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Karlheinz Banholzer
Workshop Software
Berlin, June 2017

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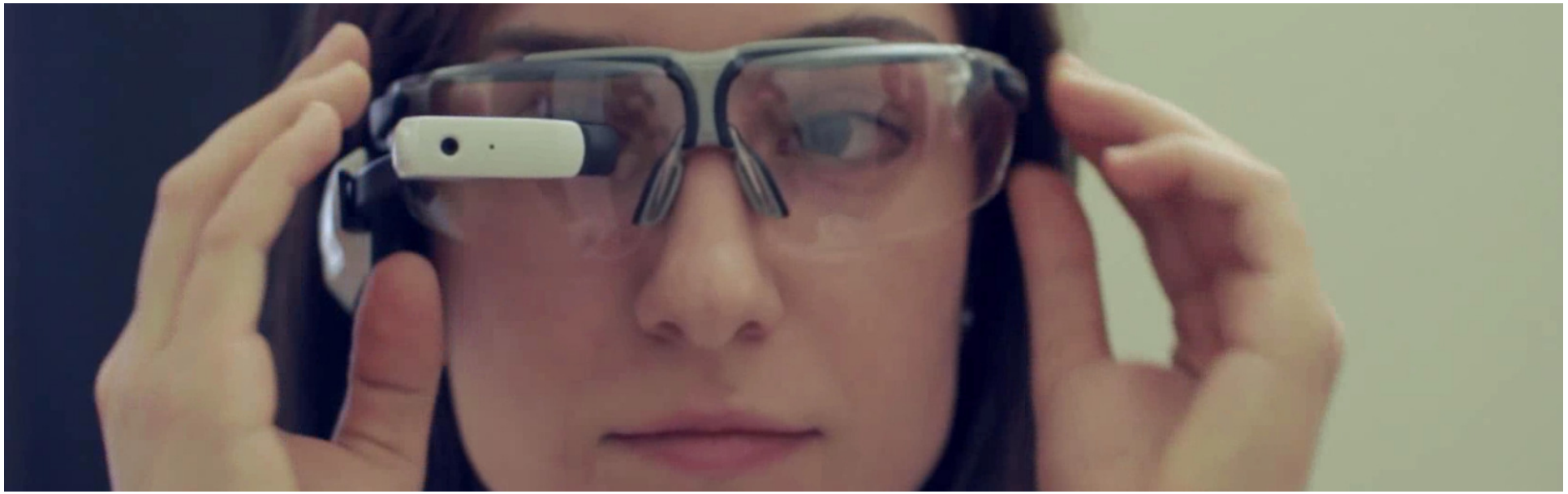

Workshop “Software and ICT Challenges in Legal Metrology”
Opportunities of the IoT in Legal Metrology

Karlheinz Banholzer, Thomas Schink

Berlin, 21. June 2017

Authors

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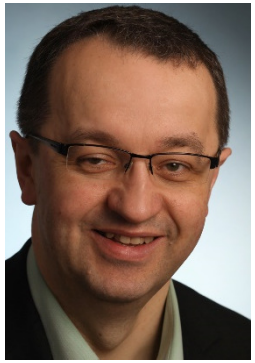

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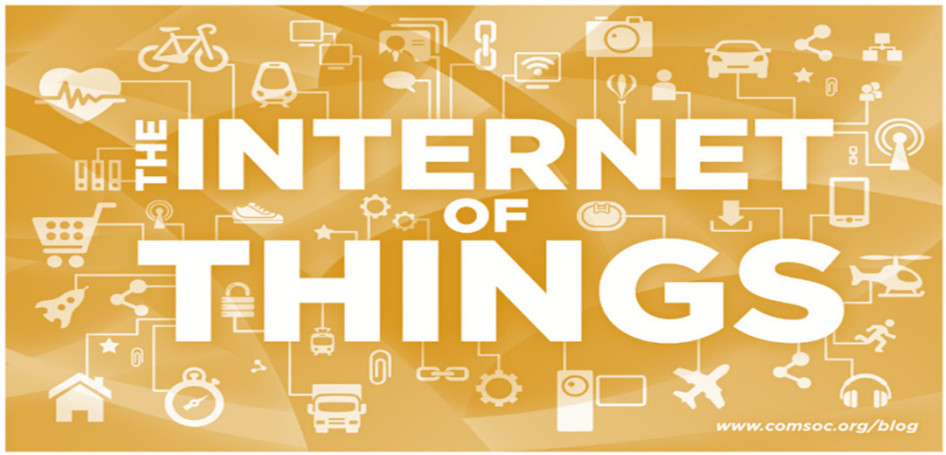
Agenda

- IoT: driver for industry
- Expectations to legal metrology bodies

IoT: evolution in technology



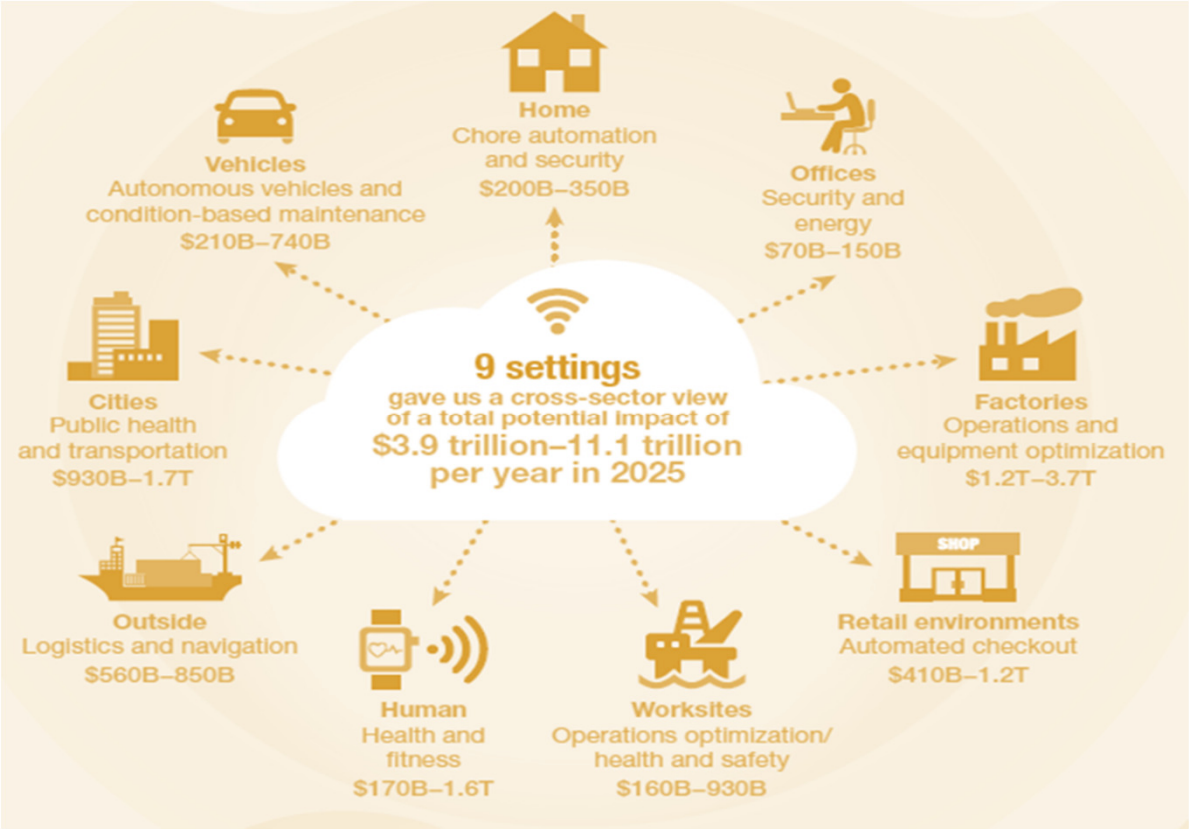
The Internet of Things (IoT) is a scenario in which objects, animals or people are provided with unique identifiers and the ability to transfer data over a network without requiring human-to-human or human-to-computer interaction. IoT has evolved from the convergence of wireless technologies, micro-electromechanical systems (MEMS) and the Internet.

Cloud computing glossary

It's all about software

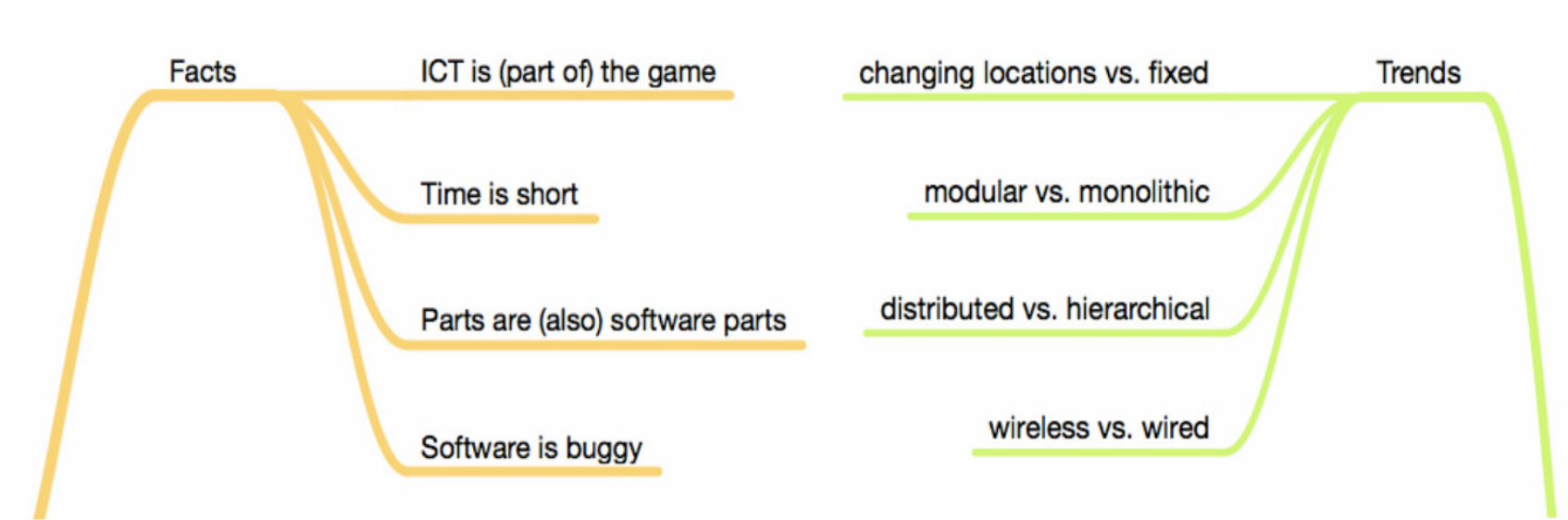
The value of IoT:

$11 Trillion by 2025



Source: McKinsey Global Institute analysis

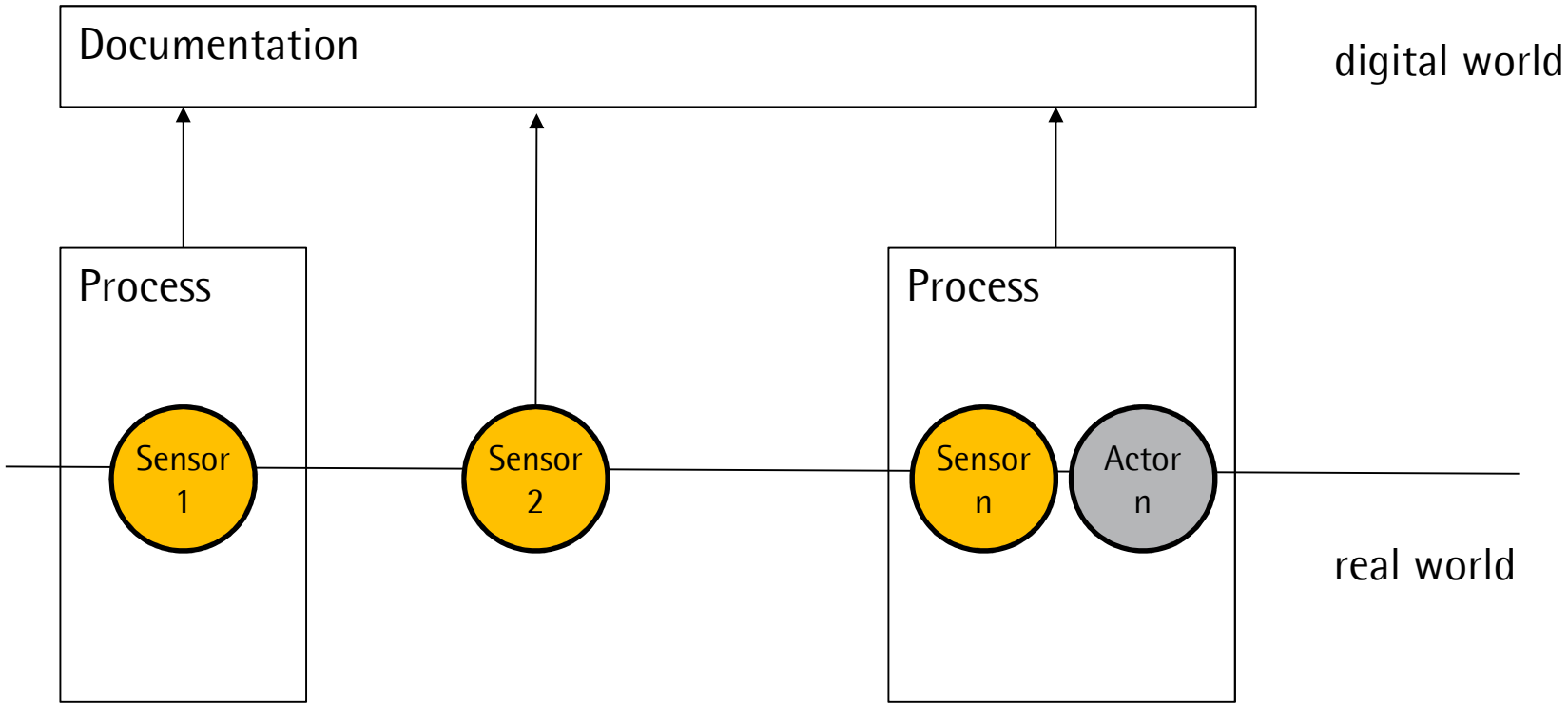
Where is manufacturing going to ?
Facts and Trends



Source: Stefano Rizzo, 2016

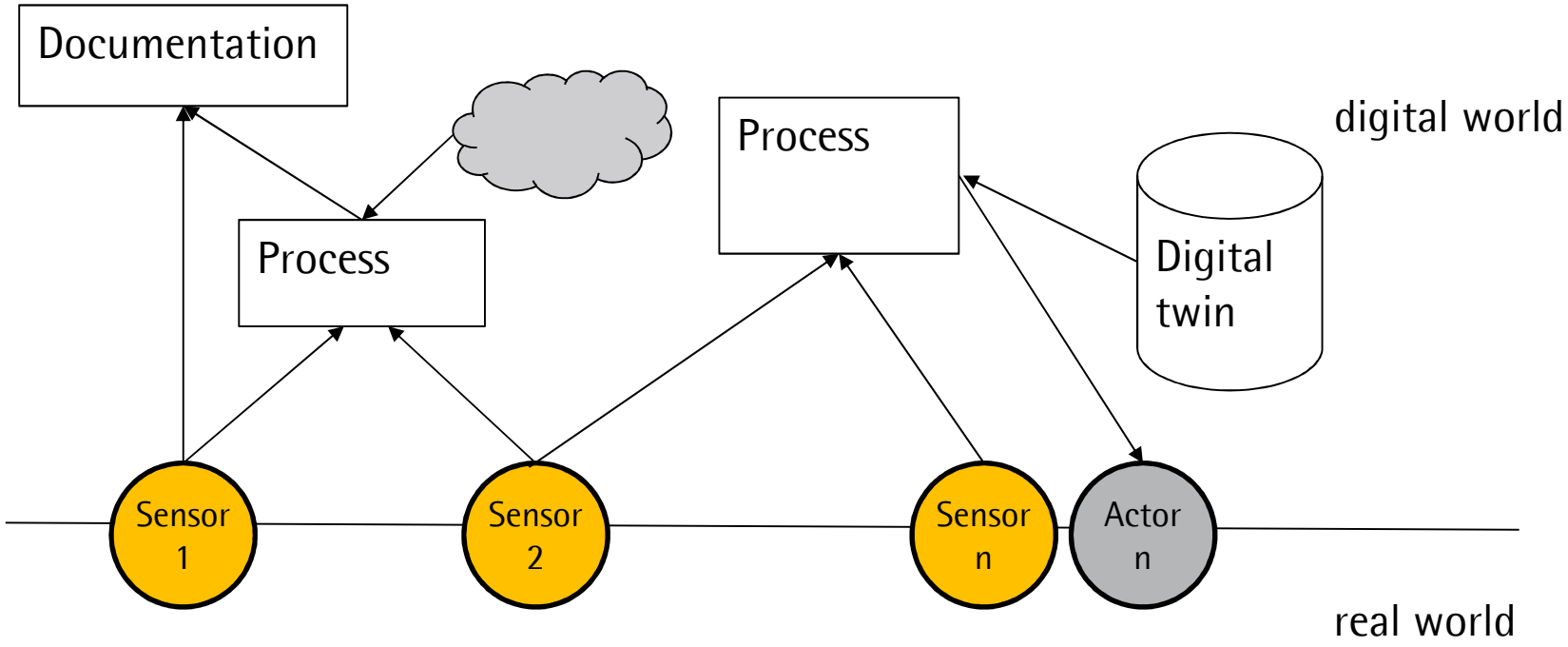
** information and communications technology*

IoT Architecture: how sensors change their role



From a collection of single instruments ...

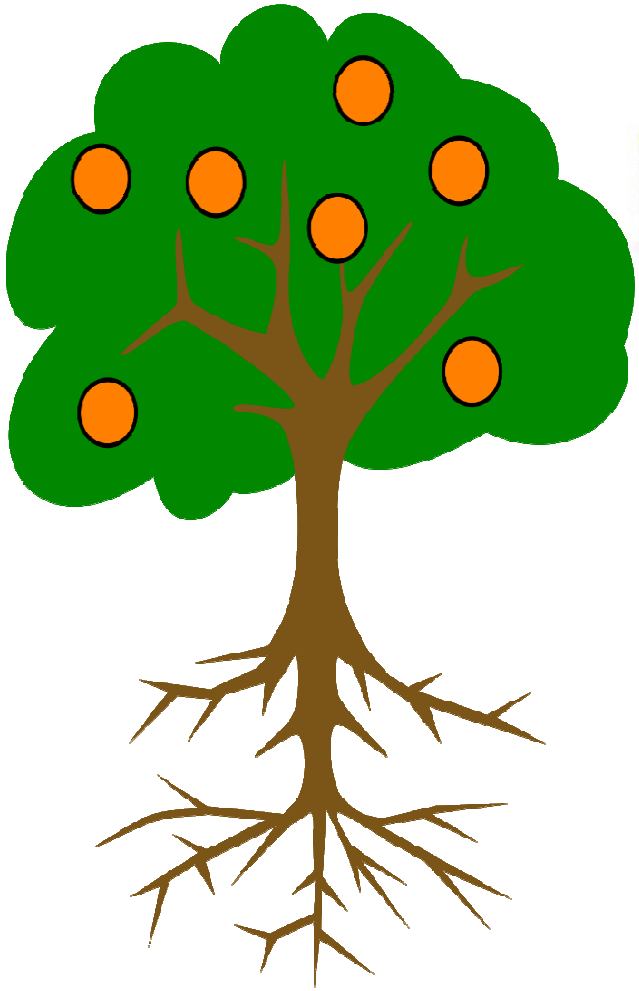
IoT Architecture: how sensors change their role



From a collection of single instruments ...

to enhanced connected services

The challenge of IoT: disruptive changes in business models



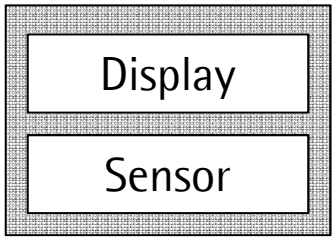
This is the innovation driver:
Create solutions by combining data and algorithm in a digitalized world

IOT enabler:
Data silos, Application platforms,
"Digital Twin"

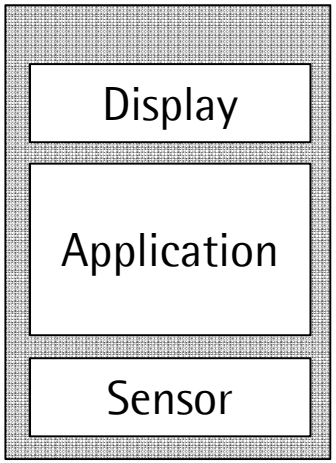
Important but commodity:
Sensors, hardware devices,
measurement instruments, IT infrastructure

How does IoT evolution change classical Lab Instruments?

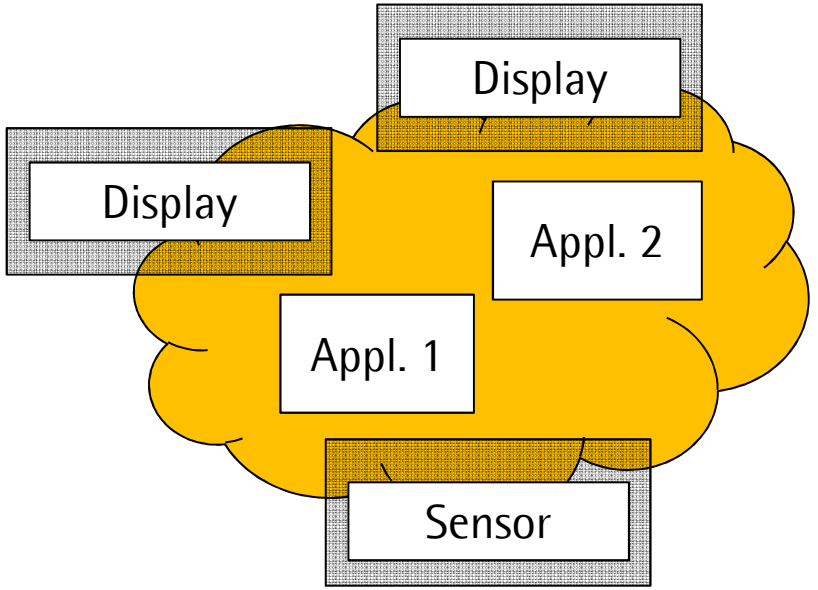
Starting with a compact, simple instrument using a single hardware



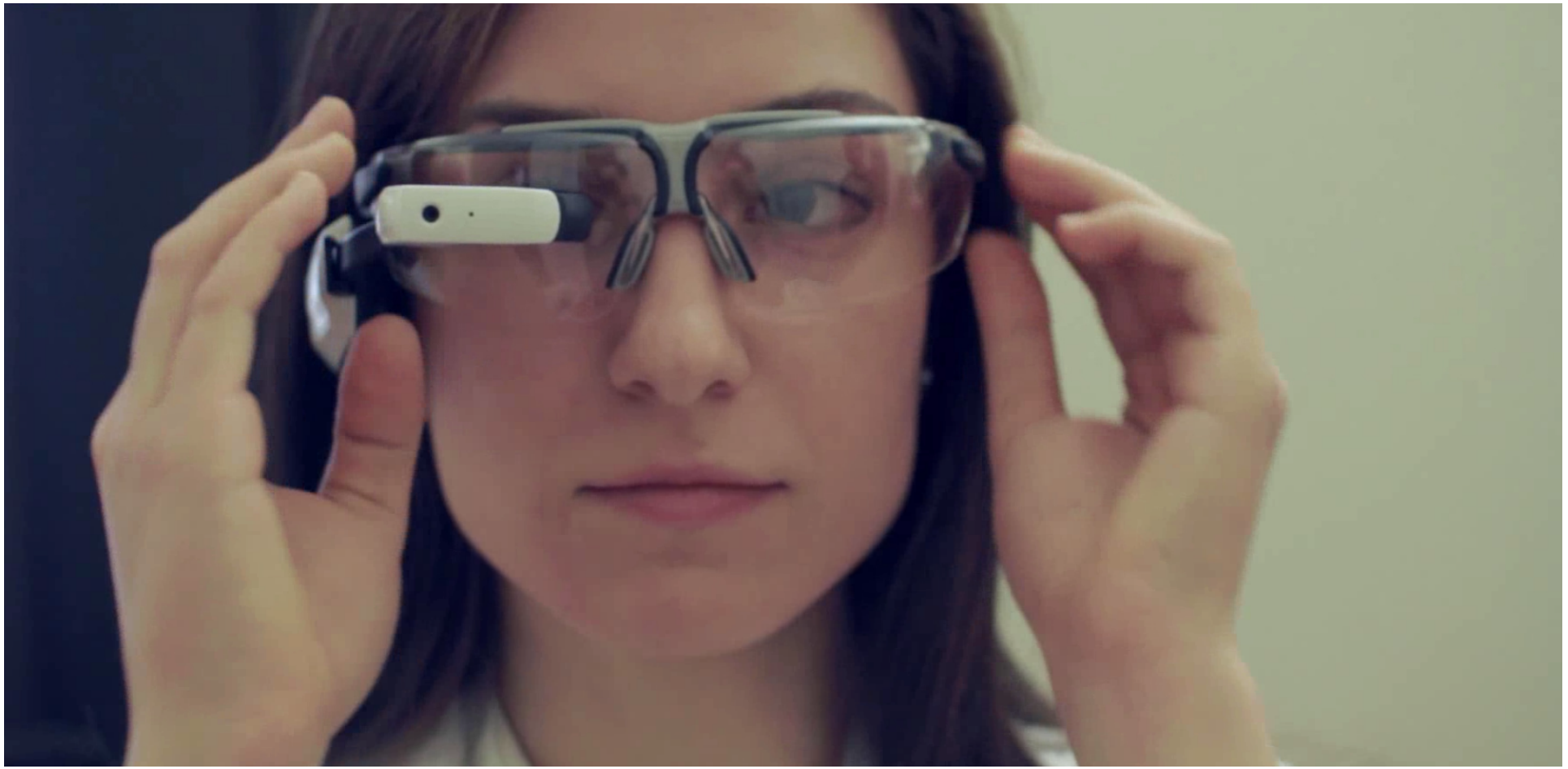
Applications, workflows included to the instrument



Measurement instruments distribute to the IoT cloud (Sensor hardware separated, application in IoT cloud, wearables are used for displaying values



"Lab of the future" vision



Internet of Things (Industry 4.0)

- Is a rapid technical evolution
- business models are changing in a disruptive way
  from selling devices → to selling applications/solutions as a service
- sensors and actor equipment becomes commodity
- innovation is mainly driven by software in a complex distributed architecture
- many new actors are using existing data/values, combining them to new information
- stand alone devices are decreasing.
  Connectivity, interoperability in addition with new applications is increasing and more in focus.

What does the producer and customer expect from authorities?

- Acting in a complex IT-infrastructure
  Speed up approval processes:
  - today: up to 2 years for approvals worldwide
  - how can we get approvals in a month?
  - Is IoT possibly the solution for accelerated approvals?
- Predictability of acceptance by market surveillance for new products
- Alignment of processes and documentation to other certification types (e.g. GxP, Pharma, ...)
- Ability for fast launch of new software in the market
  for updates, upgrades, individualization of applications

Chance for new services in future for legal metrology

- In an IoT world sensors are the bridge between real world and the „digital twin“
- **Trust** in the validity of measurements is crucial to accept IoT in all critical environments, not just in established legal metrology fields
- Laboratories are requesting means to make any kind of measurement results more comparable - independent of time, location, environmental conditions
- Metrology authorities can be established as trust authorities for this new approach

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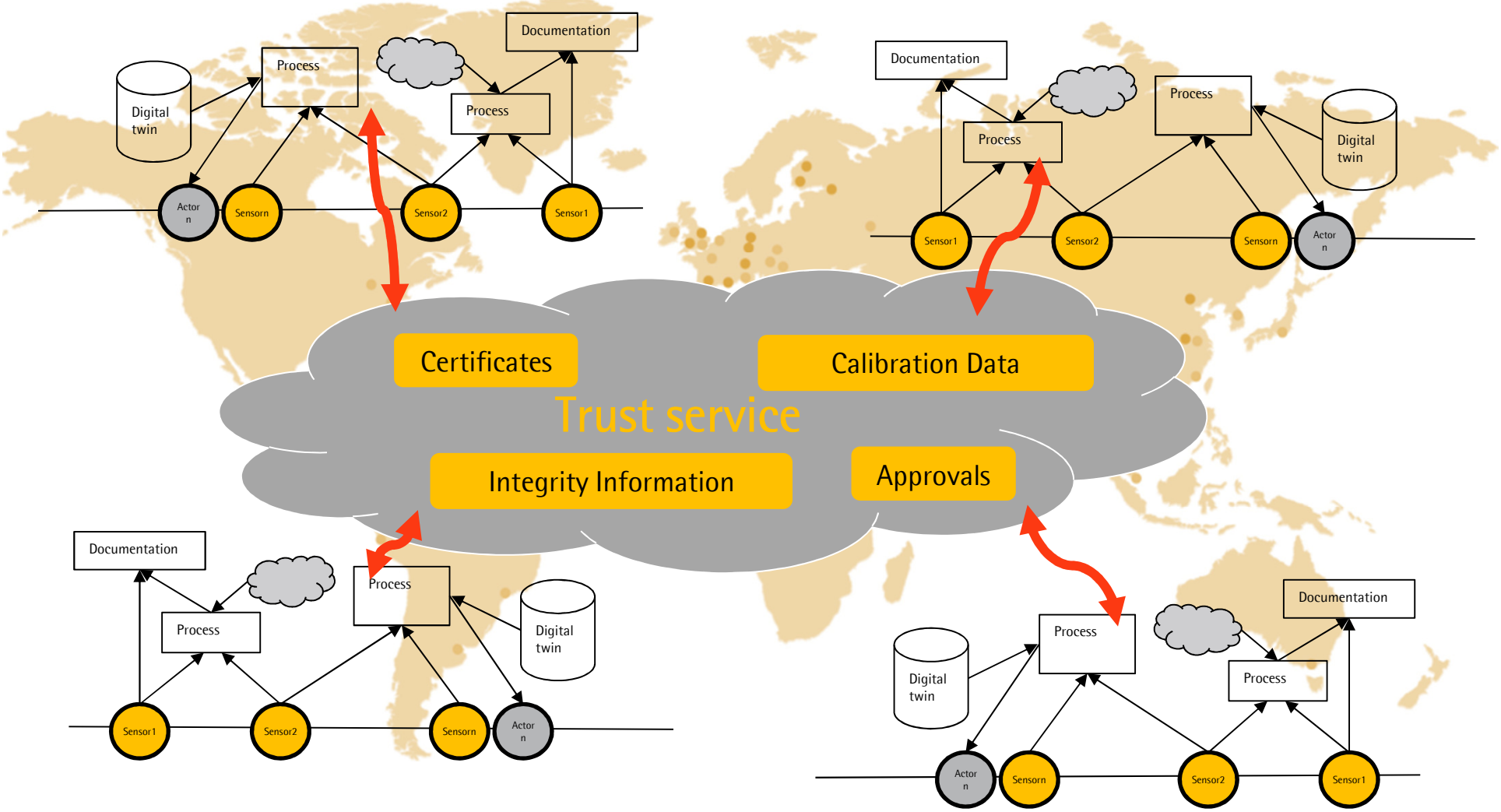
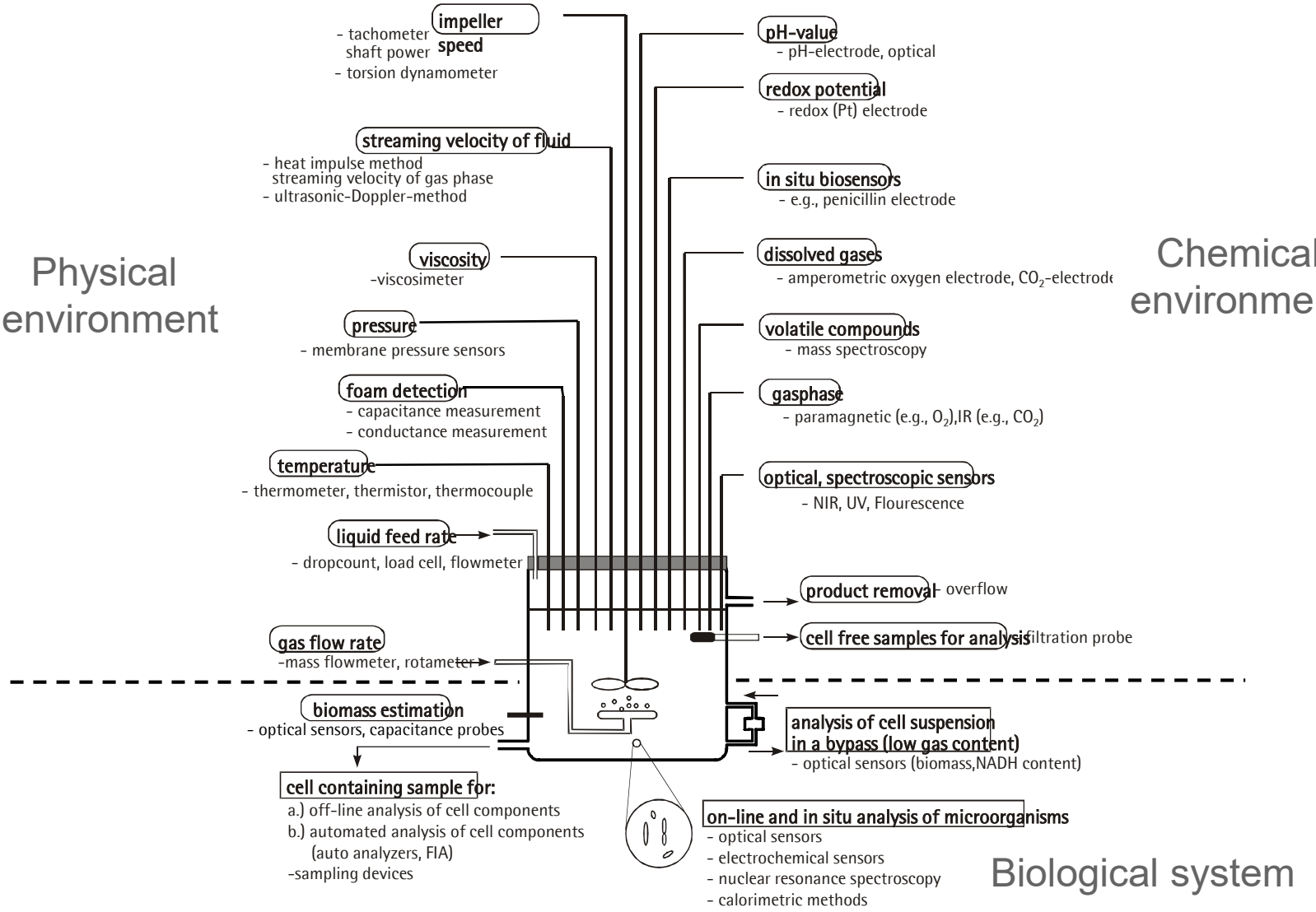
Metrology in IoT: create trust services for a wide range of measurements



Example: Measurements in Bioprocess



Opportunities

Software is the main innovation driver in metrology

IoT drives the technology in a fast evolution, but changes the business models in a disruptive way.

For classical legal metrology business:

- be open to new solutions
- speed up approval processes worldwide (business does not stop on borders)

Chances for legal metrology

- Offer trust services to additional metrology fields
- Metrology is essential to get a real IoT-world
- Reduce fixed requirements
- Development of new businesses to supervise Legal Applications

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