

# *What did Alice see on the other side of the mirror...*

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# What do we care about?

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- Communication?
  - ➔ No, not really
- We do care about the availability of services...
- They tell us this requires continuous, ubiquitous high quality communication...

## The reality about the (wireless) internet access

- Could not connect during the dinner yesterday ...
- Had weak signal ...
- The transmission has been really slow ...
- I See 30+ APs which I can not use...

. . .

? Is this all really about communication ?

→ This is a result of interaction

**DATA!!!! , Computation, Communication**

# Data? IoT !!!

- We are on the peak on the IoT Hype
  - The problem: Vertical Solutions... do not pay-off
- Trend: Platform enabling sharing of sensor and actuator hardware across many diverse applications
  - Towards a shared economy for IoT... Novel applications, cross-correlation, context
- The recent trend: High centralization
  - Diverse data collected “as per agreement of the user”  
This app requests the access to ..... XXXXXX
  - Data pushed for storage / processing in the cloud
  - Usually owned by a single company
  - Negative impact on delay, traffic, energy-efficiency (Device operation not optimized to QoS requirements of the application.

# Alice in the Zoo

- When I have visited the Zoo with my Mom
  - Looking at the Mountain Lion
- ALice looking at the Mountain Lion today?
  - ➔ Shoots the picture and uploads to the cloud  
(jointly with her Location, time, and XXXXX)

## Âlice in the Zoo – a better option

- Alice looking at the Mountain Lion in the future...
  - ➔ Has downloaded a data bank of animals and the data mining application ...
  - ➔ Does not need connectivity!
- How can it happen: The propagation of current trend
  - More and more of your personal data go into cloud (Your calendar, Your movement, Your chat with friends)
  - Future activities are predicted and proper Data/Programs downloaded in advance

? ALTERNATVES ?

## Own Work : Social Sensor Cloud

- Featuring the EDGE
- Multiresolution data base
- Sensor search engine...

- Some Aspects covered in...

*Happ, D., Karowski, N., Menzel, T., Handziski, V. and Wolisz, A.  
"Meeting IoT Platform Requirements with Open Pub/Sub Solutions", *Annals of Telecommunications*, vol. 72, 2016.*

- These is just technoogy... but more is needed....

# IOT TRENDS TO WATCH IN THE FUTURE

- Increased focus on edge computing and analytics
- IoT data → DATA BROKER  
IoT generated data is bought, analyzed and sold  
e.g., IBM buys The Weather Company data
- Interoperability Problems
- Security

*Courtesy of I. F. AKYILDIZ*



## A different Vision

- What does the ALICE in the Zoo (Future) require?
  - Private Data - stored as locally as possible
  - General Data (animals) purchased from AAAAA
  - APPS for data analysis (animal image recognition)  
Purchased from BBBB
- The General Data (think traffic, think ????) should be collected with anonymity assurance
  - Should be offered on an open market to anybody!
  - A third party „in the middle“ → Think Telco??
- An business opportunity for data mining APPs
  - No privileged “owner of Big Data” beating everybody, due to data ownership!!!
  - A third party verifying the data mining applications?

## Some Open Questions

- Open interfaces to different „General Data Base“
  - E.g. Traffic, E.g. Arrivals/Departures at the Airport....
- Open interfaces to different „Personal Data“ and context computing applications

*Example: Lemic, F., Handziski, V., Azcarate, I., Wawrzynek, J., Rabaey, J. and Wolisz, A. "[SLSR: A Flexible Middleware Localization Service Architecture](#)", in Proc. of the 8th International Conference on Indoor Positioning and Indoor Navigation (IPIN'17), September, 2017.*

- Deregulation (?):  
Either General Data or Data Mining
- ???

## Side Effects

- The competitive usage of Context Information has a huge potential to reduce the traffic!
  - Pre- fetching news? Newspapers/magazines
  - Pre- getsching movies
  - Discovering the „requested cntent in procimity“ ...
- What resolution of your screen can you really use?

S. He et al. „Optimizing Smartphone Power Consumption through Dynamic Resolution Scaling“ Proc MOBICOM '15, p 27

Remember



**Smart management  
can bring huge gains !**

Thank You ! ...

## But: Which resolutions needs your smart phone?

- Smart Phones compete on graphics
  - iPhone 4 → 960x640 pixels, FullHD → 1920x1080 pixels, 2K → 2560x1440 pixels (2K).
  - LG G3 has 538 ppi, Samsung Galaxy S5 has 577 ppi
- Can our eyes really resolve this?

$$N = \frac{L}{2D \tan\left(\frac{\delta}{2}\right)} \quad \delta \text{ normal} = 2.9 \cdot 10^{-4} \text{ radians}$$

where **N** is the resolvable pixel number, **L** is the length of the longer side of the display, **D** is the user screen distance and  $\delta$  is the angular resolving acuity of the user.

- At Samsung S5 resolution surpasses the **normal user vision** beyond 5.4 inches distance....i.e 13.5 cm...

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## Reduced density will not be noticed... [op.cit., tab.3]

Scaling Factors		1.0	0.9	0.8	0.65	0.5
PPI		577	519	462	375	289
Range(inch) Normal Vision	Start	0.0	6.0	6.7	8.3	10.8
	End	6.0	6.7	8.3	10.8	30.0

Scaling factors vs. distance range.

- Think in terms of a really nice TV Set?
  - You come to your home, switch the TV and go to the kitchen
  - Do you need the full resolution of your 4 K Screen?