UNIVERSITÄT PADERBORN

HITS
Human-Centered IT Security

EXERCISE: PRIVACY AND EMERGING TECHNOLOGIES
19TH & 20TH DEC

PRIVACY AND TECHNOLOGY (PaT)

L.079.05705

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Today's Outline

1. Recap Contextual Integrity

2. Case Study: Neuroprivacy

3. Exercise about Quantitative Analysis

Privacy as "Contextual Integrity" (CI)*

Helen Nissenbaum, "*Privacy as Contextual Integrity*" (2004)

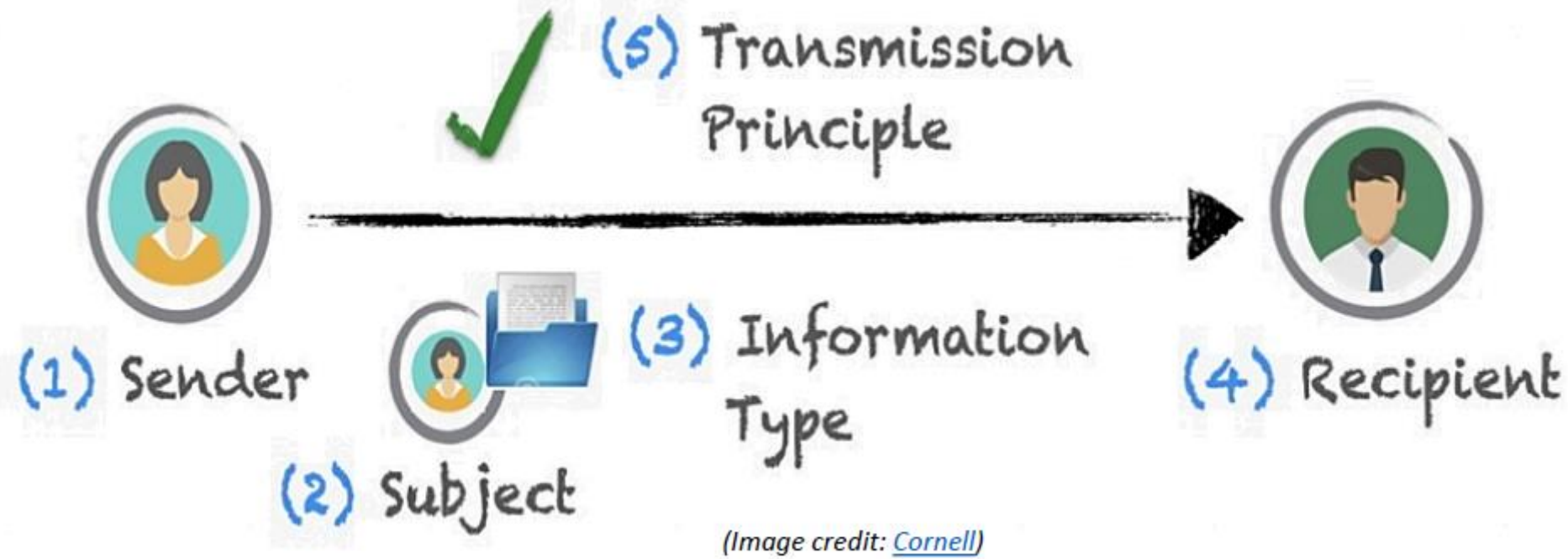
Idea: data is shared with specific mindset in specific context. Within each context there are established norms how information should be shared

Privacy is the **appropriate** flow of information

- Appropriateness = follows informational **norms** in a given context
- Information norms = 5 key parameters

* See lecture slides "General Background"

Privacy as “Contextual Integrity” (CI)



(Image credit: Cornell)

Contextual Integrity: Example

Information flow

- **Sender:** fitness tracker
- **Subject:** fitness tracker user
- **Information type:** physiological data (heart rhythm)
- **Recipient:** doctor
- **Transmission Principle:** health emergency support

Full flow:

The fitness tracker sends user's physiological data (heart rhythm) to a doctor for health emergency support.

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Case Study: Neuroprivacy

Brainwaves correlate with mental states and emotions, interests and more personal data can be inferred

Neuroprivacy:

- Need to safeguard brain data
- Call for legal frameworks[1]

[1] Marcello Ienca and Roberto Andorno. 2017. Towards new human rights in the age of neuroscience and neurotechnology.

Case Study: Neuroprivacy[2]

- Conducted online survey with 287 participants to investigate public towards towards brain data collection and use
- Research Questions:
  - **Neuroprivacy Expectations:** Under which conditions do people consider sharing neurodata acceptable?
  - **Neuroprivacy and Neurotechnology Awareness:** How aware are people of neurotechnology privacy implications and how would they use this technology?

[2]Kablo, E., and Arias-Cabarcos, P.. "Privacy in the Age of Neurotechnology: Investigating Public Attitudes towards Brain Data Collection and Use." *Proceedings of the 2023 ACM SIGSAC Conference on Computer and Communications Security*. 2023.

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Case Study: Neuroprivacy

Methodology:

- CI as instrument to define information flows

Parameters:

Sender (1)	Recipient (10)	Subject & Attribute (1)	Transmission Principles (16)
• BCI device	• Its manufacturer	• User's brain signals	• If user has given consent
	• Online service provider		• If user is directly notified before data collection
	• Academic researchers		• If data is kept confidential and secure
	• User's social media accounts		• If data is stored online for a limited period
	…		…
			• Null (no principle)

Case Study: Neuroprivacy

11 **Matrix-like visualizations** with a 5-point Likert scale for rating acceptability:

(2) Completely acceptable
(1) Somewhat acceptable
(0) Neutral
(-1) Somewhat unacceptable
(-2) Completely unacceptable

Null-principle:

A commercial **BCI headset** records **the brain signals of its user**. How acceptable is it for the headset to share this information with the following recipients? *

Please choose the appropriate response for each item:

	utral	Somewhat acceptable	Completely acceptable	Doesn't make sense
with its manufactur				
with online service				
with academic rese				

Manufacturer:

A commercial **BCI headset** records **the brain signals of its user**. How acceptable is it for the headset to share this information with **its manufacturer** under the following conditions: *

Please choose the appropriate response for each item:

	Completely unacceptable	Somewhat unacceptable	Neutral	Somewhat acceptable	Completely acceptable
if the user has given verifiable and revocable consent	○	○	○	○	○
if the user is directly notified before data collection	○	○	○	○	○
if data is kept confidential and secure	○	○	○	○	○

Case Study: Neuroprivacy

Analysis and results:

Your Part!

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Practicing CI and Quantitative Analysis