# Cloud Computing for Smart Buildings

**for smart city, smart society and the 4th industrial revolution**

## Keynote Speaking

Yong Woo LEE, Ph.D.
Professor, University of Seoul
President, Smart Consortium for Seoul, Korea
Chair, Seoul Grid Center
Chair, The Korean National Committee for ISO JTC1/SC22

2018. 2. 21, Barcelona

# World Smart City – EU has Started.

**2013.5. Belgium, Brussel, EU Parliament Conference.**

**One Digital Europe (Digital Single Market) : Smart City**

**EU Policy Decision => From 2014, EU Smart City Project Started.**

Seoul R & BD Program

Smart(Ubiquitous) City Consortium

THE UNIVERSITY OF SEOUL

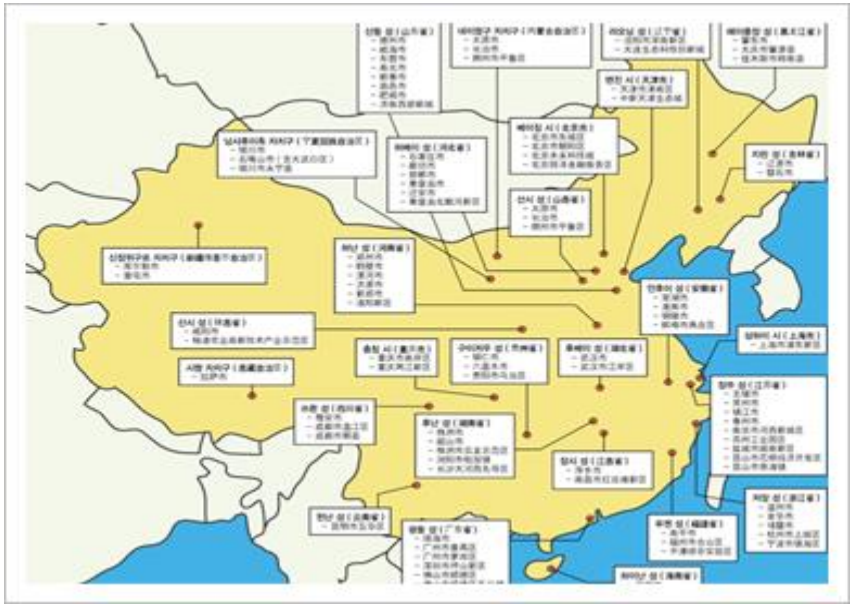
# World Smart City – EU has Started.

# World Smart City – EU has Started.

**Over 400 smart cities have been constructed.**

# World Smart Cities – Mainland China

- **People's Republic of China (PRC), Prime Minister** Lǐ Kèqíang
- **Ambition: 700 smart cities => Currently over 200.**



# World Smart City – Taiwan

**2015. 5. Taiwan Government**

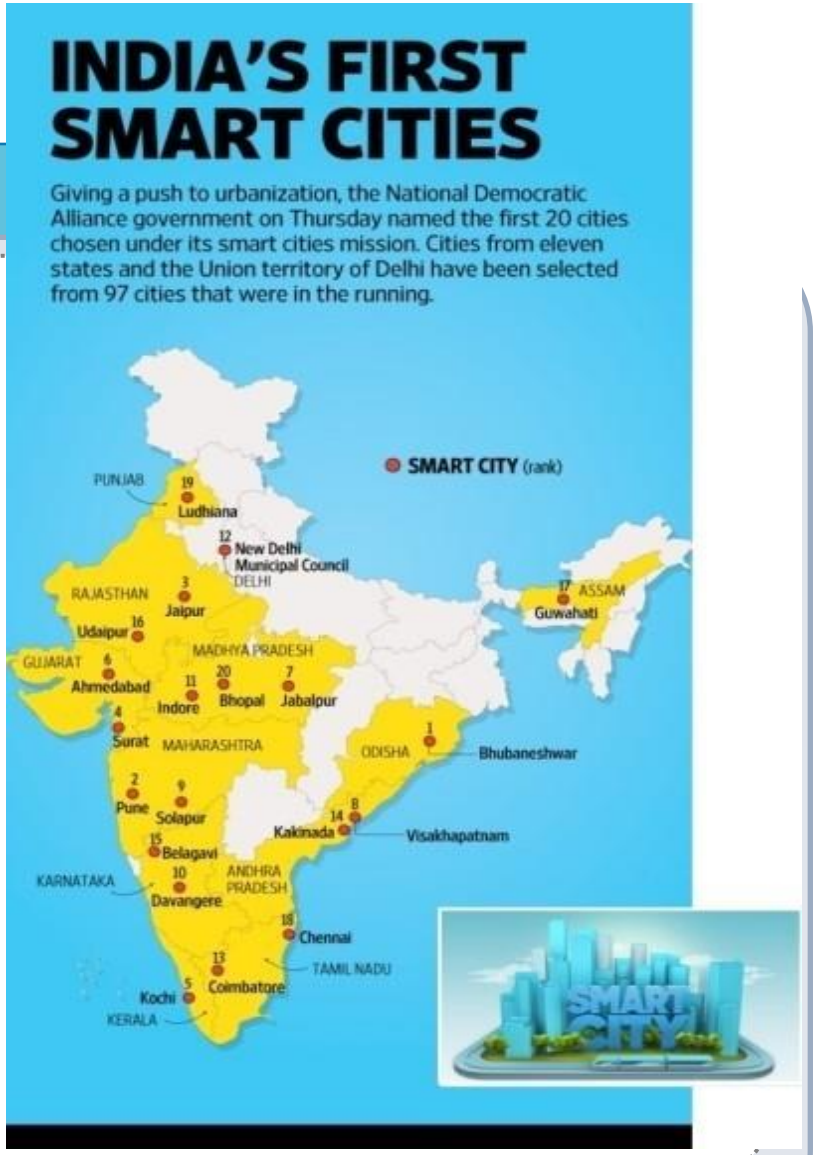
**Smart Territory: Smart Nation Construction Plan**

# World Smart City – Middle East Asia

**Dubai, Abu Dhabi, Doha, Riyadh. Manama, etc.**

# World Smart Cities – India

**Ambition : over 100 smart cities**



# World Smart City – Japan

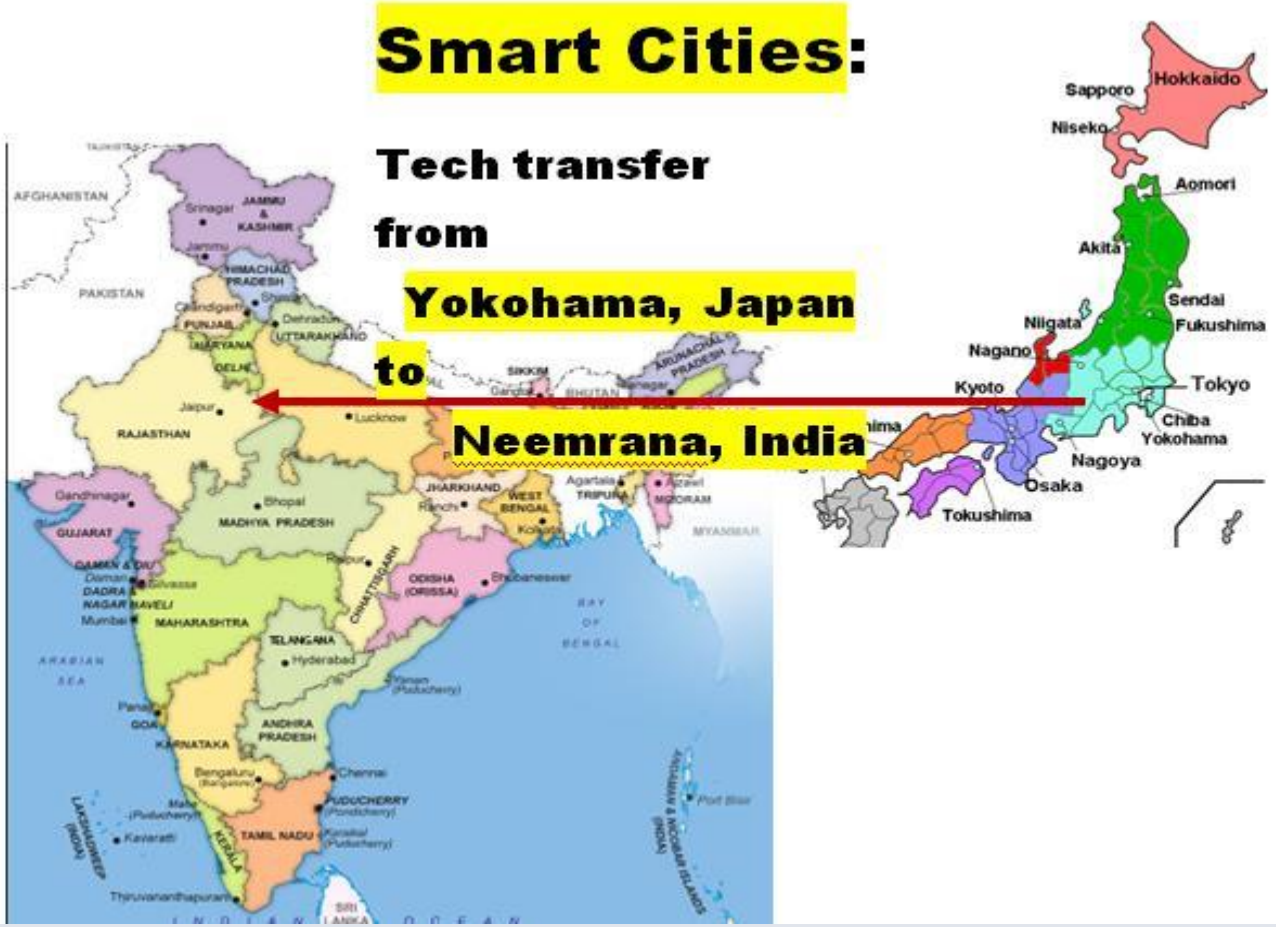
Kyoto

Tokyo

Osaka

Etc.

Limited



# World Smart City – South East Asia

## Indonesia

# World Smart City – South East Asia

## Vietnam

# ICT, IoT Demonstration Purpose

부산광역시
BUSAN METROPOLITAN CITY

SK telecom

# Smart Cities - Korea

## The Smart City Consortium

- The world first smart city project.
- Since Dec. 2005, formal funds from Seoul Metropolitan Governments.
- Academic organizations
  - University of Seoul, Korea University, Yeonsei University, etc.
- Companies : LG-CNS, SKT, ……
- Developed Intelligent Middleware which includes platform.
- Case usage development
- Consulted EU, Taiwan, ….
- Started many international conferences
  - IEEE Cloud Conference
  - IARIA Cloud Computing Conference

# Smart Cities in World Organizations

**ITU – 2016.8. Pusan Plenary Meeting : Vivid Discussion**

International Telecommunication Union

International Organization for Standardization

**ISO – Since 2013, active progressing**

**- Reports & Standards**

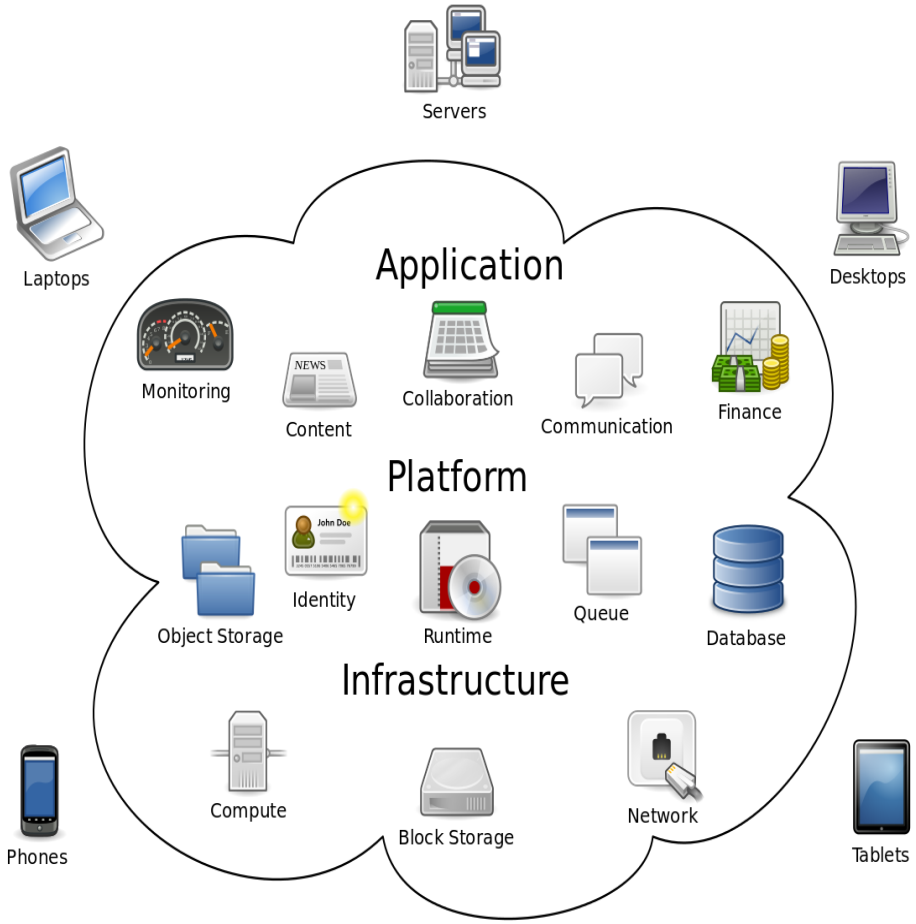
## Smart Cities include

**Smart Buildings**

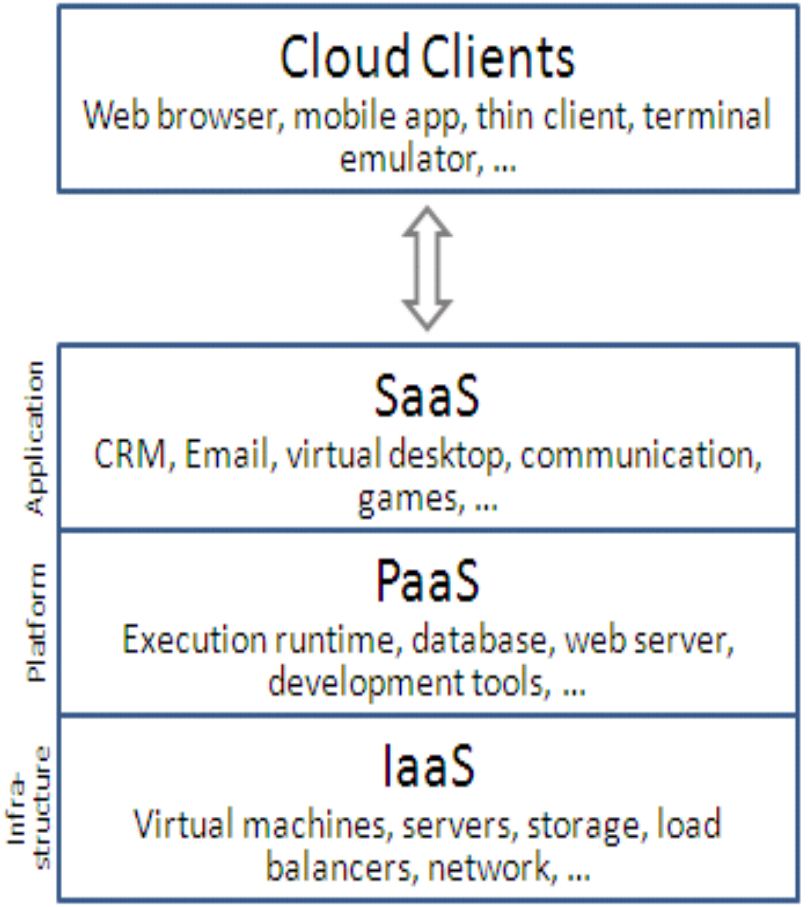
# Why cloud computing For smart building?

- You have to deal with big data.
  - In many cases, real-time processing is required
- No your own data center is required for the big data processing.
  - No data center management man-power required.
  - No data center place required.

# Cloud Computing?

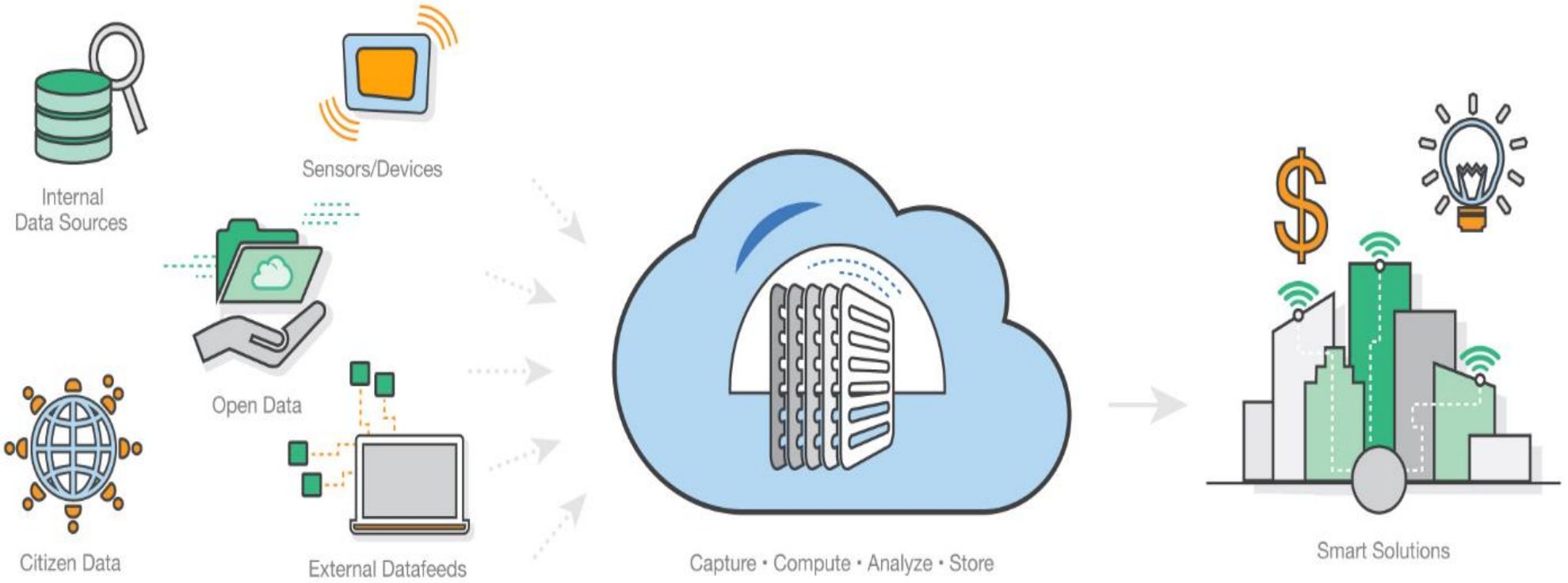



Cloud computing



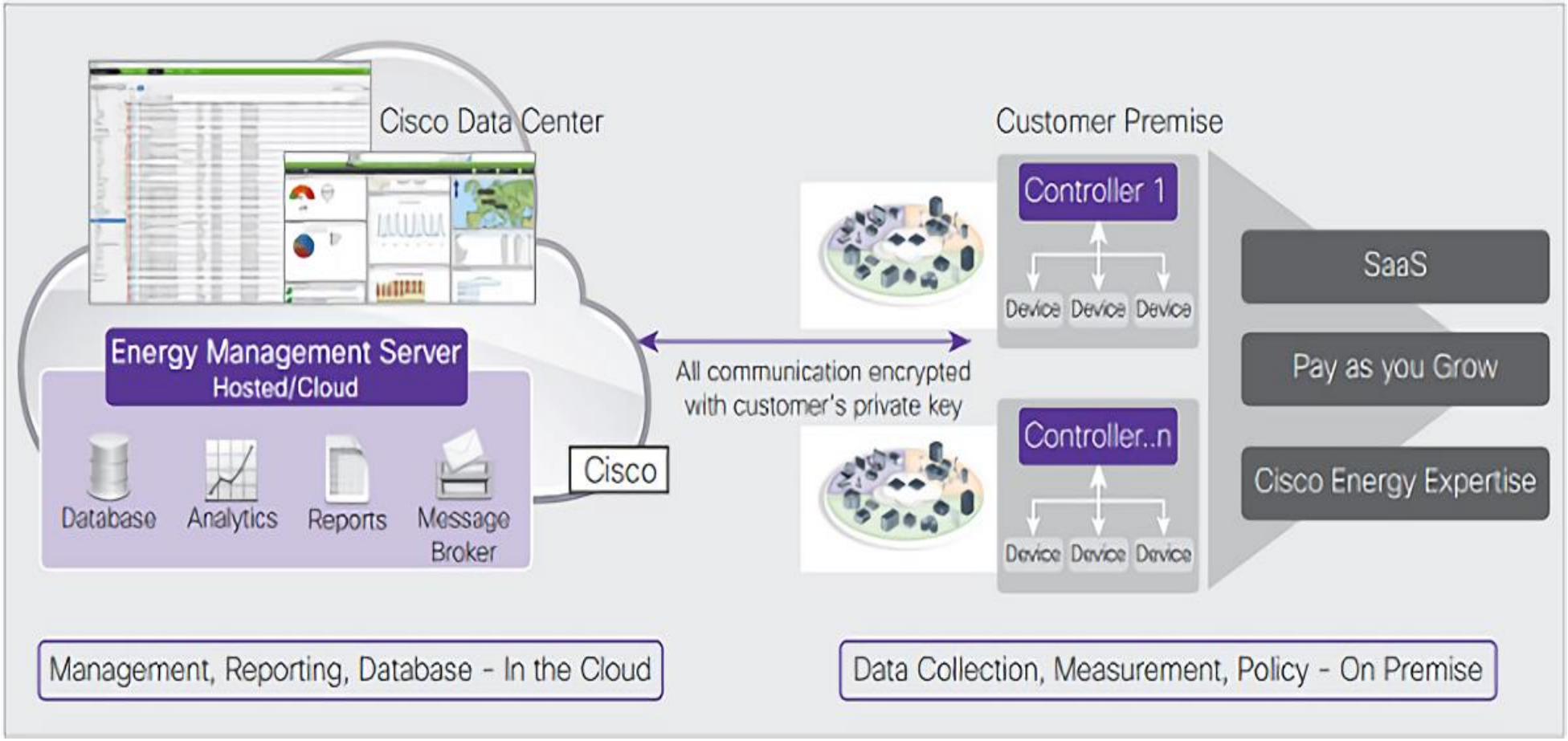

https://en.wikipedia.org/wiki/Cloud_computing

# Amazon aws smart city platform => smart building platform



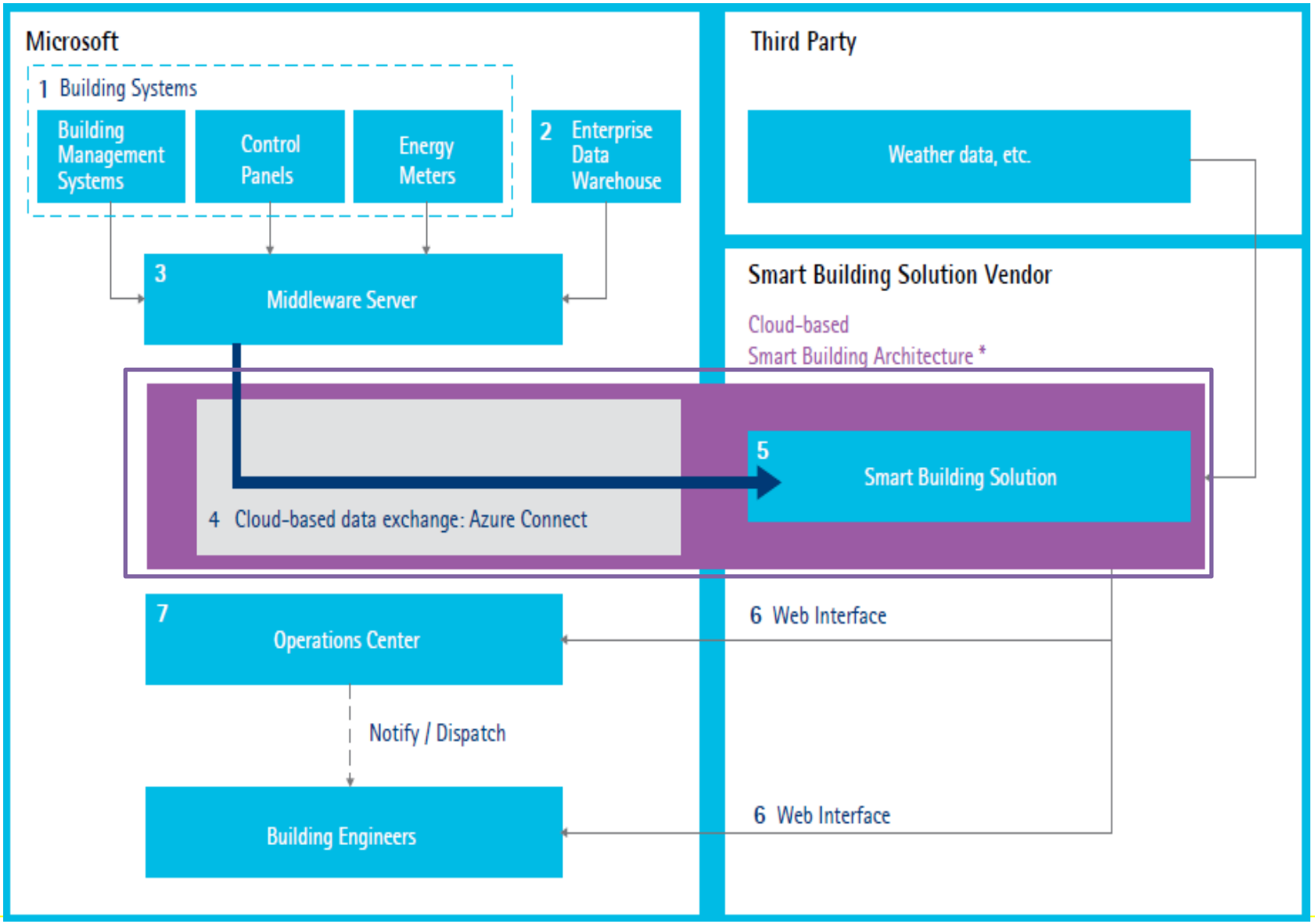

https://aws.amazon.com/ko/smart-cities/

# CISCO Energy Management Cloud



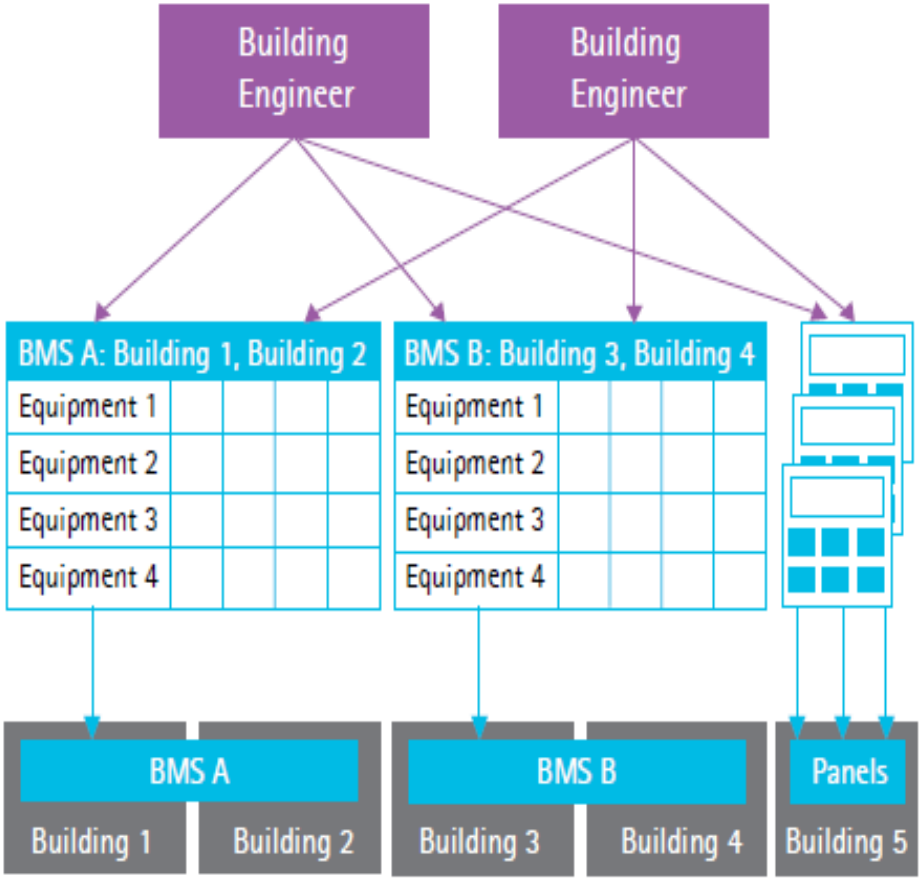

http://www.frontalcommunication.ro/index.php/ro/services-2/cisco-services/cisco-webEx-telepresence

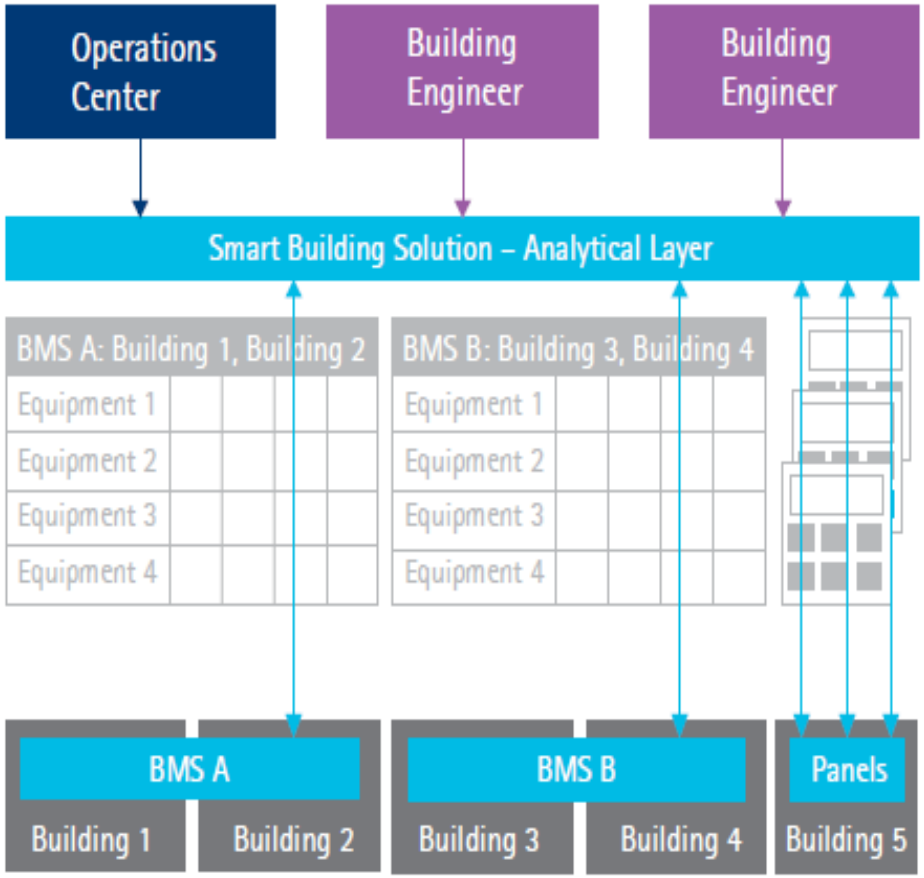
# MICROSOFT'S SMART BUILDING ARCHITECTURE




accenture, energy-smart-buildings-whitepaper, 2011

# Building management:
# traditional approach (left) vs. smart building approach (right)



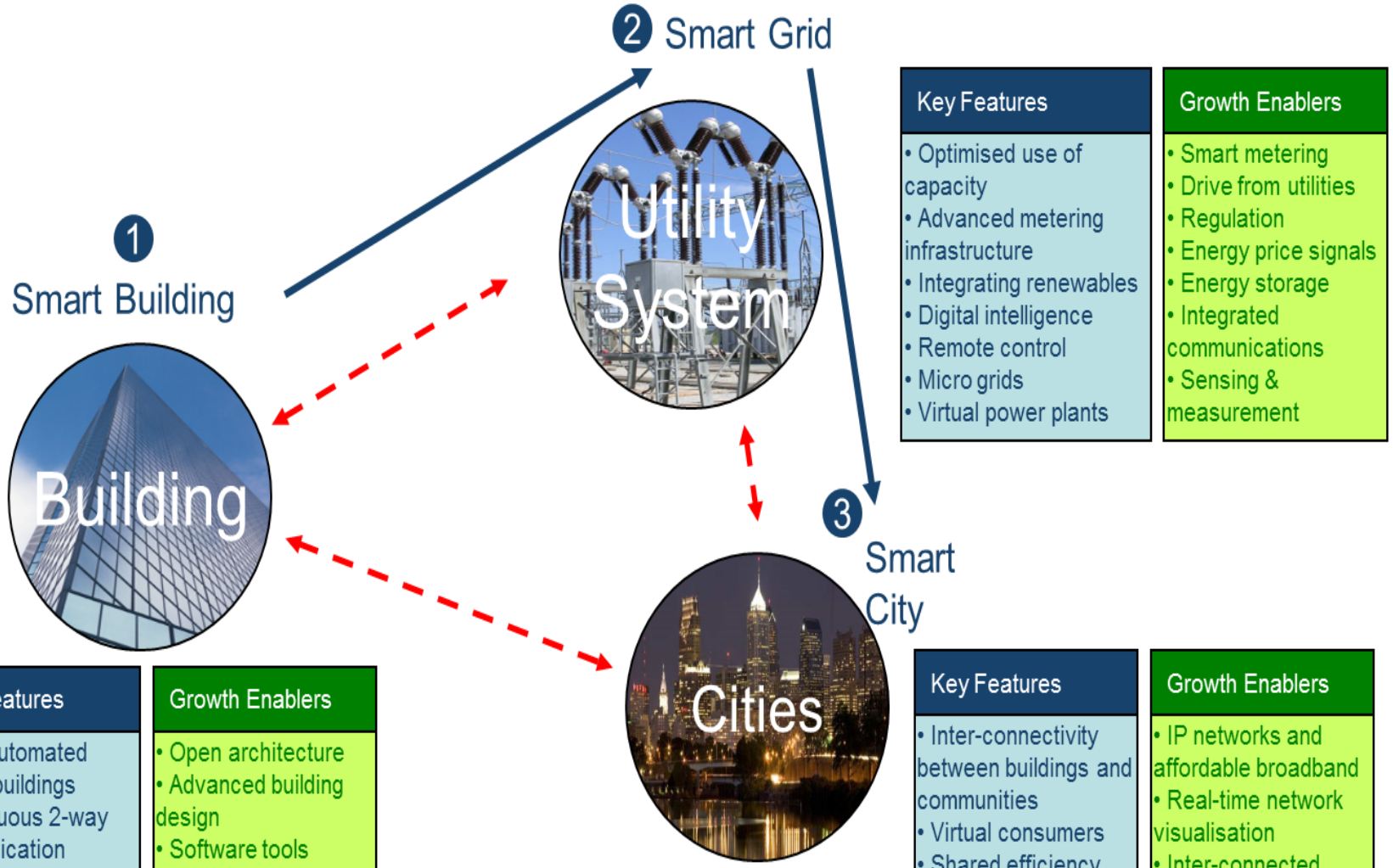




accenture, energy-smart-buildings-whitepaper, 2011

# BEMS + CLOUD COMPUTING

# BEMS + Virtualization

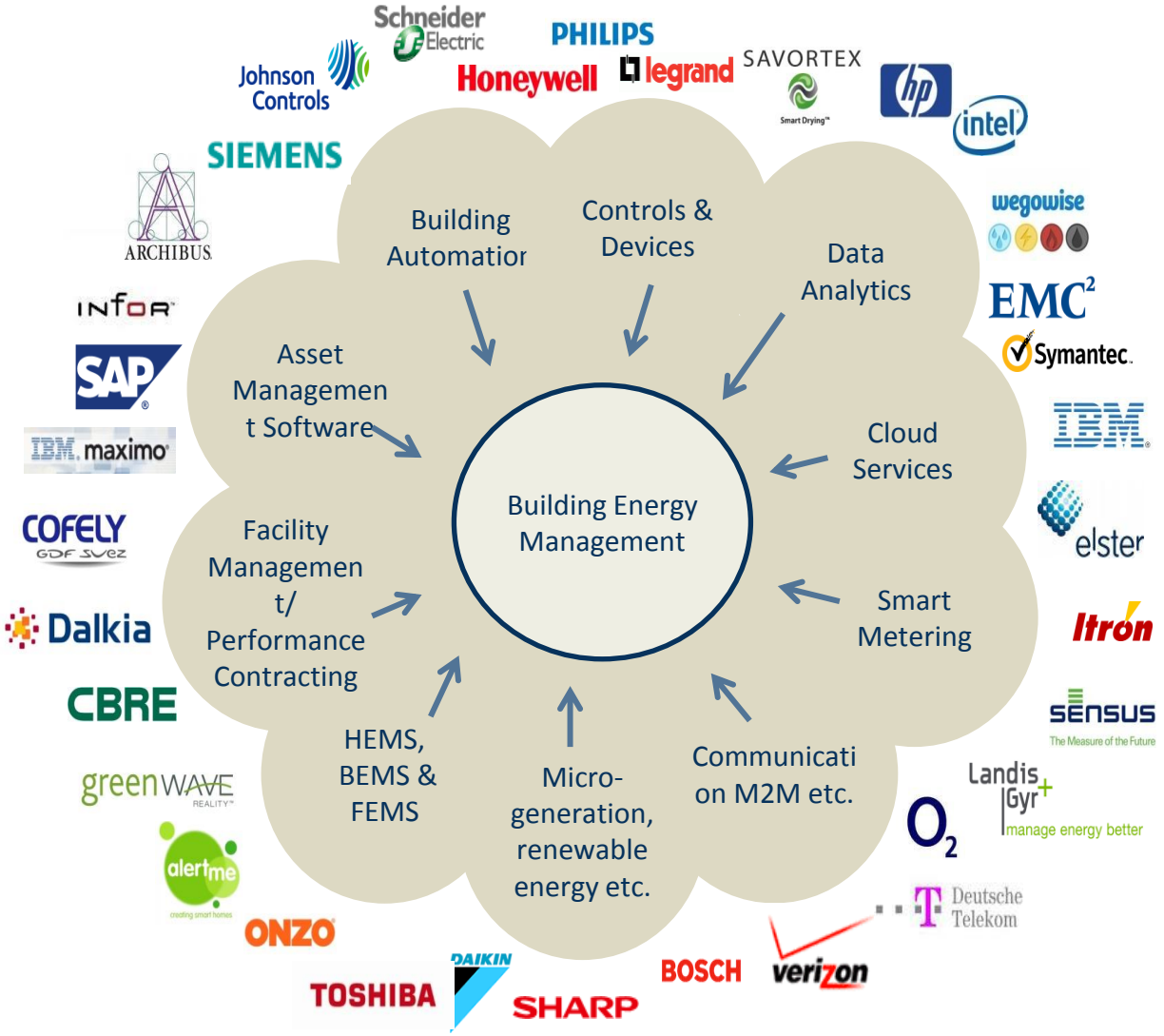
# Smart Concepts and the Key Enablers for Growth




John Raspin, The Future of Building Energy Management, Frost& Sullivan, 2013.

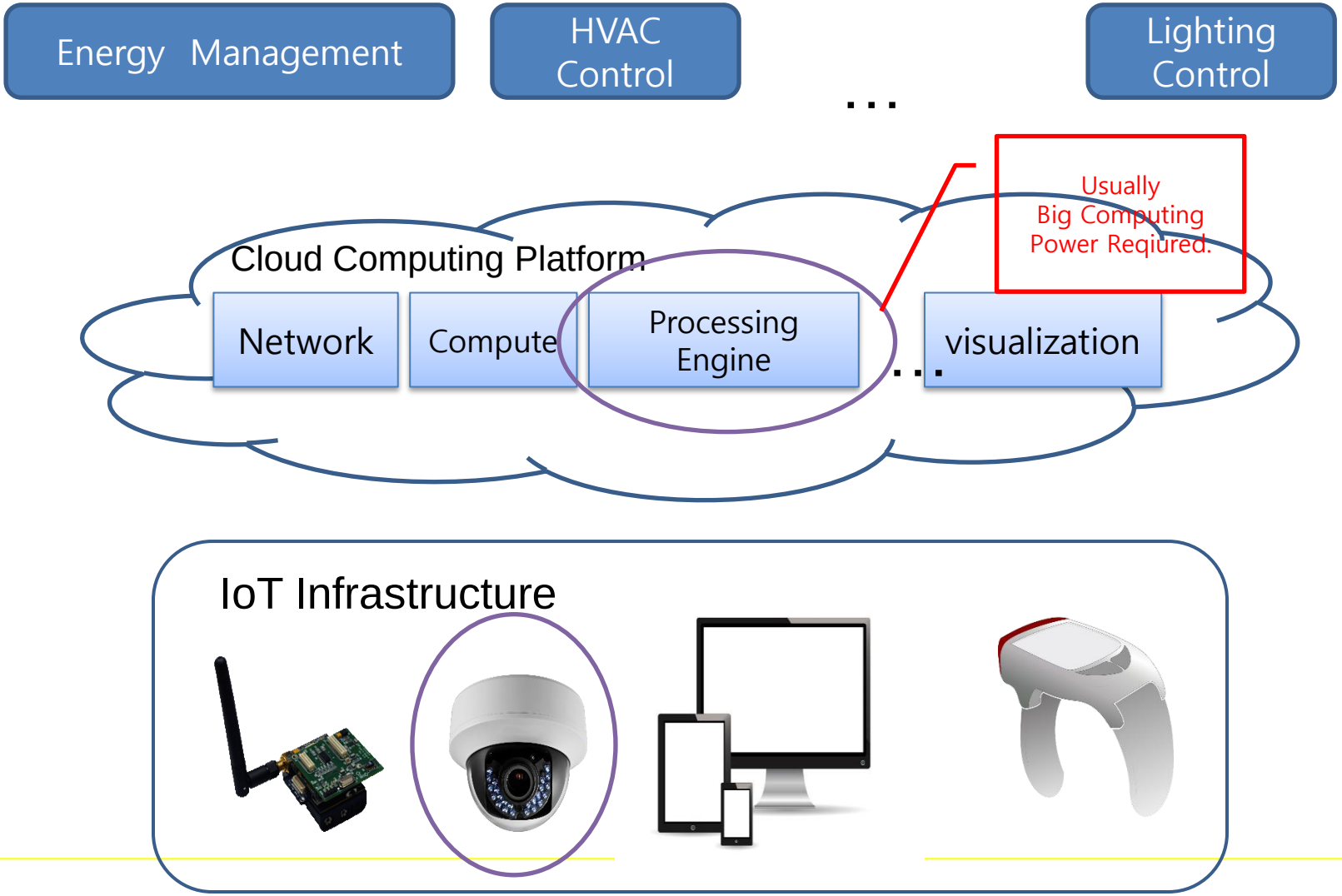
# Building Energy Management

## Multiple Convergence of Technology, Services and Competition




John Raspin, The Future of Building Energy Management, Frost& Sullivan, 2013.

# Smart Building Management



# Iot enabled Smart Building Monitoring System

## Introduction

Network monitoring is the use of a system that constantly monitors a computer network for slow or failing components and that notifies the network administrator via email, SMS or other alarms in case of outages.
This project deals with the monitoring of network system of a home or an office. The monitoring tools that are used in this project are Raspberry Pi along with Amazon Web Services-Internet of things and Simple Notification Service, Python Script and MQTT.

## Objectives

- To publish network monitoring speed after reaching up to a certain threshold
- To provide a report regarding the speed of network of the computers
- To scan the active computers working in network
- To know about the status and uptime of network monitoring systems used in office/home
- To power up as well as power down the devices in the office/home and access resources remotely

## AWS-Internet of Things

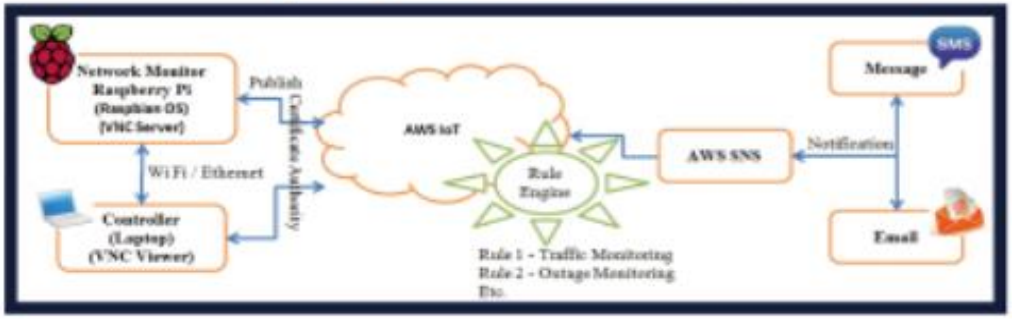
Enable users to connect their devices to AWS services, and enable applications to interact with devices even they are in offline.

- Connection Engine ,
- Security Engine
- Rule Engine
- Shadow Engine

## Benefits of Project

- Increased profits
- Peace of mind
- Secures your turnover
- Gives a chance to switch to redundancy systems
- Raspberry Pi is Cost-Effective and uses less Power

## Design and Implementation




The Project design is to monitor the network by connecting AWS-IOT with physical raspberry device where raspberry pi acts like network monitor box.

The Implementation of Network Monitoring Using AWS-IOT and Raspberry is categorized into five major steps

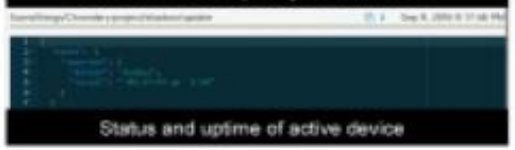
- AWS-IOT Project Setup
- Raspberry Pi Device Setup
- Python Code Setup
- AWS SNS Setup
- MQTT Setup

## Results


AWS-IOT and Raspberry Pi Connection


Processing Speed

Active Devices in Network


Status and uptime of active device


Power up and Power down

SMS Notification if Threshold reached

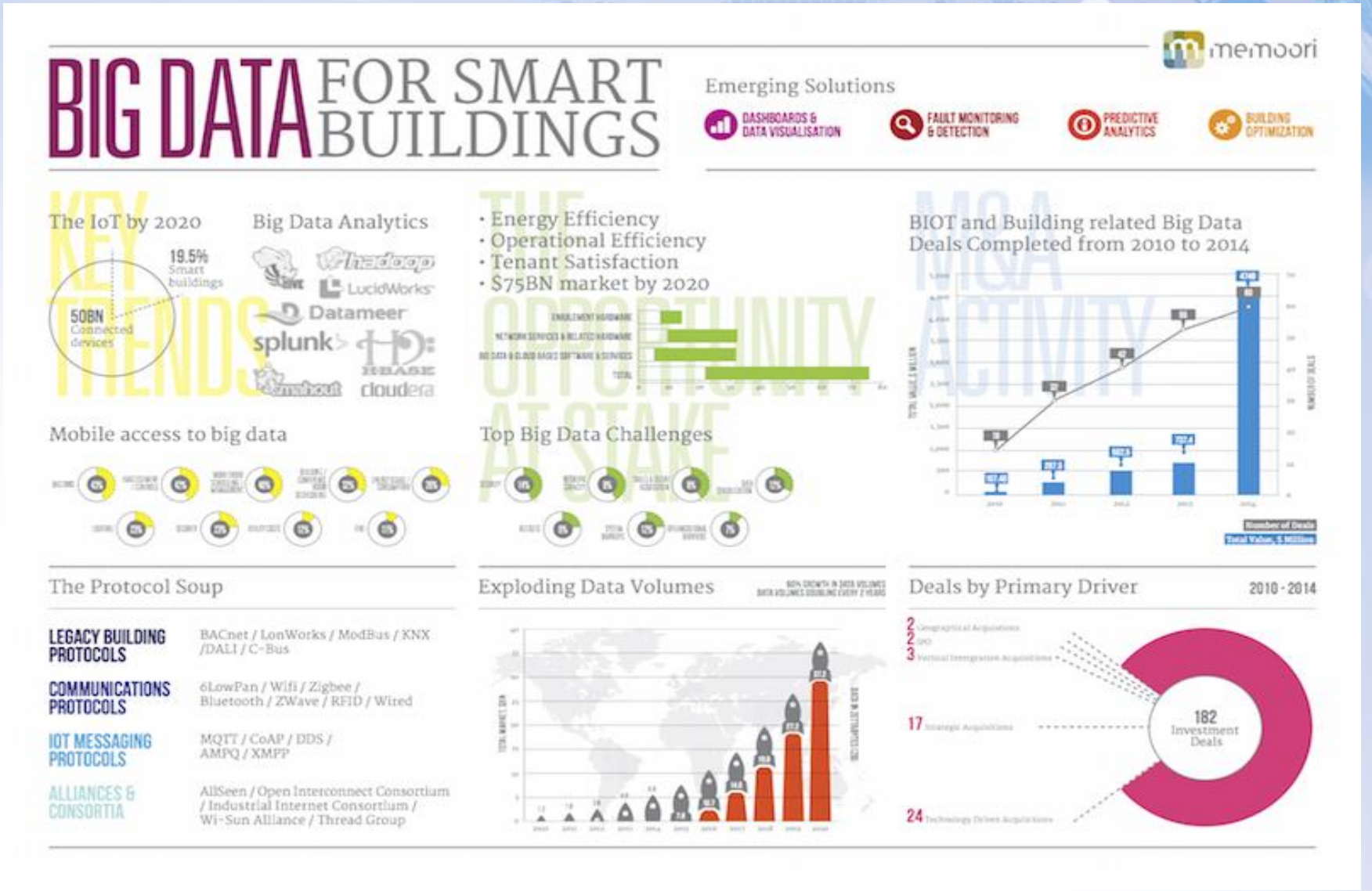
## Conclusion

The evaluation of result establishes the fact that the smart home and office network monitoring is simplified with the help of Internet of Things.

## Refrences


Weber, R. H., & Weber, R. (2010). Internet of Things. Springer, NY, 12, 62-64.
Waldbusser, S. (2006). Remote network monitoring. Management information, 2(1). 125-130.

# Big Data for Smart Buildings

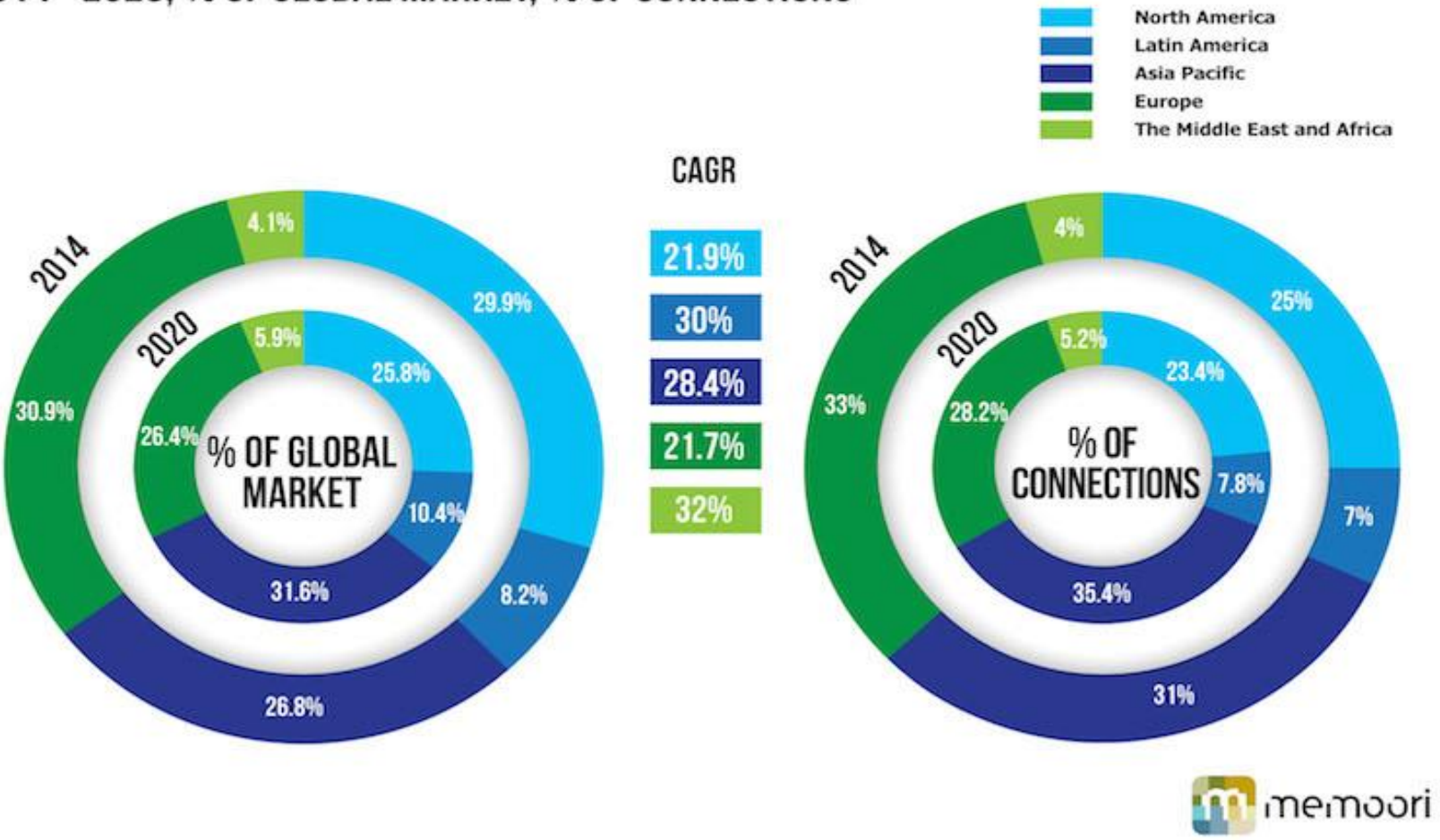



https://www.memoori.com/portfolio/big-data-smart-buildings-2015-2020/

# Market for the internet of things in buildings

Fig 5.4

THE MARKET FOR THE INTERNET OF THINGS IN BUILDINGS BY REGION, 2014 - 2020, % OF GLOBAL MARKET, % OF CONNECTIONS




https://www.memoori.com/portfolio/internet-things-smart-buildings-2014-2020/

# Conclusion

# Q & A

# Thank You.