UiO : Department of Technology Systems
University of Oslo

## IoTSec.no Meeting Halden, 23-24Apr2019

# Societal Security - Towards Trusted and Innovative Society


Josef Noll,
Professor, University of Oslo, Department of Technology Systems
Secretary General, Basic Internet Foundation
Kjeller, Norway, m: +47 9083 8066, e: josef@jnoll.net

# Outline

***"The last time I was connected by wire was at birth"***

- Mobile development
  - From Network development
  - To Societal Empowerment
- Societal Trust
  - IoT devices and challenges
  - People empowerment
- Privacy, Internet and net-neutrality
  - IT-industry

Discussion

# Grand Challenges

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

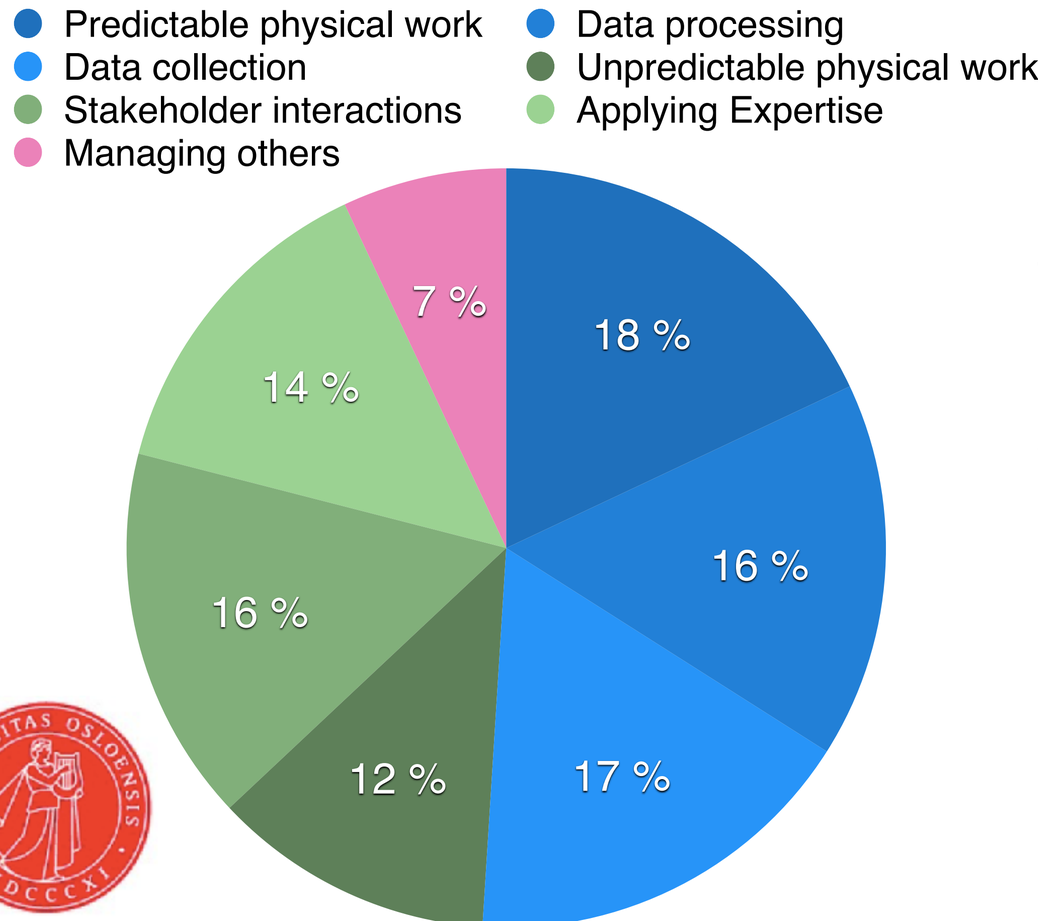
- Digitisation
  - Mobile Networks
  - IoT
  - Automation

...


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

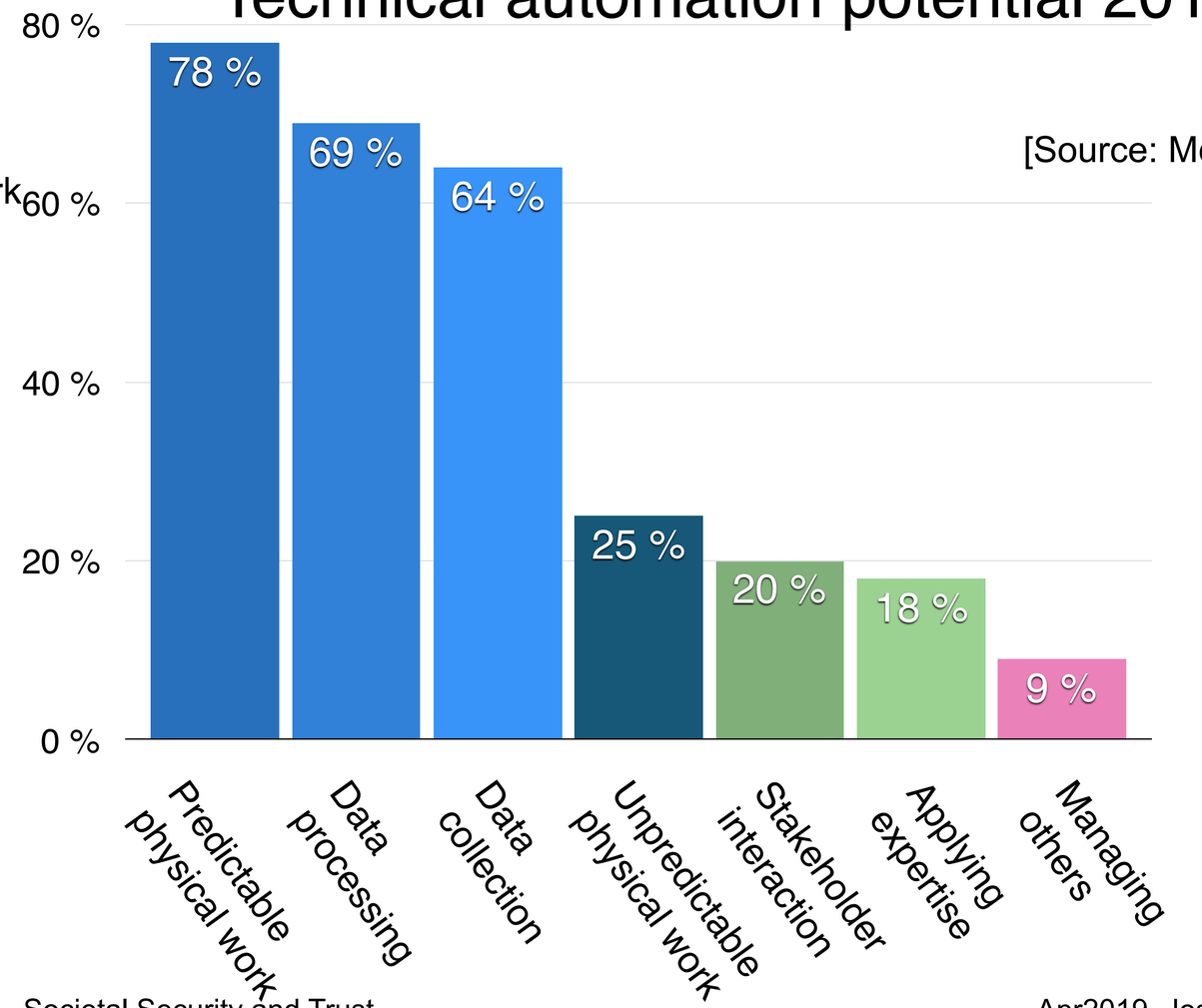
# The challenge from automation

## USA work force time spent [%]

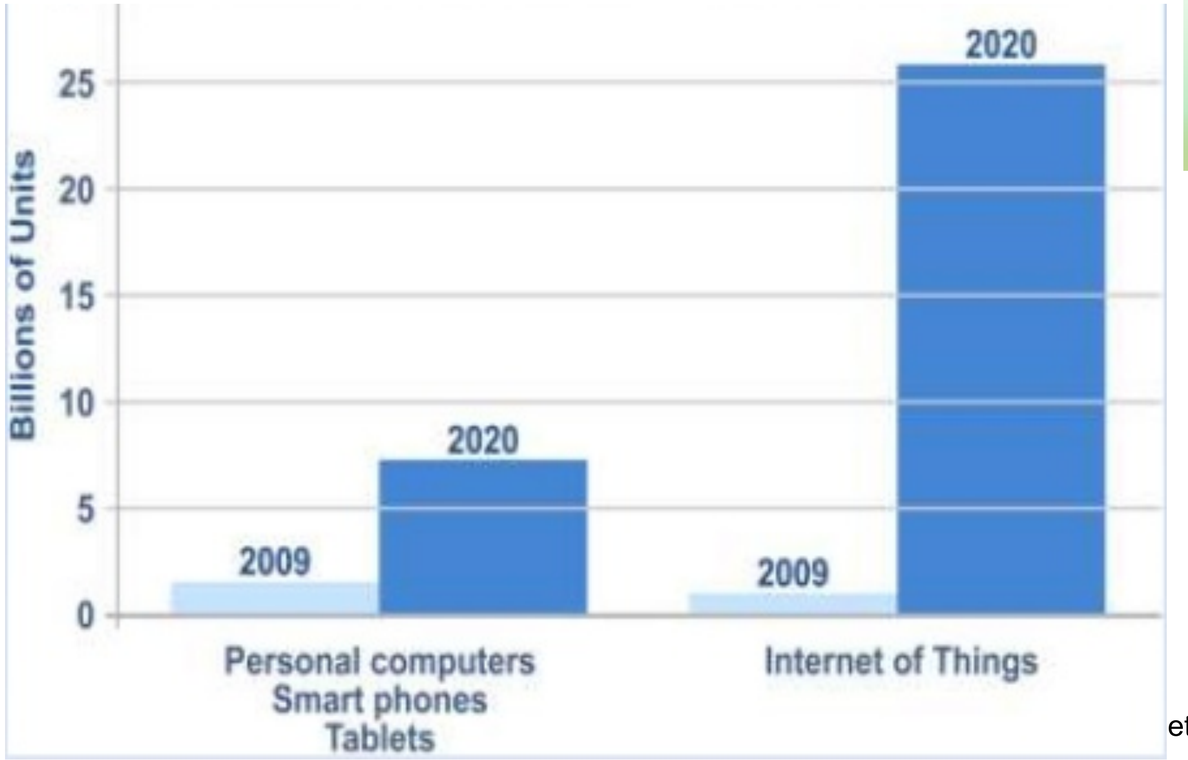



## Technical automation potential 2016 [%]

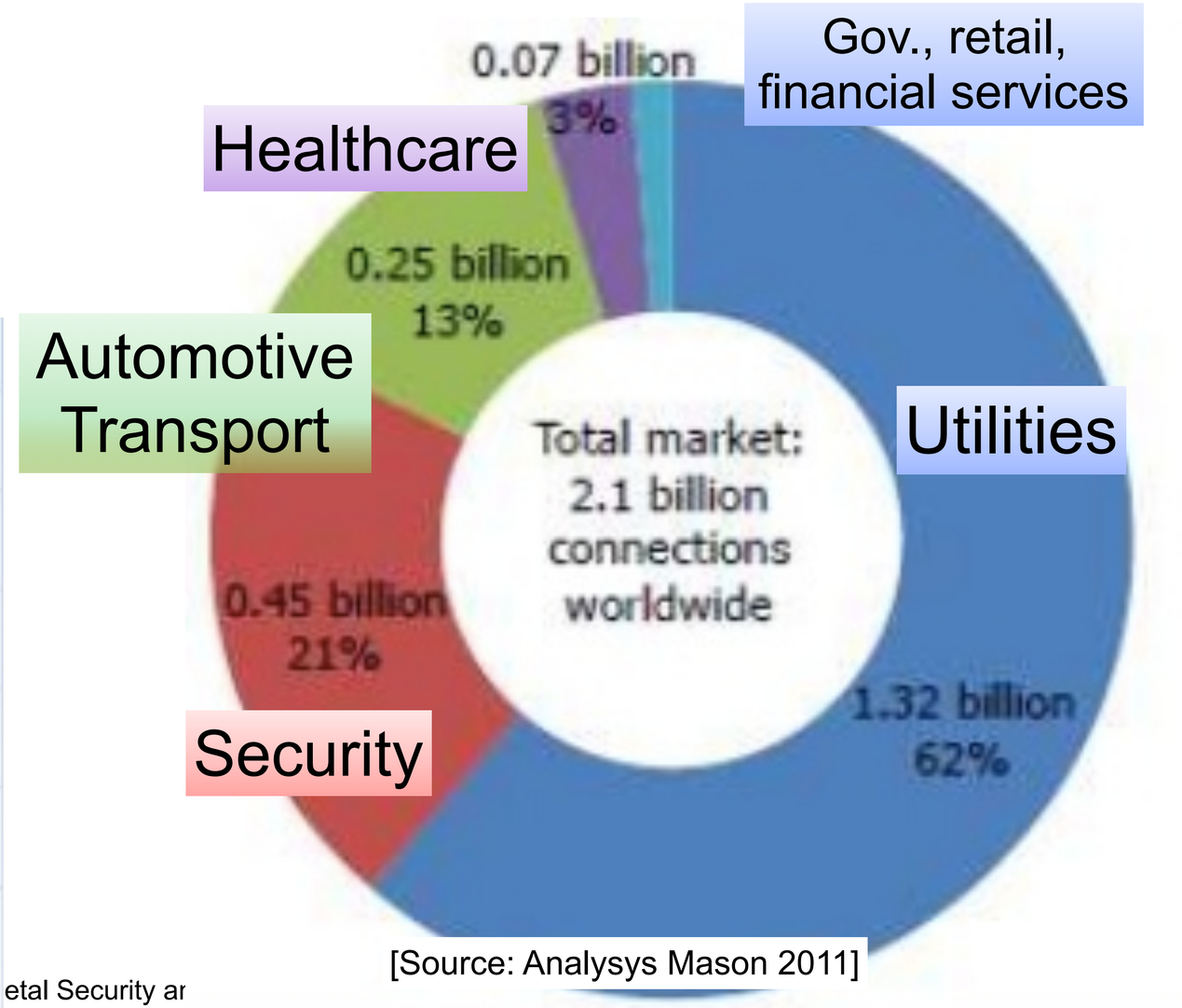
[Source: McKinsey, 2016]



# IoT - 10 x impact of Internet



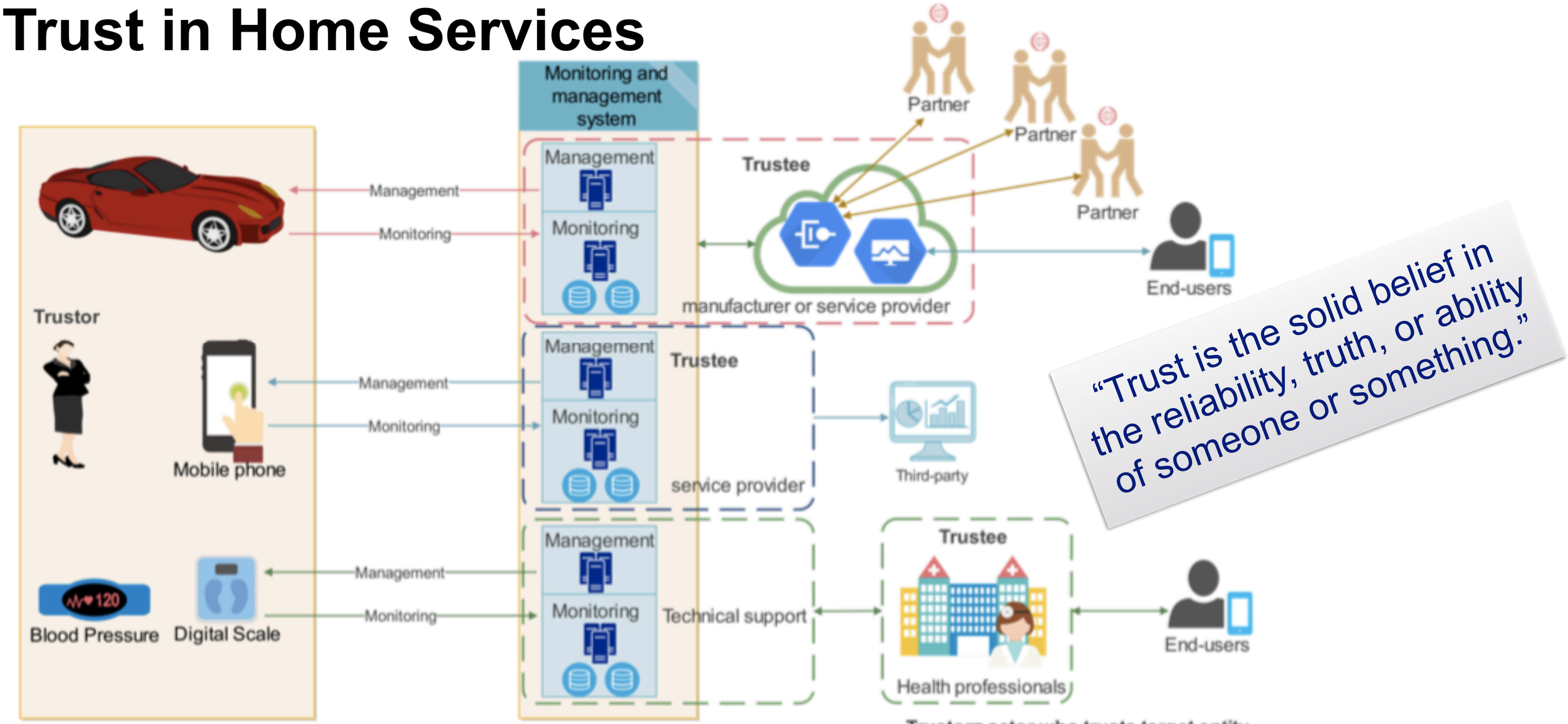

***Commercial & Consumer M2M Device Connections Worldwide 2020***




[Source: Analysys Mason 2011]

etal Security ar

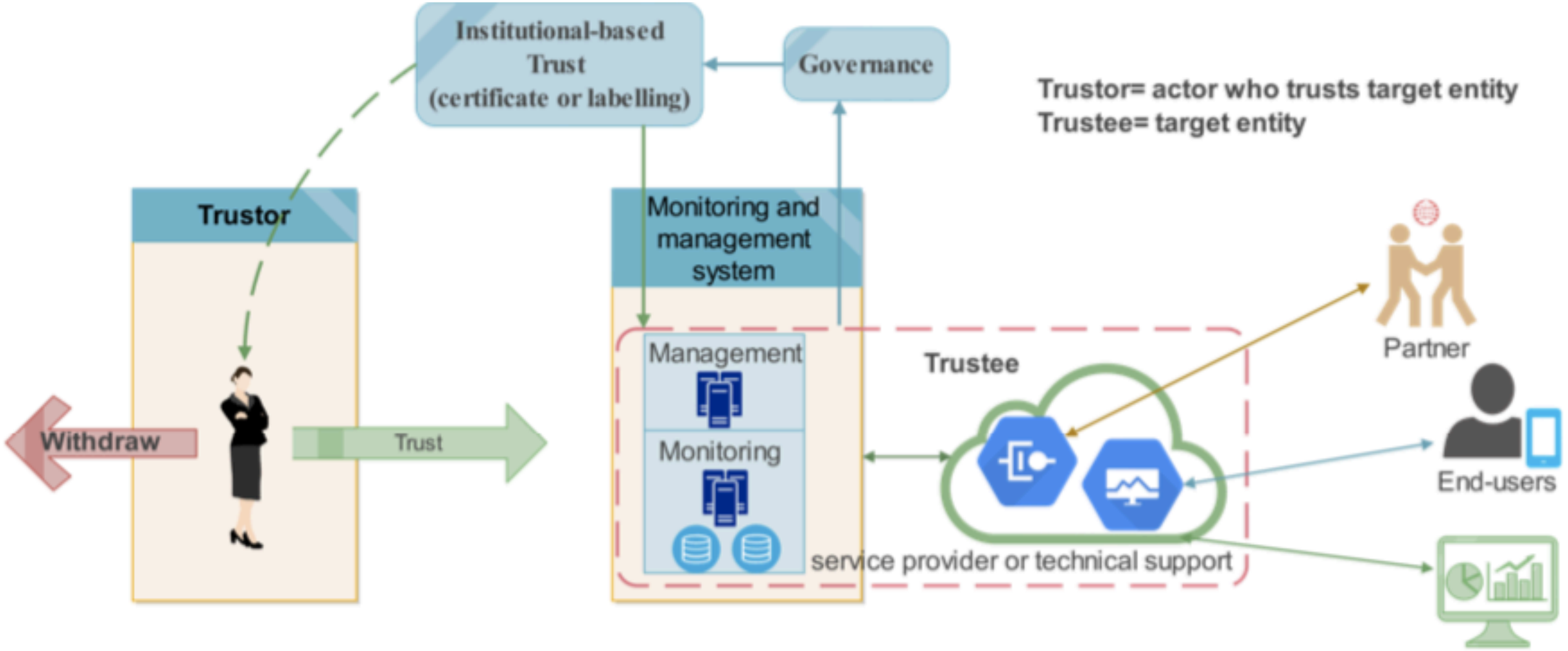
# Trust in Home Services




"Trust is the solid belief in the reliability, truth, or ability of someone or something."

[Source: Morshedi et al., Building Trustable Remote Monitoring and Management Systems, 2018]

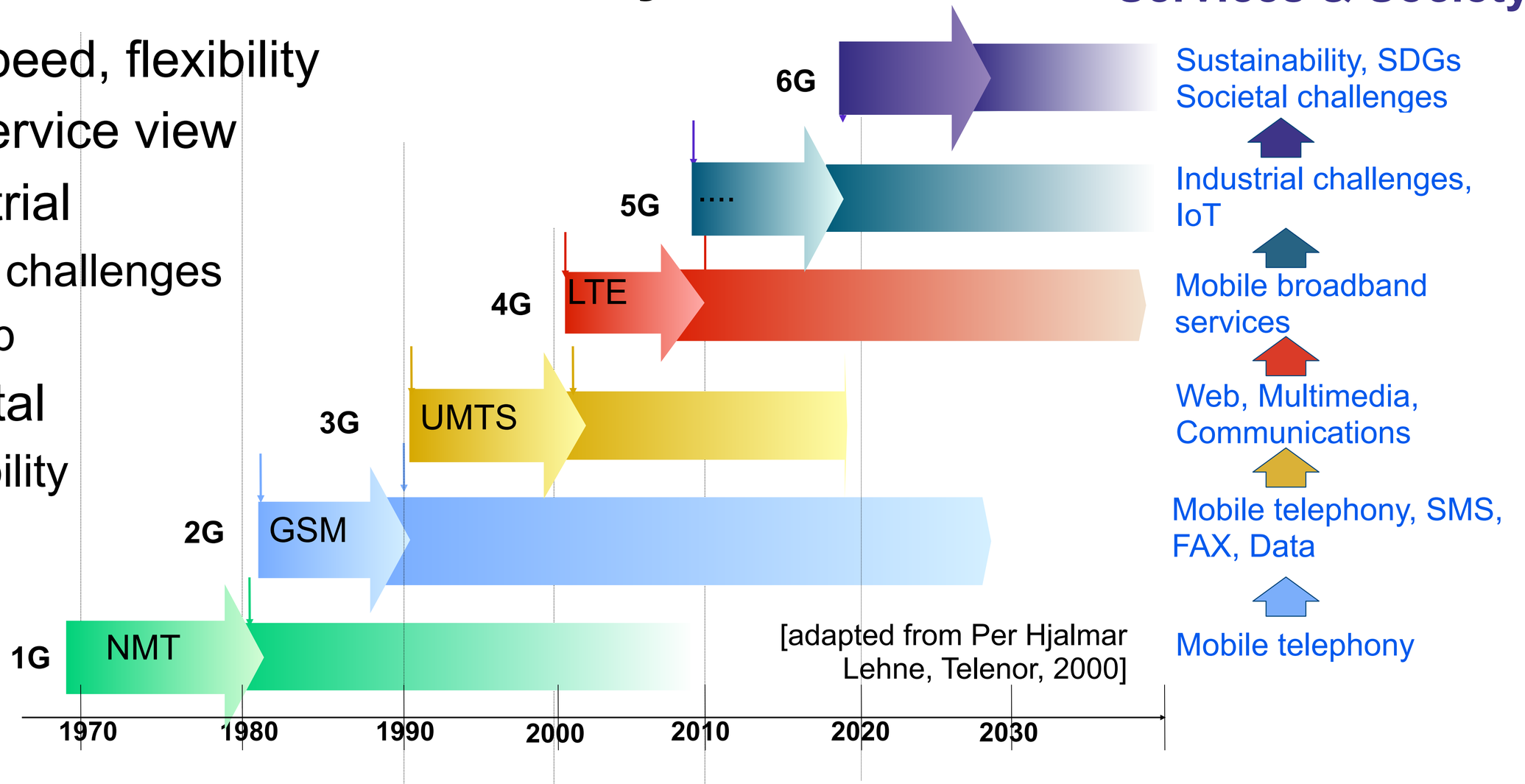
# Managed Service




[Source: Morshedi et al., Building Trustable Remote Monitoring and Management Systems, 2018]

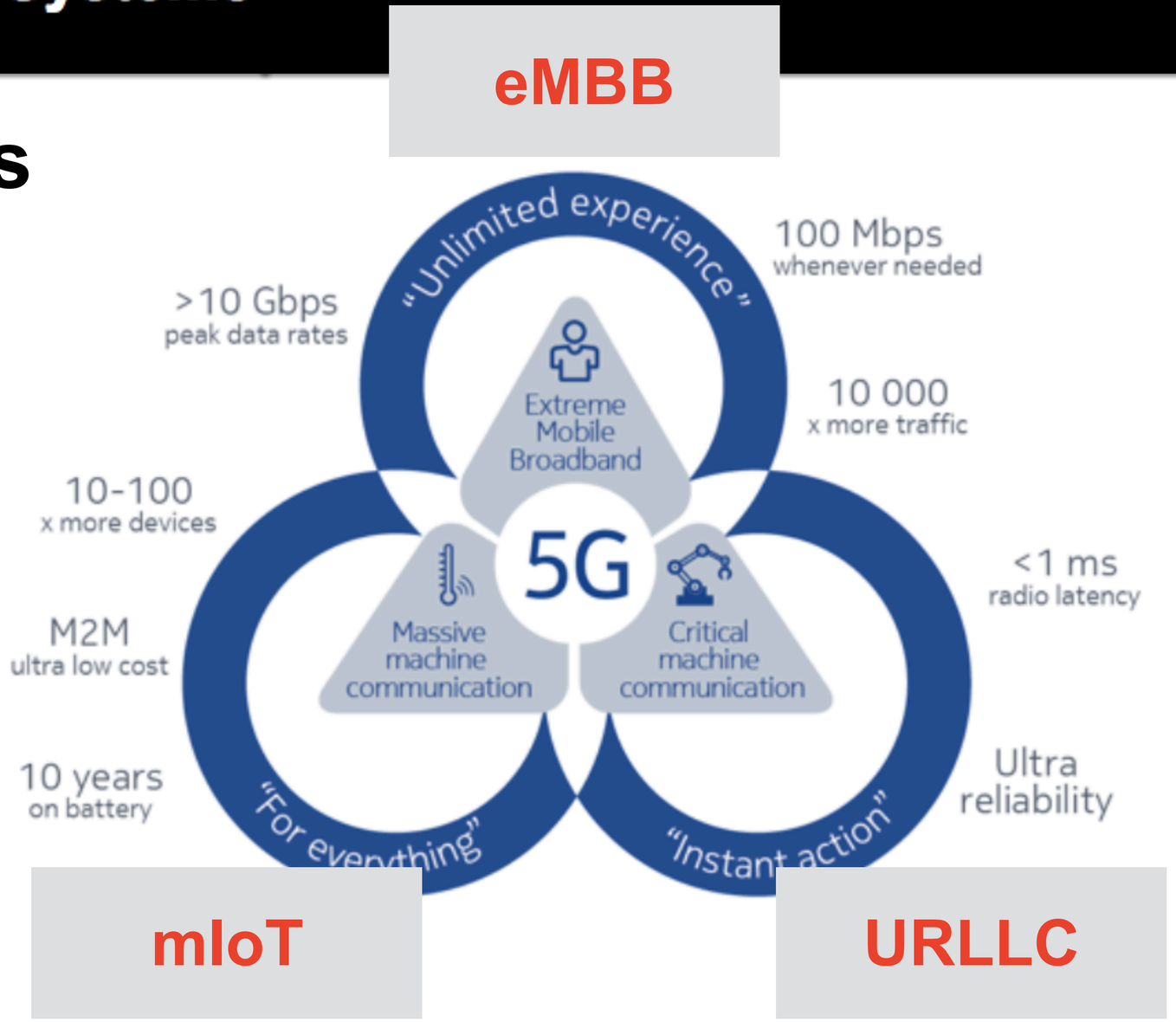
# 6G: Digitisation of the Society

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



# 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

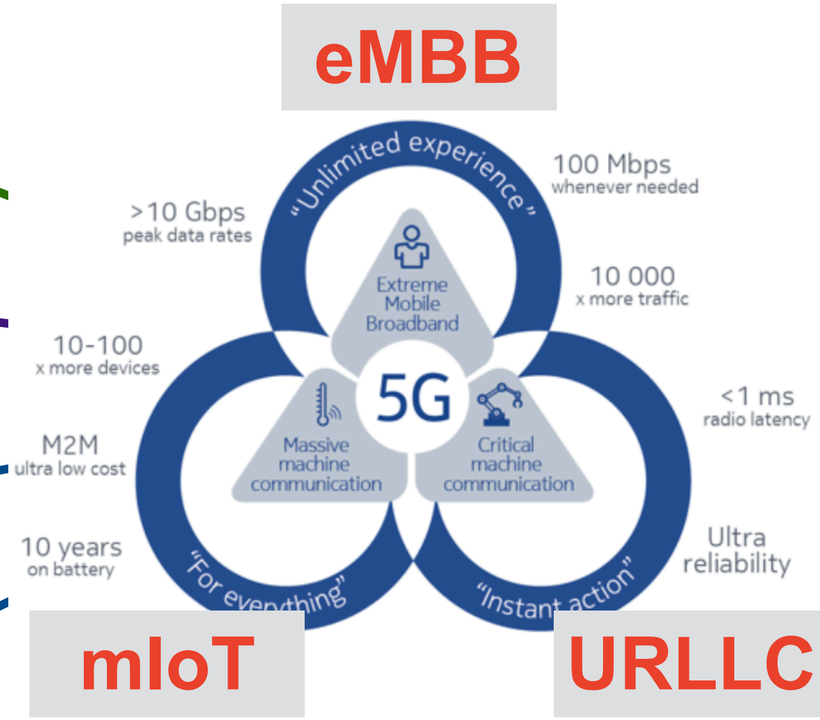
Mobile Broadband

Massive IoT

Reliable & ultra-low latency

0 1 0 1
1 0 0 1
0 1 0 0

**Free access to information for all**




Communication, Internet, Entertainment

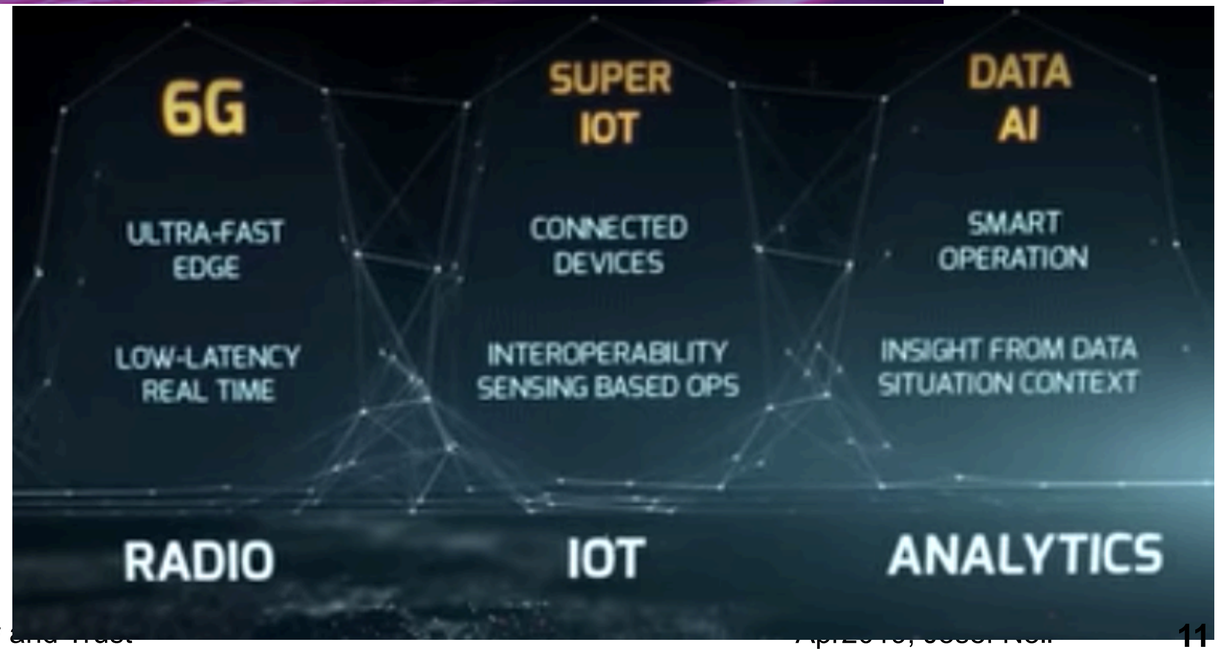
Automation, Manufacturing, Retail

Autonomous systems Health/Medical Alarm, Infrastructure

Information (text & pictures)

# 6Genesis.com by Oulu University

- Lighthouse project in Finland
  - 251 M€ funded
- Goals
  - Support industry in finalization of 5G
  - Develop the fundamental technology needed to enable 6G
  - Speed up digitalization in society
- Focus on Sustainable Development
  - FI, SE, NO, DK academic collaboration

# The change of Business Models

- Car industry: Liability in IoT driven business models
- Energy: Cost of providing of Energy -> Cost of Reliable Network
- Telecom: uO (MicroOperator), Partnership

http://www.scmagazine.com/iot-security-forcing-business-model-changes-panel-says/article/448668/



Teri Robinson, Associate Editor
Follow @TeriRnNY

October 22, 2015

# IoT security forcing business mode panel says



To secure the Internet of Things and to build trust with customers, the way that vendors approach manufacturing, distributing and supporting devices and solutions must change, a panel of security pros said Monday at the National Cyber Security Alliance's (NCSA's) Cybersecurity Summit held at Nasdaq.


"Business models will have to change. We used to build them [products], ship them and forget about them until we had to service them," said John Ellis, founder and managing director of Ellis & Associates. "We've moved to a new world where we have to ship and remember."

# Volvo to 'accept full liability' for crashes with its driverless cars

## But decide on rules so we can make the dang vehicles

13 Oct 2015 at 06:04, OUT-LAW.COM



Volvo will "accept full liability" for collisions involving its autonomous vehicles, the company has confirmed.

# Privacy in IoT

- Privacy: All our data to IT companies?
-

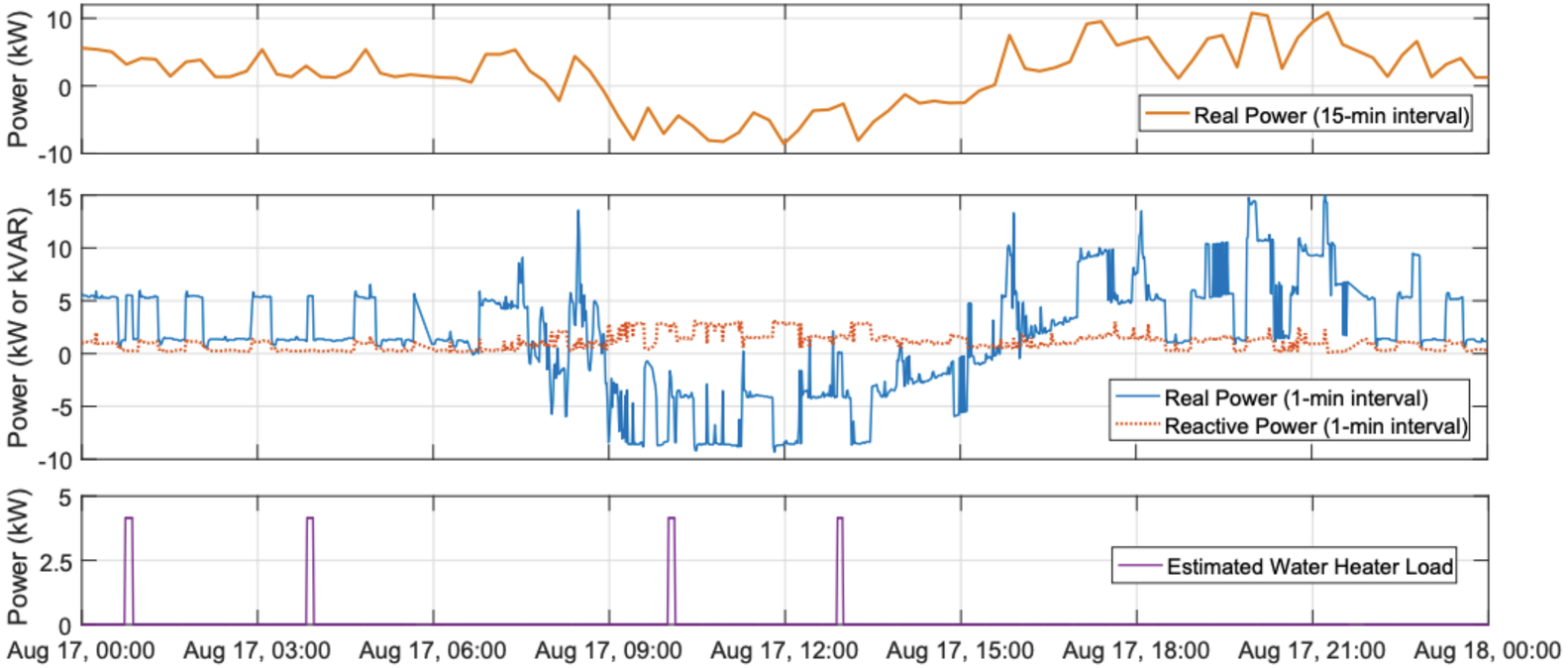
# Instantaneous and high-resolution

- HAN Port
  - ➡ energy usage
  - ➡ online monitoring (1/s … 1/min)
- Typical Norway
  - ➡ Power (every 2.5s)
  - ➡ Current (every 10s)
  - ➡ Voltage (every 10s)
- Connected devices
- Security
  - physical security, encryption


AMS HAN port (NEK)
https://www.nek.no/info-ams-han-brukere/

# Meter analysis - knowledge about you

- Security
  - (unencrypted) wireless data
  - Cloud computing
  - “is my HAN port open?”
- Information & control
  - energy saving (water heater)
  - load control
  - Fridge, freezer, heat pump,…
  - usage pattern, “door is open”
  - “which TV channel do you watch” (every 2s)




http://nilmworkshop.org/2018/proceedings/Poster_ID17.pdf


https://www.cnet.com/news/researchers-find-smart-meters-could-reveal-favorite-tv-shows/

# "Amazon Echo" in your smart meter

- Amazon/Google/Apple home control
  - ➡ works on your command

- "Amazon HAN connect"
  - ➡ works all the time
  - ➡ brings all your information to the cloud

**Amazon Echo/ Alexa**


**Apple Home Kit**


**Google Home/Nest**

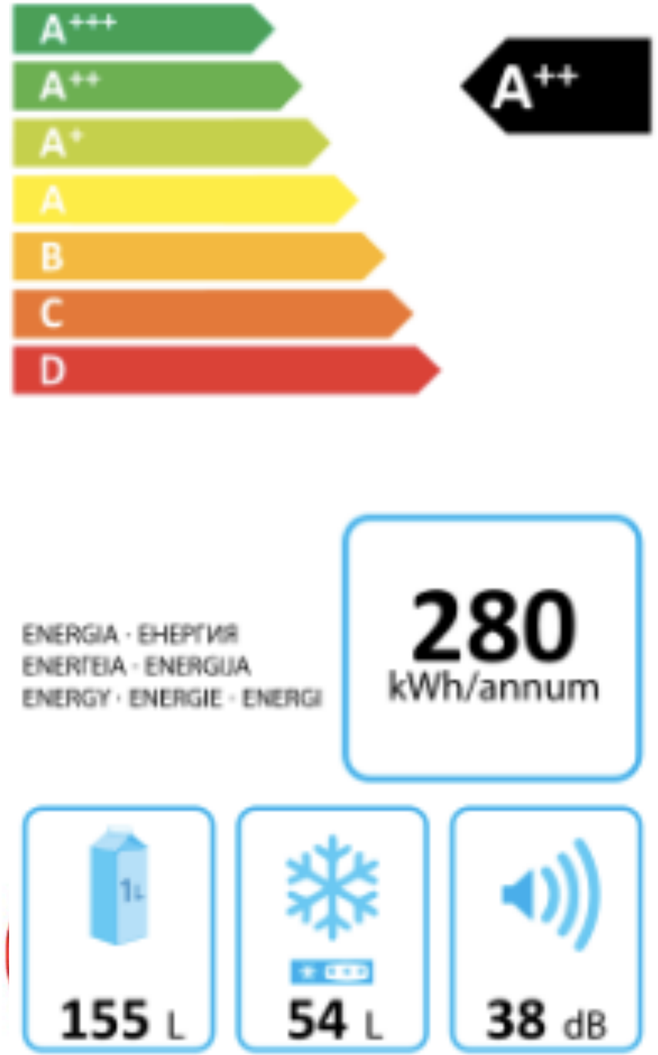

# Comparison with the Mobile Network

- Facebook's Free Basics
  - ➡ 0-rated content (free usage)
  - ➡ 3-months break even
- The con's of Free Basics
  - ➡ every click goes to Facebook
  - ➡ Net-neutrality

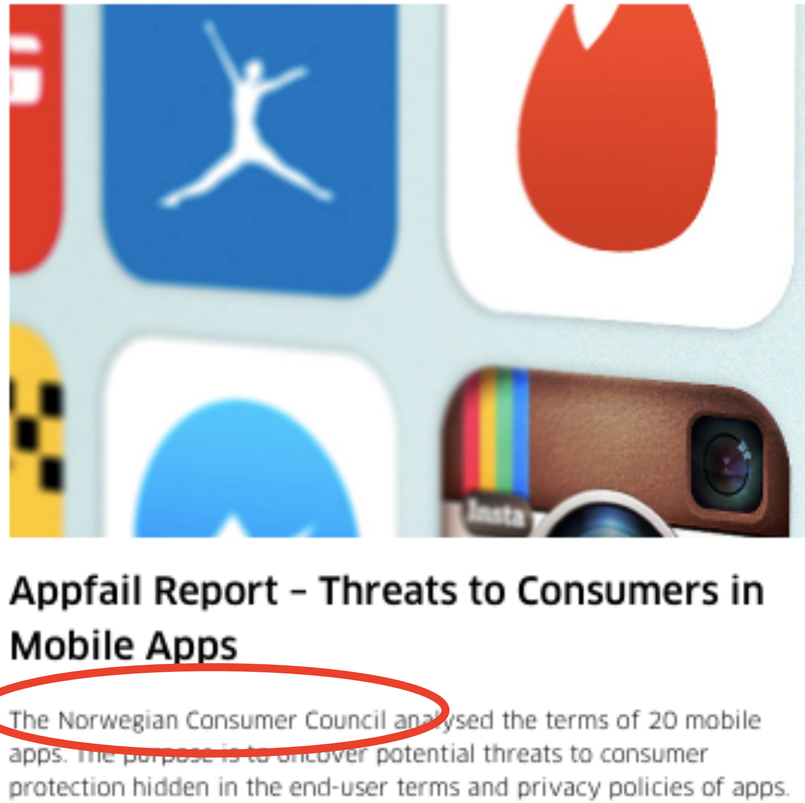
- HAN port
  - ➡ who owns my power consumption?
  - ➡ cloud analysis?


**Premier Minister Narendra Modi (India)**

# Towards Measurable Privacy - Privacy Labelling




- "Measure, what you can measure - Make measurable, what you can't measure" - Galileo
- Privacy today
  - ➡ based on lawyer terminology
  - ➡ 250.000 words on app terms and conditions
- Privacy tomorrow
  - ➡ A++: sharing with no others
  - ➡ A: …
  - ➡ C: sharing with ….
- The Privacy label for apps and devices



**Appfail Report – Threats to Consumers in Mobile Apps**

The Norwegian Consumer Council analysed the terms of 20 mobile apps. The purpose is to uncover potential threats to consumer protection hidden in the end-user terms and privacy policies of apps.

# The economic perspective

- The big 5 IT companies have a GDP as big as that of France
- Amazon largest sector in terms of revenue is selling of data
  - ➡ 20% of revenue

- How can SMEs compete?
  - ➡ Each service and device gets a privacy label

- Four areas for Privacy Label
  - ➡ which data are collected
  - ➡ sharing to my phone, my cloud, public cloud,...
  - ➡ data communication integrity and storage
  - ➡ further distribution of data, ownership of data, further processing

Privacy Label (A-F)
- easy visibility
- customer focus
- transparent


privacylabel.IoTSec.no



Source: EU commission(2015)

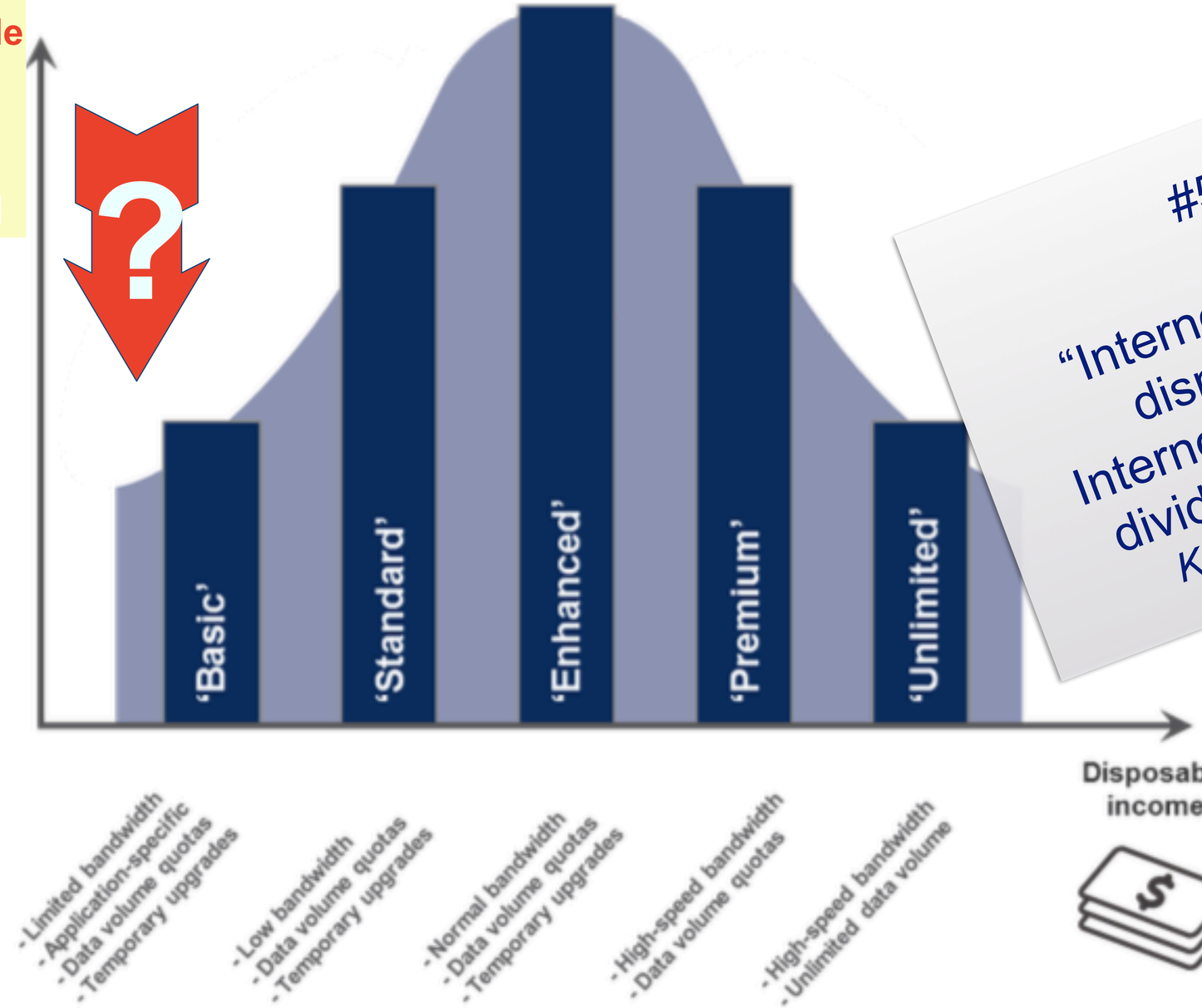
| Score | Label | Color |
|---|---|---|
| 90-100 | A | |
| 80-90 | B | |
| 70-80 | C | |
| 60-70 | D | |
| 50-60 | E | |
| <50 | F | |

# Trustability, Trust labels

- Declaration of what can be/is monitored
  - Purpose
  - minimised collection//prove
  - interval for collection of data
- Storage and law enforcement
  - data center location// responsibility
  - in-house vs third party
  - law enforecement
  - data backup and destruction plan
  - data protection methods
- Access to monitoring data and configuration
  - industry grade access control mechanisms
  - record data from access control
  - minimize configuring for attack avoidance
- Security and privacy measures
  - transmission encryption
  - multi-factor cloud authentication
  - PKI secure devices and communications

# Telecom view on digital inclusion

Addressable Market

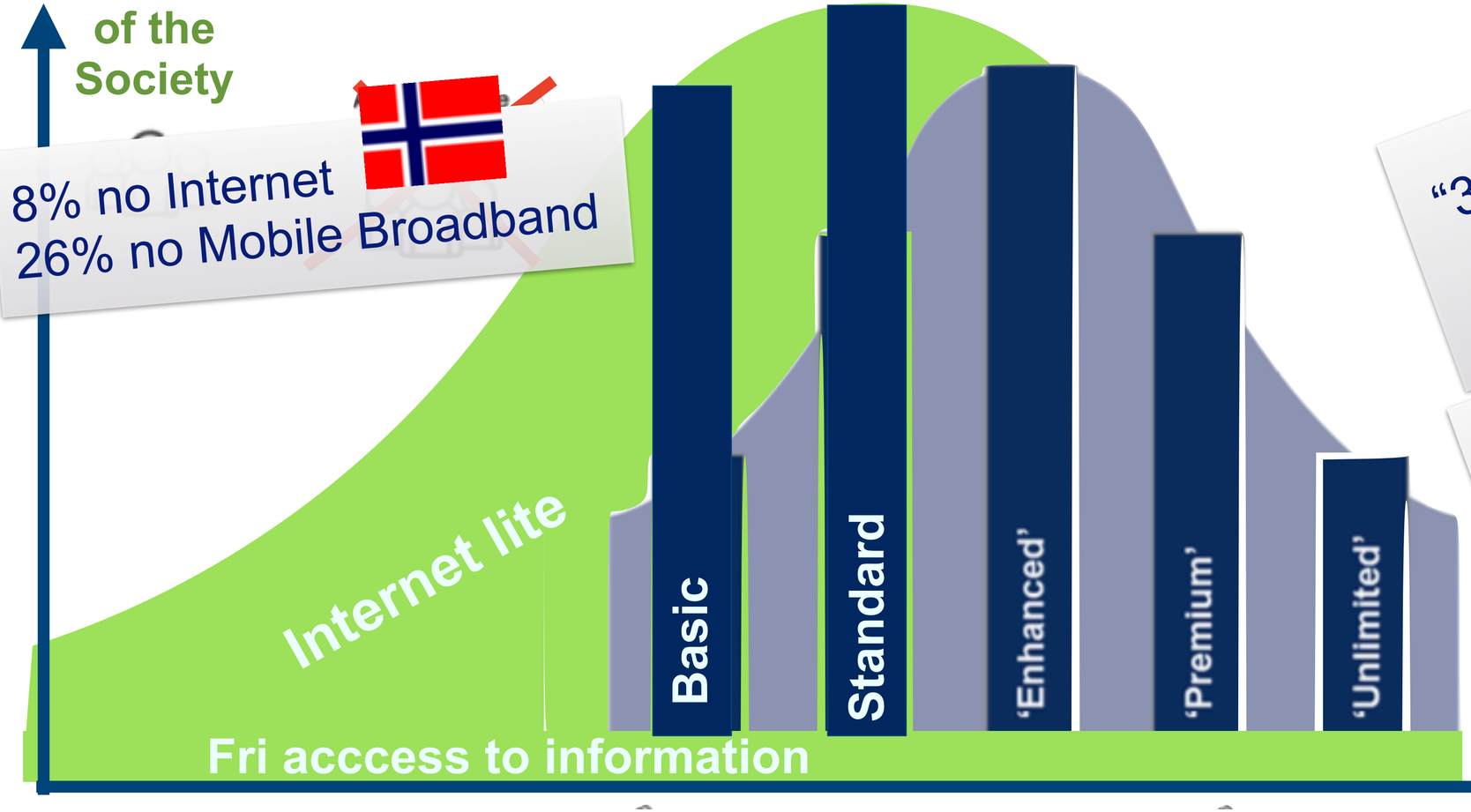



#5Gfor All?

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

Source: Service Innovation through Smart Networks, Ericsson, https://www.ericsson.com/assets/local/networks/documents/service-innovation-through-smart-networks.pdf

# 6G (#5GforAll) for digital inclusion




"3.9 Billion People are not connected"
*[Internet Government Forum, 2018]*

"In 2020 45% of connections in Africa (SSA) are still 2G connections"
*[Ericsson: Service Innovation]*

[Adapted from: Service Innovation through Smart Networks, Ericsson, 2018]

And what about IoT?

SUSTAINABLE DEVELOPMENT GOALS

FREEDOM OF EXPRESSION

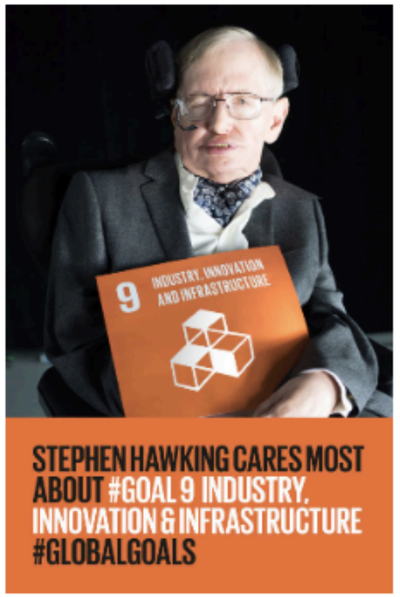
# We can't reach the U.N. goals for sustainable development without the internet

22 JUNE 2017 | 11:40 AM

Tweet Share

It's become common wisdom that the United Nations' ambitious "Global Goals for Sustainable Development" aren't just for the U.N., or even governments, to implement. Launched in September 2015, the 17 goals and 169 targets are "a series of ambitious targets to end extreme poverty and tackle climate change for everyone by 2030" (hence the alternative moniker, the "2030 Agenda for Sustainable Development").

Replacing the more arcane "Millennium Development Goals," these Sustainable Development Goals (SDGs) are everyone's goals, crowd-sourced to completion and promoted by companies and civil society alike. (Cue the hip, auto-playing video on the website.)




Smartly, the goals, especially Goal 17, emphasize that **access to technology underpins every one of these commitments** to the eradication of extreme poverty.

However, not all connectivity is the same, nor yields the same benefits to societies in terms of economic, social, or cultural development. As we told the International Telecommunication Union (ITU), only **stable, secure, and open access** to broadband internet will ensure success for the U.N. SDGs. That's something civil society and our partners will continue to make clear, and we'll need to work in legislatures to get the point across, not simply at aid and development banks.

**To reach the SDGs, we need civil and political advocacy**

Traditionally, information and communications technology (ICTs) have not been a major recipient of aid funding. That's one reason this crucial technology is "under-represented" in the SDGs and appears in only four of the 169 targets. It's assumed that telecommunications will take care of itself, having been largely deregulated and privatized in the 1980s and 1990s. Yet **more than half the world's population is not using the internet**, a statistic showing the failure of local, national, and global governance, with economic, political, and moral implications

PETER MICEK
@lawyerpants

FREEDOM OF EXPRESSION | GLOBAL | #ITU4SDG | #KEEPITON | CONNECTIVITY | ITU | SDG | SUSTAINABLE DEVELOPMENT GOALS | UNITED NATIONS

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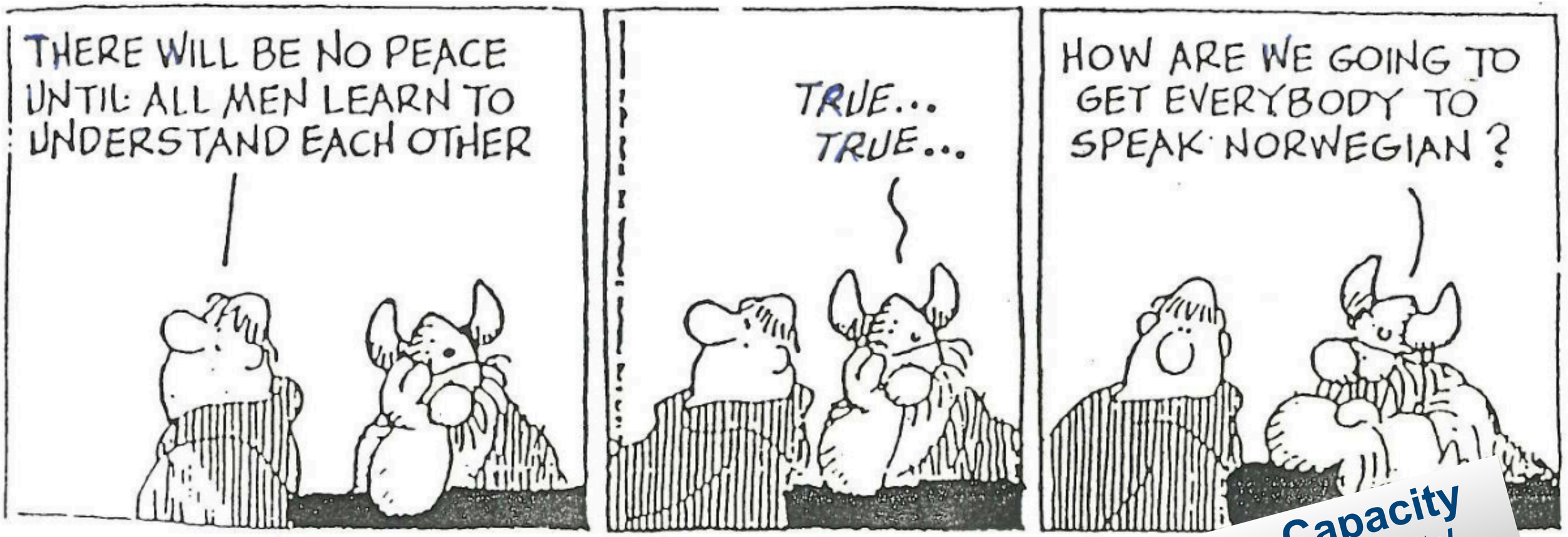
**Beyond connectivity: building an inclusive U.N. agenda for internet development** Read More ▸

**Access Now welcomes new report on economic impact of shutdowns** Read More ▸

https://www.accessnow.org/cant-reach-u-n-goals-sustainable-development-without-internet/

# Internet lite for all
## *the catalyst for the goals*




**Inclusiveness - Trust - Capacity**
**United Nations High Level Panel on Digital Cooperation 2019**

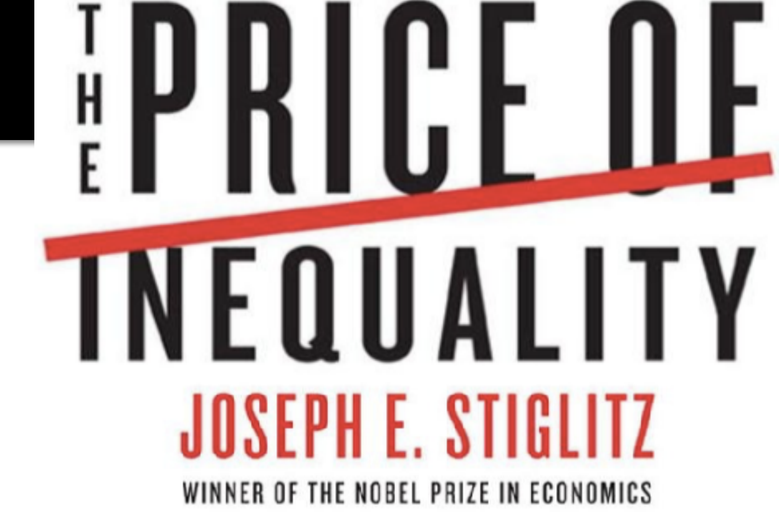
# Societal Trust - Discussion

- Digital Inclusion
  - ➡ Catalyst for the SDGs
  - ➡ Innovative Society
- Mobile evolution
  - ➡ from technology
  - ➡ to services
  - ➡ to societal empowerment
- Internet Lite for All
  - ➡ free access to information


Ved å bygge internett for alle, og ved å skape relevante og uunnværlige digitale tjenester, kan vi bidra til en bedre verden, skriver Sigve Brekke.
FOTO: Heiko Junge, NTB scanpix

**IKT er den nye oljen! | Sigve Brekke**

[Source: aftenposten.no]




**Norway's wealth:**
**Oil, now data, for societal empowerment and wealthy society**

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24-26 March 2019

http://www.6gsummit.com