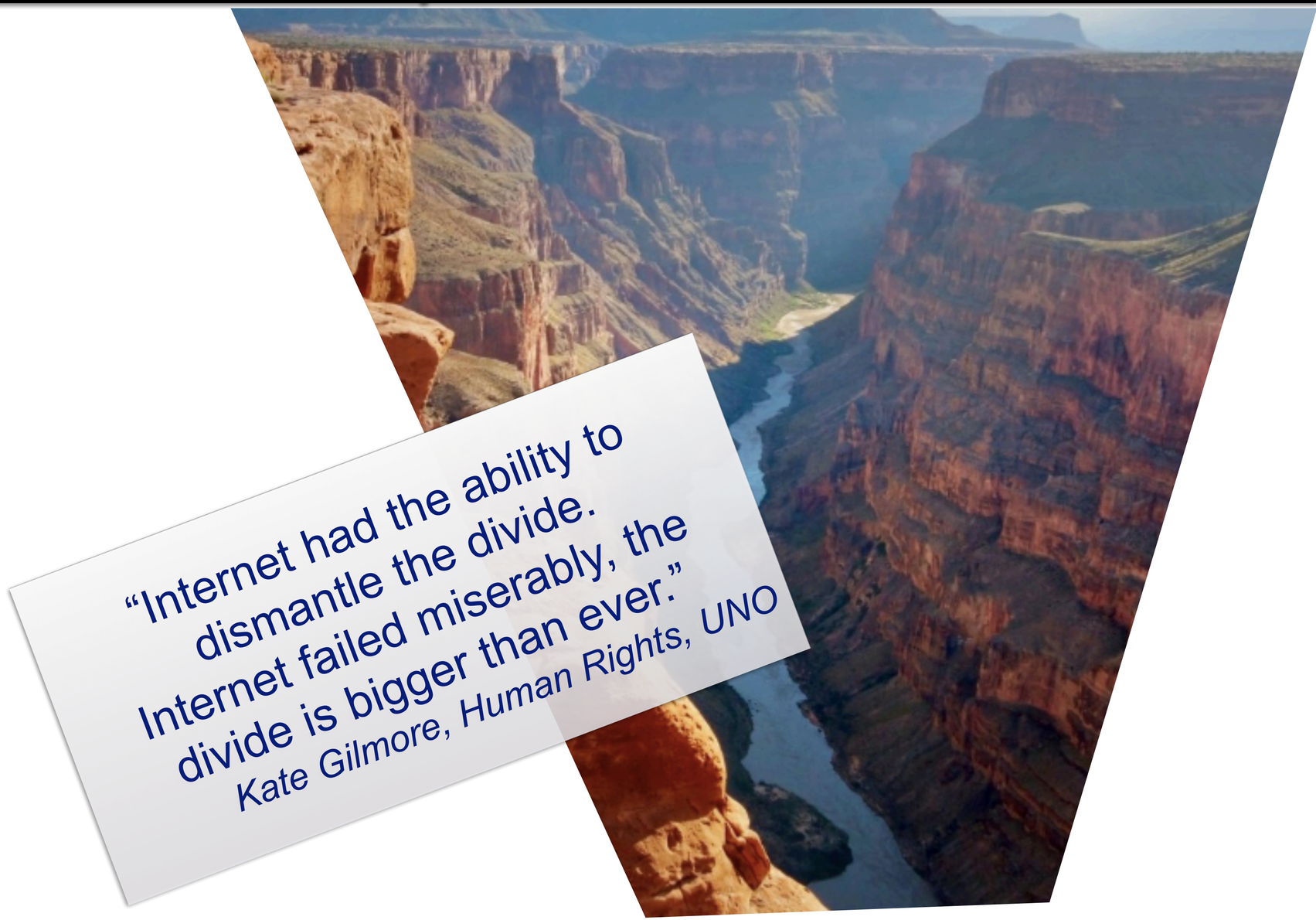
University of Oslo: http://www.mn.uio.no/its
Basic Internet Foundation: http://BasicInternet.org
Our Wiki: http://ITS-wiki.no

Grand Challenges

- Grand Challenges
  - Climate, CO_2
  - Resources (radio, minerals)
    - Kobald (East - DR Congo)
  - Societal Divide

- Energy
  - Transition to renewable Energy
- Digitisation
  - Mobile Networks
  - IoT, Automation
- Society
  - Inequality, Divide



Addressing Education 5.0 and Global Challenges

- Cognitive skills
  - literacy and numeracy
  - critical thinking
  - problem solving

Edu 3.0

Edu 4.0

- Social and emotional skills
  - empathy, teamwork
  - leadership, cultural awareness
  - **fraternity** & **social friendship**

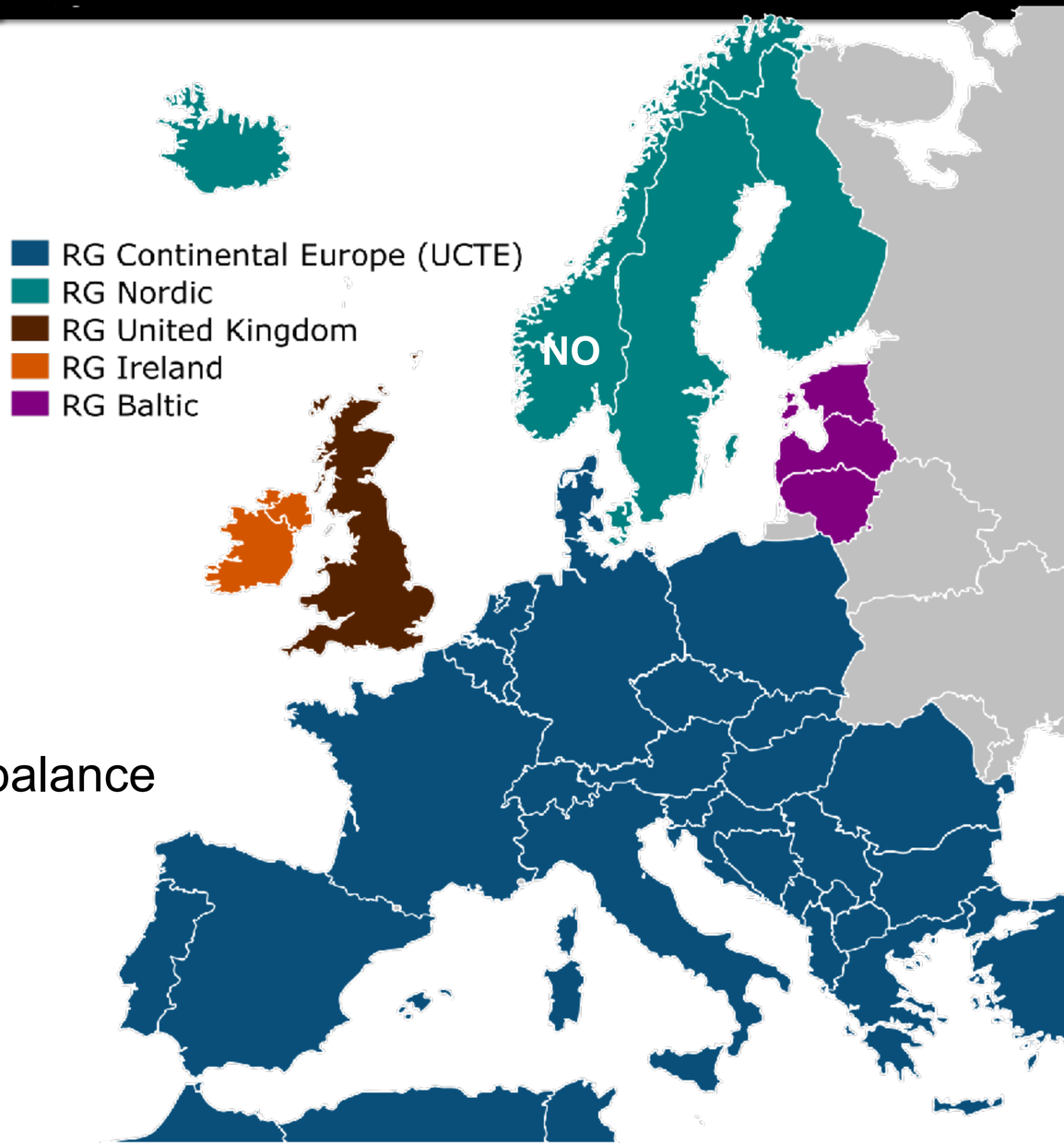
Edu 5.0

- Global challenges
  - **Climate**, **Sustainability** (SDGs)

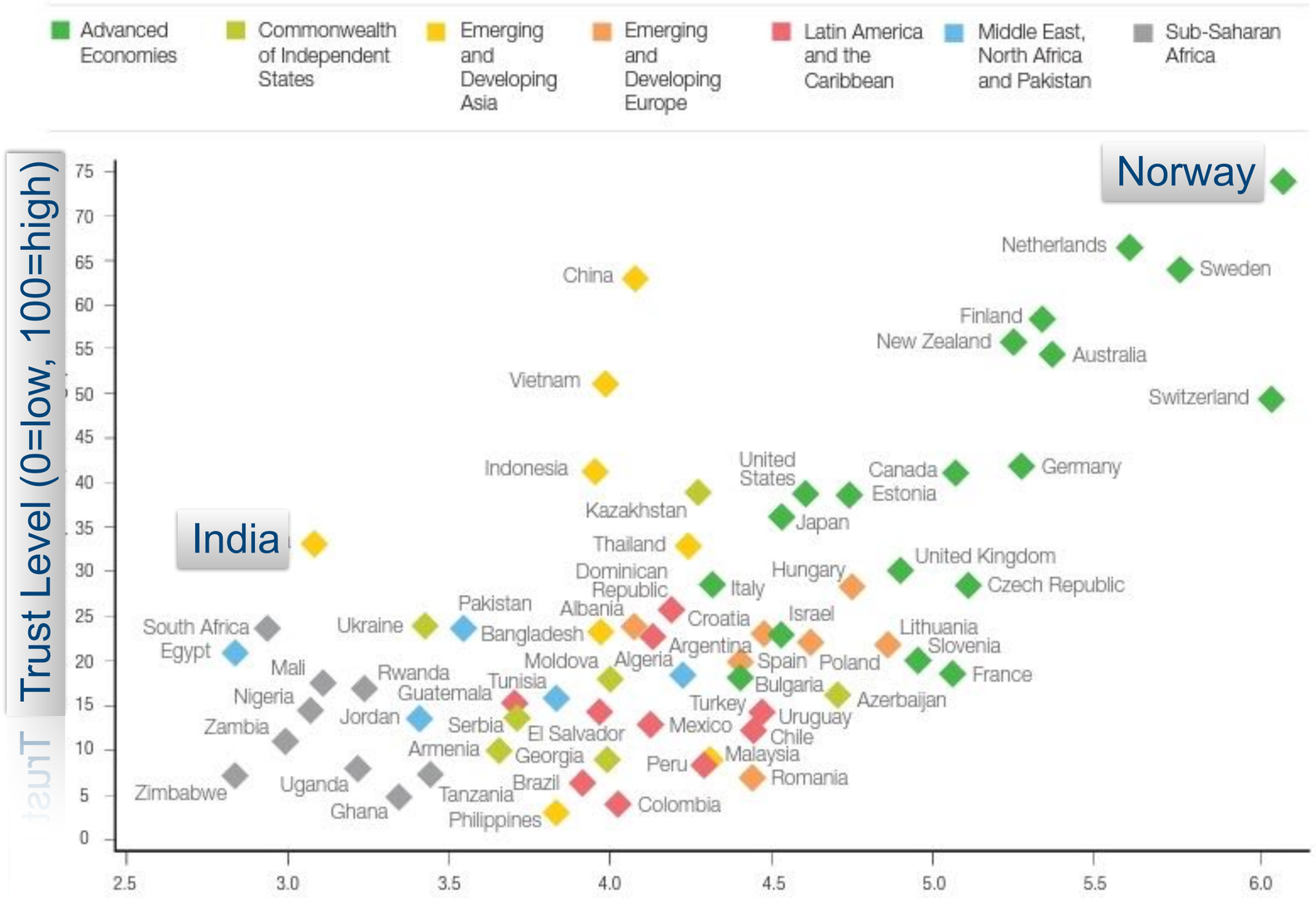
Norway - Nordics/Baltics Europe

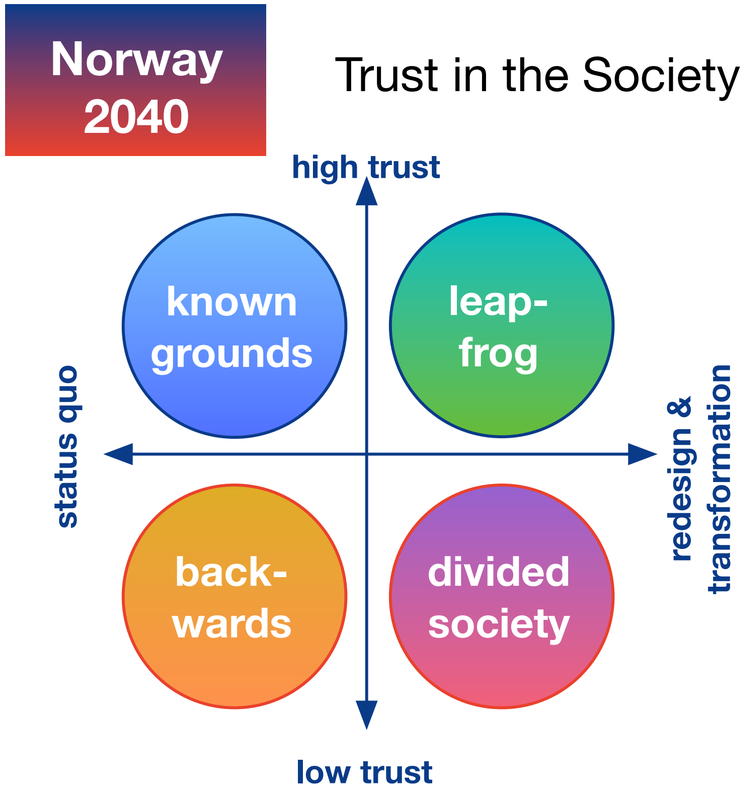
Norway

- 95% of produced electricity is hydropower
- Sales of cars (Dec2020):
  - 60% electric, 20% hybrid
  - 12% petrol, 8% diesel
- almost all heating is electrical
- about 10-15% electricity export in generator/consumer balance
- Interconnections with UK, DE, NL, DK, SE, FI



Inclusive Development Performance and Interpersonal Trust





[Source: World Values Survey (2014) World Economic Forum]

Area 1: Energy transition - climate crisis

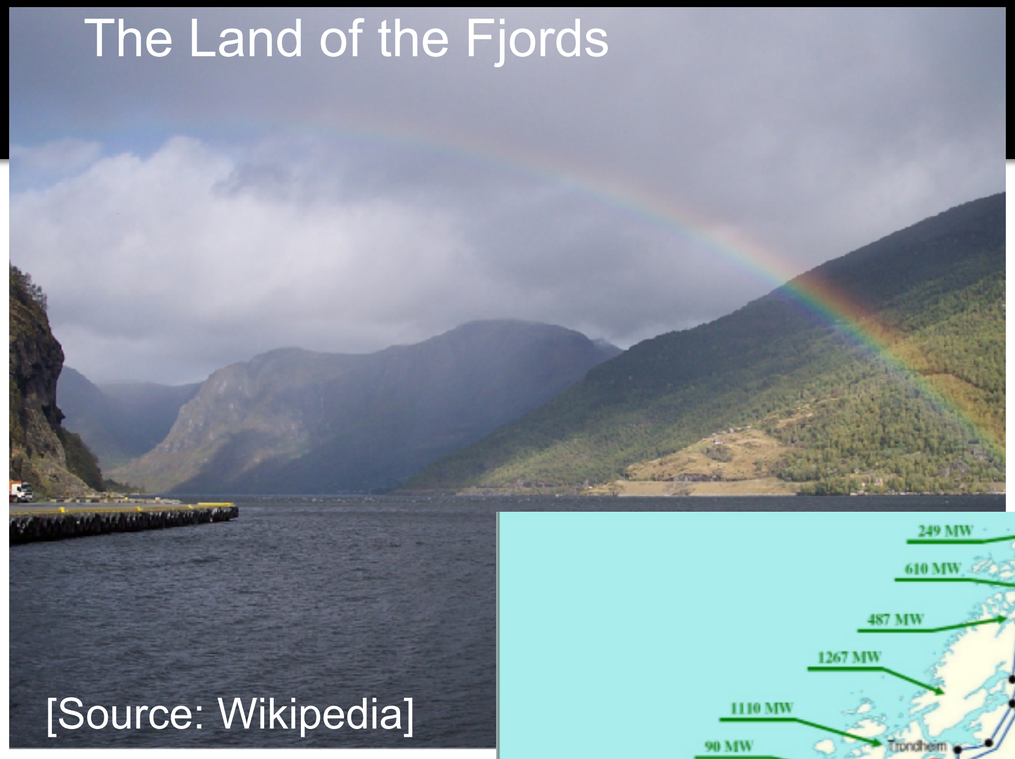
Quick clay land slide in Gjerdrum Norway, Dec2020

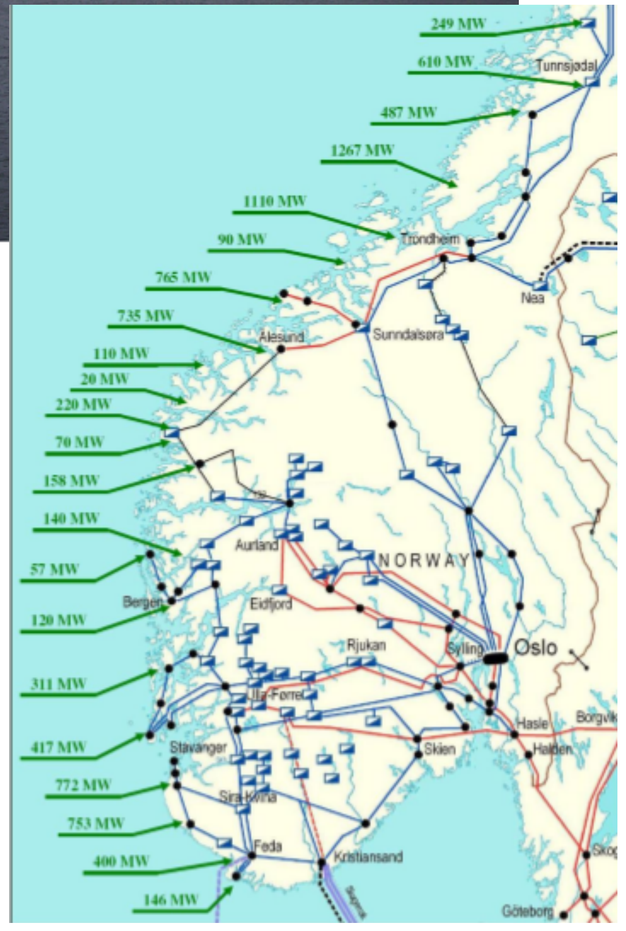
Research Areas in Energy

- Change in generator/consumer balance
  - ➡ Prosumers
  - ➡ Electric cars as battery banks

- Lack of investments to cover consumption peaks in production
  - ➡ Flattening the power peaks in the morning & afternoon
  - ➡ Cope with seasonal changes
  - ➡ Grid stability

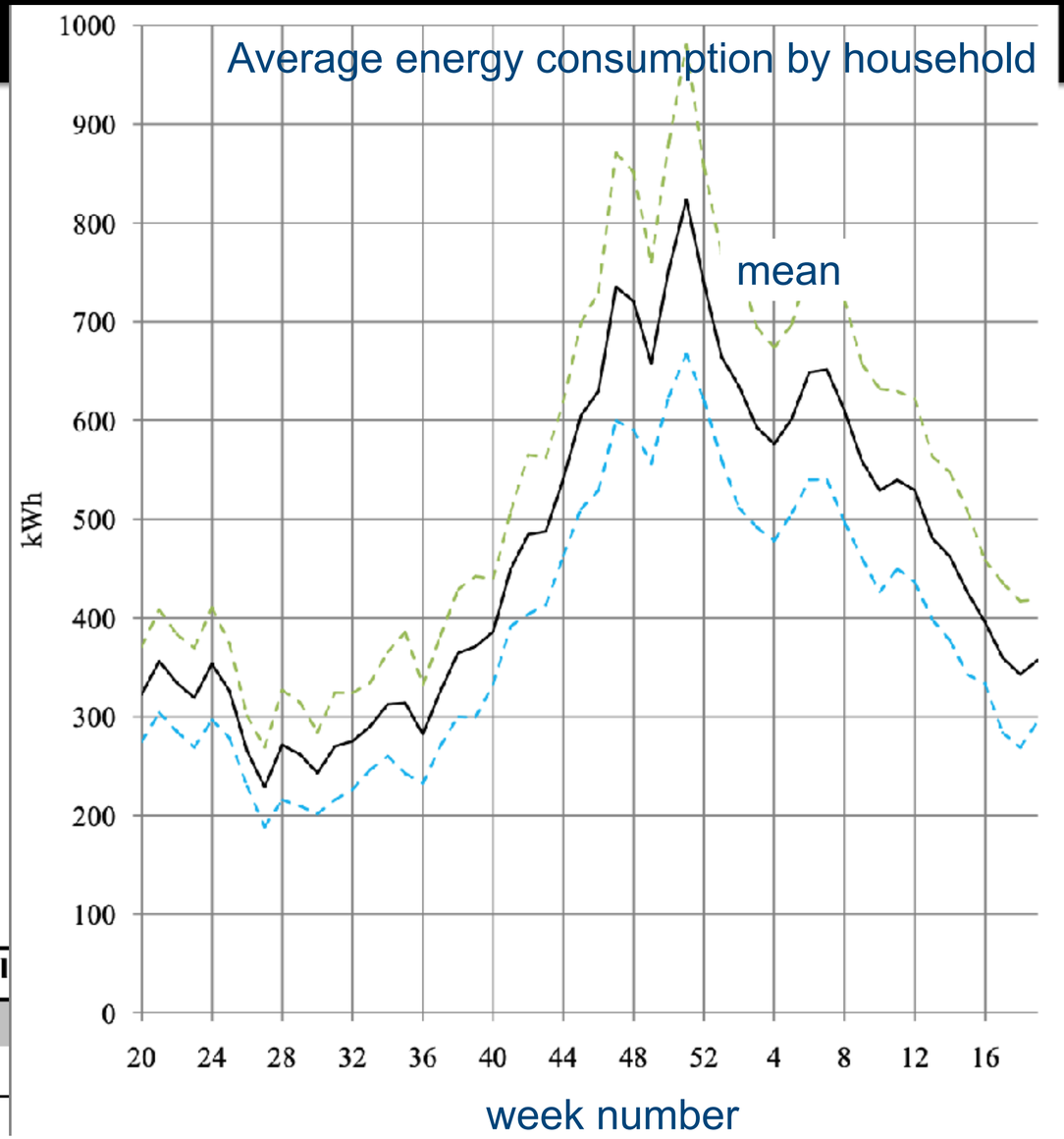
- Conversion of transport sector
  - ➡ “no more petrol/diesel cars by 2025”
  - ➡ all public-purchased cars are electrical by 2022
  - ➡ access to cities (Bergen, Oslo) only by zero-emission vehicles
  - ➡ electric/hydrogen ferries
  - ➡ hydrogen, NH3 (Ammonia) trucks





Electricity variability

- Strong variation during the year
  - ➡ heating with electricity
-



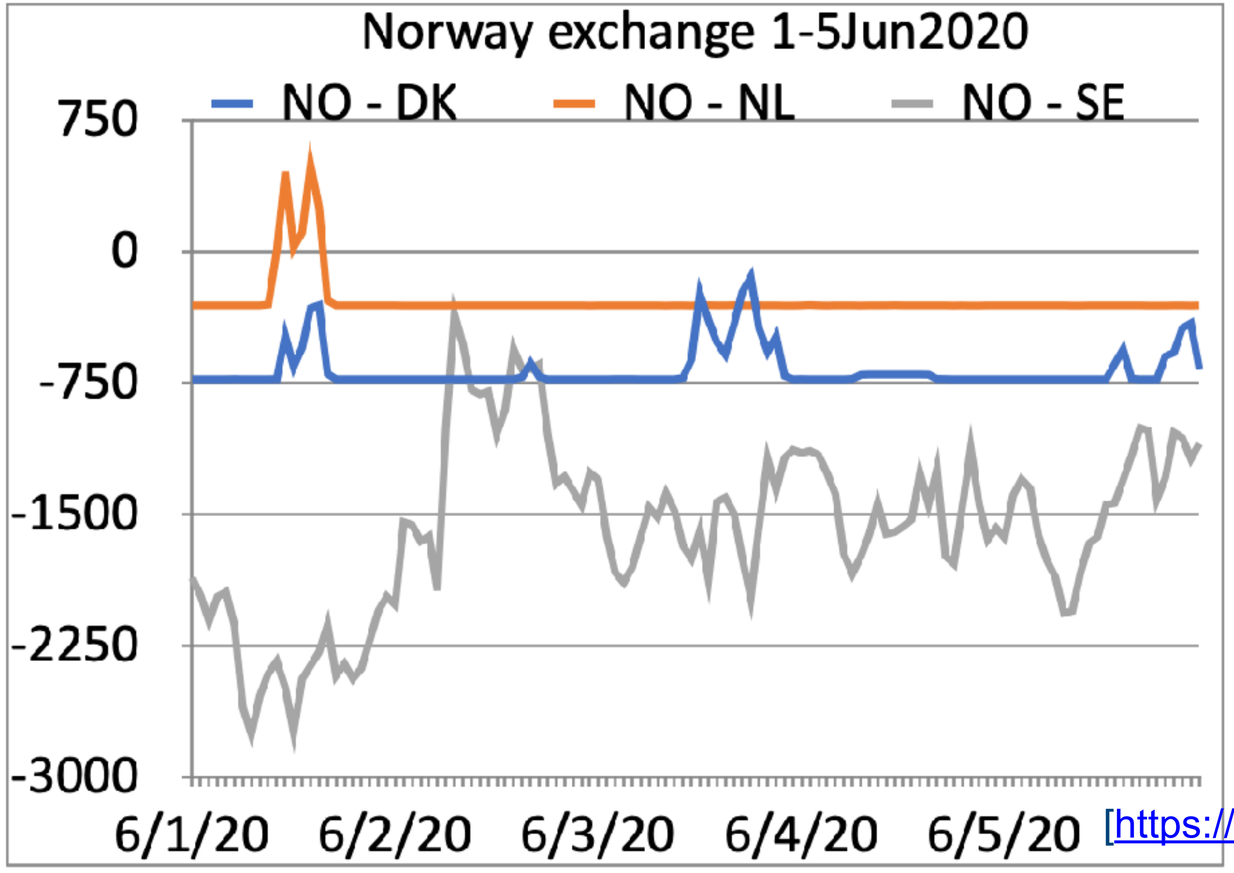
Monthly mean temperature Ørlandet

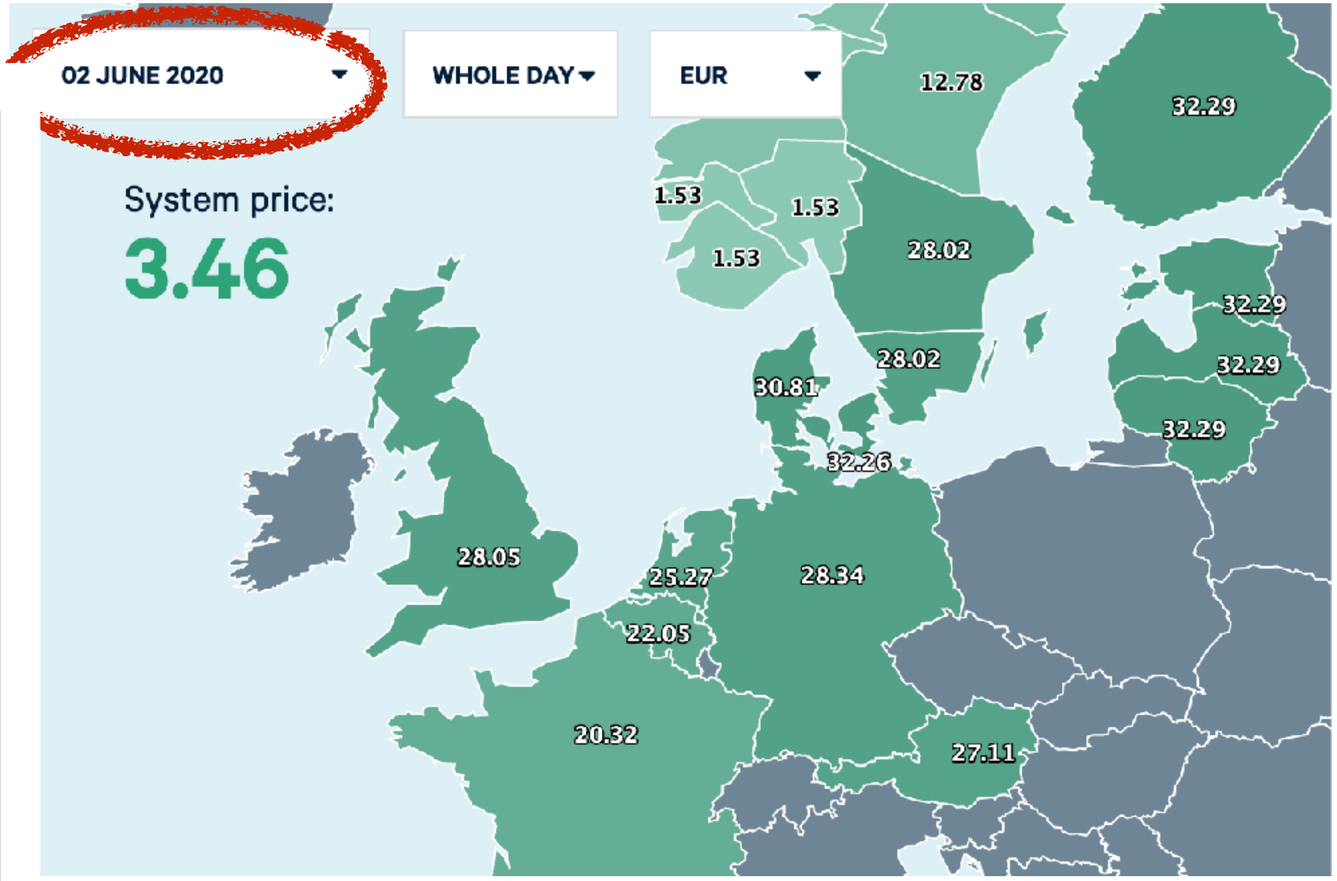
Måned	Mai	Juni	Juli	Aug	Sept	Okt	Nov	Des	Jan	Feb	Mars	April
Middel, °C	7,7	10,1	14,4	14,2	10,6	7,6	-1	-3,7	1,6	-0,5	2,1	7,2
Normalår, °C	8,7	11,4	12,7	12,9	9,9	6,9	2,6	0,5	-0,7	-0,3	1,4	4,1

https://www.sintef.no/globalassets/project/eldek/publisering/stromforbruk-i-norske-husholdninger.pdf

What has happened on 3-5Jun2020?

- See: SE-NO, DK-NO



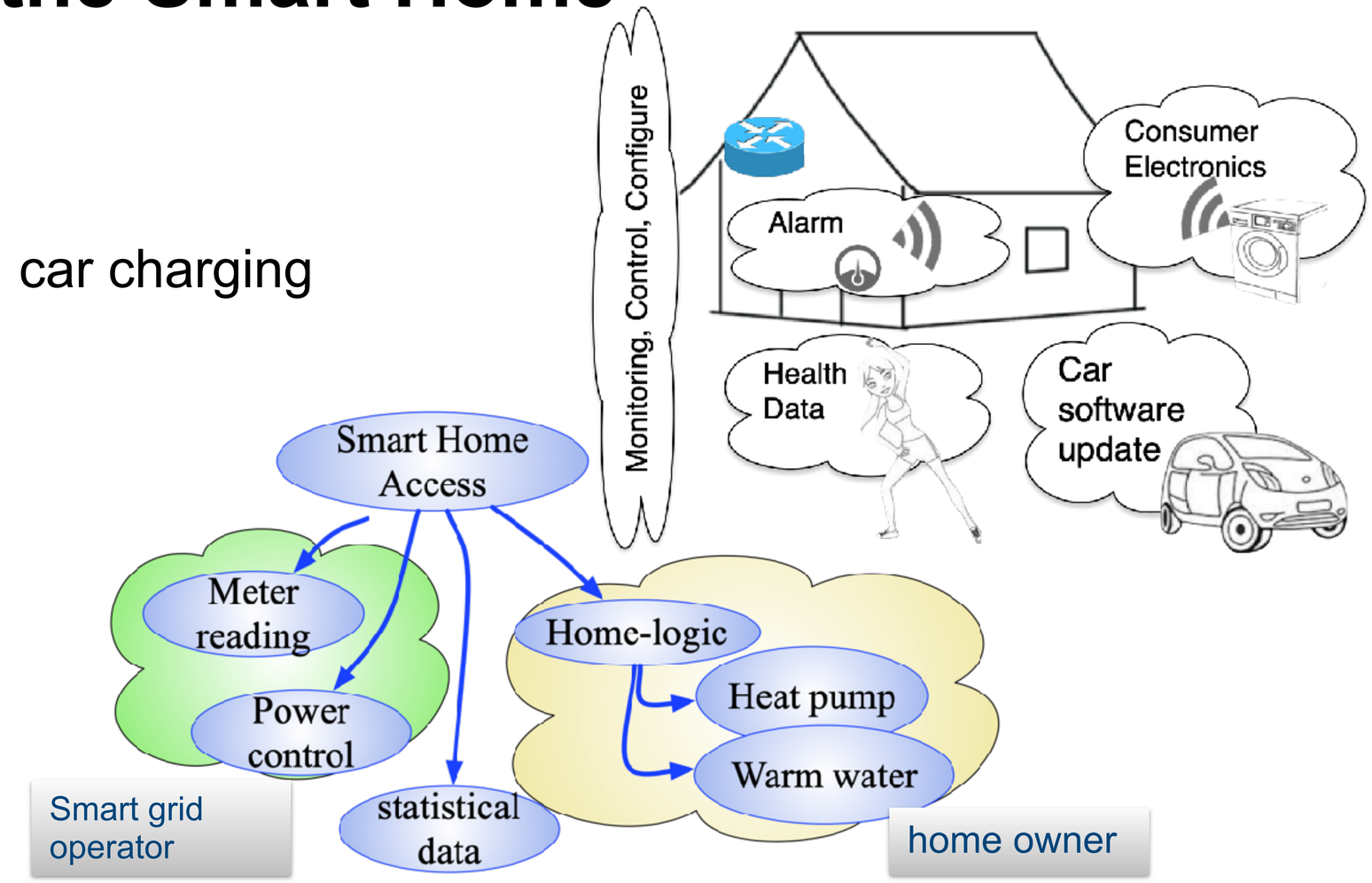


[https://www.nordpoolgroup.com/historical-market-data/ -retrieved 22Oct2020]

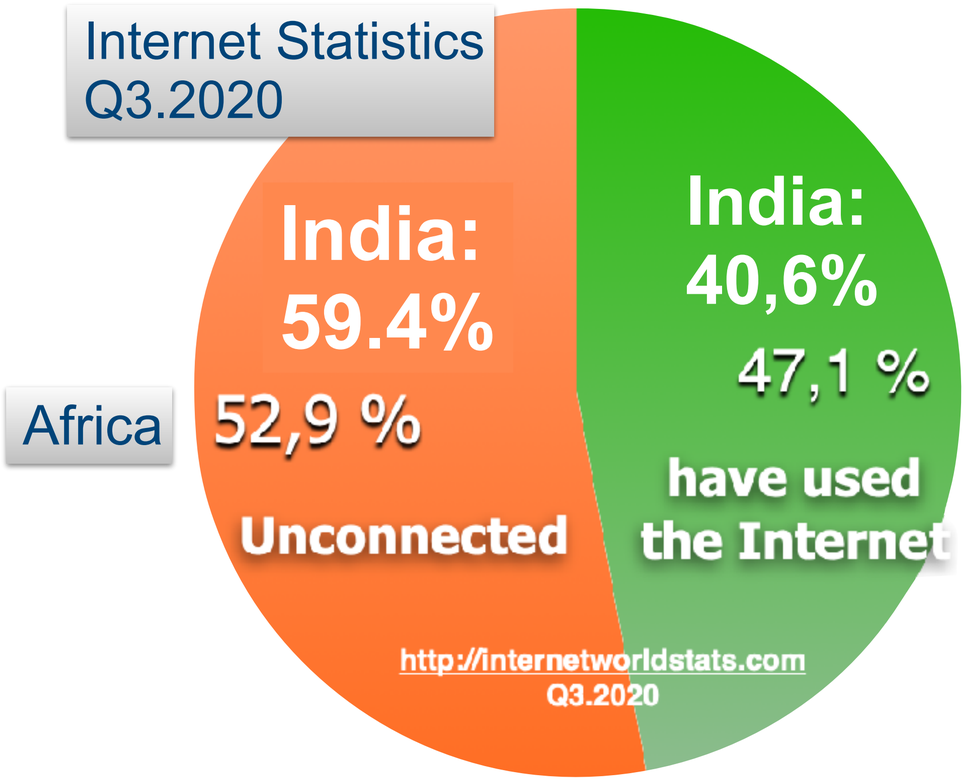
Control and access in the Smart Home

Goal: Grid stability

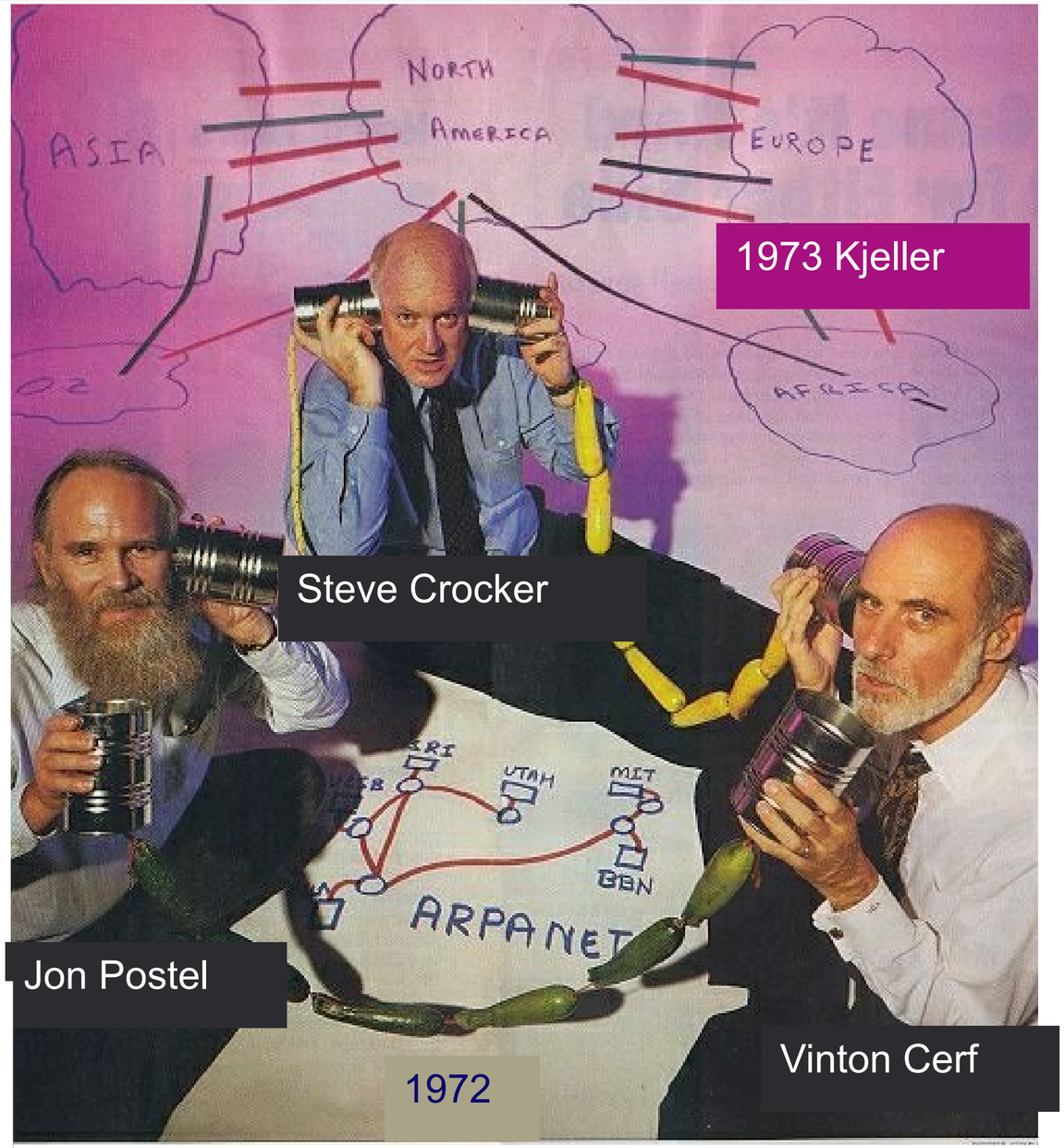
- Smart home and grid stability
  - ➡ energy devices: heating/cooling, car charging
  - ➡ “gracefull degradation”
- Access to information
  - ➡ who (sensor, person, service)
  - ➡ what kind of information
  - ➡ from where
- Attribute-based access
  - ➡ role (in organisation, home)
  - ➡ device, network
  - ➡ security tokens



Area 2: Information as basis for empowerment



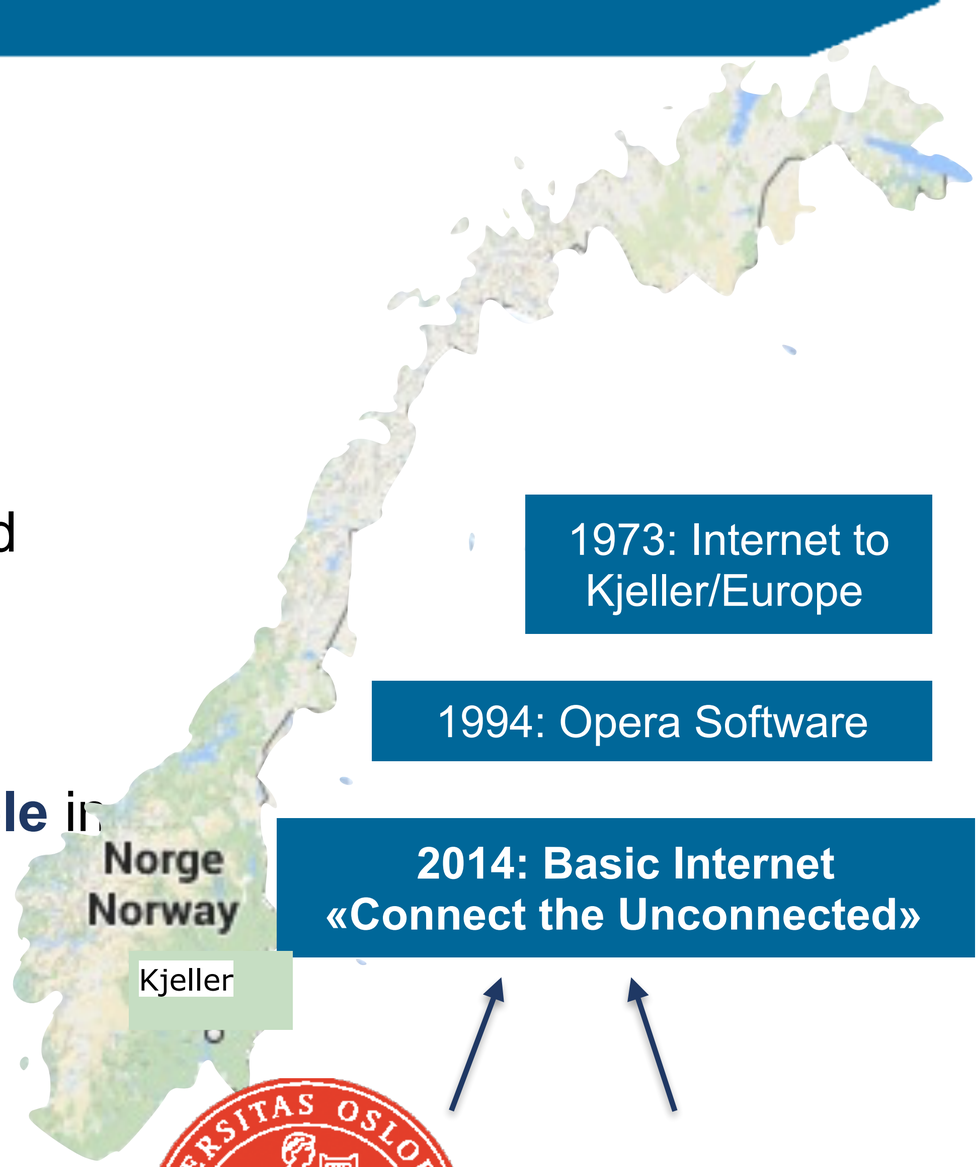
ASIA INTERNET USE, POPULATION STATISTICS DATA AND FACEBOOK DATA - JUNE 30, 2020						
ASIA	Population (2020 Est.)	Internet Users, (Year 2000)	Internet Users 31-MAY-2020	Penetration % Population	Users % Asia	Facebook 31-MAR-2020
India	1,380,004,385	5,000,000	560,000,000	40.6 %	24.3 %	251,000,000



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

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



1973: Internet to Kjeller/Europe

1994: Opera Software

2014: Basic Internet «Connect the Unconnected»

- **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

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

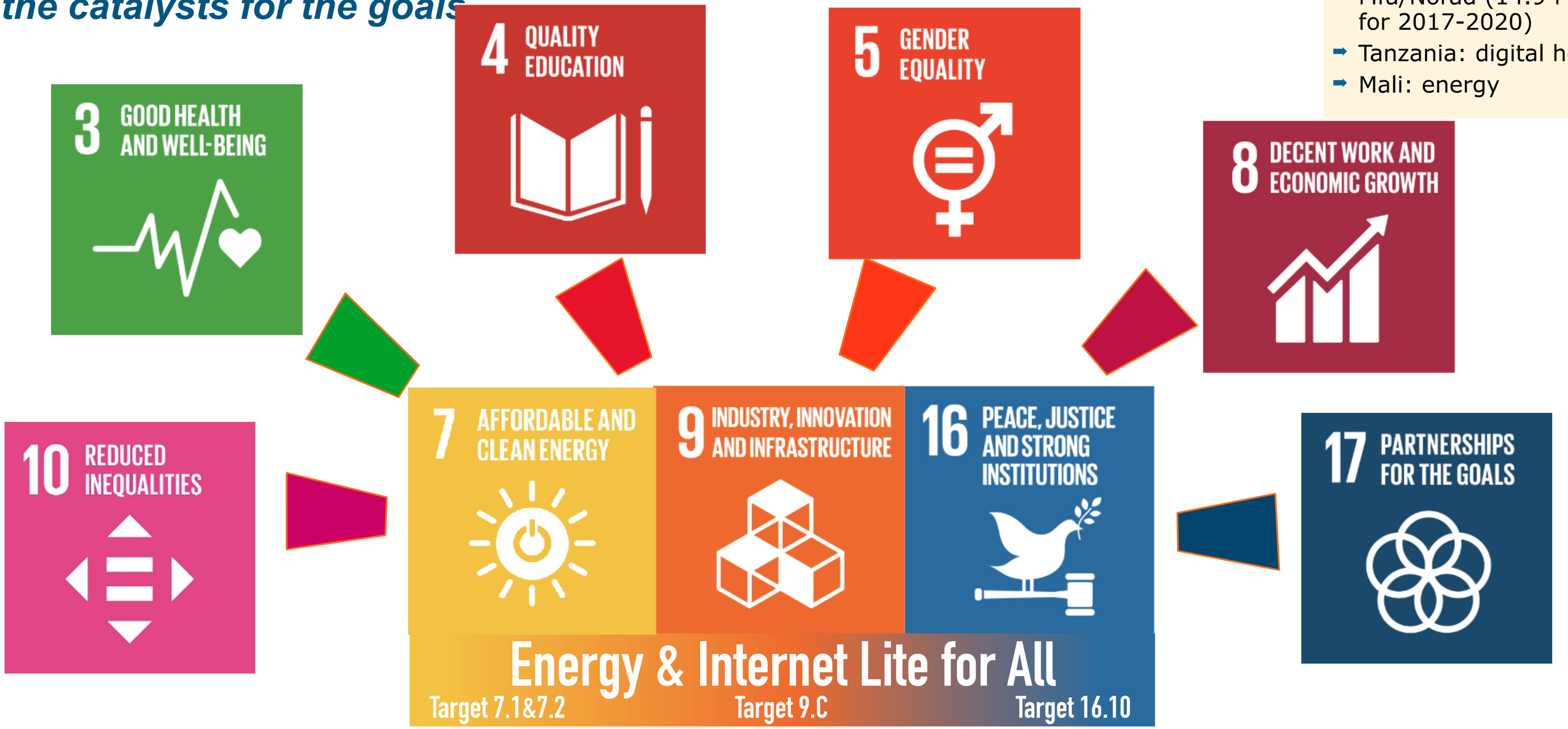
Source: Akers Avis Groruddalen, 2013

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
  - …

https://blogs.worldbank.org/africacan/how-do-africans-priorities-align-with-the-sdgs-and-government-performance-new-results-from

Example: Decent Work

- Centre for Monitoring the **Indian Economy**:
- 31 million people seeking actively for work
- 11 Million jobs lost in 2018
  - 9 Million in **rural areas**
  - 8.8 Million **women** lost work

- 31 Million look for work
  - most of them in RUrban area
  - from 80/20% Rural/Urban to
  - 70 / 15 / 15% Rural / RUrban / Urban

- How can we create a **sustainable future** for the young generation?
  - Rural
  - RUrban (Smart Cities)

Area 3: Research Topics in Digital Inclusion

Digital transformation and development policy

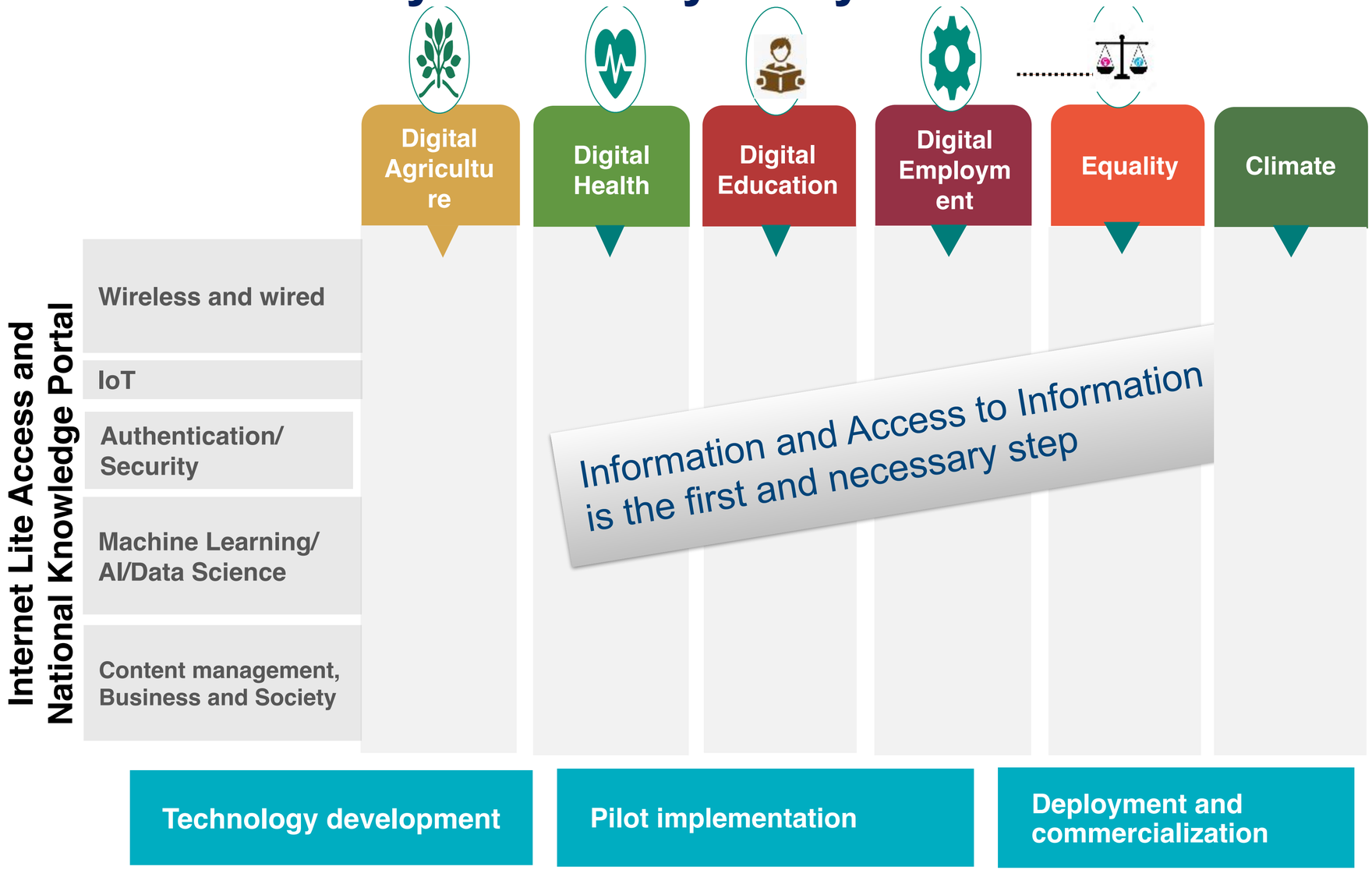
- Report to the Parliament of Norway Meld. St. 11 (2019-2020) Priorities
  - Access, skills, regulations, inclusion

- Gender divide: “Boys have the toys”
  - digital divide in devices and
  - mobile broadband access

- Integrated model for digital inclusion
  - School connectivity (SDG 4.A.1)
  - Knowledge Portal as facilitator
  - Knowledge transfer
  - Community involvement

https://www.regjeringen.no/no/dokumenter/meldst11_summary/id2699502/?ch=1

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



Plaksha University:
“all our outcome is digital”
- empowering the society

"interdisciplinary projects with social impact with sustainable business models”

[Source: Shalini Sarin, Plaksha]

Basic Internet Foundation

Example: Digital Health Promotion and Community Involvement

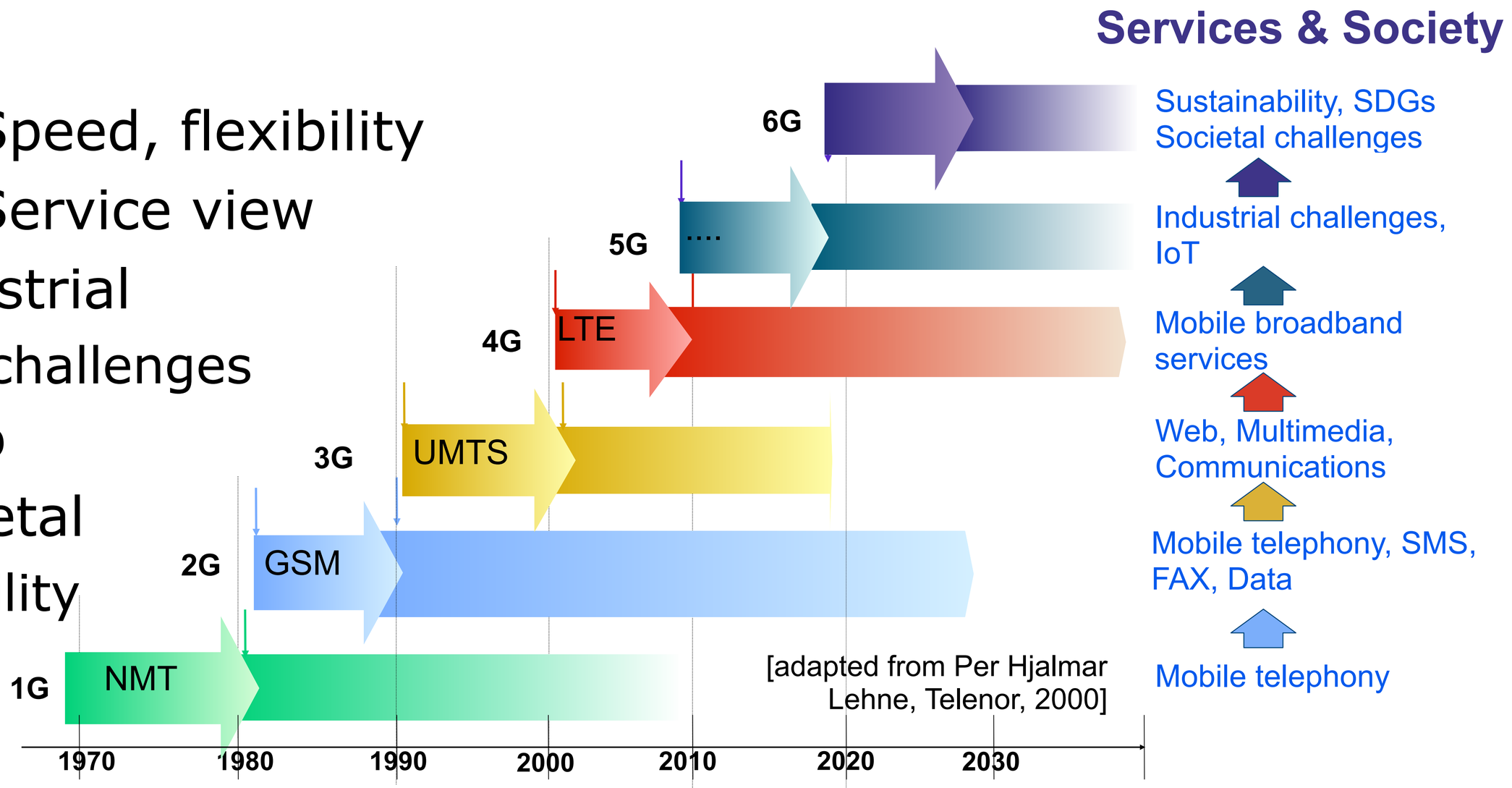
Providing the information through animations

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

[Source: Christine Holst, UiO (Nov2019)]

(5G) and 6G: Digitisation of the Society

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

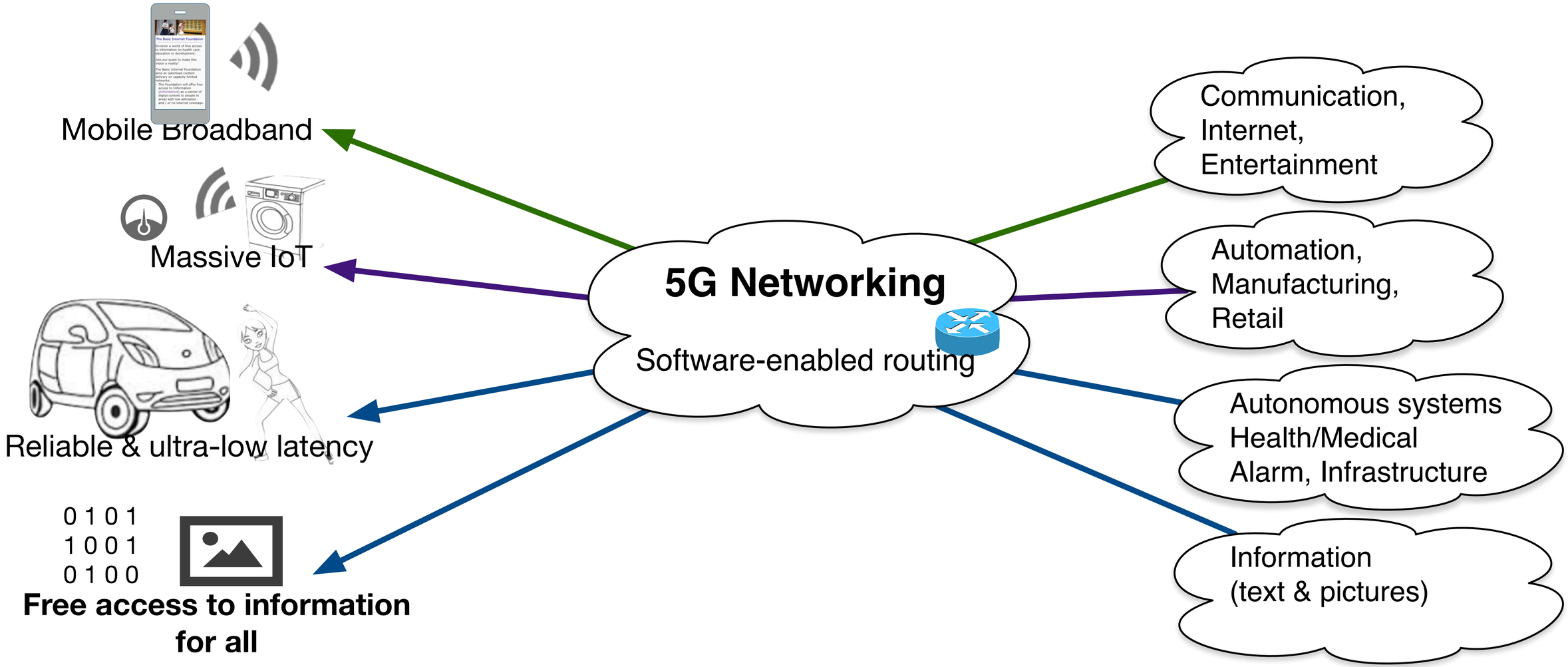


Providing 6GforAll

- **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

5G network slicing for Free Access to Information for All



Example: an InfoSpot for every village

“Connect the Unconnected”

#Digital Inclusion
#Societal Empowerment
#Digital Health
#Women and Girls

Esilalei

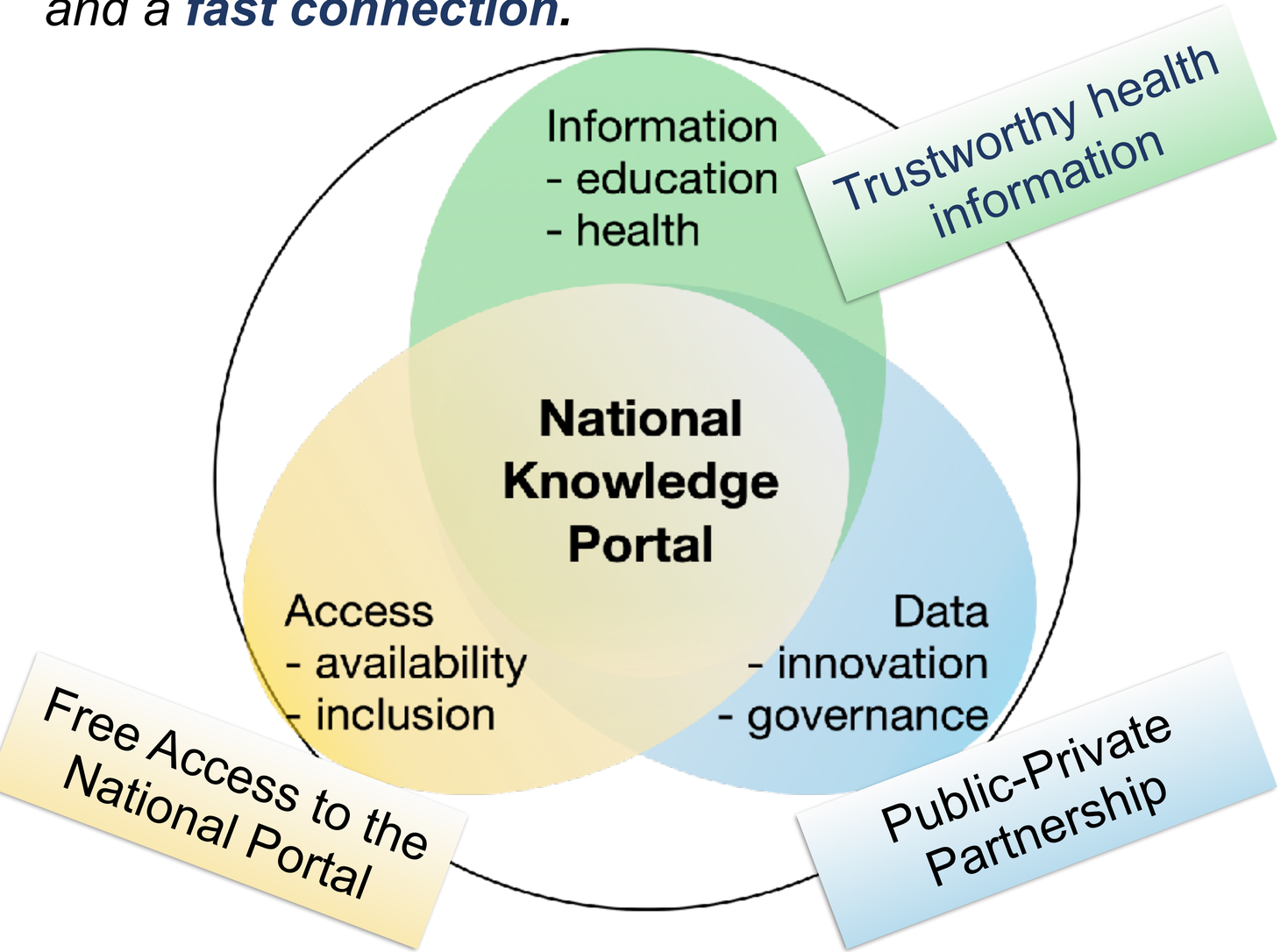
“Connect the Unconnected”

Izazi

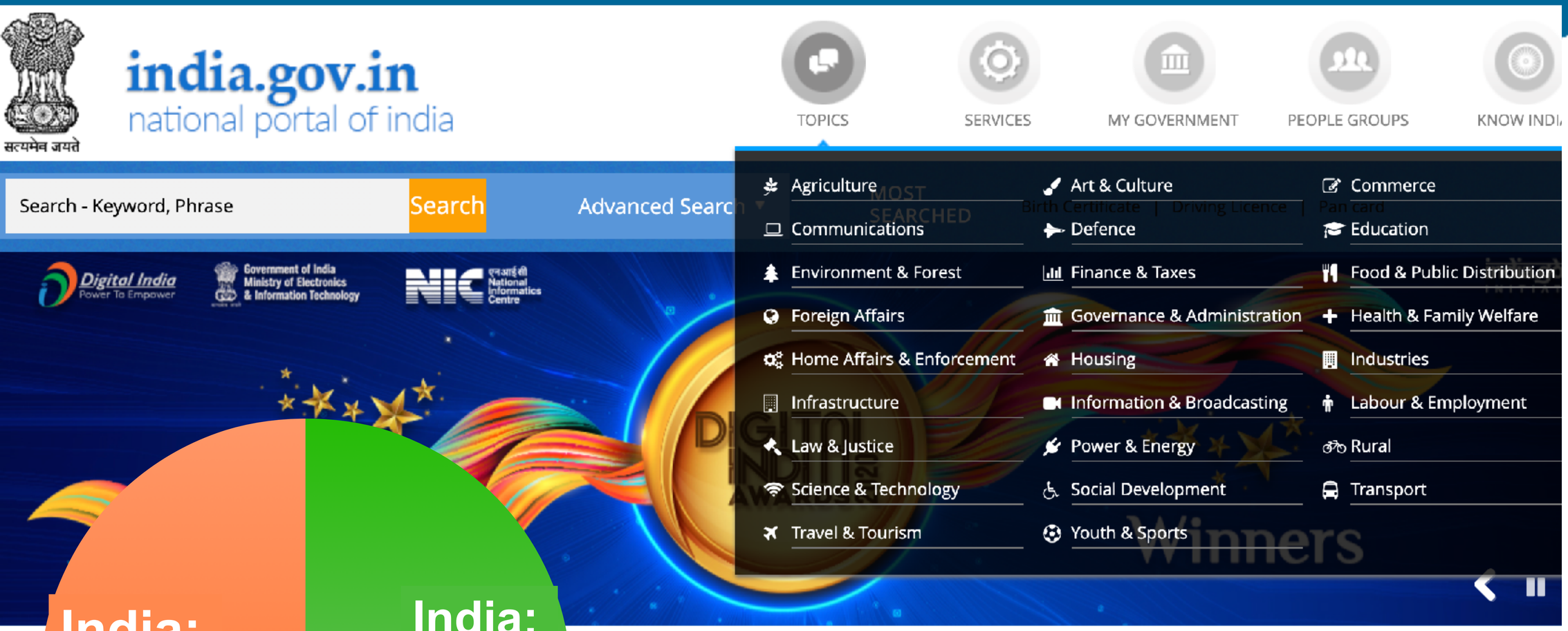
Installation time: 90 min

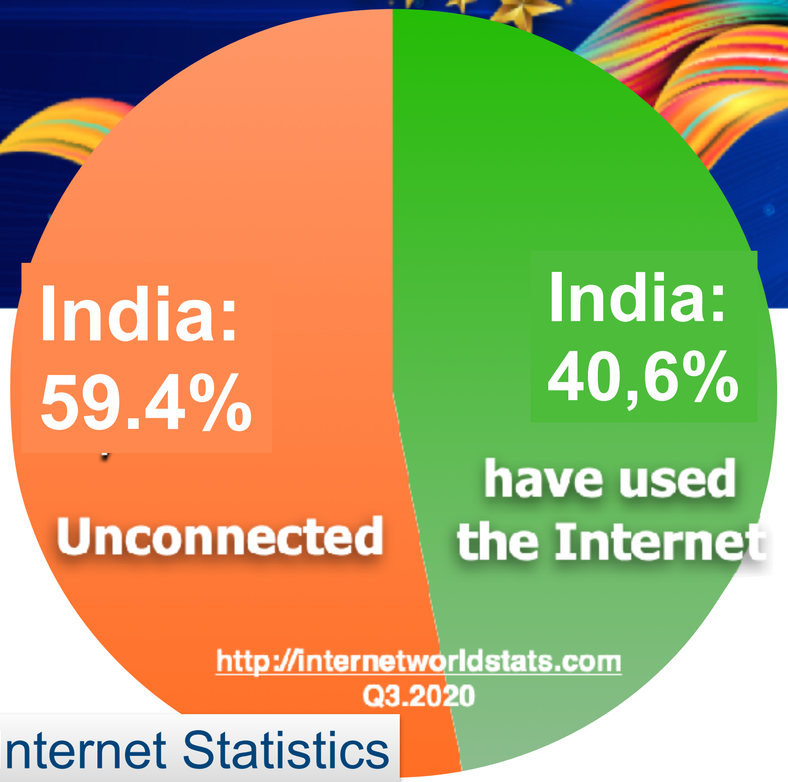
catching the signal from the Vodacom tower in Migoli (~10km away)

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



NationalKnowledgePortal.net





Why are 59.4% not using the Internet?
- access: network, device
- electricity/charging
- perceived value
- focus

Internet Statistics
Q3.2020

“Internet Lite” and the Freemium Model

free: Lightweight Protocols & premium: for broadband

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

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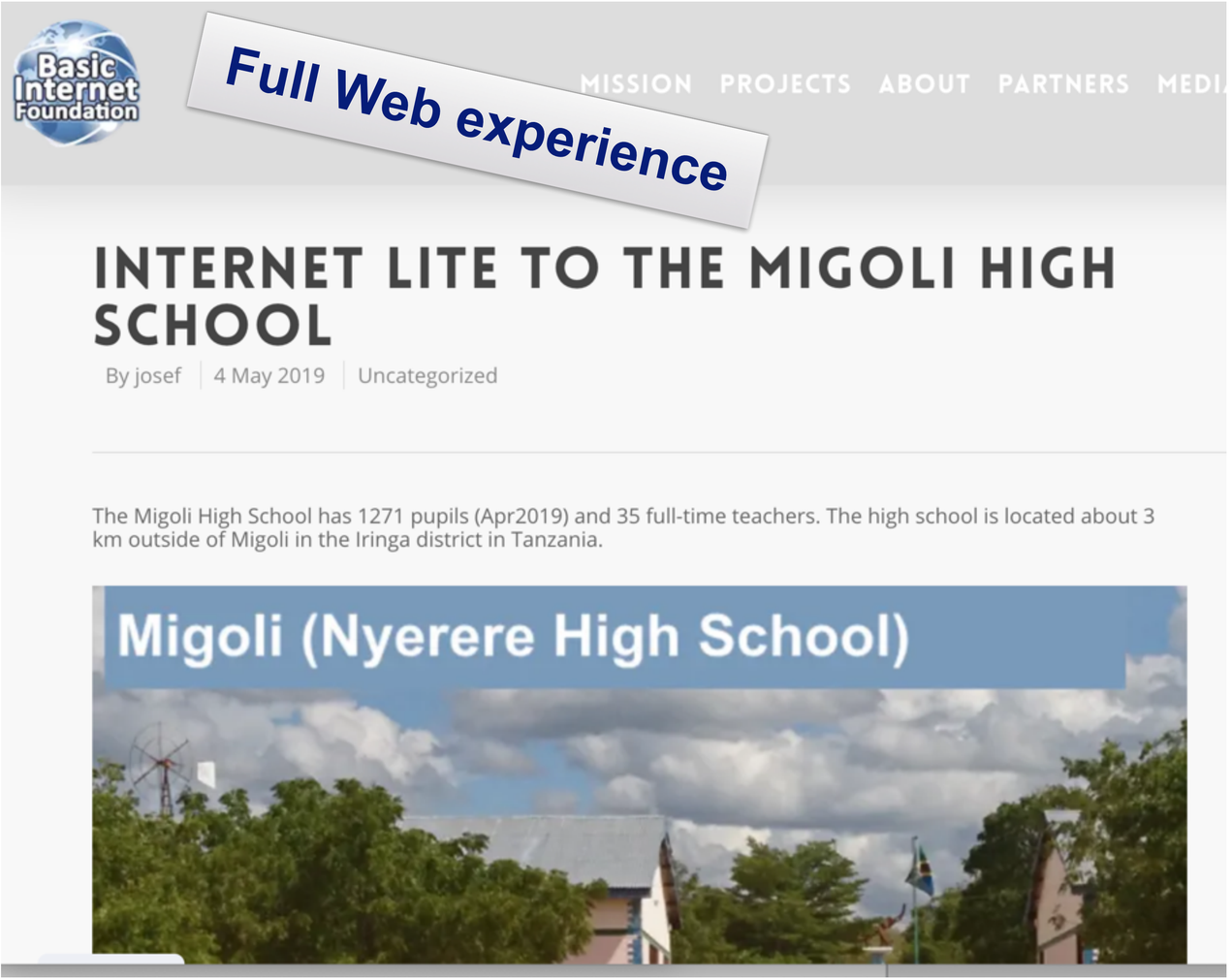
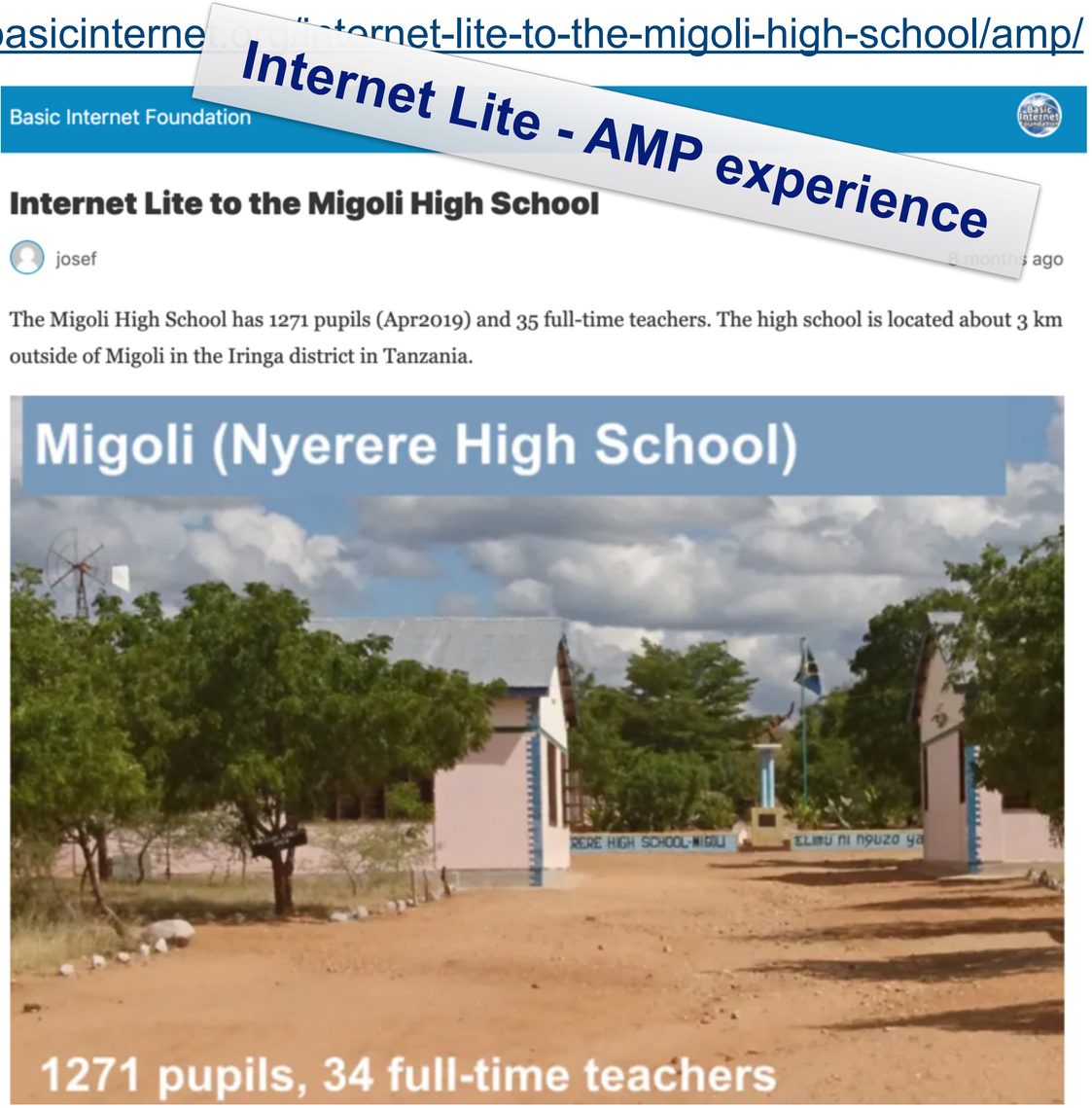
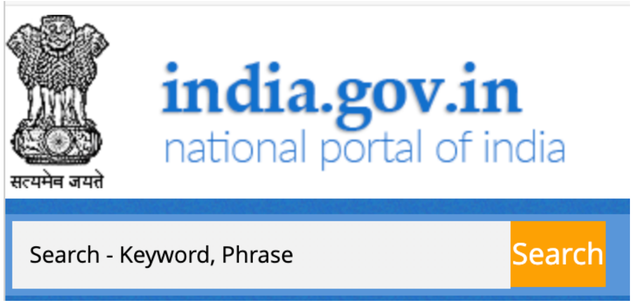
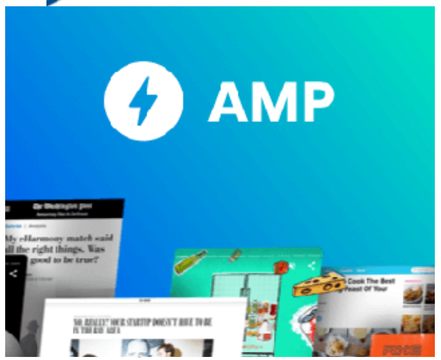
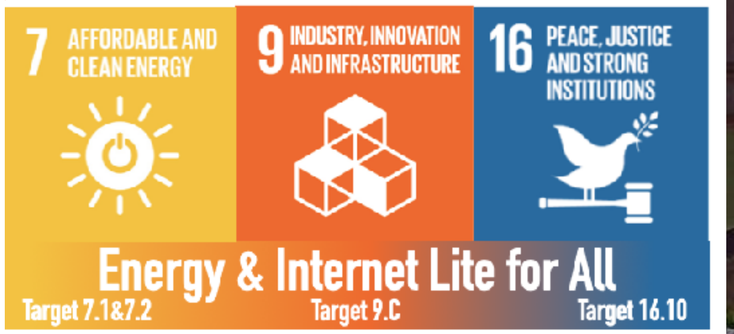




Solutions for ~3.5 Billion non-digital people

1) Value proposition:
   - ✓ Freemium access: Free access to digital education, health, online learning and skills development,
   - ✓ Local empowerment, Relevant content (Village empowerment)

2) Technology and Capacity to absorb digital technologies
   - ✓ Local Info Spots connected to schools, health dispensaries, govern. buildings
   - ✓ Solar/wind, Macro and micro cells, Integrated terrestrial (TVWS)/ Satellite/ backhaul, Crowd sourcing, mesh networks, Aggressive use of cloud and virtualization

3) Affordability (Business/Economic)
   - ✓ Freemium model for access
   - ✓ Collaborations with governments (public-private partnership)
   - ✓ Downward price trend under $85 (large 2nd hand market), Regulations, Push for barter and shared business models, Micro-operator eco-system mandated by the government, Replace USOF