

## UiO Universitetet i Oslo

# Tekna seminar "Sårbarhet i kraftsektoren", Gardermoen, Apr2017 Hvordan ivareta sikkerhet rundt loT enheter?



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# 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

rivacy labelling

Conclusions









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# Who is going to manage the home?





Securing the Internet of Things





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# Considerations

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

| <ul> <li>Monitoring, Control, Configure</li> </ul> | 1 |
|--|---|
| Monitoring, Co                                     |   |









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# **Digitalisation of the Society**

Digital Agenda Scoreboard 2015: Strengthenin... 🕓 🥕

#### A DIGITAL SOCIETY IS MADE OF DIGITALLY-SKILLED CITIZENS

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



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# Digital Agenda Scoreboard 2015: Strengthenin... OF ۵% EUROPEANS DON'T EVEN HAVE BASIC DIGITAL SKILLS





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# 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



#### Source: L. Atzori et al., The Internet of Things: A survey, Comput. Netw. (2010), doi:10.1016/

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







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# How to handle security?



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





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## **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 loTs into boti





#### 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.









# **Communication & IoT for society**

# IoTSec.no

## "Research on IoT security" with "The national Security Centre for Smart Grid"

http://loTSec.no









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## **Example: Measurable Security**

- From people defined security classes
- To automated security decisions
  - through metrics assessment



### based on

### security, privacy and dependability functionalities





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## 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)
  - $\gg$  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<sub>System</sub>: (60, 30, 70)

> Mathematical combination, e.g.  $S_{System} = 100 - SQRT(S_1^2 + S_2^2 + ... + S_x^2)$ 



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# 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 | Ср |  |
|-------------------|----|----|--|
| Remote Access ON  | 60 | 60 |  |
| Remote Access OFF | 10 | 20 |  |

| (2) authenti       | cat |
|--------------------|-----|
| Configuration      | Cs  |
| Authentication ON  | 10  |
| Authentication OFF | 80  |





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# **SPD**<sub>Goal</sub> **Versus System-SPD**<sub>Level</sub>

- Application-based security goals
- Automated assessment
- Visualisation of "operating envelopes" Security good enough? Too high Security
- Critical component/subsystem assessment







| Table 1 SPD <sub>Goal</sub> of e |          |         |
|----------------------------------|----------|---------|
| Use Case                         | Security | Privacy |
| Billing                          | 90       | 80      |
| Home Control                     | 90       | 80      |
| Alarm                            | 60       | 40      |

Table 9 Selected configuration SPD level for each use case

|    | SPDGoal    | Configuration | SPD level  | SPD vs SPD                              |
|----|------------|---------------|------------|---|
|    | (90,80,40) | 10            | (67,61,47) | (,,,,                                   |
| ol | (90,80,60) | 10            | (67,61,47) | (,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,, |
|    | (60,40,80) | 6             | (31,33,63) | (,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,, |



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# 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/iotsecurity-forcing-business-modelchanges-panel-says/article/448668/

#### IoT security forcing business model changes, 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 Nasdag.

"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."





UNIT



#### 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.







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## The "sharing economy" for energy companies?

### **Sharing Economy:** "Telenor will create a digital ecosystem in Pakistan"



Home

About

## Prosumer bidding and scheduling in electricity markets

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[Source: <u>eSmartSystems.com</u>]

### **Energy stability**

### **Security**

#### **Privacy**





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# **Towards Measurable Privacy - Privacy Labelling**







280

kWh/annum

- "Measure, what you can measure 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

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Make measurable, what you can't



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# **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)













