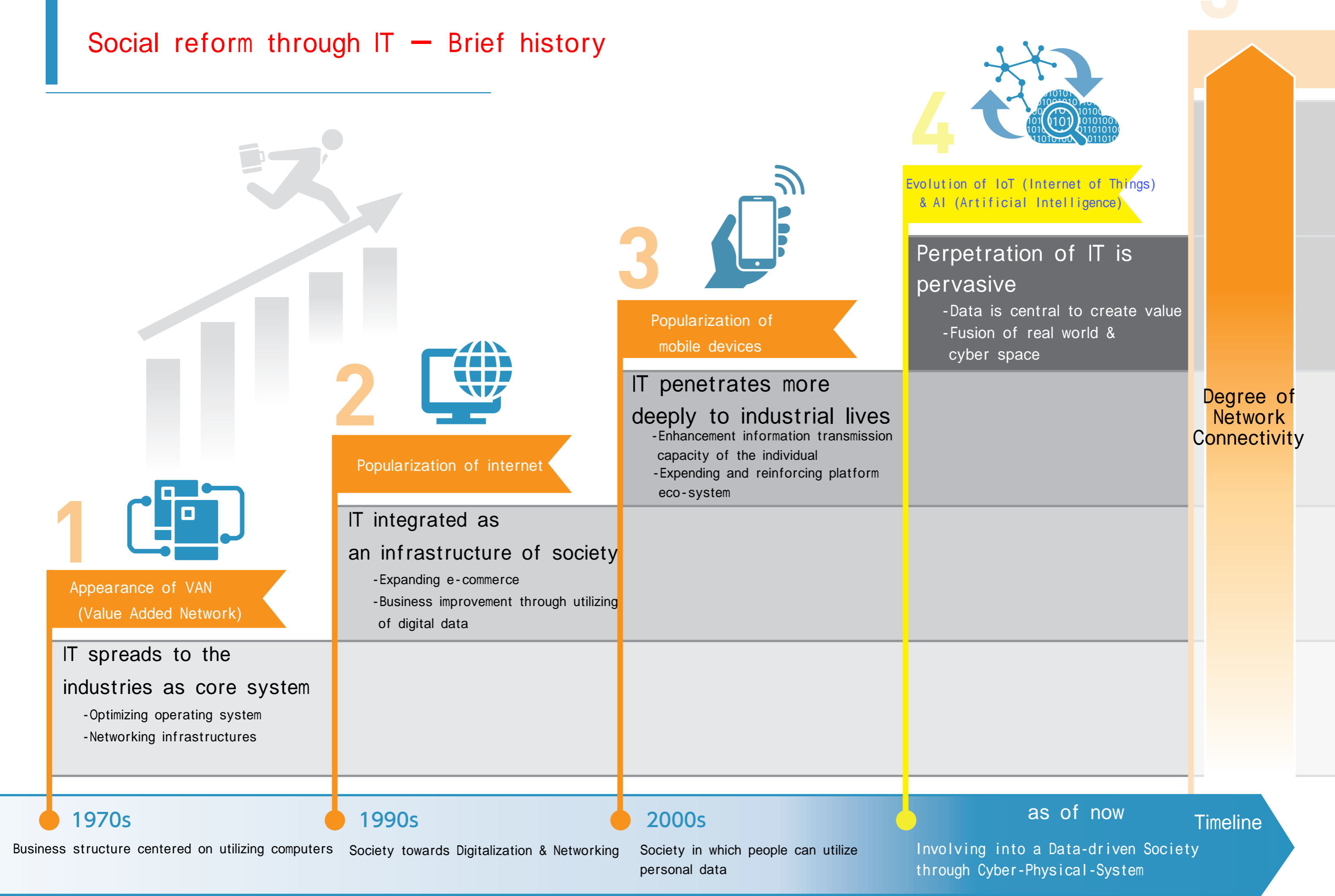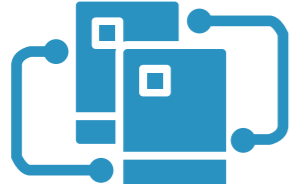# Social reform through IT   Brief history

1

Appearance of VAN
(Value Added Network)

IT spreads to the
industries as core system
- Optimizing operating system
- Networking infrastructures

2

Popularization of internet

IT integrated as
an infrastructure of society
- Expanding e-commerce
- Business improvement through utilizing
  of digital data

3

Popularization of
mobile devices

IT penetrates more
deeply to industrial lives
- Enhancement information transmission
  capacity of the individual
- Expending and reinforcing platform
  eco-system

4

Evolution of IoT (Internet of Things)
& AI (Artificial Intelligence)

Perpetration of IT is
pervasive
- Data is central to create value
- Fusion of real world &
  cyber space

Degree of
Network
Connectivity

1970s
Business structure centered on utilizing computers

1990s
Society towards Digitalization & Networking

2000s
Society in which people can utilize
personal data

as of now
Involving into a Data-driven Society
through Cyber-Physical-System

Timeline

"Data-drivenSociety" through CPS (Cyber-Physical-System)

Society where CPS is implemented throughout social activity, and huge value is created
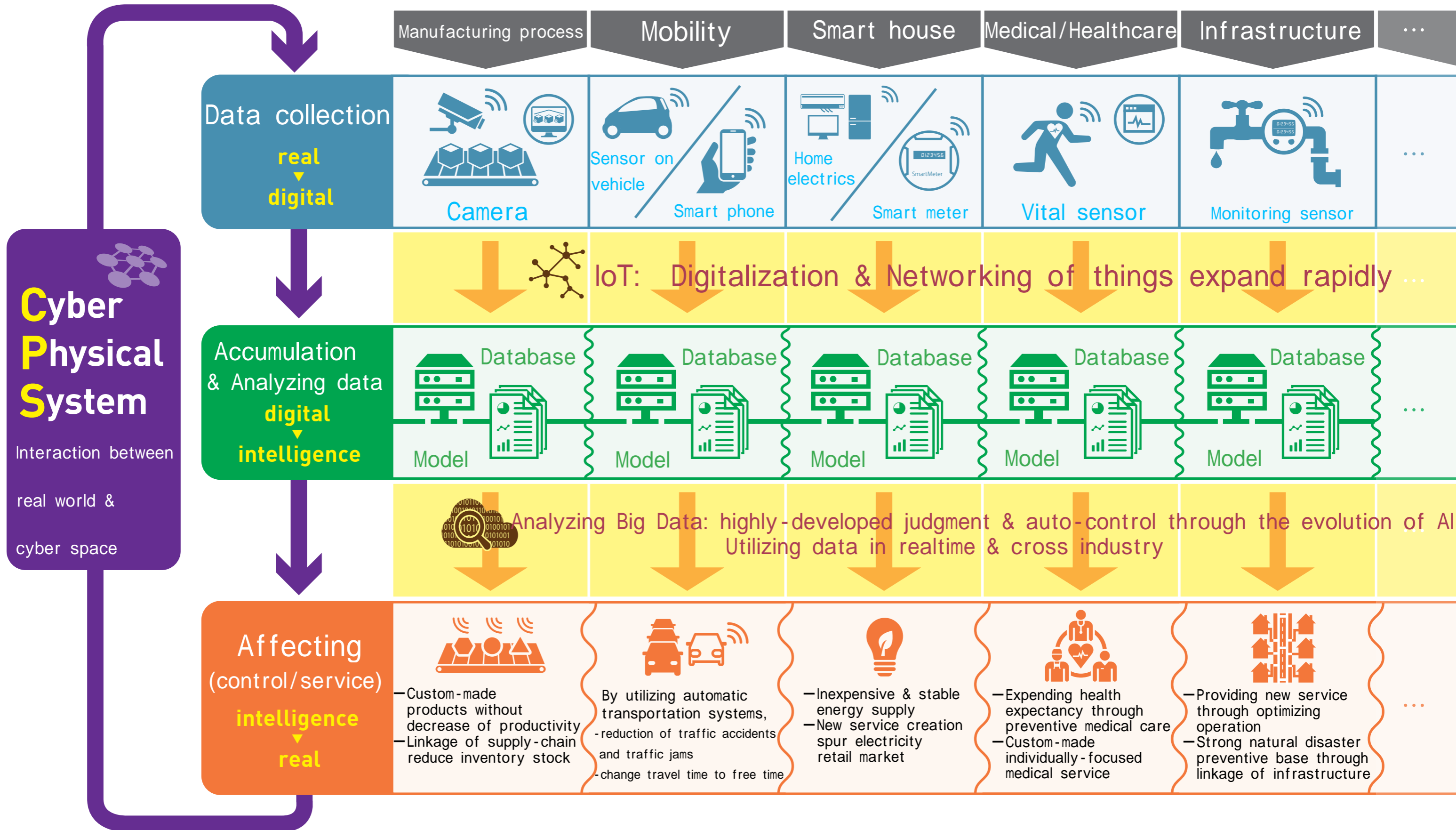
	Manufacturing process	Mobility	Smart house	Medical/Healthcare	Infrastructure	...
Data collection real ▼ digital	Camera	Sensor on vehicle / Smart phone	Home electrics / Smart meter	Vital sensor	Monitoring sensor	...

IoT: Digitalization & Networking of things expand rapidly ...

	Manufacturing process	Mobility	Smart house	Medical/Healthcare	Infrastructure	...
Accumulation & Analyzing data digital ▼ intelligence	Database Model	Database Model	Database Model	Database Model	Database Model	...

Analyzing Big Data: highly-developed judgment & auto-control through the evolution of AI
Utilizing data in realtime & cross industry

	Manufacturing process	Mobility	Smart house	Medical/Healthcare	Infrastructure	...
Affecting (control/service) intelligence ▼ real	Custom-made products without decrease of productivity Linkage of supply-chain reduce inventory stock	By utilizing automatic transportation systems, - reduction of traffic accidents and traffic jams - change travel time to free time	Inexpensive & stable energy supply New service creation spur electricity retail market	Expending health expectancy through preventive medical care Custom-made individually-focused medical service	Providing new service through optimizing operation Strong natural disaster preventive base through linkage of infrastructure	...

**Cyber Physical System**

Interaction between real world & cyber space

and Challenges of Deta-driven Society through CPS

Drastically change basic structure of value creation

Revolutionary change of business model occurs in every business sector
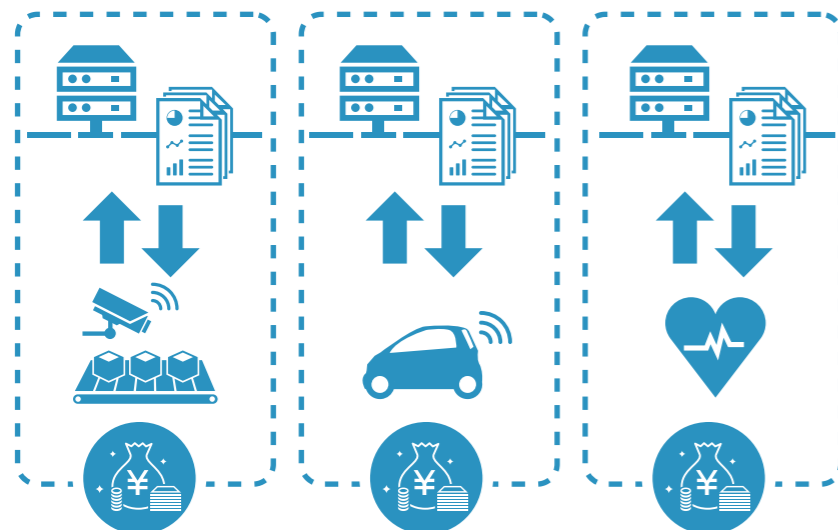
- In the mobile phone business sector, sources of value creation have shifted from " device" to " service" as a result of OS software platform
- Devices become commodified and manufacturers lost sources of competitiveness
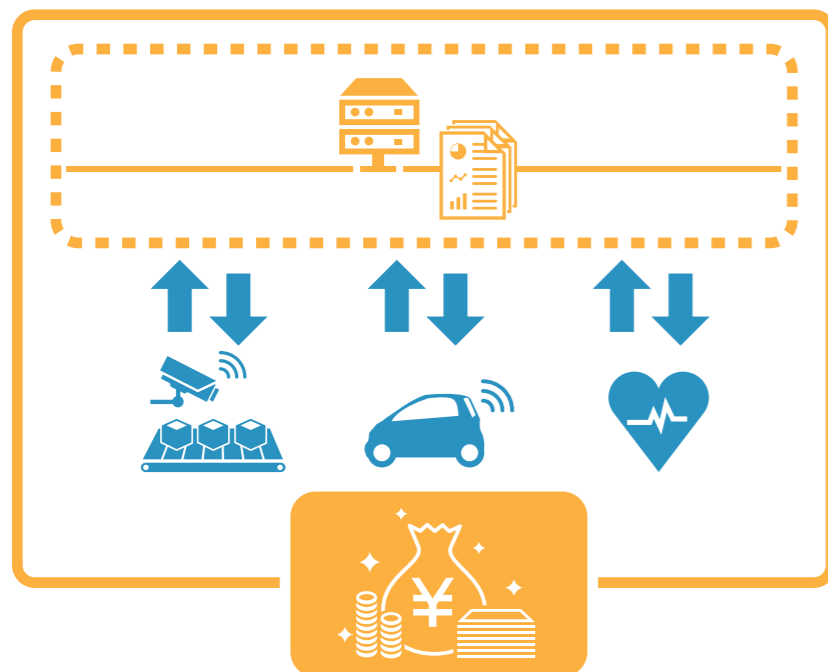
A delayed response risks major losing their competitiveness

Cross industrial revolution is inevitable
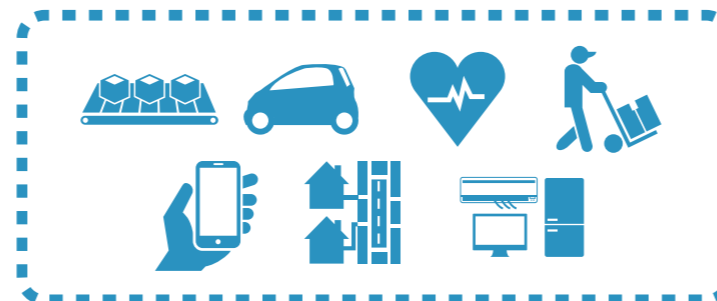
Japanese industries including auto and machinery manufactures face strong complexities unless appropriate counter measures are taken

Foreign trends

Germany

Implement " Industry4.0" strategy optimizing research, development, manufacturing and distributing process through IoT

United States

- GE has developed new system where industrial devices can be highly controlled by connecting to the internet and analyzing data
- Utilized in various business sectors, including electricity, medical and aircraft manufacturing
- Google has expanded its business from cyber space to the real world such as autonomous vehicle, robots, energy, etc.

Japanese companies have the opportunity to gain competitiveness if they shift business models to new data-driven ones

Competition of CPS has just begun

Cross industrial cooperation with other companies, and swift & flexible shift to value creation model considering user needs is necessary

3 keys for CPS

Challenge

New business models will be discovered via heuristic challenges to traditional methods and systems

1

Cooperation

Strategic cooperation among players is necessary in order to develop on data-driven business model smoothly

2

Speed

Swifter players getting data and implementing business model will have competitiveness

3

Sectional measures to realize Data-driven Society through CPS

Japan must become the "Testbed" which can swiftly respond to active challenges through collaboration of companies

Direction I: Changing institutions

Task

The current legal institutions currently do not reflect developments in IT, which inhibits the free flow of data among companies

For example,

- Relationship between new businesses and current regulations such as autonomous driving under the "Read Traffic Act," and sharing businesses under current business sector regulation etc. could cause legal issues
- Security and privacy concerns

### Institutional reform to create new businesses

- Framework for business creation utilizing data
- Framework to improve ability to cope with security risks
- Considering revision of the "Law for Information Processing Promotion" and its implementation scheme

Direction II: Promoting pioneering spirit

Task

- Companies tend to be sticking to own specific technologies and are unable to establish and participate in eco-systems where cooperative relationships with other companies
- Challenge spirit is limited to develop game-changing including venture
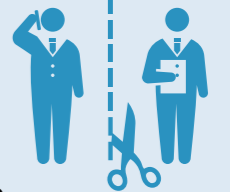
Creating new industrial model through collaboration with companies

- Creating CPS business case studies in each industrial field.
  Promoting regulatory reform through establishing special economic zones
  Creating regulations on privacy, standards, cyber-security, etc.
- Establish "CPS Promotion Council (tentative title)" within this year as core base for collaboration
- Making a contract format for a "Data Exchange Market"

Strengthening environment of companies drastically to innovate in CPS

- Create scheme in which stock market correctly and positively evaluates aggressive adoption of CPS business
- Establish "Start-up Accelerator Association" in which senior entrepreneurs support new entrepreneurs in developing game-changing innovation

Direction III: Establishing infrastructures

Task : Security
1

There are serious cyber-security risks as cyber-attacks become more and more common

Strengthening cyber-security countermeasures through the government's initiative

- Making "Security Management Guideline" for CPS
- Making corporate activities visible by encouraging third-party certification and its international standardization
- Making scheme for information sharing regarding cyber-attacks and countermeasures

Task : Technologies
2

There is insufficient core technology supporting CPS

Leading the most advanced core technology for CPS in the world

- AI research center will be established at AIST (National Institute of Advanced Industrial science and Technology) which operates a platform for leading evolution of basic research and real world implementation
- Strengthening R&D activities, for example, development of sensor systems without external electrical power, and analysis algorithms for Big Data

Task : Human resources
3

IT human resources are insufficient in both quality and quantity for CPS. Low productivity persists because of the subcontracting structure

Securing IT human resources for CPS

- Establish scheme which supports finding jobs in Japan and study abroad programs to Japan in order to recruit high-level IT human resources from India, Vietnam, etc.
- Strengthen "Subcontracting Guideline" which accelerate proper subcontracting to decrease cyber-security risk and improve productivity
- Securing and training persons who have knowledge both IT and business management for expansion CPS business

Sectional measures to realize Data-driven Society through CPS

Manufacturing process

Future Image
- Optimizing design, manufacturing and maintenance management
- From standardized products to custom-made products

Examples
- Compiling best practices of connecting data among companies and factories
- Developing standardized tools to analyze manufacturing process and product data
- Drastically shortening development period by introducing "model-based" methods etc. in the auto-industry

Distribution

Future Image
From mass-production and sale of standardized products to selling products matching individual tastes with zero lead time

Examples
- Sharing data within complete supply chain, improving accuracy of demand forecasts, real-time stock control and optimizing stock
- Establishing efficient auto-distribution systems

CPS Promotion Council (tentative name) (core base for collaboration)

Creation of industrial model (earning and handling methods)

Plan proposal of industrial model creation

Making cross-sectorial rules necessary for creating and expanding new business privacy, cyber-security, data trading contracts, etc.

Matching major corporations and venture businesses

Considering utilization of special zone system etc.

Mobility

Future Image
In addition to reducing traffic accidents and traffic jams, creating new mobility by utilizing autonomous driving technology

Examples
- Preparing environment to promote efficient technology development such as traveling vehicle camera video images data base
- In addition to creating and verifying digital map prototypes
- Considering international collaboration and business models by utilizing autonomous driving technology

Infrastructure/Industrial safety

Future Image
Sustainable management and expansion of private companies participation in public infrastructure, improving maintenance standards, and reducing burden of regulators

Examples
- Improving self-maintenance technology
- Making smart water supply business by utilizing sensor etc.
- Considering incentives to front-runners

Smart house

Future Image
- Inexpensive and stable energy supply
- Vitalizing electricity retail markets through new service creation

Examples
- Creating world-leading, attractive services by utilizing HEMS data which will be a differentiating factor in the electricity retail market
- Considering legal measures such as preparing "Guidelines for negawatt power trading" to launch demand response service

Administration

Future Image
Drastic improvement of service through data-driven administration

Examples
- Developing real-time economic index to complement official statistics, future forecasts utilizing information provided by individuals and companies
- Establishing highly developed support systems such as prior art searches in patent examinations supported by AI

Medical/Healthcare

Future Image
Adjusting social cost of medical expenses through proliferation of prevention service

Examples
- Preparing environment that gathers and utilizes health data through various devices
- Development of medical devices and systems which enable analysis and utilization of medical information including diagnostic and therapeutic information