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On the Design of a Privacy-focused Data Lifecycle for Smart Living Spaces

(Redacted Version)

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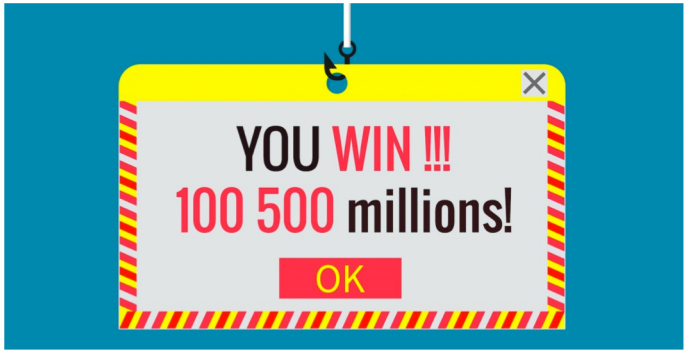
INTRODUCTION

- ✓Over 20 billion Internet of Things (IoT) devices by 2020
- ✓Internet-connected devices will outnumber people at least 2:1
- ✓Global market size of about $457B by 2020
- ✓Applications range from domestic to industry scenarios

SOME EXAMPLES OF PRIVACY HARMS

Discrimination

Identity theft



Unsolicited ads

PRIVACY RISKS HITTING MAINSTREAM MEDIA

Amazon Workers Are Listening to What You Tell Alexa

A global team reviews audio clips in an effort to help the voice-activated assistant respond to commands.

Amazon Echo

Amazon Listening To What You Tell Alexa

Source: https://bloom.bg/2D6kQbq

PRIVACY DEFINITION TIMELINE

1890: Warren and Brandeis identified privacy as "*the right to be let alone*"

1968: Westin described privacy as "*the claim of individuals, groups, or institutions to determine for themselves when, how, and to what extent information about them is communicated to others*"

1975: Altman conceptualizes privacy as a boundary regulation process whereby people optimize their accessibility depending on a context

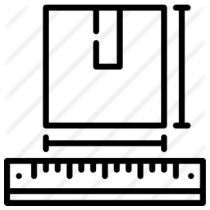
2009: Nissenbaum proposed the theory of Contextual Integrity that argues for a consideration of information flow in context

PRIVACY IN PRACTICE

- ✓ **Regulations**

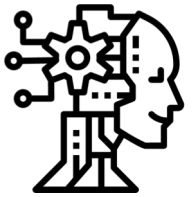
European General Data Protection Regulation

- ✓ **Standards and Frameworks**



ISO/IEC 29100 2011

- ✓ **Engineering Approaches**



Privacy by Design

IOT EXTERNAL ENTITIES

Data subject: The human entity that generates the original raw data

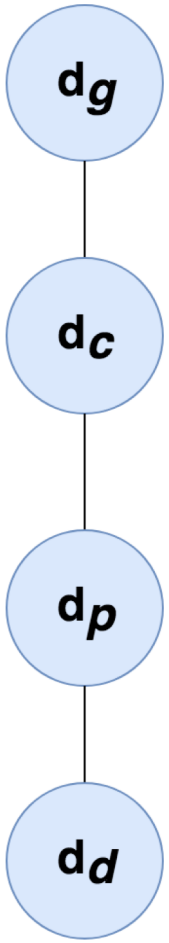
Data curator: Typically the organization, that collects, stores, processes, and releases the data

Data users: Signifies the entities who access the released data

IOT EXTERNAL ENTITIES

Data attacker

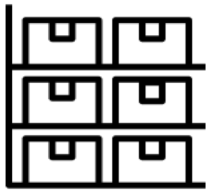
IOT DATA PHASES



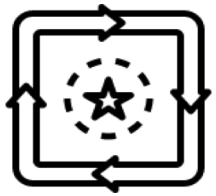
- ✓ **Data generation:** Activity where the data subject interacts with the IoT system to create personal data
- ✓ **Data collection:** Acquiring personal data from data subjects, including external sources
- ✓ **Data processing:** The IoT analyses the stored data to provide the smart services
- ✓ **Data disclosure:** Disseminating, making available or transmitting personal data for external use by third-parties

OTHER PRIVACY THREATS

- ✓ **Privacy-violating interaction and presentation:** Exposing personally identifiable information to individuals who are not supposed to have access to it



- ✓ **Inventory attacks:** Unauthorized collection of information about the existence and characteristics of personal things



- ✓ **Lifecycle transitions:** Disclose private information during changes of control spheres in their lifecycle

THANK YOU FOR *YOUR* ATTENTION !

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