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NORWEGIAN COMPUTING CENTER

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PETweb – Privacy Enhancing Technology

for large scale web based services

VERDIKT Program Conference

Åsmund Skomedal

Norsk Regnesentral

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Overview

- Background
- Protective measures
- Privacy Principals
- Architecture
- Privacy Ontology
- Privacy Threat Impact Analysis
- Summary

Background

- Cost of storage approaches zero – can save everything
- Find out what end-users actually do to handle their privacy
- Find out what systems do
  - Portal owners, System integrators, Technology providers

Goals

- Develop tools to analyse the impact of privacy violations
- Identify efficient PETs in large scale web solutions
- Use a Case Study:
  MinSide/MyPage – the G2C portal
- Main partners: NR, HiG, Software Innovation, Sun, norge.no

Summary of protective measures (1)

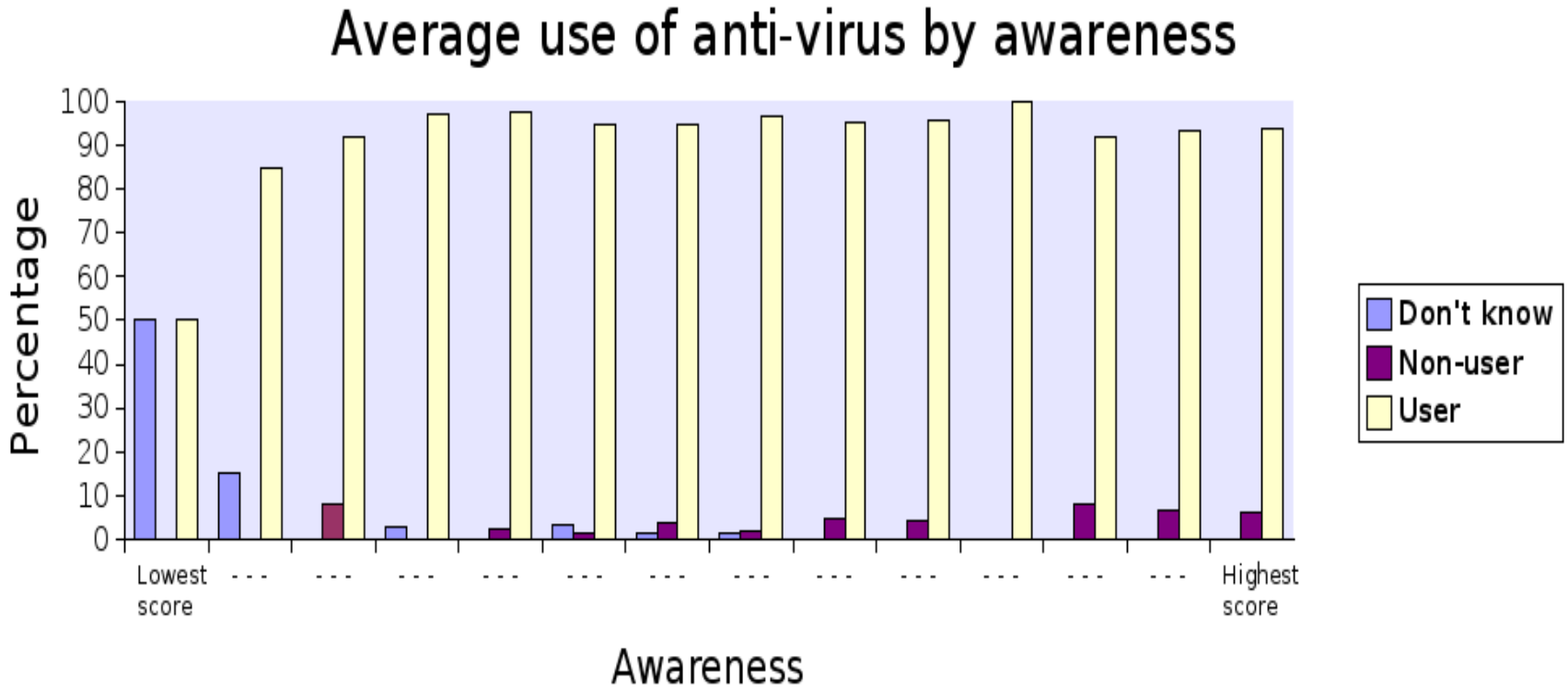
Findings from MSc Thesis (Høgskolen i Gjøvik) [F. Andreassen]

- There is a strong correlation between actual use and awareness
- Almost everyone knows about Viruses and the need to protect against it
- ca 70 % use Firewalls and pop-up blockers
- ca 50% use anti spyware SW on average

Why is this a problem?

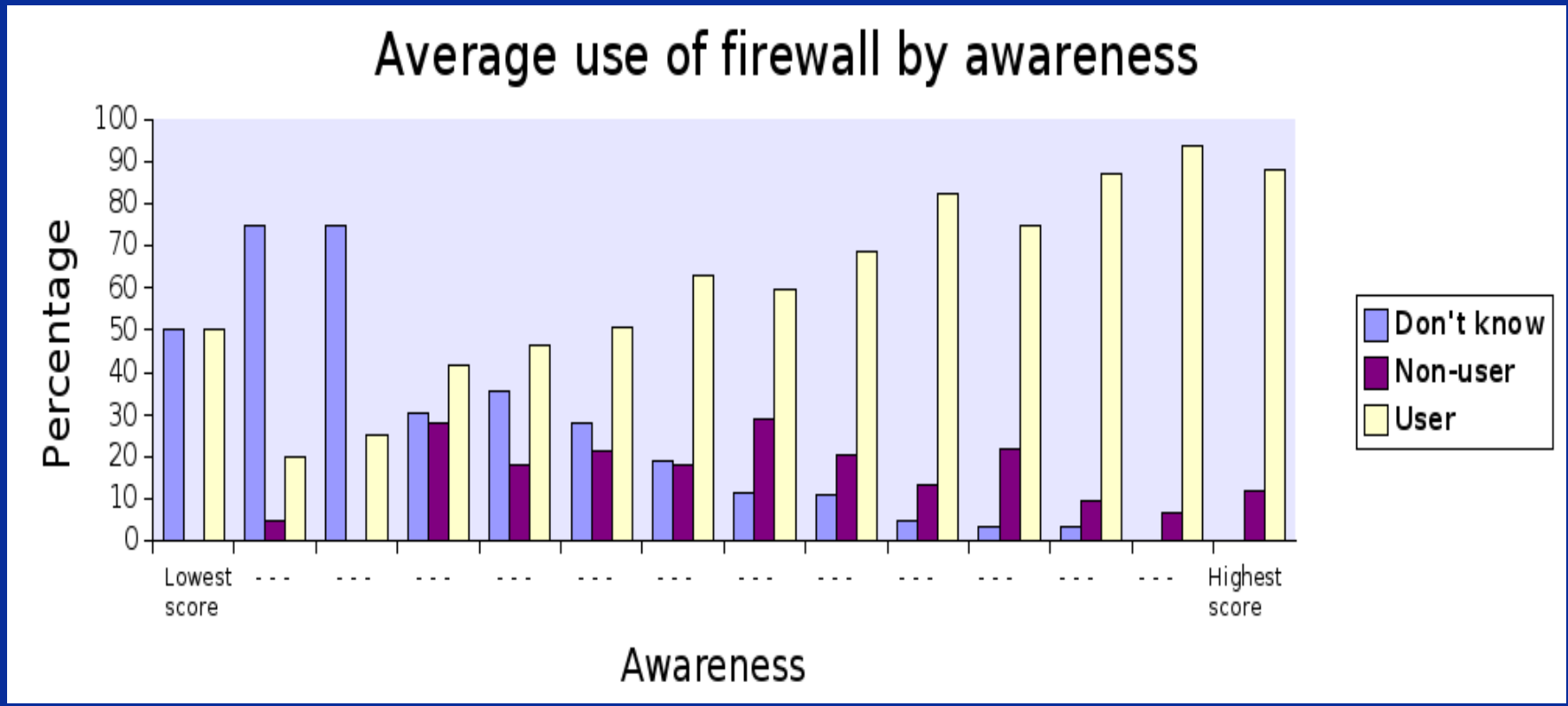
In the second quarter of 2006, close to x% of checked U.S. home computers contained forms of spyware.

Who uses Anti Virus (AV) SW



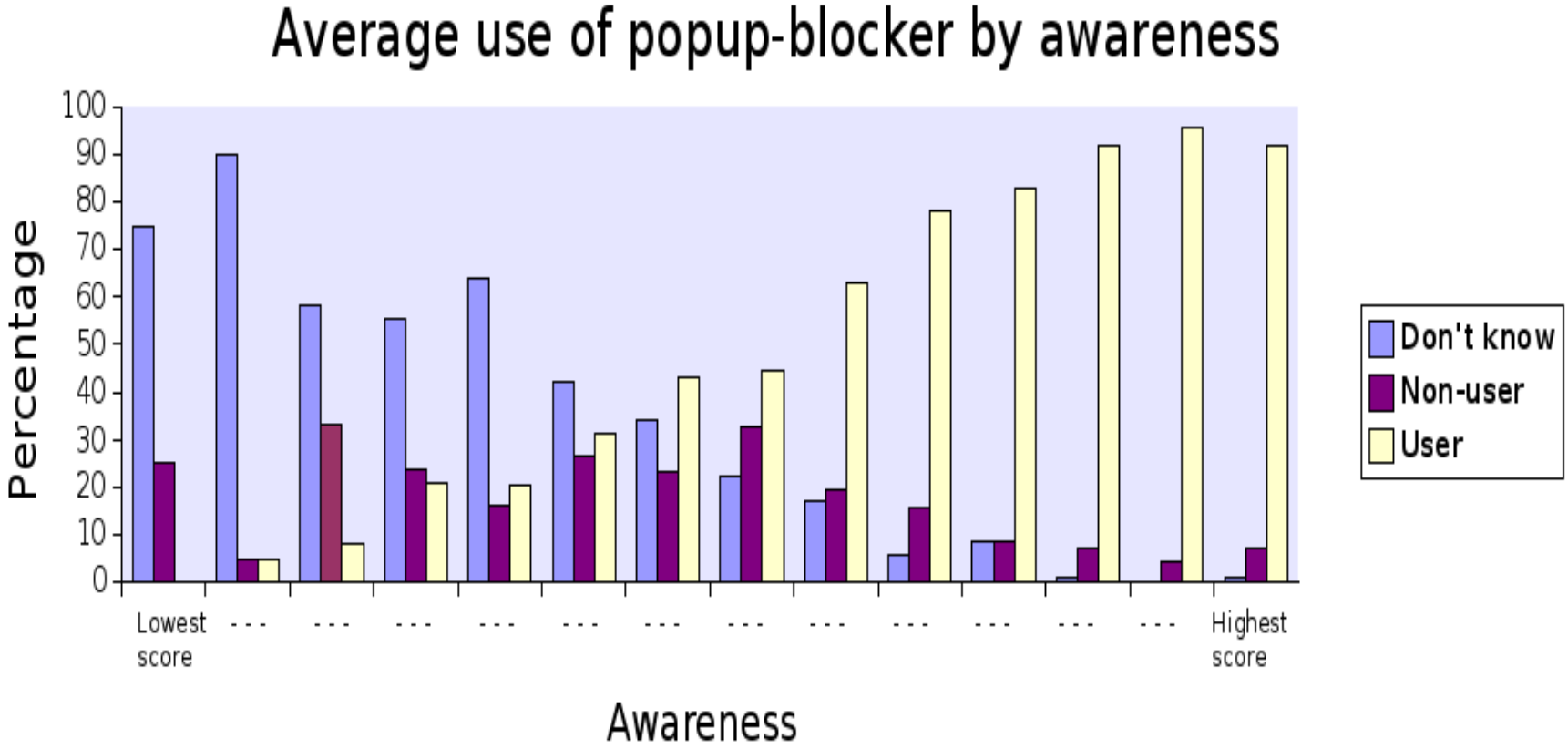
- In total: 92.1% uses AS SW -> OK !

Who uses Firewalls (FW)



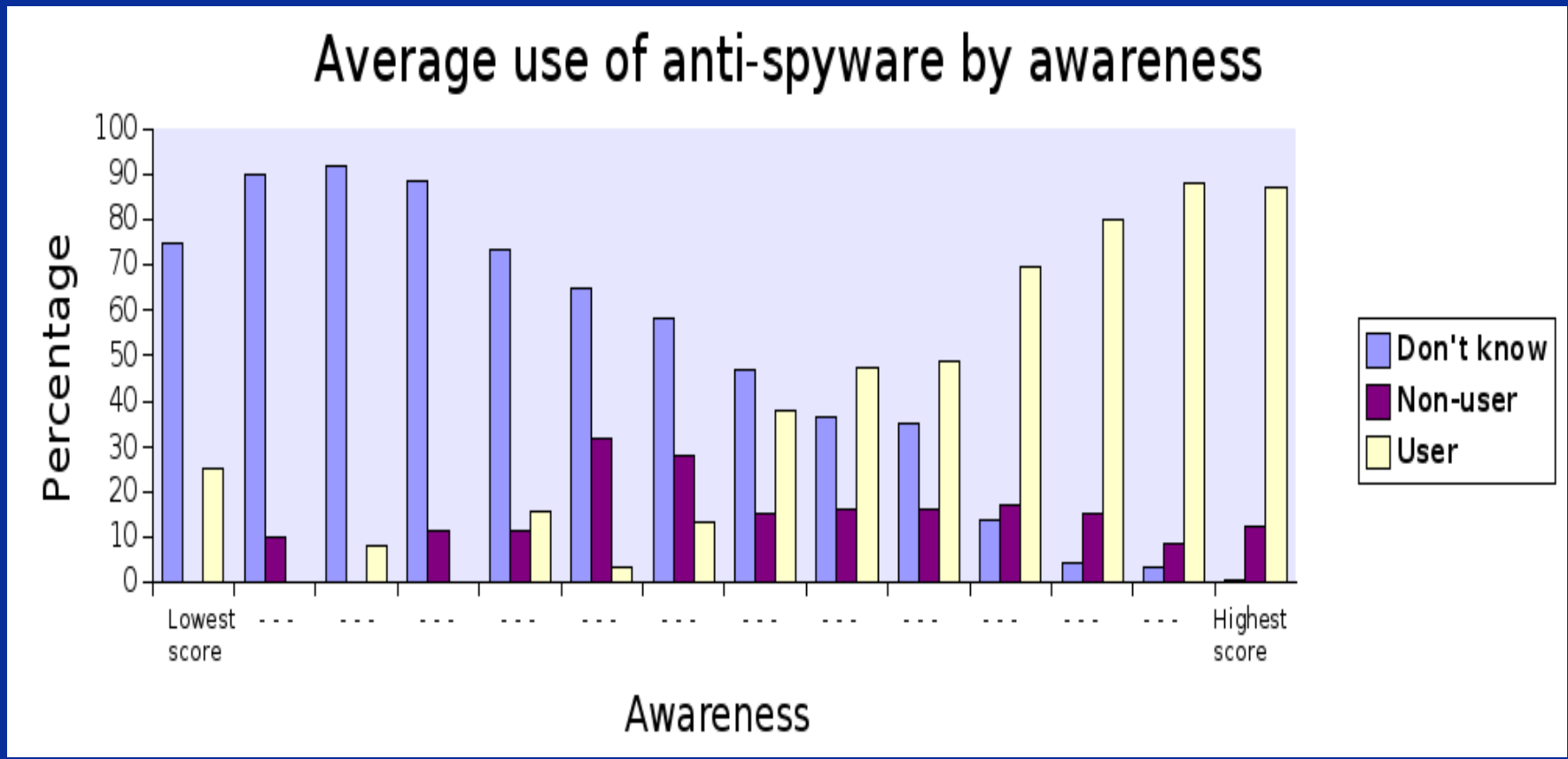
- In total: 72% uses a FW -> OK !

Who uses Pop-Up Blockers



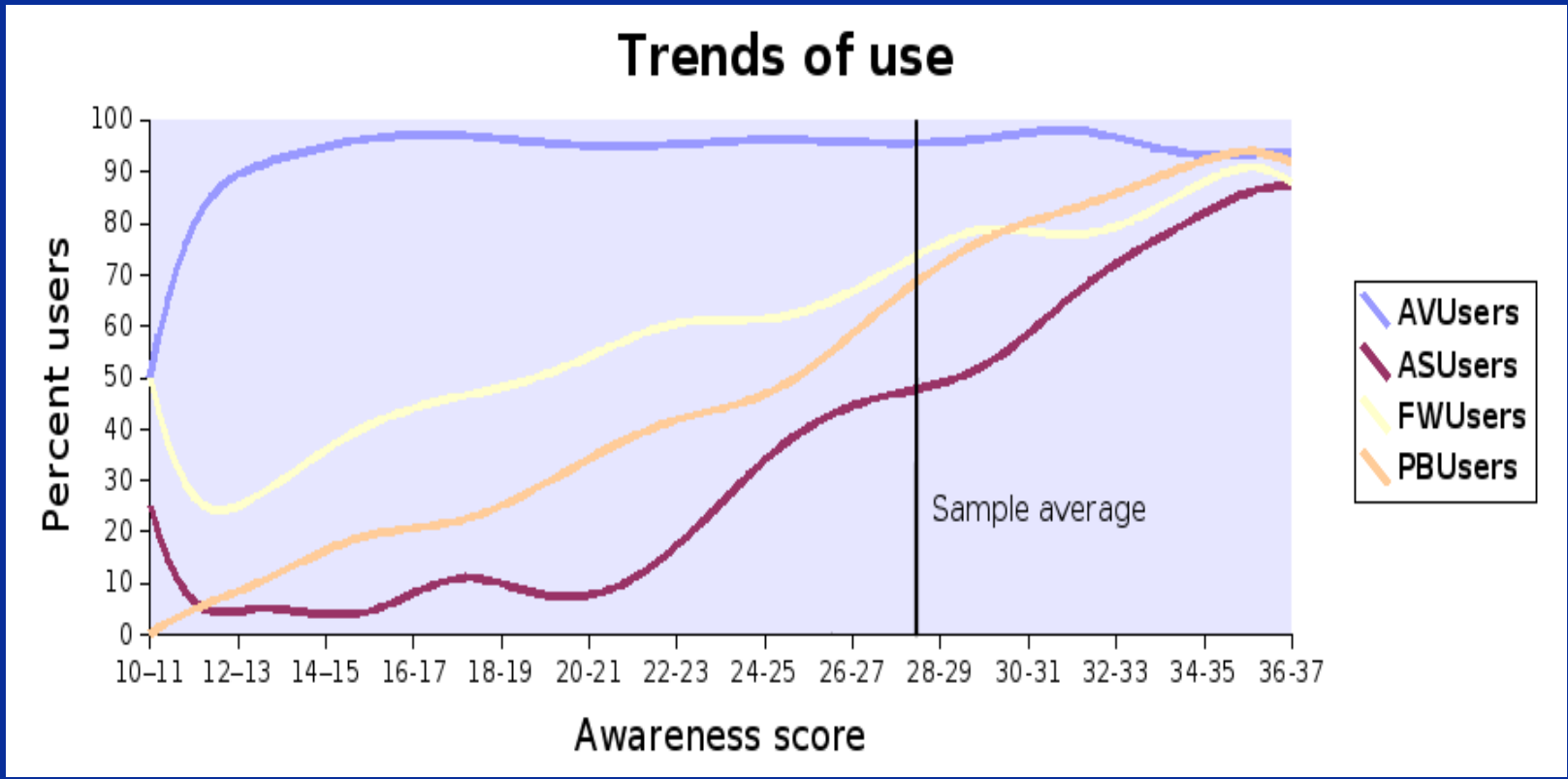
- In total: 66 % uses AS SW -> fair !

Who uses Anti Spyware (AS) SW



- In total: 52 % uses AS SW and 23% don't know !

Summary of protective measures (2)



In the second quarter of 2006, close to 90% of checked U.S. home computers contained forms of spyware.

Best guess
⇒ many get spyware without knowing about the threat
⇒ even more get it with Anti Spyware installed
When citizens use PCs to access SENSITIVE private information this is an issue

Privacy Principals – basis

1. Principles concerning the fundamental design of products and applications:
   - Data minimization (maximum anonymity and early erasure of data)
   - Transparency of processing
   - Security
2. Principles concerning the lawfulness of processing:
   - Legality (e.g. consent)
   - Special categories of personal data
   - Finality and purpose limitation
   - Data quality
3. Rights of the data subject:
   - Information requirements
   - Access, correction, erasure, blocking
   - Objection to processing
4. Data traffic with third countries

Privacy Principals – basis

5. Notification requirements
6. Processing by a processor – responsibility and control
7. Other specific requirements resulting from the
   - Directive on Privacy and Electronic Communications 2002/58/EC/,
   - Data Retention Directive 2006/24/EC and
   - the Norwegian legislation.

The grouping of privacy facilitation principles of data processing have been used by the ICPP – the Data Protection Authority of Schleswig-Holstein, Germany for the purposes of conducting privacy audits, and in particular by the catalogue of requirements of the ICPP "Privacy Seal for IT Products"

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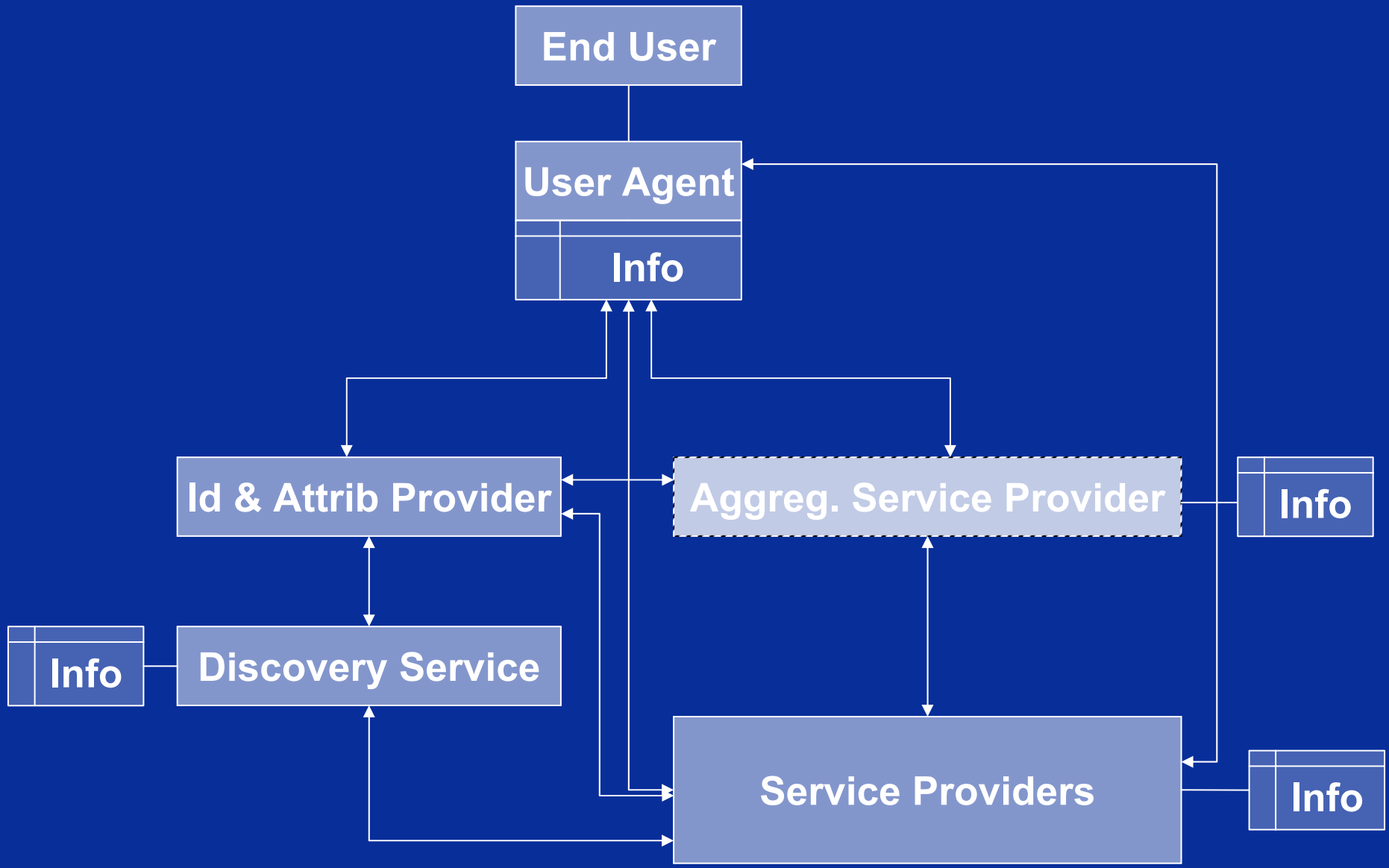
The PETweb Architecture



Privacy Ontology

Privacy Objectives

- **Data protection** – fair information practices: anonymity, unlinkability, pseudonymity,
- **Unobservability**
- **Security**: Conf., Integrity, Accountability, Availab.

Threat Actor
- Intent
- Capabilities
- Opportunities

Automated
- Scripted
- Controlled
- Autonomous

Manual

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Threat Target

Threat

Threat Agent

1..* 0..* 0..* 1..*

Passive

Active

Security Privacy
- Interception
- Manipulation
- Repudiation
- Denial of Service

Information Privacy
- Collection
- Processing
- Dissemination
- Invasions
- Non-compliance

as applicable
- roles (outsider, system admin, foreign, intelligent, etc)
- observing / interfering upon agreed rules

Locality threats
- global attackers (Governments)
- local attacker (Local admin)

User threats
(sender, receiver)
- hostile user
- user errors
- user's misuse
- user abuses

Admin threats
- errors of commiss.
- errors of omission
- hostility (data, user)
- violation of user privacy policy

Developer threats
- SW containing security flaws
- input validation, integer/buffer overflows

System threats
- component fails
- degradation over time
- excess voltage

Hackers threats
- spoofing
- social engineering
- malicious code exploitation
- eavesdropping

Threat Model

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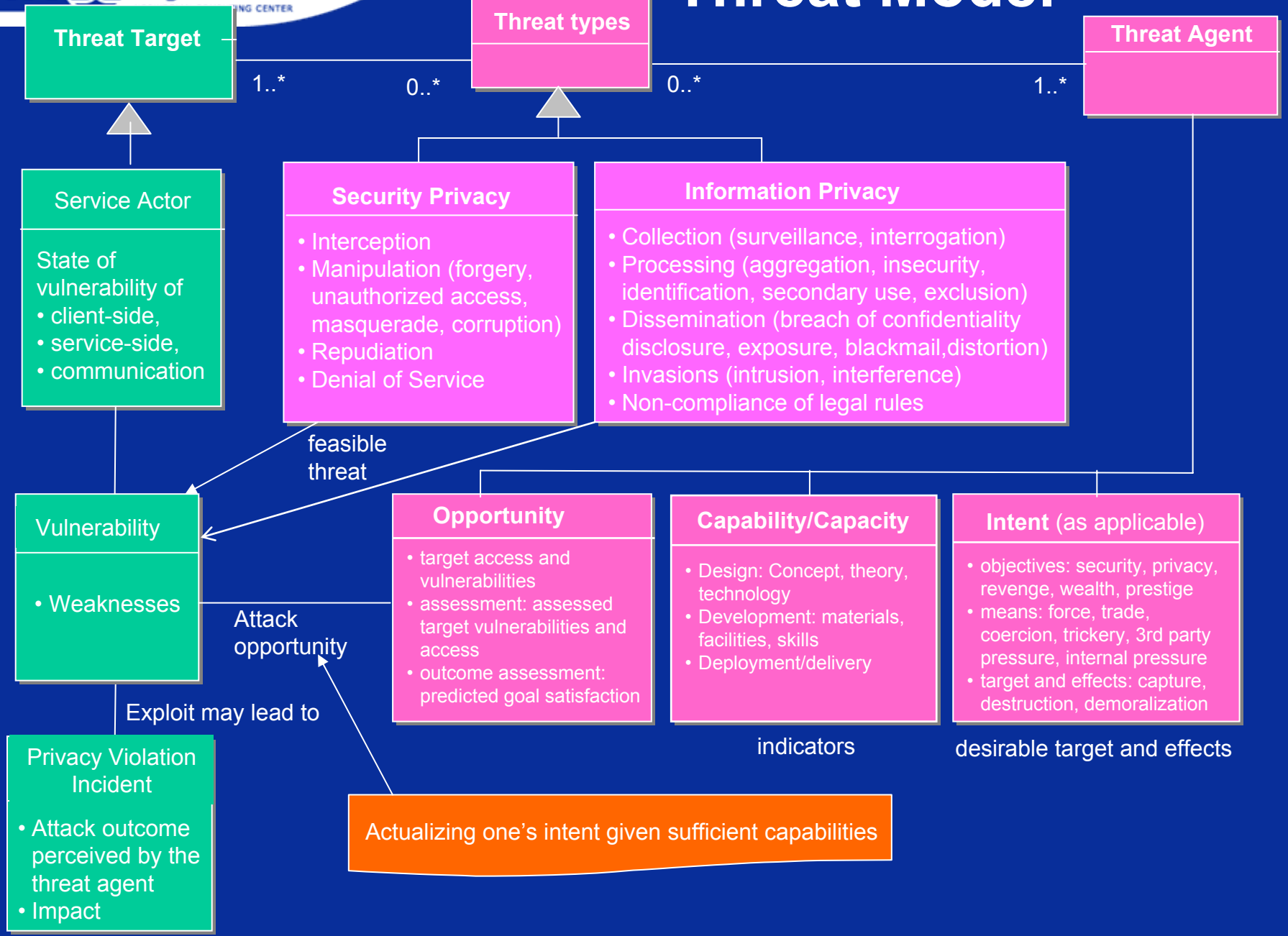

Privacy Threat Impact Analysis

- Privacy ≠ Security
- Model needs to capture
  - Capability, Intent and Opportunity
  - Assets, actors and threats
  - "Impact"
- Goals:
  - Find the weak spots -> efficient PETs
  - Understand how Data Subjects and Data Processors view the same threat differently
  - What assumptions can Service providers make on behalf of end users and their protective measures

Privacy Threat Impact Analysis tool

For each … calculate

- Asset
  - Threat Types (Locality, User, Developer … Hacker)
    - Threat Agent
      Properties
      - Auto/Manual, Active/Passive
      - Intent, Capability, Opportunity

        - Threat 1, Impact
        - …
        - Threat n, Impact

Min Side (norge.no)

MinSide is an Aggregated Service Provider

- Uses “existing” authentication methods
- Min ID is Identity Provider (based on SAML), federation is Possible

Unconfirmed estimates

- Federation is not anonymous when it can be ?
- Personal Information transferred (and stored) in the User PC is not protected by Min Side – and not by the average user ?

Some open issues

- Availability vs Privacy
  - What is the responsibility of the (Aggreg.) Service Provider knowing that end-user security is more or less inadequate
  - Should MinSide place Security requirements (SW !?) on the User PC
  - What about on-line security evaluations
- User volume vs Security
  - What are adequate Authentication Methods to access SENSITIVE private information

PETweb summary

Background

- Awareness study => many users without adequate security

PETweb Framework consists of

- System Architecture
- Ontology
- Privacy Threat Model
- Privacy Impact Analysis tool

Validation of results with Min Side

- Validate the PETweb framework and tools
- Point out weak spots => identify efficient PETs
- Identify Open Issues
  often a trade-off between Data Owner and Data Processor interests