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The 4th International Conference on Communications, Computation, Networks and Technologies

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Information in the Internet of Things: From Sensing to Meaning

Departamento de Comunicaciones

Information in the Internet of Things: From Sensing to Meaning

Moderator

Jaime Lloret Mauri, Polytechnic University of Valencia, Spain

Panelists

- David Musliner, Smart Information Flow Technologies (SIFT), USA

- Svetlana Boudko, Norsk Regnesentral, Norway

- Mike Johnstone, Edith Cowan University, Australia

- Ben Lee, Oregon State University, USA

IoT allows devices to be accessed and controlled remotely through Internet and enables advanced services by interconnecting devices using existing communication technologies.

IoT concept has been defined in Recommendation ITU-T Y.2060 (06/2012):

ITU-T Y.2060 (June 2012), http://www.itu.int/ITU-T/recommendations/rec.aspx?rec=y.2060

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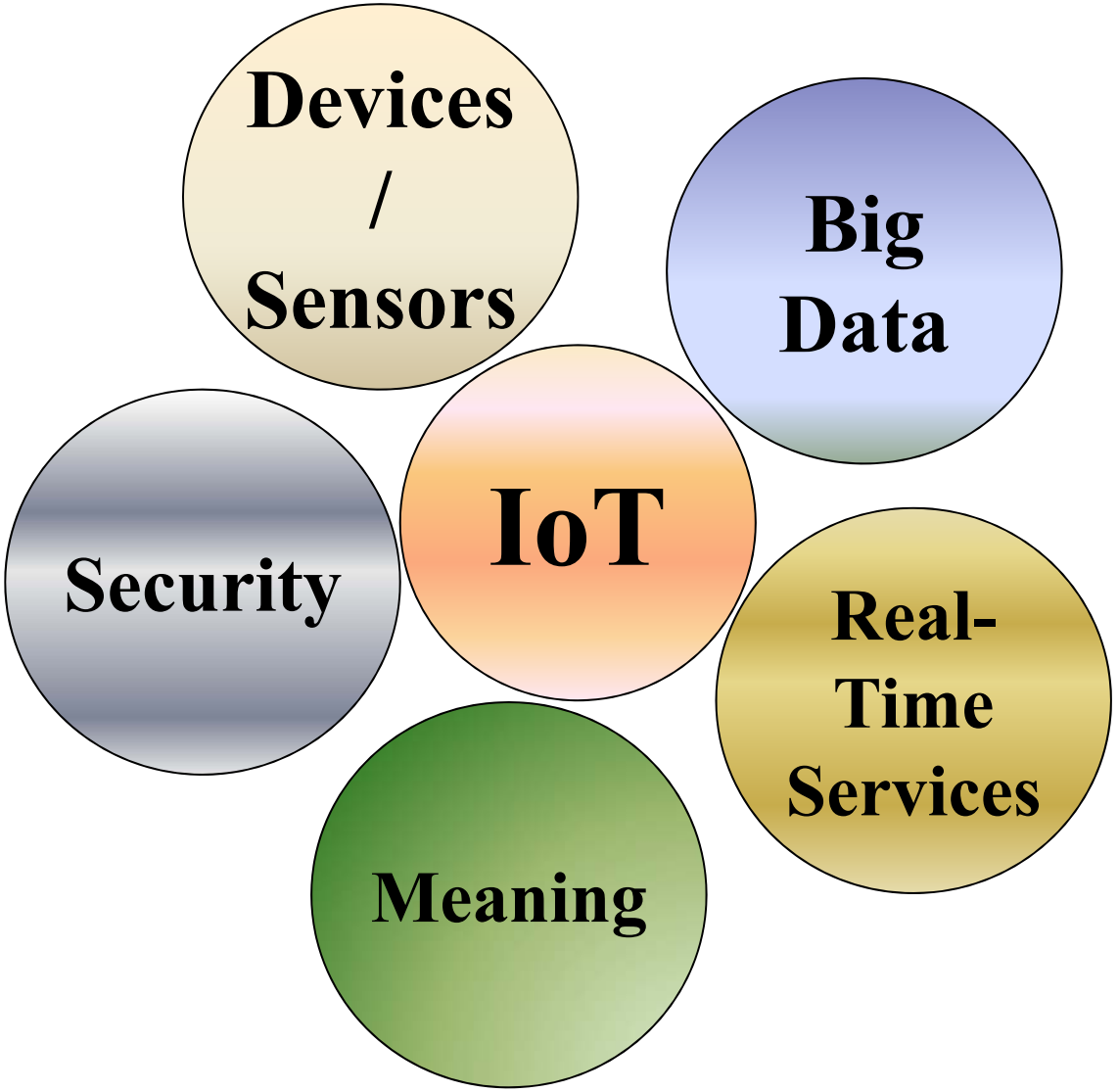

Information in the Internet of Things: From Sensing to Meaning

Elsa Macias, Jaime Lloret, Alvaro Suarez and Miguel Garcia, Architecture and Protocol of a Semantic System Designed for Video Tagging with Sensor Data in Mobile Devices, Sensors, Vol. 12, Issue 2, Pp. 2062-2087. February 2012.

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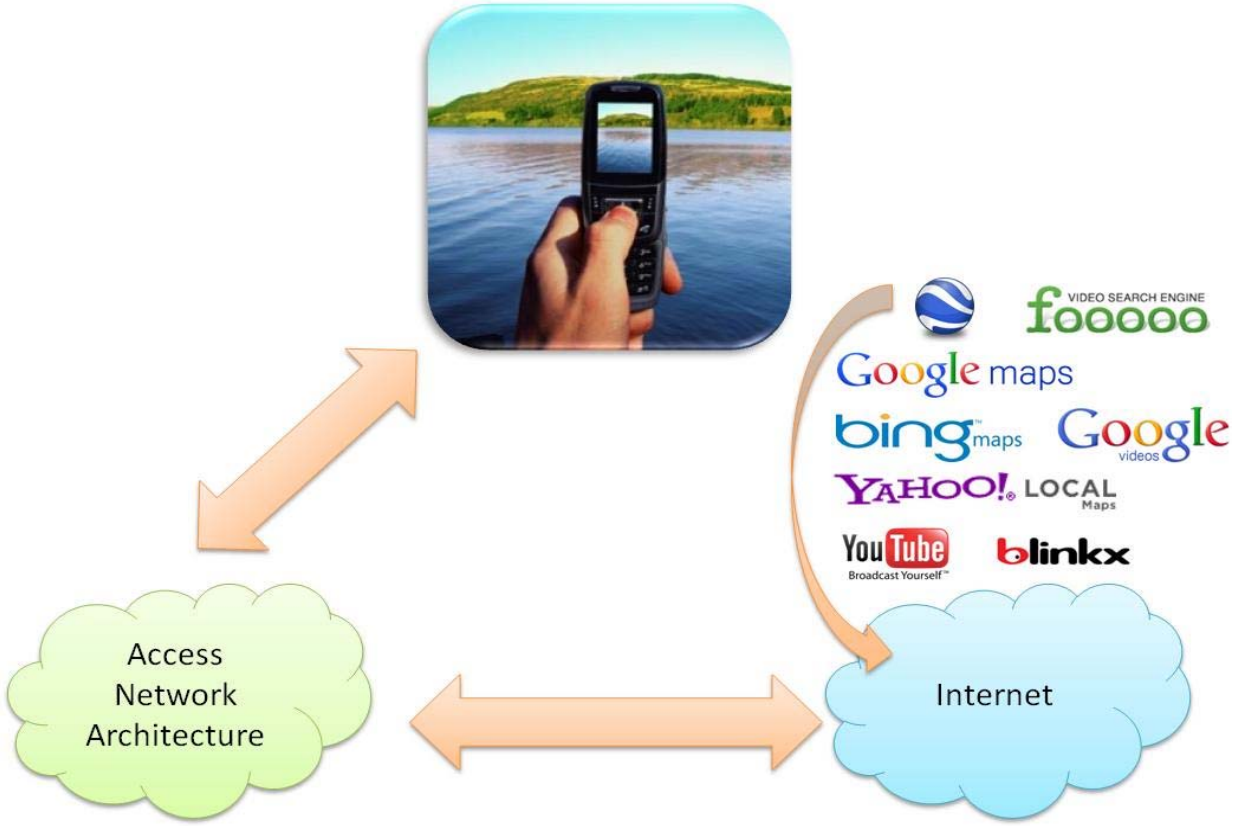

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Jaime Lloret, Elsa Macías, Alvaro Suárez and Raquel Lacuesta,
Ubiquitous Monitoring of Electrical Household Appliances,
Sensors, Vol. 12, Issue 11. Pp. 15159-15191. December 2012

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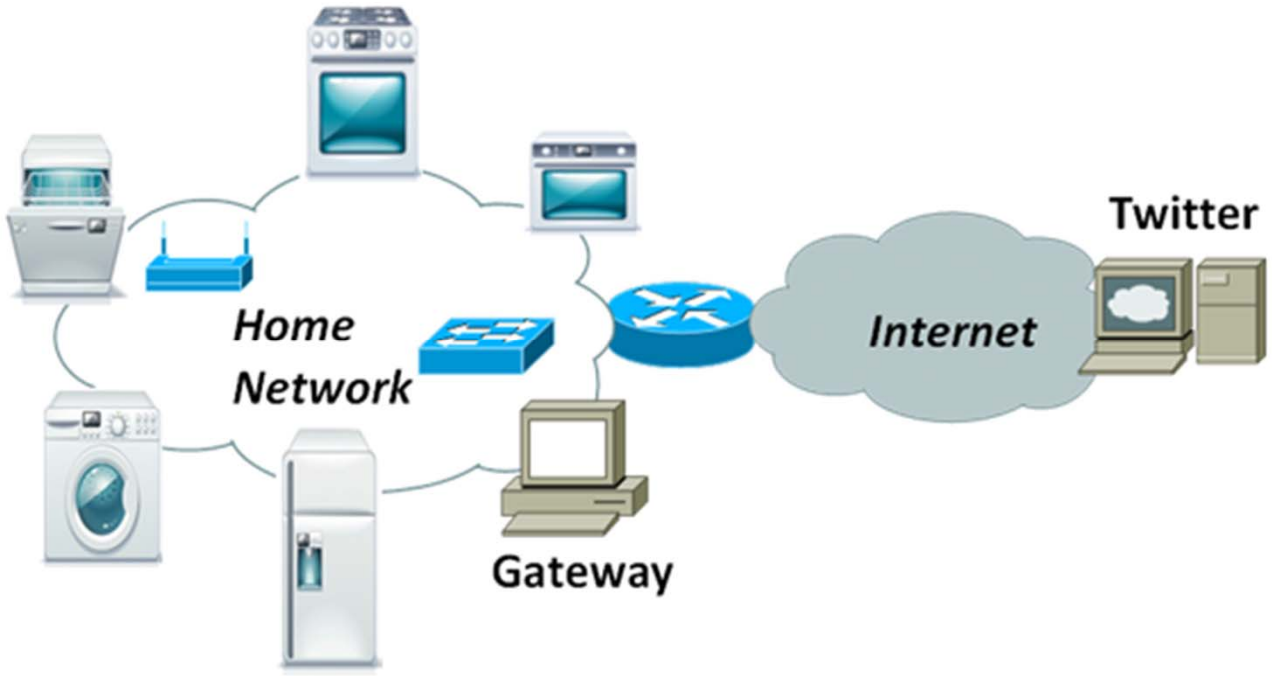

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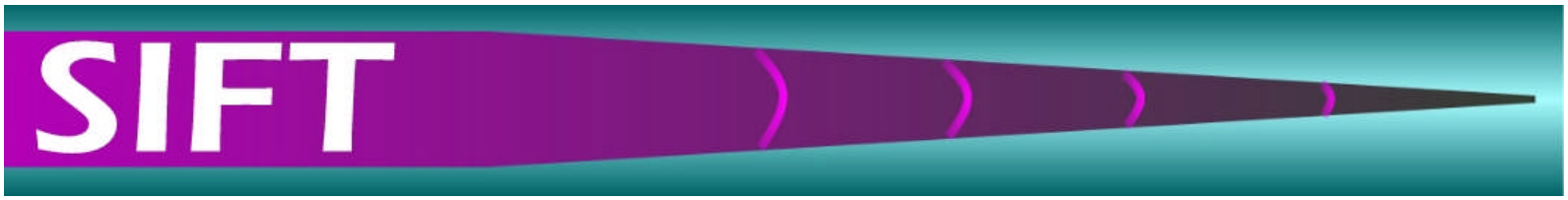

Smart Information Flow Technologies

IoT Panel

Dr. David J. Musliner

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For other staff and projects, please see

www.sift.net

Not about Things, It's about Data

- John Fruehe, Moor Assoc:
  - If you cant measure it accurately, you can't control it.
    - Single source bias.
  - Data chain security.
  - Data must be actionable- analysis, not storage.
  - Data as a liability.

- Big data. Big big big data.
- Analytics: where will the analysts come from?
- Security and vulnerability: making ourselves even more dependent, more vulnerable.

Security

- One weak link.
- Embedded systems.
  - Outside firewalls.
  - Supply chain security.
- Parallels to the PC/internet explosion.
  - Security lessons not learned.
  - Deployment leads research.
  - Vulnerabilities flourish unknown.

AYBABTU

SIFT

Multimedia Streaming in the IoT World

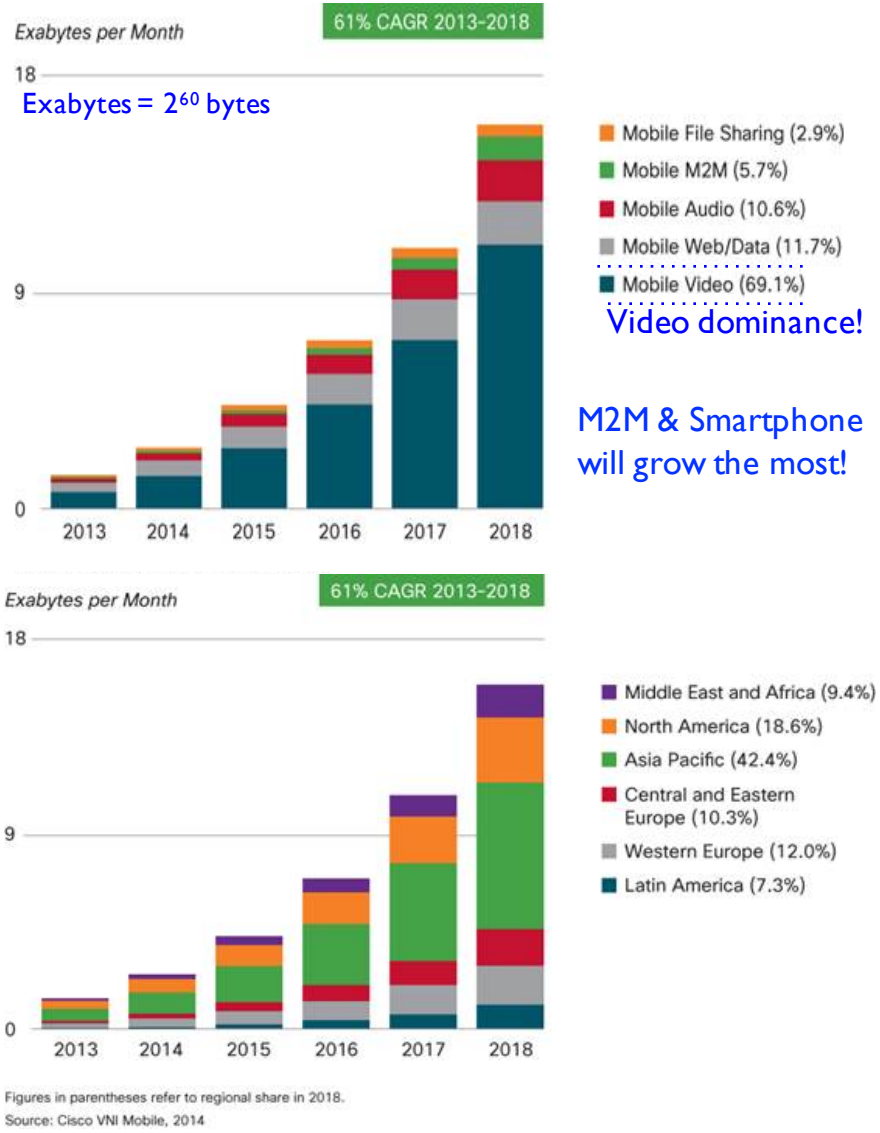
Prof. Ben Lee

School of Electrical Engineering and Computer Science

Oregon State University

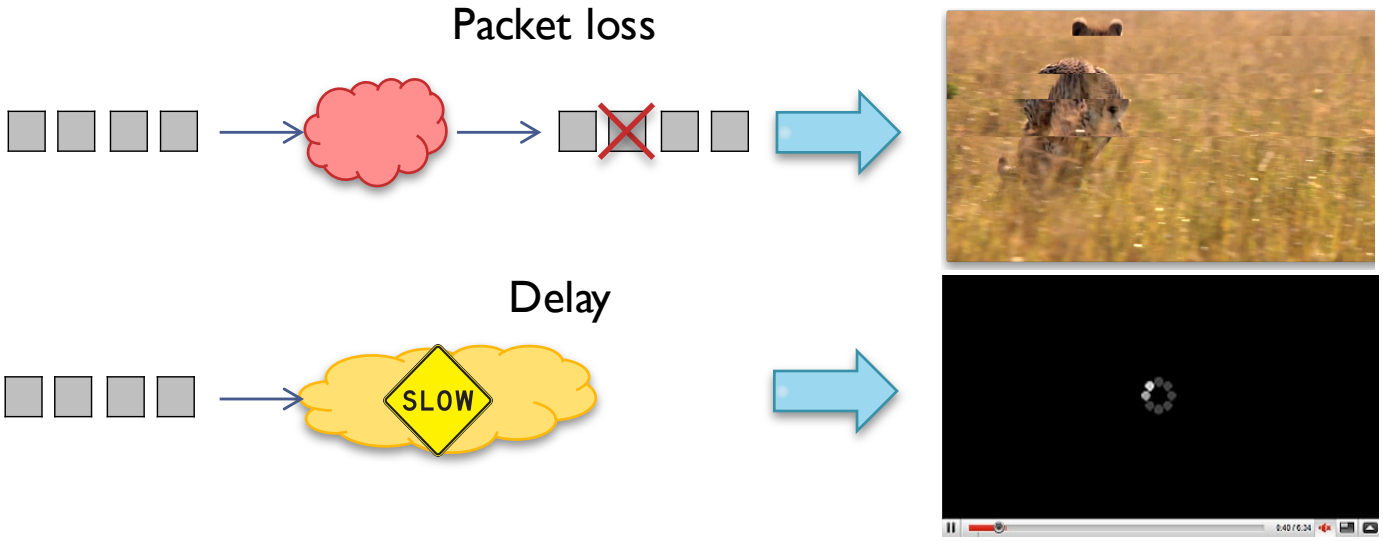
Introduction

- Streaming HD video is an important enabling technology:
  - Home-entertainment
  - N-screens
  - On-line games
  - Context & location aware Digital Sinage
  - Wearable cameras
  - Media-centric IoT
    - Motion/object detection & classification
    - Cooperation with other IoT devices.
  - …
- Increasing number of devices using this technology will cause packet loss and delay degrading visual quality.



Motivation

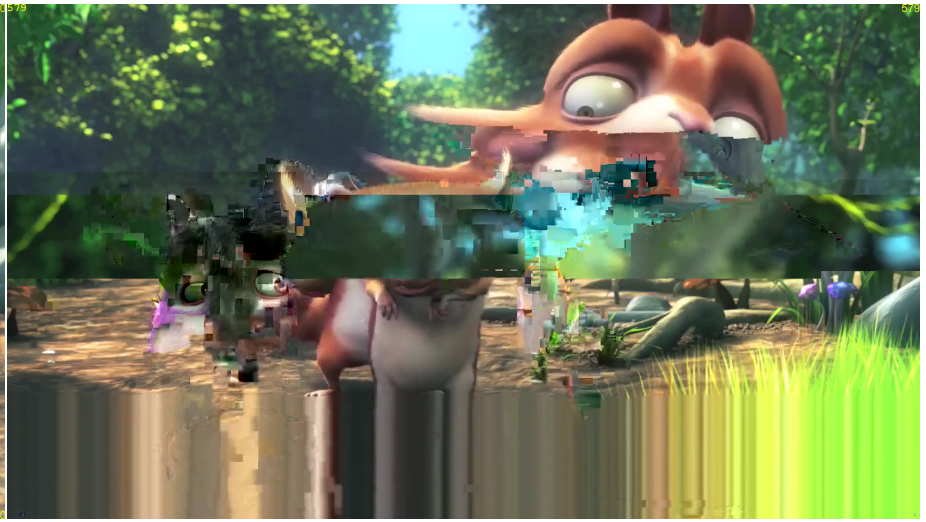
- Challenges of video streaming:
  - Requires a certain degree of data integrity and has to meet playout deadlines.
  - Packet loss reduces visual quality, while delay induces re-buffering.



- Most of existing streaming methods use either TCP or UDP.

TCP vs. UDP

Pure-TCP



Pure-UDP

Bunny video

FDSP with Adaptive-BP

Panel Discussion

- Despite the explosion in Internet traffic, how can provide qood QoE for users?
  - Efficient video codecs - H.264/5
  - Network QoS
  - CDN architecture and Management.
  - Better streaming protocols
    - Reliability, flow control, ordered delivery, congestion control, etc.
  - Network condition estimation
  - QoE metrics:
    - Rebuffering vs. packet loss
  - Multimedia adoptation:
    - e.g., SVC (used by MPEG DASH and Apple HLS)
  - Loss resilience and error concealment:
    - FMO, Redundnat Slices, DP, etc.
  - Transmission over LoWPANs
  - …

Edith Cowan University
Security Research Institute

Information in the Internet of Things: From Sensing to Meaning

Mike Johnstone

"Artificial intelligence bears the same relationship to intelligence as artificial flowers do to flowers. From a distance they appear similar, but up-close they are quite different"

Sensors everywhere

- Sensing
- We can do this now
- Cars, traffic lights, roadways
- For example, the Libelium Waspmote
  - 100 sensors
  - 2/16 wireless protocols

The IoE

- How many sensors?
- Cisco's vision of IoE (28B devices by 2020)
- IPv6
- A "big data" problem
- A security problem

Meaning

- But what does it all mean (and how do we know)?
- Ontology -> semantics
- Mass-customisation
- Home automation
- Cloud services
- The technological singularity
  - Remember Asimov's Laws

Norsk Regnesentral
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Information in the Internet of Things: From Sensing to Meaning

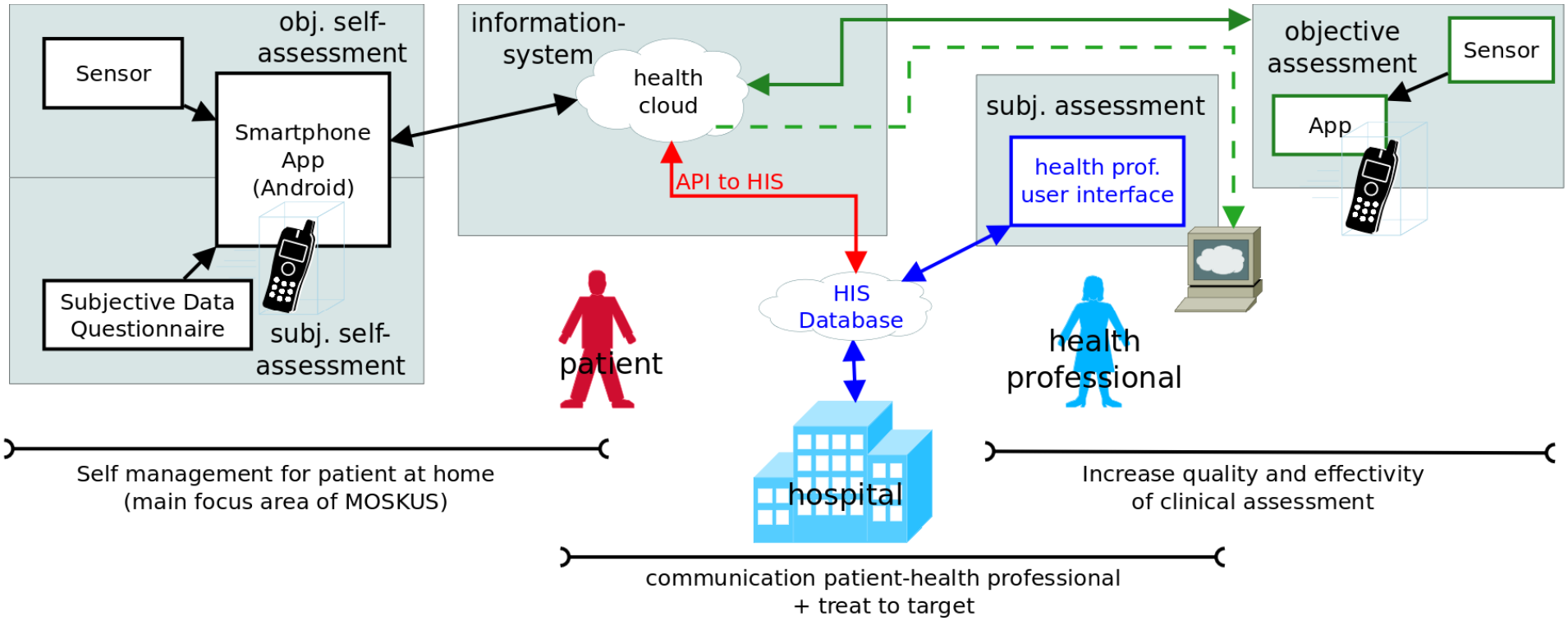
Svetlana Boudko

Norsk Regnesentral

Sensing

- Raw data
  - acquisition and analysis of extremely large data sets
  - IoT needs Big Data
- What is this data?
  - data sets from different locations
  - do we need all these data?
  - select the right subset
  - when and how often to sample?
- Where to process?
  - sensors have limitations
  - IoT needs cloud

System Architecture of MOSKUS



From Sensing To Meaning To Action