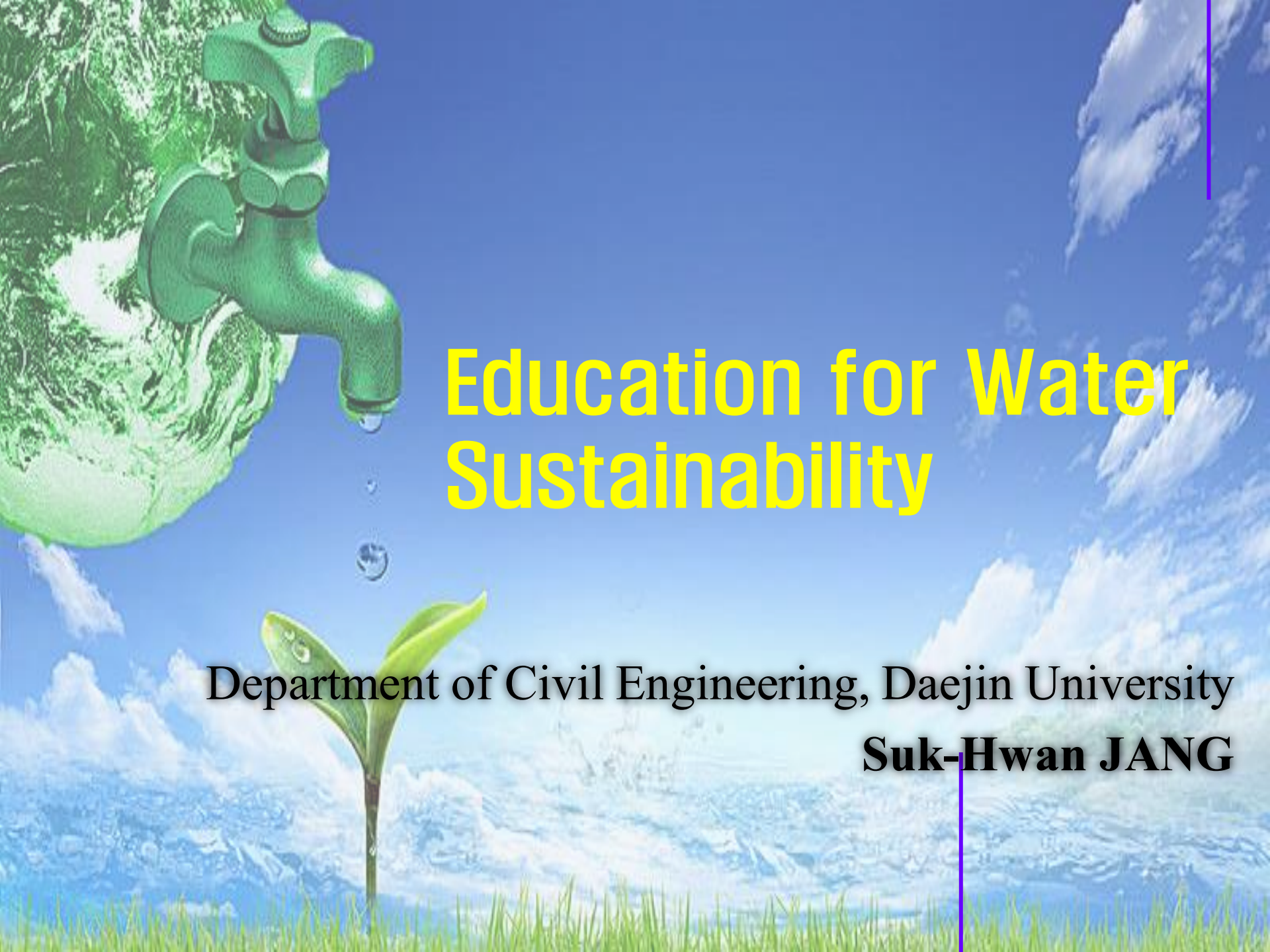


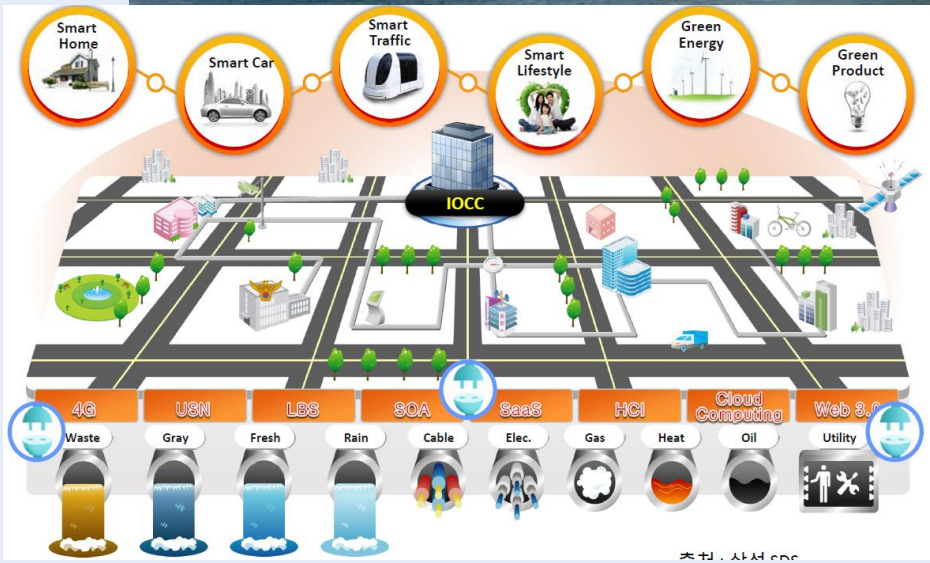
Education for Water Sustainability

Department of Civil Engineering, Daejin University

Suk-Hwan JANG

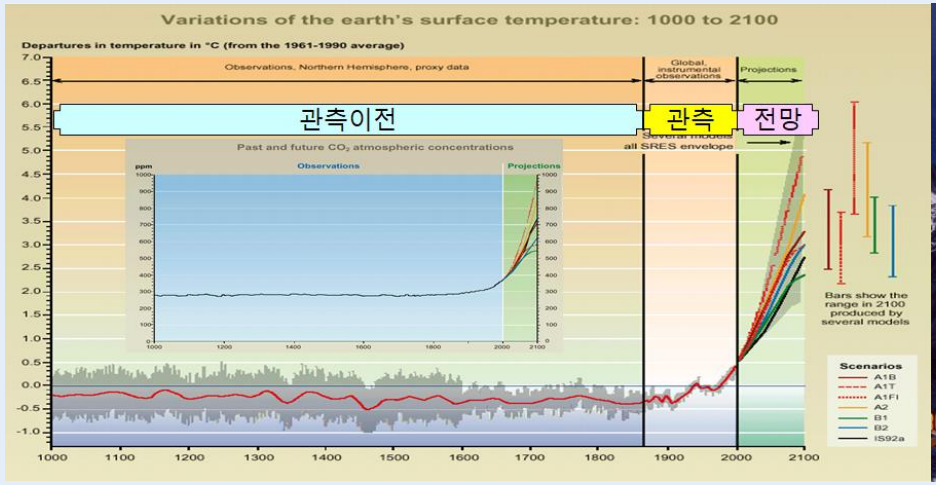
Key Words for Future Water Works

1. Climate Change
2. 4th Industrial Revolution
3. Smart Water
4. Smart City
5. W-E-F Nexus



1. Climate Change

1. Increasing Planet Temperature



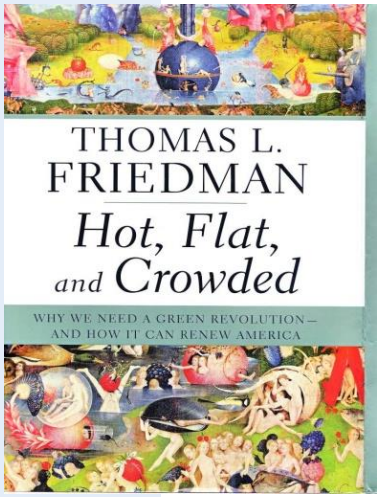
2. Shrinking Glacier

3. Rising Sea Level

4. Desertification

1. Climate Change

Hot. Flat and Crowded



Human influences. Dramatic changes in runoff volume from ice-free land are projected in many parts of the world by the middle of the 21st century (relative to historical conditions from the 1900 to 1970 period). Color denotes percentage change (median value from 12 climate models). Where a country or smaller political unit is colored, 8 or more of 12 models agreed on the direction (increase versus decrease) of runoff change under the Intergovernmental Panel on Climate Change's "SRES A1B" emissions scenario.

Extreme Flood_Typhoon

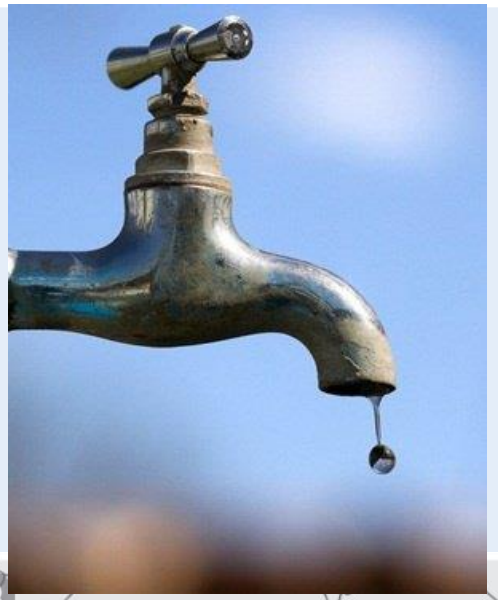
<Thailand Chaba>

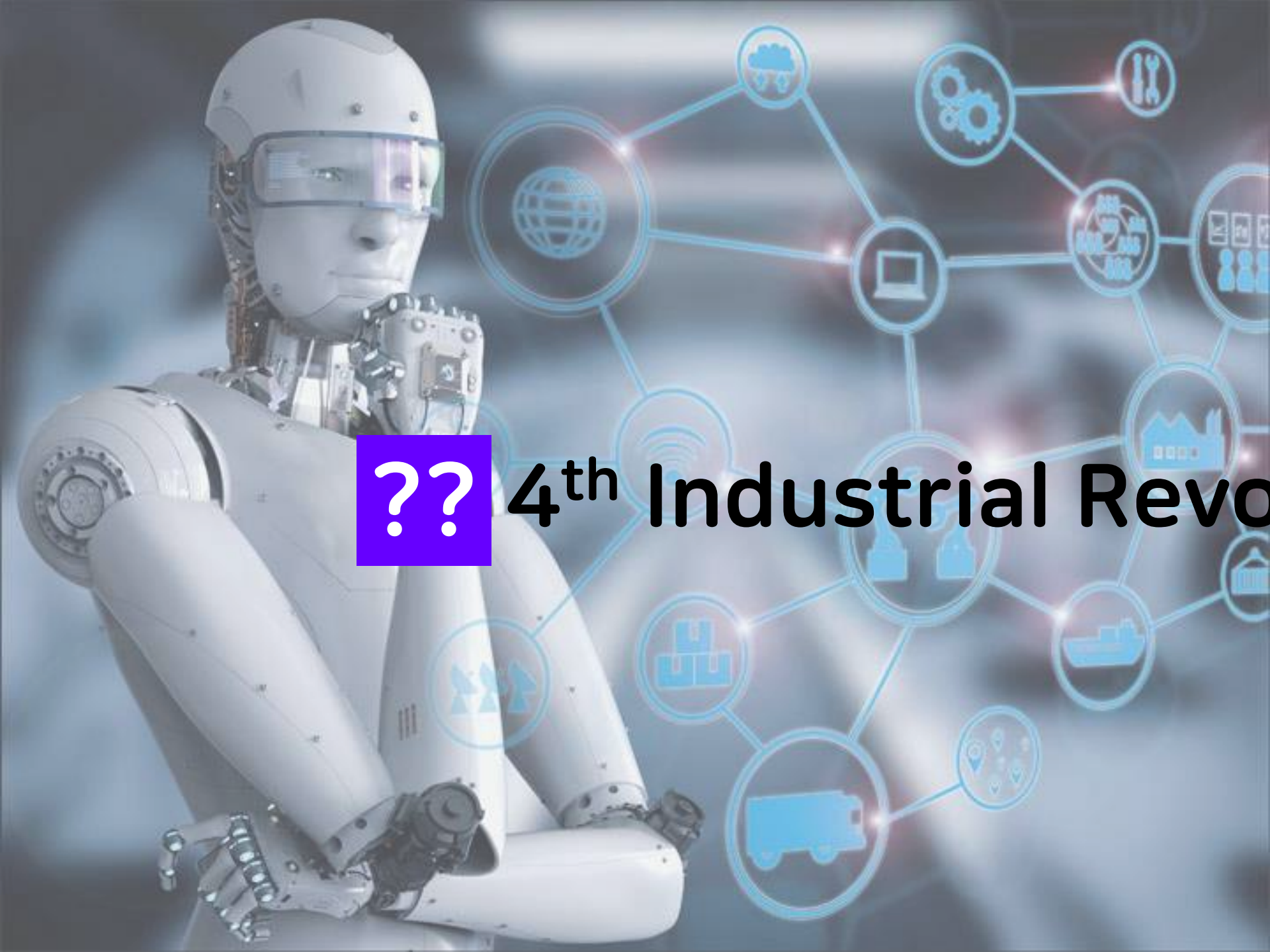
<Philippines Hiyen>

Extreme Flood(Huston, US)_Aug. 29th 2017_ 1,320mm

미국 제4대 도시 휴스턴 홍수 피해 확산

Mega Drought_ Cape Town, South Africa

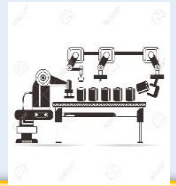



??
4th Industrial Revo

What is 4th Revolution?

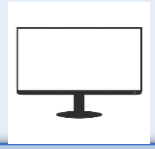
1st Industrial Revolution in 18C

Steam Engine and Mechanization



2nd Industrial Revolution in 19C

Mass Production based on Electricity Energy



3rd Industrial Revolution in late 20C

Knowledge Information by Computer and Internet

4th Industrial Revolution (2nd Information Revolution) 21C

[Intelligence Information Technology]

Intel

AI S/W

Info

BigData

IoT

Cloud

4th Industrial Revolution

Intelligence Information System is National Competitiveness

Background of 4th Industrial Revolution

Socio Economic Environment

- ✓ New Growth needed against Low Growth
- ✓ Increasing High Labor Cost
- ✓ High Tech Manufacturing Industry Preparing

Technology Environment

- ✓ Cloud Computing and Big Data Technology are Developed
- ✓ Recognition and Deep Learning by AI in Computer
- ✓ Expansion of IoT Based on Interaction Flatform between H & T

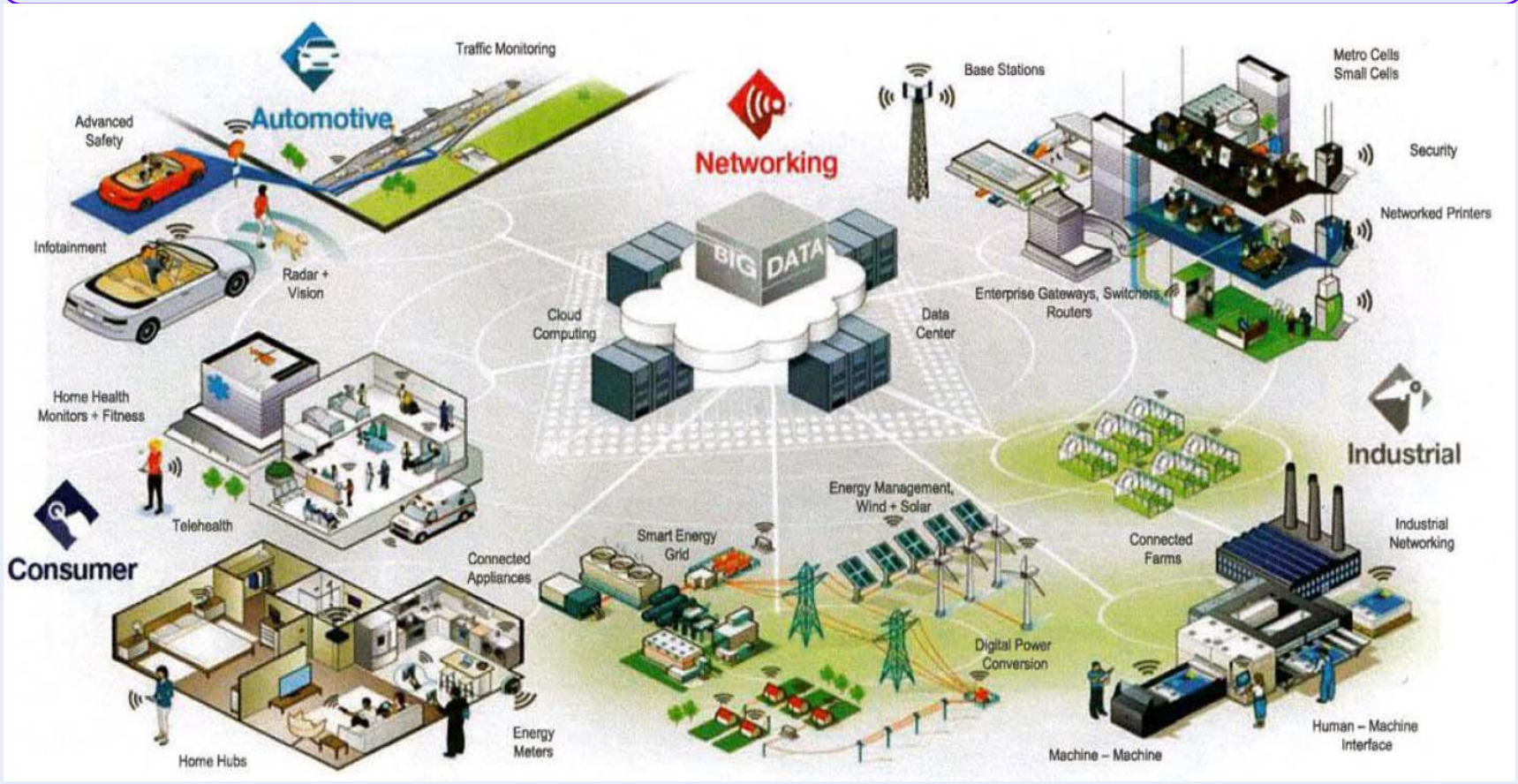
Foundation for 4th Industrial Revolution

- ✓ Artificial Intelligence, Big Data, IoT, Cloud Computing, Drone, Bio Tech etc. New Convergence
- ✓ Adaption with Climate Change, Environmental Problem Confluence

IoT; Internet of Things

- ✓ Interaction between Human and Things by Telecommunication Module

  A.I. providing Information and Communication



AI : Artificial Intelligence_ Henna Hotel

Amazon Go (Unmanned CS)

- ✓ No Check out Convenient Store
- ✓ Automatic payment System by Sensor and Application

Big Data

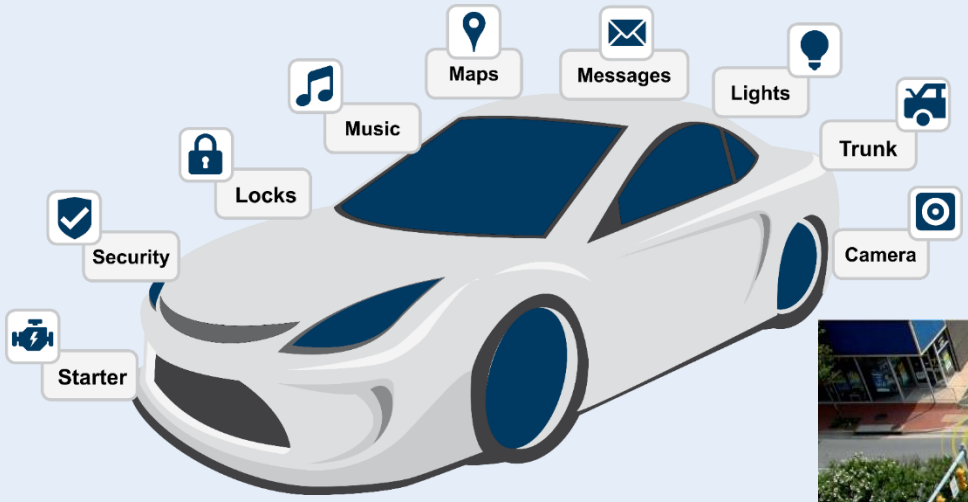
✓ Valuable Information Extraction by Big data Application and Analysis

Driverless Car(Autonomous Vehicle, Self-driving Car)

두 손이 자유로워 진다, 다가오는 무인 자동차 시대

2015.11.16 07:00

Posted in 호호, 신나는 생활 by 금호타이어



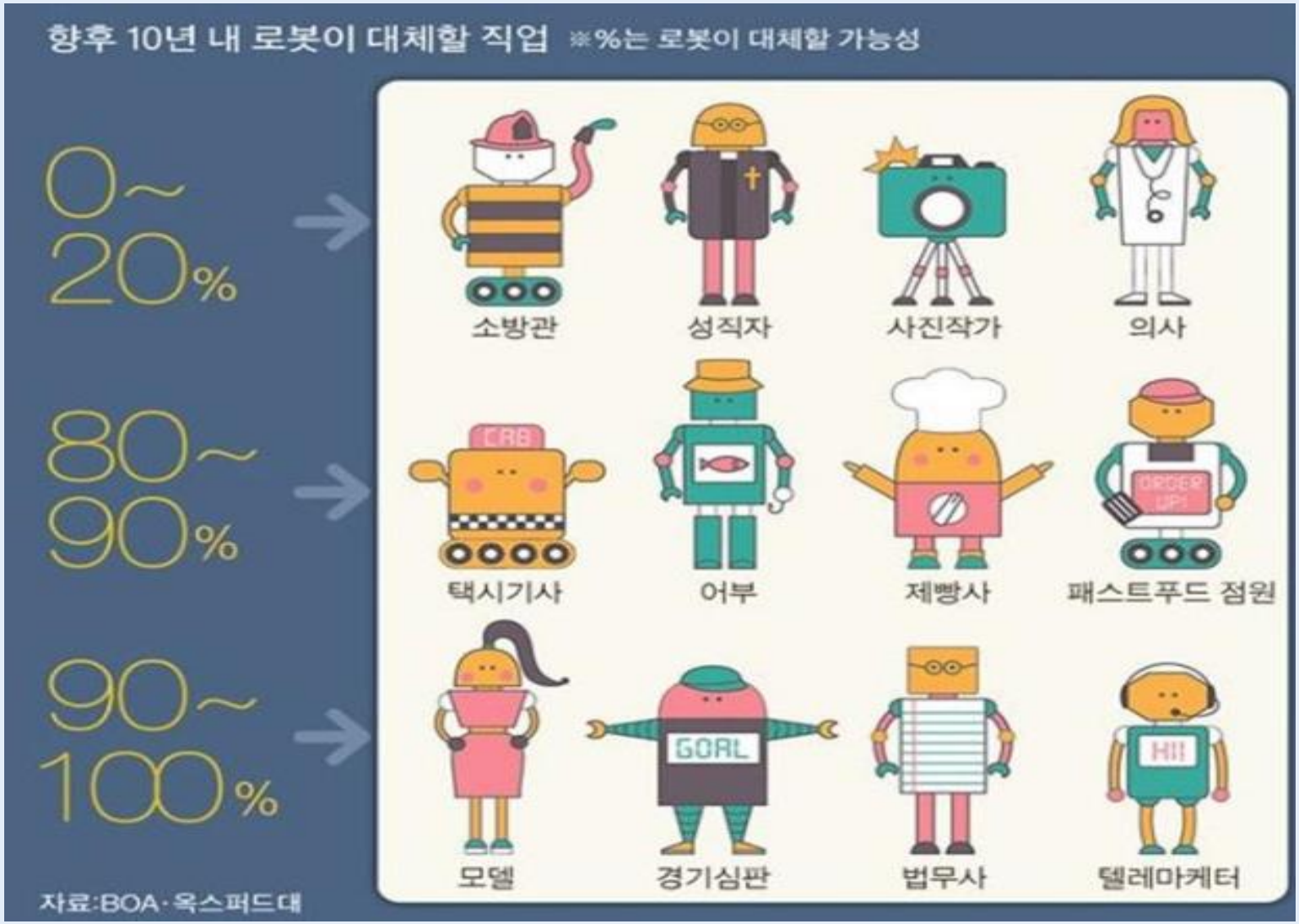
Advantage

- ✓ Provide drive to the Aged, disable

Disadvantage

- ✓ Accident by computer racking hacking
- ✓ Unemployment of forwading agent

Changes of Future Jobs

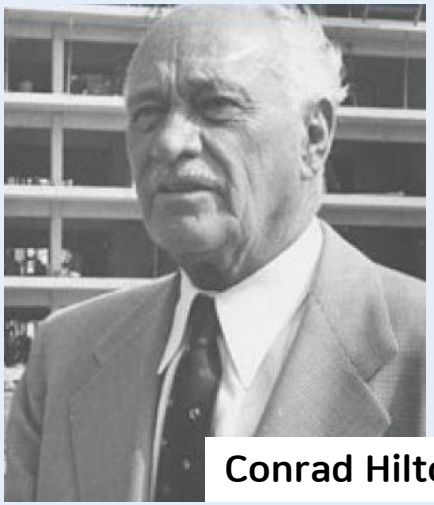


Substitution of Jobs in 10 years by Google


?? How We Deal with

Think Differently

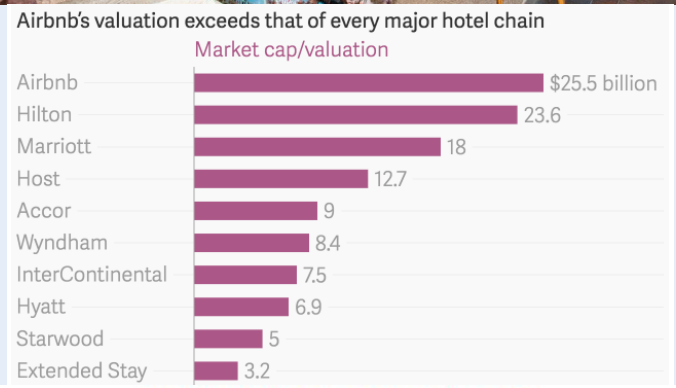
Hilton Hotel



Conrad Hilton

V.S

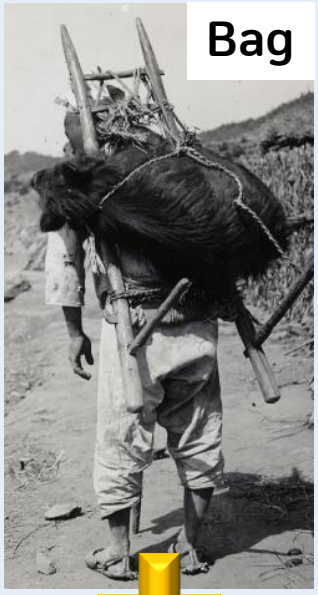
Air B & B



Evolution and Innovation ..

주) 네이버 이미지

Bag



Carrier

Vehecle


Future WATER Industry
Smart Water/Smart City

Application to Smart Water

◆ State-of-the art commercial drones

- Performance level (including automatic flight…)

<DJI, MAVIC PRO2>

- Zoom camera (1,300 USD)

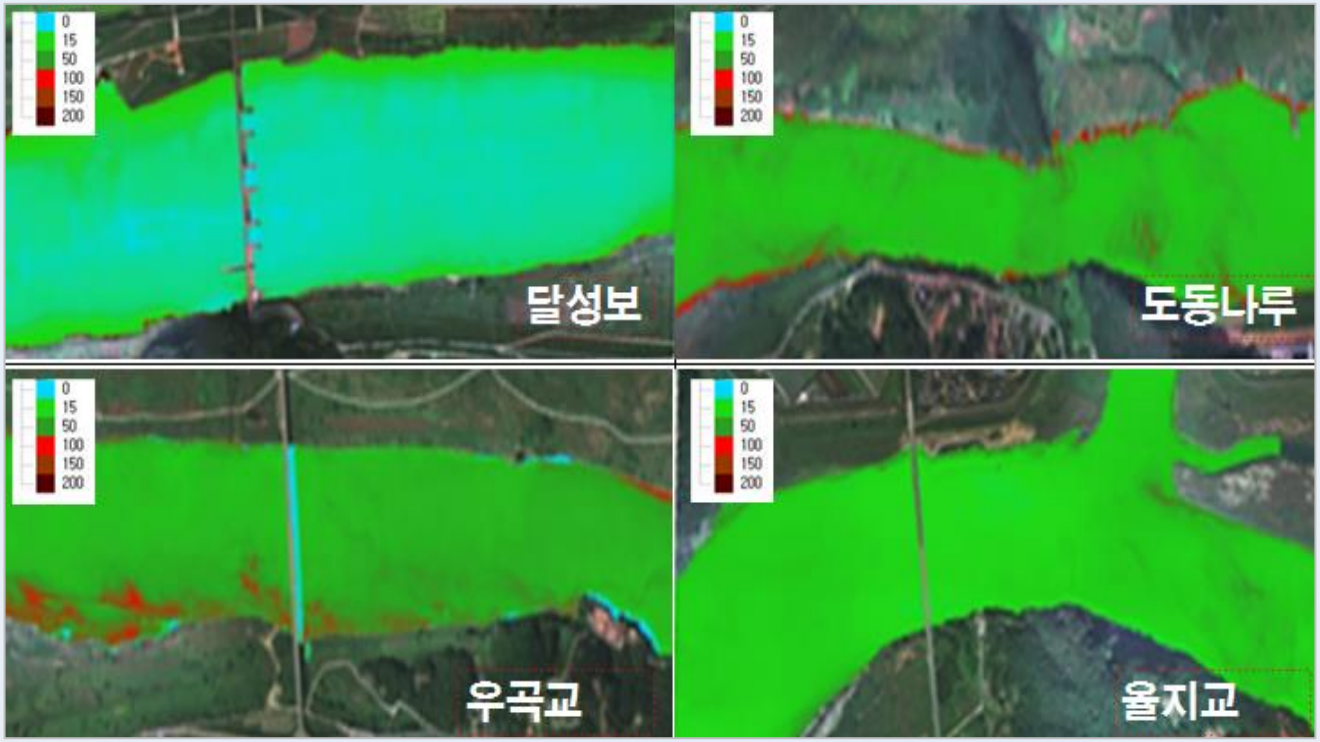
<DJI, Phantom 4 RTK>

- Using VRS for modifying GPS errors
- 2 or 3D mapping with its application

Application to Smart Water

◆ Cases of Drone Use

- Mainly monitoring harmful algal blooms and floating after flooding

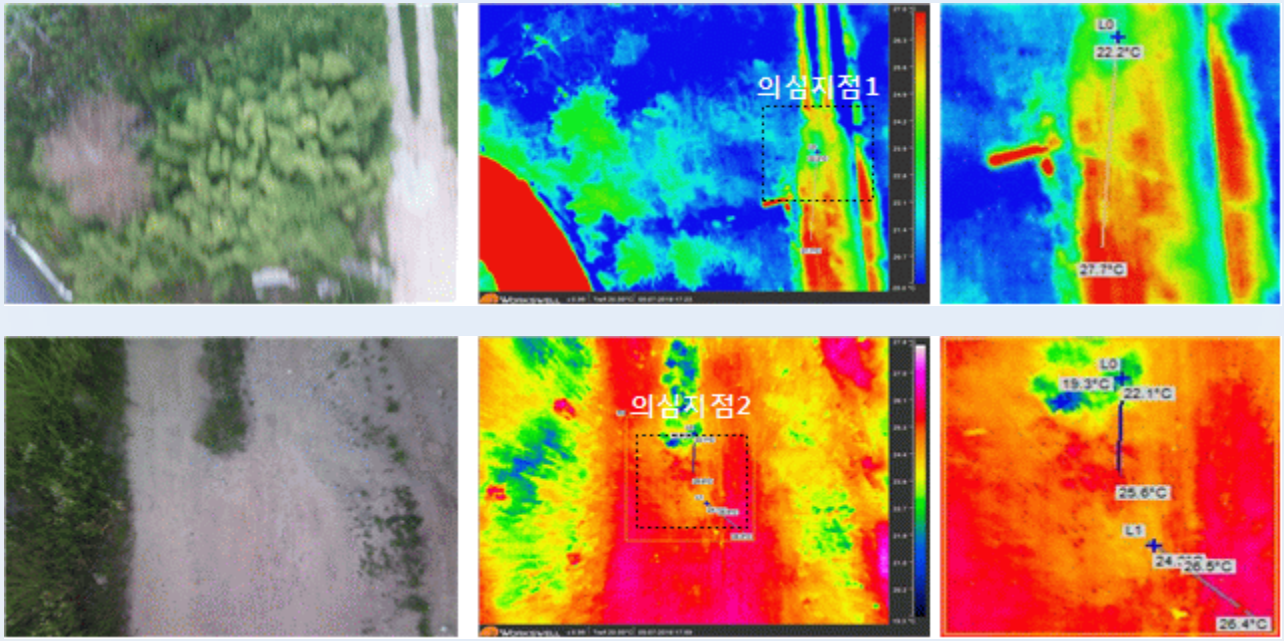


Chl-a analysis example using drone (Took pictures on 10th OCT. 2017_)

Application to Smart Water

◆ Adoption and Development of Drone Technology

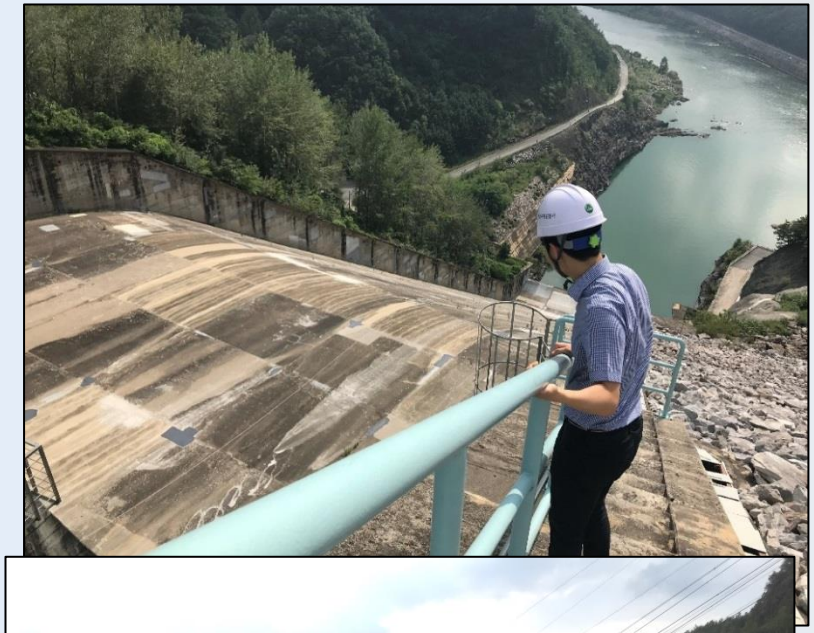
- Bridge Automatic Inspection system using drones (`19 –`25)
- Pipeline Inspection and Leakage Exploration System (`19 –)



(Finding a leakage point along the pipeline using the thermal image took by the drone)

Application to Smart Water

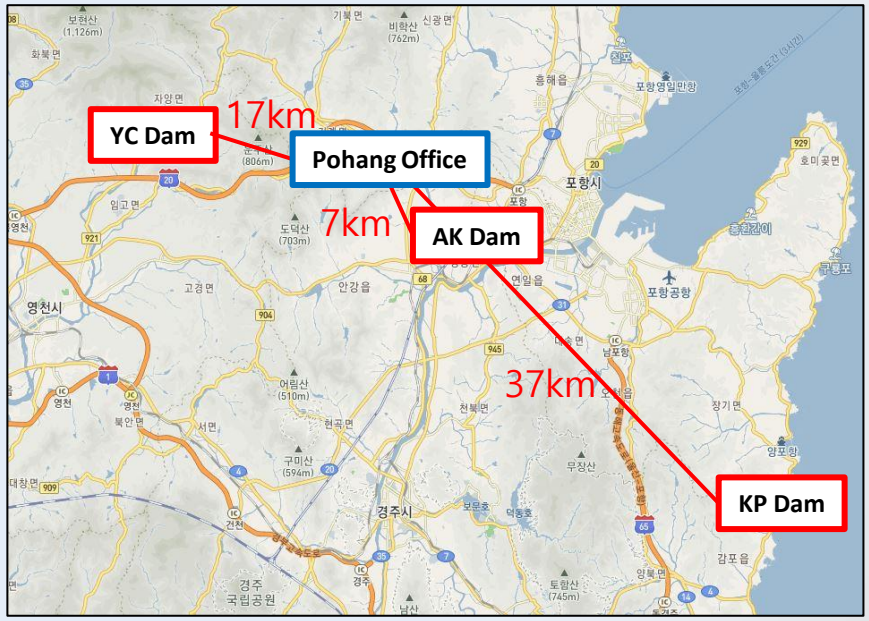
◆ Routine Inspection (Daily, Weekly, or Monthly) on a dam



Application to Smart Water

◆ Something inconvenience in visual inspection

- Access limitation to a high place and concern about falling accident
- Difficulty of emergency inspections (within 2hr) at the same time on two more dams under an office



Drone could be an alternative

Drone could be an alternative

◆ Functional Advantages

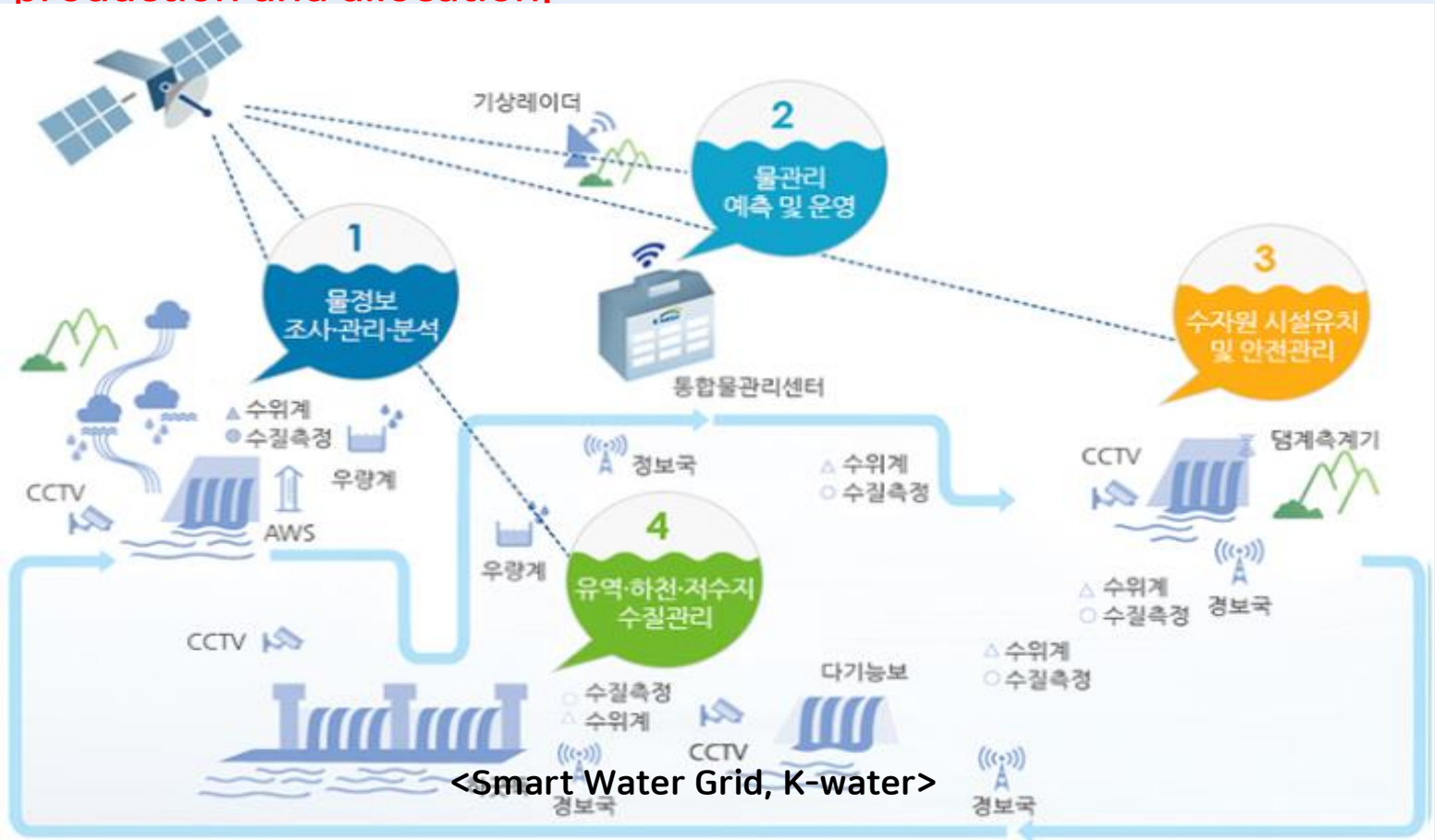
Easy control

Consistency over time

Safe access

SMART WATER GRID

✓ Integrated Water Resources Management by Connecting IT & Water System from the water resources origin to the end users in terms od production and allocation.



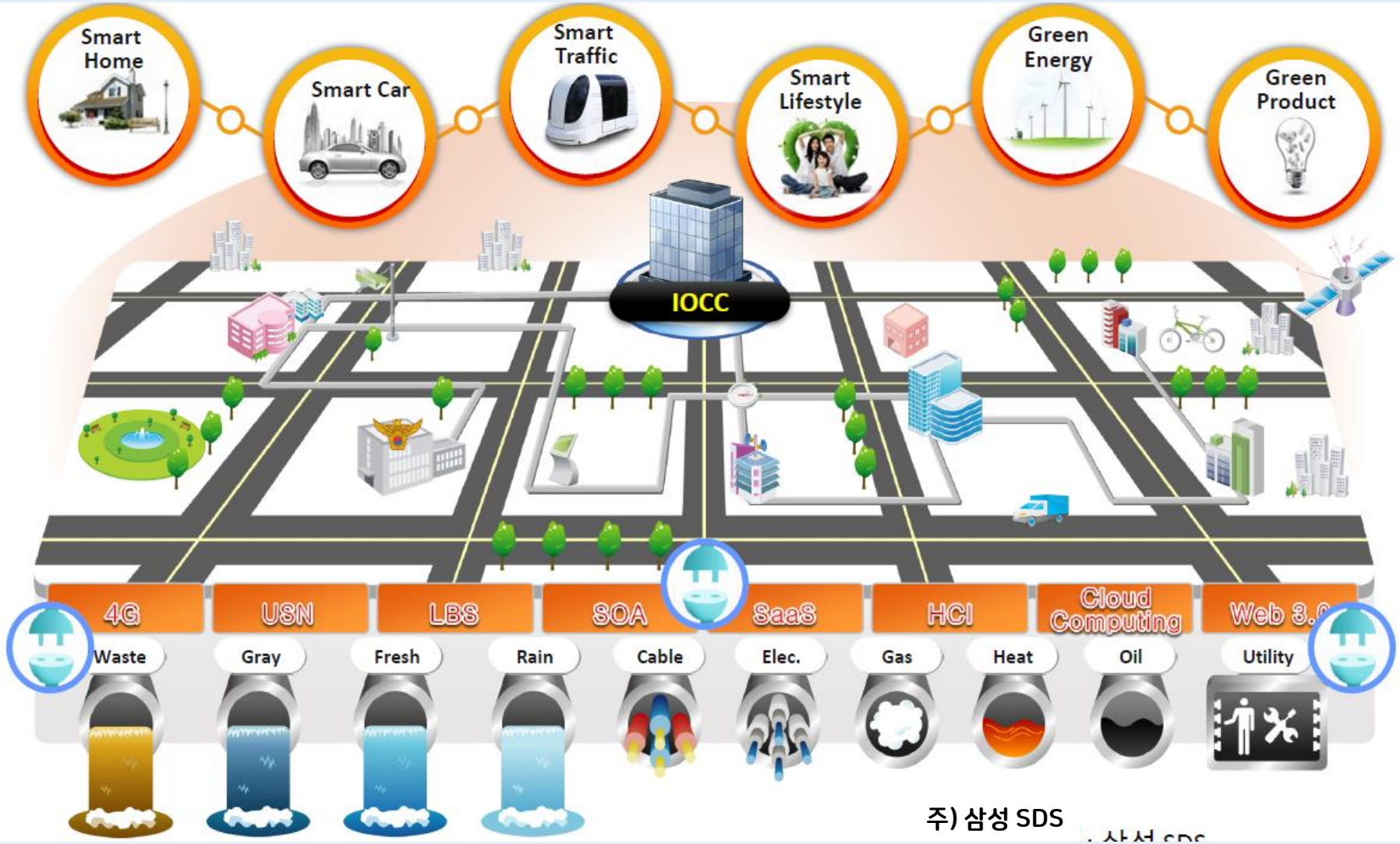
<Smart Water Grid, K-water>

SMART WATER GRID

- ✓ Real-time transmission of Water Quality/Quantity by Sensing in the Pipe Network
- ✓ Remote Automatic Warning System and Recovery in Failure Spot

<Smart Water Pipe>

SMART WATER AND CITY



주) 삼성 SDS

<Basic Concept of Smart City>

Curriculum : Undergraduate Course Can We Start ?

Classification	Subjects	
Civil Engineering	Structural Engineering	Prestressed Concrete & Design, Steel Structure Engineering & Design, Design and Engineering of Steel Structures, Civil Construction Cad & Design, Civil Construction Technology, Materials for Construction & Lab., Repair and Rehabilitation of Structures, Structural Mechanics & Practice, Applied Mechanics & Practice, Materials Of Mechanics & Practice, Reinforced Concrete Engiceering & Practice,
	Water resources Engineering	Hydraulics & Practice, Water Resources Engineering & Design, Fluid Mechanics, Coastal & Harbor Engineering, River Engineering, Water and Sewerage Engineering, Water and Sewerage Engineering
	Surveying	Photogrammetry, Applied Geomatics, Geomatics & Practice, Geodesy & Global Positioning System
	Geotechnics	Foundation Engineering, Introduction to Computer Science, Social Base Institution & Design, Rock Mechanics, Geotechnical Engineering, Underground Structures Design, Civil Engineering Construction, Estimation and Design of Structure
Environmental Engineering	Policy of Climate Change, Air Pollution Control Engineering, Solid Waste Treatment, Water Quality Medeling, Water Analysis Laboratory, Water-Pollution Engineering, Water Treatment Engineering, Numerical Analysis and Practice, Pollution, Remediation and Design, Waste Management, Environmental engineering Mathematics and Practice, Environmental Engineering Design, Laboratory of Environmental Microbiology, Ecological Engineering, Environmental Hydraulics, Environmental Hydrology, Environmental Energy Engineering, Environmental Impact Assessment, Environmental Pollution Measurements	

Curriculum : Graduate Course , Can We Start ?

Classification	Subjects
Civil & Environmental Engineering	Advanced Environmental Statistics, Ecosystem Impact Assessment, Microbial Ecology, Advanced Wastes Treatment, Hazardous Wastes Treatment, Environmental Policy Study, Advanced Geomatics, Advanced Fluid Mechanics, Advanced River Engineering, Hydrometeorology, Stormwater Design and Management, Computational Hydraulics, Advanced Hydrologic Analysis, Hydraulic structure design, Theoretical Hydrology, River Ecology, Environmental Fluid Dynamics, Advanced Global Positioning System, Hydraulic Modeling Design, Sediment theory, Adjustment of Observation, Landscape Engineering, Automated Mapping & Facility Management :AM/FM, Advanced Geodesy, Advanced Geospatial Information System, Digital Photogrammetry, Advancned Photogrammetry, Remote Sensing and Application, Seminar in Geomatics, Computer Applications in Hydraulic Engineering, Open Channel Hydraulics, Advanced Applied Hydrology, Urban Hydrology, Water Resources System Engineering, Analysis of Receiving Waters, Stochastic Hydrology, Hydropower Planning and Design, Water Treatment.

Thank you for your Attention

2018. 03. 15

장 석 환