Smart-Cities and Cloud Computing

Toward Smart Society and the 4th Industrial Revolution

Panel Discussion

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Leader, The ISO Linux Standard Implementation Study Group

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Smart-Cities and Cloud Computing

- Smart-Cities
  - IoT & Smart Devices: Embedded systems
  - Smart Home, Smart Town, Smart Village, Smart Country

- Cloud computing
- Smart Society
- The 4th Industrial Revolution

The Smart City Consortium for Seoul

- **R&D for The Intelligent (Smart) Cities based on IoT and ubiquitous Cities.**
- **LG-CNS, SK-Telecom, Small Companies as well**
- **Seoul Metropolitan Government,**
- **Many universities,**
- **Research organizations, etc.**
- **Since 2002, Digital Media City.**
- **Over 20 million U.S. Dollars for R&D since 2005.**

Cf. The Eco U-City Consortium by Korean Ministry of Land and Traffic Management.

*** Focused on real construction and testbeds.**

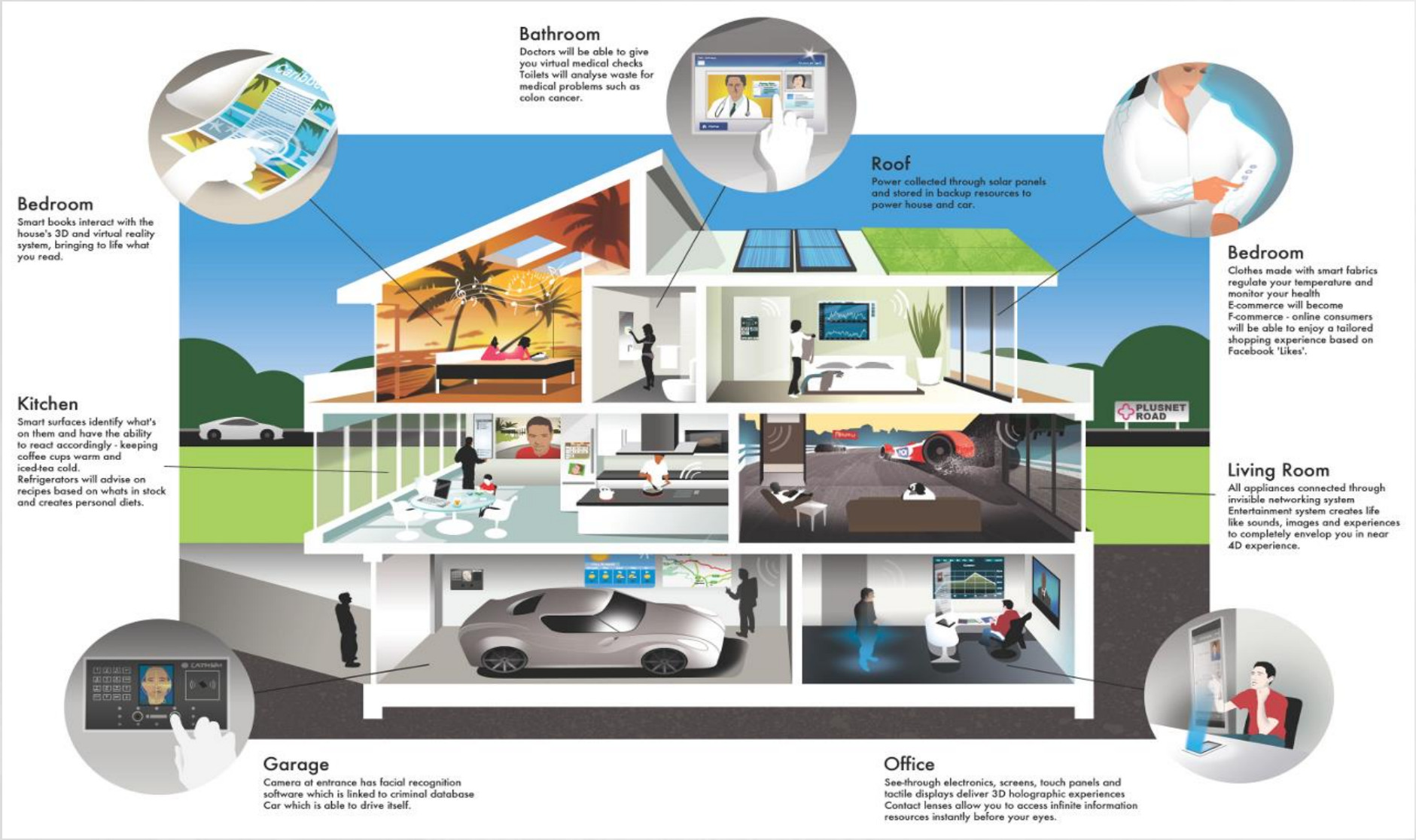
*** Fund over 300 million U.S. Dollars.**

*** Since 2007, operational.**

*** Over 100 cases throughout Korea.**

Smart-Cities

Smart House


Bathroom
Doctors will be able to give you virtual medical checks
Toilets will analyse waste for medical problems such as colon cancer.
Roof
Power collected through solar panels and stored in backup resources to power house and car.
Bedroom
Smart books interact with the house's 3D and virtual reality system, bringing to life what you read.
Bedroom
Clothes made with smart fabrics regulate your temperature and monitor your health
E-commerce will become F-commerce - online consumers will be able to enjoy a tailored shopping experience based on Facebook 'Likes'.
Kitchen
Smart surfaces identify what's on them and have the ability to react accordingly - keeping coffee cups warm and iced-tea cold.
Refrigerators will advise on recipes based on whats in stock and creates personal diets.
PLUSNET ROAD
Living Room
All appliances connected through invisible networking system
Entertainment system creates life like sounds, images and experiences to completely envelop you in near 4D experience.
Garage
Camera at entrance has facial recognition software which is linked to criminal database
Car which is able to drive itself.
Office
See-through electronics, screens, touch panels and tactile displays deliver 3D holographic experiences
Contact lenses allow you to access infinite information resources instantly before your eyes.

Smart Village, Smart Town

The Smart-City based on the ubiquitous city..

Smart Korea, Smart World, Smart Universe.

Smart-Cities

- A future city.
- **Based on Internet of Things (IoT).**
  - Smart devices.
- Based on super-connection.
  - Based on ubiquitous computing.
- Being smart for smart services.
- Cloud computing.
- Security.
- .....

What is being smart?

- **Human like?**
- **Or, more than human beings?**

- **The same ways as the human beings do?**
- **Or, different ways?**
  - **See, airplanes, cars, ...**

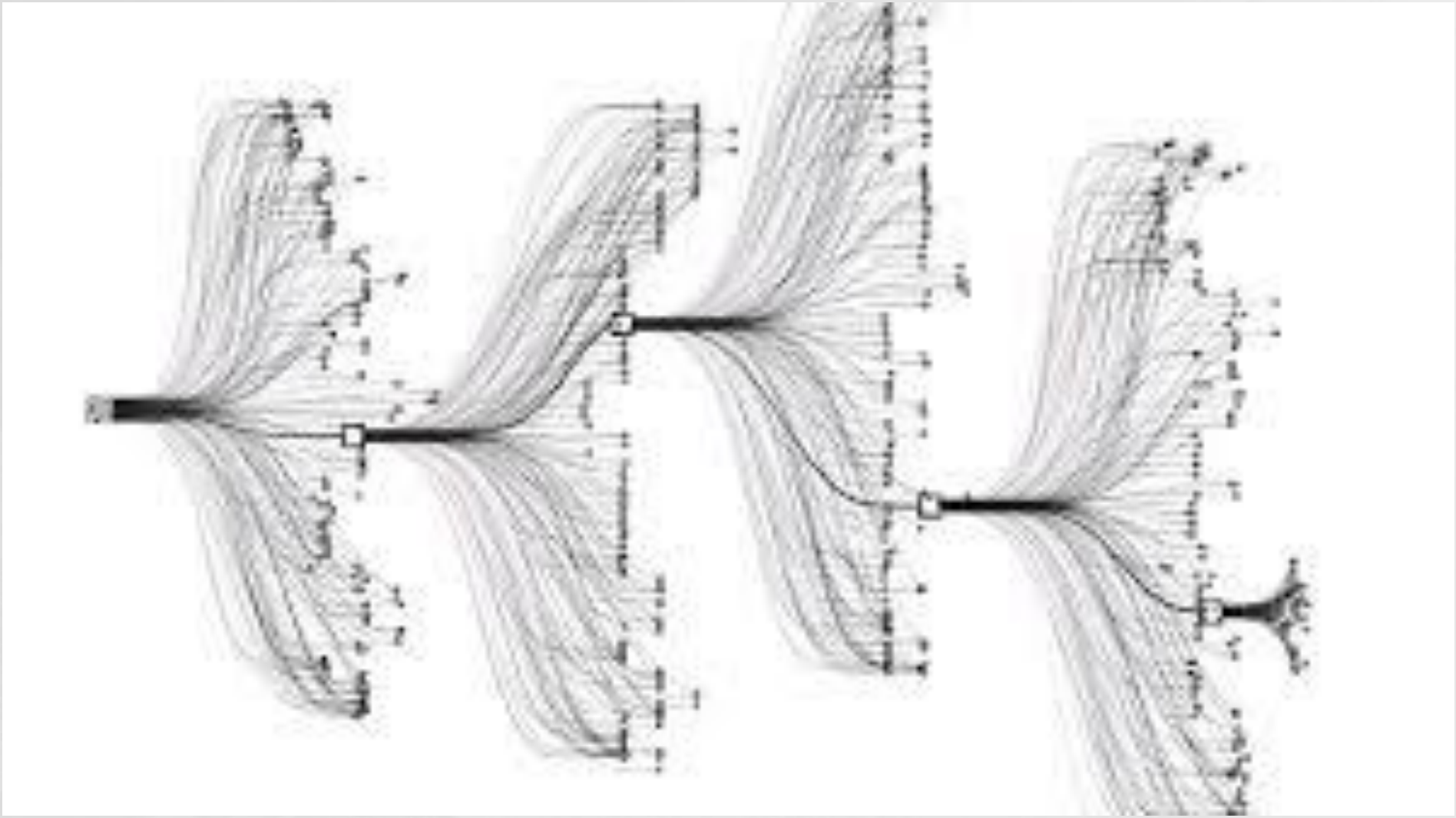
- **The AlphaGo vs. LEE Se-Dol's five go-matches.**

The AlphaGo vs. LEE Se-Dol's five go-matches

- Google DeepMind (vs. IBM Big Blue for chess.)
- 4 to 1 results.
- Machine learning with tree search techniques
- Deep Neural Network.
- The Monte Carlo Algorithm
- XILINK's FPGA & NVIDA's GPU, not DRAM.
- 3000 cpus
- 264 Tflops

The AlphaGo vs. LEE Se-Dol's five go-matches

The AlphaGo machine learning with neural network



Smart Devices

Smart cars

Google driving to be driverless

Google's modified Toyota Prius uses an array of sensors to navigate public roads without a human driver. Other components, not shown, include a GPS receiver and an inertial motion sensor.

Laser-guided mapping
A rotating sensor with lasers called a LIDAR on the roof scans more than 200 feet in all directions to generate a precise three-dimensional map of the car's surroundings.

Position estimator
A sensor mounted on the left rear wheel measures small movements made by the car and helps to accurately locate its position on the map.

Video camera

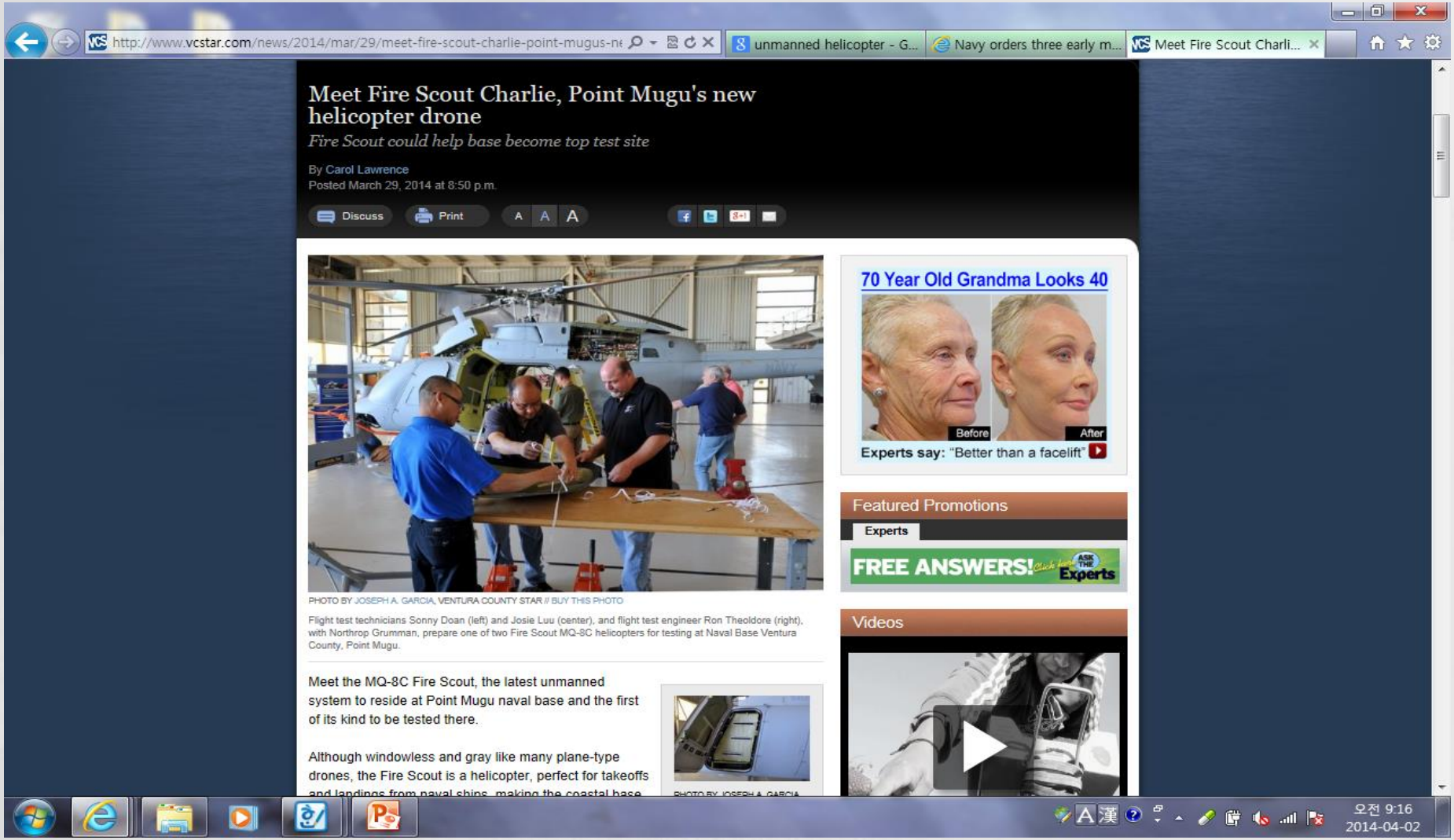
A camera mounted near the rear-view mirror detects traffic lights and helps the car's onboard computers recognize moving obstacles-such as pedestrians and bicyclists.

Radar
Four standard automotive radar sensors, three in front and one in the rear, help determine the positions of distant objects.

Source: Google

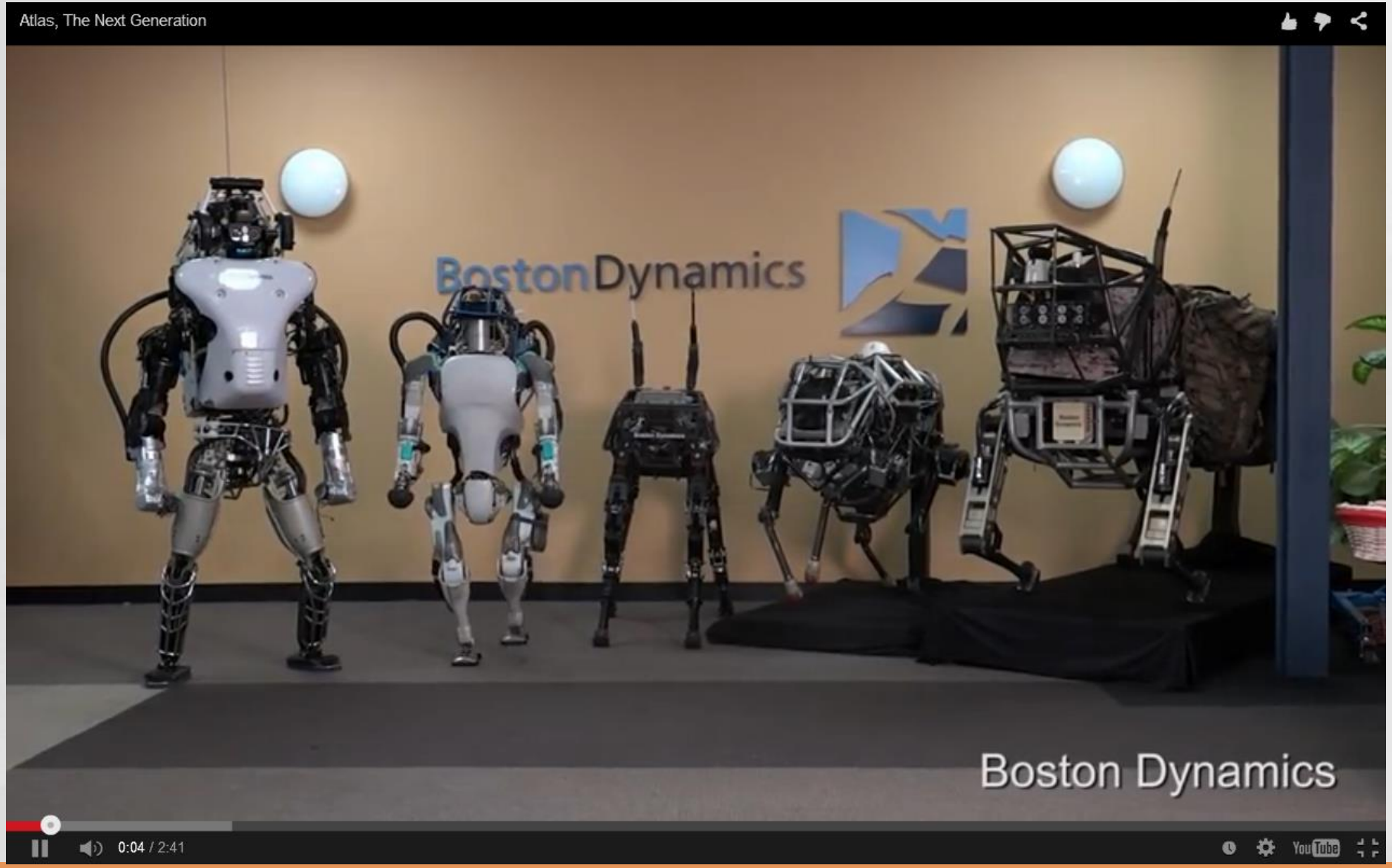
NEW YORK TIMES; PHOTOGRAPHS BY RAMIN RAHIMIAN FOR THE NEW YORK TIMES

Unmanned Helicopter Drone



Drones & robots

Smart Robots



Smart Robots

Smart OS - CHAPPIE

Smart OS – Big Hero 6

Smart-Cities

- **Based on Internet of Things (IoT).**
  - Smart devices

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Internet of Things (IoT): Internet of Everything (IoE)

IoE

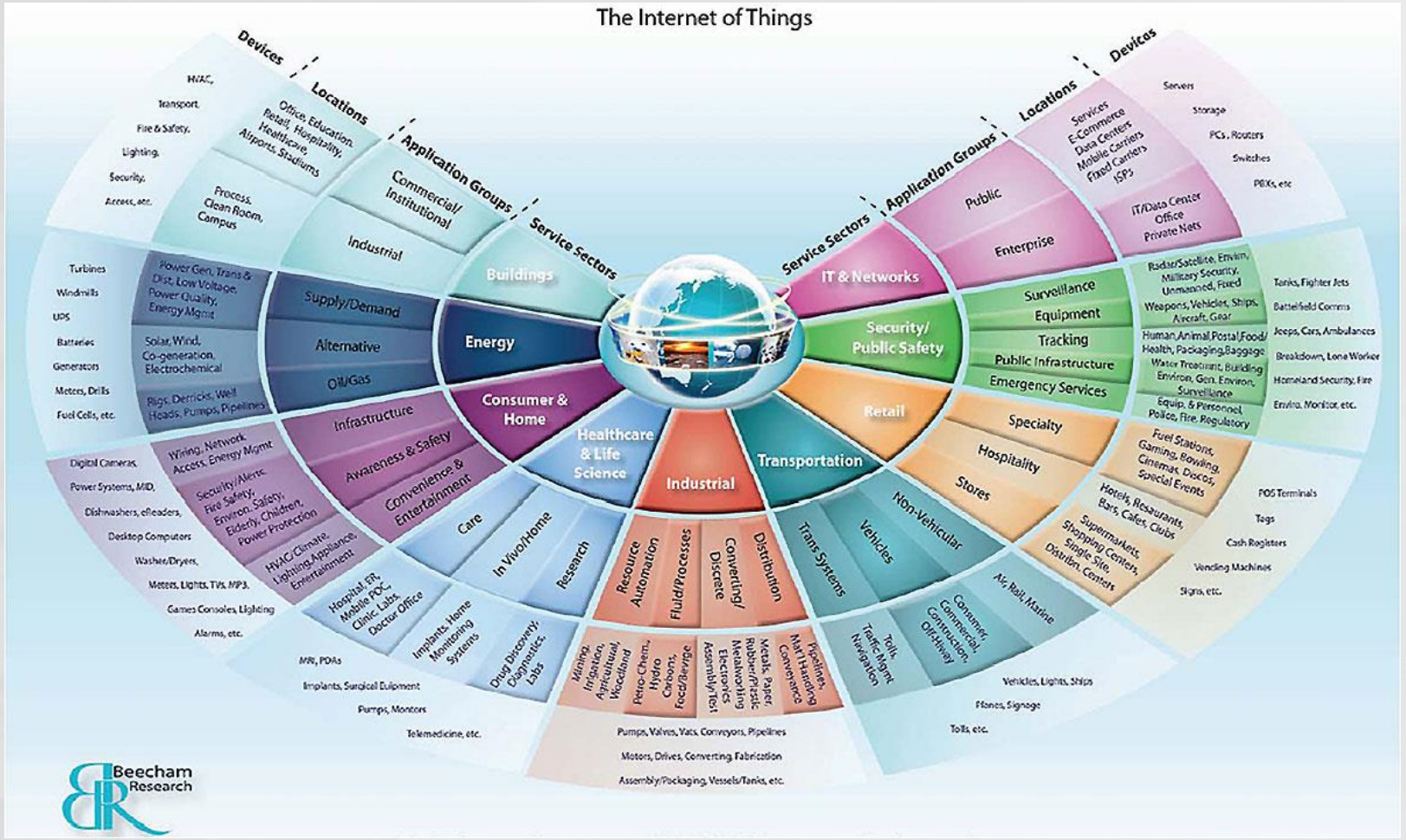
- The **Internet of Things** (**IoT**) refers to uniquely identifiable objects and their virtual representations in an Internet-like structure.

- Smart Device + Virtual Representations

IoE

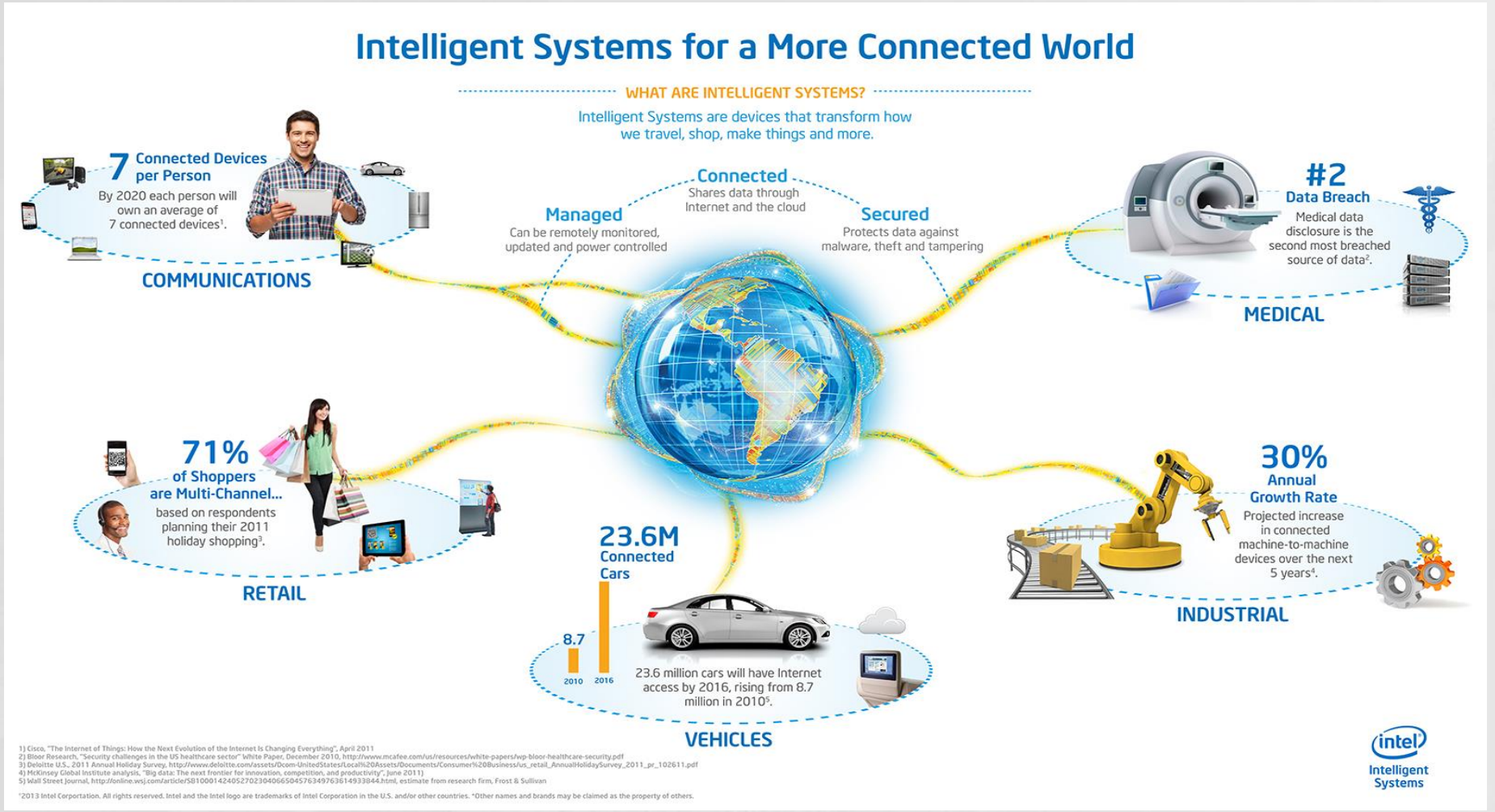
- Companies and organizations explain the Internet of Things in various ways, but the Internet of Things, or IoT, is most commonly described as an ecosystem of technologies monitoring the status of **physical objects**, capturing meaningful data, and communicating that information through IP networks to software applications.
- The recurring themes in all definitions of the Internet of Things include **smart objects**, machine to machine communication, RF technologies, and a central hub of information.
- See more at http://blog.atlasrfidstore.com/internet-of-things-and-rfid#sthash.maX6z58Z.dpuf

Cisco & Beecham Research



IoT by iStockphoto/chris_lemmens

IoE by Intel


Intelligent Systems for a More Connected World
WHAT ARE INTELLIGENT SYSTEMS?
Intelligent Systems are devices that transform how we travel, shop, make things and more.
Connected
Shares data through Internet and the cloud
Managed
Can be remotely monitored, updated and power controlled
Secured
Protects data against malware, theft and tampering
7 Connected Devices per Person
By 2020 each person will own an average of 7 connected devices[1].
COMMUNICATIONS
#2 Data Breach
Medical data disclosure is the second most breached source of data[2].
MEDICAL
71% of Shoppers are Multi-Channel...
based on respondents planning their 2011 holiday shopping[3].
RETAIL
23.6M Connected Cars
8.7
2010
2016
23.6 million cars will have Internet access by 2016, rising from 8.7 million in 2010[5].
VEHICLES
30% Annual Growth Rate
Projected increase in connected machine-to-machine devices over the next 5 years[4].
INDUSTRIAL
1) Cisco, "The Internet of Things: How the Next Evolution of the Internet Is Changing Everything", April 2011
2) Bloor Research, "Security challenges in the US healthcare sector" White Paper, December 2010, http://www.mcafee.com/us/resources/white-papers/wp-bloor-healthcare-security.pdf
3) Deloitte U.S., 2011 Annual Holiday Survey, http://www.deloitte.com/assets/Dcom-UnitedStates/Local%20Assets/Documents/Consumer%20Business/us_retail_AnnualHolidaySurvey_2011_pr_102611.pdf
4) McKinsey Global Institute analysis, "Big data: The next frontier for innovation, competition, and productivity", June 2011)
5) Wall Street Journal, http://online.wsj.com/article/SB10001424052702304066504576349763614933844.html, estimate from research firm, Frost & Sullivan
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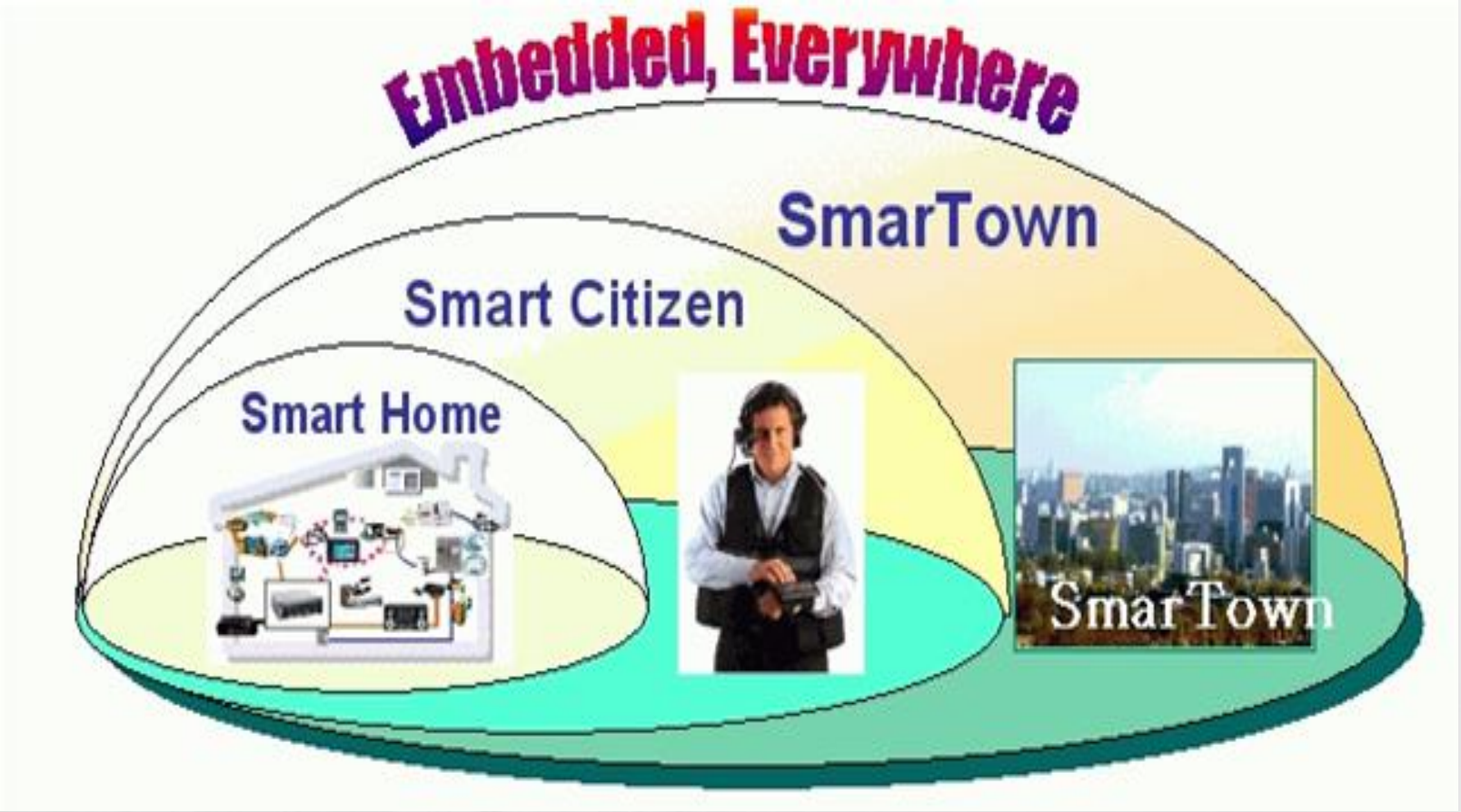
intel
Intelligent Systems

Smart Devices.

The Smart Society
We need smart devices for it.



Internet of Things / Everything

- The Internet of Things (IoT) is the network of physical objects—devices, vehicles, buildings and other items—embedded with electronics, software, sensors, and network connectivity that enables these objects to collect and exchange data. - wiki.

Internet of Things / Everything

"Internet of Things Global Standards Initiative". ITU. Retrieved 26 June 2015.

- The Global Standards Initiative on Internet of Things (IoT-GSI) concluded its activities in July 2015 following TSAG decision to establish the new Study Group 20 on "IoT and its applications including smart cities and communities".
- All activities ongoing in the IoT-GSI were transferred to the SG20. For more information see SG20 webpage or contact tsbsg20@itu.int.

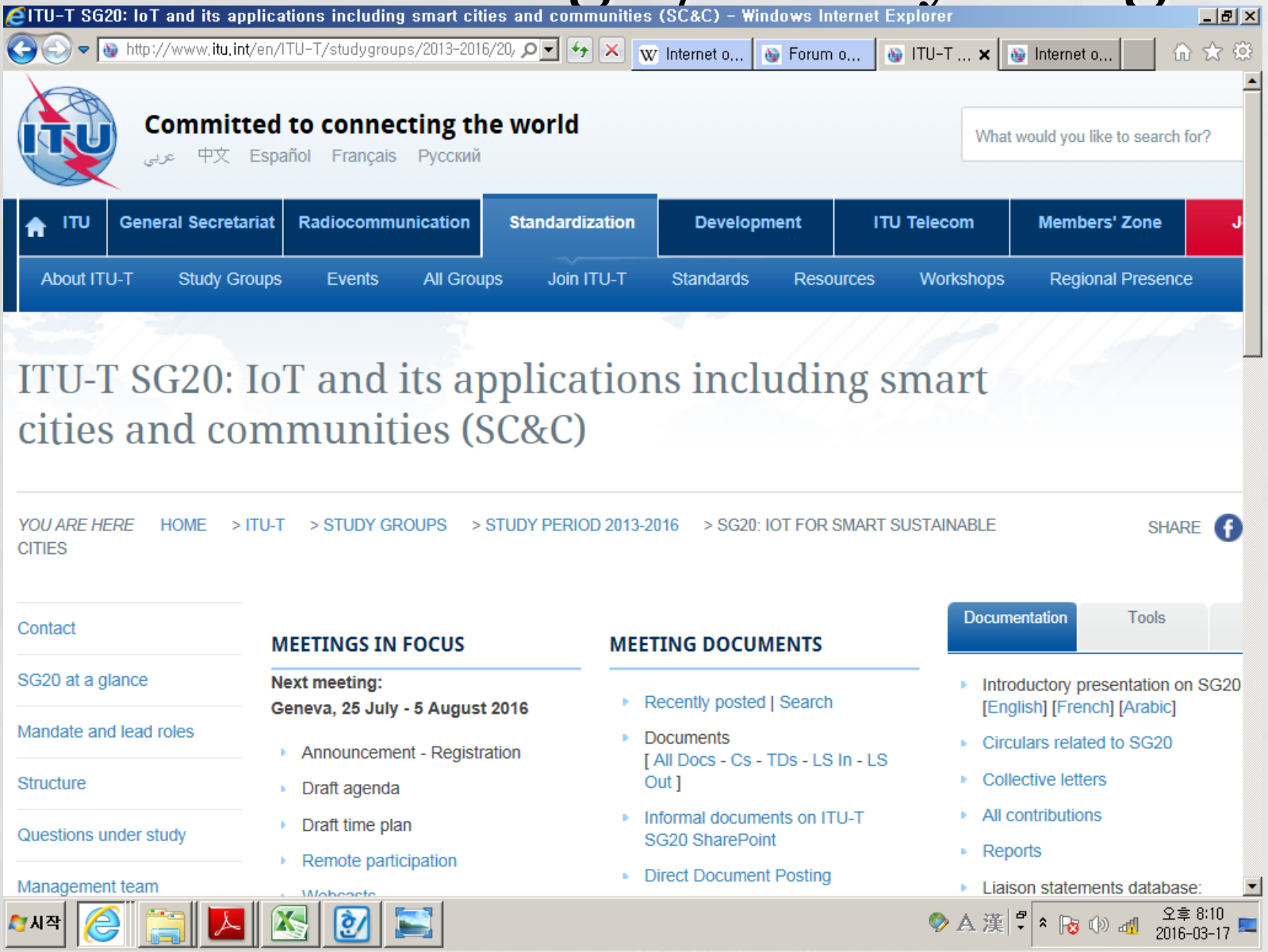
Internet of Things / Everything

- IoT-GSI aimed to promote a unified approach in ITU-T for development of technical standards (Recommendations) enabling the Internet of Things on a global scale.
- ITU-T Recommendations developed under the IoT-GSI by the various ITU-T Questions - in collaboration with other standards developing organizations (SDOs) – will enable worldwide service providers to offer the wide range of services expected by this technology.
- IoT-GSI also aimed to act as an umbrella for IoT standards development worldwide.

Internet of Things / Everything

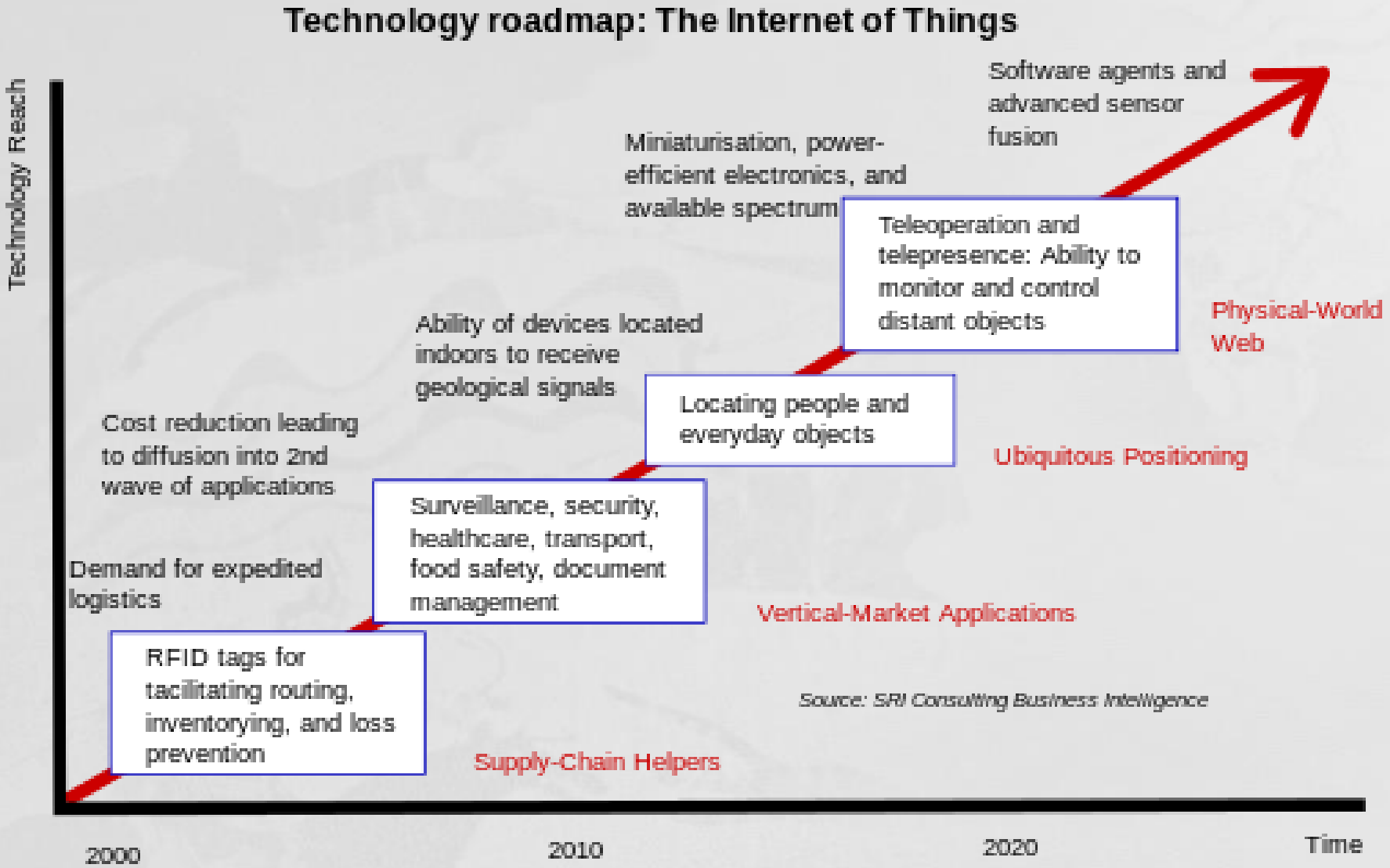
- The Internet of Things (IoT) has been defined in Recommendation ITU-T Y.2060 (06/2012) as a global infrastructure for the information society, enabling advanced services by interconnecting (physical and virtual) things based on existing and evolving interoperable information and communication technologies.

Internet of Things / Everything



Internet of Things / Everything

Internet of Things / Everything



Internet of Things / Everything

IoT plaftorms

Platform based approaches.

Smart-Cities

- Based on super-connection.

Based on super-connection Super connected cities

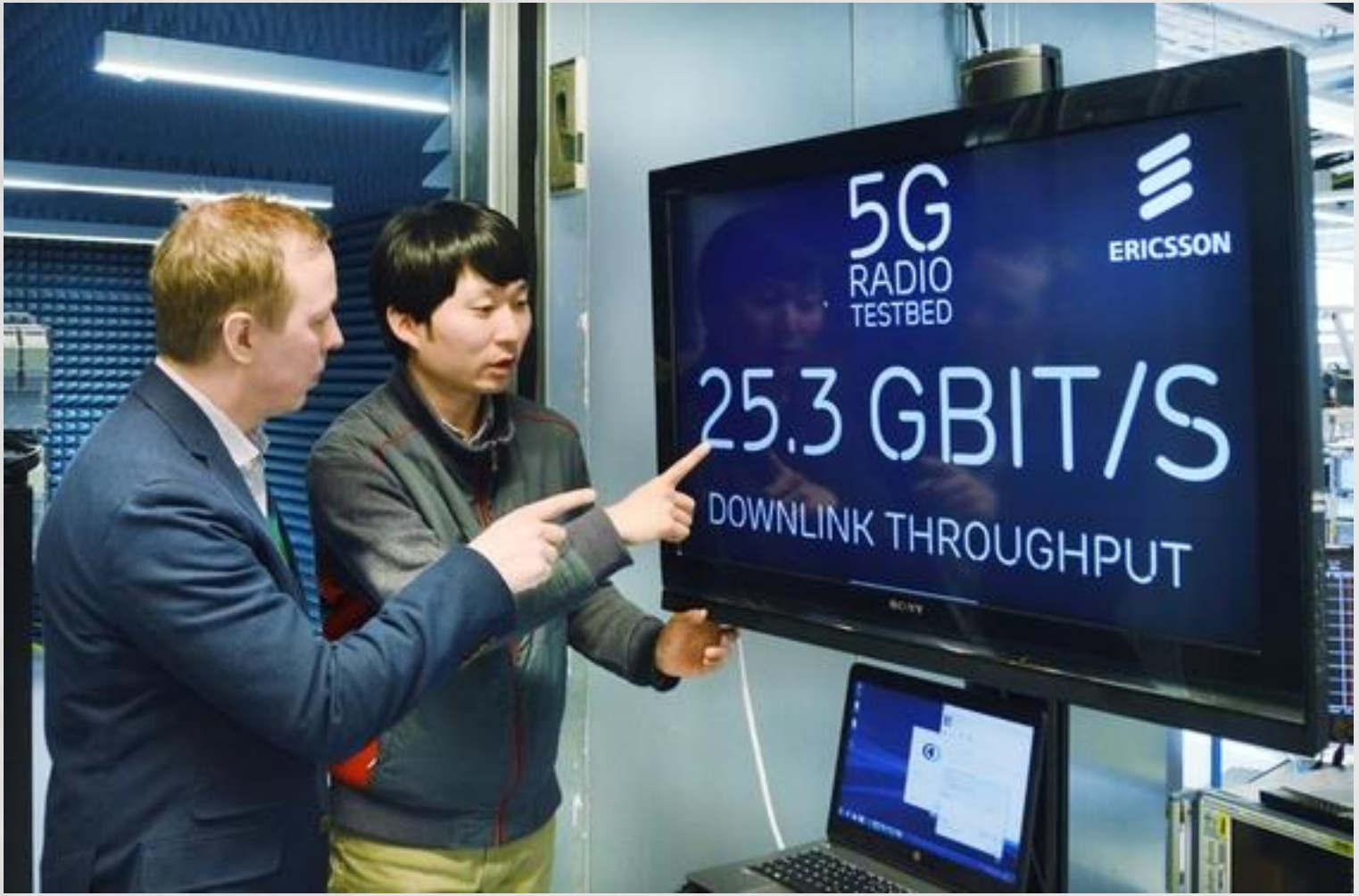
- Everything connected.
  - Integrated devices.
  - Compound connection including mobile comm.

Very high speed communication - Mobile computing

- Anywhere, anytime & any device (3A).
  - 5th Generation : 50 Giga-bps speed.
    - Toward Tera-bps.
  - Giga Korea soon.
  - 2018 in PyungChang Winter Olympic Game in Korea.

5 G Mobile computing

WMC Barcelona 2016.2



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5 G Mobile computing

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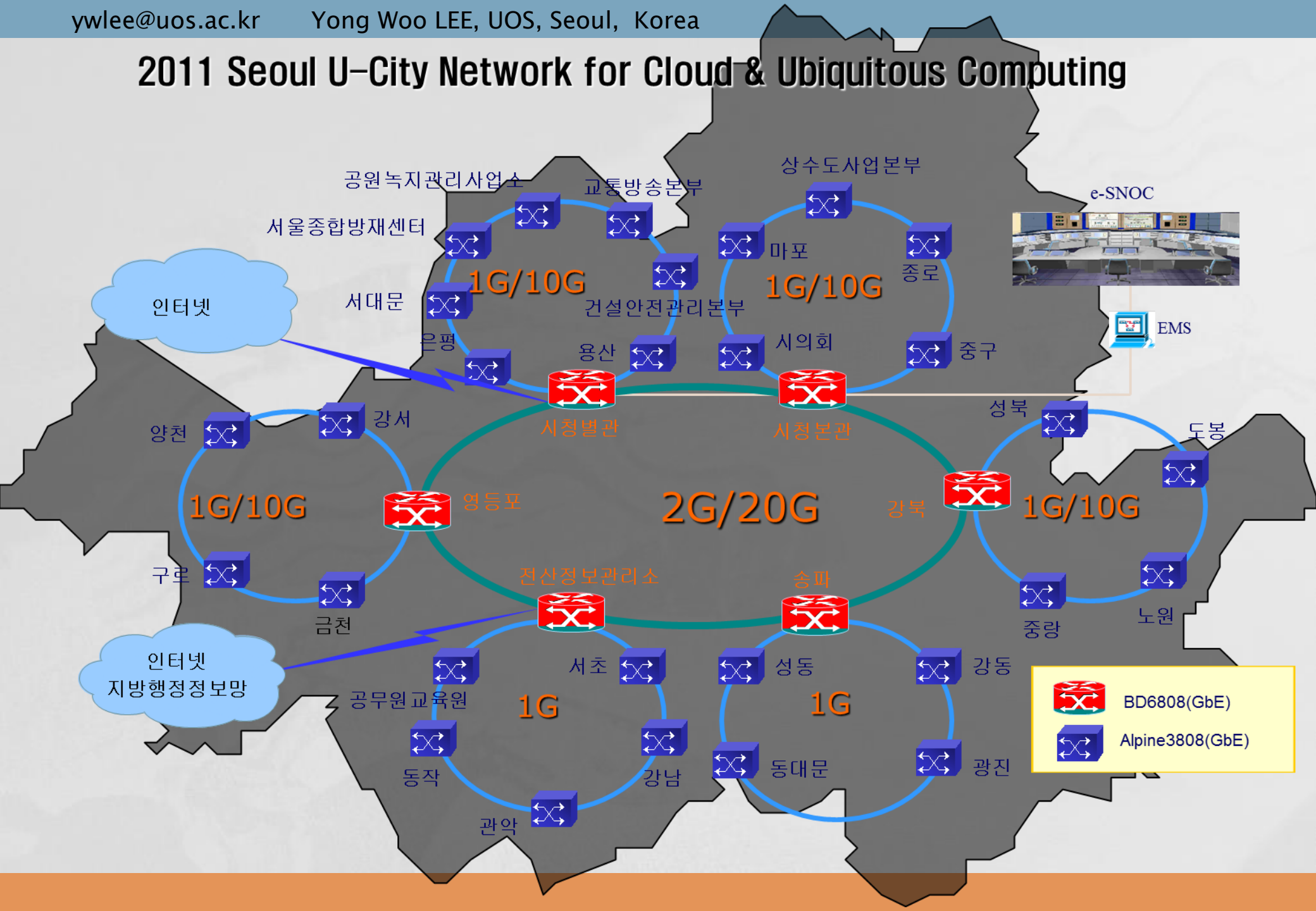
2011 Seoul U-City Network for Cloud & Ubiquitous Computing



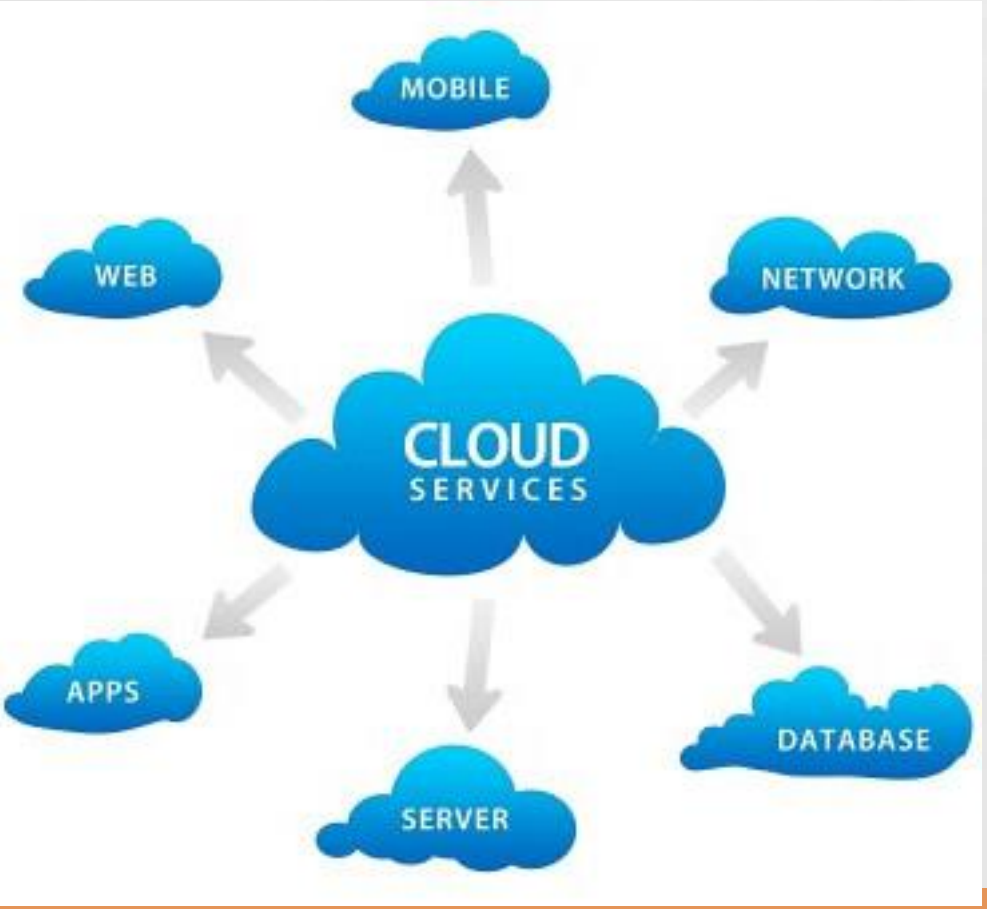
The Concept of the Smart-City based on the ubiquitous city..

Smart-Cities

- Cloud computing
  - Big data management.
  - Unlimited computing power provided flexibly.
  - Flexible Software sharing.
  - Cooperation.
  - Seamless system integration

Cloud Computing

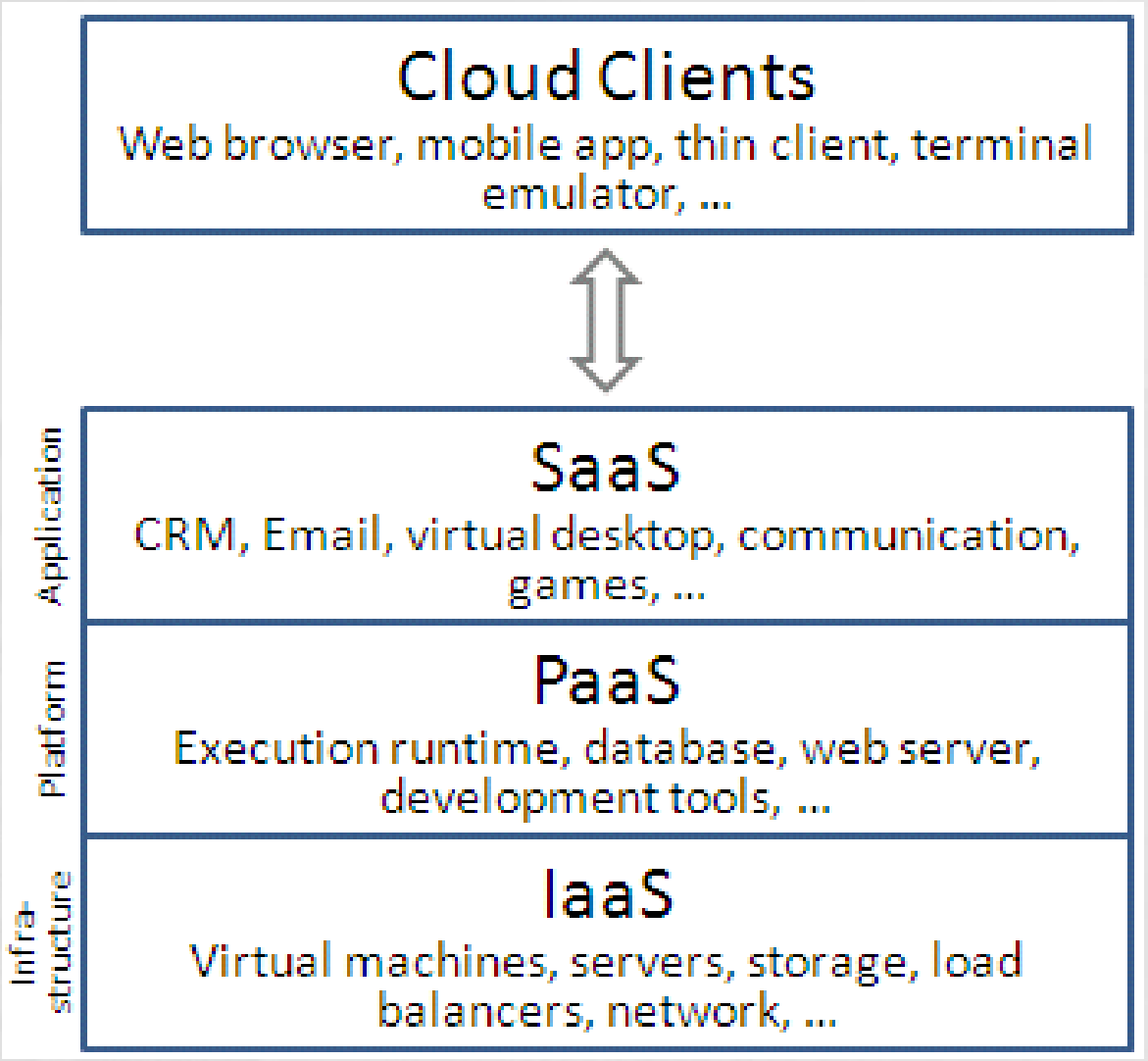
- Essential for smart devices in IoT/IoE and smart-cities.



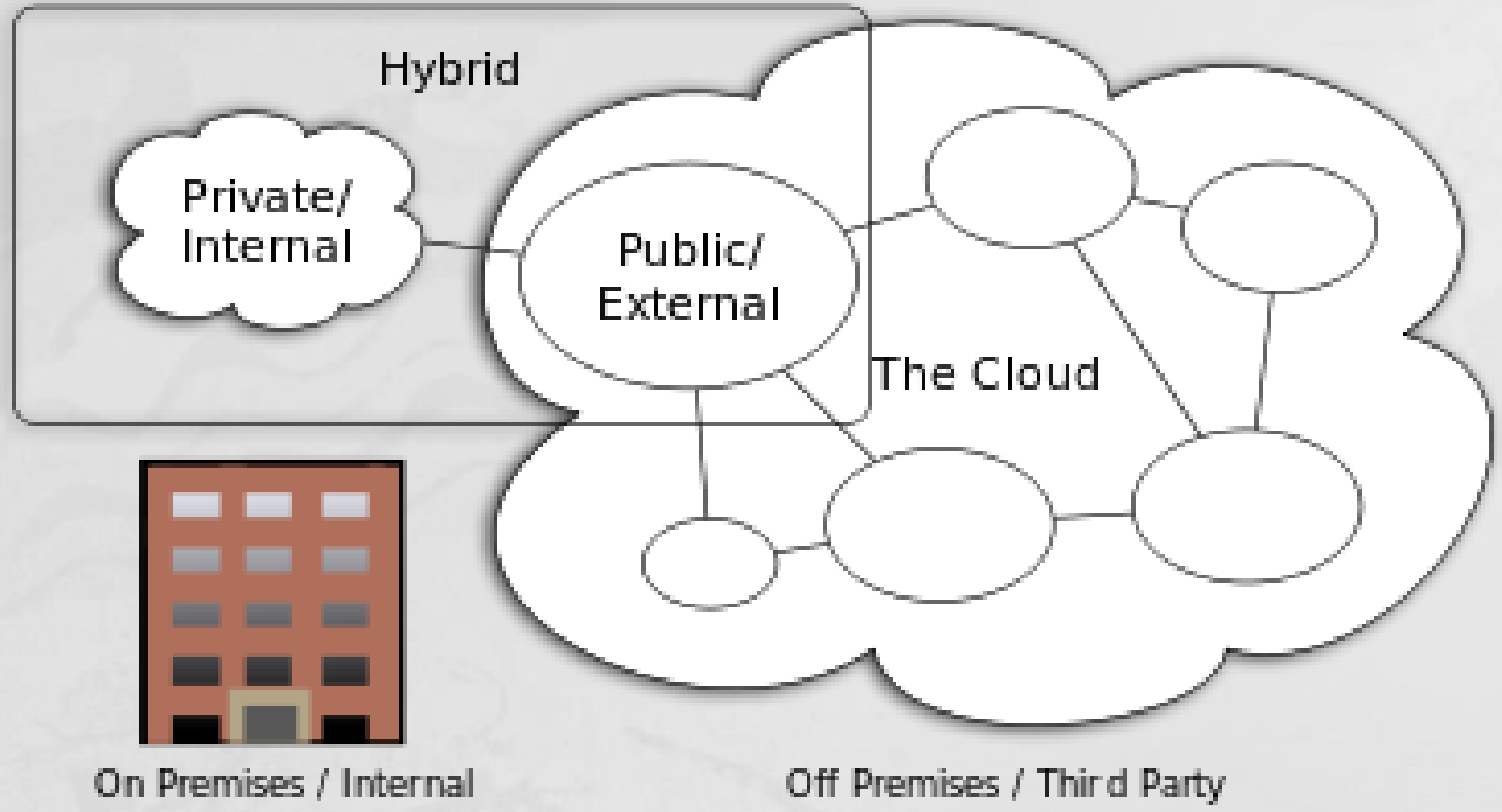
Cloud Computing

- The smart city really needs cloud computing as one of the basic components.
- Cloud computing can show it usefulness in the smart city.

Cloud Computing



Cloud Computing



Cloud Computing Types

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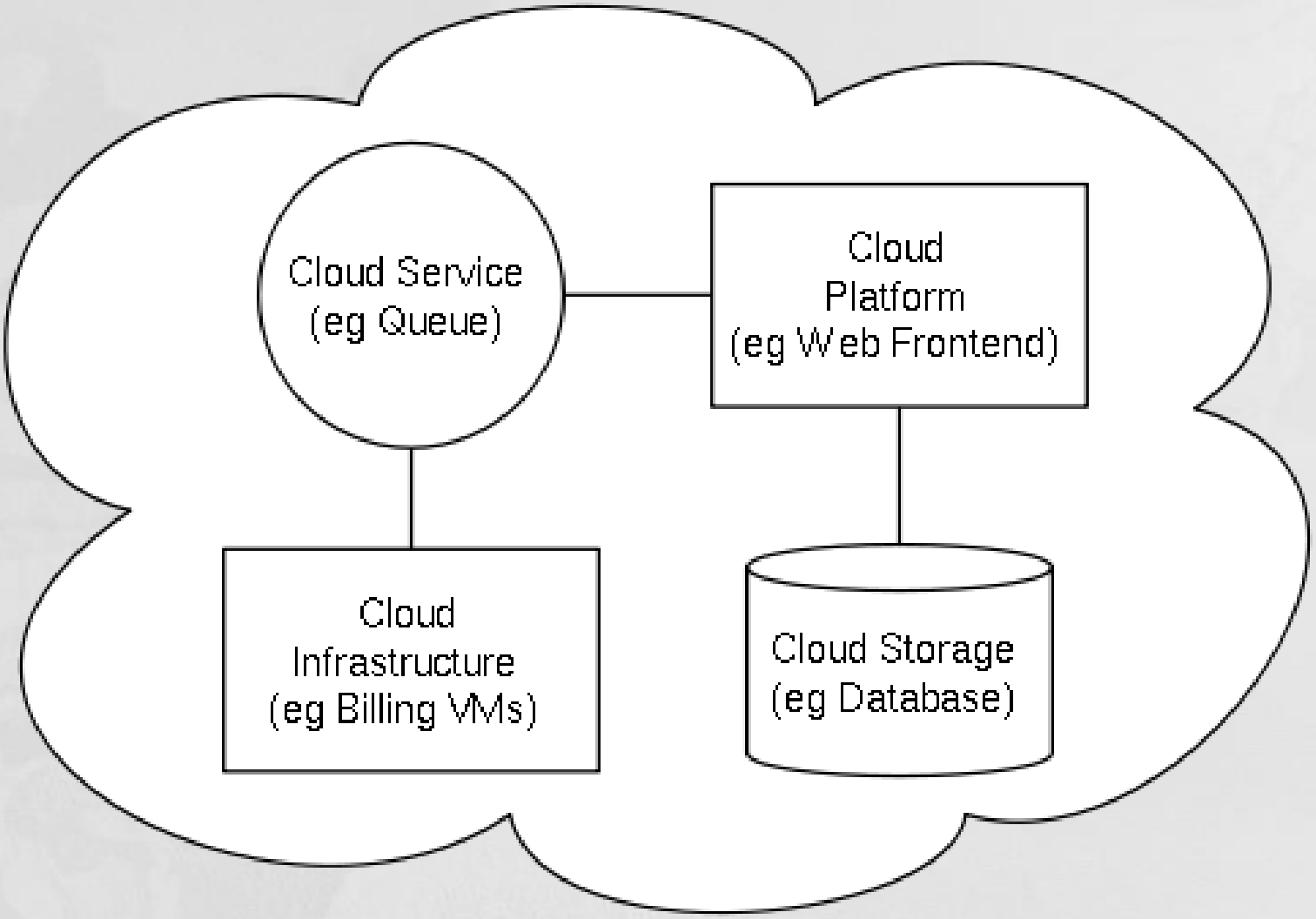
Cloud Computing



Who works for cloud standards?

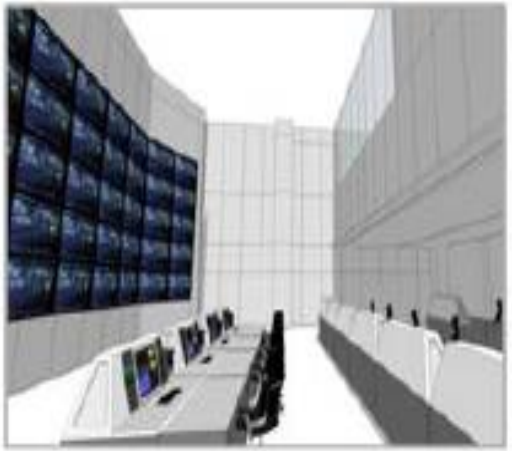
The Smart City & Internet of Things & E-government & Mobile computing & Cloud Computing

- Requires limitless computing power : IaaS.
- Various software in mobile devices : SaaS.
- Smart city deals with huge volumes of data usually and a wide range of data in real time mode usually.
- Human beings are a factor.

서울시 IT 콤플렉스

The Seoul IT Complex to manage Cloud Computing & Ubiquitous Computing

Seoul IT Complex
to manage Cloud Computing & Ubiquitous Computi



Thanks you!