

New era of the 4th Industrial Revolution & Climate Change

Joon Ha Kim

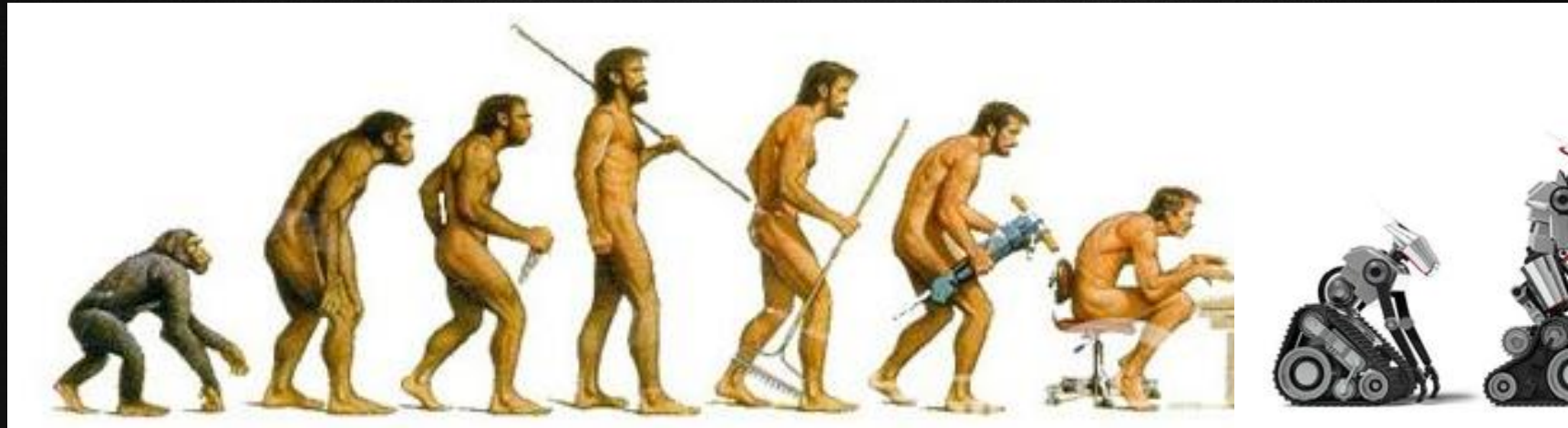
Gwangju Institute of Science & Technology, Korea



Homo Faber

(A human species of tool-making)

can control their fate and their environment through tools.



✓ Three tragedies of Homo Faber...

- Wars and economic crisis through tools: Weapons & Money
- Climate change through tools: Green house gases
- Human clone through tools: Artificial cloning & Artificial Intelligence

In the past 100 years...

Green house gases | 20 → 54 G [tCO₂/yr]

CO₂ concentration | 310 → 403 [ppm]

Ice area in the arctic ocean

250 × 10⁴ → 100 × 10⁴ [km²]

Sea surface level : +19 [cm]

Desertification from irrigation

20 %

Species reduction in 50 yrs.

$\frac{1}{6}$

Surface temperature

-0.2 → 0.8 [°C]

D.O. ↓ & Dead zone ↑

Extirpation rates

Fish : 20 %

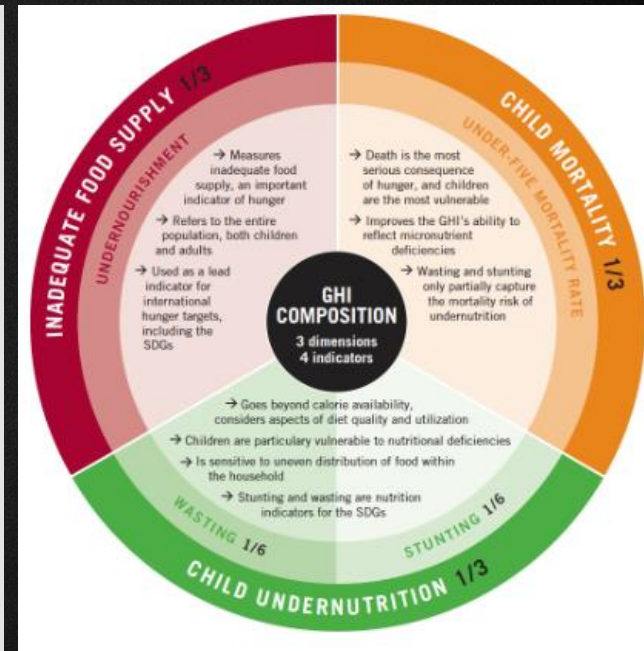
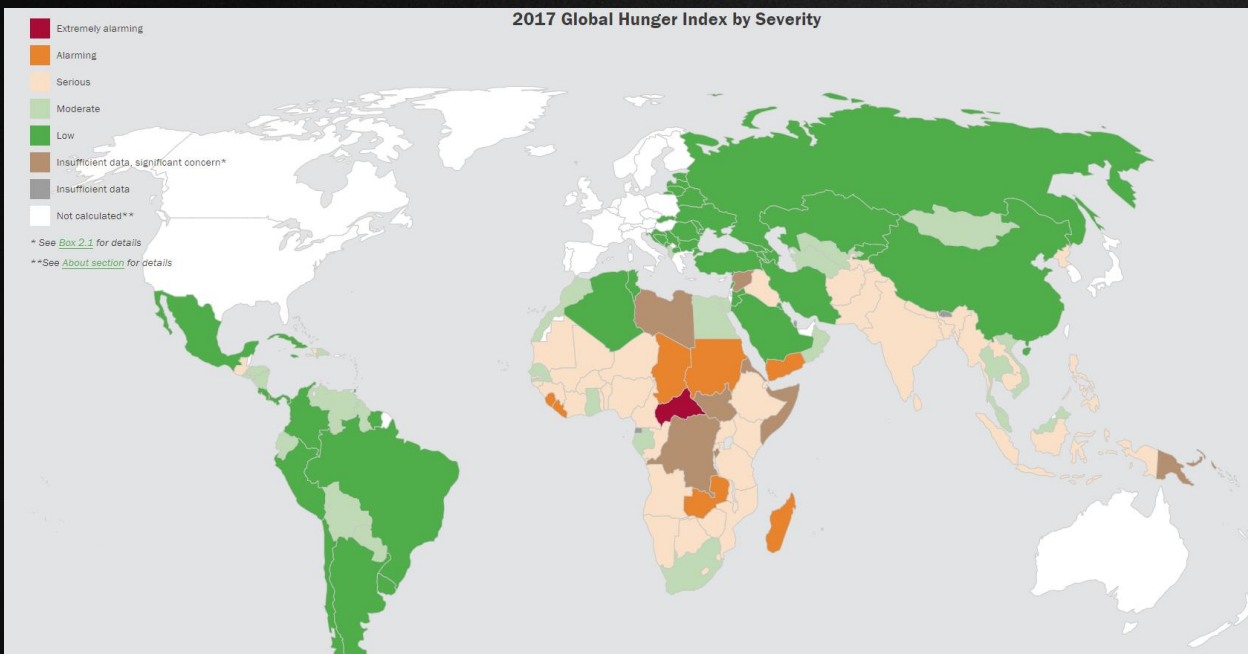
Mammals : 21 %

Plants : 70 %

Q: Does **climate change** makes few issues?

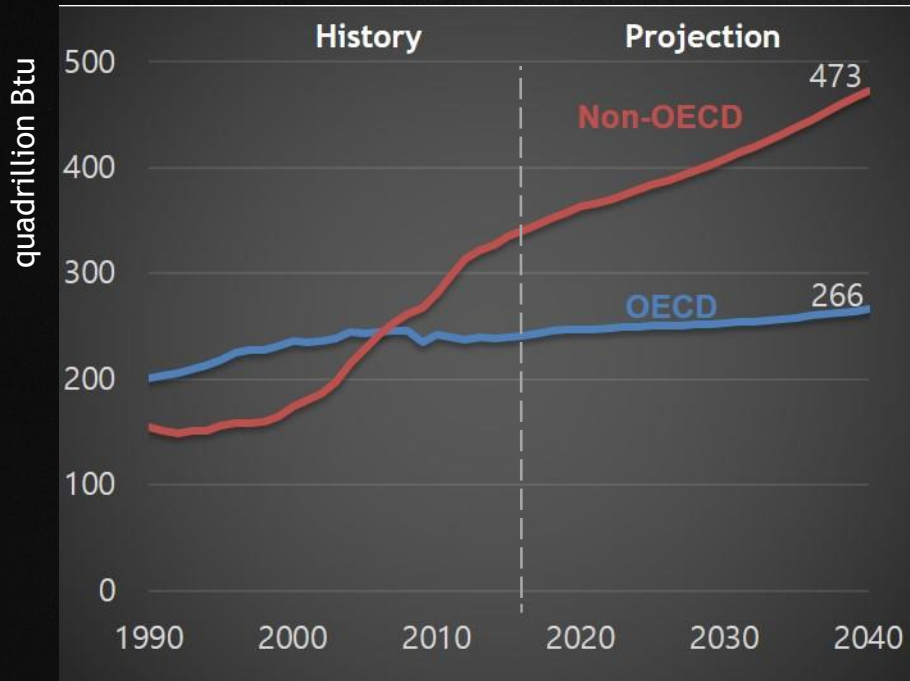


Divide of **Food** resource

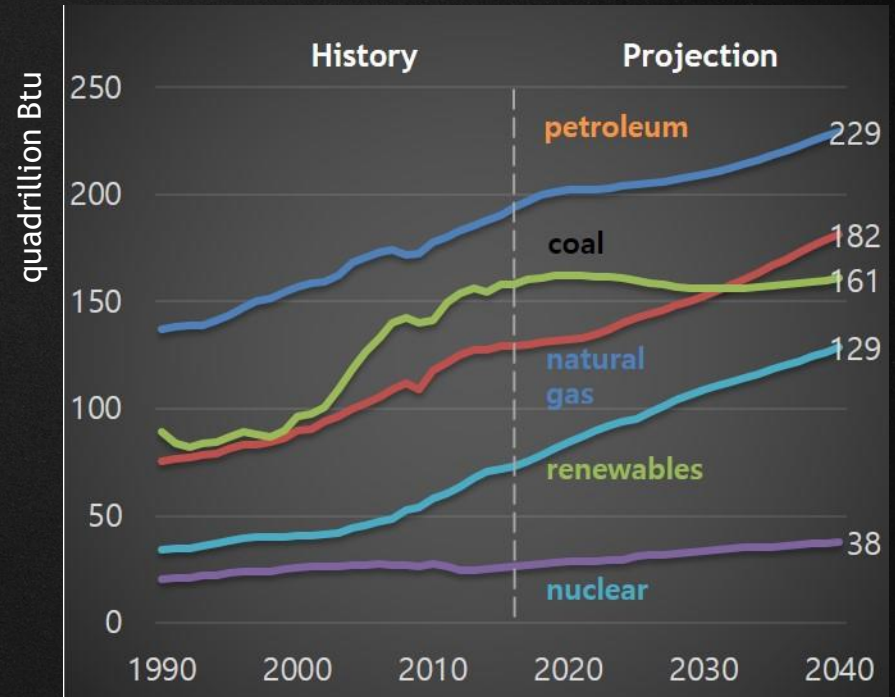


- ❖ The level of hunger in the world has decreased by 27% from the 2000 level
 - ❖ **13.0%** of the overall population is undernourished
 - ❖ **27.8%** of children under five are stunted
 - ❖ **9.5%** of children under five are wasted
- ❖ **Central Africa and South Asia are experiencing the most hunger**

Divide of **Energy** resource



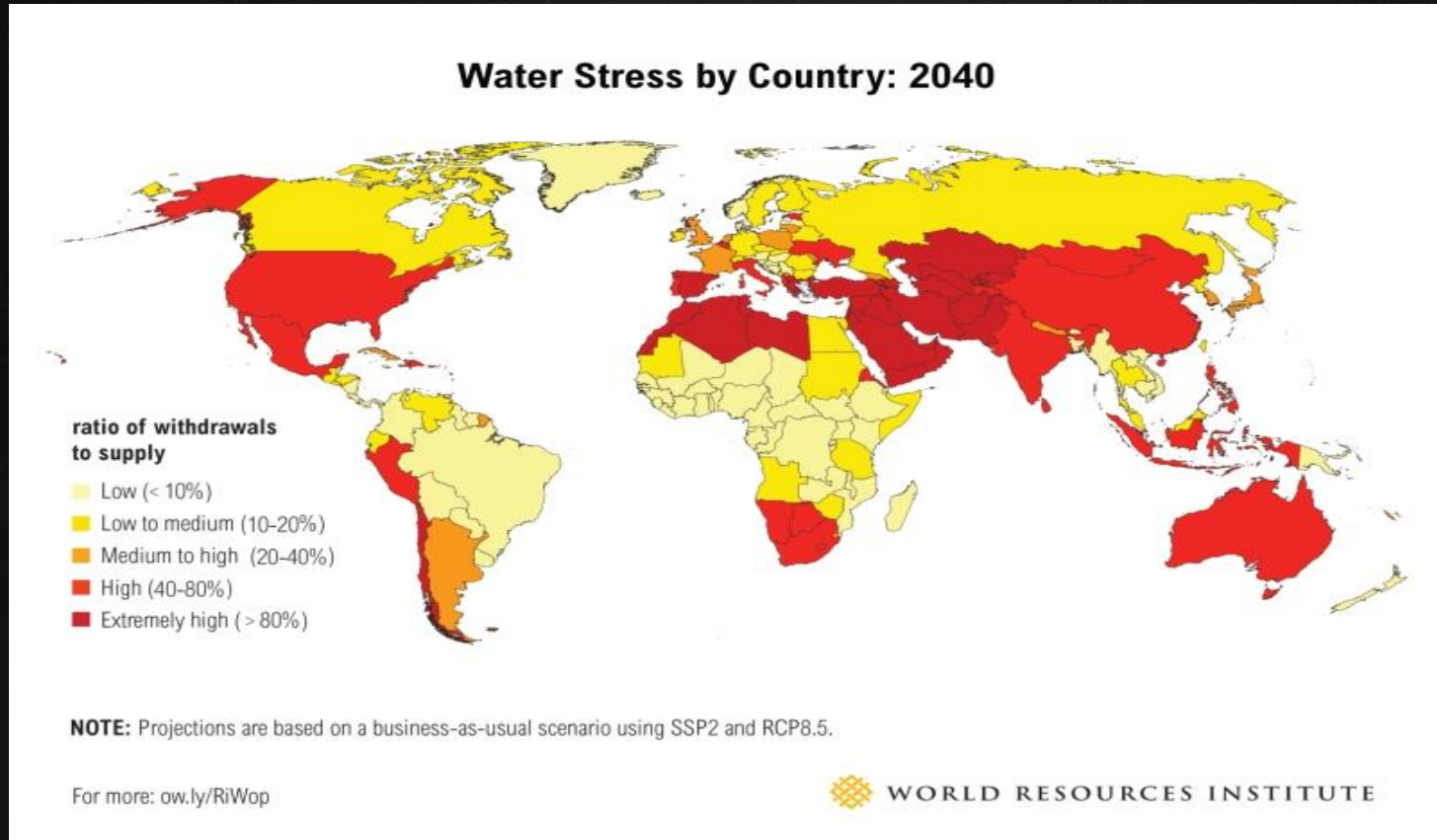
<World energy consumption>



<World energy consumption by energy source>

- ❖ **Non-OECD** nations are projected to account for **64% of the global consumption by 2040**
- ❖ The increase of non-OECD nations' energy consumption is caused by **Asia**

Divide of **Water** resource



- ❖ Based on ensemble of climate models and socioeconomic scenarios,
 - **33 countries** faces extremely high water stress in 2040
 - In 2040, global superpowers such as **US, China, and India** faces water risks

Q: Does climate change makes few issues?

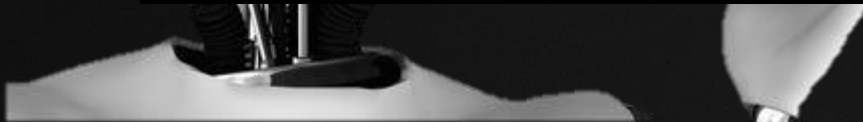
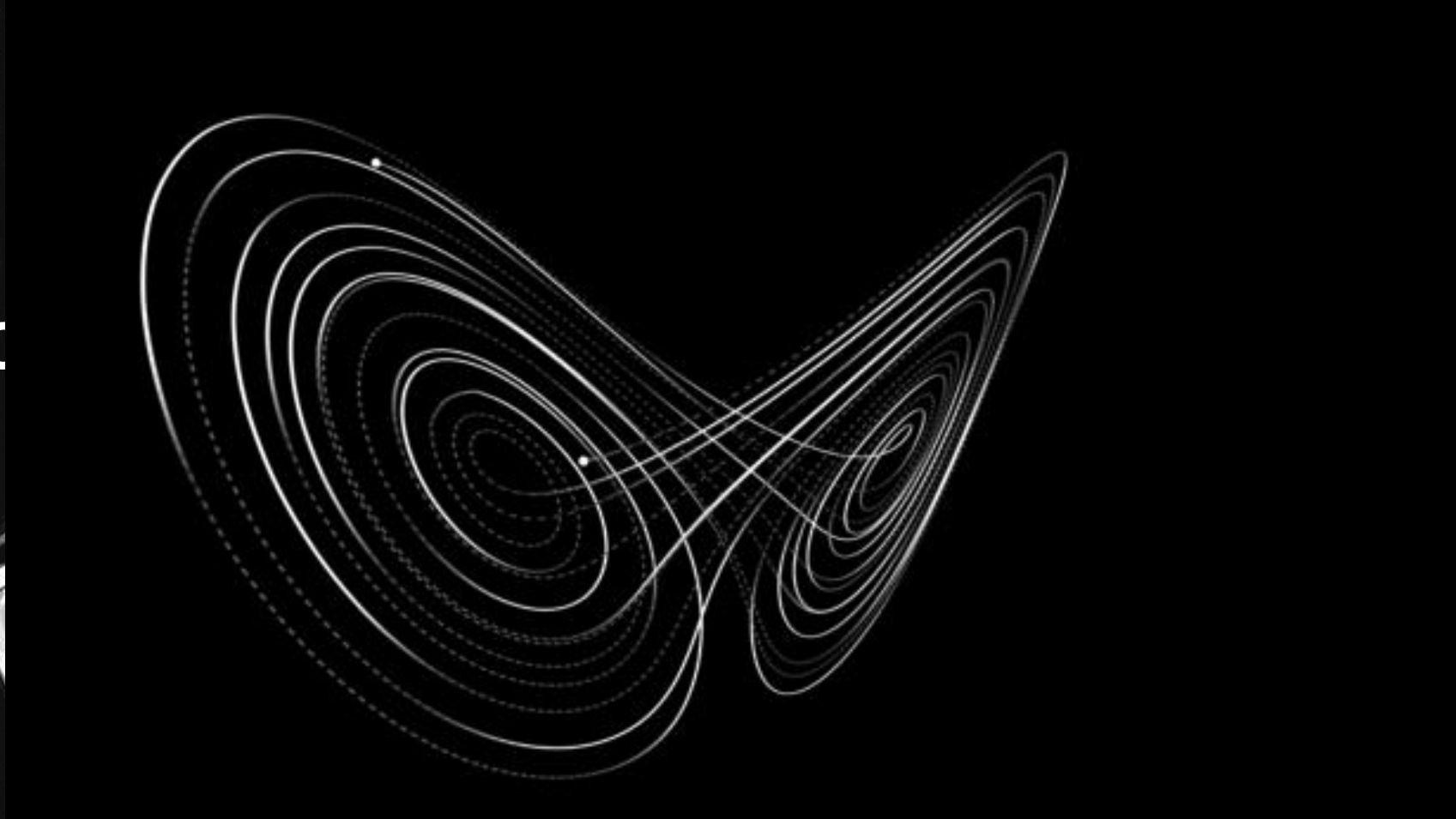


1.A: Yes!

2.Climate change makes FEW resource issues!

Chaos...

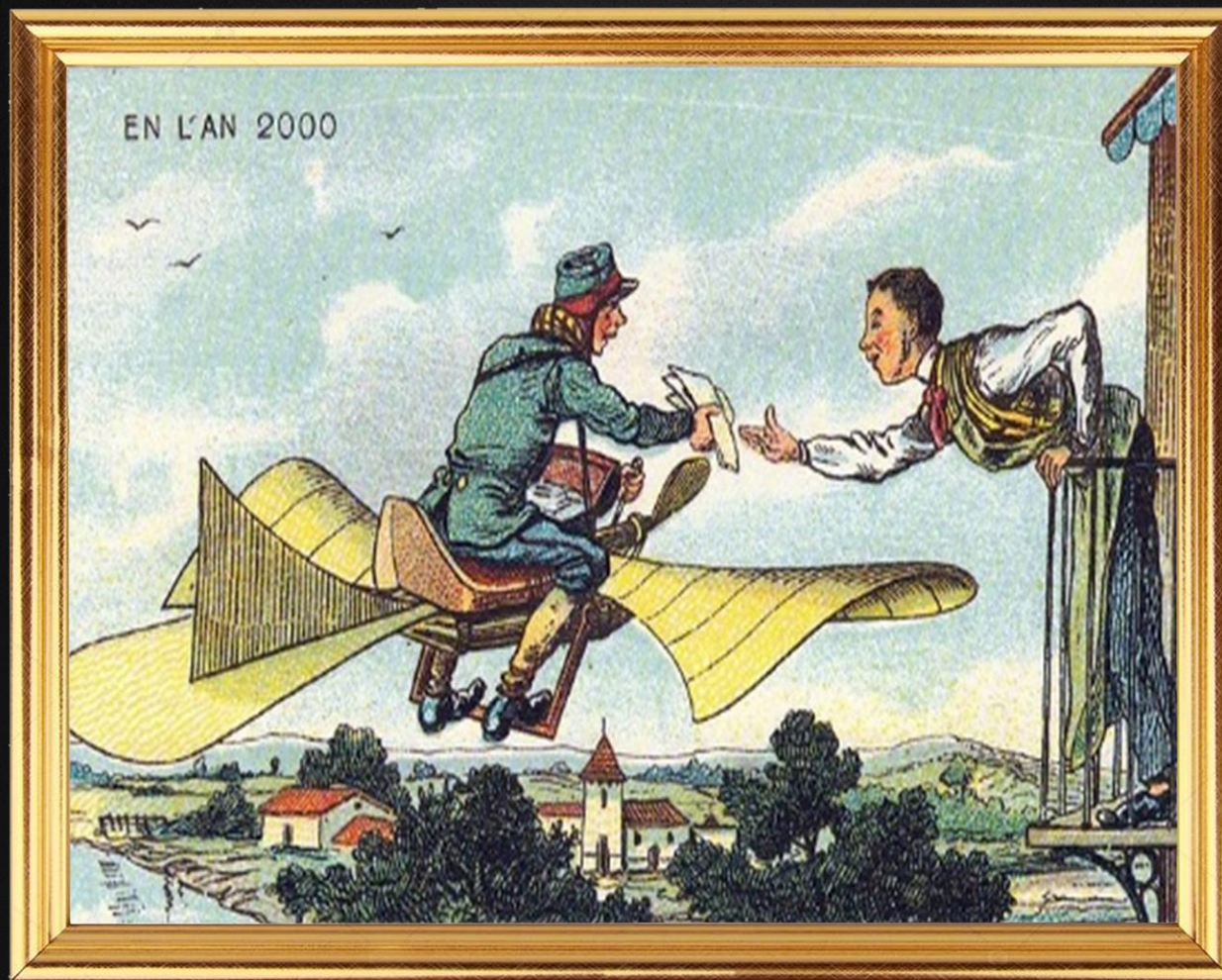
the formless state preceding the creation of the universe



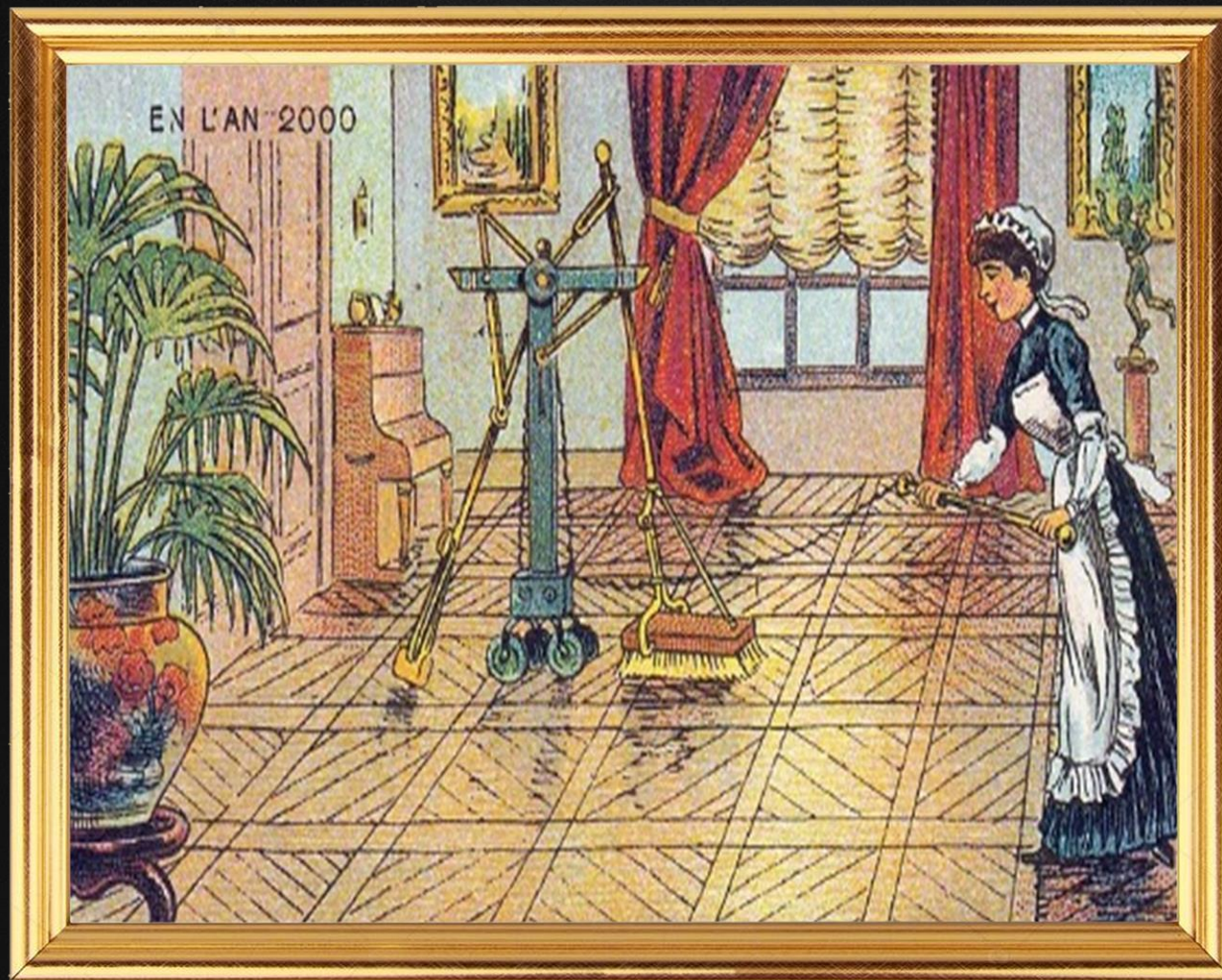
Everything we have known... will be changed.



Long time ago in 1900 (Jean-Marc Côté)



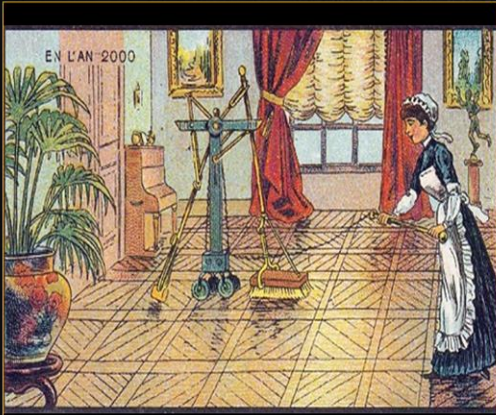
Long time ago in 1900 (Jean-Marc Côté)



Imagination in 1900

Present

Future



Robot Cleaner (2007)



100 yrs



Drone (2010)

30 yrs

Imagine
Something
Now...



Accelerated

⋮

⋮

⋮

The logo for 'Gi Gadgets' is located in the top left corner. It consists of a dark circular background containing the letters 'Gi' in a stylized, glowing yellow font. To the right of the 'i' are three curved lines representing a signal or Wi-Fi icon.

Gi Gadgets forecasts the year 2030

In the year 2030...

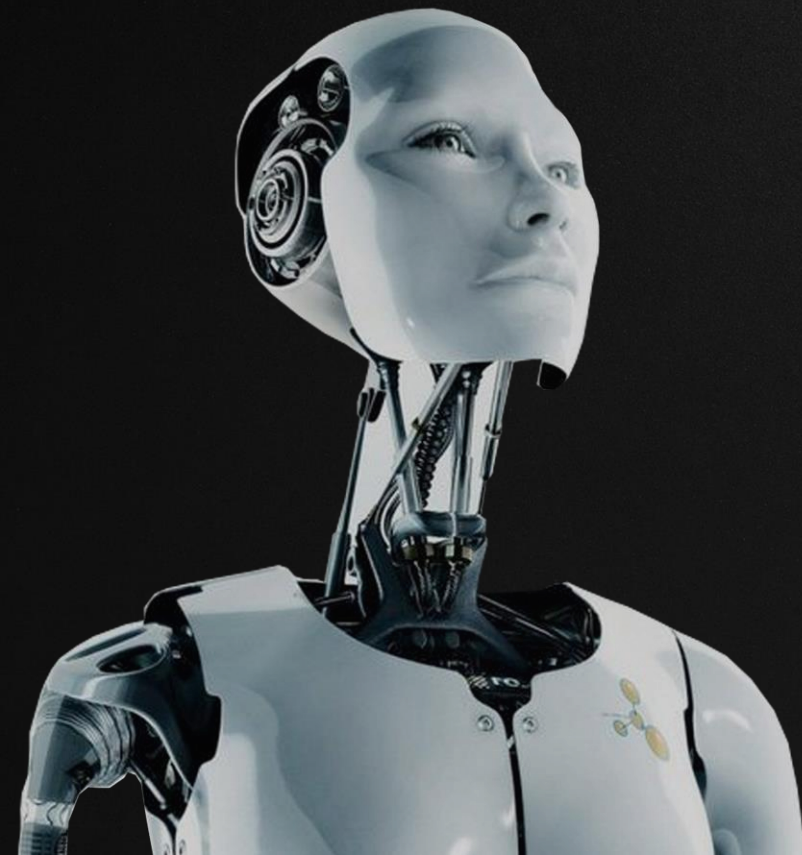
In the year 2050...
Everything we have known will be changed.



What is the 4th industrial revolution?

“The 4th revolution is characterized by a fusion of technologies that is **blurring the lines** between the physical, digital and biological spheres,”

- World Economic Forum (WEF), 2015 -

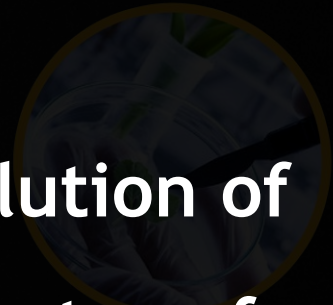


“The revolution of
a social structure for
the **cyber-physical**
production **systems**”

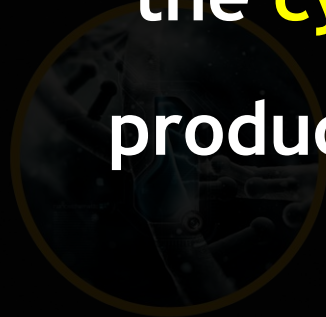
(CPS)



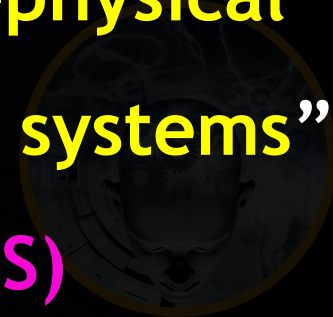
Information tech.



Bio-tech.



Nano-tech.



Cognitive Sci.

Big change of society by the 4th industrial revolution

- Technological development by the 4th industrial revolution
→ **Social structure change**



Substitution of
traditional jobs into
Intelligent Robots
Super-Intelligence



New education &
new service industry
(Virtual and/or
Augmented Reality)
Virtualization



Accelerated globalization
& Big changes of
traditional politics &
economy
Hyper-Connectivity

Key technologies for the 4th Industrial Revolution



IoT sensors



3D Printing



Virtual Reality



Bio-tech.



Drone



AI Robot

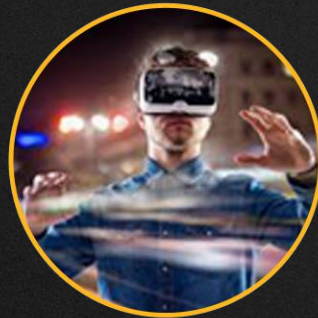
Key technologies for the 4th Industrial Revolution



IoT sensors



3D Printing



Virtual Reality



Bio-tech.



Drone



AI Robot

and...

Big Data

Basic value in the 4th industrial revolution

**Big Data
(D.I.K.W.)**

Increase
of value



Wisdom

Knowledge and experience
needed to make sensible
decisions and judgments

Knowledge

General awareness or possession
of information, facts, ideas,
truths, or principles

Information

A message, usually in the form of
a document or an audible or visible
communication

Data

Facts represented in
a readable language
(numbers, characters, or
images)

Why Big Data?

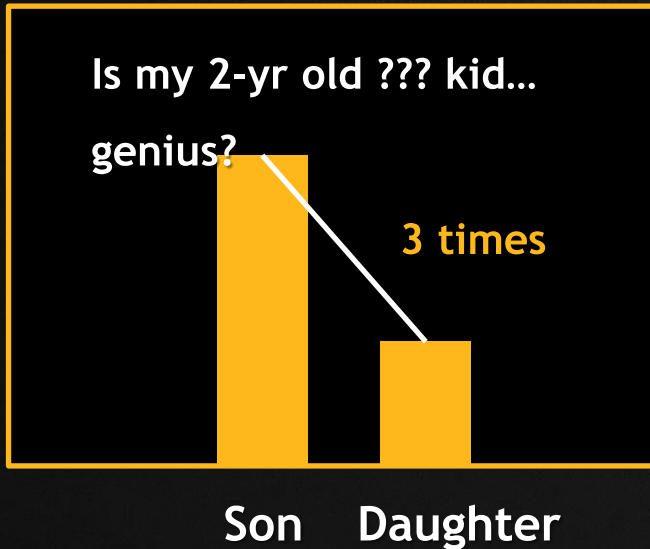
Big data reflect transparently the thought of people.

Virtualization of a bias

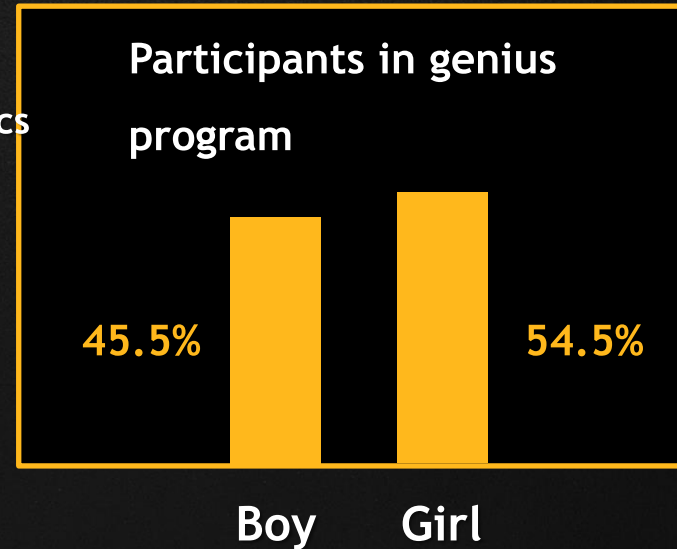


Is my 2-year old kid... **genius?**

Google
Search
Frequency



Actual
Statistics



➔ Big Data = Objective Facts

Big data application in self-driving car

Find the nearest Starbucks...

Big data application in off-line market

Just walk-out technology...

Big data application in humanoid robot

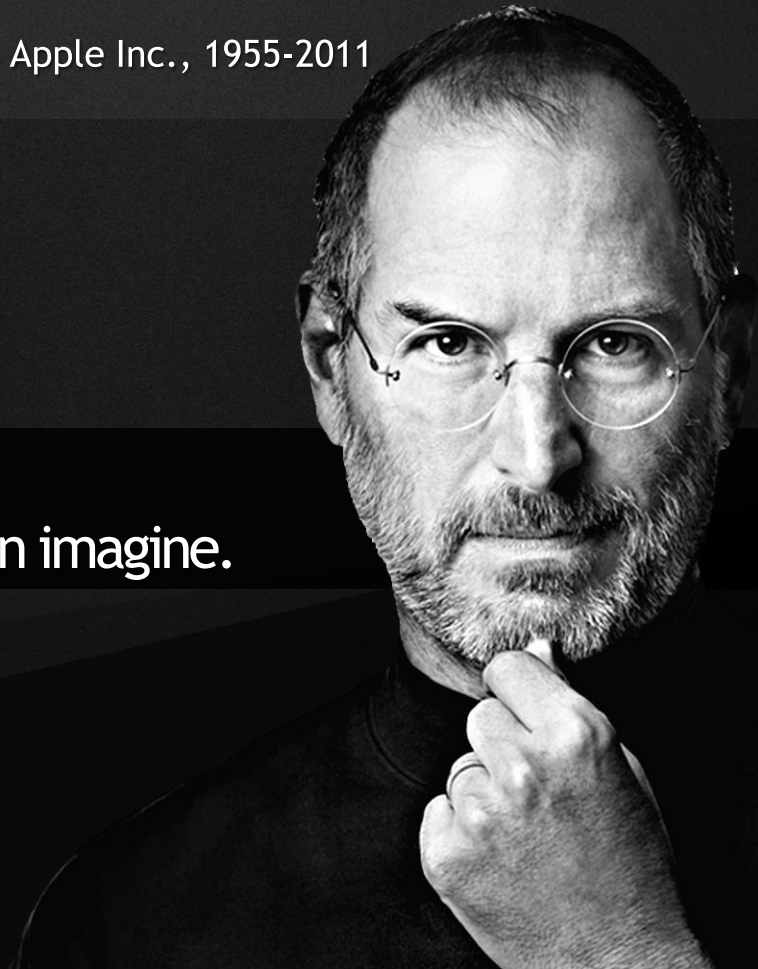
Atlas ... Boston Dynamics

What should we prepare for **the big data paradigm?**

“Creativity is just connecting things.”

- Steve Jobs, Entrepreneur & Inventor , Apple Inc., 1955-2011

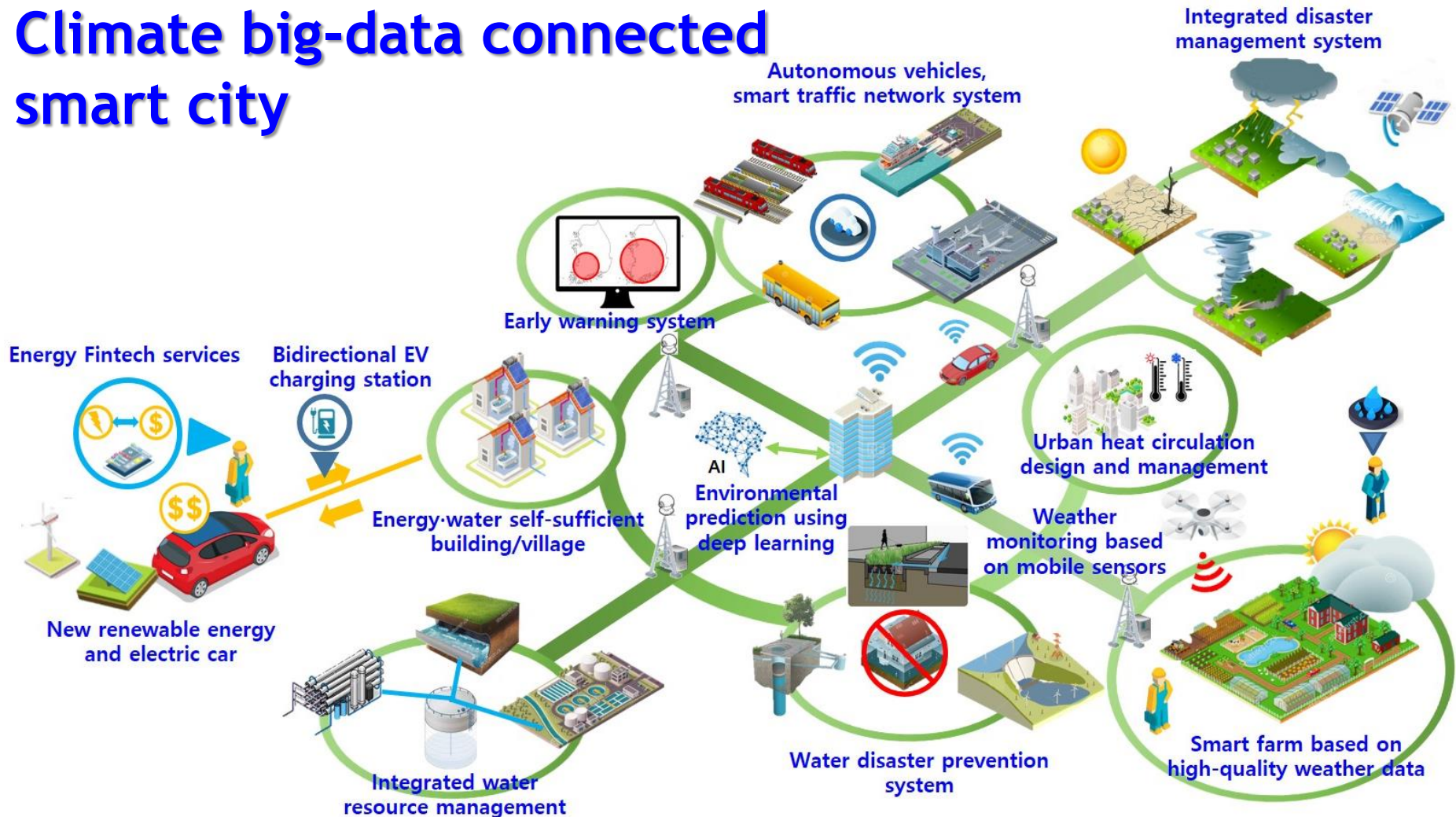
→ **Connectivity & Convergence...**
will be needed for all area you can imagine.



Intelligence Connected Society for adapting Climate Change

“New Business Model using Big Data”

Climate big-data connected smart city

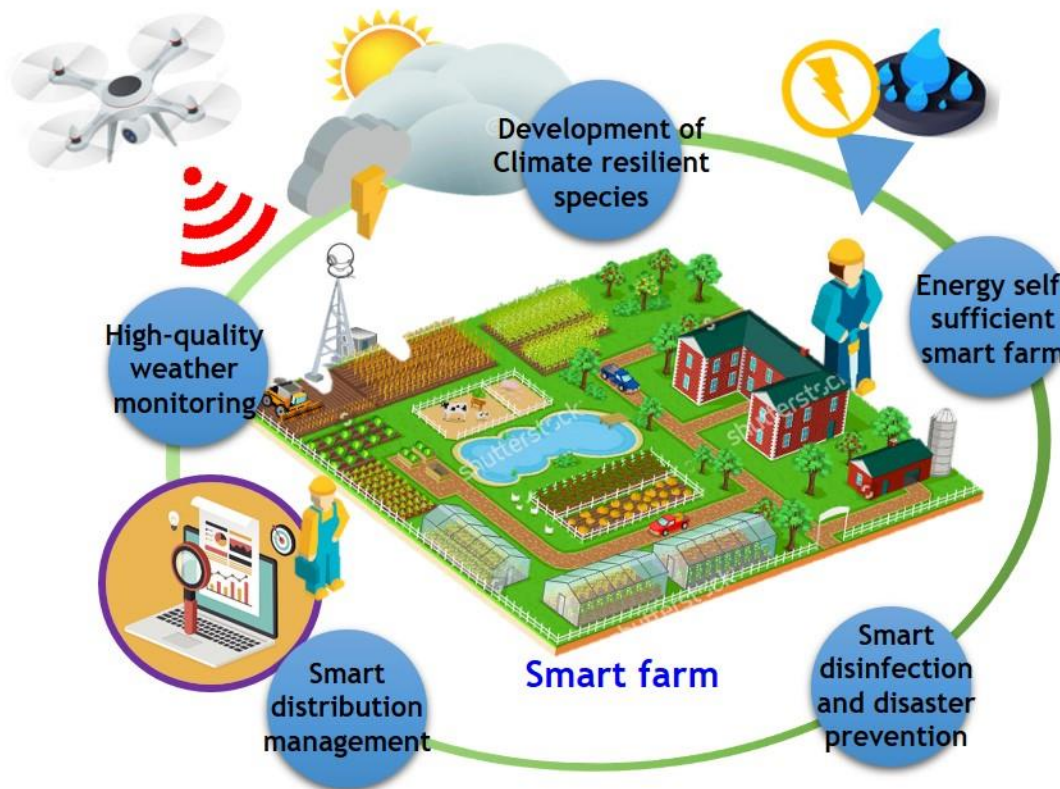


Intelligence Connected Society for adapting Climate Change

“New Business Model using Big Data”

Divide of **Food** resource → **Solution**

Smart farm based on high-quality weather data



What :

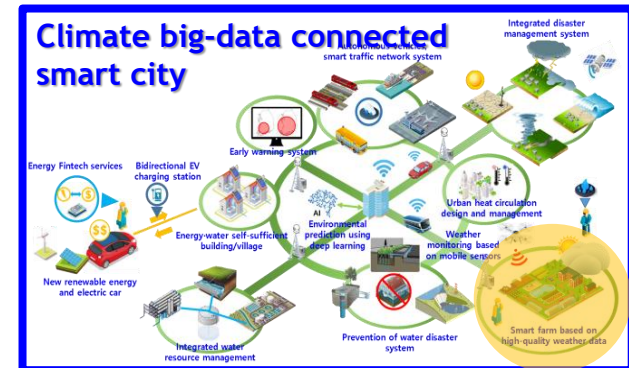
- High-quality weather monitoring
- Smart disinfection and disaster prevention
- Development and distribution management of climate resilient species
- Management of energy self-sufficient smart farm

Who :

- Municipality, Ministry of Agriculture and Forestry and other agencies

Where :

- Agriculture and forestry area

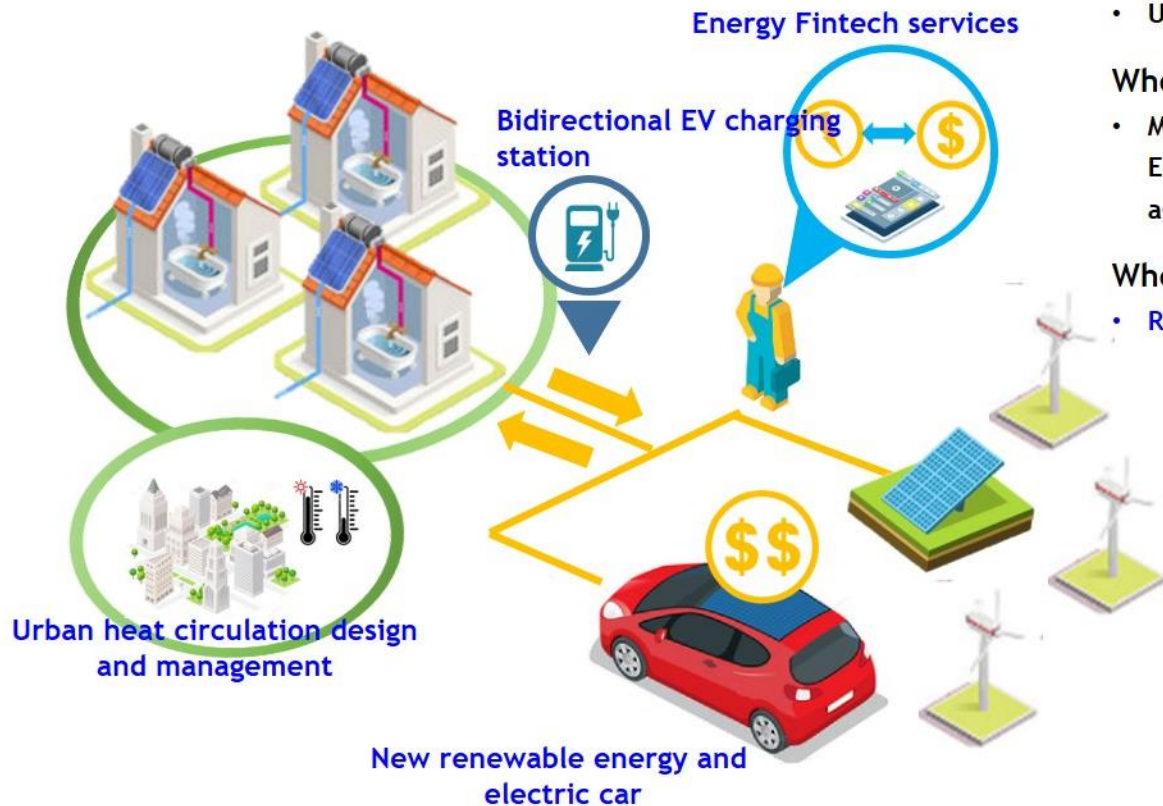


Intelligence Connected Society for adapting Climate Change

“New Business Model using Big Data”

Divide of **Energy** resource → **Solution**

Energy·water self-sufficient building/village



What :

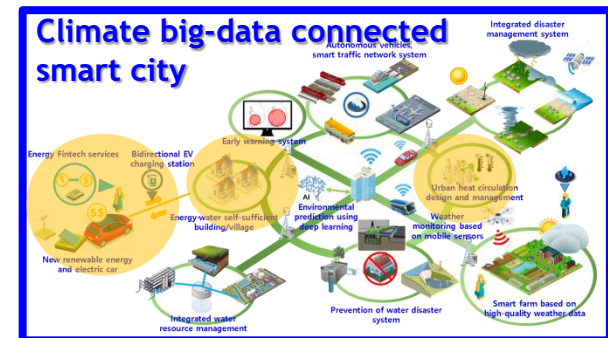
- Energy Fintech services
- Electric car technology
- Bidirectional EV charging station
- Urban heat circulation design and management
- Smart water grid
- New renewable energy

Who :

- Municipality, DOE(United States Department of Energy), EPA(Environmental Protection Agency) and other agencies

Where :

- Residential/Urban/Commercial/Industrial Area



Intelligence Connected Society for adapting Climate Change

“New Business Model using Big Data”

Divide of **Water** resource → **Solution**

Integrated water resource management



What :

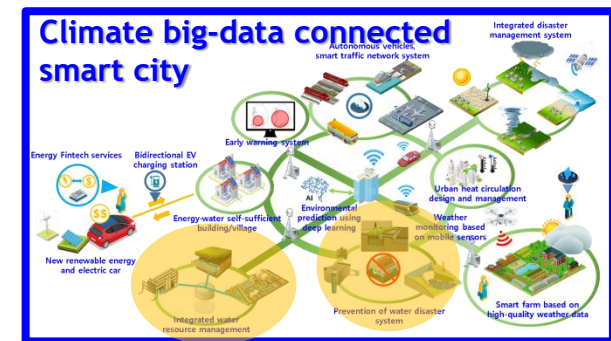
- Smart water grid
- Standard and support system of Low Impact development (Water disaster prevention)
- Big data analysis, hydro-economic analysis using AI

Who :

- Municipality, United States Department of Agriculture, Ministry of Agriculture and Forestry and other agencies

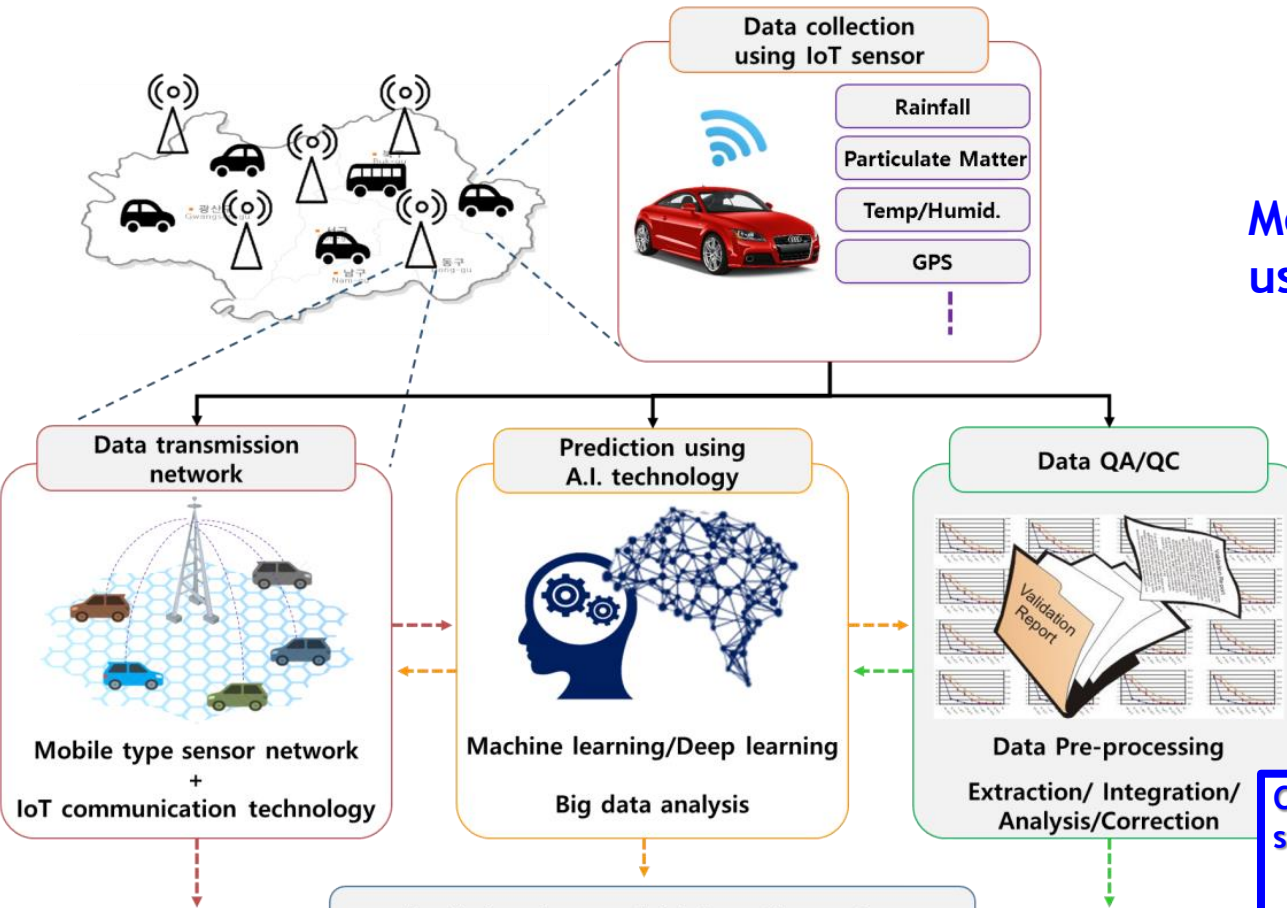
Where :

- Water Distribution Networks



Intelligence Connected Society for adapting Climate Change

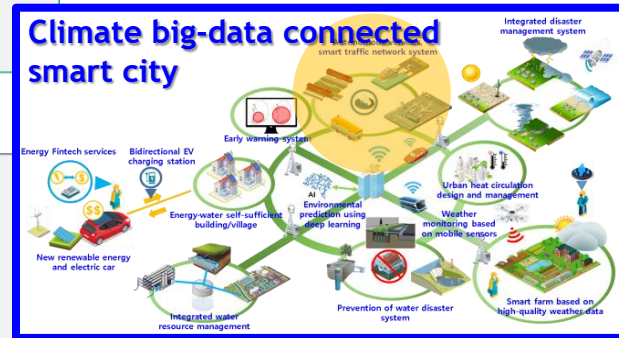
Mobile big-data generation using transportation



Applied environmental information system

Real-time monitoring platform
 Forecasting, Generating Input data for environmental model
 Visualization

The screenshots show a dashboard with a map of South Korea, a heatmap, and several line graphs. One graph is titled 'Global Land-Ocean Temperature Index' and shows a clear upward trend in temperature from 1880 to 2016. Another graph shows 'Global Mean Surface Air Temperature' with a 5-year running mean. The interface also includes a 'Weather Report' and 'Air Quality' indicators.



Intelligence Connected Society for adapting Climate Change

“New Business Model using Big Data”

Climate change prediction based on Artificial Intelligence



What :

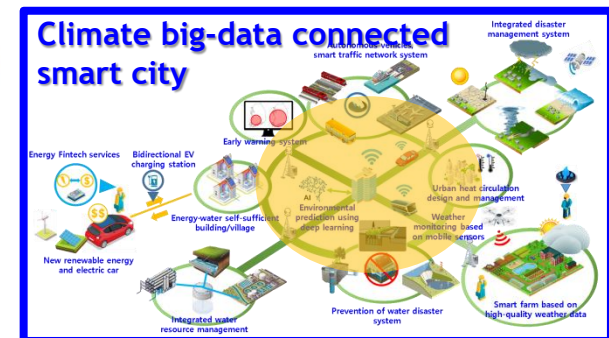
- Particulate matter(PM) monitoring
- Weather monitoring based on mobile sensors
- Environmental prediction based on deep learning
- Training talented person

Who :

- Municipality, NSTC(National Science and Technology Council), NWS(National Weather Service) and other agencies

Where :

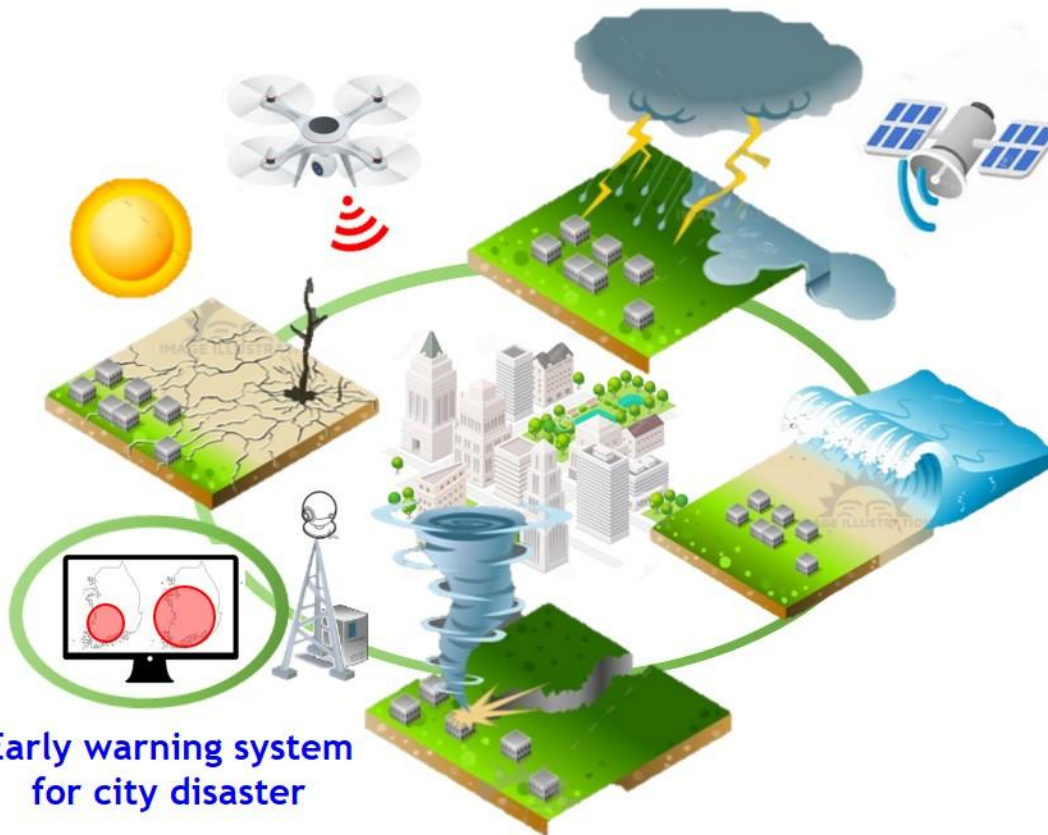
- Management area and urban/suburban areas



Intelligence Connected Society for adapting Climate Change

“New Business Model using Big Data”

Integrated disaster management system



What :

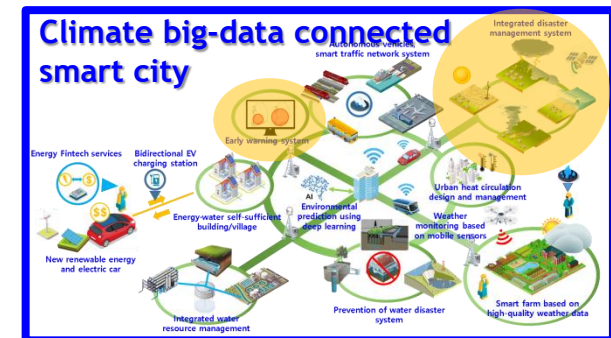
- Database construction
- Early warning system for city disaster
- Monitoring system based on IoT
- Disaster response decision support system

Who :

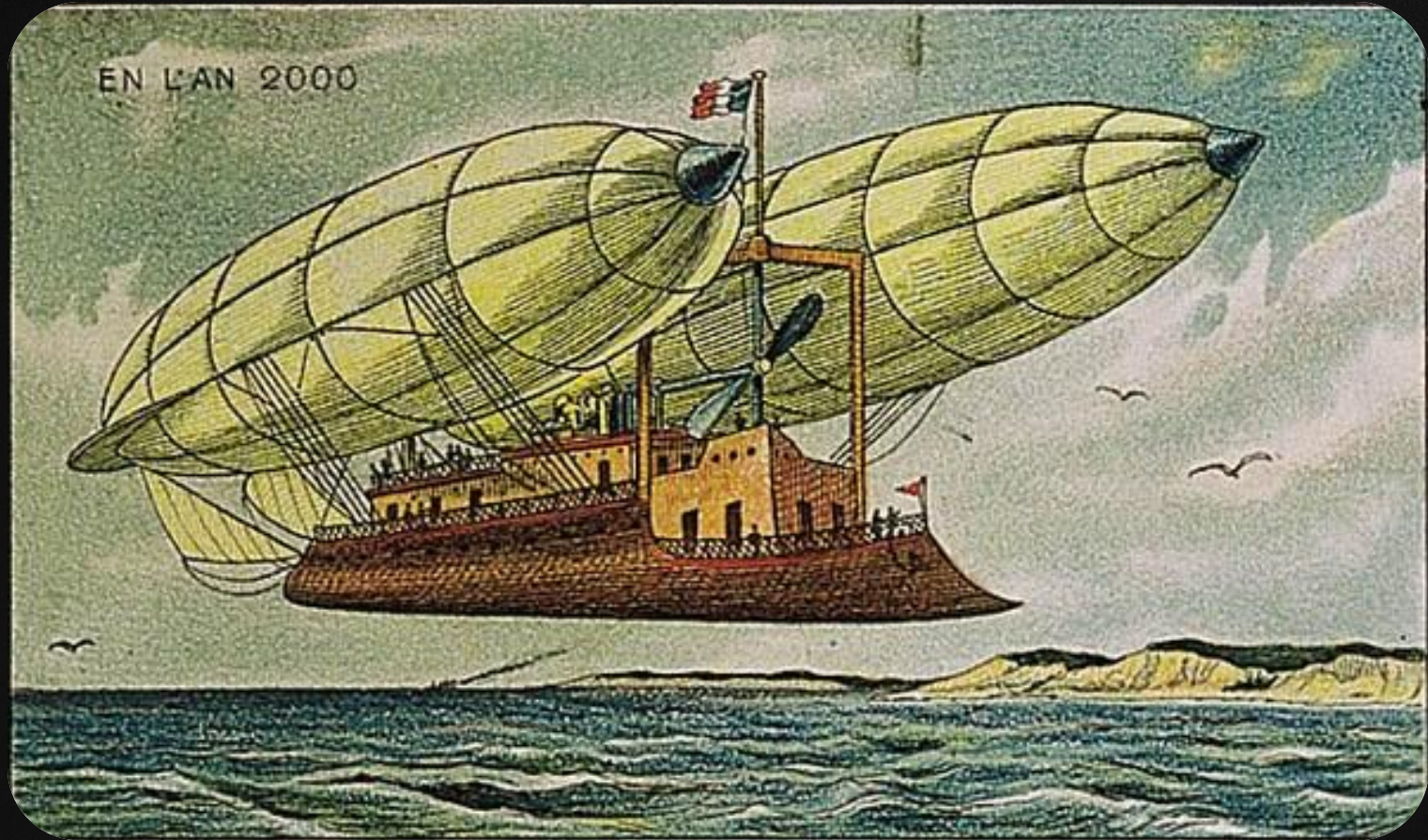
- Municipality, FEMA(Federal Emergency Management Agency), HHS(Department of Health and Human Service) and other agencies

Where :

- Residential/Urban/Commercial/Industrial Area



Long time ago in 1900 (Jean-Marc Côté)



Climate Big-data Industry (CBDI)

“Creativity is just connecting things.”

- Steve Jobs, Entrepreneur & Inventor , Apple Inc., 1955-2011

CBDI →

It's the time to start now !

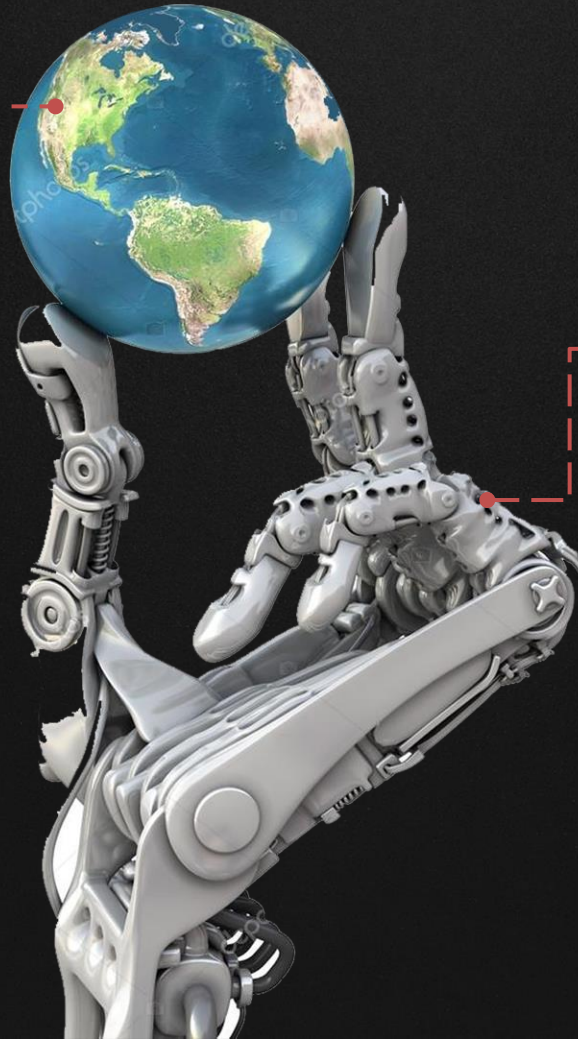


Everything we have known... will be changed in 2050.



"Global warming will make all the resources that humans have always felt free to be **payable**."

Need a cost !



Need a job !

"**Robots** are different from humans, so that they are **not tired**, they do **not make mistakes**, they do **not compromise** with anything"





What do we need for the era of
the 4th industrial revolution, climate change,
new-normal, post-human,
& Intelligence connected society ?

Connectivity

Convergence

Communication

Connectivity, Convergence, & Communication...

→ “**Collaboration** and/or **Cooperation**”

To prepare for the post-human era of climate change and the 4th industrial revolution, we need to learn to collaborate through connectivity, convergence, and communication.

“ **We will find a way, we always have** ”



✓ Thank you !