



Smart Energy 2017, Halden, Feb 2017

Collaboration for a more secure Smart Grid operation

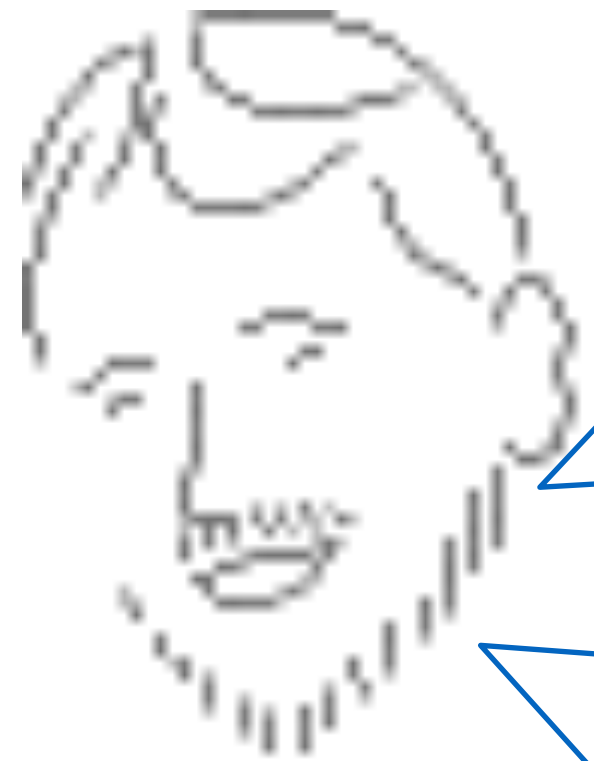
*Josef Noll, Christian Johansen
UiO*

*IoTSec Project leader/COO
jnoll@uio.no, christi@ifi.uio.no*

[#IoTSec](#), [#IoTSecNO](#)

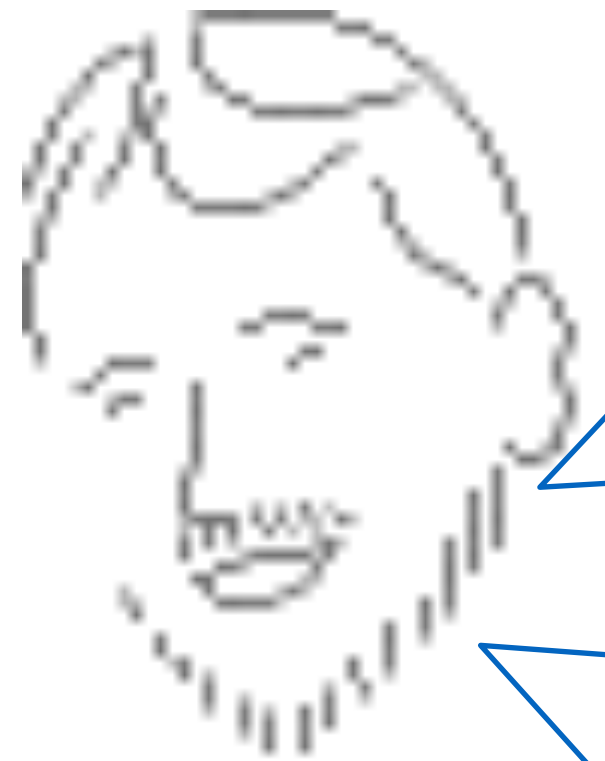


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- Faster
- More difficult to understand
- Autonomous
- Less secure?
- Sustainable?
 - Waste, CO2
 - Energy
 - Noise



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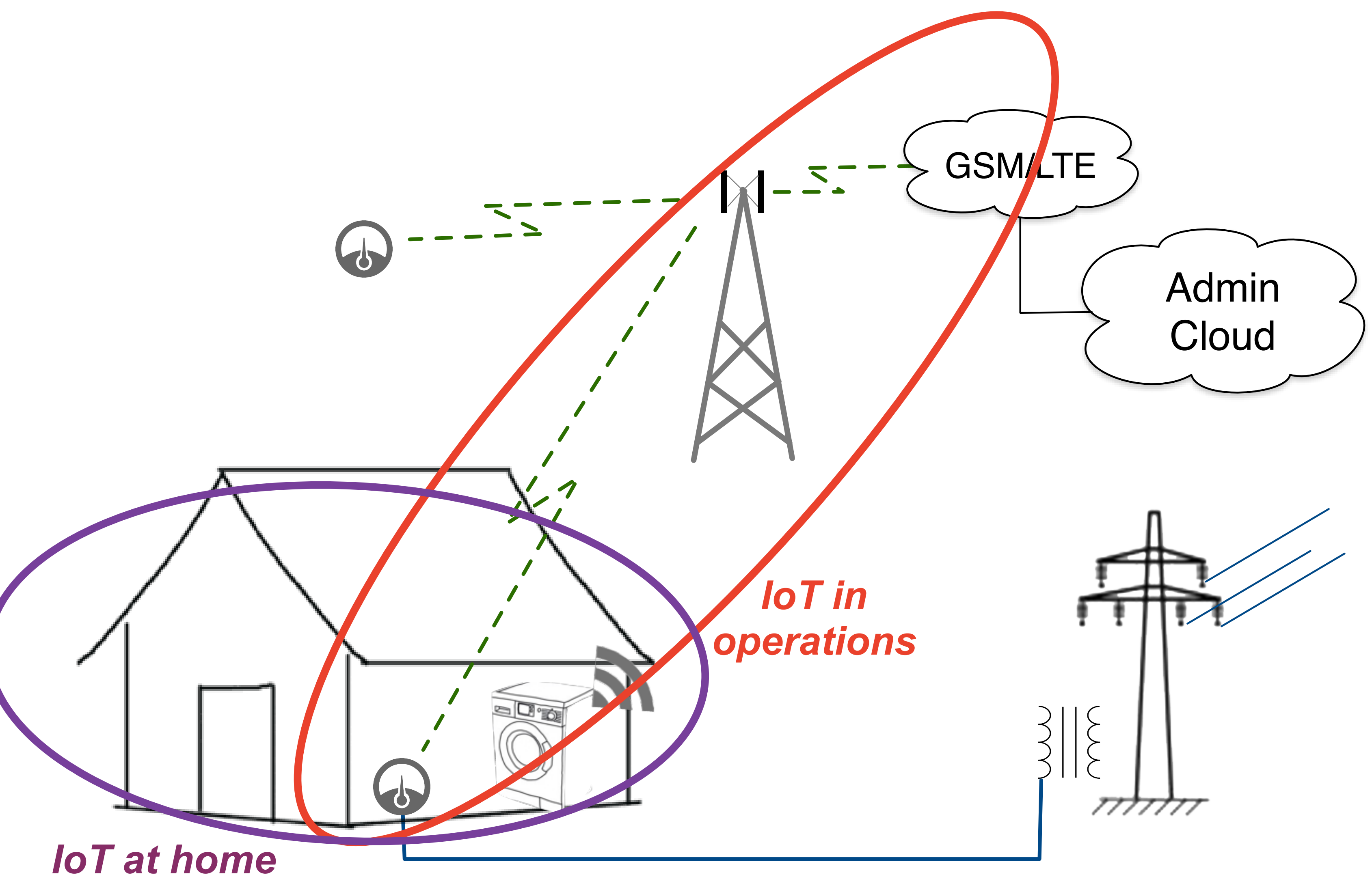
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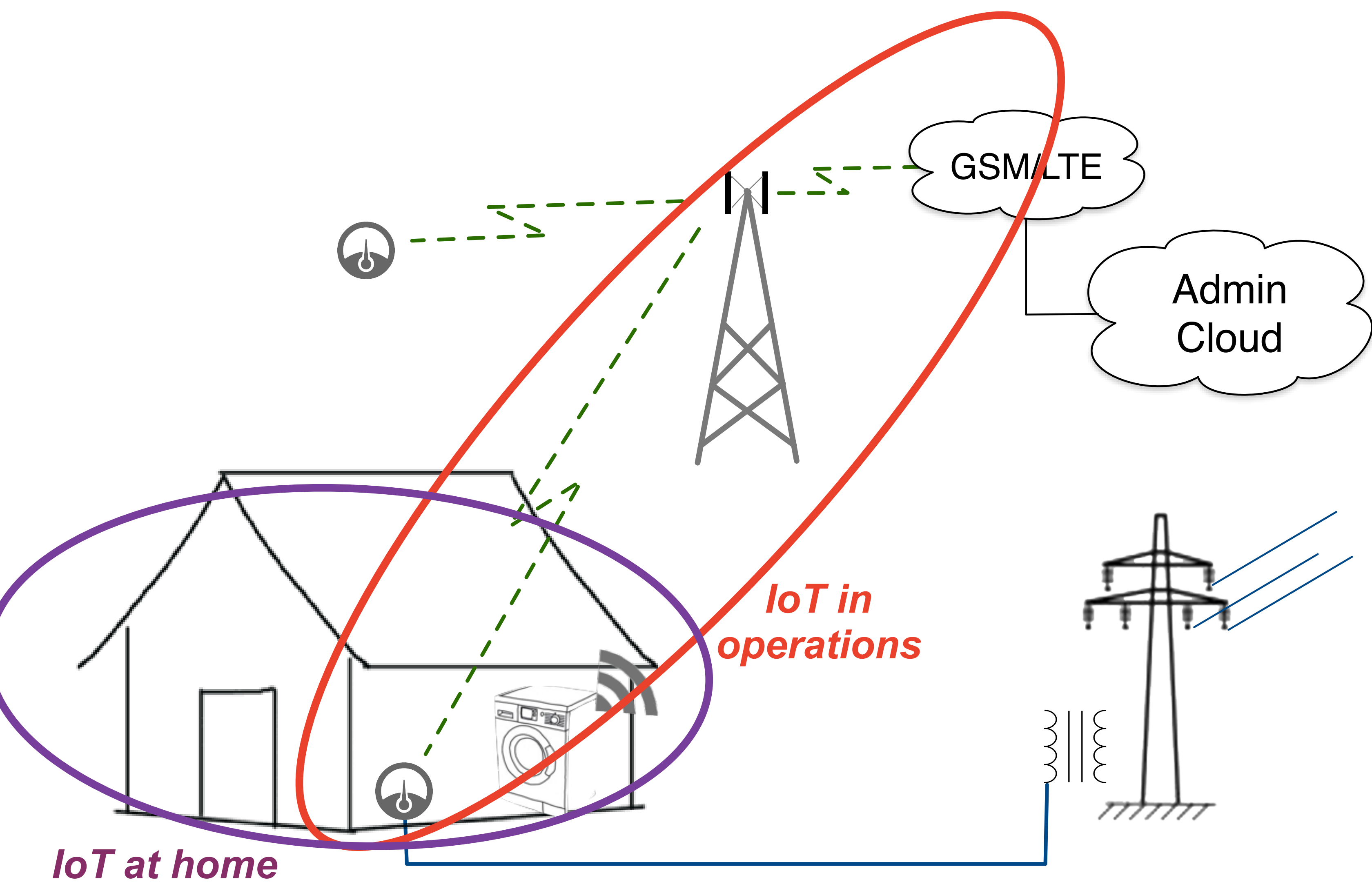
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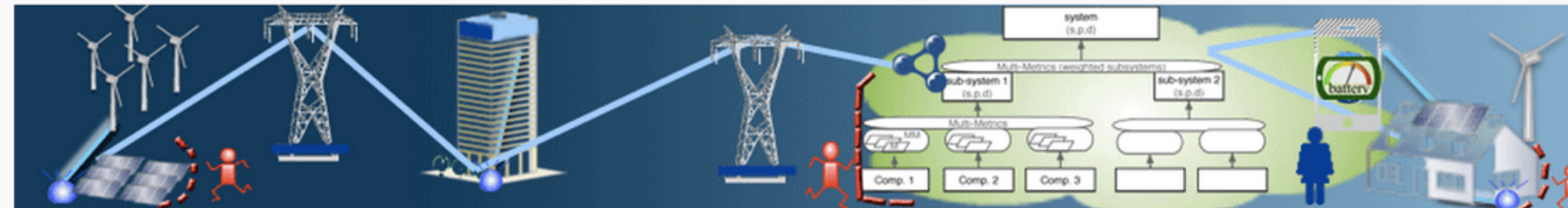
Kronikk: Som gjesteland på G20-toppmøtet må vi bidra til å endre verden | Erna Solberg

ERNA SOLBERG (H), STATSMINISTER
OPPDATERT: 30.JAN.2017 21:39 | PUBLISERT: 30.JAN.2017 19:58





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The diagram shows a smart grid architecture with wind turbines, solar panels, and a central system (s.p.d.) connected to sub-systems 1 and 2. Sub-system 1 is connected to Comp. 1, Comp. 2, and Comp. 3. Sub-system 2 is connected to a battery and a house. A person icon is also shown near the house.


The **IoTSec - Security in IoT for Smart Grids** initiative was established in 2015 to promote the development of a safe and secure Internet-of-Things (IoT)-enabled smart power grid infrastructure. The [Research Project received funding from the Research Council of Norway \(RCN\)](#) to contribute to a safe information society.

IoTSec addresses the basic needs for a reliable and efficient, uninterrupted power network with dynamic configuration and security properties. It addresses in addition the needs of businesses and end users of additional IoT services by exploring use cases for value-added services with the intent to design the building blocks for future services that consider the necessary security and privacy preconditions of successfully deployed large-scale services. IoTSec will apply the research in the envisaged Security Centre for Smart Grids, co-located with the Norwegian Centre of Excellence (NCE Smart).

About

The IoTSec initiatives drives Research for secure IoT and Smart Grids

#iotsecno

**Josef Noll**
@josefnoll
11 Nov

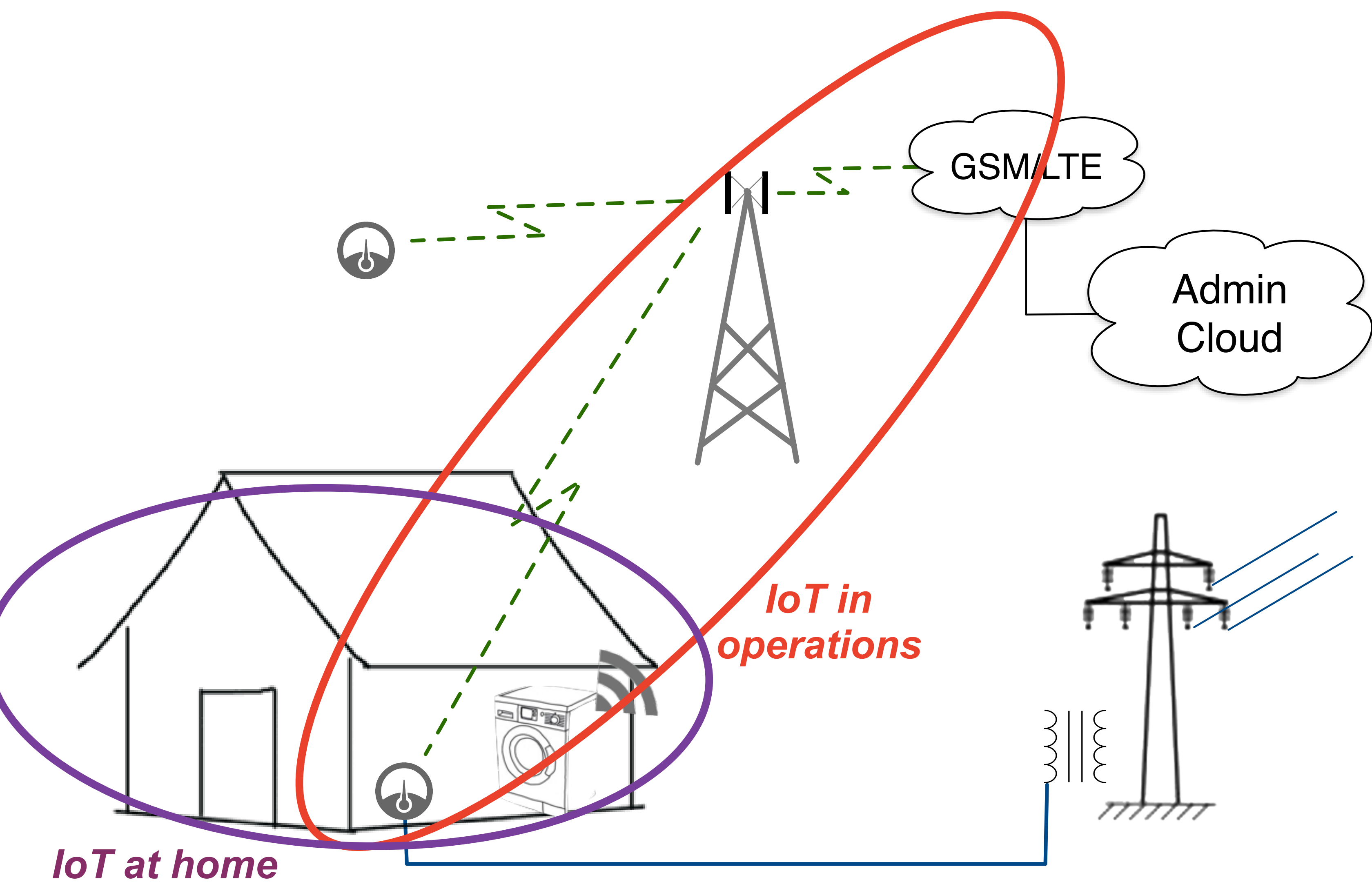
NCE Smart Partnerkonferansen med @KristinHalvorsen og Nasjonalt senter for Sikkerhet i SmartGrid #IoTSecNO pic.twitter.com/FLUa94wIN

«Open World Approach»
everything that is not declared closed is open



National initiative for a more secure future in IoT

IoTSec.no - Security for IoT for Smart Grids



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NCE Smart Partnerkonferansen med @KristinHalvorsen og Nasjonalt senter for Sikkerhet i SmartGrid #IoTSecNO pic.twitter.com/FLLua94wIN

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Partners and Collaborations

- UiO/Iifi
- UiO/ITS
- NR
- Simula
- NTNU
- UiA
- Smart Innovation Østfold

Academia

- Smart Innovation Østfold
- eSmart Systems
- Fredrikstad Energi
- Glitre Energi Nett
- Movation
- EyeSaaS
- mnemonic
- Open Innovation Lab

Industry

- Norw. Data Protection Auth.
- Forbrukerrådet

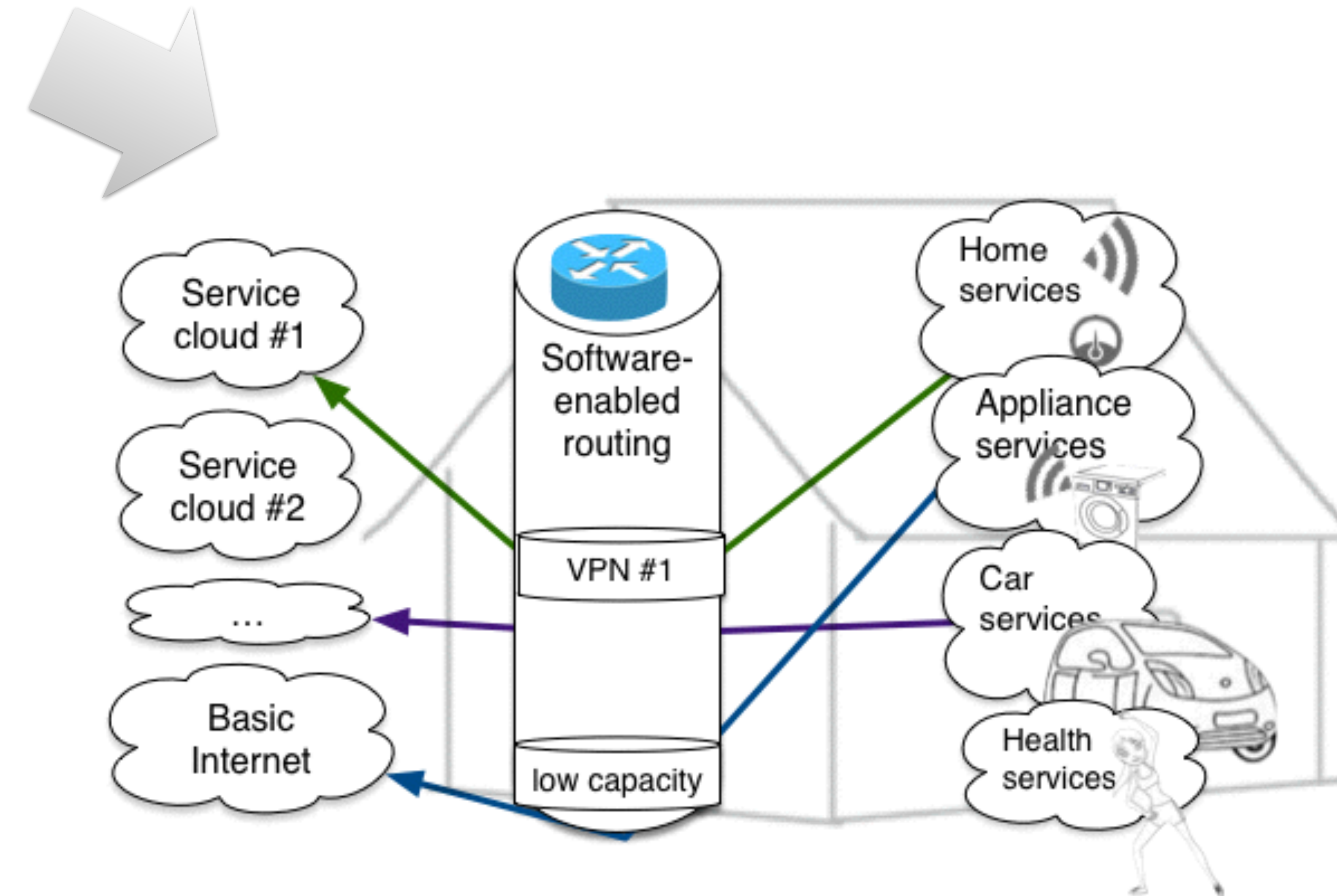
Interest Org.

- Mondragon Unibersitatea
- University of Victoria
- Universidad Carlos III
- La Sapienza
- COINS Research School
- Nimbeo
- H2020 and ECSEL projects
- Academic Collaborators

International

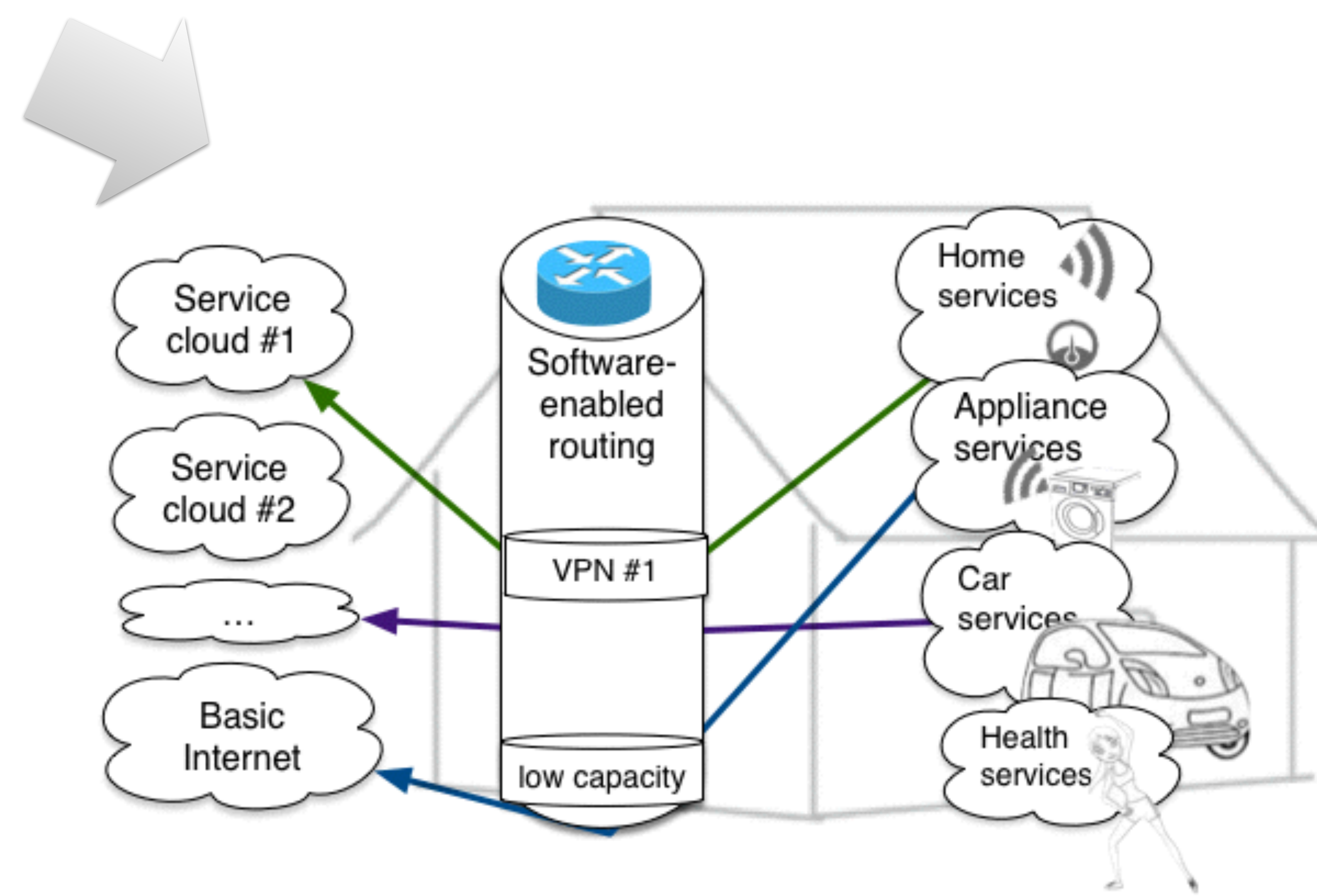
- “*we have no control of what is going on in Wifi*”
- “only 25% of broadband customers experience the speed they got promised”
- more than 75% of all calls to ISPs is related to wireless
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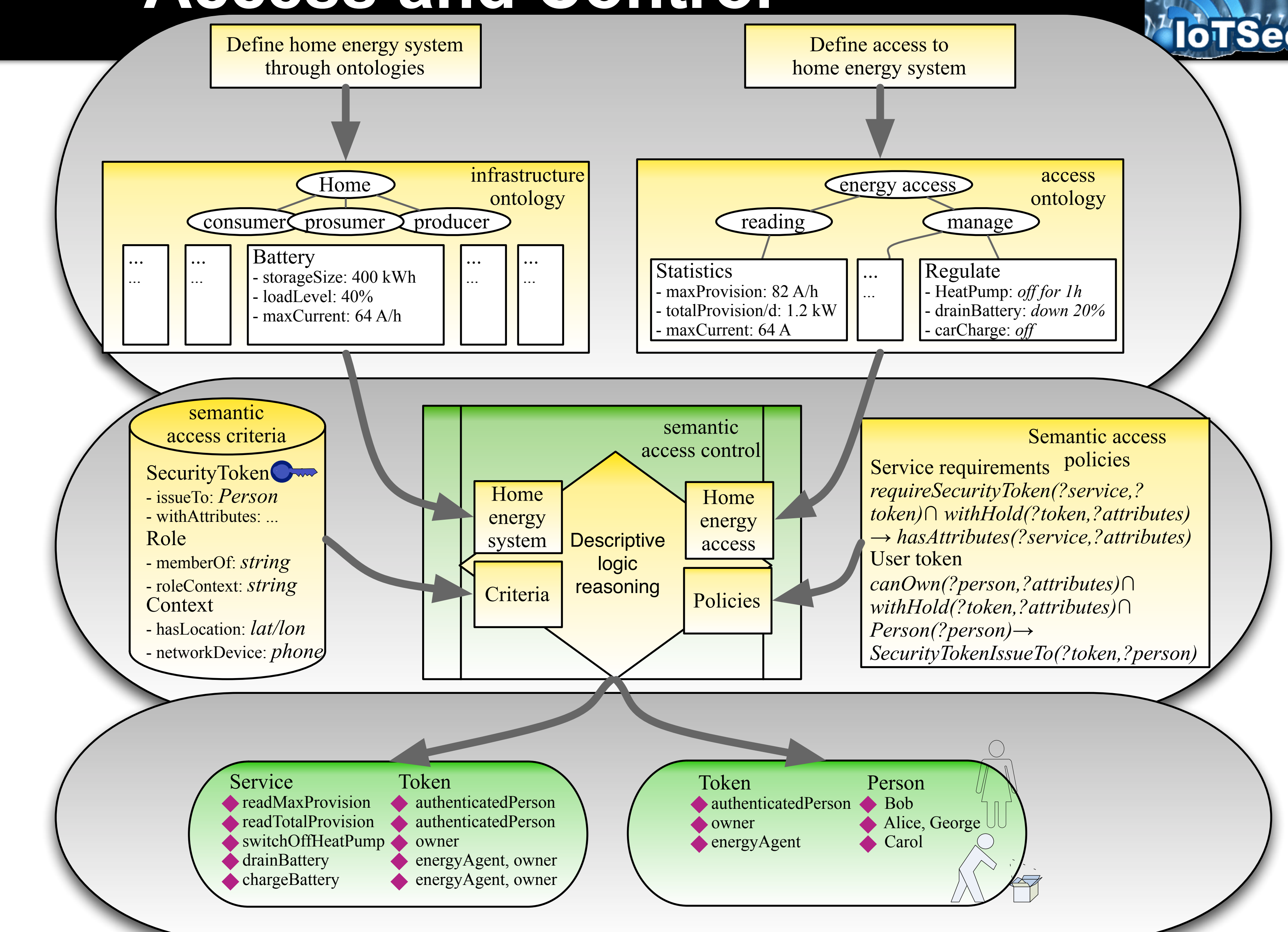


Future Service Requirements (in a wireless infrastructure)

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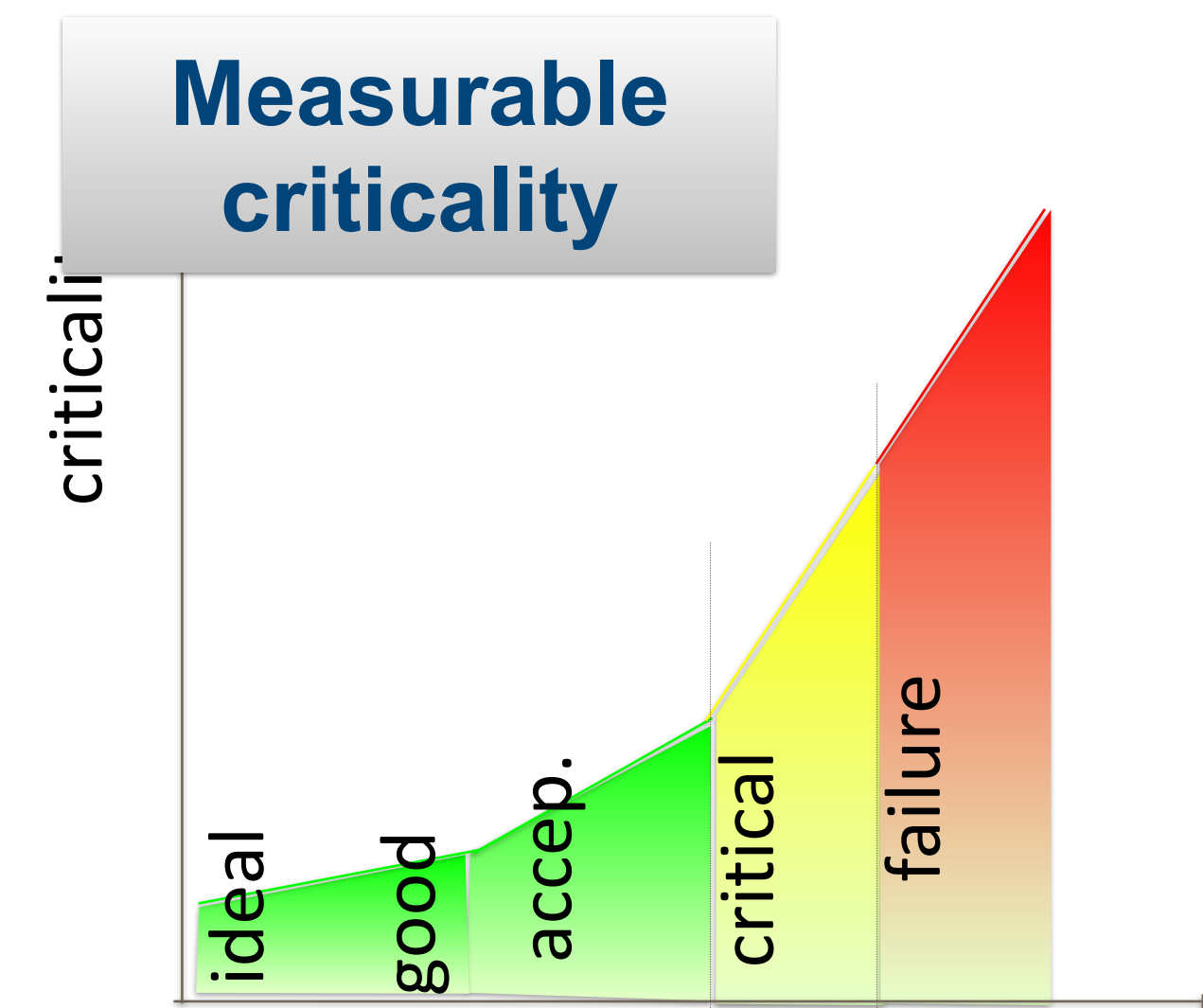


Access and Control

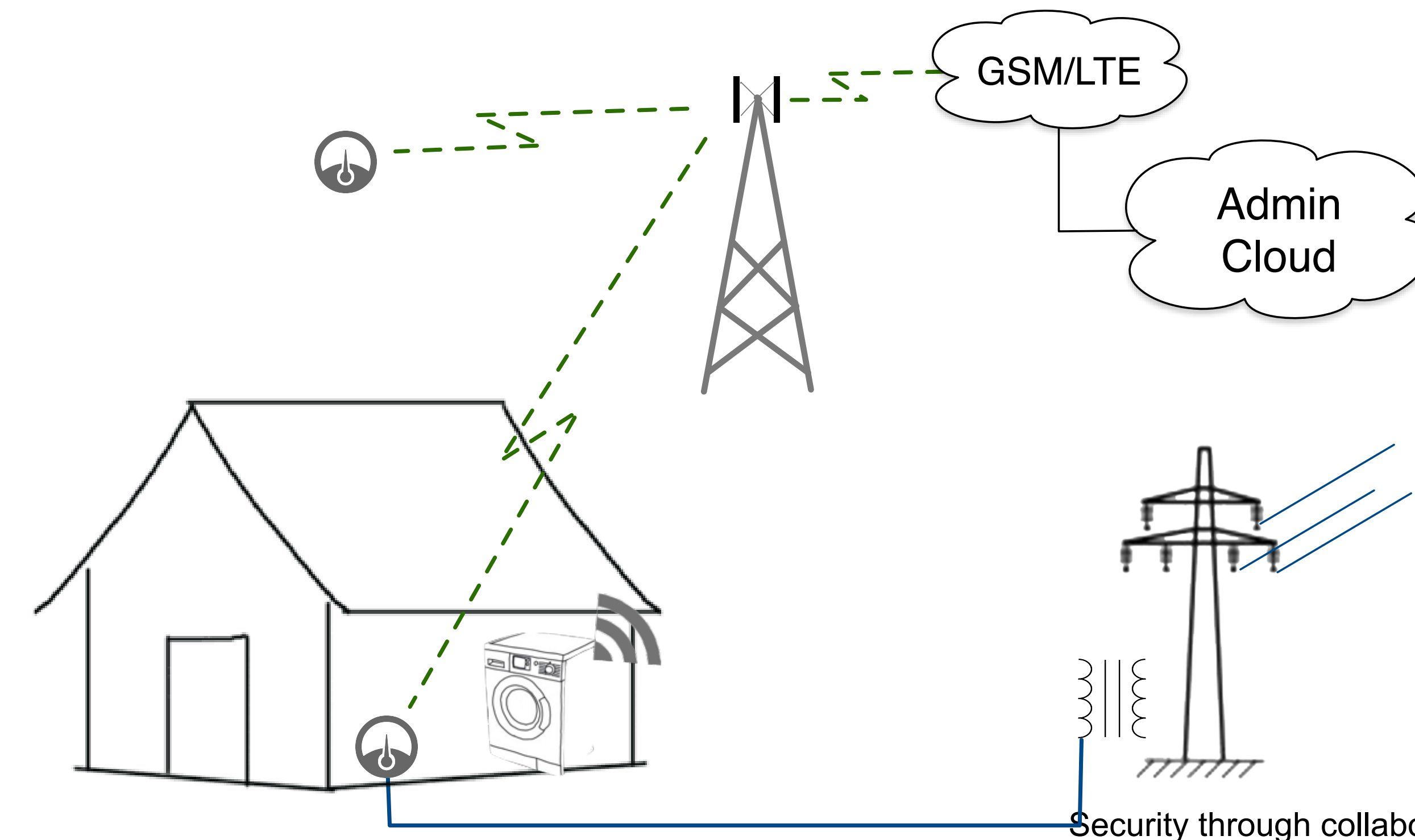


Scientific focus and achievements

- Semantic system description
 - Understanding the system and describing security through security functionality
 - **Measurable security - the novel** security concept



- Security modelling
 - Privacy-aware models and measures
 - Adaptive security for system of systems
 - Formal languages for semantically proving signalling



- System versus Goal analysis
 - **Application-specific** security/privacy, e.g. billing vs
 - Human/technical interface, security usability

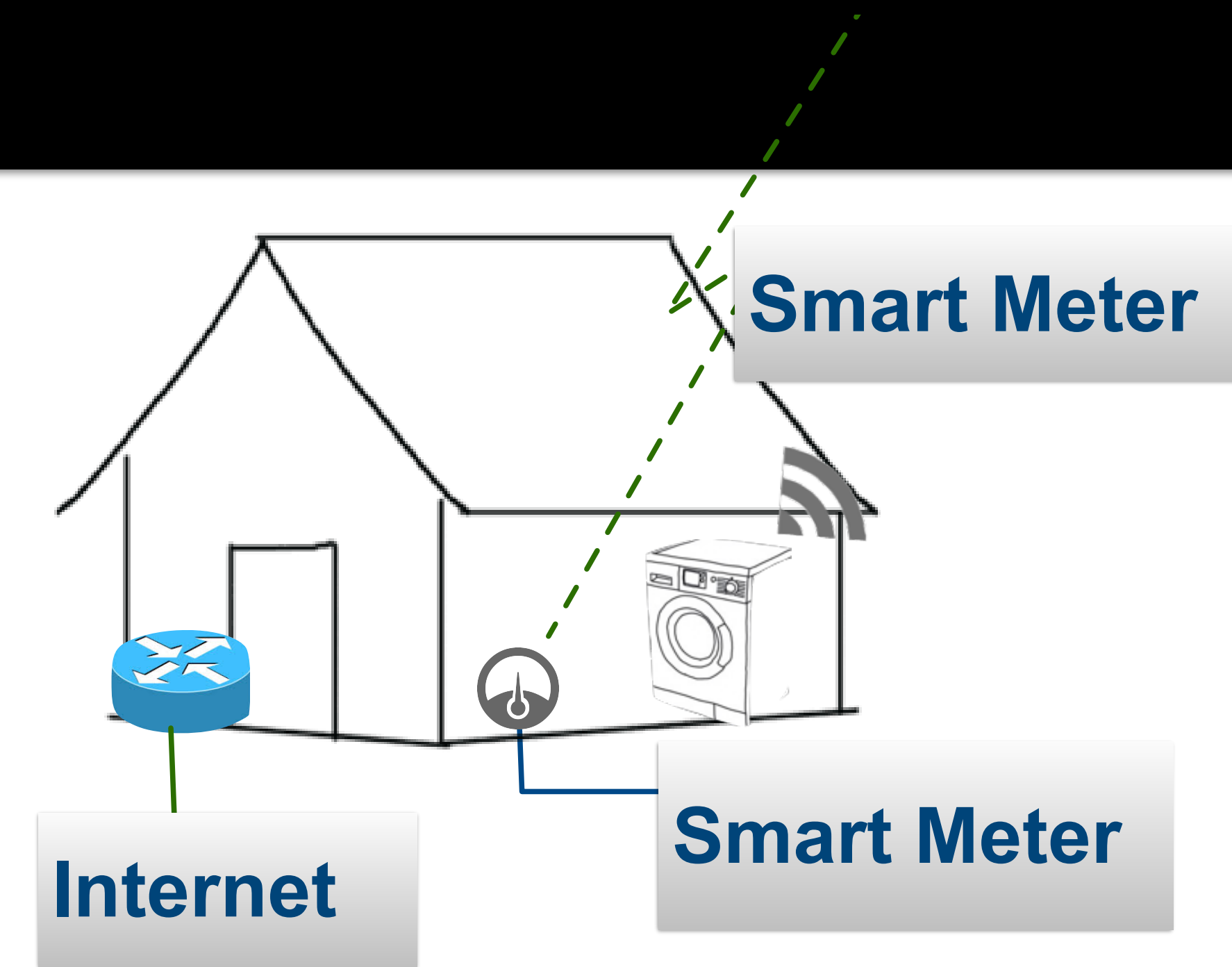
to measurable:
security, privacy and dependability

SPD level	SPD vs SPD _{Goal}
(67,61,47)	(, ,)
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(31,33,63)	(, ,)

- Operational security for IoT-based critical infrastructure
 - IoTSec ecosystem -> **extended** network
 - **Smart Grid Security Centre (SGSC)**
 - (Gap Analysis of security methods for critical infrastructures)

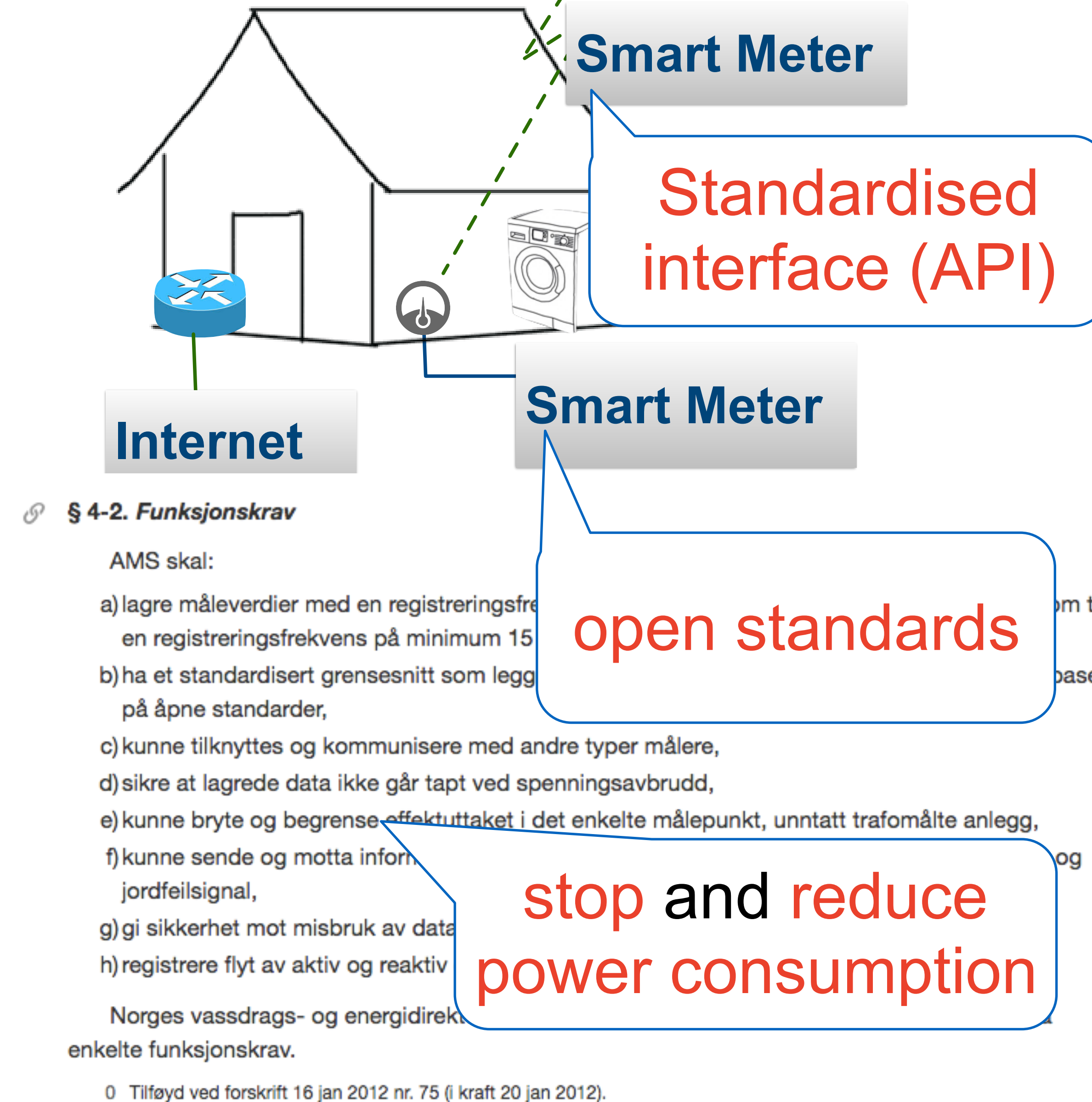
Opportunities

- Monitoring the grid to achieve a **grid stability** of at least 99,96%,
- **Alarm functionality**, addressing
 - ➔ failure of components in the grid,
 - ➔ alarms related to the Smart Home, e.g. burglary, fire, or water leakage,
- **Intrusion detection**, monitoring both hacking attempts to the home as well as the control center and any entity in between,
- **Billing functionality**, providing at least the total consumption every hour, or even providing information such as max usage,
- **Remote home control**, interacting with e.g. the heating system
- **Fault tolerance and failure recovery**, providing a quick recovery from a failure.
- Future services
 - ➔ Monitoring of activity at home, e.g. “**virtual fall sensor**”

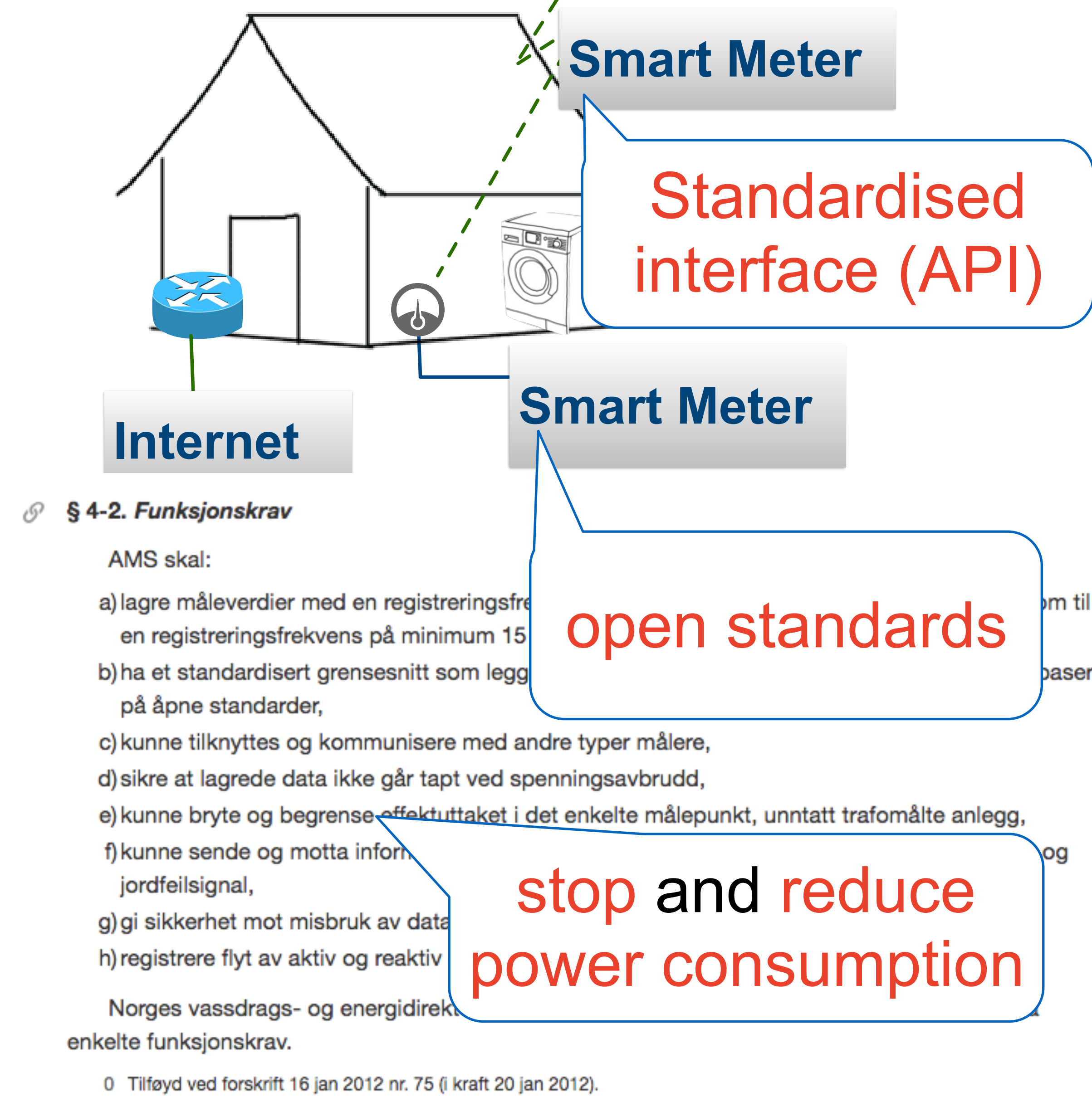


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IoTSec

Home Research Security Centre Publications Student corner About

Student Corner for IoTSec

Please be welcome to the Student Corner for *Security and Privacy in the Internet*

Feel free to have a look at [UNIK4750](#) course related to the project.

Topics for Master Thesis

Open Master Thesis related to IoTSec

- Privacy labels for IoT consumer products (Supervisor(s): Josef Noll, Hanne Brostrøm)
- Building an Attack Simulator on the Electric Grid Infrastructure (Supervisor(s): György Kálmán,
- Security challenges of open low-capacity wifi access (Supervisor(s): Josef Noll)
- Semantic Modeling of a Smart Home Infrastructure (Supervisor(s): Josef Noll, Christian Johans
- Risk Assessment tool analysis for Industrial Automation and Control Systems (Supervisor(s): M
- Chowdhury, Judith Rossebø, Josef Noll)
- Prosumers for the future smart electricity grid (Supervisor(s): Josef Noll)
- Measurable Security for Sensor Communication in the Internet of Things (Supervisor(s): Josef
- Chowdhury)

Ongoing Master Thesis related to IoTSec

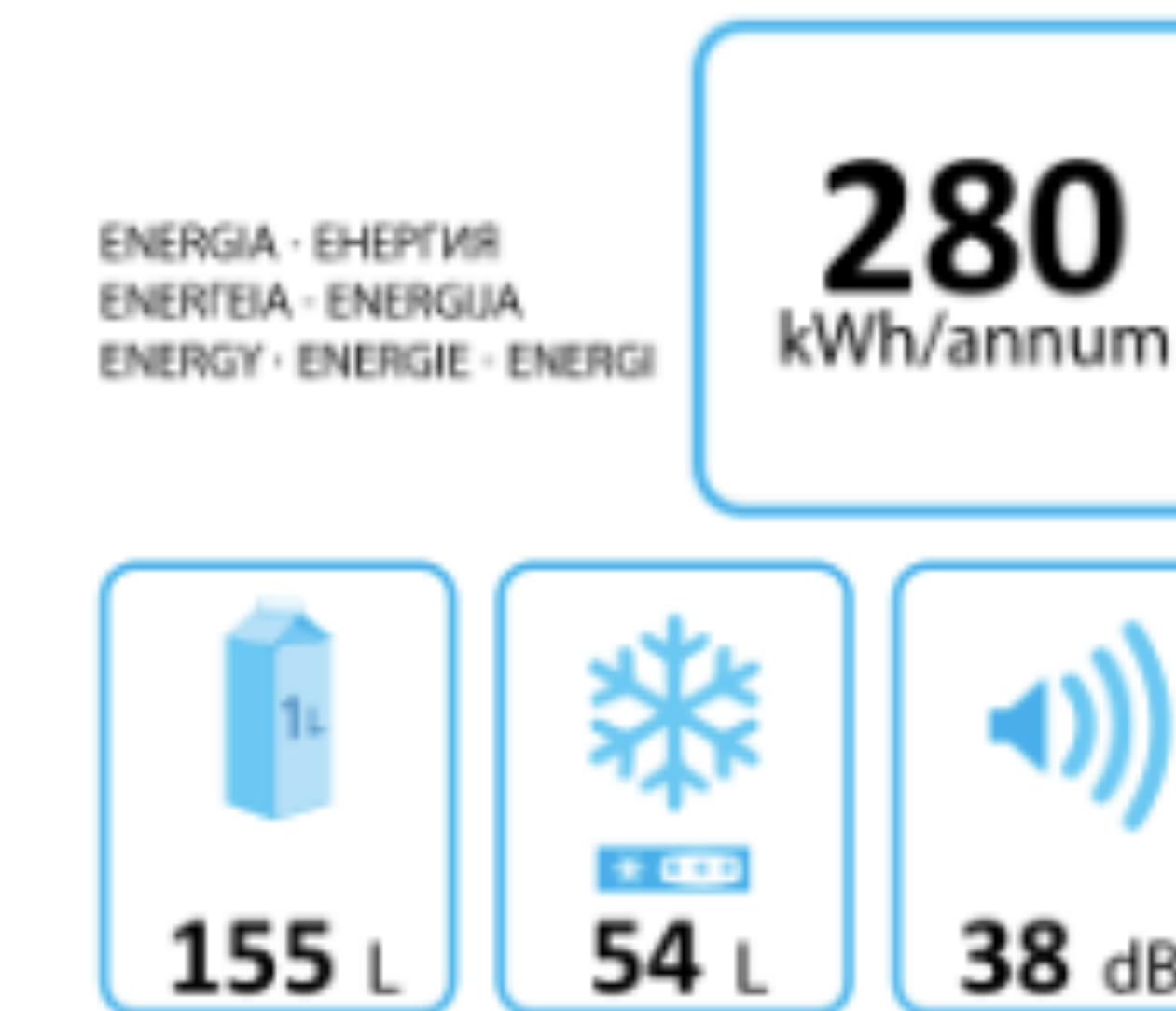
- Integrating Energy Devices through BasicInternet (Editor: Syead Nusrat Nur)
- Privacy labels for IoT consumer products (Editor: Linn Eirin Paulsen)
- Security challenges of open low-capacity wifi access (Editor: Naji Ahmed Kadah)
- Measurable Security for Sensor Communication in the Internet of Things (Editor: Zyyad Shah)

Finished Master Thesis related to IoTSec

- Pervasive computing in smart electricity grid (Supervisor(s): Christian Johansen, Josef Noll, Trond Aalberg)

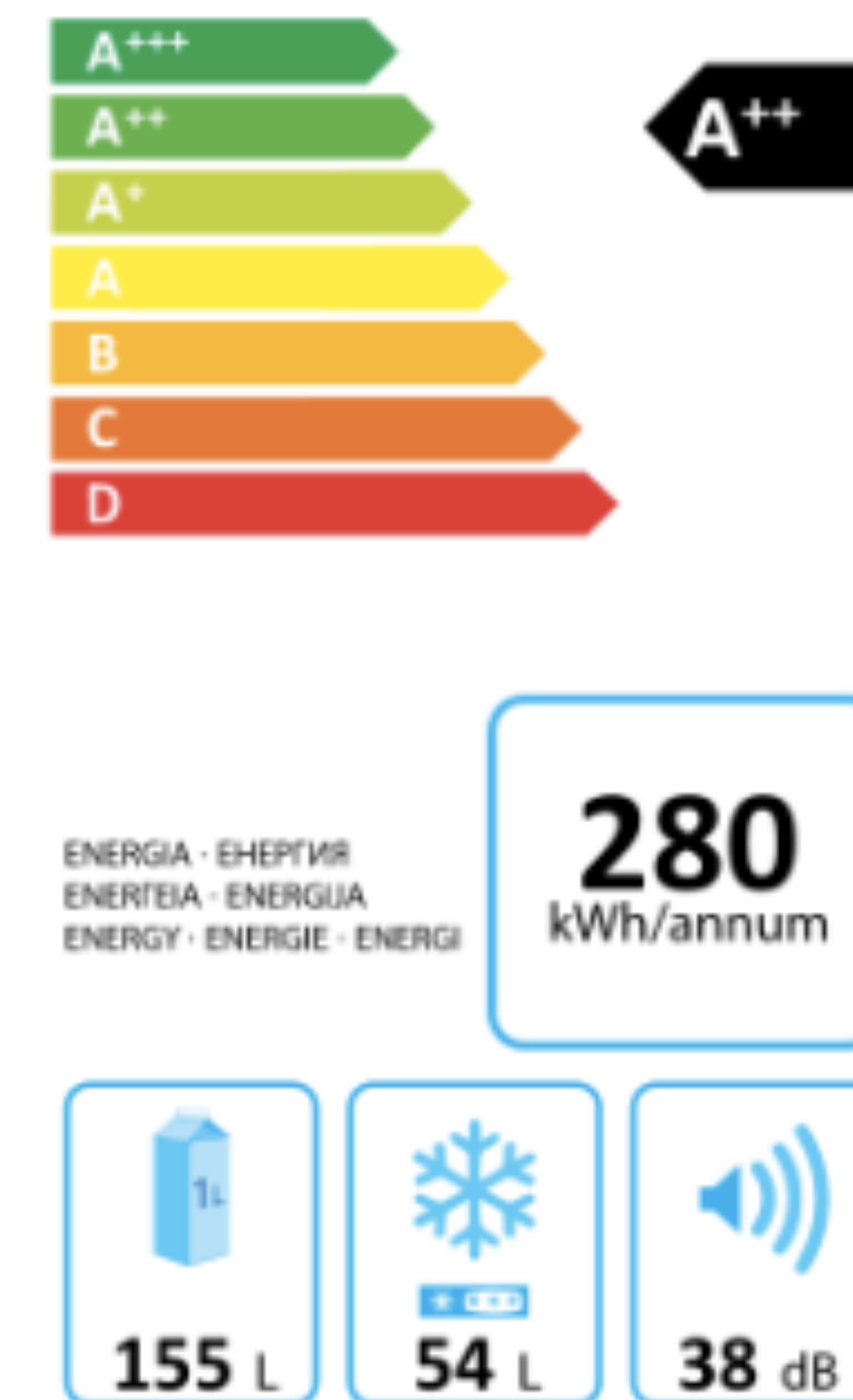
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Make measurable, what you can’t
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- Privacy today
 - ➔ based on lawyer terminology
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In collaboration with Consumer
Services (Forbrukerrådet)
- Paul Chaffey (Statssekretær) support
- Finn Myrstad (Forbrukerrådet) -> EU

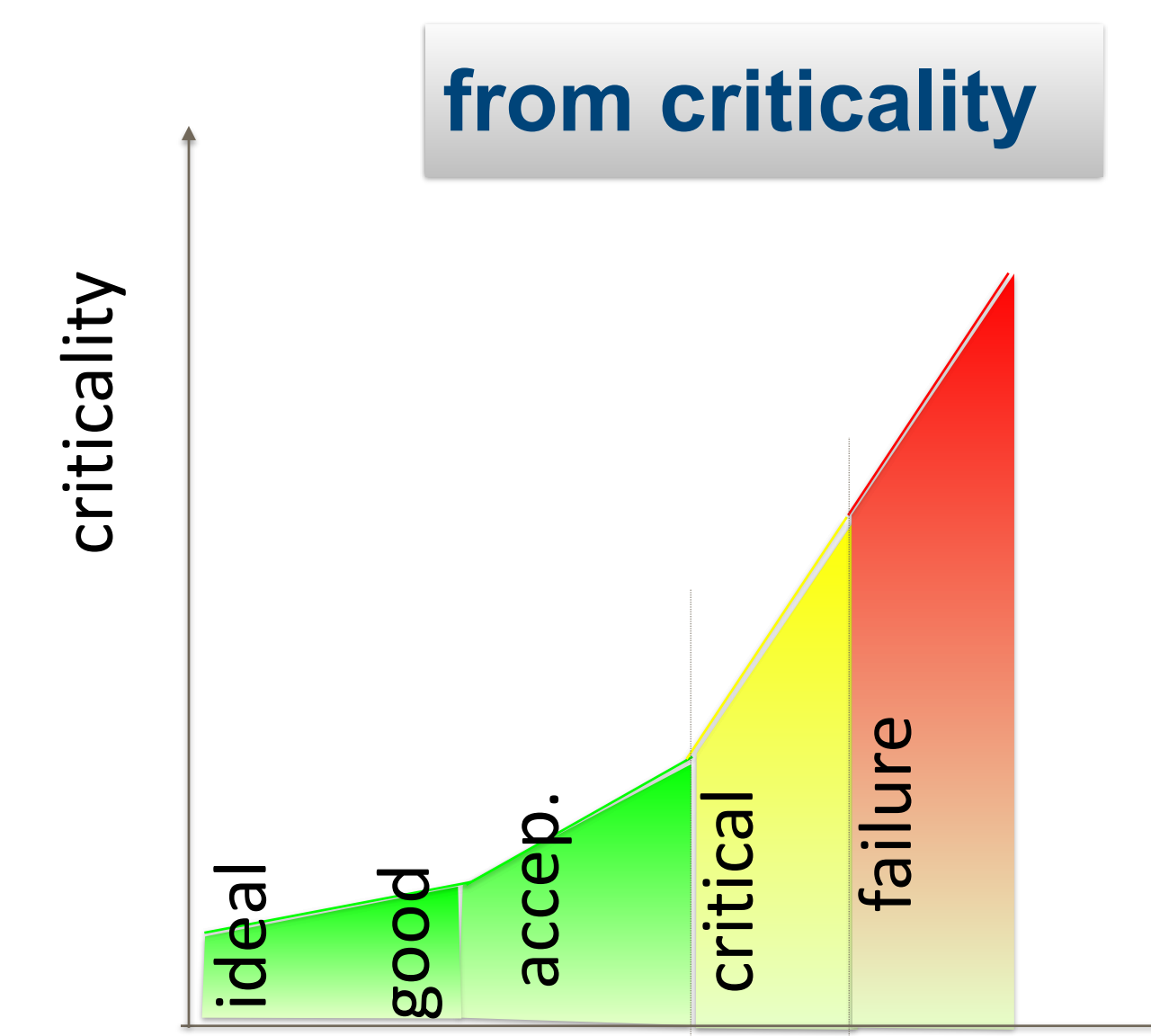


Appfail Report - Threats to Consumers in Mobile Apps

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.

- Smart Meter
 - ➔ read and control
 - soft switch, remote switch off
 - ➔ logic?

- Challenges
 - ➔ Logic: Centralised ↔ Fog
 - ➔ Smart Meter: Information ↔ Control
 - ➔ Smart Grid Information ↔ Internet Info

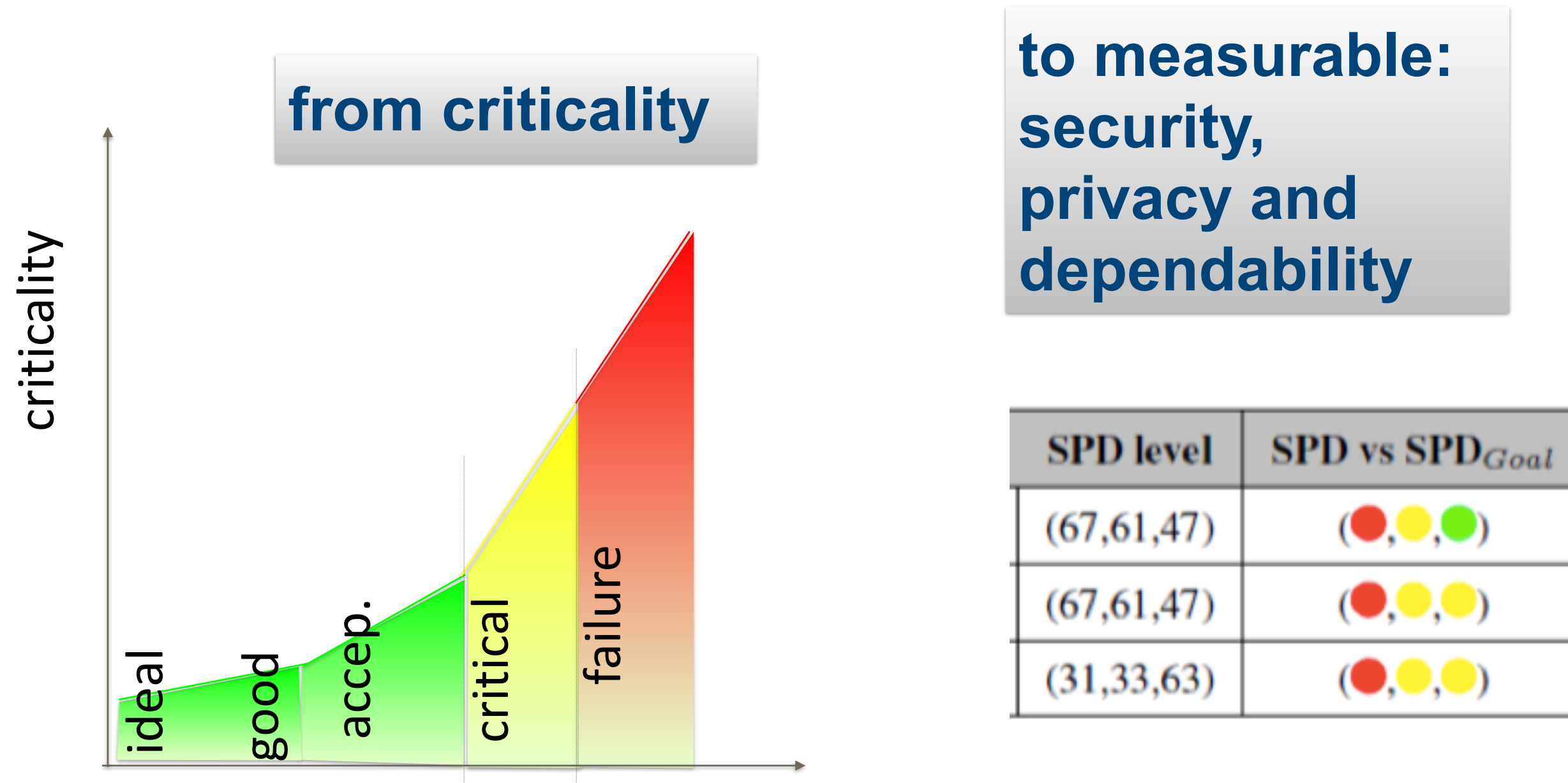


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- Access control
 - ➔ access to read, control, configure
 - ➔ based on attributes (network, position,)
- Rules and policies
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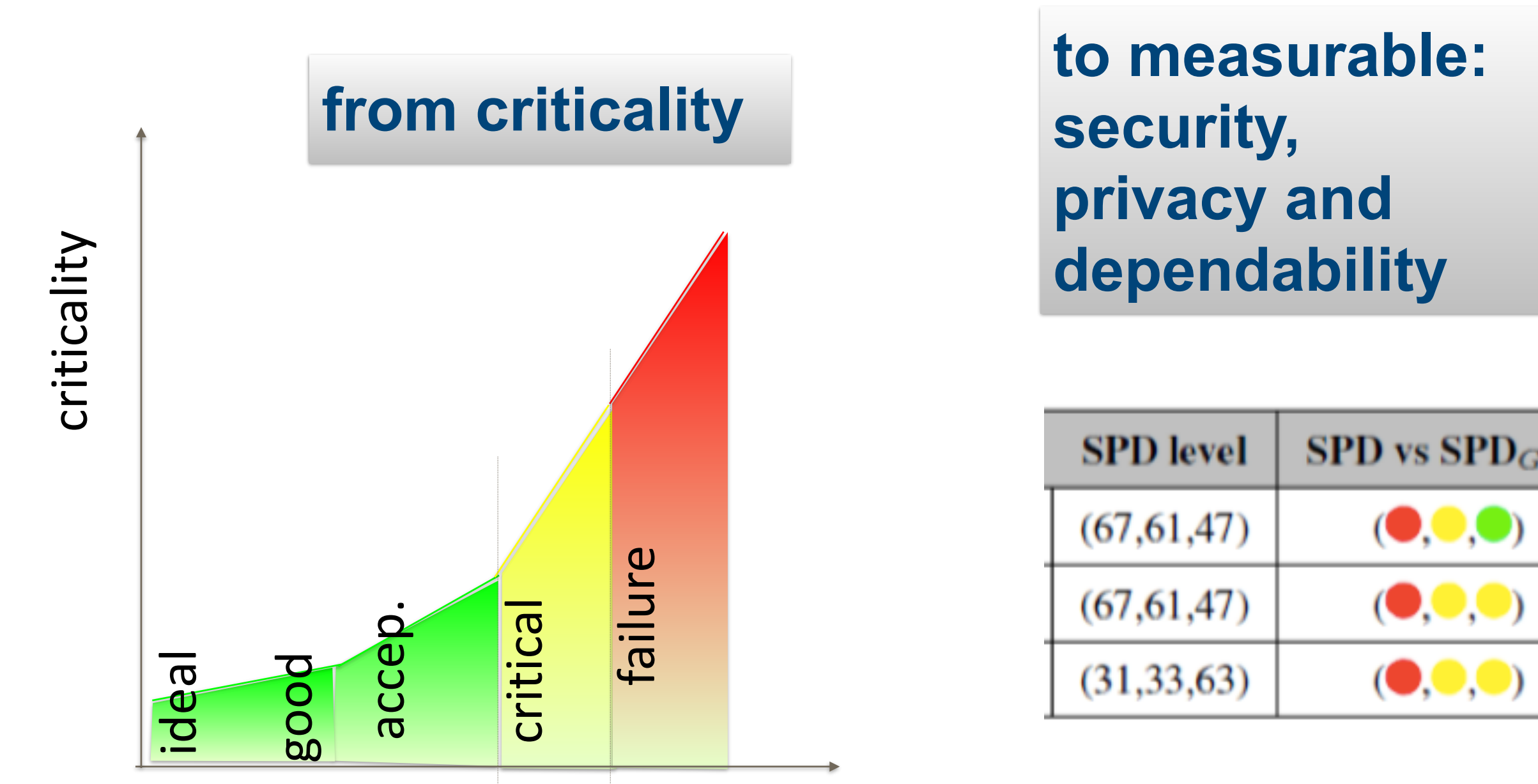


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Collaborate to answer the questions

- Smart Meter
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 - Logic: Centralised ↔ Fog
 - Smart Meter: Information ↔ Control
 - Smart Grid Information ↔ Internet Info



IoT security challenges

- Mirai attack
 - “security by obscurity”
 - different security viewpoint
- “it is just the beginning”

21 Hacked Cameras, DVRs Powered Today's Massive Internet Outage

A massive and sustained Internet attack that has caused outages and network congestion today for a large number of Web sites was launched with the help of hacked “Internet of Things” (IoT) devices, such as CCTV video cameras and digital video recorders, new data suggests.

Earlier today cyber criminals began training their attack cannons on **Dyn**, an Internet infrastructure company that provides critical technology services to some of the Internet's top destinations. The attack began creating problems for Internet users reaching an array of sites, including Twitter, Amazon, Tumblr, Reddit, Spotify and Netflix.

