



Privacy in the context of smart cities Cities as fora (and battlegrounds) of civilization

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Vienna Cyber Security Week

Securing smart cities and
emerging technologies

Techgate Vienna

Austria



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- Cities
- Cities as agglomerations of buildings
 - Smart homes and other buildings
 - Utility provisioning and analysis
- Public space, urban spirit, and surveillance
 - Sensing traffic and public life
 - “Camera zones”
- Summary & outlook

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- “By far the greatest and most admirable form of wisdom is that needed to plan and beautify cities and human communities.”
— Socrates
- “Privacy is precious in cities. It is indispensable. Perhaps it is precious and indispensable everywhere, but in most places you cannot get it. In small settlements everyone knows your affairs. In the city everyone does not — only those you choose to tell will know much about you.”
— Jane Jacobs, *The Death and Life of Great American Cities*

- Ich verlange von einer Stadt, in der ich leben soll: Asphalt, Straßenspülung, Haustorschlüssel, Luftheizung, Warmwasserleitung. Gemütlich bin ich selbst.
- From a city in which I am expected to live I demand concrete roads, street-cleaning, a key for the door, air heating, hot water pipes – gemütlich I am myself."



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7.40 am – Making coffee

Information:

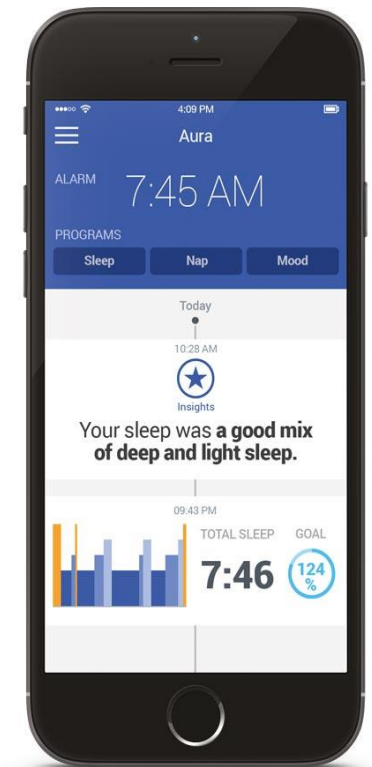
- Daily routines
- Coffee consumption



[Philipps / Saeco]

Information:

- Sleep rhythm
- Sleeping habits



7.50 – Shaving (foam running out)

Information:

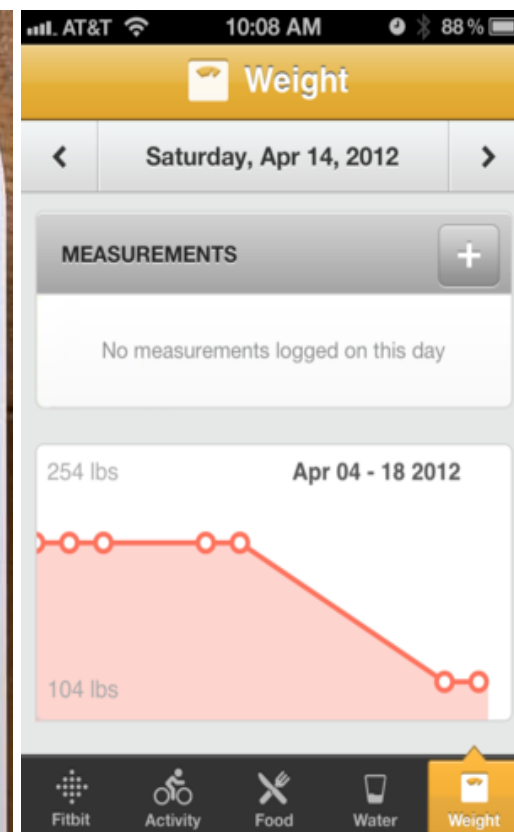
- Daily routine
- Preferred products



[Amazon]

Information:

- Daily routine
- Weight



[Fitbit]

7.55 – Cleaning teeth

Information:

- Daily routine
- Dental health (care)



[Oral-B]

8.30 – Locking the door

Information:

- Daily routine
- Persons in household



[August]

8.35 – Turning heating down

Information:

- Daily routine
- Persons in house



[Nest]

Information:

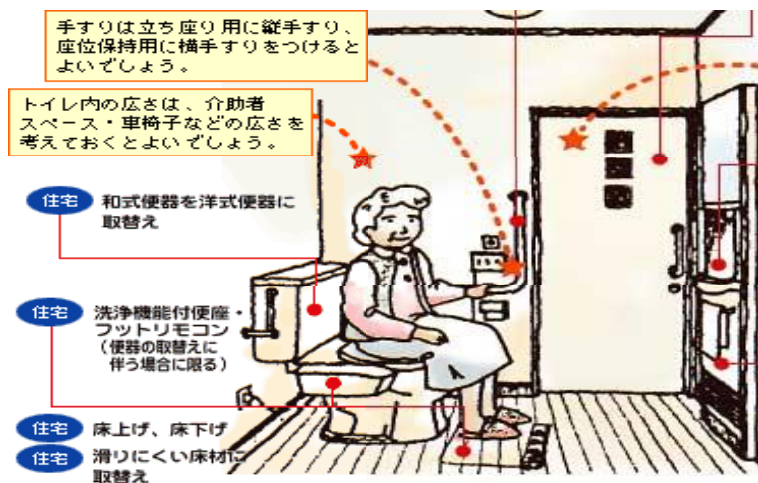
- Daily routine
- Persons in house



[Philipps]

The networked washlet

- ... and in Japan, Matsushita has demonstrated a health-monitoring toilet that can analyze your stool and send the information online to your doctor. [www.asiaweek.com/asiaweek/technology/article/0,8707,130495,00.html, 2001-06-22]
- “ ... sensors detect seven abnormal behavior patterns of the elderly in their living quarters and three abnormal patterns in the toilet area. Any abnormality that is sensed is automatically transmitted to the PHS terminals or pagers of the nursing staff. The care monitor system that uses these sensors will help provide safe and high quality nursing service.” [www.mew.co.jp/e-tecrepo/73e/main02.html]



Smart home Typical devices properties

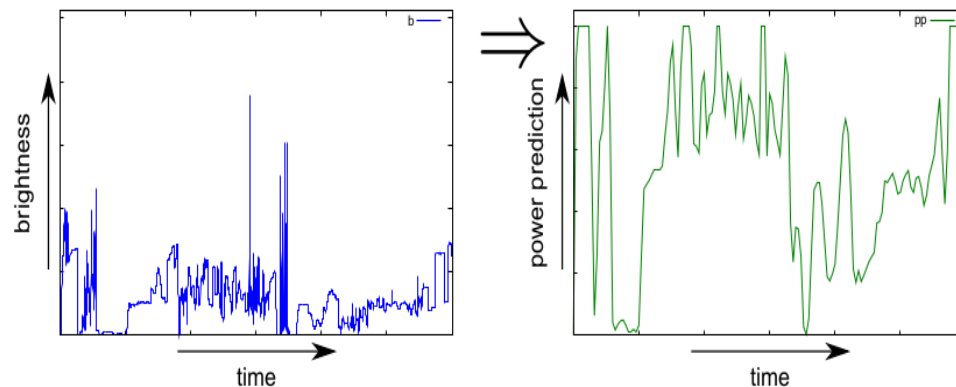
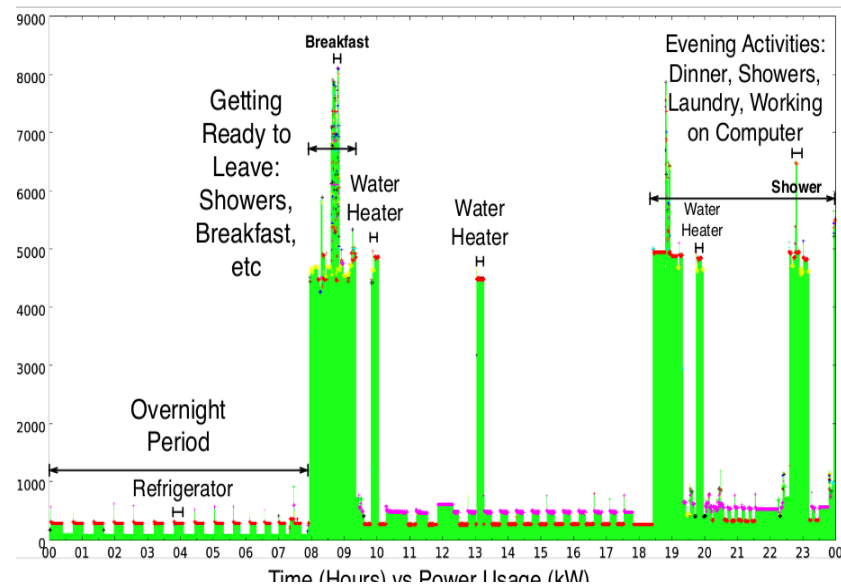
- Strong connectivity
- In most cases control via app
- Specialised on one application
- Data oft stored in clouds or with 3rd parties
 - Access via provider's server
 - Globally distributed
- Often (but not always) app and device by the same provider
- Data protection terms and conditions complex and difficult to understand



“Get all the
information you can
– we’ll think of a use
for it later.”

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- Depending from the resolution of the collected data
- [Molina-Markham et. al. 2010]
 - 15 minute slots
 - Presence
 - Sleep times
 - Meal times
 - 1 minute slots
 - Cold or hot breakfast
 - TV times
 - Washing machine in operation
 - Children alone at home
- [Enev et. al. 2011; Greveler et. al. 2012]
 - 0,5 second slots
 - Identification of TV programme



Smart Meter

- Reduction of load signatures through electricity storage [Kalogridis et. al. 2010, 2011]

In general

- Data aggregation before analysis
 - More users (load analysis for network control)
 - Longer terms (accounting)



Remove the link between
electricity consumer and payer

- Payment with vouchers
- Attribute-based credentials to show one's authorisation to receive electricity
- Beyond households also relevant for charging of electric vehicles (possibly away from home)



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Sensing the City



Cities are tremendously big, highly dynamic and complicated objects of study for complex systems researchers.

Understanding citizens' behavior is of high interest for sociologists, urban planners, etc.

To better understand such a complex system

➤ **Capture its behavior.**

The Citizen as a sensor



The log of events in relation with citizens and their municipality

Social media as a source of data



Social media + mobiles = **users continuously sharing information anytime and anywhere**

- Develop a social sensor without hardware whose observation target is the city.
 - Fed with microblogging information proactively provided by users
- Evaluate the viability of the newly developed sensor to build urban-behavioral models.
 - To detect anomalous urban behavior

Case Study 1

Mobile World Congress (MWC) 2012

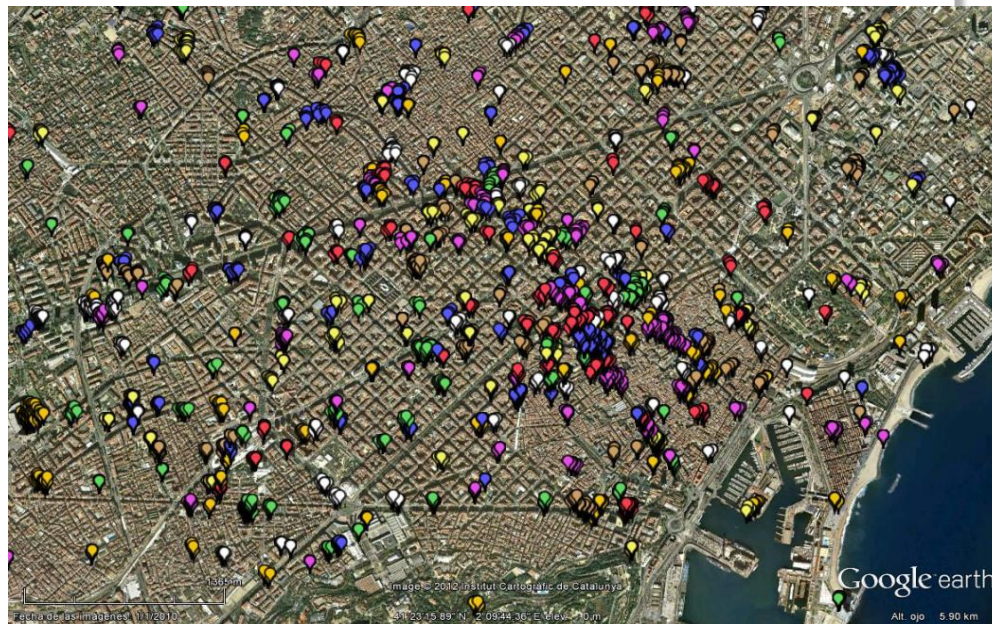


MOBILETM
WORLD CONGRESS

Barcelona | 27 February – 1 March 2012

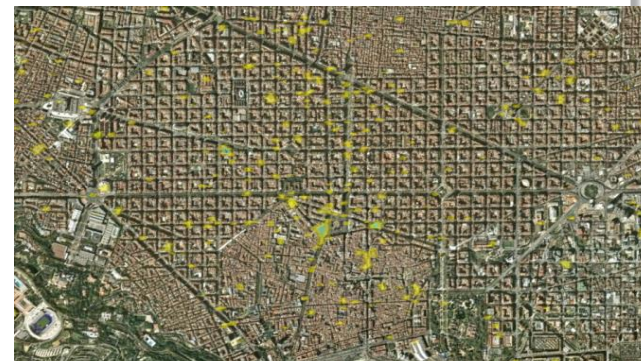


Geo-spatial Clustering MWC12

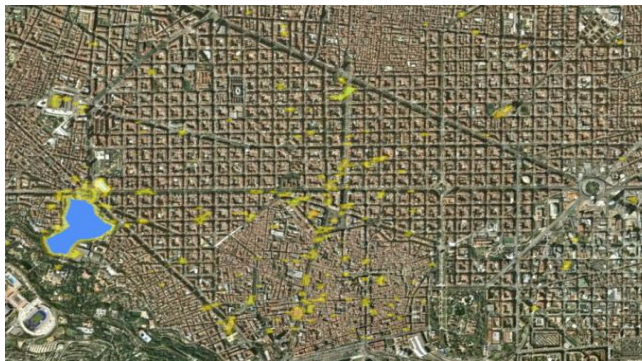
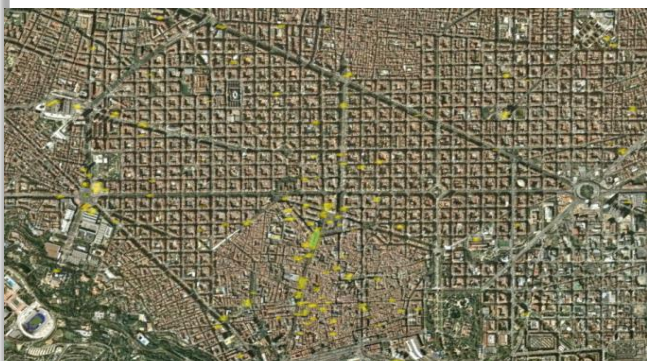


Geo-spatial Clustering MWC12 over time

Locals



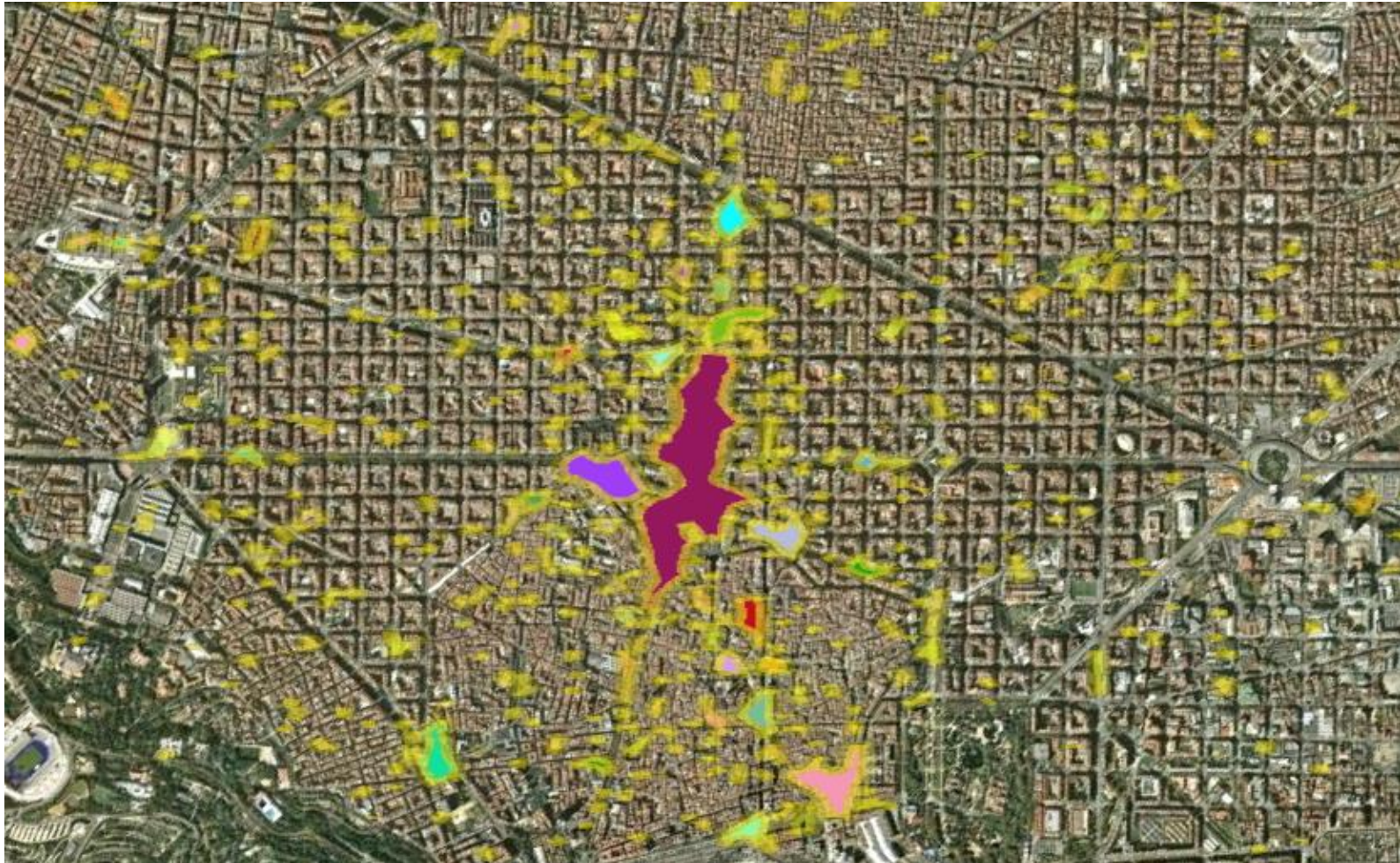
Tourists



Case Study 2

2012, September 11







Olympics 2020 Tokyo

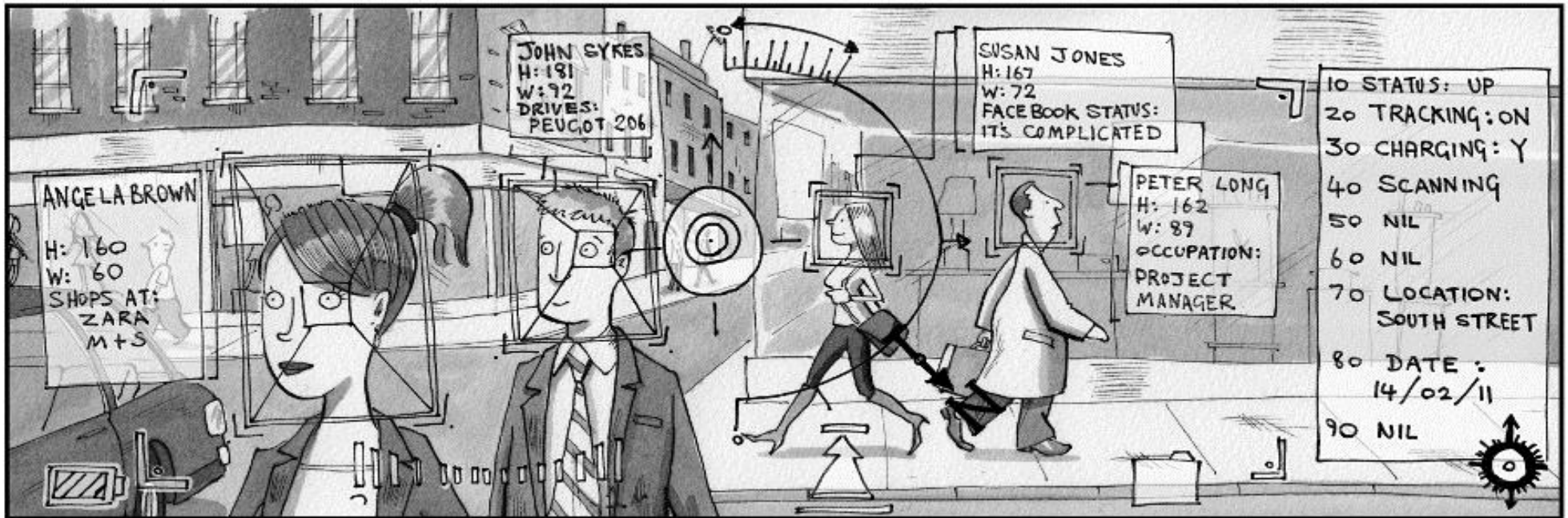


Citizen as a Sensor - Privacy Issues in Participatory Sensing



The screenshot shows a web browser window with the address bar displaying `www.spiegel.de/netzwelt/netzpolitik/facebook`. The page header includes navigation links like Home, Video, Themen, Forum, English, DER SPIEGEL, SPIEGEL TV, Abo, Shop, Schlagzeilen, Wetter, and TV-Programm. The main content area features the article title **Umgang mit Nutzerdaten: Bundeskartellamt ermittelt gegen Facebook** and a sub-headline **Missbraucht Facebook seine Marktmacht in Deutschland? Das Bundeskartellamt eröffnet ein Verfahren gegen den Konzern. Es geht um die Nutzerdaten.** A video player with the Facebook logo is visible on the right side of the article. The left sidebar contains a date stamp (Mittwoch, 02.03.2016 - 12:09 Uhr), a print button, and a comment count (5 Kommentare). The bottom of the page shows a 'THEMA Facebook' section and a link to 'Alle Themenseiten'.

Big Data = Big Brother?



[www.thebigdatainsightgroup.com/site/article/big-data-talk-005-big-data-big-brother]

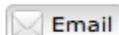
Topics: [Content](#) | [Mobile Operator News](#) | [Operator Strategies](#)

Telefónica withdraws 'Big Data' service from German market

November 2, 2012 | By Paul Rasmussen

SHARE

Telefónica's O2 Germany said it has no plans to sell anonymous customer location data to retailers there after the operator received strong pushback from the government following consumer privacy worries.



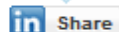
Email

18



Tweet

4



Share

4



Gefällt mir

The company says its "Smart Steps" service, which aims to interpret, analyse and then sell the anonymous data of O2 customers to retailers and public sector organisations, is not expanding to Germany. "Privacy and customer satisfaction is a top priority for Telefónica, and after feedback from our customers we have now decided not to introduce Smart Steps in Germany," a company spokesperson told *Teltarif.de*.

This comes after Telefónica Digital announced last month that its newly formed Dynamic Insights unit would shortly offer anonymous customer data--often known as Big Data--to organisations in the UK, Germany and Brazil. Trials of Smart Steps were said to be underway in the UK with a launch expected this month.

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[Nokia buoyed by Lumia 920 deal with China Mobile](#)

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ePrivacy

*The proposed rules for the respect for private
life and the protection of personal data in the
electronic communications in the EU*



- EU Draft Regulation on Privacy and Electronic Communications (2017/0003(COD))
- Hearing documented on www.europarl.europa.eu/committees/en/libe/events-hearings.html?id=20170328CHE01221

- Art. 4 (3)(c): “ ‘electronic communications metadata’ means [...], including [...] **data on the location of the device generated in the context of providing electronic communications services, [...]**”
- Too narrow:
 - Telcos are covered.
 - OTTs are not covered!
- Only limited protection for users (and the borderline is hard to understand for users)
- Competitive disadvantage for telcos (European players)
- **Delete the text in red.**

Art. 8(2)(b): Collection Zones with Wifi/Bluetooth tracking

- Person responsible for collection must indicate measures end-users may take to minimize or stop the collection.
- Gives the impression that **organisations may collect information emitted by terminal equipment to track the physical movements of individuals (such as “Wifi/Bluetooth-tracking”) without the consent of the individual concerned.**
- The party collecting these data could apparently comply by **means of a notice informing users to switch off their devices, when they do not want to be tracked.**
- Contrary to a basic goal of the telecommunications policy of the European Commission to provide high-speed mobile internet connectivity with strong privacy protections at a low cost to all Europeans, across borders.

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- Cities are microcosms of civilization
- Digitalisation expands and intensifies data flows.
- „Data are the new oil.“
- Smart City providers must support
 - Design / control of data flows
 - Decentralisation of data and processing
 - (Transitive) Protection of users and customers
- Users (and researchers and regulators) must
 - Watch data flows carefully
 - Consider, whether the respective application ...
 - ... needs the data,
 - ... is worth the data.

- Gökhan Bal
- Sebastian Pape
- Jetzabel Serna



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