

Basic Understanding on Industrie4.0/ I o T ~ Structural Change of Industry through Digitalization of Business Processes ~

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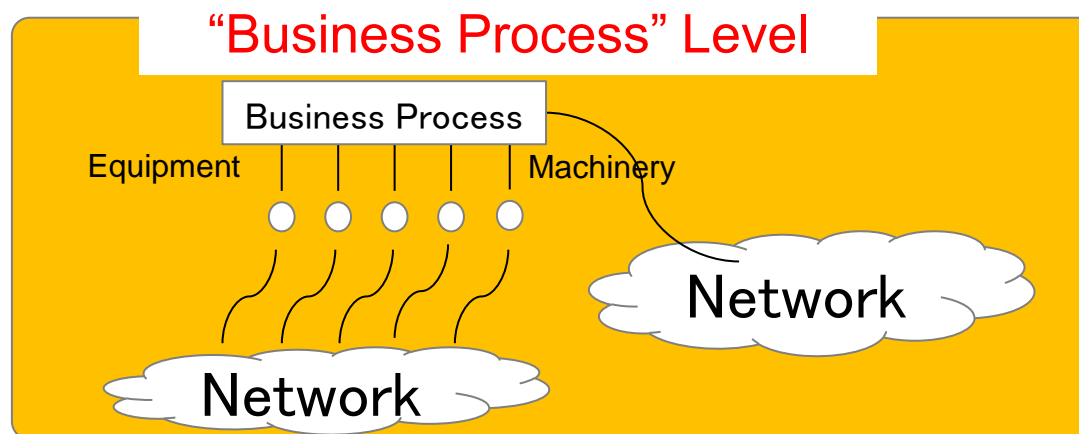
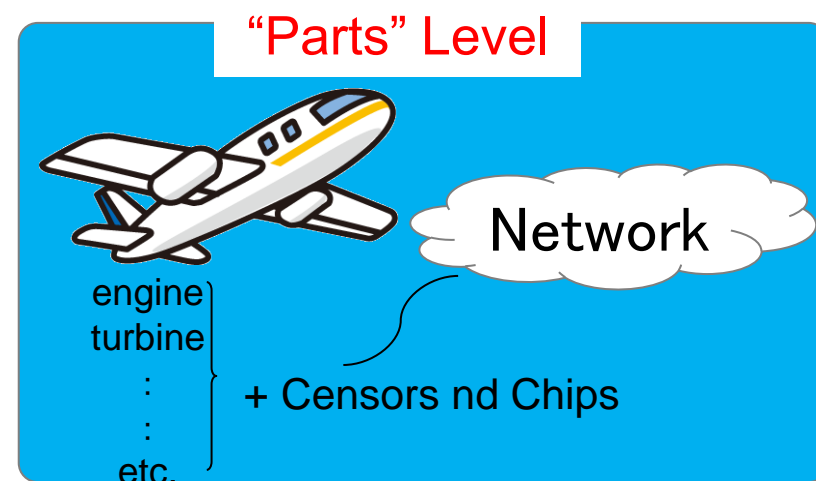
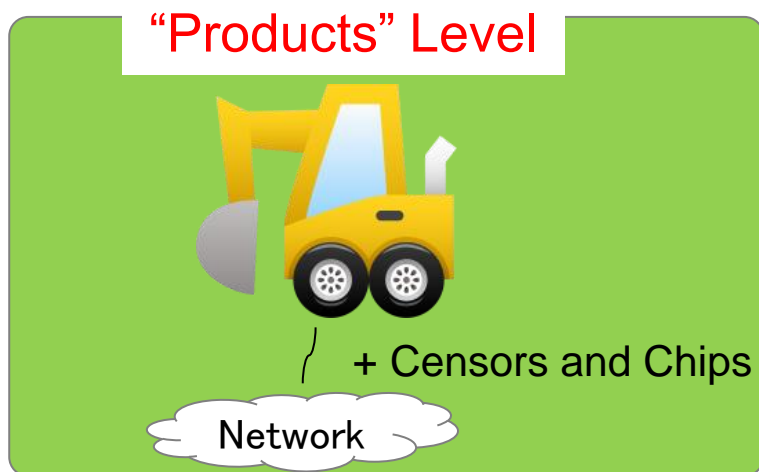


Some Points to avoid Misunderstandings

- Different Views to Industry 4.0 depending on each position
 - Each person sees different figures of “Industry 4.0” .
 - End product manufacturer, parts manufacturer, equipment maker and so on have each own interests. **Depending on its own position, each conveniently understands the phenomena to itself.** That's why the argument doesn't meet.
- People differently understand what IoT is.
 - **IoT is too big concept to understand totally. Most people don't distinguish “ micro IoT” (level of products, equipment and parts) from “macro IoT” (level of business processes).**
- Confusion of Means and Purposes
 - IoT/loE: Everything is connected to the Internet, and various data can be collected and analyzed to use. The more important is **what to realize using IoT/loE.**
 - Industry 4.0 is the adoption of ICT to business processes (**CPS, Cyber Physical System**). The purpose is to realize **Scalability and Open-Close strategy.**
- Standardization/Openness vs Lock-in/Enclosure
 - “Industry 4.0” seeks **standardization of interface and black-boxed modulation.**
 - Some companies seek de facto standard or vendor lock-in.
- What is the main target area?
 - Main target areas are not advanced countries but new emerging ones.
 - **Speedy deployment for vast demand while keeping “core brain” in the headquarters**

Varieties of I o T / Industry 4.0

■ IoT may be deepened from “products plus network” to “parts plus network” in micro direction and evolve into “Aggregation of equipment and parts plus network” (Networked Business Process) in macro direction.



The situation of whole process can be grasped by things individually networked such as equipment, machinery and parts in the business process.

Direction toward Industry 4.0

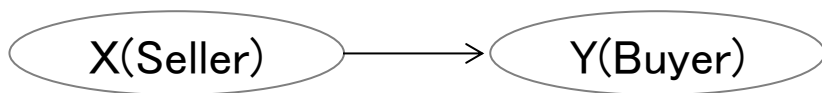
Simple product connected (Added value by Network)

- From Goods to Services -

From “Sales to Customers” to “Provision of What Customers Seek”

- **KOMTRAX By Komatsu** : Proposals on the best using ways, provision of the most adequate maintenances, remote stop at the time of theft, etc. by online monitoring of the working situation (operating time, running time zone, detection of abnormality and so on.)
- **Online boilers by MIURA, Medical testing equipment by Sysmex, Copy and print machines by Fuji-Xerox, etc.**
- **Google’s trial on automatic running of the automobiles** seems to be the effort to make products to services from the upper layer of ICT industry.

【Simple Sales of products】



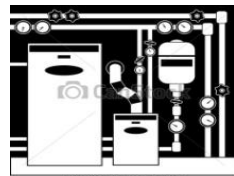
Selling and Buying of products



Construction machines

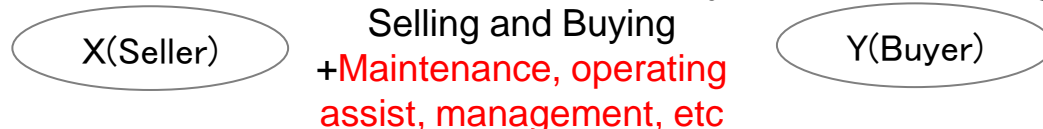


Copy machines

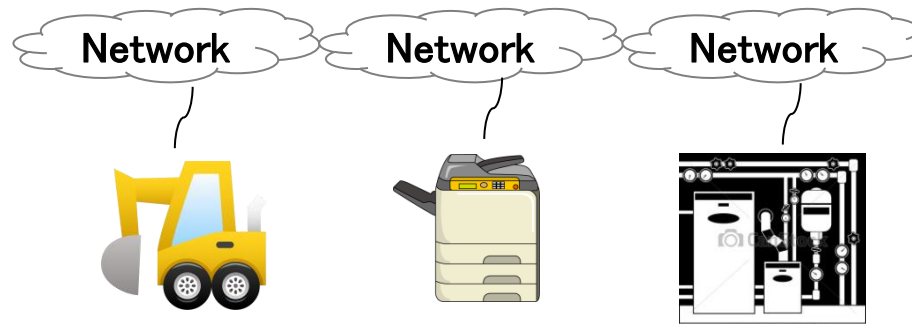


Boilers

【Sales of added values by networking】

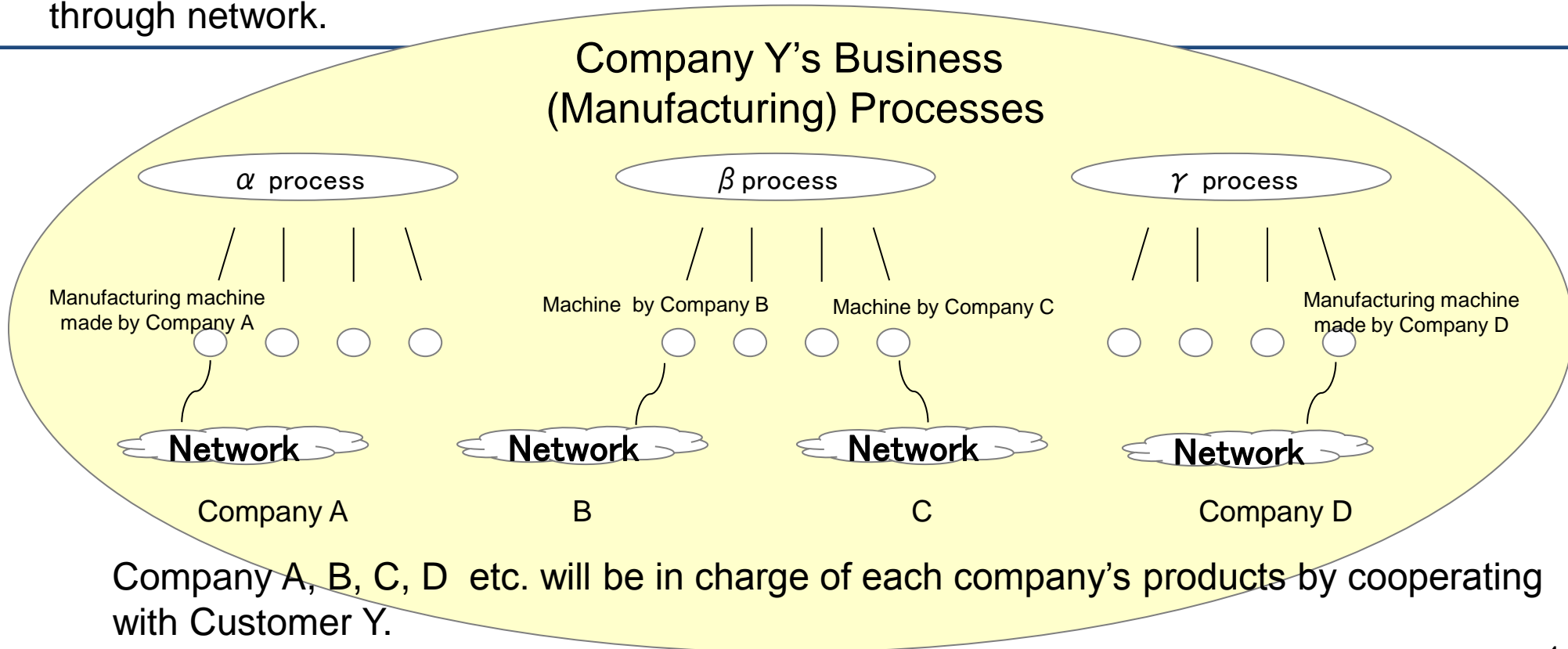


- Online Monitoring, some of functions provided by cloud services
- ✓ Maintenance and Management
- ✓ Data collection on operating situation, location, running time zone etc.



Introduction of connected apparatus and equipment into business processes

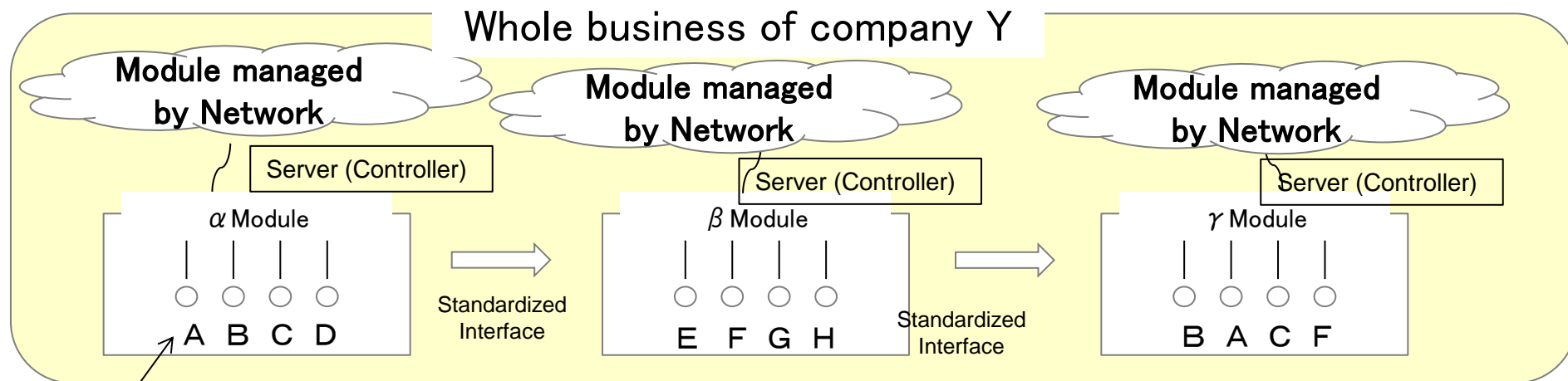
- Connected devices (equipment and apparatus) will be gradually installed in business processes (not only manufacturing ones).
- Sales companies may contribute to user companies' efficiency by **using data produced by each apparatus and equipment.**
- **Mechanical parts(hardware) and control part (software) of will be separated** and maintenance, management and even improvement will be operated by data analysis through network.



Structural Change of Industry and Realization of Horizontal Division

— Modularization & Standardization of Interfaces —

- “Modularization of each business process” and “Standardization of Interfaces between modules” → Quick start of business operation in new emerging countries: Package service, “Plug and Play (Produce)” and Remote control from home country
- Possible market entrance into each module (business process) & Horizontal Division: **All industries will be changed into something like PC and Semiconductor industry.**
- Standardization and Interoperation among apparatus and equipment used “in a business process” will make more competitions among makers
- This change will occur to not only manufacturing but also **agriculture, retailing, distribution, medical treatment, financing** and other service industries.

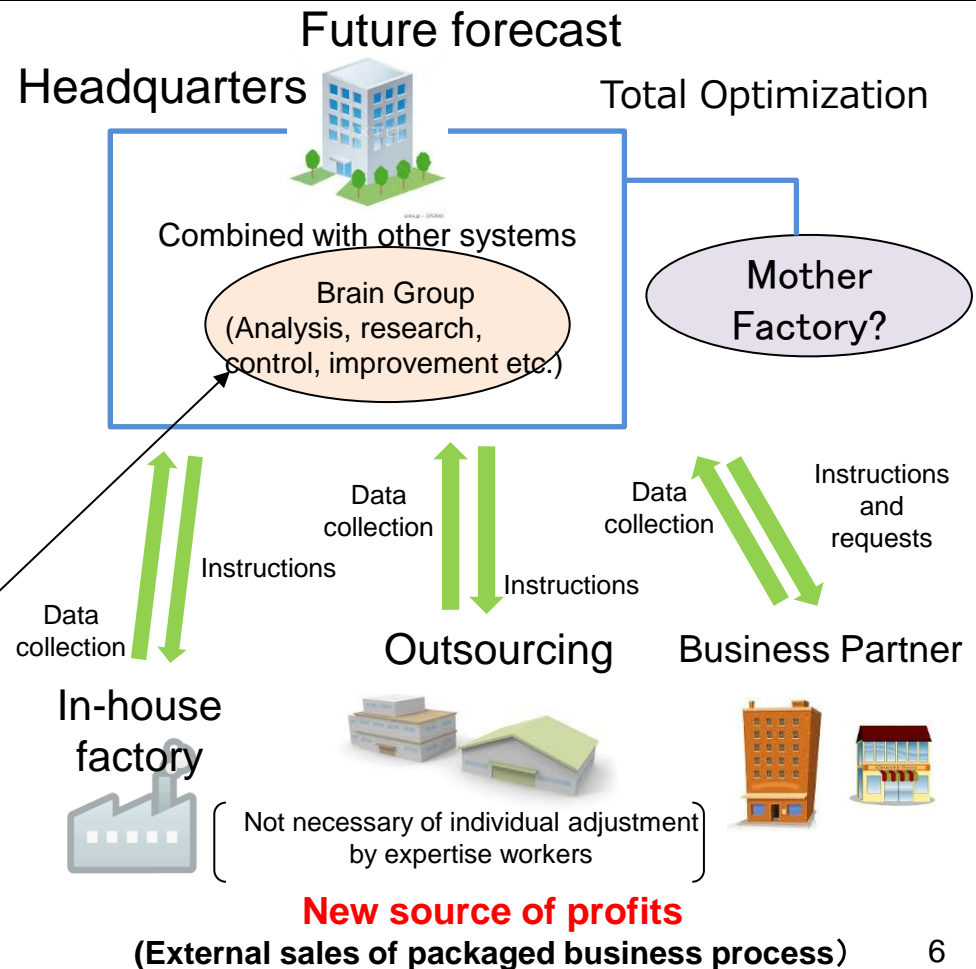
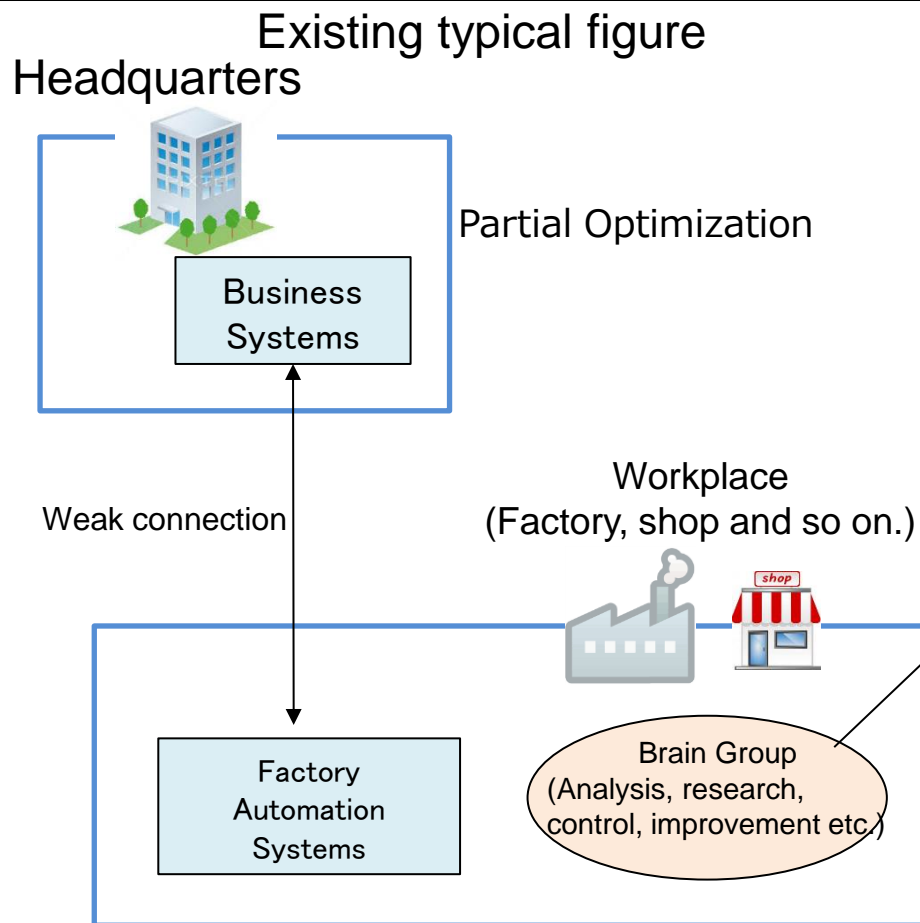


Any equipment can be replaced by other equivalents owing to standardization and Interoperability.

➤ **Modularization of each business process whose inside may be a black box ⇒ Each module as a whole can be replaced with other equivalent modules.**

From Workplace to Headquarters / Mother factory

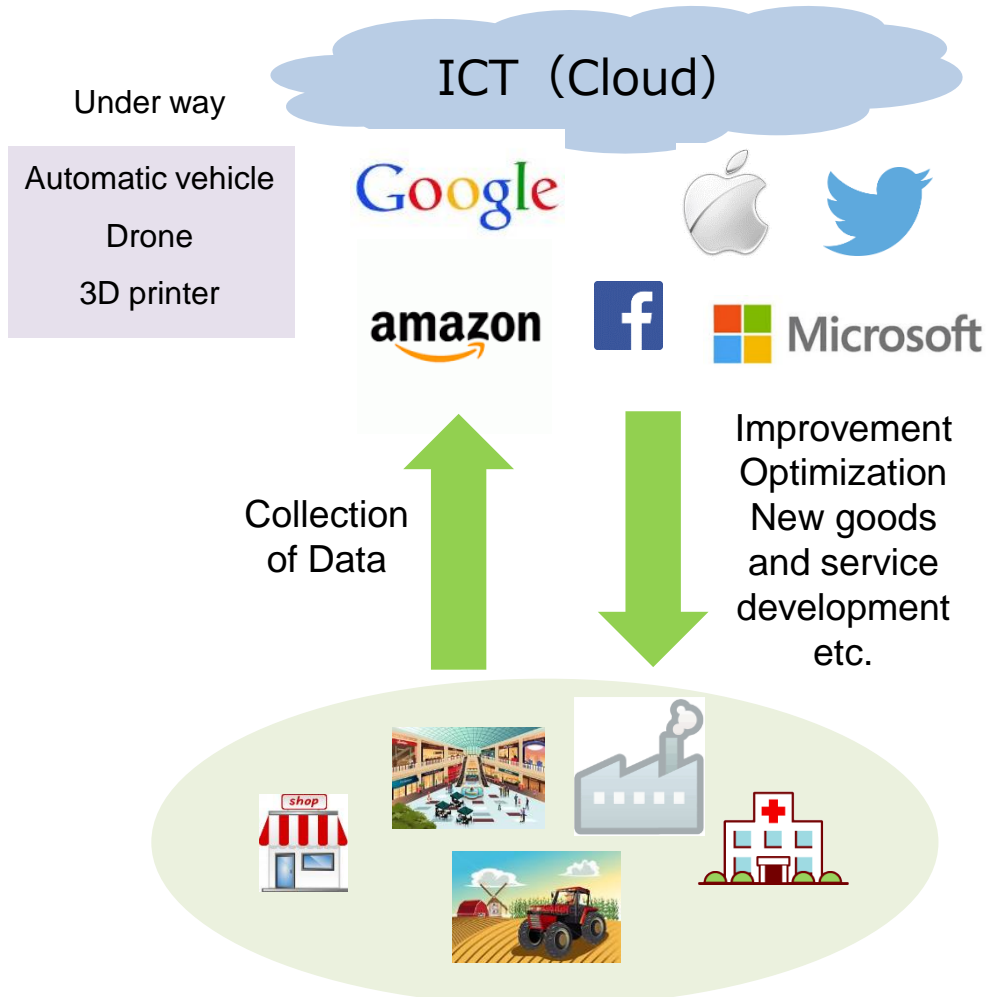
- Changing from **“Implicit knowledge” in workplace to digitalized “Explicit Knowledge”**
- The core brain group moves from workplace to headquarters or “mother factory”.
- **A head office comes to instruct improvements, change of plans and designs, adjustment of production volume and so on.** This may **facilitate factory expansion and outsourcing** in emerging markets without disclosing the intellectual properties.



Competition on the Initiative: Who gets the Data?

(ICT companies VS Existing companies)

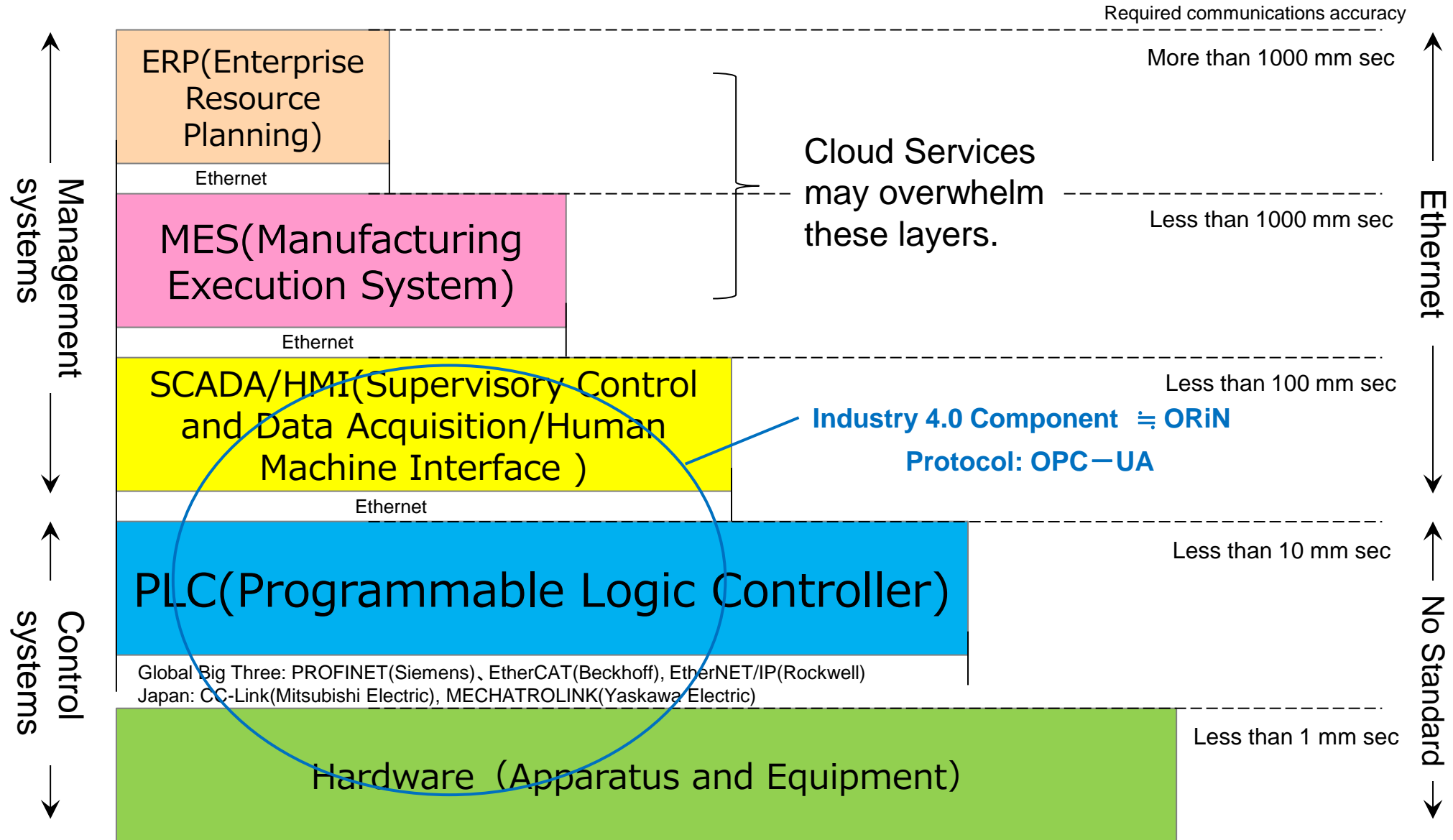
ICT Companies



Existing Companies



Systems divided into layers in manufacturing and Network Environment



Policy Challenges under Structural Change in Industry by ICT

- To make consensus on what should be protected in the modulation of business processes by ICT
- To make and show the direction and good naming of structural reform
 - GE's "Industrial Internet", German "Industry4.0", French "Industry of the Future " and so on.
- Environmental improvement to promote IoT
 - **Rule making how to use data** (Guidelines, Code of conduct, model contract etc.), **Personal data** protection, Industrial espionage measures (Protection of company secret)
 - **Cyber security** and **Safe working environment**
 - **Network deployment for IoT** (Frequency, Device ID, Communications Mode and Protocol, Power saving etc.)
- To make company leaders' better understanding
 - **Visualization of IoT's merits** quantitatively and qualitatively
 - **Enlightenment activities** through mass media and economic organizations by public and private sector
- Coordination among interested groups
 - **Induction into the entire optimum** and prevention of partial optimum
- Support to adopt the drastic change of working environment
 - Review of office organization and authority distribution
 - Support to **retraining and continuous learning** to prevent a mismatch of labor

NRI

未来創発

Dream up the future.