

For strengthening of 'The Japan Type Reform Technique '.

Collaborated Factory Automation

(Collaboration of ICT and FA)

July, 2014

MITSUBISHI Electric Co. Nagoya Works
F.IWAI

Innovation of Manufacturing

The eternal mission of the manufacturing industry.

Purpose

◆as Enterprise

Improvement in profitability
(Total cost of Ownership reduction)

<Issues>

- Improvement in Capacity utilization rate
- Improvement in Products quality
 - An employee's safety
- Improvement in integrity of equipment
- Enterprise continuity strengthening

◆as Social Member

Improvement in a corporate value
(Symbiosis with society)

<Issues>

- Energy saving and CO2 reduction
- Traceability strengthening
- Factory Safety enhancement
- Security strengthening (safety of a products)
- Environmental preservation

Reform Technique in Japanese Manufacturing Industry

Bottom-up process KAIZEN (PDCA)

◆as Enterprise

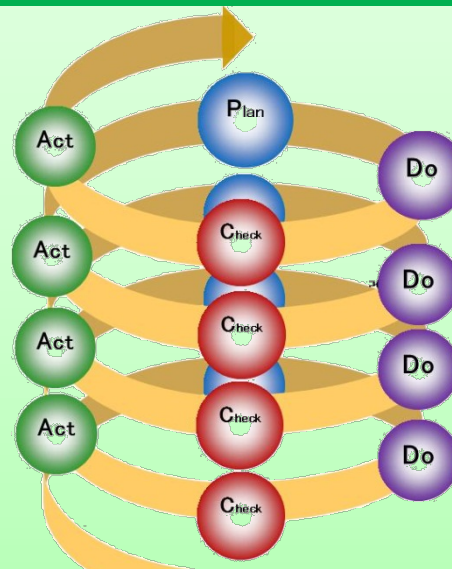
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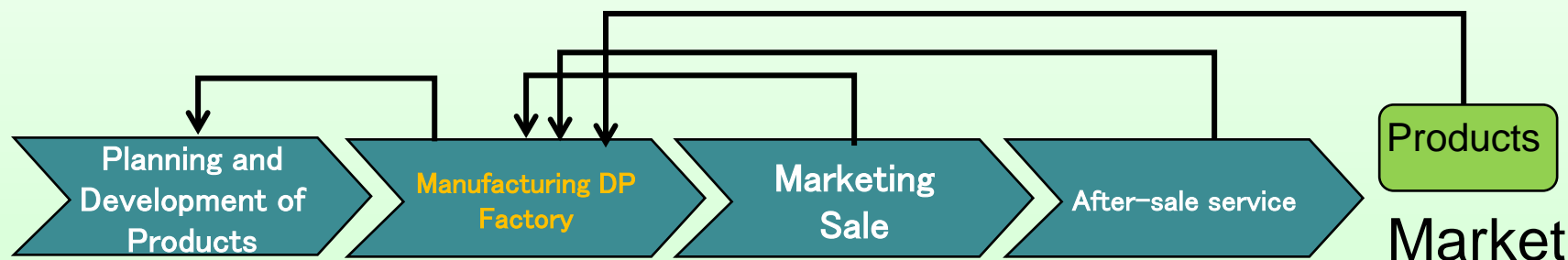
Improvement in a corporate value
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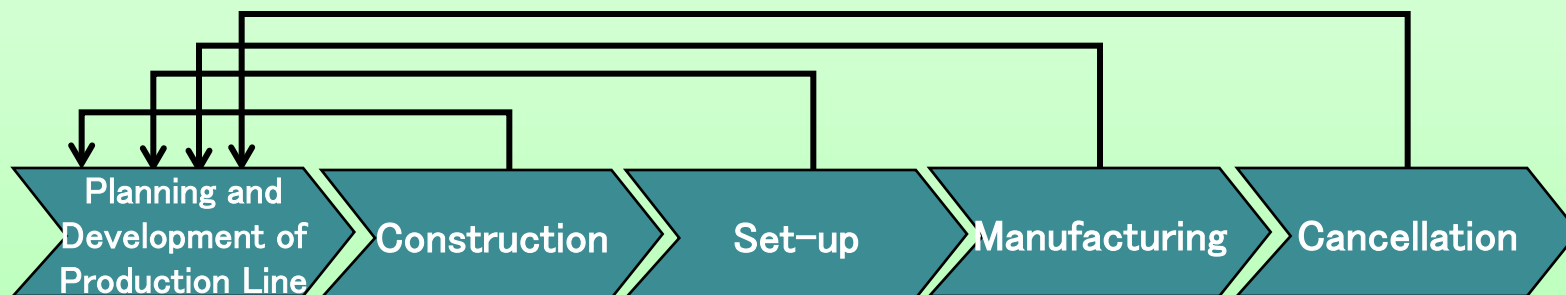
Activity which tows Manufacturing Industry in the world.
One of PLM (Products Life-cycle Management)

The newest KAIZEN (PDCA)

■ Information is collected from a value chain.

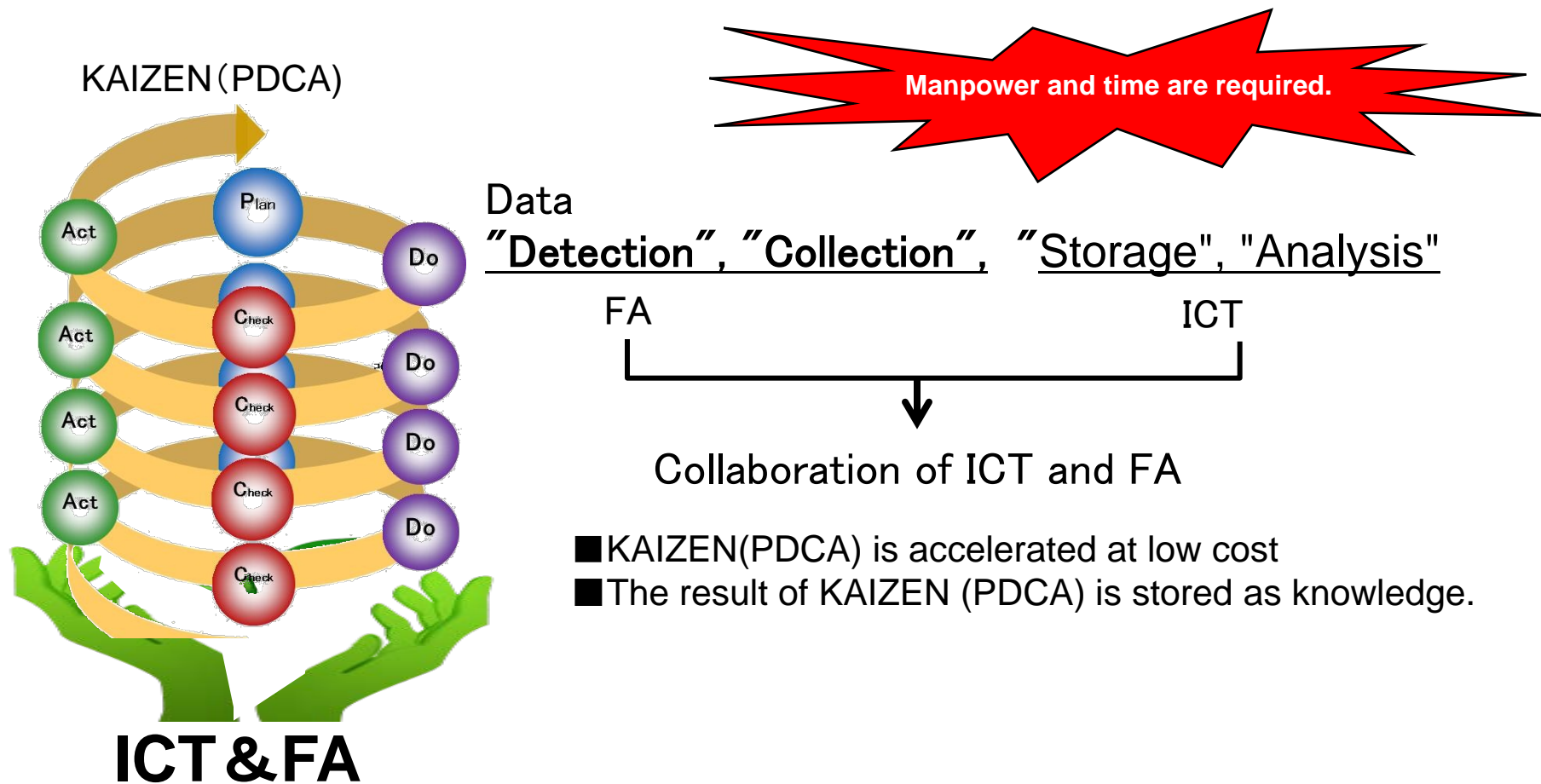


■ PLM of Manufacturing equipments & Production Line is performed.



★KAIZEN (PDCA) is expanded to the activity which includes a related section from the activity in a self-section.

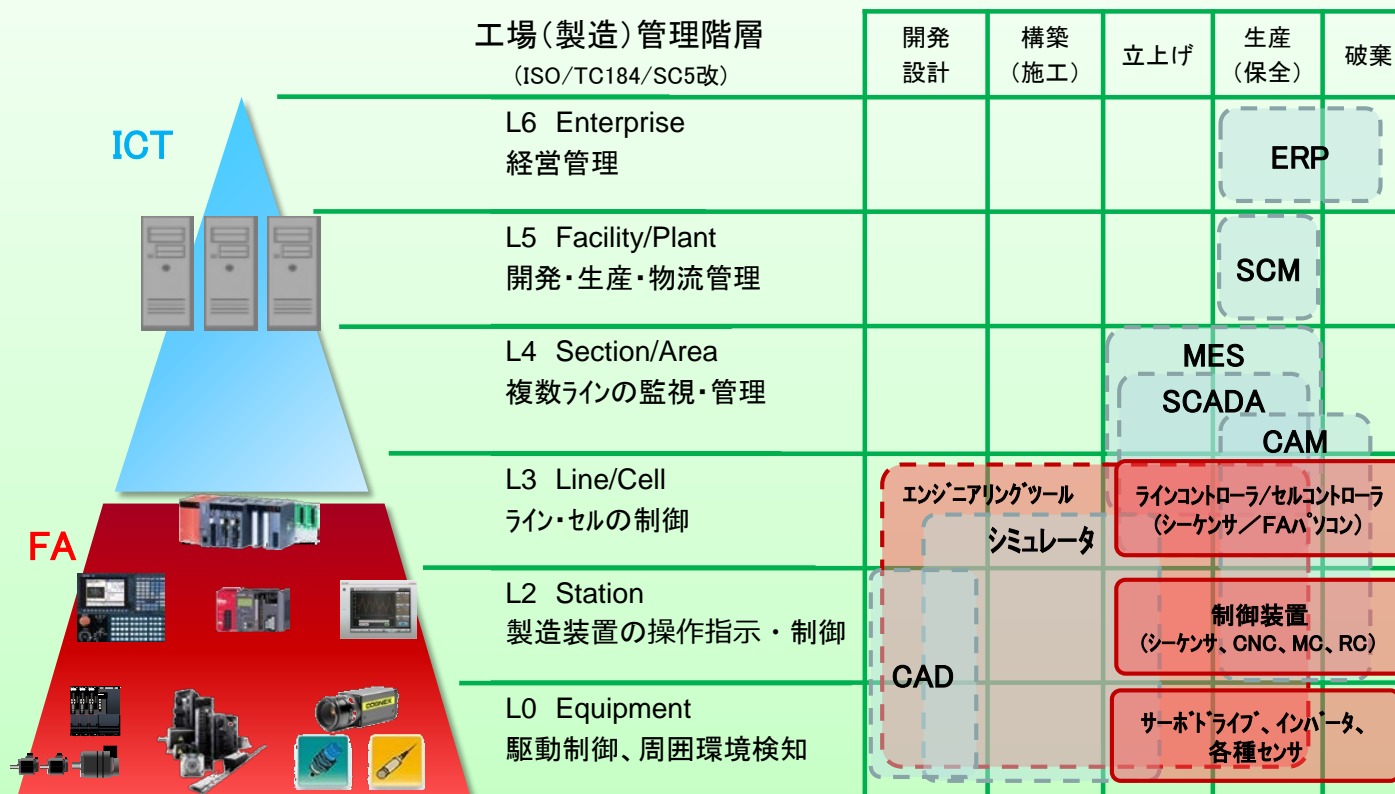
The newest KAIZEN (PDCA)



- Cooperation of FA and ICT is a tool of PLM.
PLM : Products Life-cycle Management

The present condition of ICT and FA used by the newest KAIZEN

ICT( : S/W) FA( : S/W  : コンポーネント)



The newest trend

- Future PLM requires the technology of cooperating between the divided tools.
And, the communication of an ICT engineer and FA engineer is important.

The technology of cooperating between the divided tools.

① FA component which collects the data in the factory.

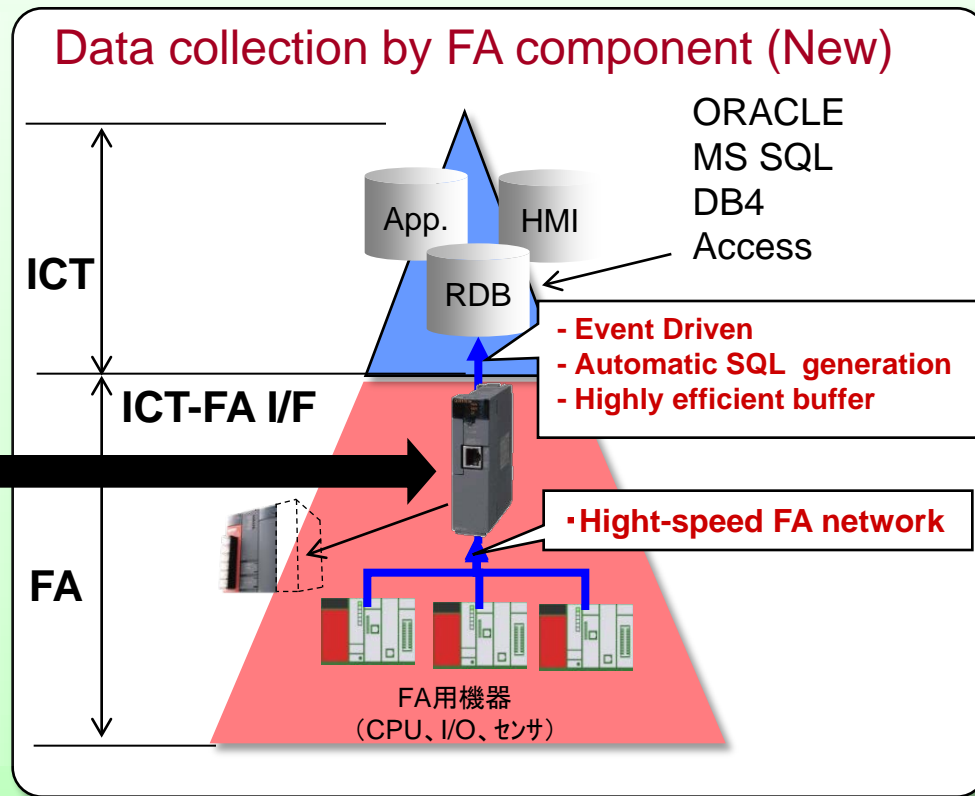
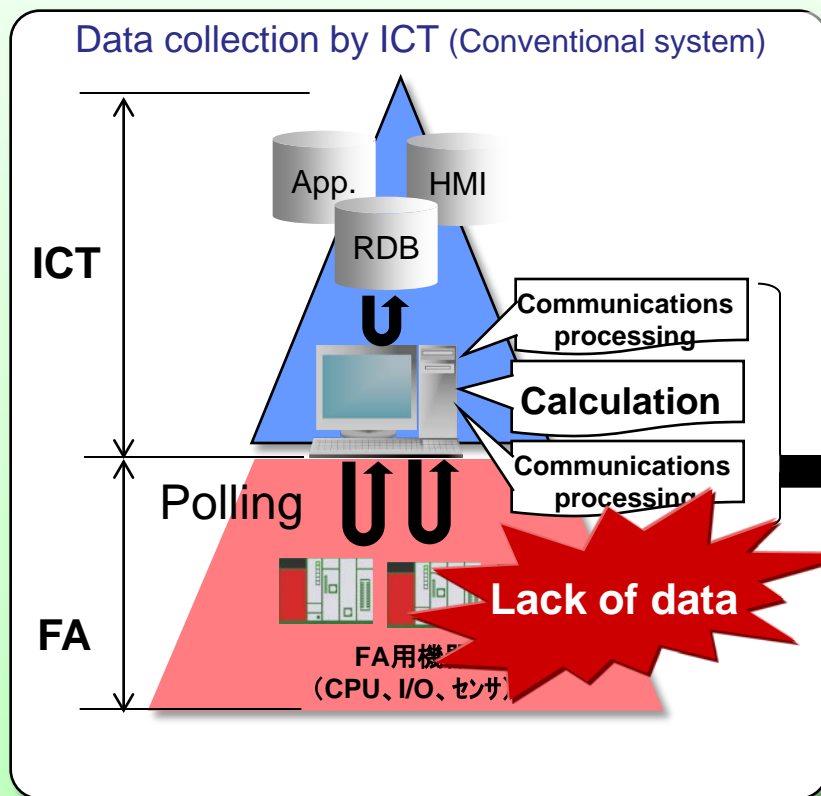


② API which can use the seamless network for FA, and High-speed FA BUS



The technology of cooperating between the divided tools.

① FA component which collects the data in the factory.



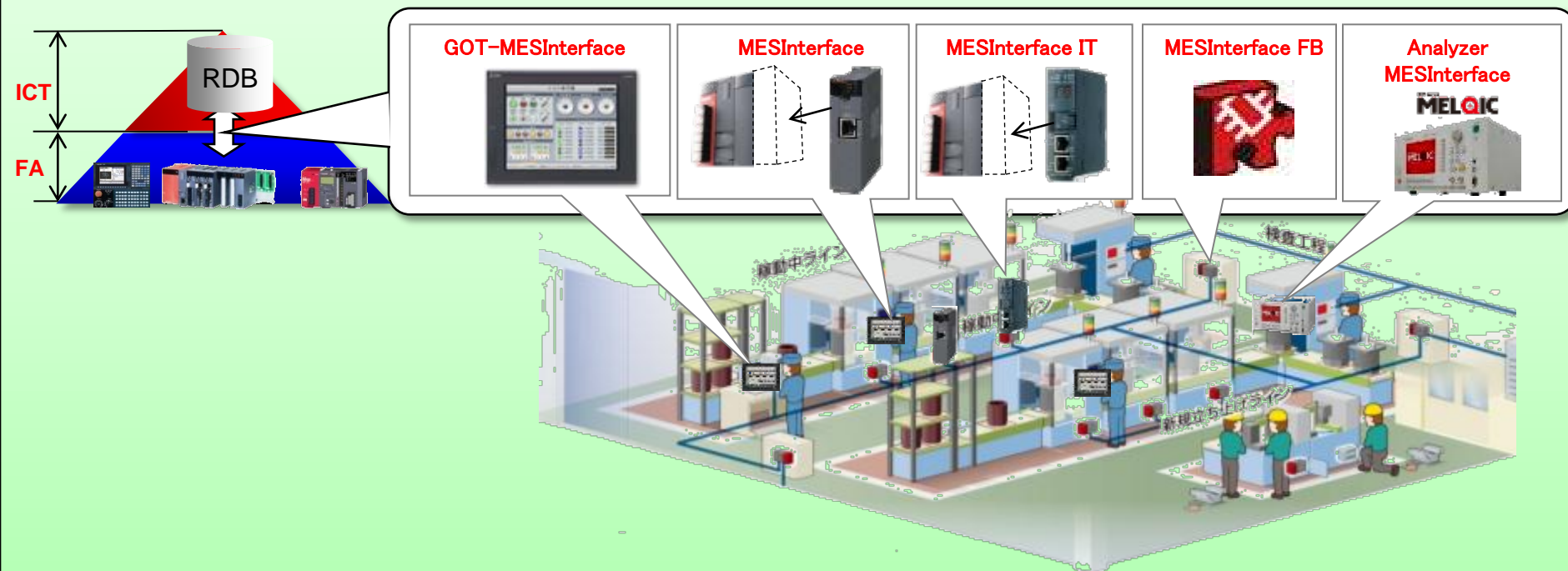
■ Direct access to a RDB engine or Stored procedure with Event Driven & SQL

① FA component which collects the data in the factory.

The technology of cooperating between the divided tools.

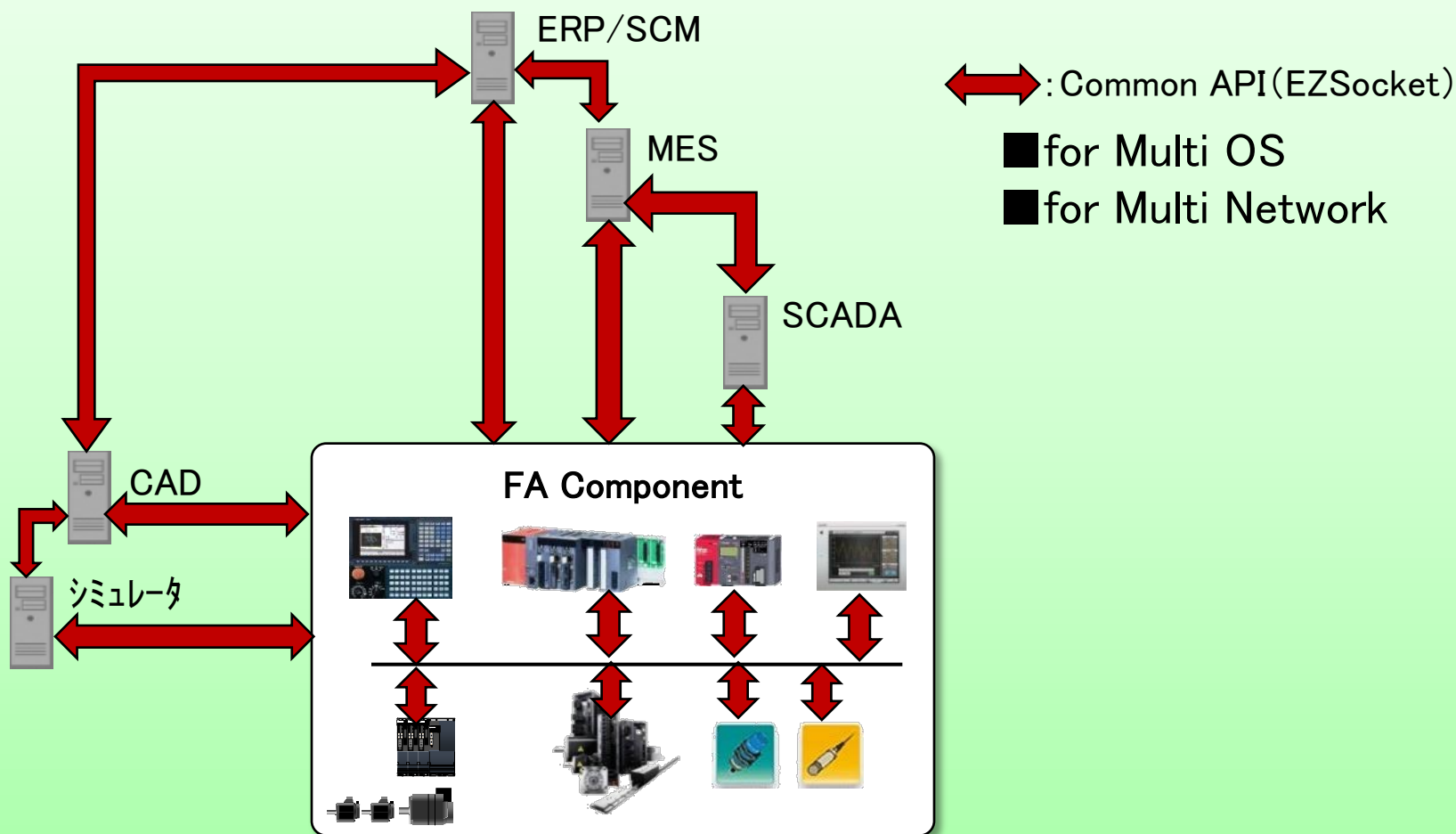
① FA component which collects the data in the factory.

■ It is added in various FA Component.



The technology of cooperating between the divided tools.

② API which can use the seamless network for FA, and High-speed FA BUS



Big data in the factory



Information which is in sight
6.9G/Day・Factory

Implicit information

- A veteran's experience, intuition, knowledge

1382G (1.4T)/Day・Factory

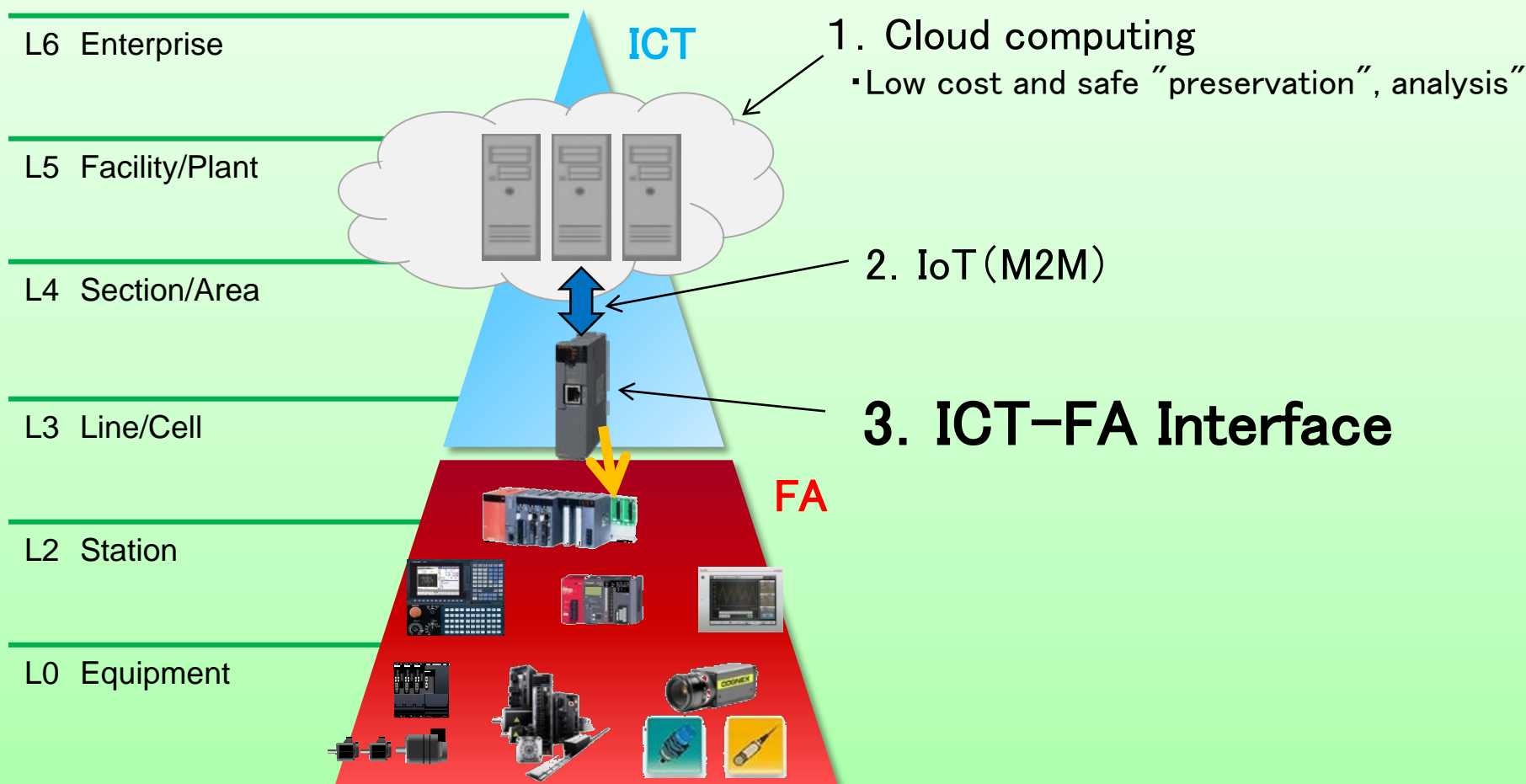


If it is possible to detect, collect and analyze,

**A newcomer also practices the same
improvement activities as a veteran.**

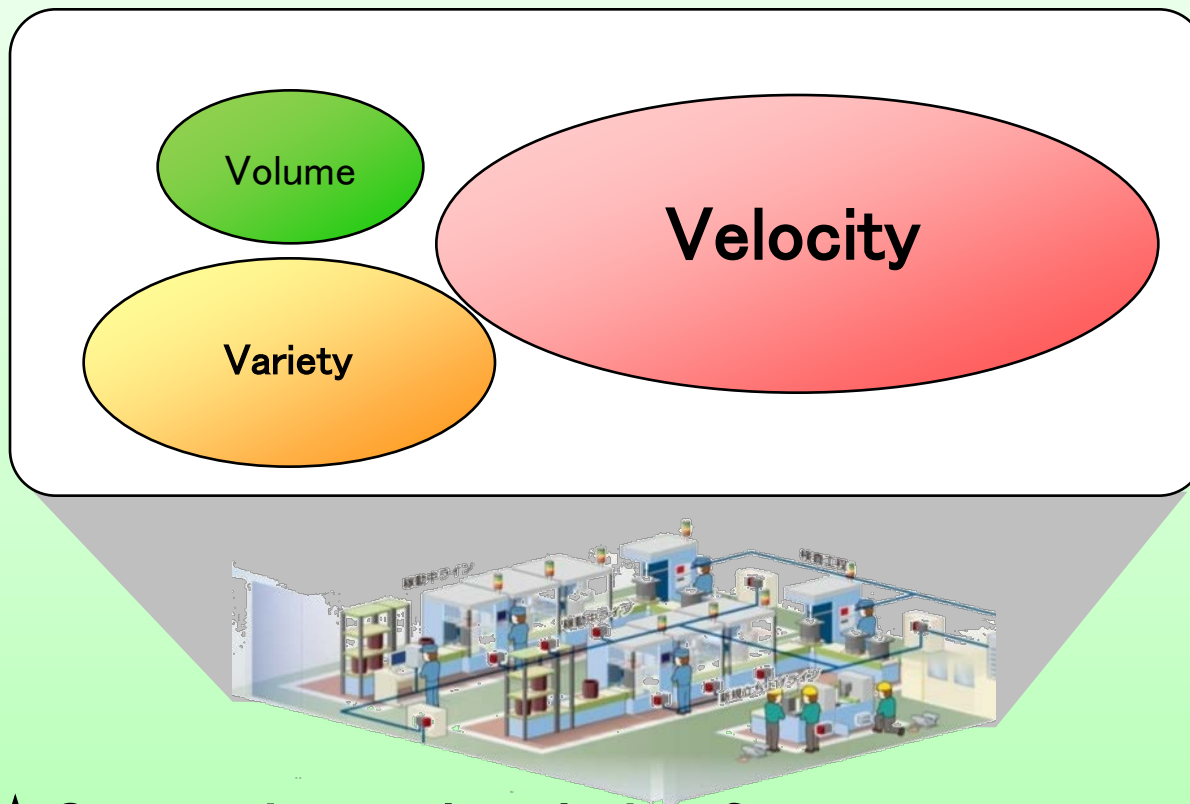
Three elements for utilizing big data (Key technology of "Collaborated Factory Automation")

The management class of a factory



The feature of the big data in a the Factory (Manufacturing site)

■ Why is it so big?



- ★ Generating and updating frequency are very high.
- ★ It becomes high frequency increasingly by the high speed and high-precision of manufacturing equipment.

The present Cloud practical use situation

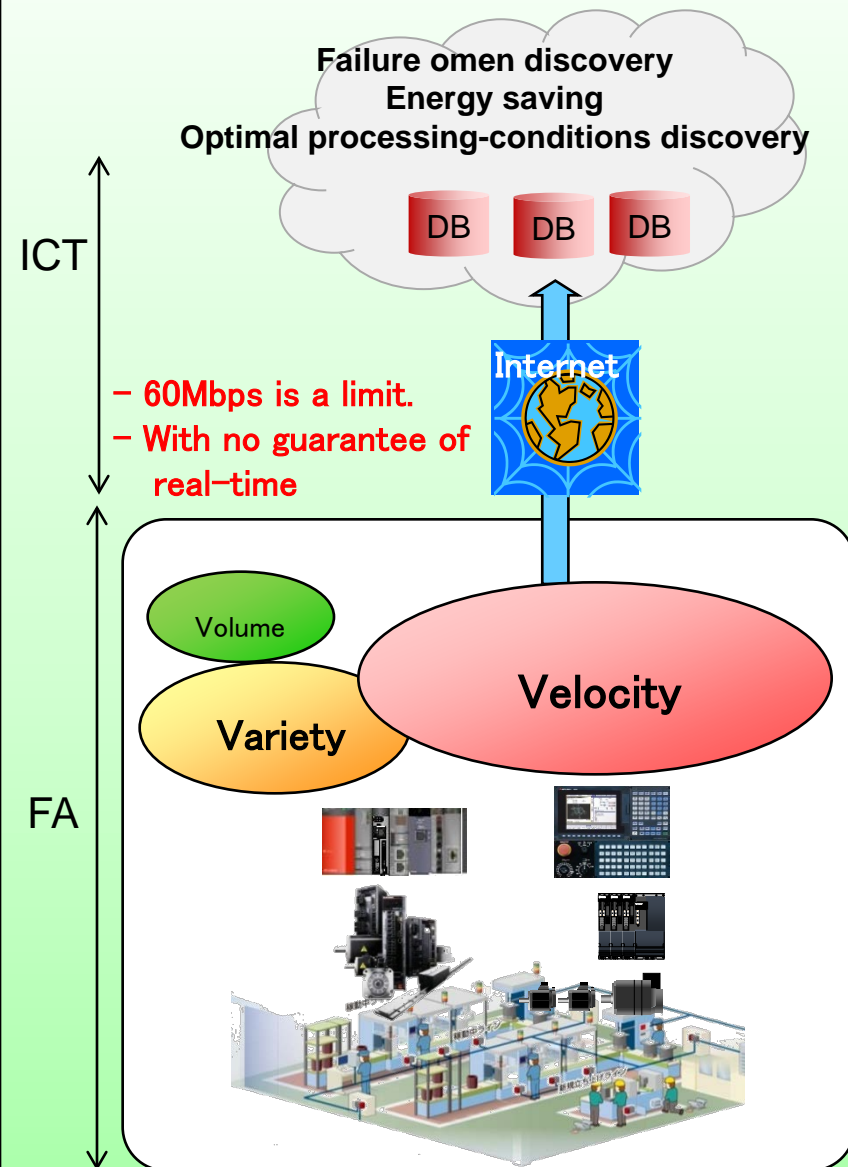
■ Since data is insufficient, exact analysis is not conducted.

<Size of data required for exact analysis>
In the case of a small machine tool.

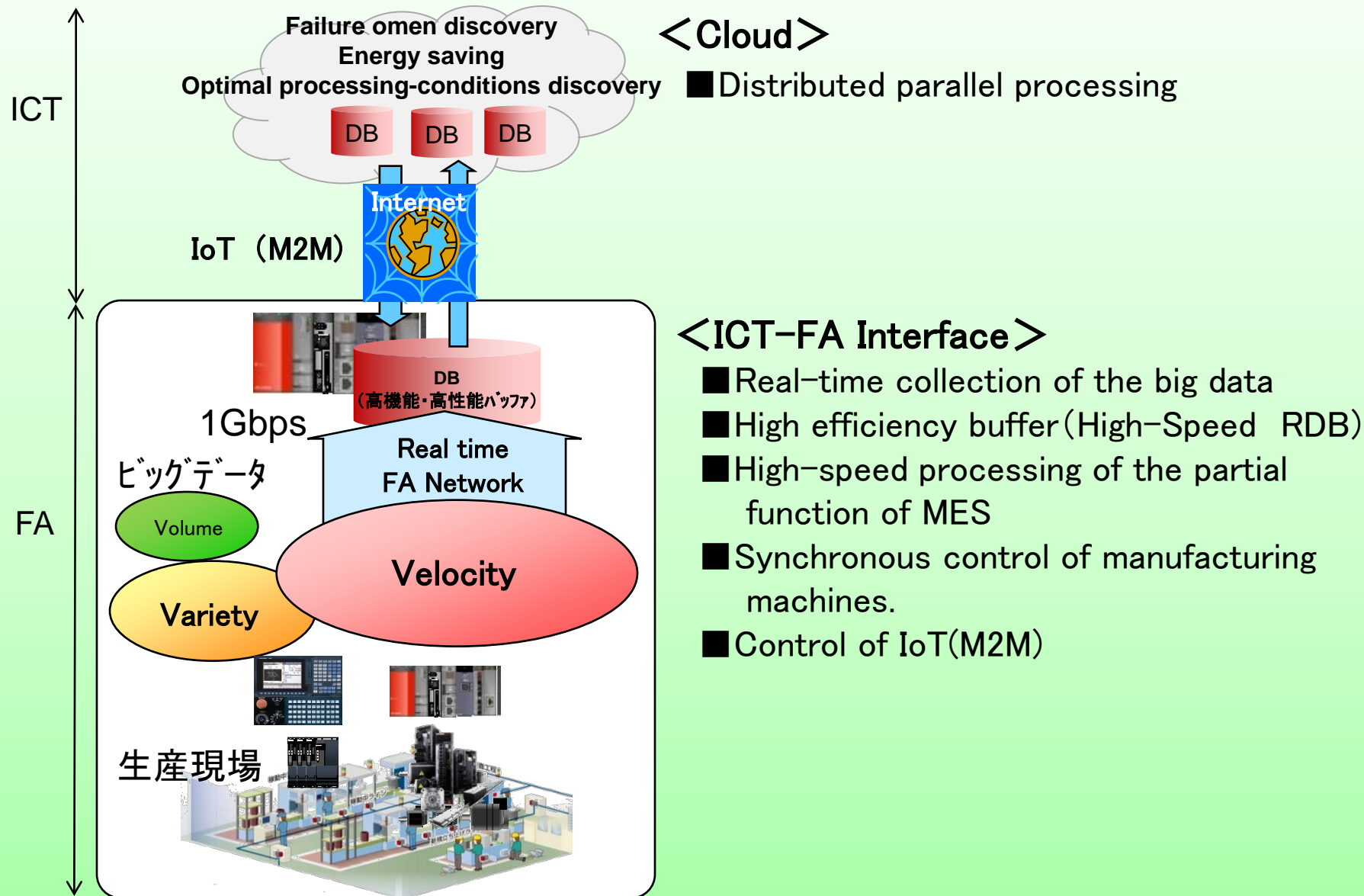
Kind of data	Size/Cycle	Required transmission speed
工具・ワーク	0.9 kbyte	0.04 k bps
サーボ	51,200 kbyte	2,560 k bps
主軸	38,400 kbyte	1,920 k bps
コンバータ	51,201 kbyte	2,560 k bps
機械	665,903 kbyte	33,295 k bps
プログラム	21,339 kbyte	1,067 k bps
合計	828 Mbyte	41 Mbps

▪ There are 100 or more machines and inspection apparatus in a factory.

■ Transmission speed is a bottleneck.

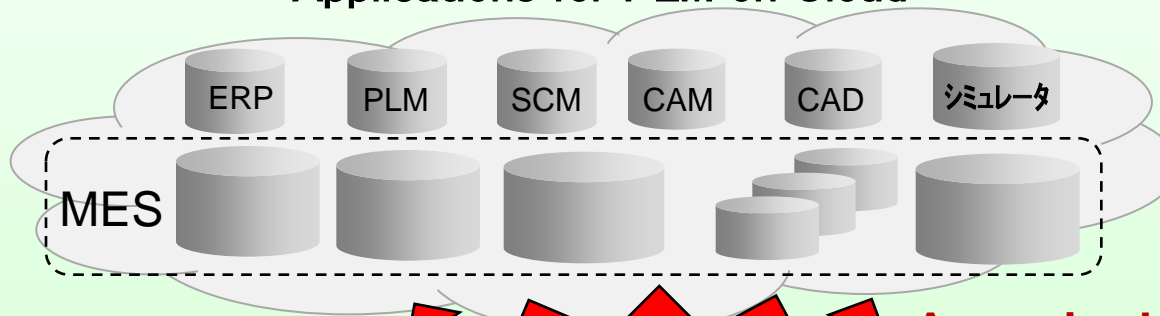


The ICT-FA cooperative system which can use the big data of a factory



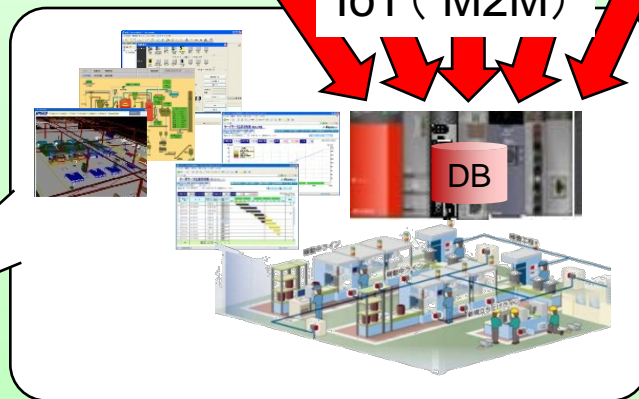
The ICT-FA cooperative system which can use the big data of a factory

Applications for PLM on Cloud



IoT (M2M)

A required function is used only when required.



- The system which is low-cost and can utilize big data
- Improvement in the speed, advanced function, and the system management cost reduction of the system for PLM are realized.

Thank you very much