Cloud Computing and Beyond for Smart Cities

Keynote Speaking

Presented by Yong Woo LEE, Ph.D.
Professor, Univ. of Seoul, Korea
The President of The Smart City Consortium
Chairman, Seoul Grid Center
Chairman, Korea National Standard Committee for ISO JTC1/ SC22
Chairman, The World Linux Standard Group, ISO

May 6, 2019
The Cloud Computing 2019, Venice, Italy

Smart City

Chyoung-Kye-Chun smart-town, Seoul, Korea.

◈ **Smart-city is a future city that melts information and communication technology (ICT) into a city.**

◈ **It provides intelligent services, that is, smart services, and allows the users to use the smart-city services anytime, anywhere and with any accessing devices (3A).**

Smart City

◈ **There was a very significant conference for the smart-city in European Union Parliament in May 2013**

◈ **Thereafter, EU launched a big and very significant smart-city project for European Countries, China, Taiwan, Middle East nations and India launched their smart-city projects as well.**

◈ **It is anticipated that they produce good results of the projects in near future.**

Pre-cloud computing for smart cities

* Distributed Parallel Computing

* Grid Computing: Open Grid Forum (Grid Forum Korea)

* E-Science

Ubiquitous & Smart Cities in Korea
2000 - 2010

Many services based on cloud computing.
It had been preached that ubiquitous cities and smart cities can be a very very important big market for Cloud computing.

Cloud Computing Conferences

◈ Establishing IEEE conference on cloud computing in 2009.

The Technical Committee on Services Computing
(TC-SVC) of IEEE Computer Society *Sponsors*

Cloud Computing

2009 IEEE International Conference on Cloud Computing (CLOUD 2009)

http://tab.computer.org/tcsc and http://thecloudcomputing.org

CALL FOR PARTICIPATION

C L O U D   2 0 0 9   P A R T   1

Co-located with IEEE ICWS 2009
July 6-10, 2009, Los Angeles, CA, USA

ICWS Web Services

**KEYNOTES
TUTORIALS
PANELS
RESEARCH
PAPERS
INDUSTRY
PAPERS
SUMMER
SCHOOL ON
SERVICES
COMPUTING**

CLOUD 2009 is the identified hot-topic conference by the 2009 World Congress on Services (SERVICES 2009). Part 1 of CLOUD 2009 will be co-located with **the 2009 IEEE International Conference on Web Services** (ICWS 2009, http://www.icws.org) on July 6-10, 2009, Los Angeles, California, USA. Part 2 of CLOUD will be co-located with **the 2009 IEEE International Conference on Services Computing** (SCC 2009, http://conferences.computer.org/scc/2009) on September 21-25, 2009, Bangalore, India.

Cloud Computing has become a scalable services delivery platform in the field of Services

Joint SERVICES-II, SCC 2009, and CLOUD-II 2009 Panels

Panel 1:
SaaS: The Second Decade (Congress2009-1004)
17:40-19:00, 9/23/2009, Wednesday, Palm and Olive

Moderator: Ephraim Feig, Innovations to Markets, Inc., USA
Panelists:
Sridhar Iyengar, IBM T.J. Watson Research Centre, USA
Yong-woo LEE, University of Seoul, Korea
J. Leon Zhao, City University of Hong Kong, Hong Kong

Abstract:

The first decade of SaaS saw some notable successes and many more failures. What can we learn from the first decade that will help make SaaS more successful in the second decade? Will Cloud Computing be a driver for SaaS? Who are the new players, and what can we expect from the usual contenders? Are there new technological advances that give SaaS added advantage? Have the economic and business conditions changed so as to give SaaS a boost?

About the moderator:

Dr. Ephraim Feig is President of Innovations-to-Market. He was a Senior Director of Motorola (2006-2009) and Chief Technology Officer and Chief Marketing Officer of Kintera, Inc. (2000-2006) and a researcher and R&D manager at IBM (1980-2000). He was elected IEEE Fellow for contributions to signal processing, holds 27 US patents, and has published more than 100 technical articles. Dr. Feig has served as an adjunct professor at several universities, including Columbia University, The City College of New York and New York Polytechnic Institute. He is a founding member of the IEEE Computer Society Technical Committee on Services Computing and this year's Program Chair of IEEE SCC. He serves on advisory boards at CUNY, UCSD and USD, and is on the board of directors of the San Diego Symphony Orchestra.

IEEE 2009 International Conference on Cloud Computing (CLOUD-II 2009), September 21-25, 2009, Bangalore, India

Cloud Computing

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About CLOUD-II 2009

Navigation in Cloud

NEWS: IEEE ICWS 2010, SCC 2010, SERVICES 2010, and CLOUD 2010 will be co-located in Maimi, Florida, USA, July 5-10, 2010.

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Panels

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ICWS 2009

SCC 2009

SERVICES 2009

Download A Full-Page Color CLOUD 2009 Poster (published in July 2009 Issue of the Communications of ACM and IEEE Computer magazine).

"**Changes we can lead**" is the theme of CLOUD 2009.

CLOUD 2009 is the identified hot-topic conference by the 2009 World Congress on Services (SERVICES 2009). The two well-established theme conferences identified by SERVICES 2009 are the 2009 IEEE International Conference on Web Services (ICWS 2009) in July 2009 in USA and the 2009 IEEE International Conference on Services Computing (SCC 2009) in September 2009 in India.

Cloud Computing has become a scalable services delivery platform in the field of Services Computing. The technical foundations of Cloud Computing include Service-Oriented Architecture (SOA) and Virtualizations of hardware and software. The goal of Cloud Computing is to share resources among the cloud service consumers, cloud partners, and cloud vendors in the cloud value chain. The resource sharing at various levels results in various cloud offerings such as infrastructure cloud (e.g. hardware, IT infrastructure management), software cloud (e.g. SaaS focusing on middleware as a service, or traditional CRM as a service), application cloud (e.g. Application as a Service, UML modeling tools as a service, social network as a service), and business cloud (e.g. business process as a service).

In the fast growing Services Computing community, we have launched a series of events to promote and

Sponsors

IEEE

인터넷 | 보호 모드: 해제   100%

About the panelists:

Sridhar Iyengar, an IBM Distinguished Engineer, leads the technical strategy for Software Tools & Methods at the IBM T.J. Watson Research Centre. Sridhar is also a member of the IBM Software Group Architecture Board Steering Committee helping drive software tools direction across IBM. His work focuses on the use of models, metadata and architectural frameworks that can be used to create an integrated software tools platform that makes it easy for systems integrators (specifically IBM's GBS) and customers to develop, optimize and deliver custom and packaged applications across the life cycle starting with Business Architecture thru BPM and Software design and implementation. Sridhar serves on the OMG Board of Directors and is working on the development and integration of Architecture, Business and IT Modeling standards.

Yong-woo LEE has been a professor at the school of ECE, the University of Seoul, Korea since 1999. He received his Ph.D. degree in Computer Science from the Dept. of Computer Science at the University of Edinburgh, UK. Before joining the University of Seoul, he was a senior research scientist at KIST (Korea Institute of Science and Technology) under the Ministry of Science and Technology, Korea, during 1982-1998. He also worked as a principal researcher at KERIS (Korea Education and Research Information Service) under the Ministry of Education, Korea, during 1998-1999 and as an international engineer at Schlumberger Technical Services Inc. during 1981. Currently he is the president of the Korean National Standard Committee for ISO JTC1/SC22, supported by the Ministry of Industry and Resource, Korea. He is also the chairman of the Academic Activity Board of Directors at KSII (Korean Society of Internet Information). He has been the member of Board of Chairs for Grid computing in Korea since 2002. He served many international conferences as the general chair. As the president of the Ubiquitous (Smart) City Consortium, he has been leading the five million U-city project funded and operated by Seoul Metropolitan Government of Korea, since 2005 and receive the Korea Best Award, from the "Korea Herald" Newspaper in 2007. His current research interests include ubiquitous computing, cloud computing, grid computing, ubiquitous-city middleware, utilities and applications and high speed Internet and applications.

J. Leon Zhao is Head and Chair Professor in Information Systems, City University of Hong Kong. He was Eller Professor in the Department of Management Information Systems, University of Arizona before January 2009. He also taught previously at HKUST and College of William and Mary, respectively. He holds Ph.D. and M.S. degrees from the Haas School of Business, UC Berkeley, M.S. degree from UC Davis, and B.S. degree from Beijing Institute of Agricultural Mechanization. His research is on information technology and management, with a particular focus on workflow technology and applications in knowledge distribution, e-learning, supply chain management, organizational performance management, and services computing. Leon's research has been supported by NSF, SAP, and other sponsors. He received an IBM Faculty Award in 2005 for his work in business process management and services computing. Leon has been associate editor of Information Systems Research, IEEE Transactions on Services Computing, Decision Support Systems, Electronic Commerce Research and Applications, International Journal of Business Process Integration and Management, International Journal of Web and Grid Services, and International Journal of Web Services Research and is on the editorial board of Journal of Database Management. He has co-edited nine special issues in various IS journals. Leon has been chair or program chair for numerous conferences. He has also served on many program committees in international conferences.

Cloud Computing Conferences

◆ Establishing (European) Cloud computing conference (IARIA) in 2010.

Now Tenth anniversary!

The First International Conference on Cloud Computing, GRIDs, and Virtualization

CLOUD COMPUTING 2010
November 21-26, 2010 - Lisbon, Portugal

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Eearly Generation

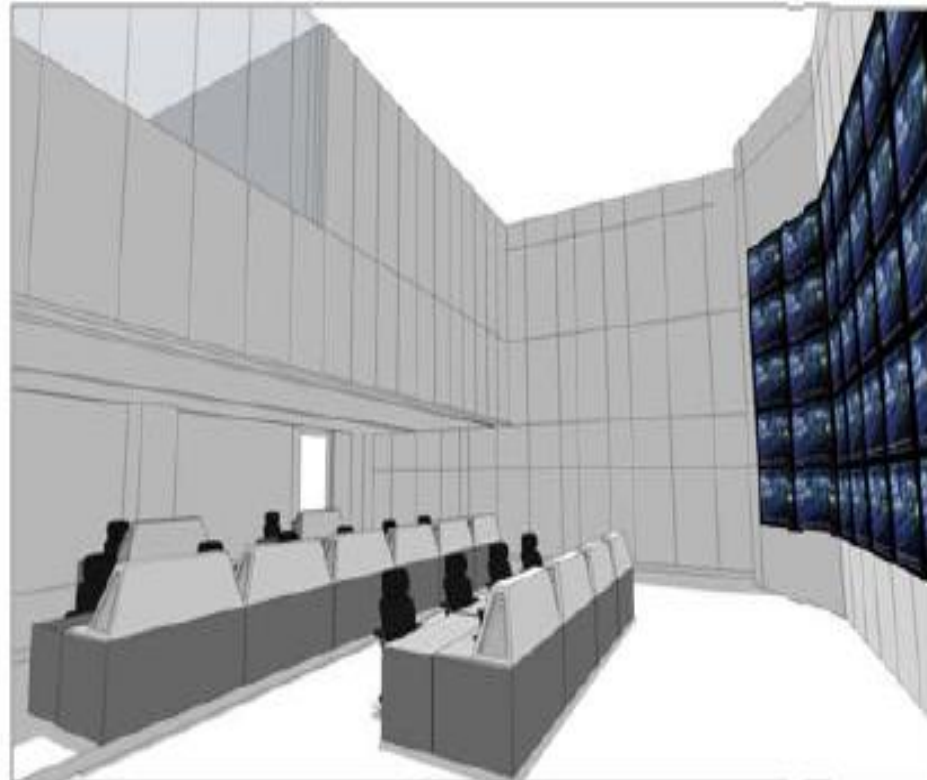◈ Cloud computing to manage big data of smart cities.

Public data

서울시 IT 콤플렉스

Seoul ICT Complex for Cloud Computing

세계도시 서울의 IT 미래

Seoul ICT Complex for Cloud Computing
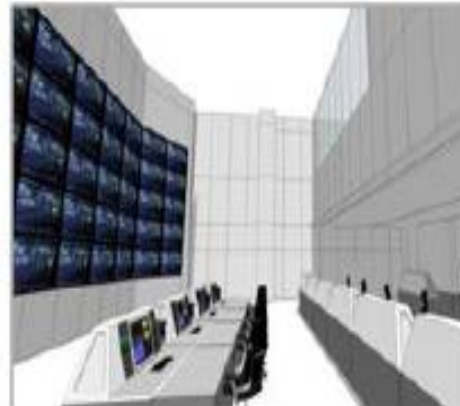
1. Government Integrated Data Center

Information systems of government agencies integrated and managed together
- **Separately managed information systems are consolidated by establishing NCIA**

Seamless & Flawless Operation Achieved

- Stable integrated IT management for 24 / 7
- Monthly system failure time : 67min ▶ 1.15min

IT Management Improved

- 67% of employees licensed for ITIL (IT Infra. Lib.)
- Number of systems managed per person : 1.8 ▶ 13

Security Environment Consolidated

- 8-layer protection / 4-step analysis against intrusion
- Cyber attack / intrusion detection system equipped
- Dual system for natural disaster relief

※ NCIA: National Computing & Information Agency

2. Government Information Sharing

- **To minimize required documents and office visits by expanding Gov't information sharing to the entire public sector and financial institutions**
  - change from register & provider-centered, to customer-tailored Gov't info. Sharing
  - prevent misuse of critical information and promote Gov't info. sharing among agencies
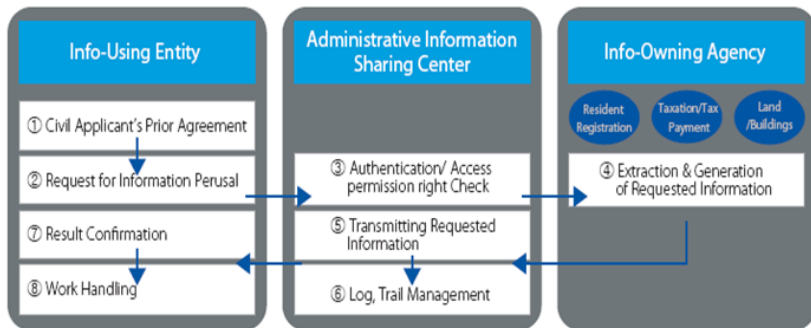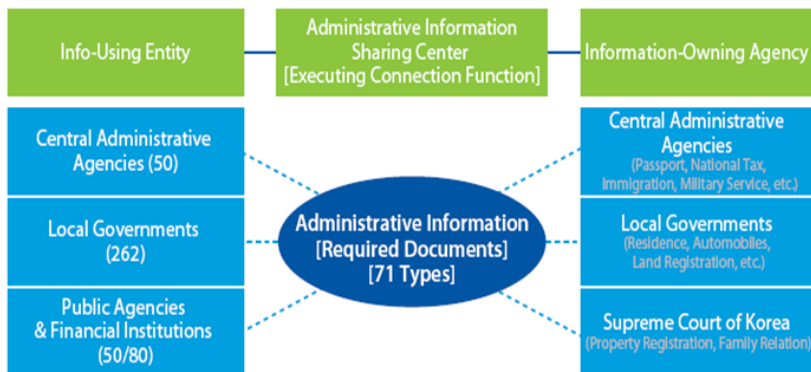
Expansion of Gov't info. sharing

- **Expanding types of information inquires.: 92 types → 120 types(2012)**
- **Expanding # of agencies: 415(2010) → 455(2012)**

  Number of agencies sharing information:
  - public: 313(administrative org.), 124(public org.)
  - private:) 18

Enhanced Transparency

- **Developing 'One Screen Service' to show only needed info.of citizens to public officials**
- **Developing Gov't info. relay system to improve the management of Gov't info. relay service**

The evolution of Government

|	Government 1.0	Government 2.0	Government 3.0
Operation	Government-oriented	Citizen-oriented	Individual-oriented
Core Value	Efficiency	Democracy	Greater Democracy
Participation	Government initiated	Limited disclosure and participation	Active disclosure, participation
Administrative Service Delivery	One-way	Two-way	Proactive, Customized
Method(Channel)	Personal Visit	Internet	Mobile internet smart phone

Web 3.0 & Government 3.0

Source: Radar Networks & Nova Spivack, 2007 – www.radarnetworks.com
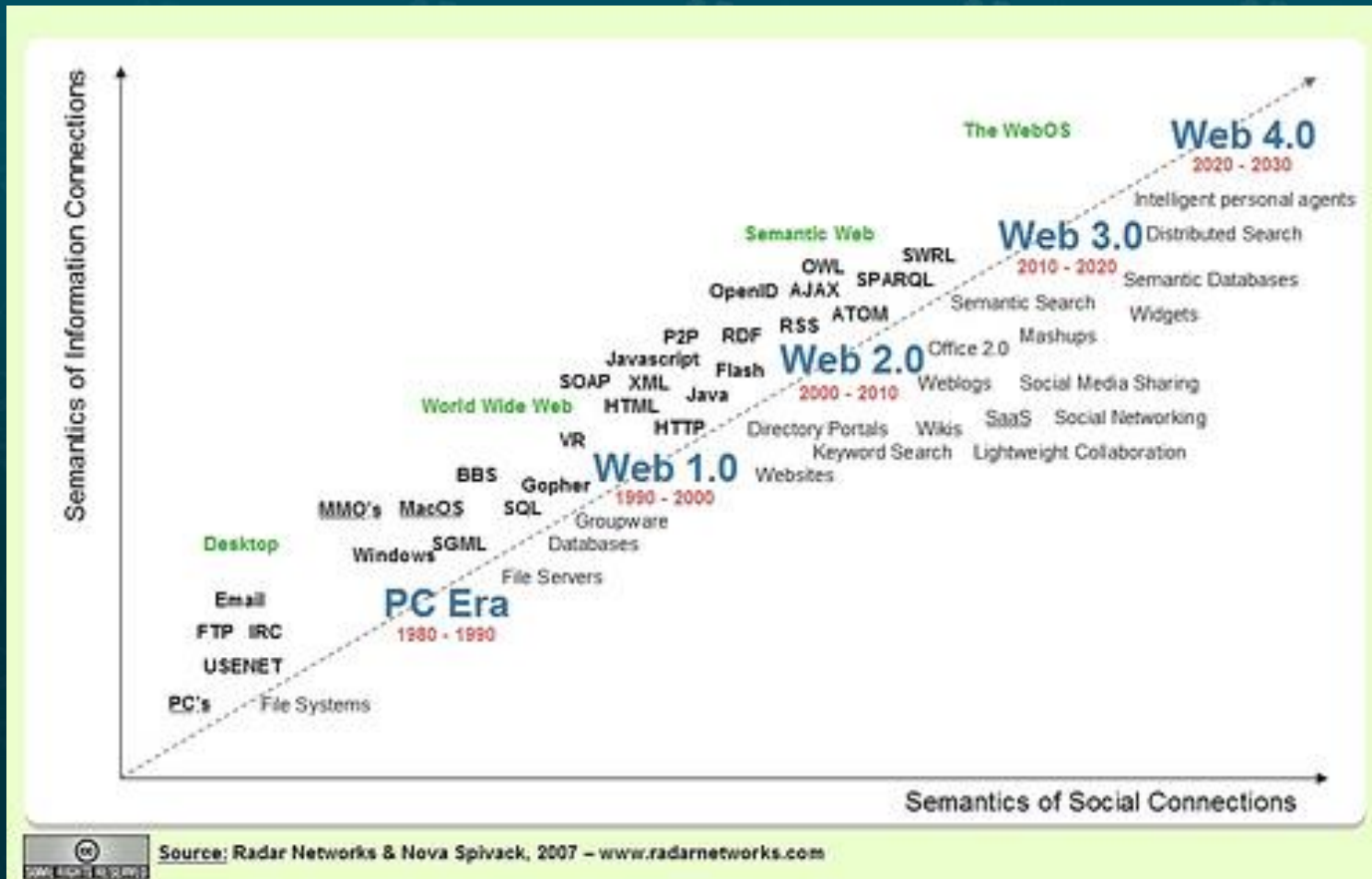
Current generation

◈ Cloud computing to provide intelligent services for smart cities.

◆ Stream Reasoning

Smart City
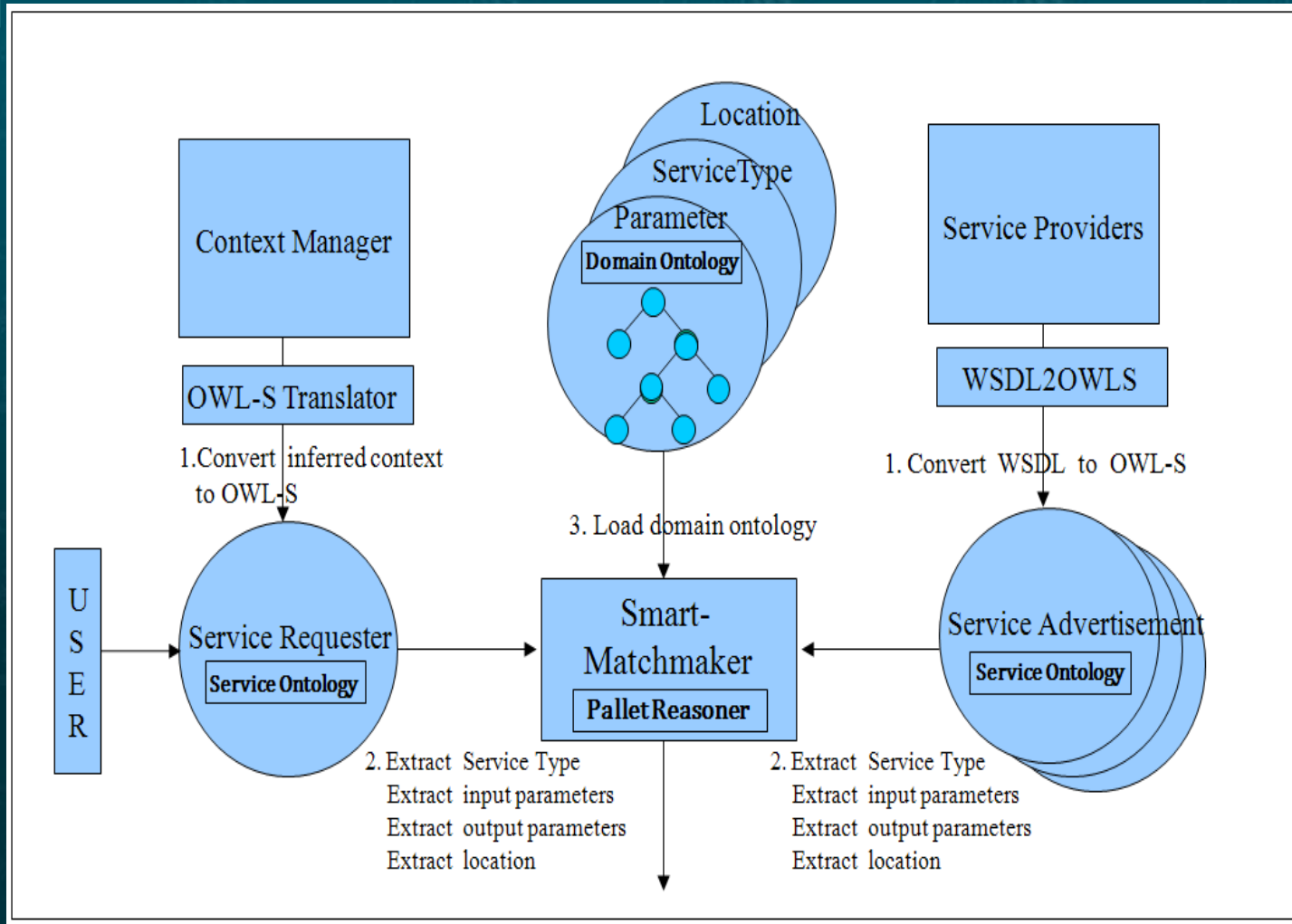

Seoul Metropolitan IT complex cloud computing data center.

- **Intelligence is one of the key factors to city management, such as infrastructure management, smart traffic management, smart ecological environment management, smart energy management, etc.**

- **The dramatic advances in information and communication technology I(ICT) enable a smart-city to solve challenging issues for sustainable urban development.**
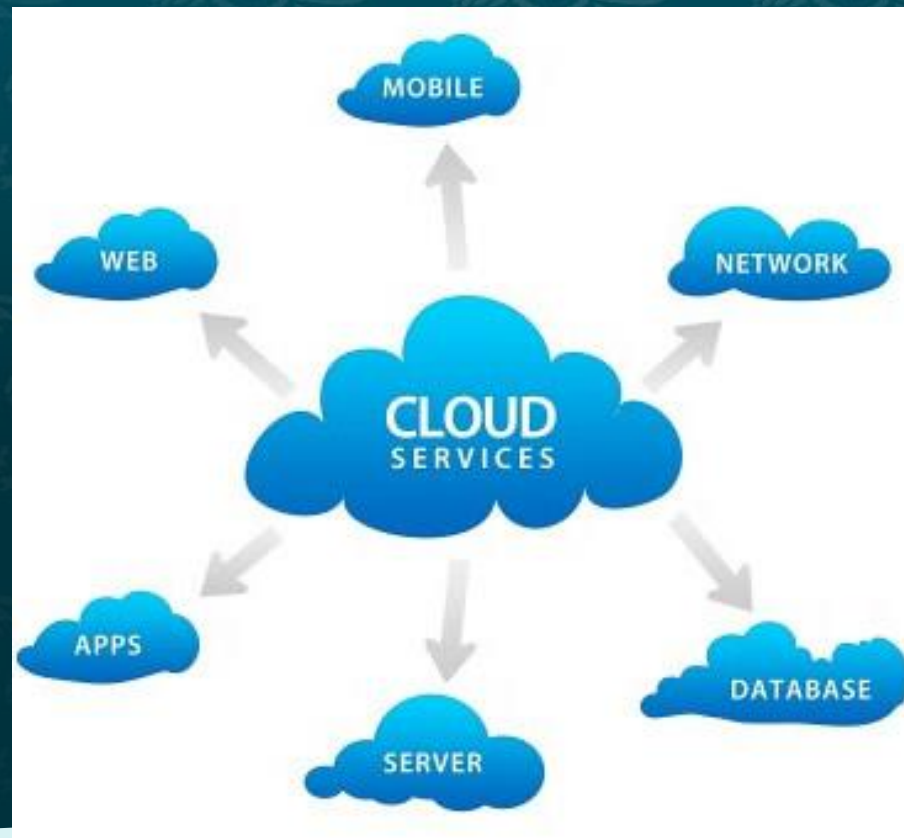
Context Based Processing

Collaboration Manager — Service Execution & Response — **Access Grid** / **Collaboration Provider**

Collaboration Discovery — **Collaboration Repository**

Resource Manager — Service Execution & Response — **Computational Grid / Cloud** / **Resource Provider**

Resource Discovery — **Resource Repository**

Service Manager — Service Execution & Response — **Web Service** / **Service Provider**

Call controller and return execution result

Service Discoverer (Smart-Matchmaker) — Service Discovery — **UDDI/OWL-S Service Repository** — publish

SmartUM Portal

Service request / Service response — **Service Broker**

10. Service request by inferred context information

Ubiquitous Core Computing Layer

Context-aware Computing Layer

Context Manager — Query context information / Return Context information

9. Send inferred context

Context Repository

8. Store inferred context

7. Rule-based inference — **Context Analyzer** — 6. Load rule file

Meta Data — Domain Ontology — Inferred Context

5. Send context instance

RFID — 1. Collect sensing data — **Context Converter** — 3. Load ontology model / 2. Store sensing data

Sensing data — Context history — Rule file

4. Convert context instance

Automatic Computing (Service Discovery & Execution).

Current generation

◈ Cloud computing to provide IoT devices with unlimited computing power and resources.

Cloud Computing

◈ Essential for smart devices in IoT/IoE.

Cisco & Beecham Research

The Internet of Things
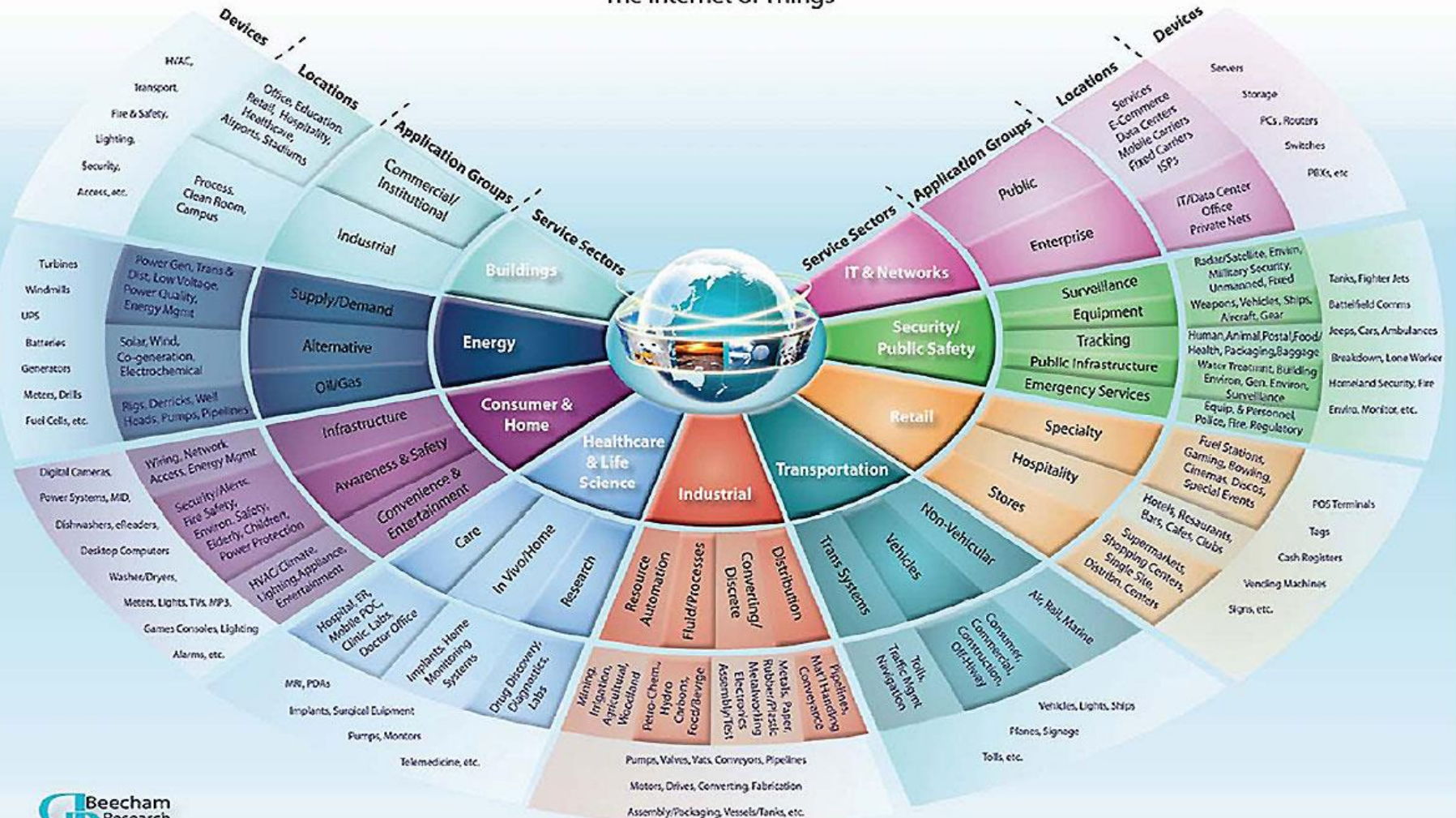
IoT
iStockphoto/chris_lemmens
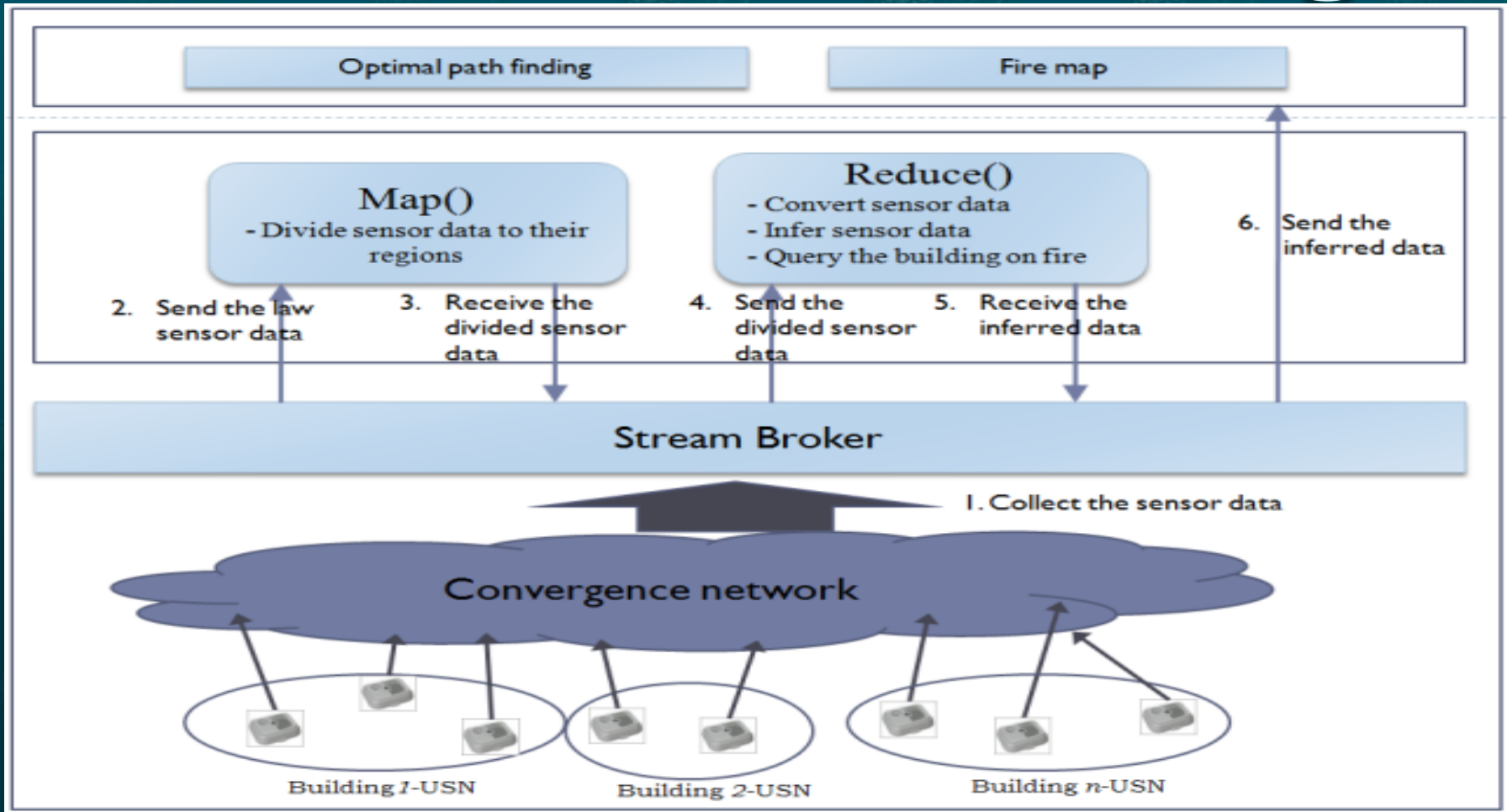
IoT : Intel

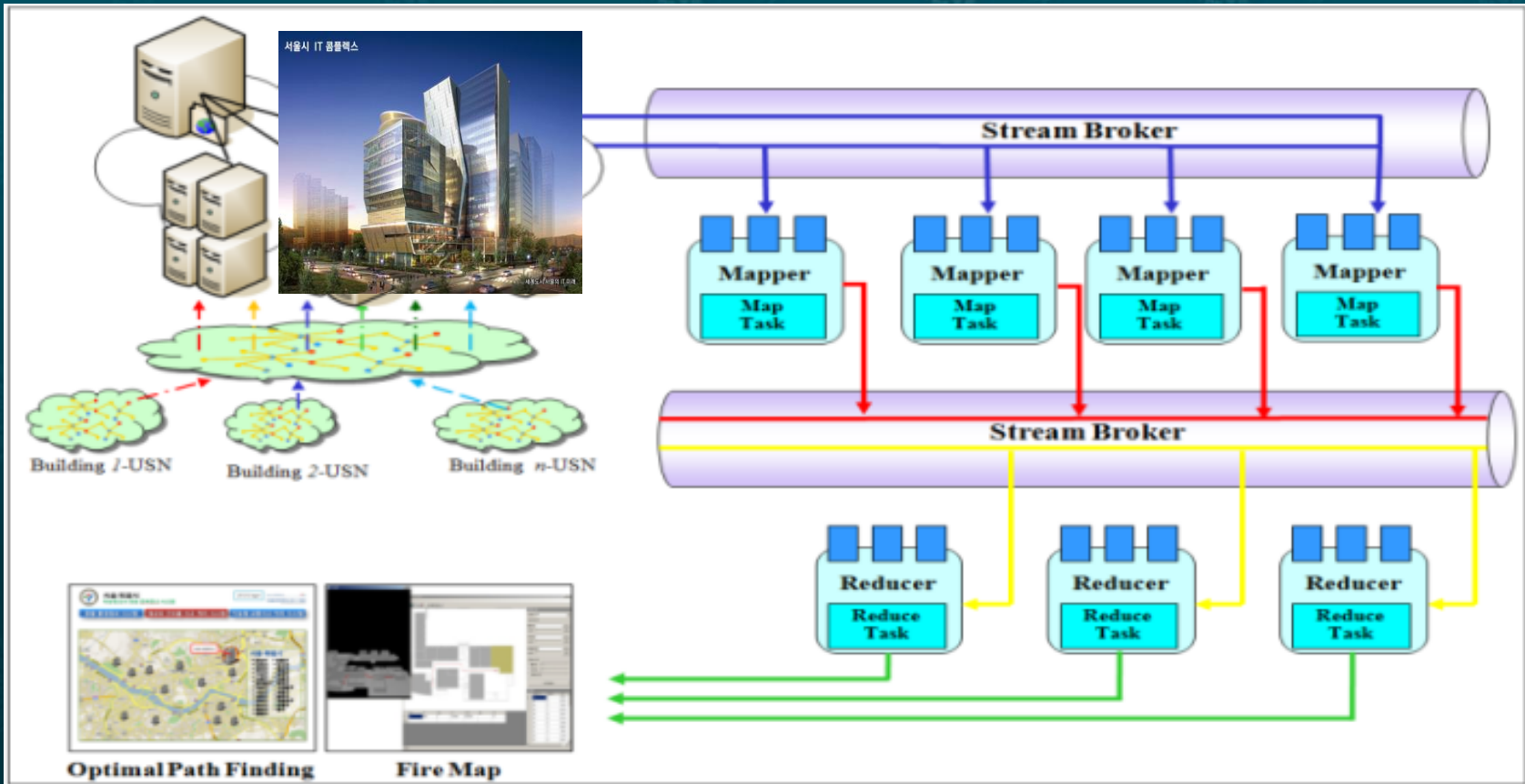# Current generation

◈ Real-time Cloud computing

Real-Time Processing

Real-Time Processing

Mobile computing

◆ 5th Generation : 50 Gigabps speed.

◆ Giga Korea.

◆ 2019 in Korea.

Next Generation

◈ Smart cities with the 4th industrial revolution based on cloud computing, big data processing, IoT, intelligent processing, real-time processing, 5G mobile communication, super-connection, convergence, etc.

Smart cities with the 4ᵗʰ industrial revolution.

Smart cities with the 4th industrial revolution.