
SEVEN TYPES OF PRIVACY: TAXONOMY REFLECTING EMERGING TECHNOLOGIES

Michael Friedewald, Fraunhofer ISI



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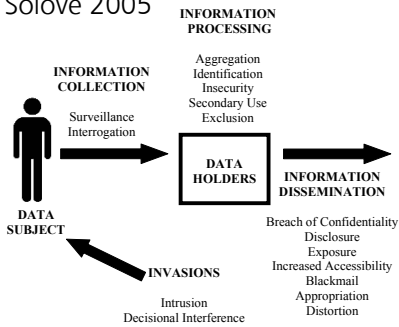
At a Glance

- 1 Taxonomies of privacy
- 2 Emerging Technologies. Some technology examples
- 3 Extending the taxonomy
- 4 Conclusions

Taxonomies

Popular taxonomies are on privacy infringements and harms, not privacy

Solove 2005



Kaspar 2005

Table I. Typology of Privacy Invasions

<i>Extraction (activity: taking)</i>	<i>Observation (activity: watching)</i>	<i>Intrusion (activity: entering)</i>
<i>Stockpiling</i>	<i>Physical</i>	<i>Sensory</i>
<i>Appropriation/disclosure</i>	<i>Communication</i>	<i>Bodily</i>
<i>Inner-state</i>	<i>Behavioral</i>	<i>Autonomy</i>

Taxonomies

Popular taxonomies do not reflect newer technology developments well:

- **privacy of the person**
- **privacy of personal communications**
- **privacy of personal behaviour**
- **privacy of personal data**

(Roger Clarke, 1997 ff.)

Challenges: Integrated surveillance robots – „cyborg insects“



Some new and future technologies impacting privacy (1/3)

- New surveillance technologies
 - Drones/UAS, Terahertz Scanners
 - New quality of visual surveillance (clandestine, intrusive)
 - Invade former sanctuaries (garden, home, body)



Biometrics: Not „Minority report“



... but Viewdle



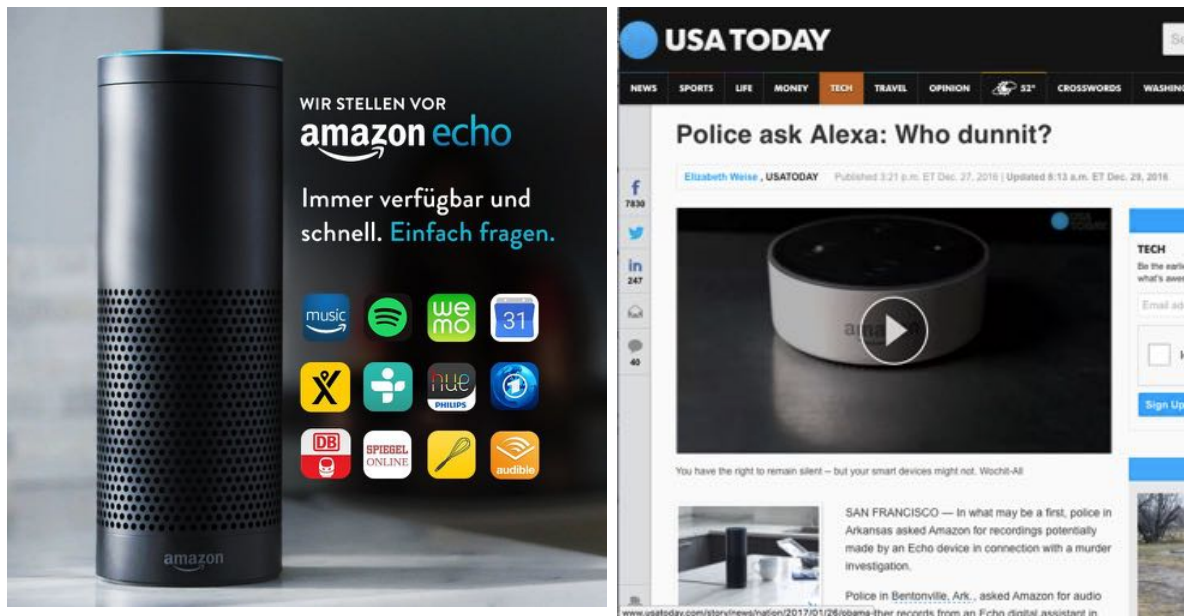
Face recognition: Emotions, Gender, Age



Pervasive surveillance: Not 1984 and „big brother“

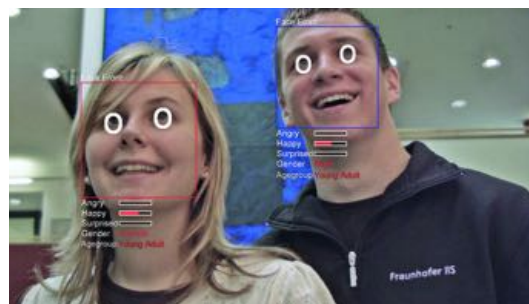
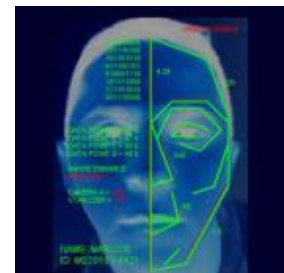


... but smart TVs, Alexa & Co: perfect bugs



Some new and future technologies impacting privacy (1/3)

- Second generation biometrics
 - Soft biometrics, behavioural biometrics
 - Recognition can take place covertly and from distance
 - High degree of sensitive (and surplus) data
 - → medical conditions and emotional states



Challenges: „Gattaca“ ...



... becoming reality



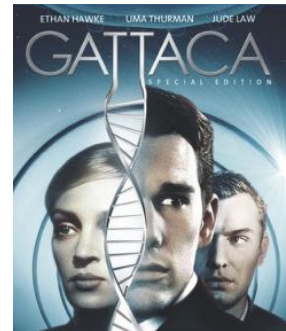
Source: Oxford Nanopore Technologies

Pricing around 900\$



Some new and future technologies impacting privacy (2/3)

- Next generation DNA sequencing
 - On the spot analysis of (whole) genome at reasonable price seems feasible in next few years
 - Richest personal information possible, but still unclear what it can reveal (sex, race, predisposition for diseases. ...)
 - Information not only about individual but also about relatives and descendants



Challenges: Neuro-Technologies



No longer „Star Trek“



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... but a real game controller



Source: Emotiv Systems

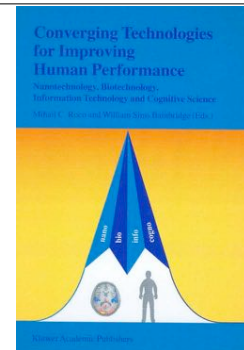
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Some new and future technologies impacting privacy (3/3)

- Technologies for Human Enhancement
 - Improving human capabilities (seeing, hearing, mental, physical) → medical and military origin
 - Interfacing Humans and Technology (Brain-Computer-Interface)
 - Experimental development stage
 - Shifting boundaries: body/technology
 - Shifting boundaries: Normality
 - Shifting boundaries: External control

- Still debated: Personal data? Medical data



Seven types of privacy – an heuristically extended taxonomy

1. Privacy of the person
2. Privacy of personal communication
3. Privacy of behaviour and action
4. Privacy of (personal) data **and image**
- 5. Privacy of location and space**
- 6. Privacy of thought and feeling**
- 7. Privacy of association**

Privacy impacts of selected future technologies

Technology \ Dimension	RFID enabled travel documents	Smart surveillance technologies	Second generation biometrics	Next generation DNA sequencing	Human enhancement technologies
	Short term	Short to medium term	Medium term	Medium to long term	Long term
Privacy of data and image	X	X	X	X	X
Privacy of behaviour and action	X	X	X	X	X
Privacy of location and space	X	X	X	X	
Privacy of association		X	X	X	
Privacy of the person		X	X	X	X
Privacy of communication			X		X
Privacy of thought and feelings			X		X

Summary

- Personal data is becoming richer
 - Directly through new sensors collecting more personal data
 - Indirectly through intelligent combination of personal data (big data mining, profiling, ...)
 - → Associations between individuals and groups become more important
- As technologies shift the border between technology and human
 - Not only bodily integrity (privacy of the person) are impacted but also
 - Mental states (privacy of thoughts and feelings)
 - → Rather an ethical than a data protection issue
- “Seven types of Privacy” took this development into account.
- Koops et als.’ typology further extend and systematize this approach

Used for survey on privacy perception of European citizens (2014)

How important is it for you to be able to...	Privacy of...
... know who has information about you?	Data and image
... control who has access to your medical files?	Data and image Thoughts and feelings The person
...use the Internet anonymously?	Behaviour and action Location and space
...make telephone calls without being monitored?	communication
...keep who you vote for in elections private?	Behaviour and action Thoughts and feelings
...keep your religious beliefs private?	Thoughts and feelings association
...attend a demonstration without being monitored?	Location and space association
...meet with people without being monitored?	association

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