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Session 4 – Cloud computing for future ICT "Knowledge" platforms

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Agenda

- Some definitions:
  - Internet of Things
  - Web of Things
  - Big Data
  - Cloud computing

- Toward a Knowledge Society ?

- The future ICT "Knowledge" platform

- Conclusion

Internet of Things (ITU-T Y.2060)

- **Internet of Things (IoT)**: A global infrastructure for the information society, enabling advanced services by interconnecting **(physical and virtual) things** based on existing and evolving interoperable information and communication technologies.

- **Thing**: With regard to the Internet of things, this is an object of the **physical world** (physical things) or the **information world** (virtual things), which is capable of being identified and integrated into **communication networks**.
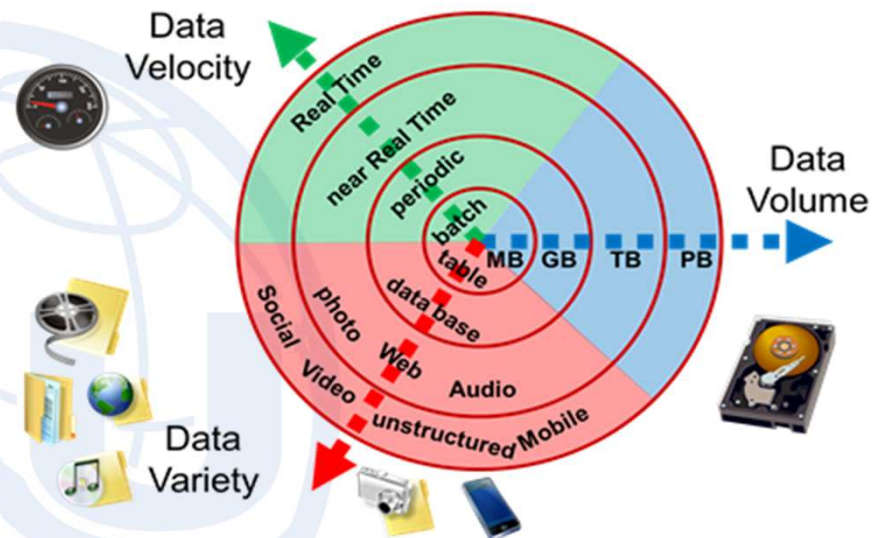
Web of Things (ITU-T Y.2063)

- **Web of things (WoT):** A way to realize the IoT where (physical and virtual) things are connected and controlled through the World Wide Web.
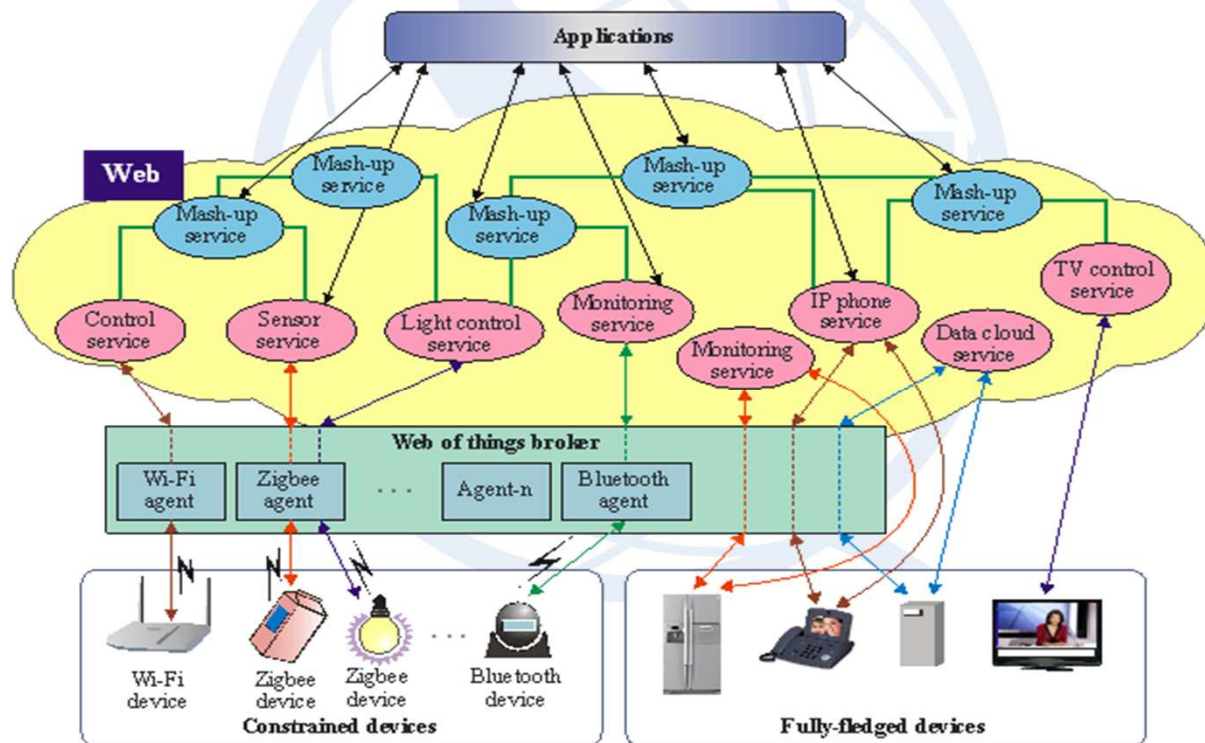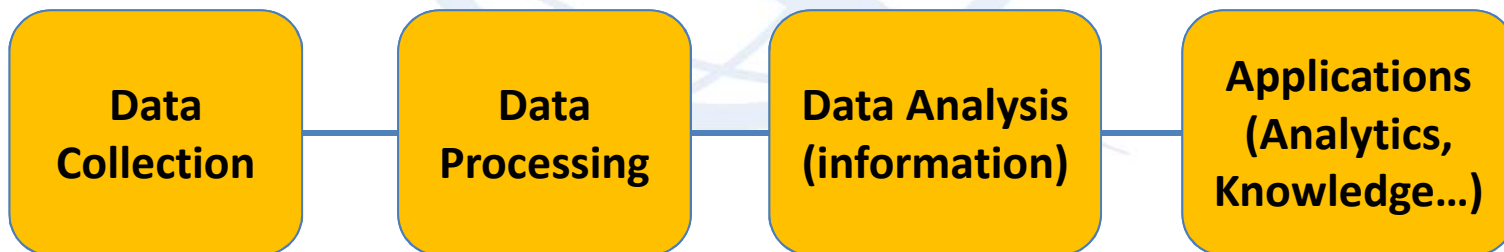

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Big Data (ITU-T SG13 draft Y.bigdata-Reqts)

- **Big data**: a category of technologies and services where the capabilities provided to **collect, store, search, share, analyse and visualize data** which have the characteristics of **high-volume, high-velocity and high-variety**.

http://www.gi.de/service/informatiklexikon/detailansicht/article/big-data.html

| Data Collection	Data Processing	Data Analysis (information)	Applications (Analytics, Knowledge...)

Cloud computing (ITU-T Y.3500 | ISO/IEC 17788)

- **Cloud computing**: Paradigm for enabling network access to a scalable and elastic pool of shareable physical or virtual resources with self-service provisioning and administration on-demand.

  NOTE – Examples of resources include servers, operating systems, networks, software, applications, and storage equipment.

- **Key characteristics**:
  - Broad network access
  - Measured service
  - Multi-tenancy
  - On demand self-service
  - Rapid elasticity and scalability
  - Resource pooling

- **Cloud service categories**: IaaS, SaaS, PaaS, NaaS, CaaS…

Emerging areas by 2020

1. **IoT & connected devices**: Smart city, meter, consumer and medical devices, connected car..
2. **Enterprise Knowledge media**: retail, banking, healthcare, public sector, business app, energy, education, transportation
3. **Public Knowledge & Social Media** : Web search, Friends & family, Audio Video content, applications
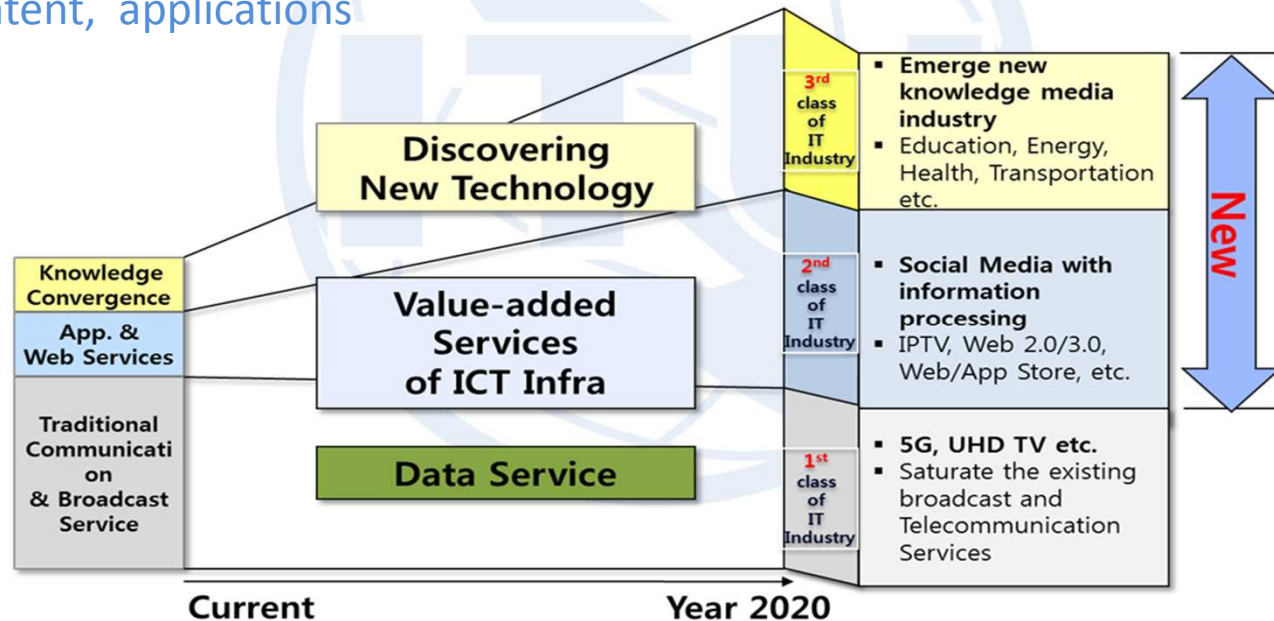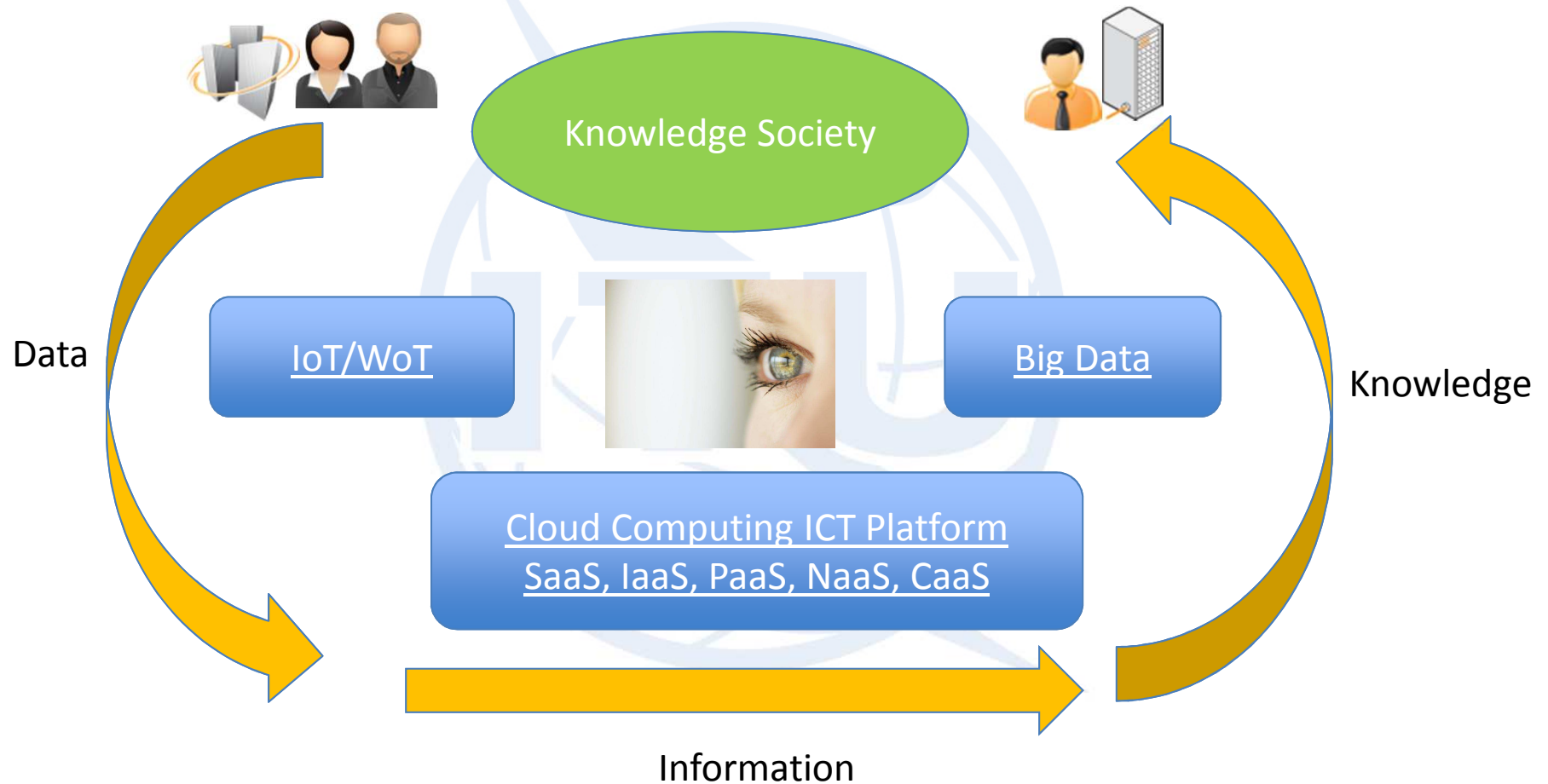

Future Trust and Knowledge, Dr. Jun Kyun Choi, KAIST

IoT challenges

- With numerous objects to connect, numerous signaling messages, high amount of traffic, new traffic patterns
- With many requirements: security and privacy, mobility or nomadism, scalability, QoS and robustness, low latency
- With a tsunami of data, corresponding to many different data models
- How to cope with numerous use cases and infrastructure services?

‣The Future ICT platform must be agile, flexible and scalable

Towards a Knowledge Society

Knowledge Society

Data

IoT/WoT

Big Data

Knowledge

Cloud Computing ICT Platform
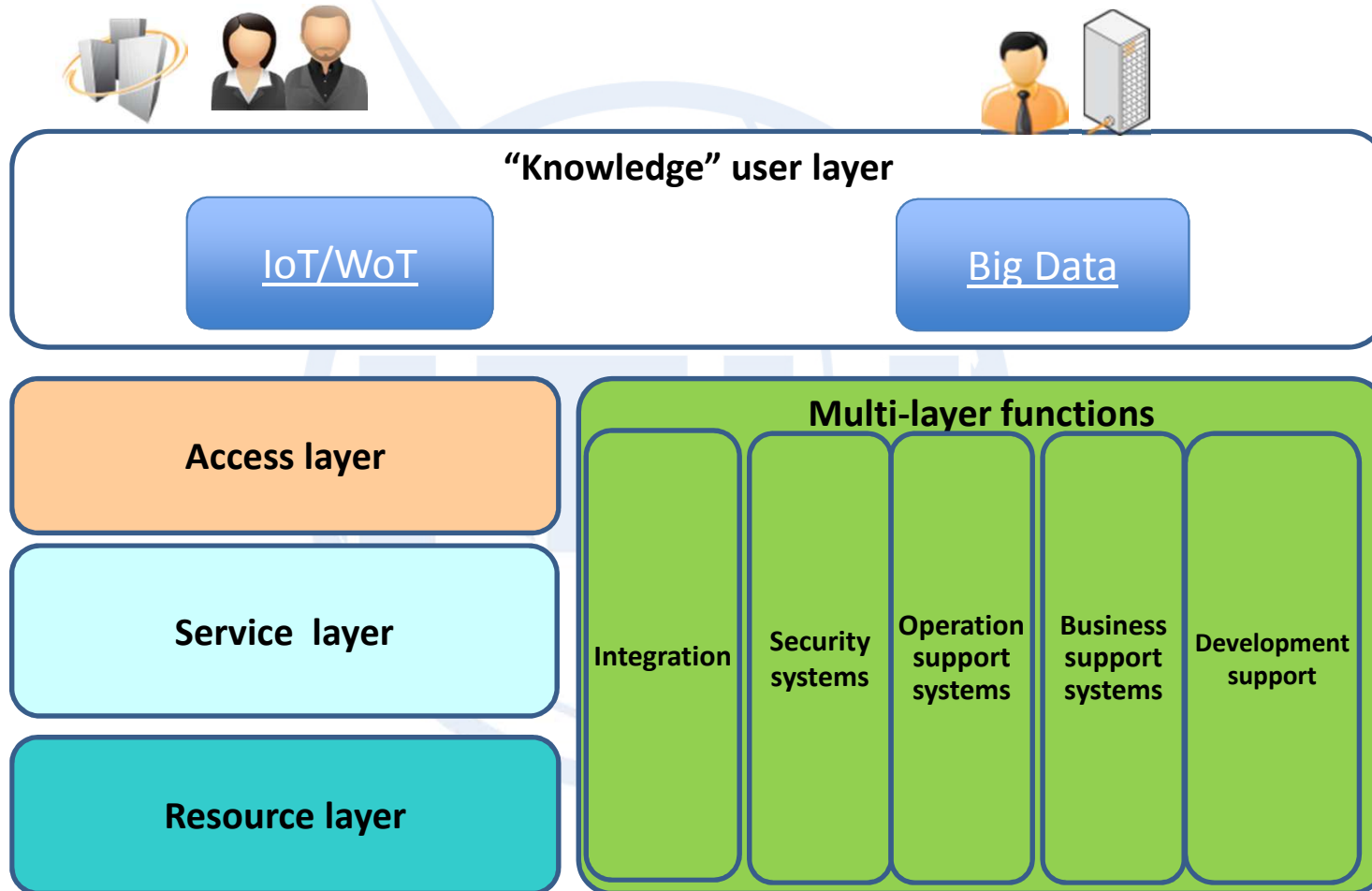SaaS, IaaS, PaaS, NaaS, CaaS

Information

Requirements of the future ICT "Knowledge" platform

- Overall objective: Facilitate and ease the life of users (humans, corporate users..)
  - handling knowledge and intelligence in an efficient manner
  - allowing advanced communications between humans, between machines and between humans and machines
  - enhance "productivity" in vertical domains (e.g. help other industries such as Transportation, energy, education, health,…)
- How?
  - Collect "data" from the IoT "Physical and Information worlds"
    - Internet of things data including building, transport, energy, water, manufacture, health, surveillance, and environments
    - Social media data…
  - Extract useful and valuable information from "data" → "Predictive" analytics
  - Provide "knowledge based" applications → "Prescriptive" analytics
    - Enable secure sharing/exposure of "knowledge"
    - Triggering possible knowledge-based actions (in real time or not)
    - Support new human to human relationships (e.g. through social media services)
    - Towards a "Knowledge as a Service" type of applications?

Cloud computing promises for ICT "Knowledge" Platform

- Variety, volume and velocity requiring new applications
  - SaaS with variety of compute, storage, and networking options

- Managing potentially massive datasets
  - BigData as a Service: Massive, virtually unlimited capacity

- Flexible network connectivity
  - NaaS (network virtualization, network connectivity/SDN,...)

- Data manipulation and analysis
  - Iterative, experimental style of infrastructure deployment/usage

- Workload variety with peaks and valleys
  - PaaS highly variable and efficient workloads

- Shared resources
  - IaaS: Multi-tenant and virtual cloud resources

Cloud for future ICT "Knowledge" Platform

"Knowledge" user layer

IoT/WoT

Big Data

Access layer

Service layer

Resource layer

Multi-layer functions

Integration	Security systems	Operation support systems	Business support systems	Development support

(ITU-T Y.3502 | ISO/IEC 17789)

Conclusion

- The future ICT "Knowledge" Platform:
  - Leveraging on cloud computing, big data and IoT/WoT
  - Providing efficient support for various services and applications facilitating and easing the life of users
  - Handling intelligence/knowledge in a well structured and arranged manner to enable new innovations on education, energy, transportation, nano-, and bio-technologies.

- Any further standardization required?
  - Assess first the global vision for an ICT "Knowledge" society (objectives, use cases)

Q&A

Thank you for your attention