

UiO • Universitetet i Oslo

Tekna seminar “Sårbarhet i kraftsektoren”, Gardermoen, Apr2017

Hvordan ivareta sikkerhet rundt IoT enheter?



Josef Noll

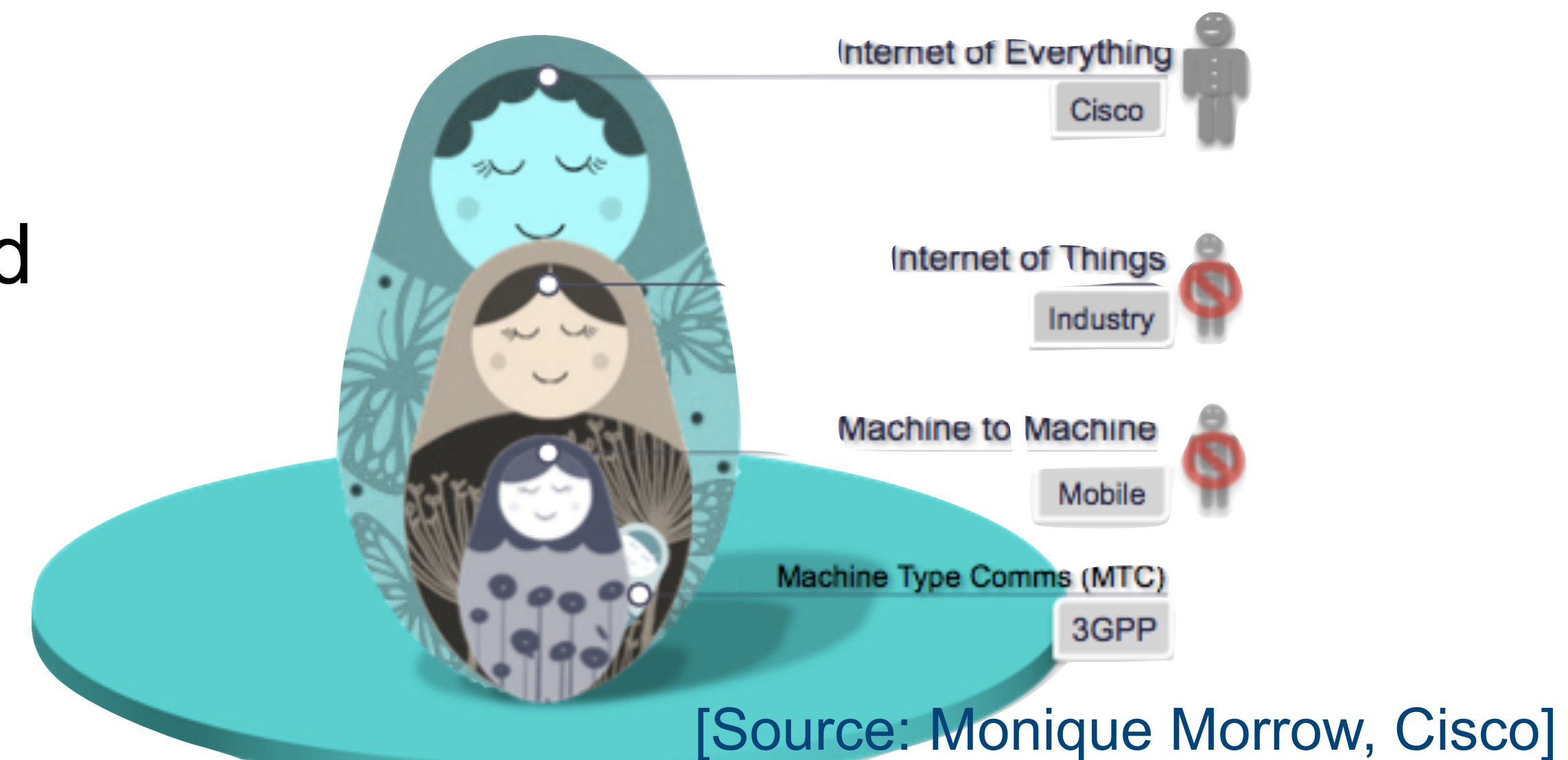
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Co-Founder and Secretary General at Basic Internet Foundation

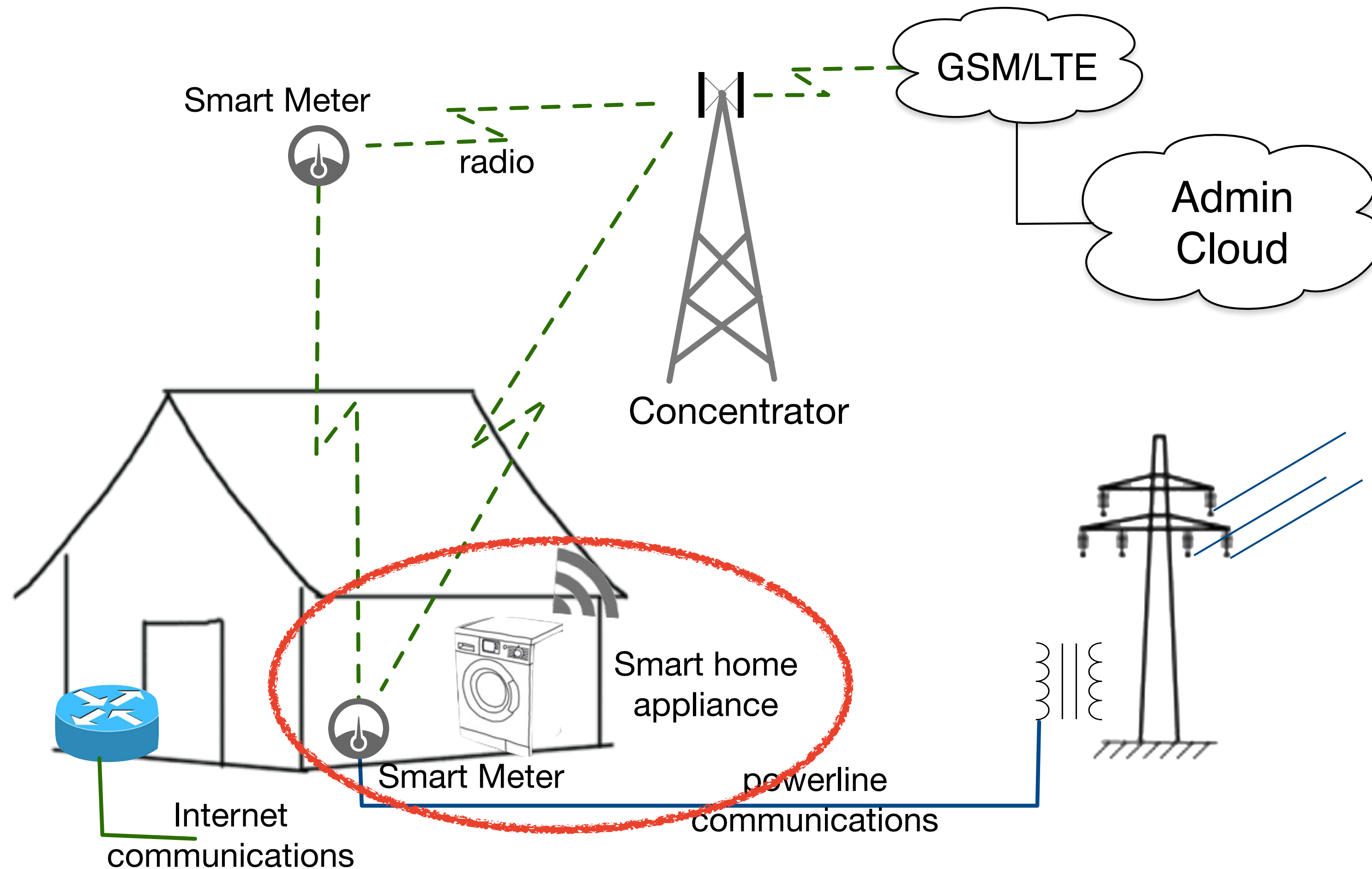


Outline

- From electricity to intelligent power
 - ➔ The Internet of Things (IoT) and the power grid
- Digitisation of the Society
 - ➔ Sensor and Data driven
 - ➔ Industry and Society
 - ➔ Your role as power provider
- Privacy and Security
 - ➔ Do we really understand the challenge?
 - ➔ Measurable security

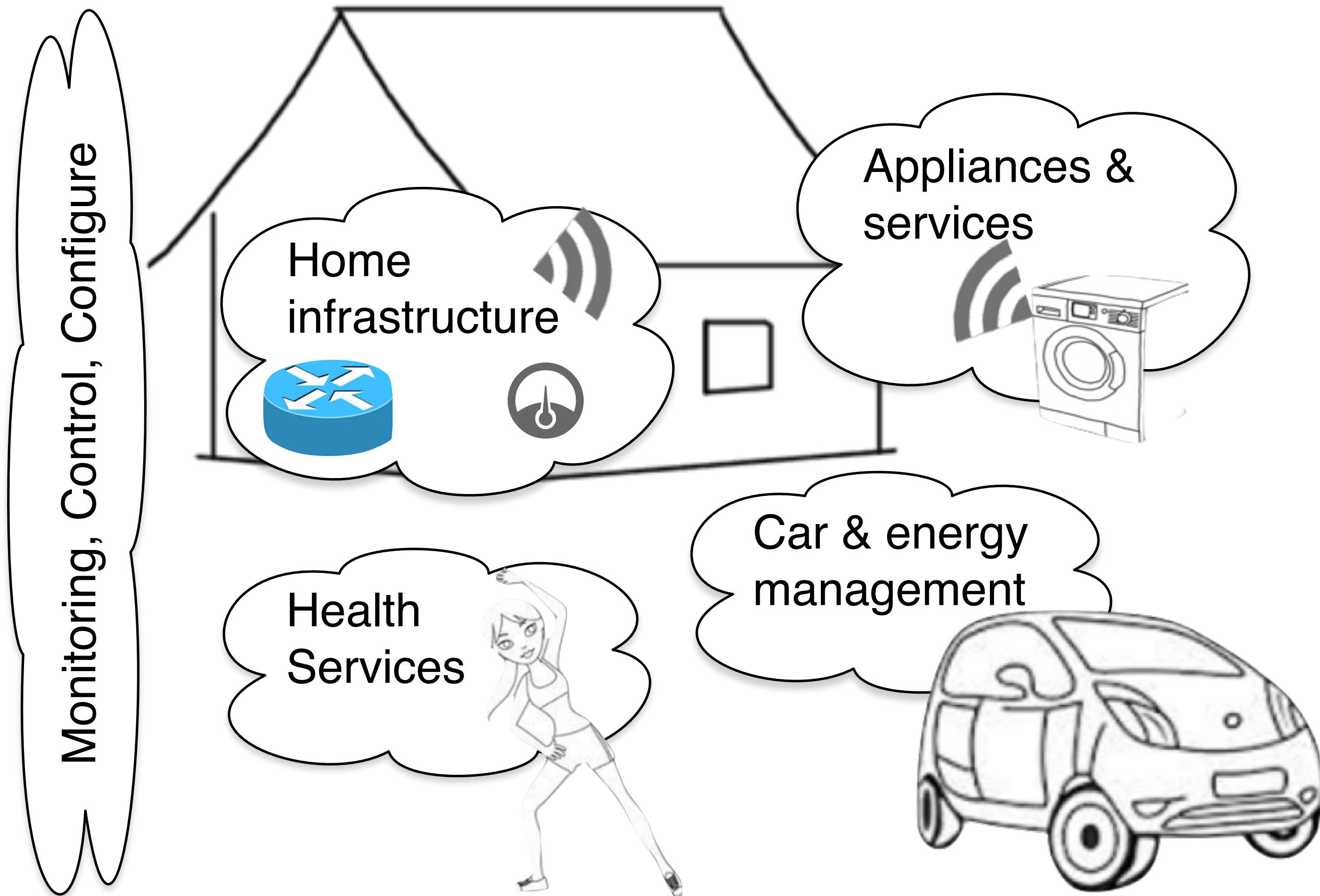


Who is going to manage the home?



Considerations

- A variety of services
- Security and Privacy requirements
- Novel trends, flexibility
- My Home is everywhere



Digitalisation of the Society



Source: EU commission,
<https://www.youtube.com/watch?v=BK-UuUnQaIM&feature=youtu.be>



The Internet of Things (IoT)

- IoT =
 - ➔ Internet +
 - ➔ Semantics +
 - ➔ Things
- Tingene som snakker
 - ➔ med en datamaskin,
 - ➔ som forstår hva det dreier seg om,
 - ➔ og tar selvstendige beslutninger

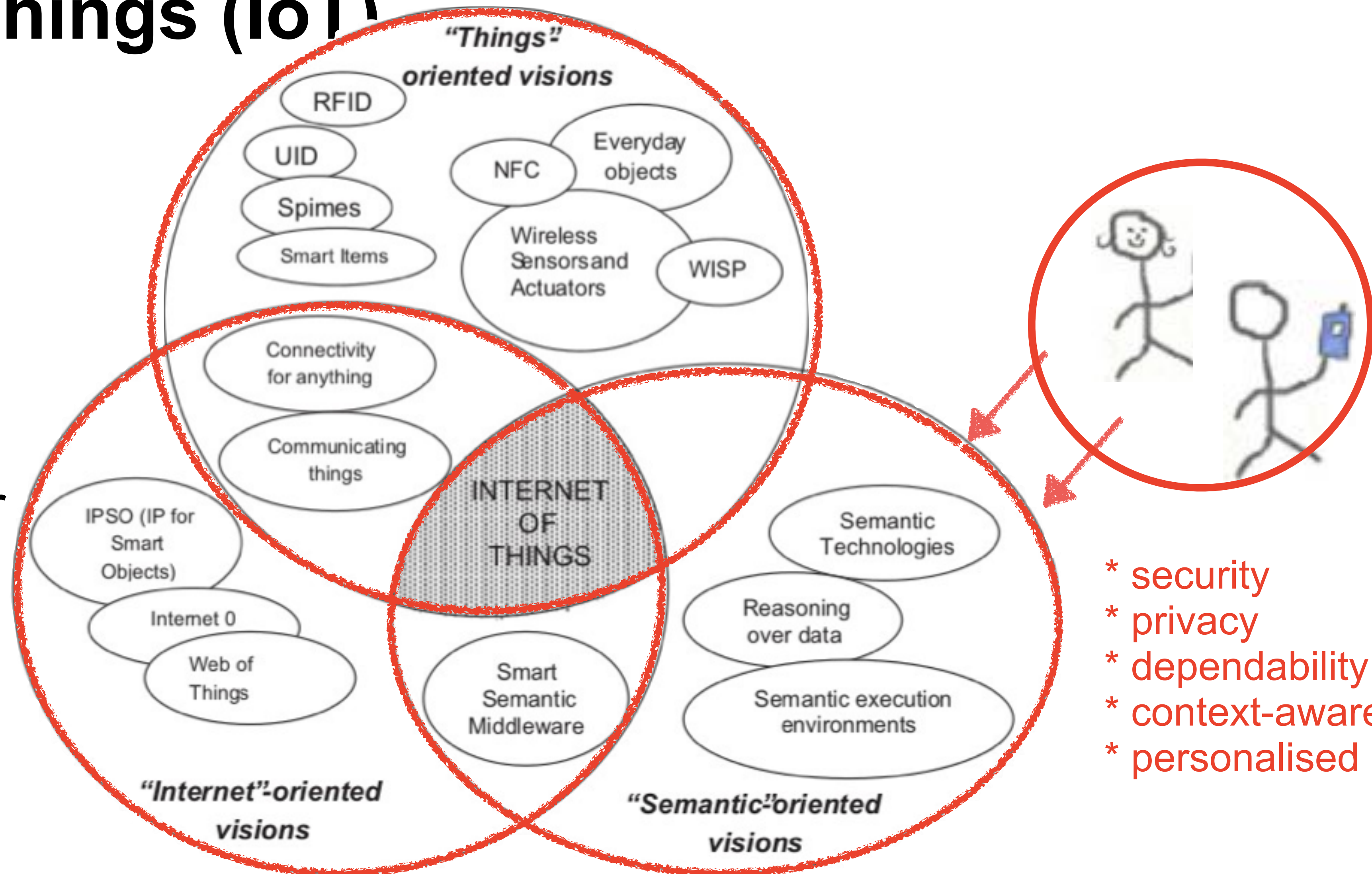
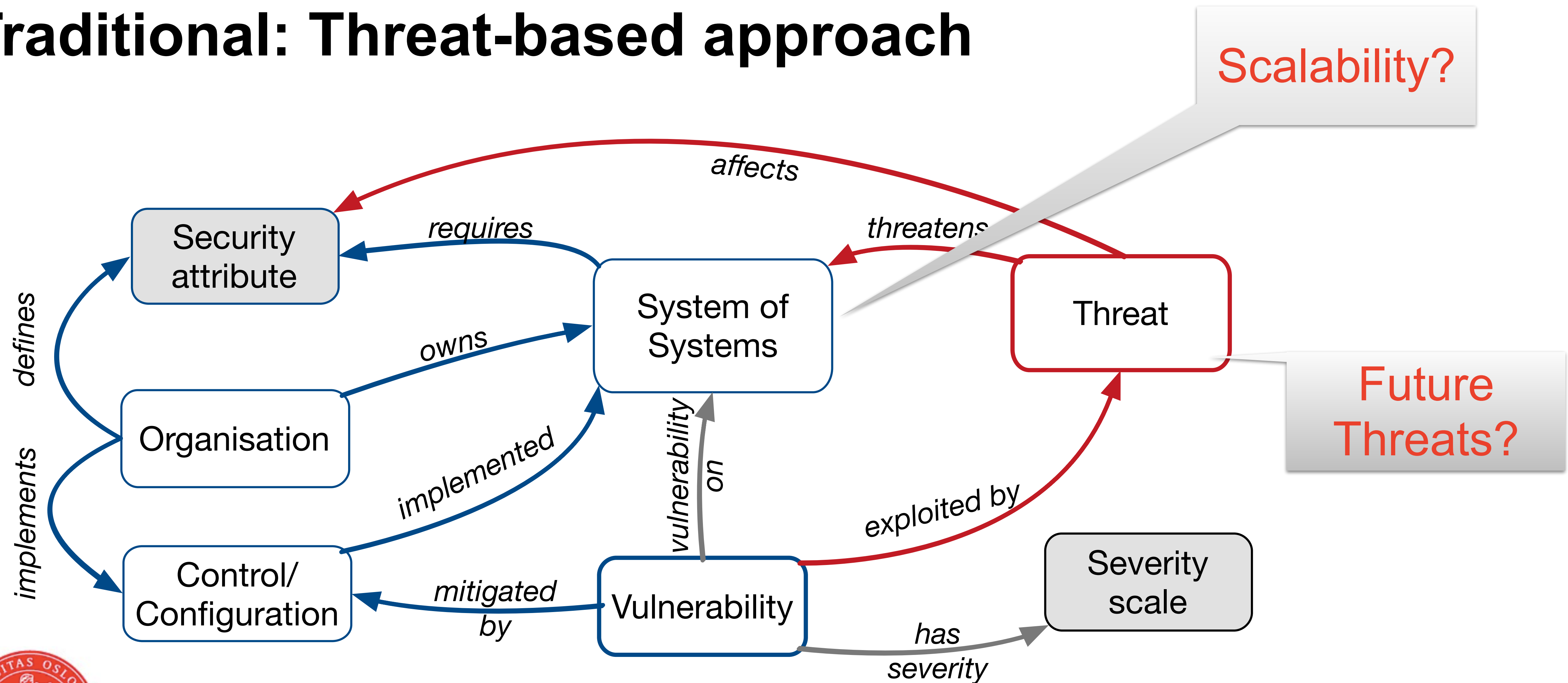


Fig. 1. "Internet of Things" paradigm as a result of the convergence of different visions.

How to handle security?



Traditional: Threat-based approach



[source: <http://securityontology.sba-research.org/>]



IoT threats

- First massive attack from IoT devices
 - ➔ 16Oct2016 IoT botnet attack on Dyn
 - ➔ Camera (CCTV), video recorder, TV,...
 - ➔ 1.2 Gbps Denial-of-Service attack
- How?
- All using Linux BusyBox for authentication
 - ➔ admin - admin, root - root, admin - 1111...
 - ➔ simple “test” was enough to convert IoTs into bot

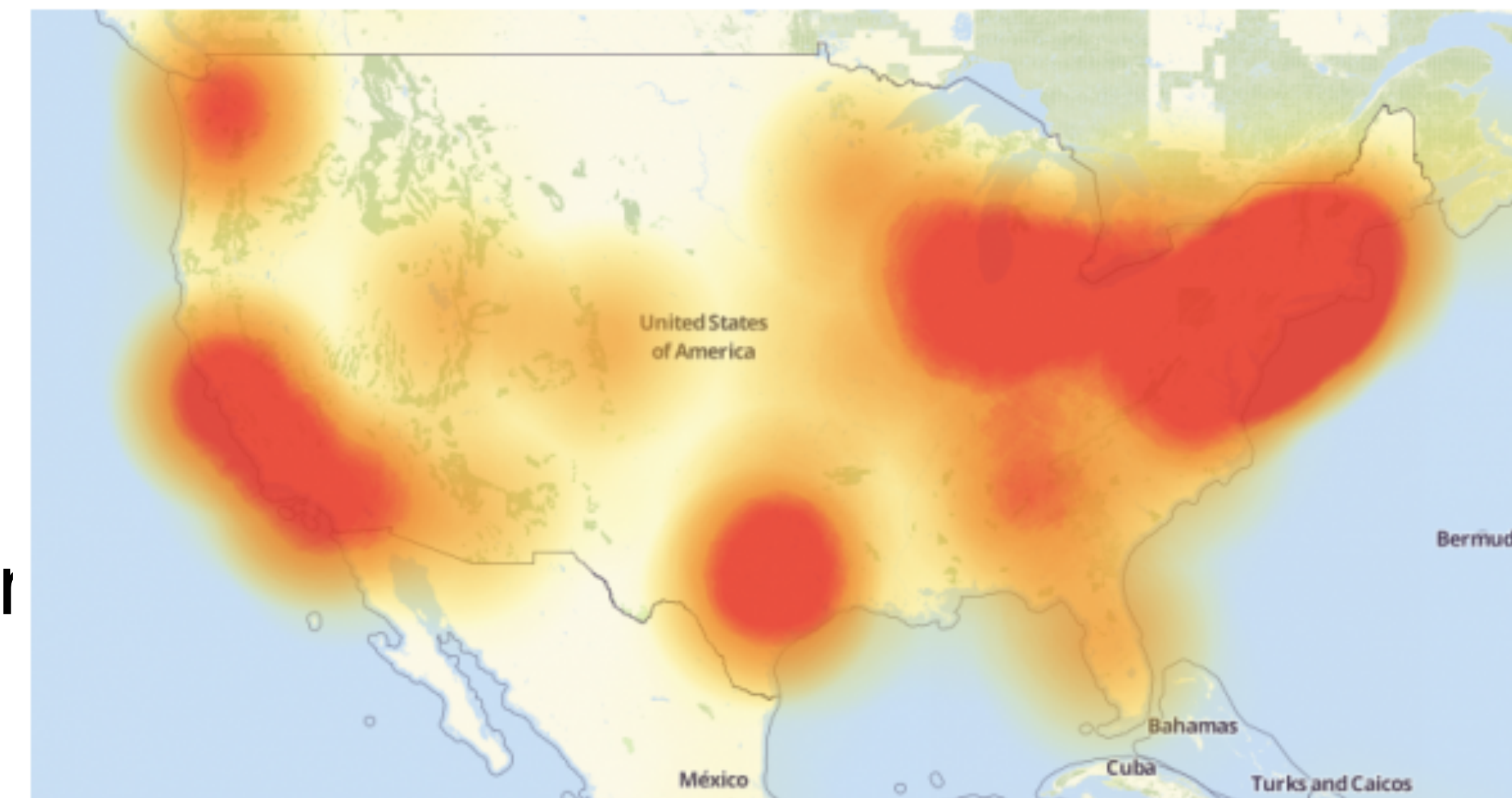


21 Hacked Cameras, DVRs Powered Today's OCT 16 Massive Internet Outage

16Oct

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.



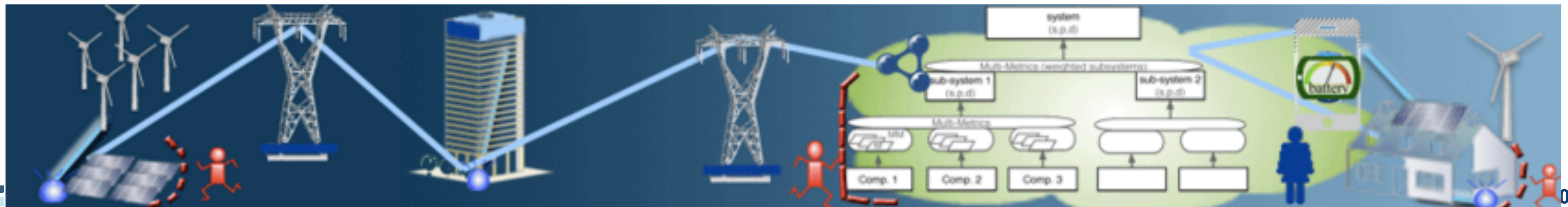
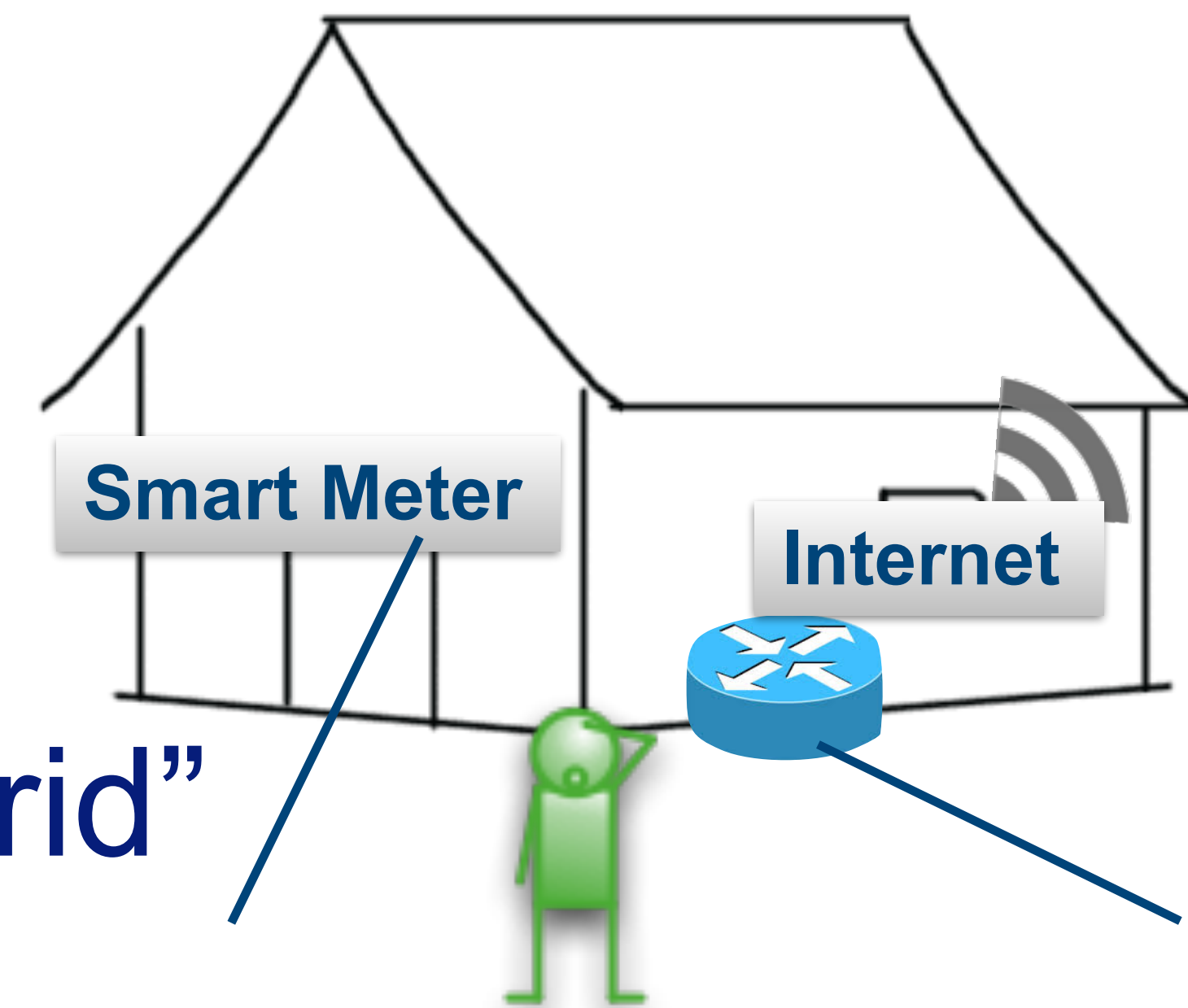
[Source: <https://krebsonsecurity.com/2016/10/16-oct-2016-attack-on-dyn/>]

IoTSec.no

“Research on IoT security”
with

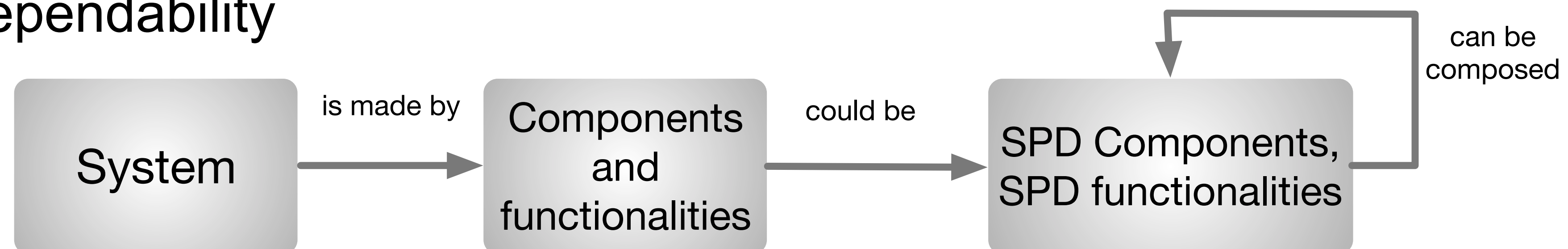
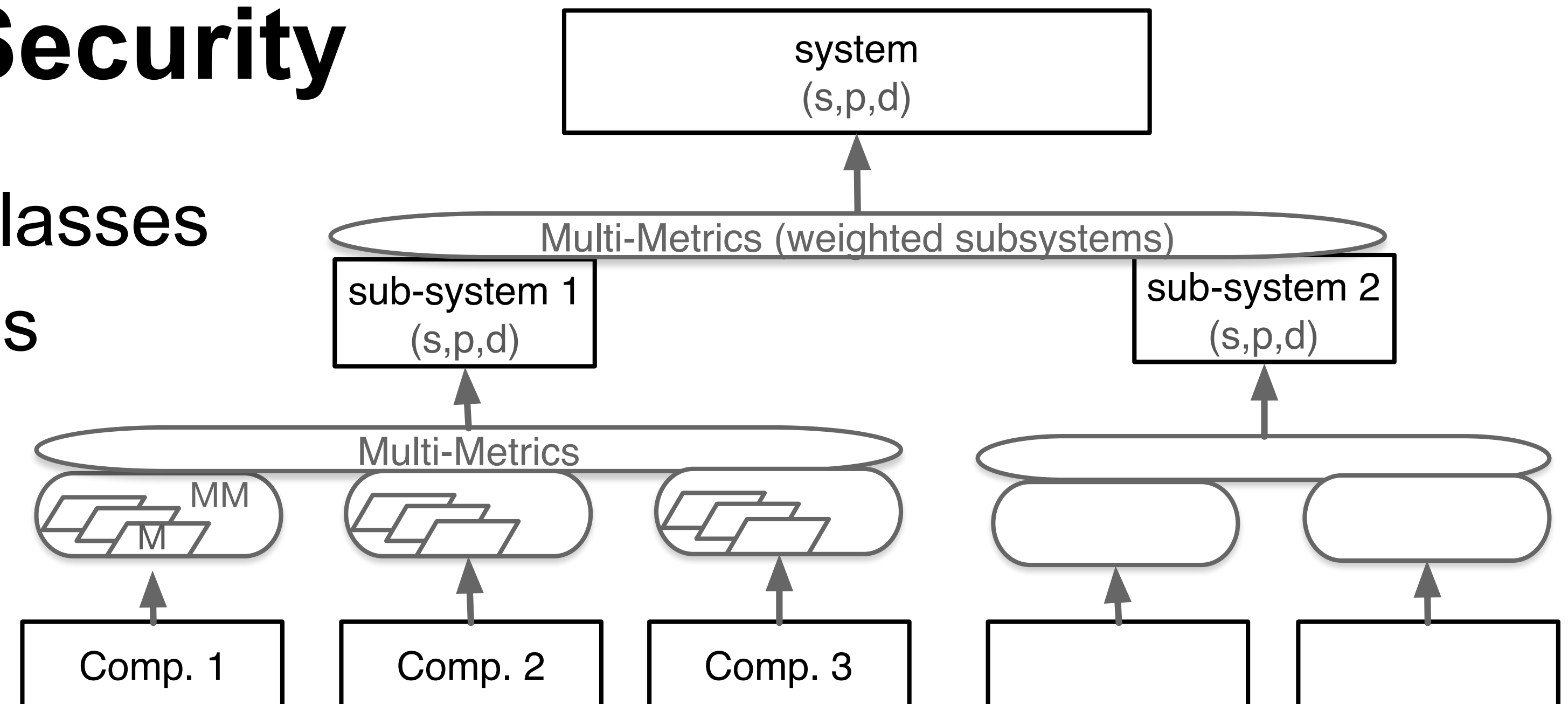
“The national Security Centre for Smart Grid”

<http://IoTSec.no>



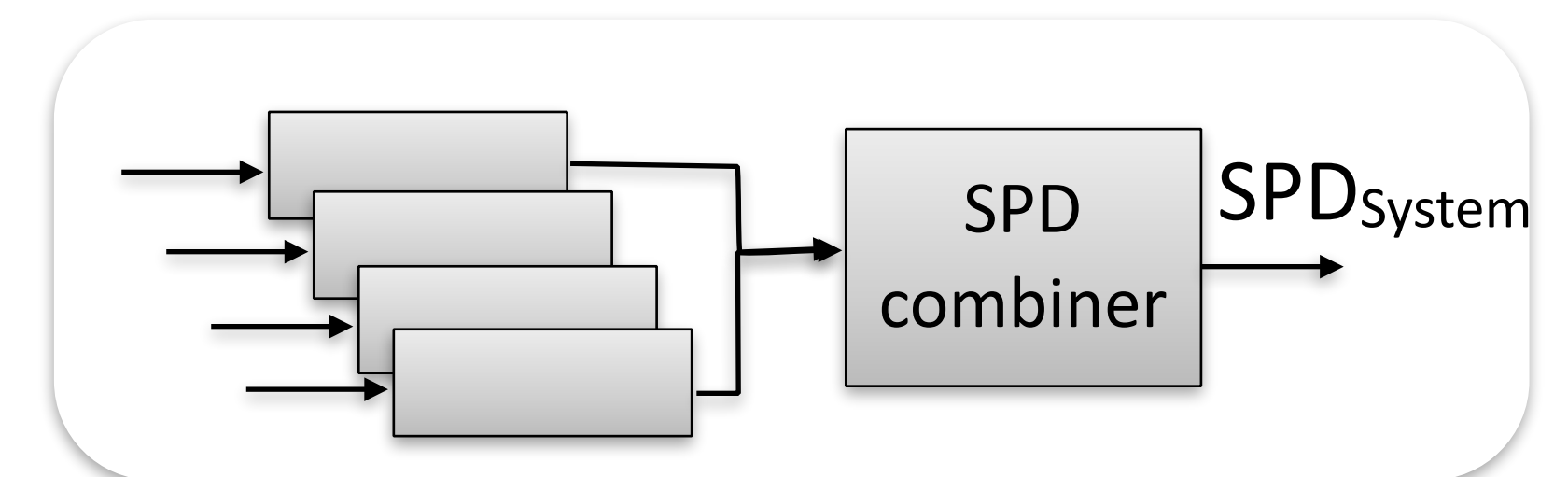
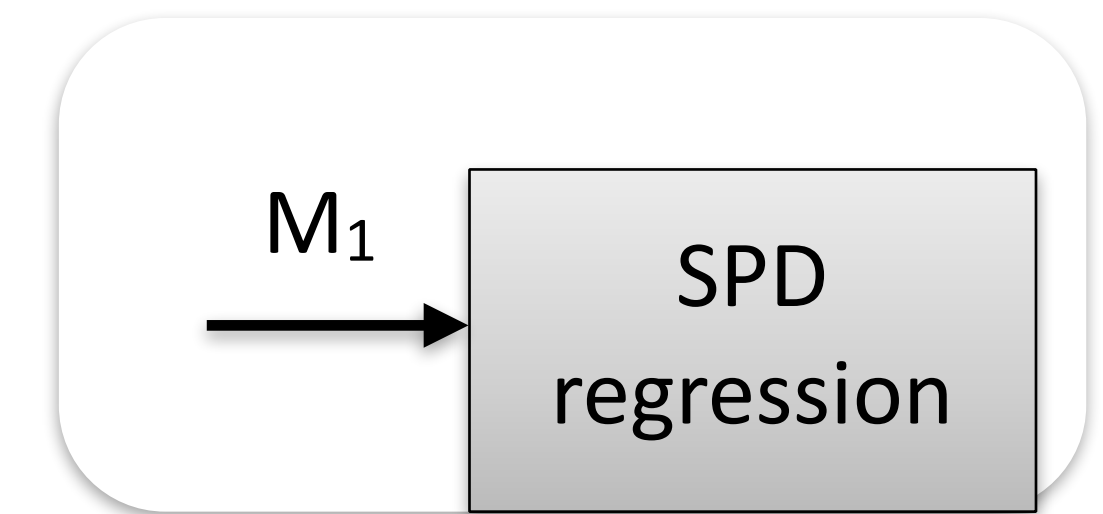
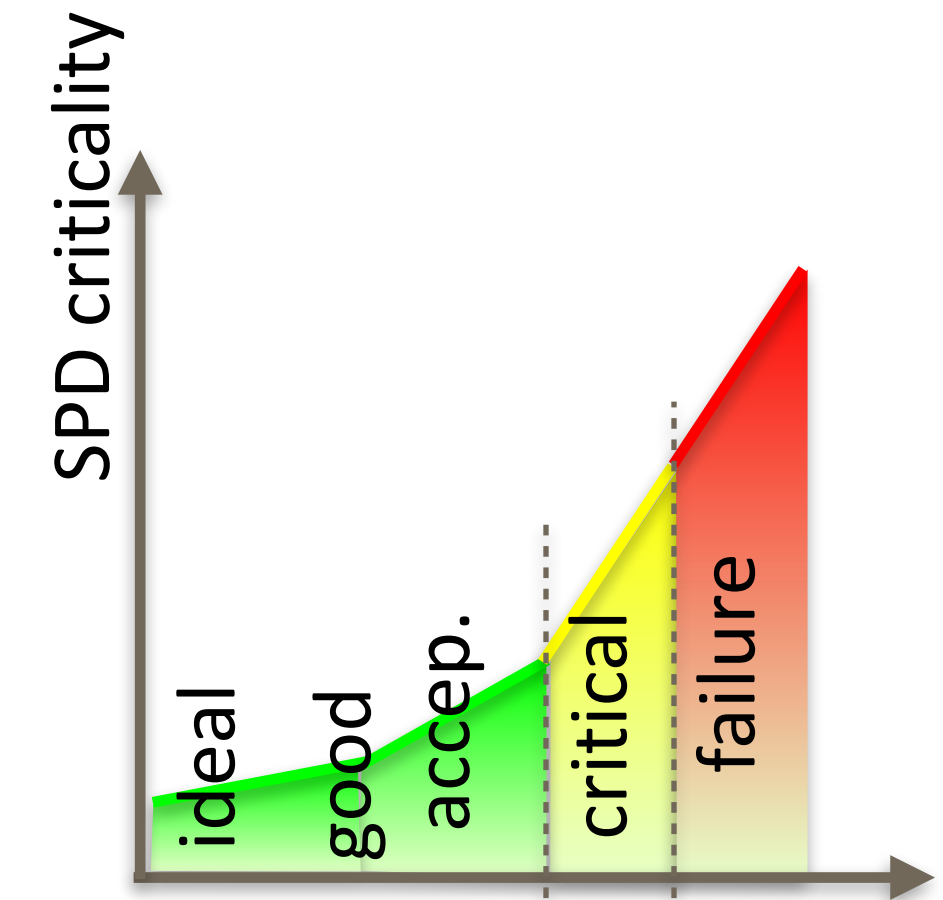
Example: Measurable Security

- From people defined security classes
- To automated security decisions
 - through metrics assessment
- based on
 - security, privacy and dependability functionalities



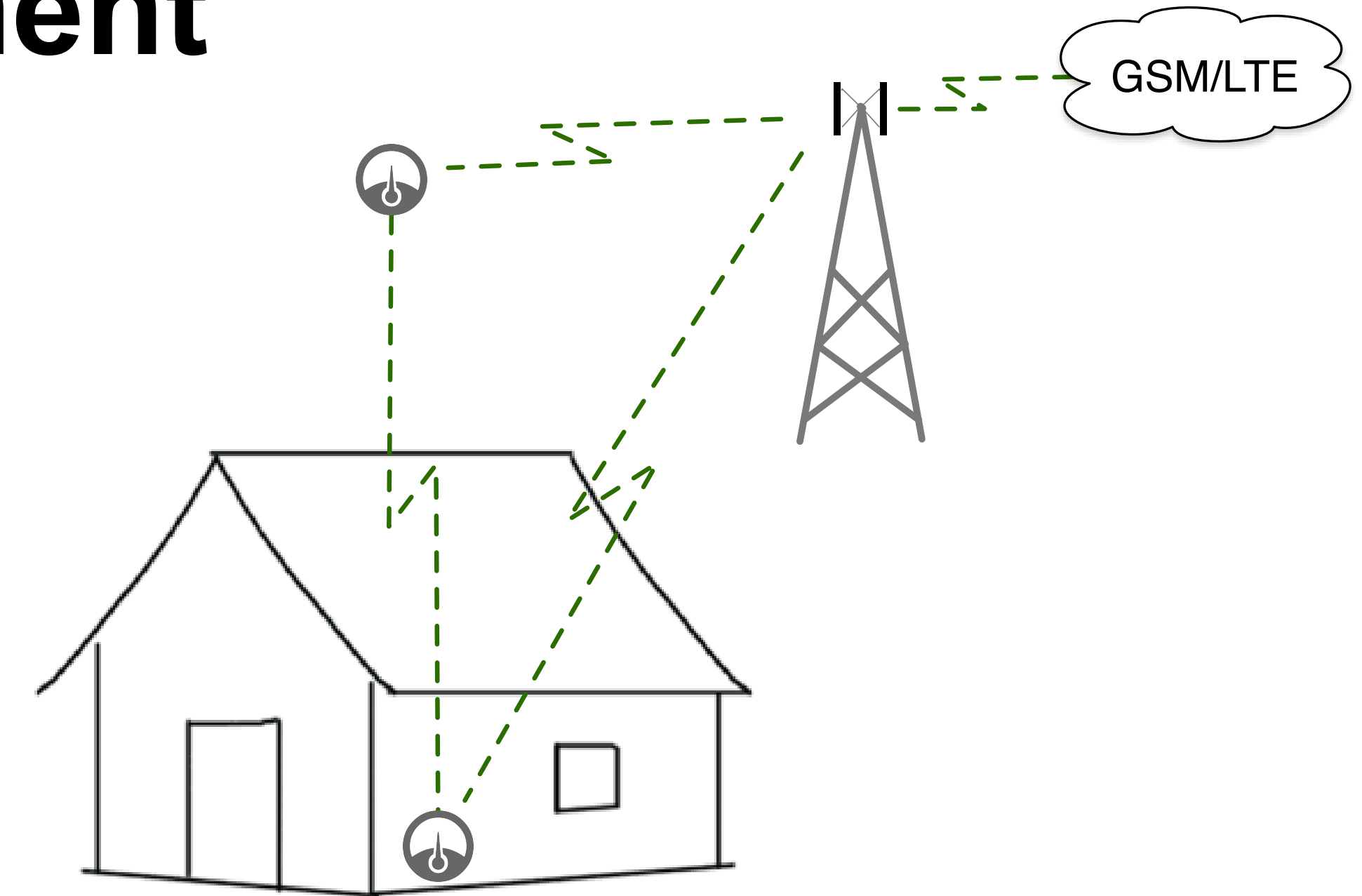
Multi Metrics Assessment

- Metrics to SPD conversion
 - » Parametrisation of system parameters, e.g. latency -> [ms]
 - » SPD regression: «SPD value and importance for the system»
 - » parameter into S,P,D value range, e.g. latency=50ms :=> (ideal, good, acceptable, critical, failure)
 - » Scaling according to System Importance, e.g. latency :=> $S_{\max}=30$, $P_{\max}=10$, $D_{\max}=20$
 - » Assignment of SPD values, e.g. latency=50 ms
- Metrics combination to provide SPD_{System} : (60, 30, 70)
 - » Mathematical combination, e.g. $S_{\text{System}}=100 - \text{SQRT}(S_1^2+S_2^2+\dots S_x^2)$



From System to Security Assessment

- System described through
 - ➔ Security functionality
 - ➔ Security attributes
 - ➔ Metrics converting security into $[0...100]$
- Automatic Meter Reader (AMR)
 - ➔ (1) remote access metric - (yes/no)
 - reading, or just controlling
 - ➔ (2) authentication metric
 - everyone, or authenticated user



(1) remote access

Configuration	Cs	Cp
Remote Access ON	60	60
Remote Access OFF	10	20

(2) authentication

Configuration	Cs	Cp
Authentication ON	10	30
Authentication OFF	80	70



SPD_{Goal} versus System-SPD_{Level}

- Application-based security goals
- Automated assessment
- Visualisation of “operating envelopes”
 - ➔ Security good enough?
 - ➔ Too high Security
- Critical component/sub-system assessment

Table 1 SPD_{Goal} of ea

Use Case	Security	Privacy
Billing	90	80
Home Control	90	80
Alarm	60	40

Table 9 Selected configuration SPD level for each use case

Use case	SPD _{Goal}	Configuration	SPD level	SPD vs SPD _{Goal}
Billing	(90,80,40)	10	(67,61,47)	(● , ● , ●)
Home Control	(90,80,60)	10	(67,61,47)	(● , ● , ●)
Alarm	(60,40,80)	6	(31,33,63)	(● , ● , ●)



Change in Business Models due to IoT

SC Magazine > News > IoT security forcing business model changes, panel says

Teri Robinson, Associate Editor

Follow @TeriRnNY

October 22, 2015

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

IoT security forcing business model changes, panel says

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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



68



22



78

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

The “sharing economy” for energy companies?

**Sharing Economy:
“Telenor will create a
digital ecosystem in
Pakistan”**



[Source: eSmartSystems.com]

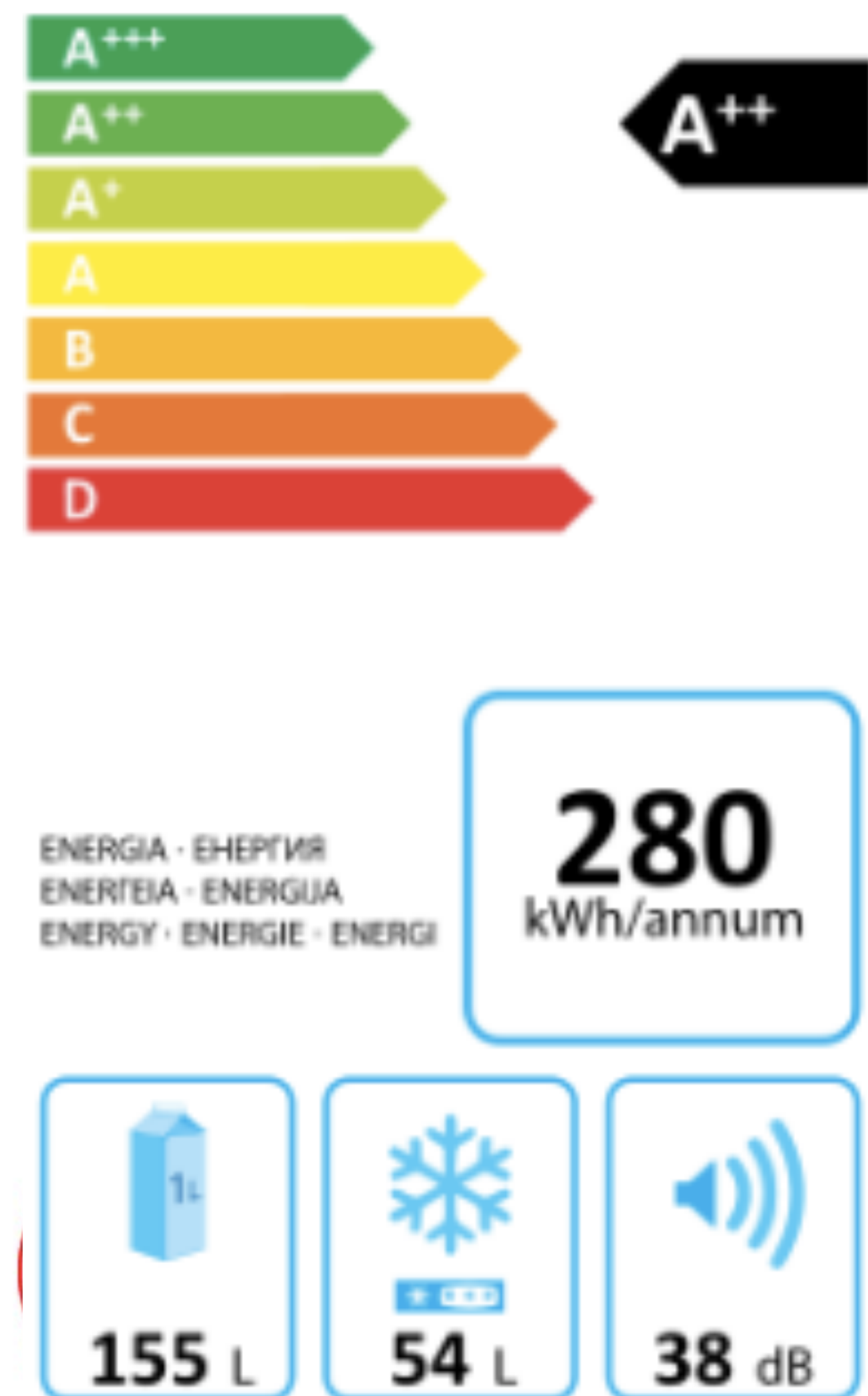
Energy stability

Security

Privacy



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.

Conclusions for 2025

- Things (IoT) are driving the digital societies
- Novel services at home
 - Internet + Semantics + Things = IoT
 - Digitisation of the Society
 - Measurable Security and Privacy
 - Autonomous Decisions
- IoT Security and privacy
 - automated privacy/security through Multi-Metrics
 - Privacy label (A++, A+...D)

