Risk Assessment von Smartphone Apps im Unternehmenskontext

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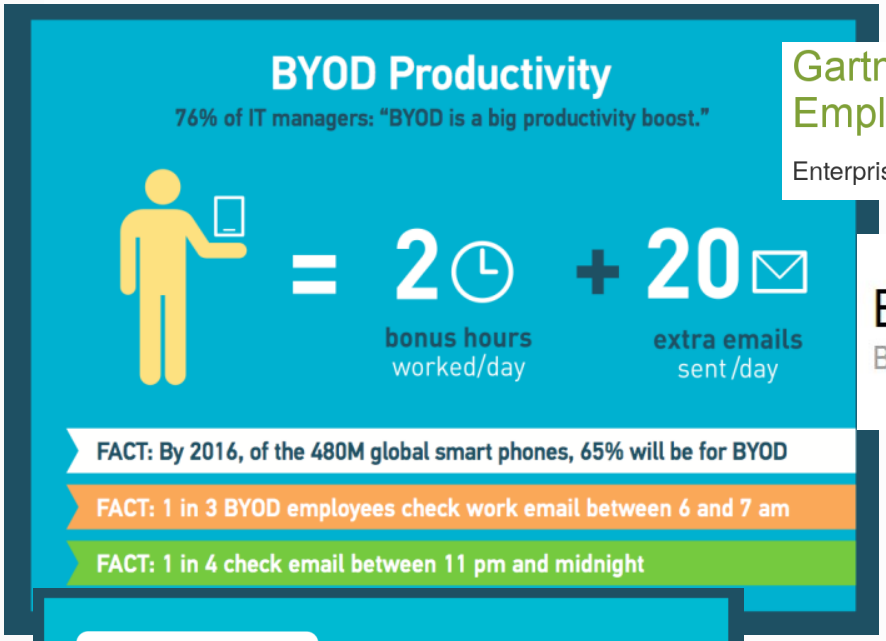
Essen

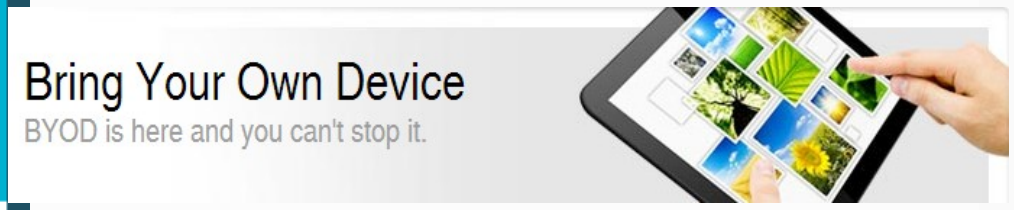
Background: Bring Your Own Device



[Source: BMC Blogs]

Gartner Predicts by 2017, Half of Employers will Require Employees to Supply Their Own Device for Work Purposes

Enterprises That Offer Only Corporate-Liable Programs Will Soon Be the Exception



[Source: Gartner]

Effects of Bring Your Own Device

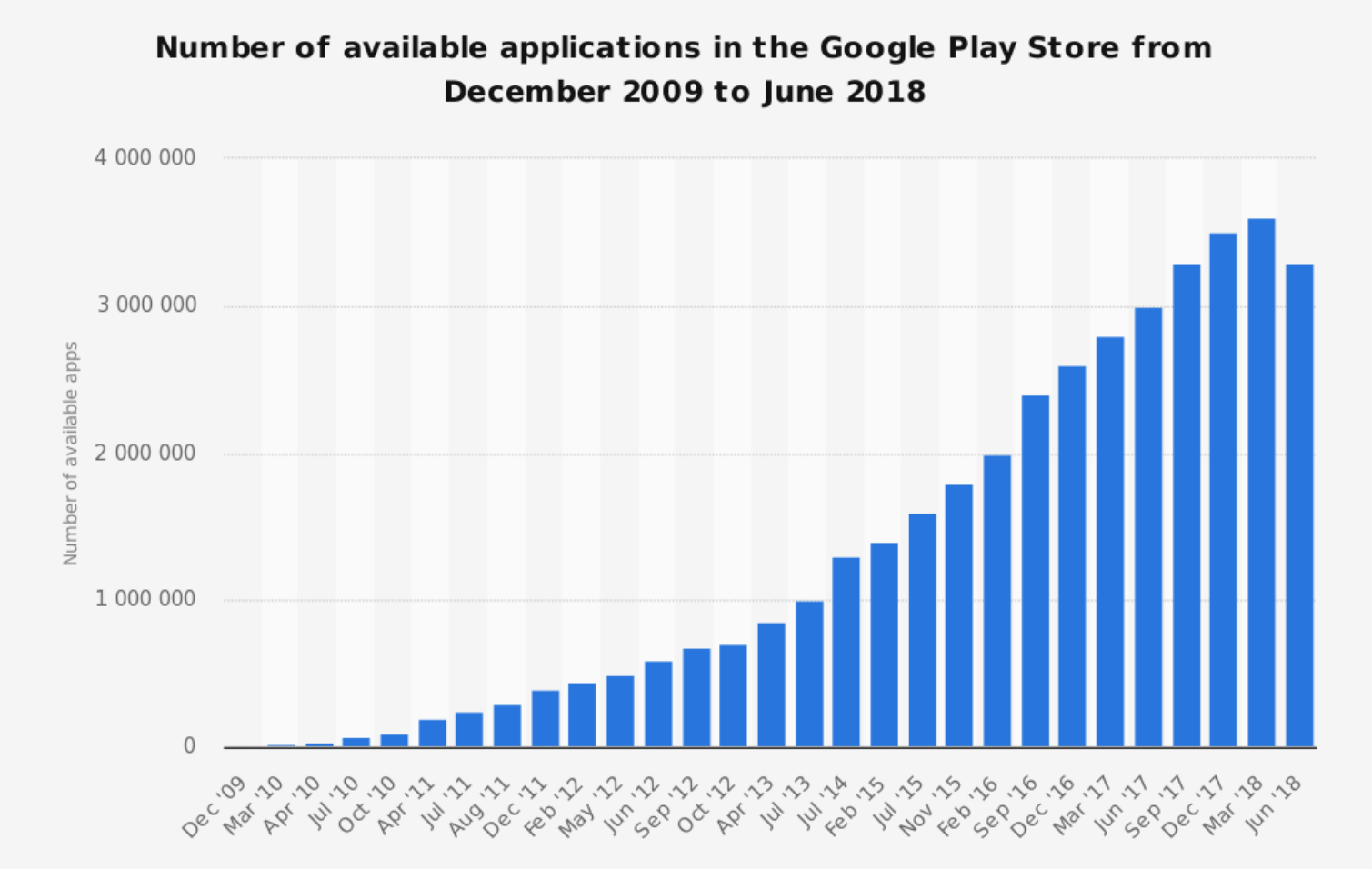
Source: www.dilbert.com, May 28, 2008

- Loss of Control
- Additional Risks
- Hard to counter

→ Solution:

  - Educate Employees
  - Awareness Raising
  - Security Policies

Available Mobile Apps



Source: Statista, June 2018

VeraCode: Mobile Apps Top 10 Risks

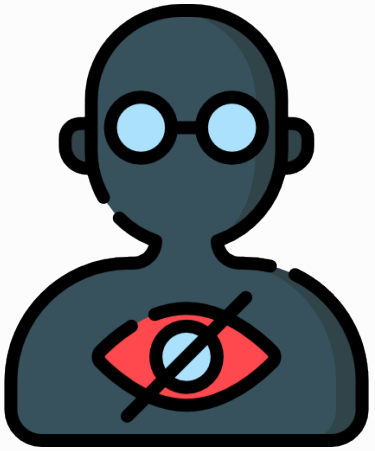
A. Malicious Functionality

- Activity monitoring and data retrieval
- Unauthorized dialing, SMS, and payments
- Unauthorized network connectivity (exfiltration or command & control)
- UI Impersonation
- System modification (rootkit, APN proxy config)
- Logic or Time bomb

B. Vulnerabilities

- Sensitive data leakage (inadvertent or side channel)
- Unsafe sensitive data storage
- Unsafe sensitive data transmission
- Hardcoded password/keys

Privacy Risks of Smartphone App Usage

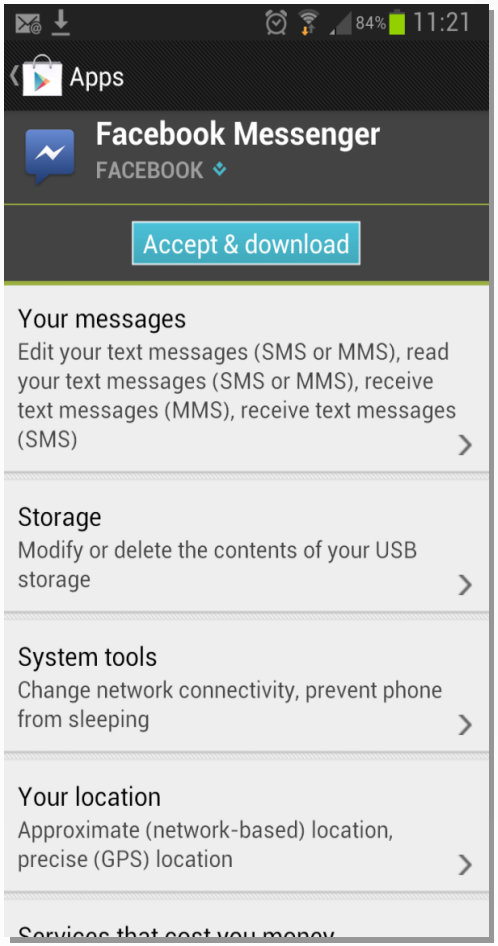


- Apps are useful and provide utility.
- APIs (e.g. geolocation API) as
  - … enabler of utility.
  - … threat to user privacy.
- Negative examples: “Brightest Flashlight”, Uber & Facebook
- Lack of risk transparency and “hidden” information flows lead to a bias in users’ risk perceptions.
- Explicitness regarding consequences can help (Laughery et al. 1993).

Current Privacy-Risk Communication

Current privacy risk information is…

- … static,
- … coarse-grained & technical,
- … timed inappropriately,
- … largely ignored,
- … not supporting informed decision-making.



Corporates Smartphone Apps Risk Assessment (COSARA)

Motivation

- Invasive apps access (ir)relevant resources without users' knowledge

- It is challenging for the corporates to protect their confidential data from threats
  e.g. data leakage, malware

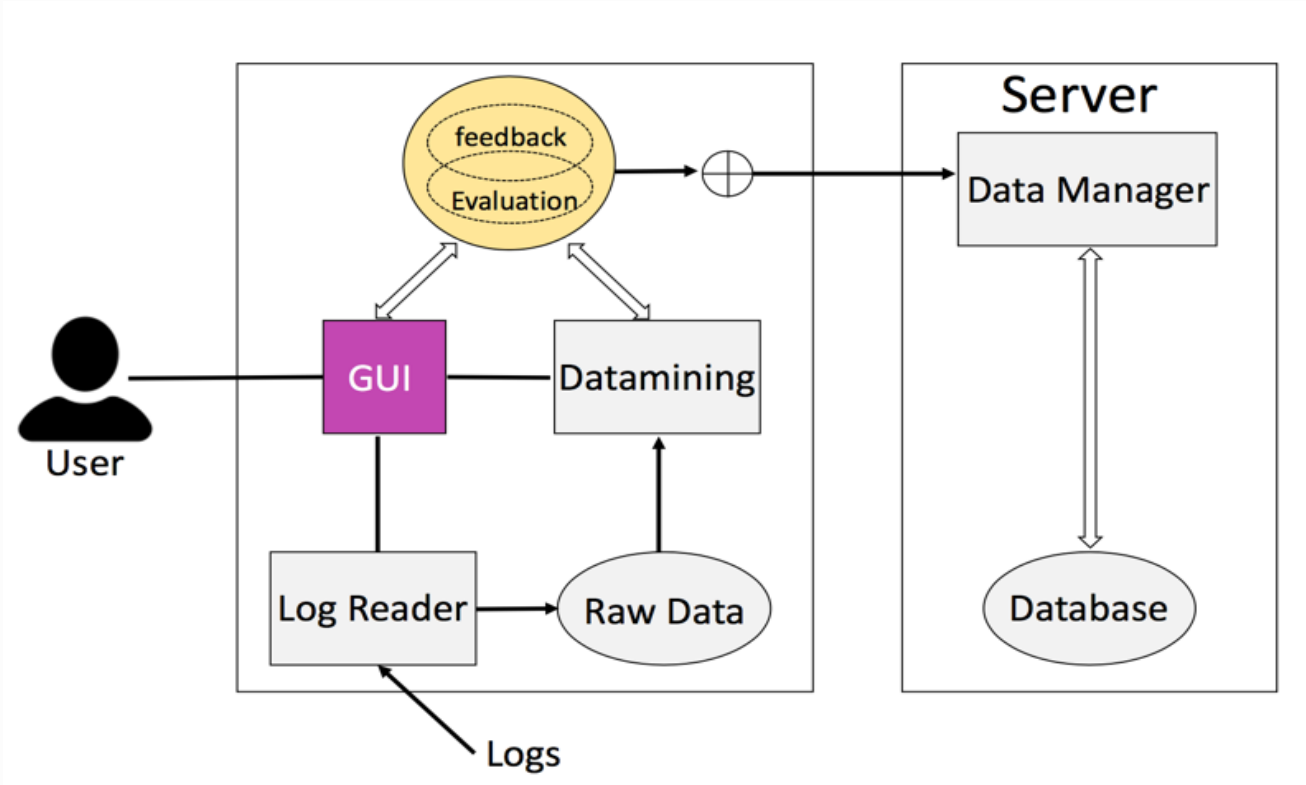
- Employees usually use a diverse number of apps on their smartphones/tablets that their actual behaviour is not clear/verified.

Android App Behaviour Analyser (A3)

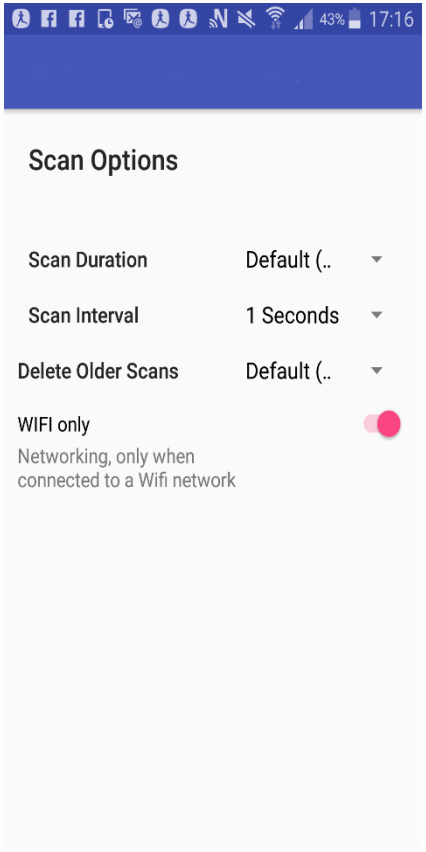
Transparency tool:
Android **A**pp Behaviour **A**nalyser (A3)

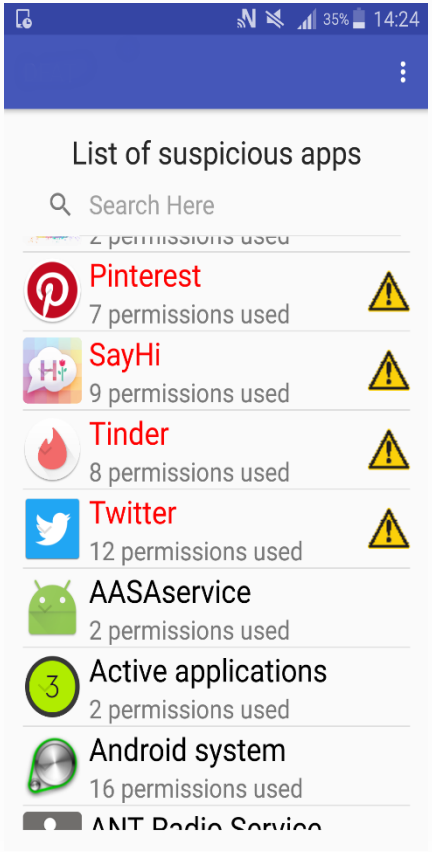
- Analysing installed apps' behaviour
- Measuring the potential privacy risks
- Risk communication to the user

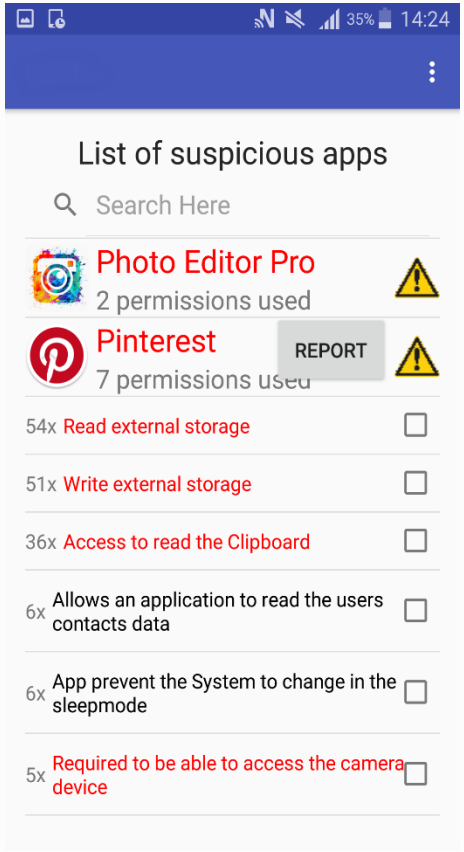
A3 Architecture

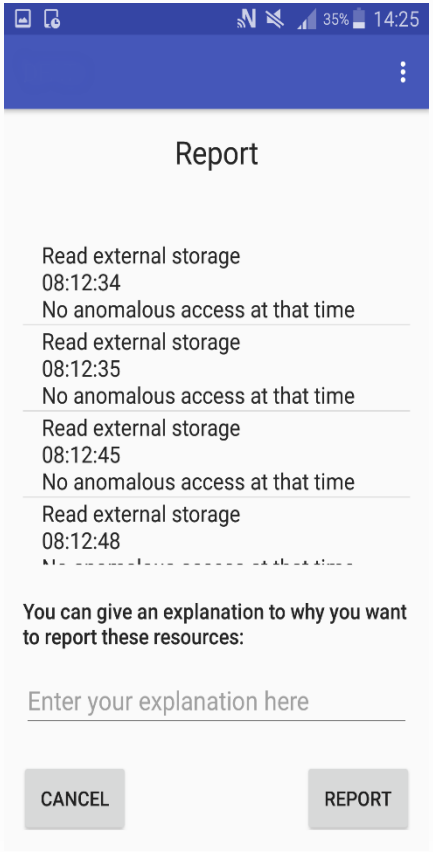


A3: Screenshots









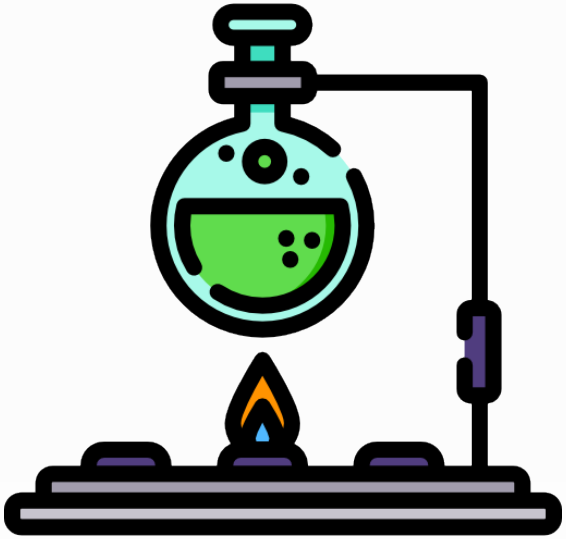
2-Phase Experiment

Phase 1:

- Installation of popular Apps on A3 Samsung
- Monitored access to resources
- Over period of 5 days
- No Interation with device

Phase 2:

- Like phase 1, but:
- Made Accounts
- No further interaction



M. Hatamian, J. Serna, K. Rannenberg, and B. Igler. 2017. "FAIR: Fuzzy Alarming Index Rule for Privacy Analysis in Smartphone Apps", 14th International Conference on Trust and Privacy in Digital Business (TrustBus 2017), pp. 3-18

Use Case Analysis by A3 (First Phase)

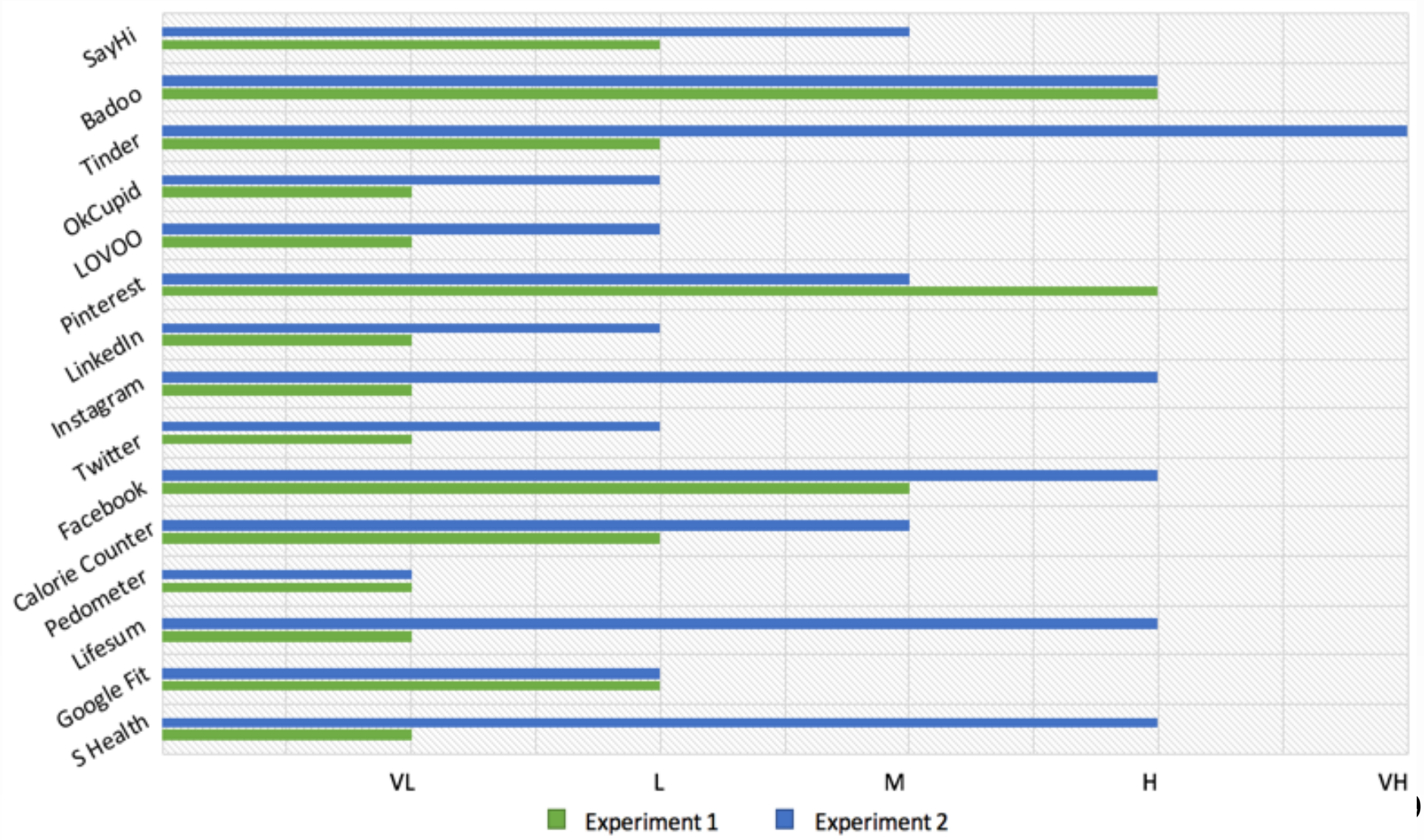
	Health & Fitness					Social Networks					Dating & Friends				
Permissions	S Health	Google Fit	Lifesum	Pedometer	Calorie Counter	Facebook	Twitter	Instagram	LinkedIn	Pinterest	LOVOO	OkCupid	Tinder	Badoo	SayHi
READ_EXTERNAL_STORAGE	594	10	2	5	6	35	16	427	3	14	21	8	14	50	5
WRITE_EXTERNAL_STORAGE	594	10	2	5	6	35	16	427	3	14	21	8	14	50	5
READ_PHONE_STATE	–	–	–	–	–	5	–	–	–	–	–	–	4	35	–
ACCESS_WIFI_STATE	–	–	–	–	–	–	–	–	–	–	–	–	–	57	–
ACCESS_FINE_LOCATION	–	130	–	–	7	–	–	–	–	–	–	–	–	395	–
ACCESS_COARSE_LOCATION	–	–	–	–	–	–	–	–	–	–	–	–	–	5	2
READ_CONTACTS	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–
WRITE_CONTACTS	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
RECORD_AUDIO	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
CAMERA	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
BODY_SENSORS	425	–	–	–	–	–	–	–	–	–	–	–	–	–	–

Use Case Analysis by A3 (Second Phase)

	Health & Fitness					Social Networks					Dating & Friends				
Permissions	S Health	Google Fit	Lifesum	Pedometer	Calorie Counter	Facebook	Twitter	Instagram	LinkedIn	Pinterest	LOVOO	OkCupid	Tinder	Badoo	SayHi
READ_EXTERNAL_STORAGE	1067	18	44	1	43	1531	63	580	28	54	143	41	212	349	27
WRITE_EXTERNAL_STORAGE	1067	18	42	1	43	1375	49	583	27	51	118	41	196	343	29
READ_PHONE_STATE	–	–	–	–	–	4	–	–	–	–	–	–	4	176	–
ACCESS_WIFI_STATE	–	–	–	–	–	39	–	–	–	–	–	–	–	170	–
ACCESS_FINE_LOCATION	3	452	–	–	123	346	43	31	–	–	37	35	37	599	–
ACCESS_COARSE_LOCATION	–	–	–	–	16	381	–	–	–	–	4	3	–	47	29
READ_CONTACTS	–	–	–	–	2	5	14	–	6	6	–	–	–	1	–
WRITE_CONTACTS	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–
RECORD_AUDIO	–	–	–	–	–	1	8	2	–	–	–	–	–	1	–
CAMERA	4	–	4	–	4	15	16	27	–	5	–	–	–	10	8
BODY_SENSORS	465	–	–	–	–	–	–	–	–	–	–	–	–	–	–

Additional observation: most access was done when user was not using the phone

Privacy Risk Scores (A3)



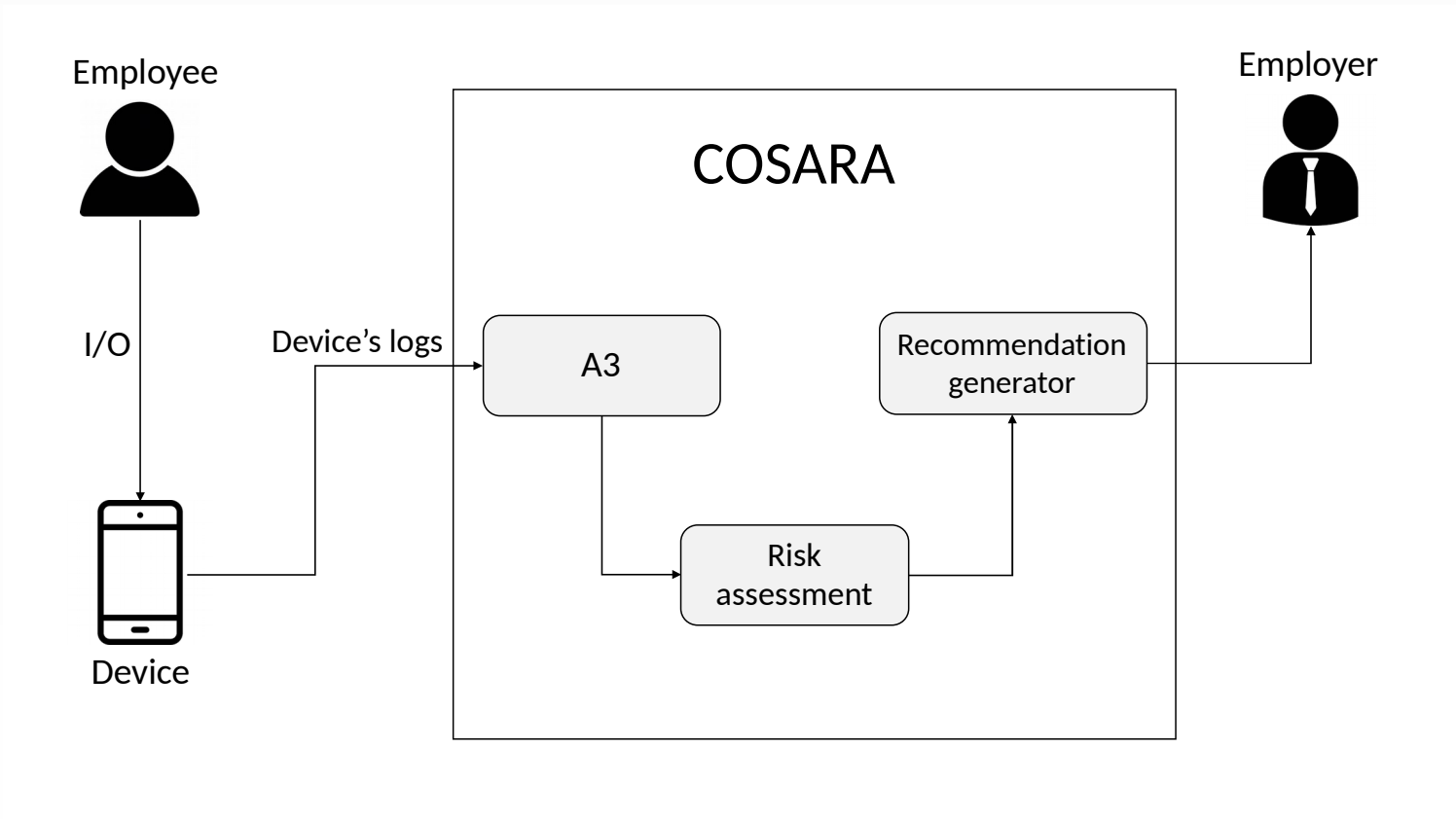
Corporates Smartphone Apps Risk Assessment (COSARA)

COSARA

… is a methodology to support corporates to ease and automate the process of creating black/white lists

… performs risk assessment to rank similar functionality apps based on their real behaviour.

COSARA: Architecture



Main benefits of COSARA

- Decision making about apps that are neither in black nor in white lists
- Help for Classification of apps into allowed or not allowed risk level, e.g. by ICT security departments
- Ranking similar functionality apps to infer which ones are aggressively accessing users' personal info
- Enabling employees to report invasive activities that they have observed from their installed apps
- Recording and monitoring the history of app's version changes

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