

**TOSHIBA**

# Toshiba's Cyber Strategy 2019

**-Aiming to be one of the  
world's leading CPS companies-**

**Hiroshi Yamamoto**

**Corporate Digitization Chief Technology Officer  
& General Manager of Digital Innovation Technology Center  
Toshiba Corporation**

November 28, 2019

# Three Takeaways

- What was promised on November 22, 2018?
- Why can Toshiba become a leader in the field of CPS (IIoT)?
- Where does Toshiba want to position itself?



# Three Takeaways

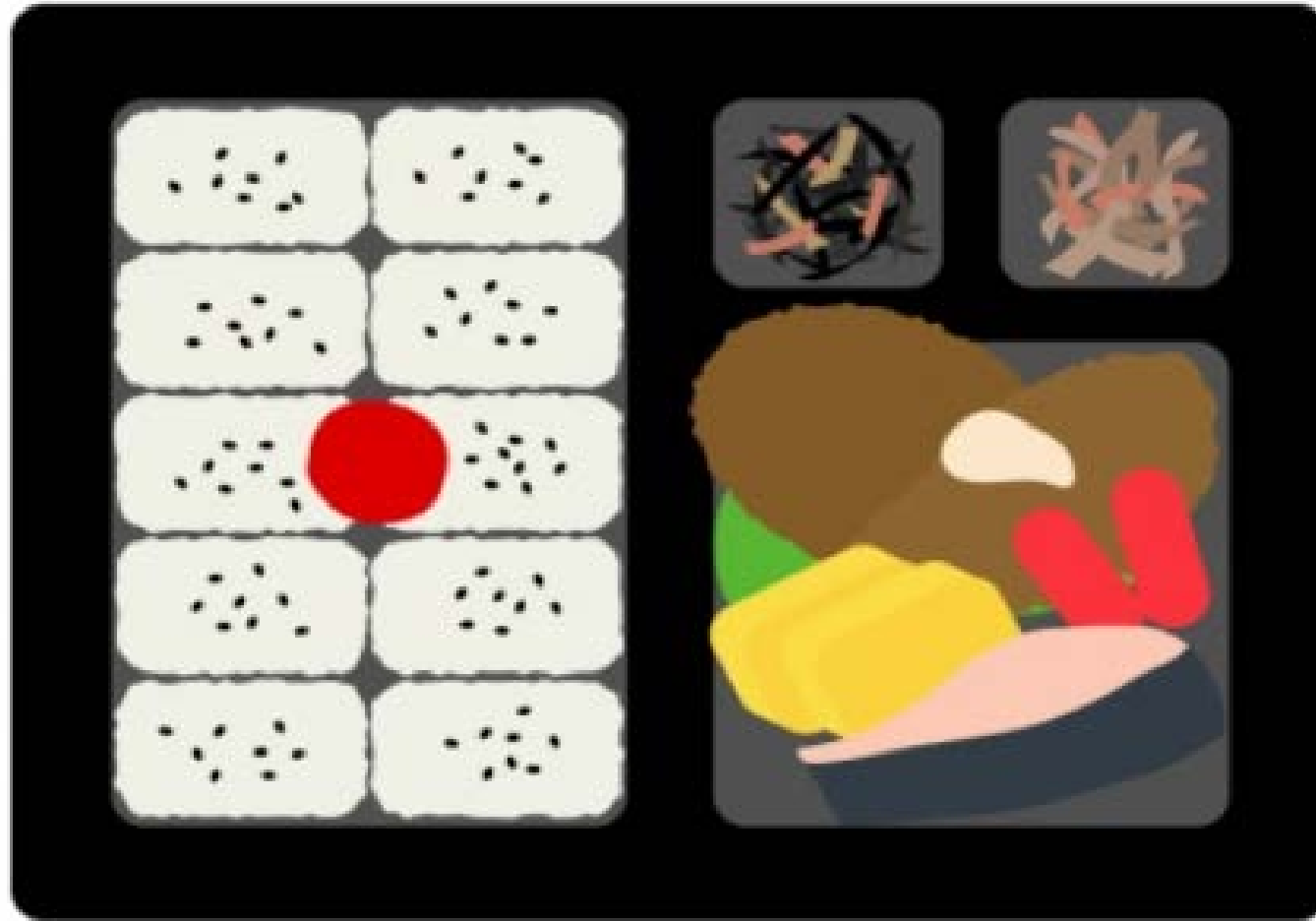
- What was promised on November 22, 2018?
- Why can Toshiba become a leader in the field of CPS (IIoT)?
- Where does Toshiba want to position itself?
  - ✓ Summary of 2018 Technology Strategy Briefing
  - ✓ TIRA policy (realization of CPS)
  - ✓ 12 IIoT services in 4 sectors
  
  - ✓ Toshiba CPS? 1: open/closed
  - ✓ Toshiba CPS? 2: Utilization of data sources
  
  - ✓ Industry leader
  - ✓ Focus in 2020 (Execution)
  - ✓ Establish Thought Leadership (Vision)

# 1

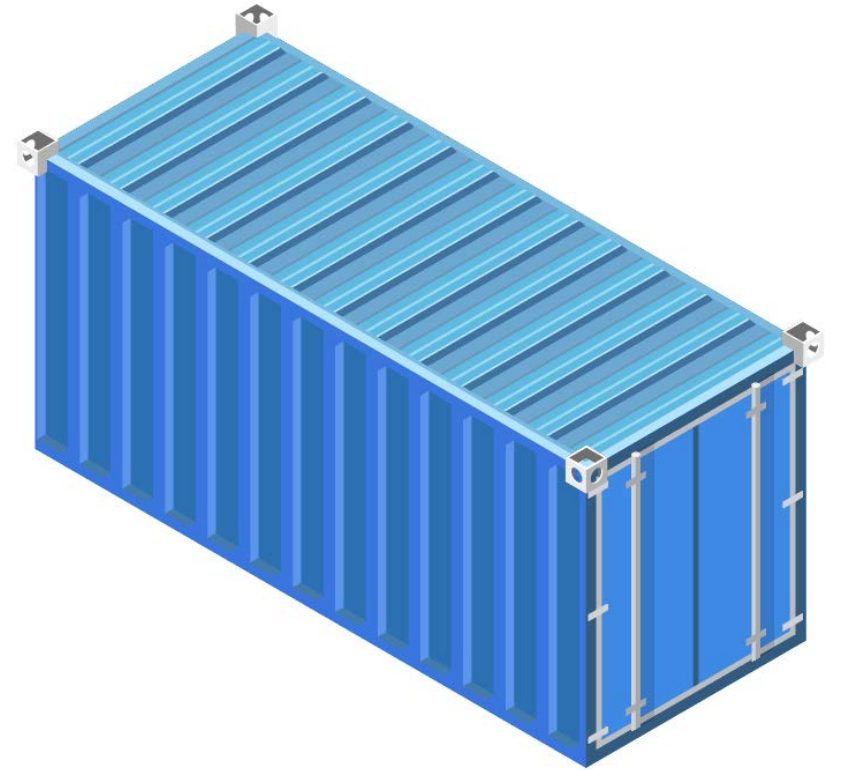
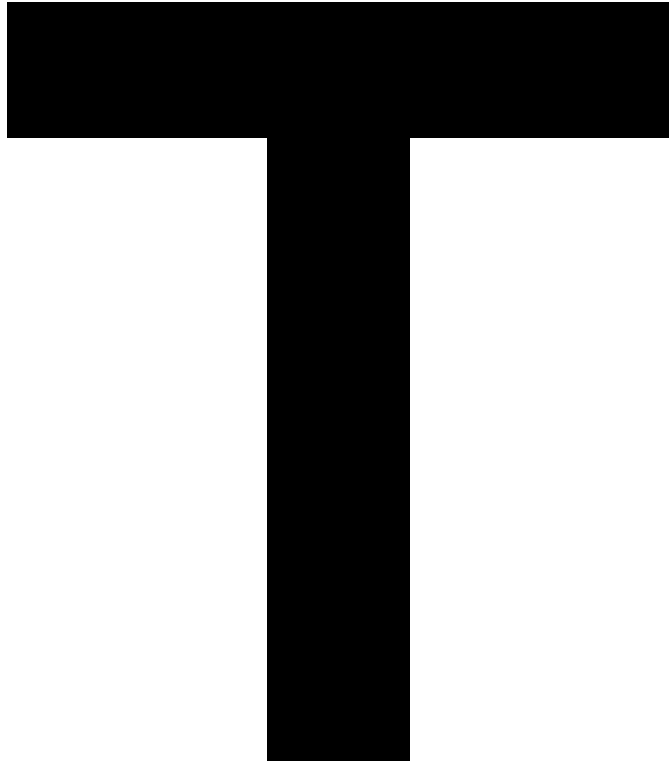
## The Promises made on November 22, 2018

- Summary of 2018 Technology Strategy Briefing
- TIRA philosophy (Realization of CPS)
- 12 IIoT services in 4 sectors

# 2018



# 2019



# Summary of 2018 Technology Strategy Briefing

Technologies that differentiate Toshiba's CPS  
(from FY2018 Technology Strategy Briefing)

- SCiB™ Rechargeable battery
  - Power electronics
  - Large capacity nearline HDD
  - Supercritical CO<sub>2</sub> cycle power generation system
  - Railway systems
  - Automation/Robotics
  - Semiconductors for automobiles
  - Hydrogen energy
- 
- Toshiba Analytics AI SATLYS™
  - IoT solution for power plants
  - VPP
  - Digital substation
  - Demand forecasting
  - Image segmentation
  - Solutions for infrastructure maintenance
  - Wireless multi-hop video transmission
- 
- Heavy-ion therapy solution
  - Biodegradable liposome
  - AI hardware
  - Quantum bifurcation machine
  - Quantum cryptographic communication



## Toshiba IoT Reference Architecture



①



TOSHIBA SPINEX

Digital Energy

Digital Infrastructure

Digital Logistics

Digital Manufacturing

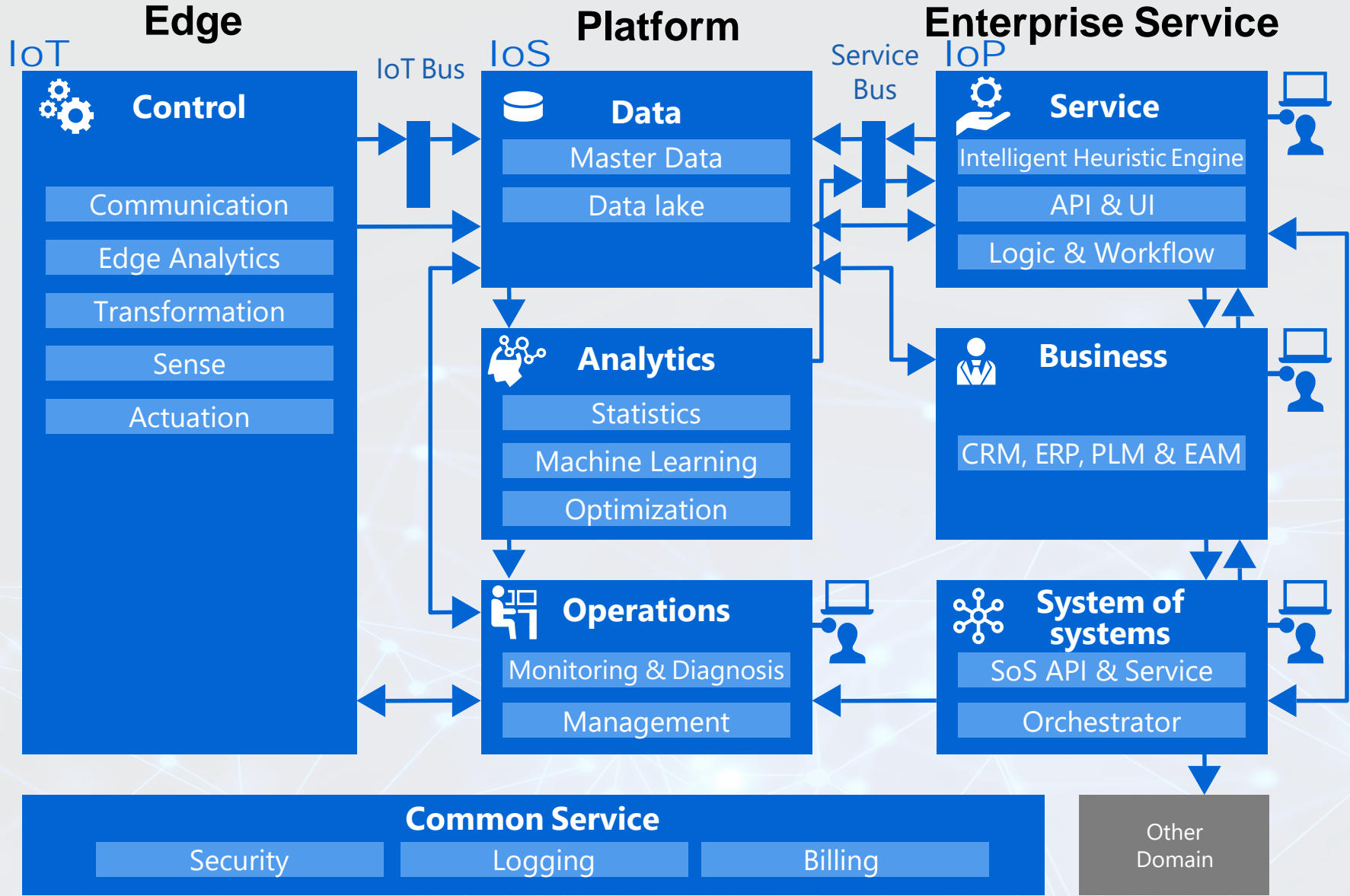


②



Contribution to international standardization

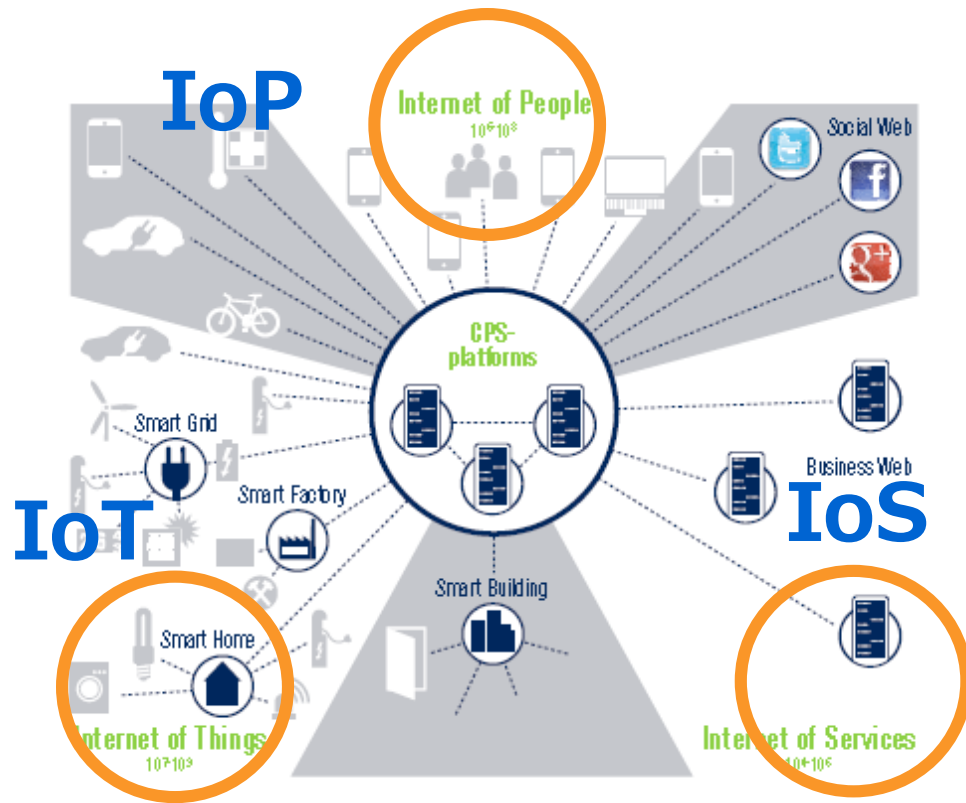
# Toshiba IoT Reference Architecture Ver2.0 (3 Tier Architecture)





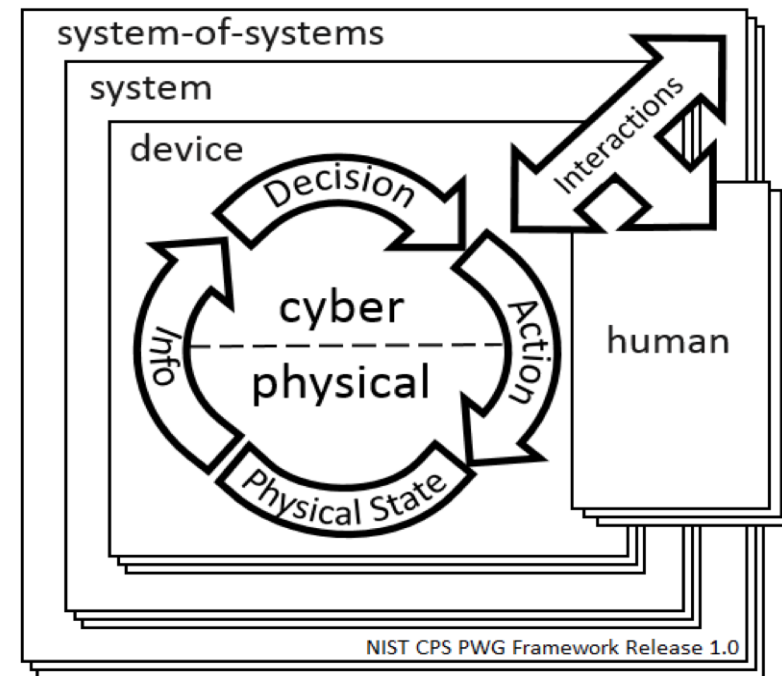
# What Are Cyber Physical Systems? (definition is unchanged)

- IoT, IoS and IoP as major elements
- A closed loop back between cyber and physical
- Systems, System-of-Systems and Human Interaction as key characteristics



acatech

Source : "Recommendations for implementing the strategic initiative INDUSTRIE 4."



NIST  
National Institute of  
Standards and Technology  
U.S. Department of Commerce

Source : "Cyber-Physical Systems (CPS) Framework Release 1.0"

# Services Scheduled for this Fiscal Year (TOSHIBA SPINEX)

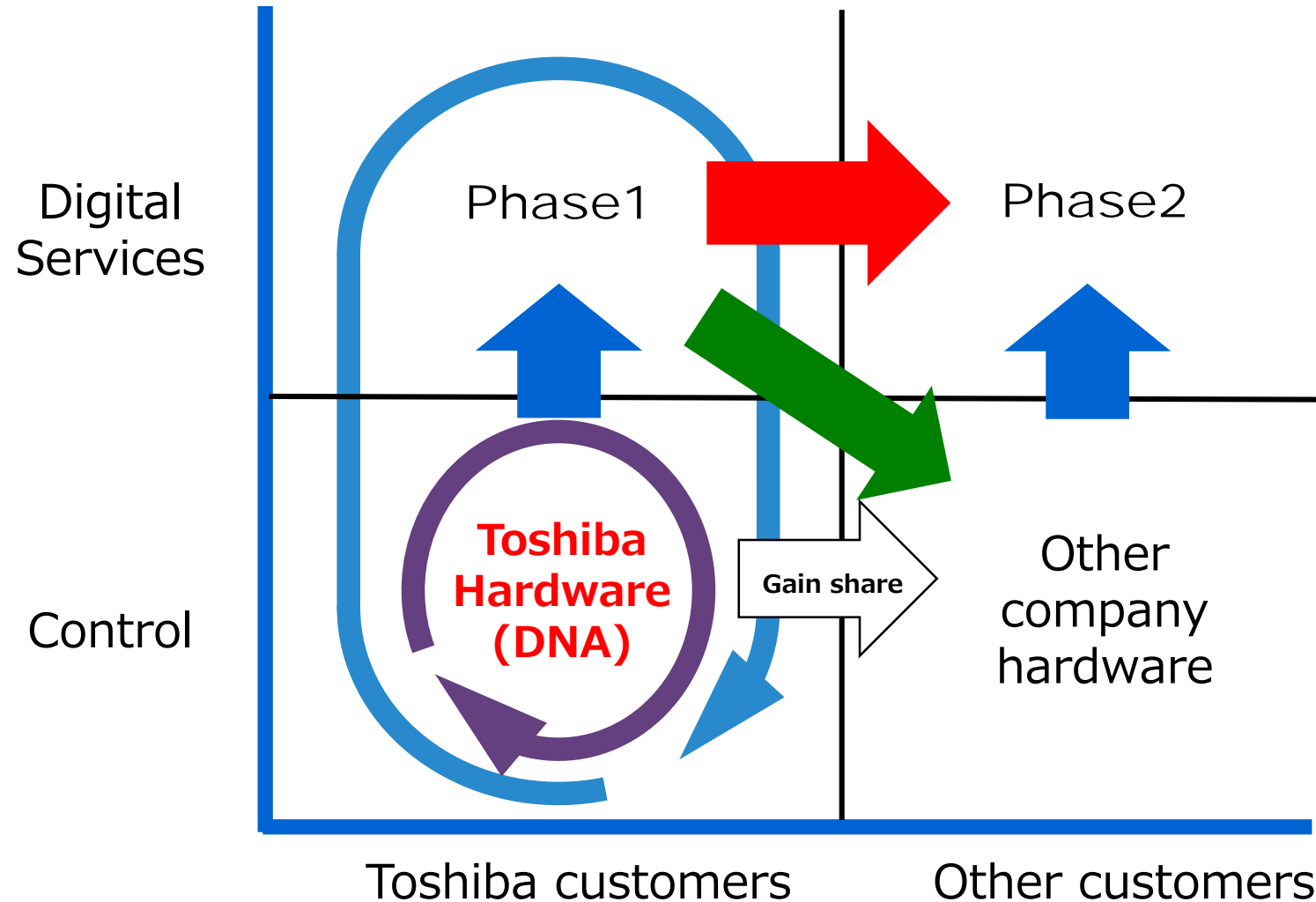
<b>Energy</b>	① Dashboards	<b>Social Infrastructure</b>	⑥ Rolling stock remote monitoring service
	② Performance evaluation/performance monitoring to detect abnormalities		⑦ Remote management and maintenance service for chillers
	③ Detection of signs of failure using operating data		⑧ Building wellness service
	④ Optimal power generation planning service	<b>Manufacturing</b>	⑨ Meister Cloud™ Series for manufacturing industry
	⑤ Data management system based on engineering drawings		⑩ Distributed & coupled simulation platform for in-vehicle control model
		<b>Logistics</b>	⑪ AI image inspection service
			⑫ Logistics IoT cloud service



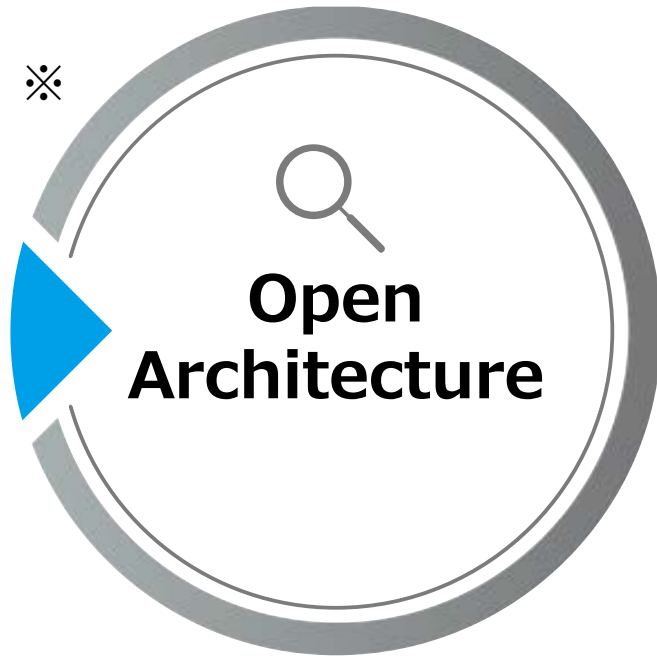
# Target in 2019 – Phase1

Phase 1: Digital services created from data generated by Toshiba products

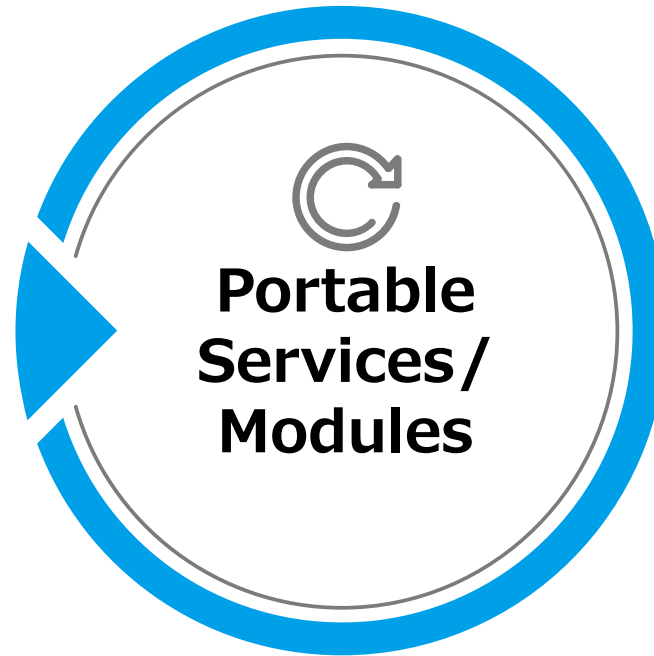
Phase 2: Digital services that are neutral



# Basic Design Policy



Open IIoT API  
(API Management)



Micro Service based  
on container technology



CPSF  
IEC 62443  
NIST SP800-82

# 2

## Why can Toshiba become a leader in CPS (IIoT)?

- Toshiba CPS? 1: Open/Closed
- Toshiba CPS? 2: Utilization of data sources

# Essential Characteristics of Cyber Physical Systems

External specifications

Internal specifications

## Closed / Closed



**Collaboration**



External specifications

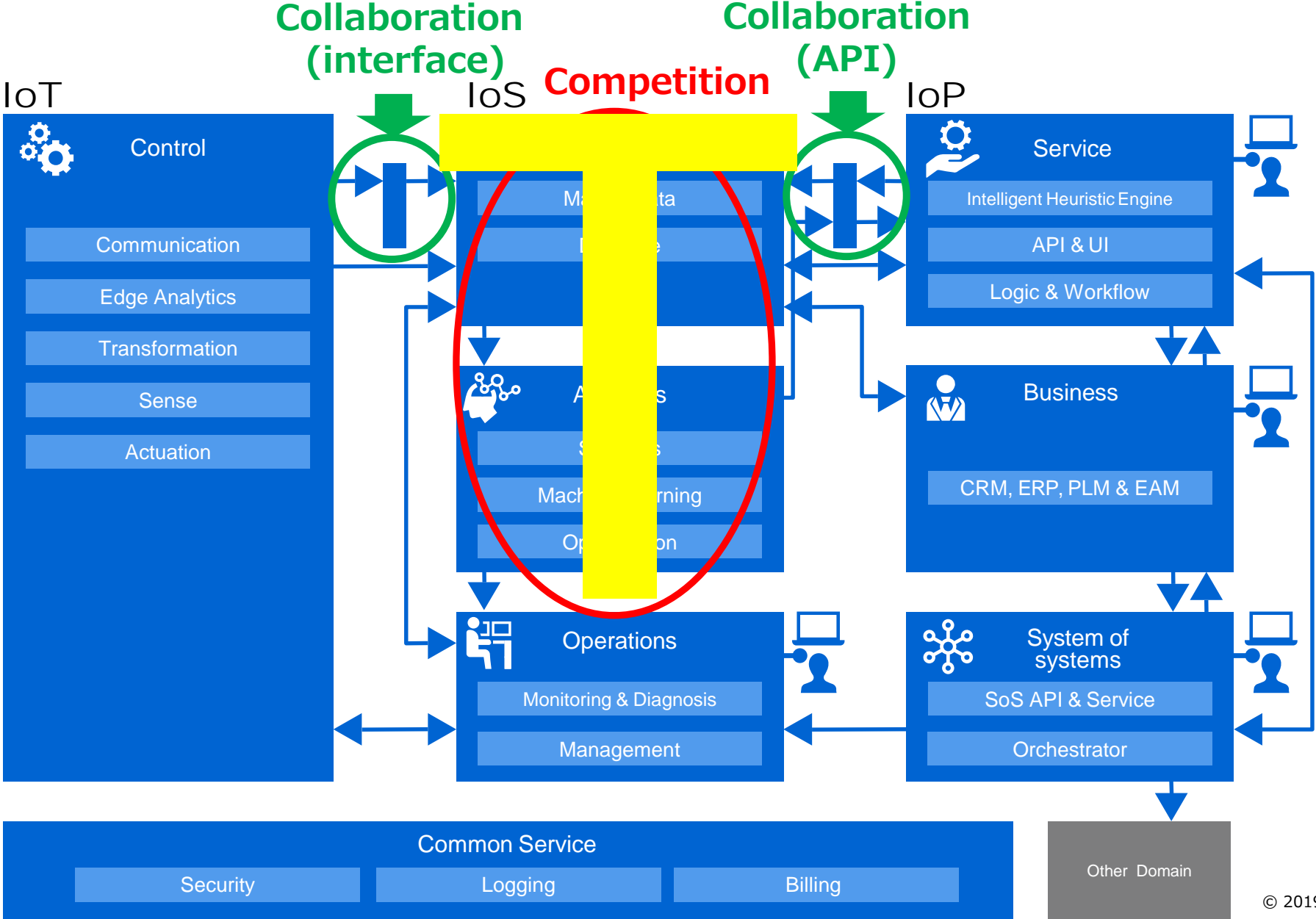
Internal specifications



**Competition**

## Open / Closed

# Collaboration and Competition – T-shaped Strategy

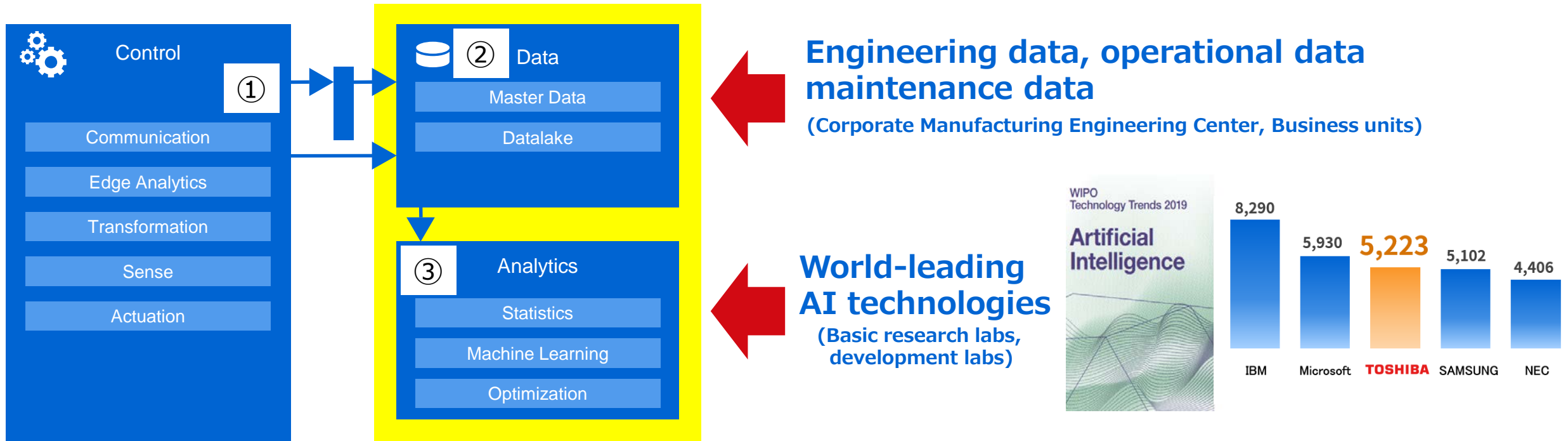


# Toshiba Consolidated Data Platform



- A consolidated data platform that supports new data businesses (Habanero)
- Start as IoT data base
- AI service powered by strong AI technology

## Habanero

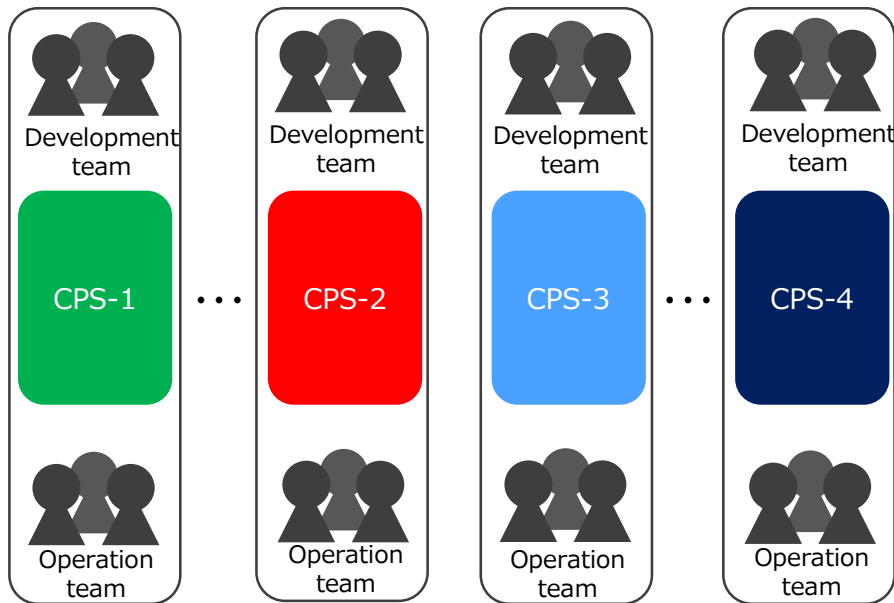


- ① Capture IoT data from control (devices)
- ② Analyze IoT data analysis to classify and make predictions
- ③ Take action by utilizing insights

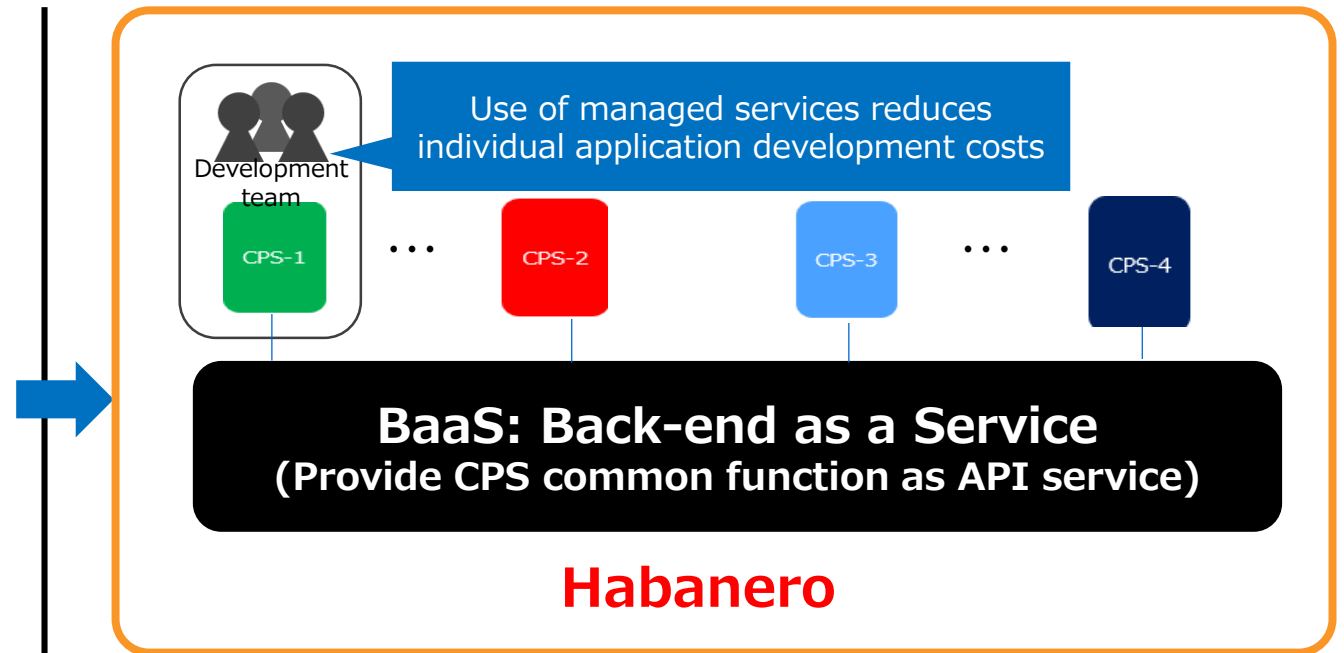


# Habanero Objectives

Aim to reduce cost of development and operation, and strengthen competence in service businesses by unifying the CPS-related development operation platform in the Group and centralizing human resources and technologies



It is inefficient for every Toshiba Group company to individually use human resources and technologies to develop and operate CPS. Know-how is also fragmented.



Enhance CPS service quality and competence by centralizing human resources, technologies and know-how Possible to develop service businesses that make a strong feature of the service operation itself

Japan Machinery Federation

[http://www.jmf.or.jp/english/activities/survey\\_and\\_research/5.html](http://www.jmf.or.jp/english/activities/survey_and_research/5.html)

“Responding to the Paradigm Shift in Worldwide Manufacturing” \*available only in Japanese

## “People play the lead role in digitization and AI utilization”

Although there might come a time when AI handles everything, for the time being there can be no doubt that the role people play is indispensable

Even if options automatically emerge from data obtained from improvement activities using ICT, at the very least, the role of people is to choose one option and determine the next action.

Even if new automation technology appears, such as digitization and networks, new skills and know-how will be required somewhere in the operation.

New technology requires endeavors to create new skills and know-how that those technologies need.

People play a key role in digitization in Japan.

\*Translation by Toshiba



## Expertise Inheritance

Natural language

The five senses

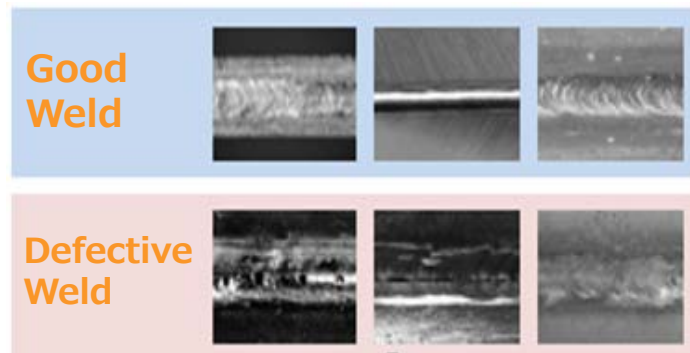
Human movement



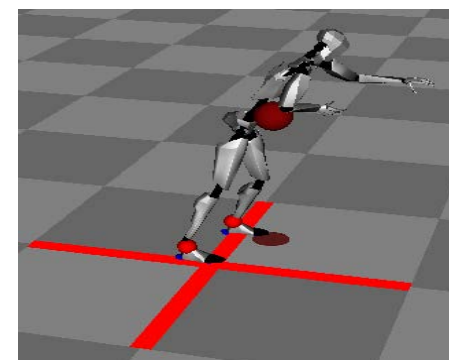
Text Analysis Tool



Deep Neural Network



Posture Capture with RFID

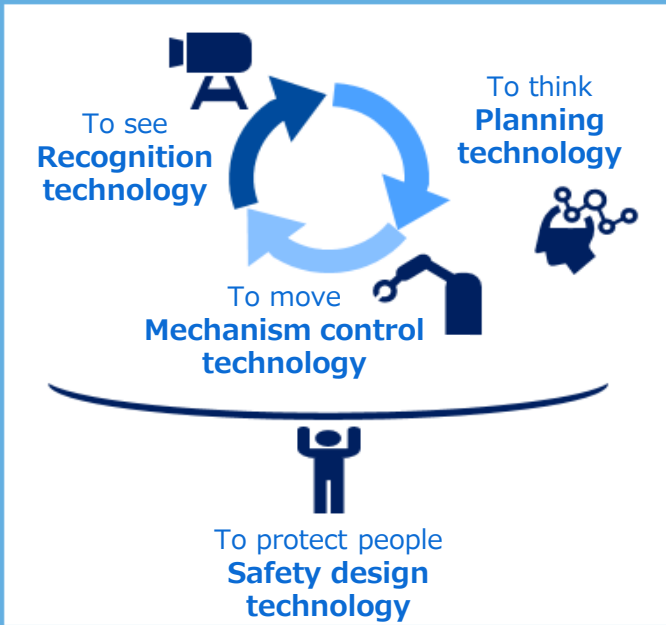


# Utilizing Artisanal Digital Knowledge – Toshiba Robot Reference Architecture



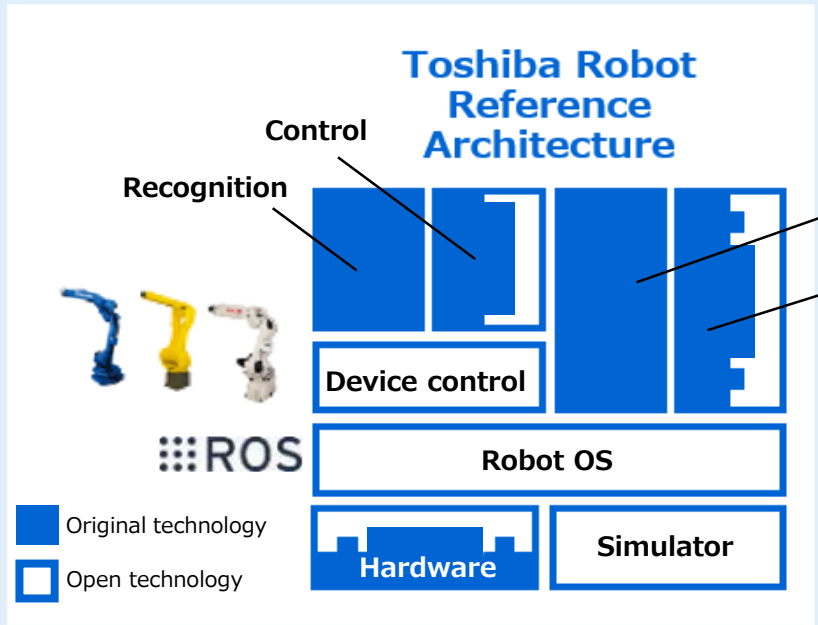
### Core technologies for intelligent robots

Technologies for robots able to move autonomously according to the situation



### Organize as an architecture that must be complied with

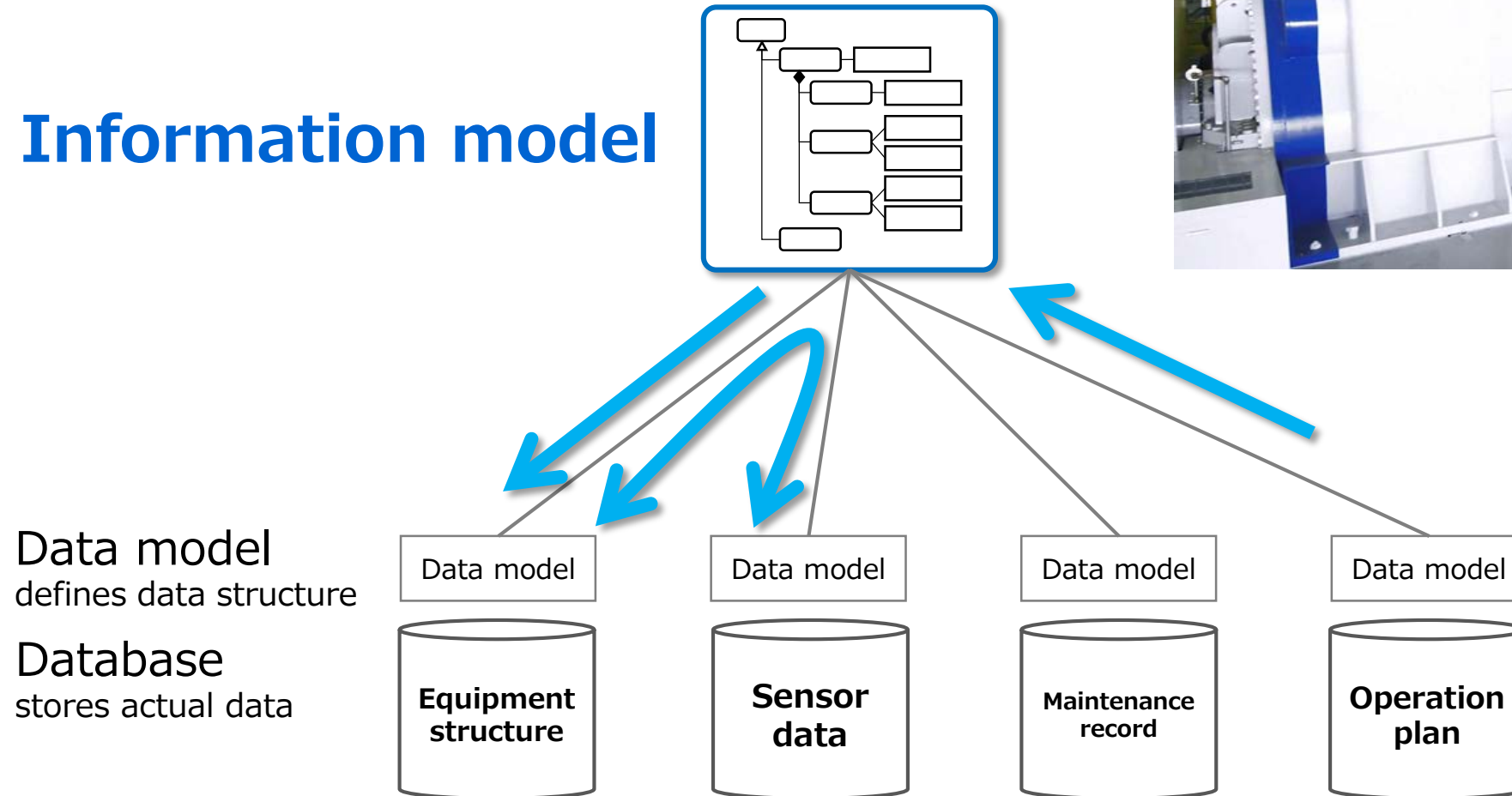
Realize value cultivation and high development efficiency



- Establish information models based on structures and relationships within existing equipment data
- Relate data models through information model

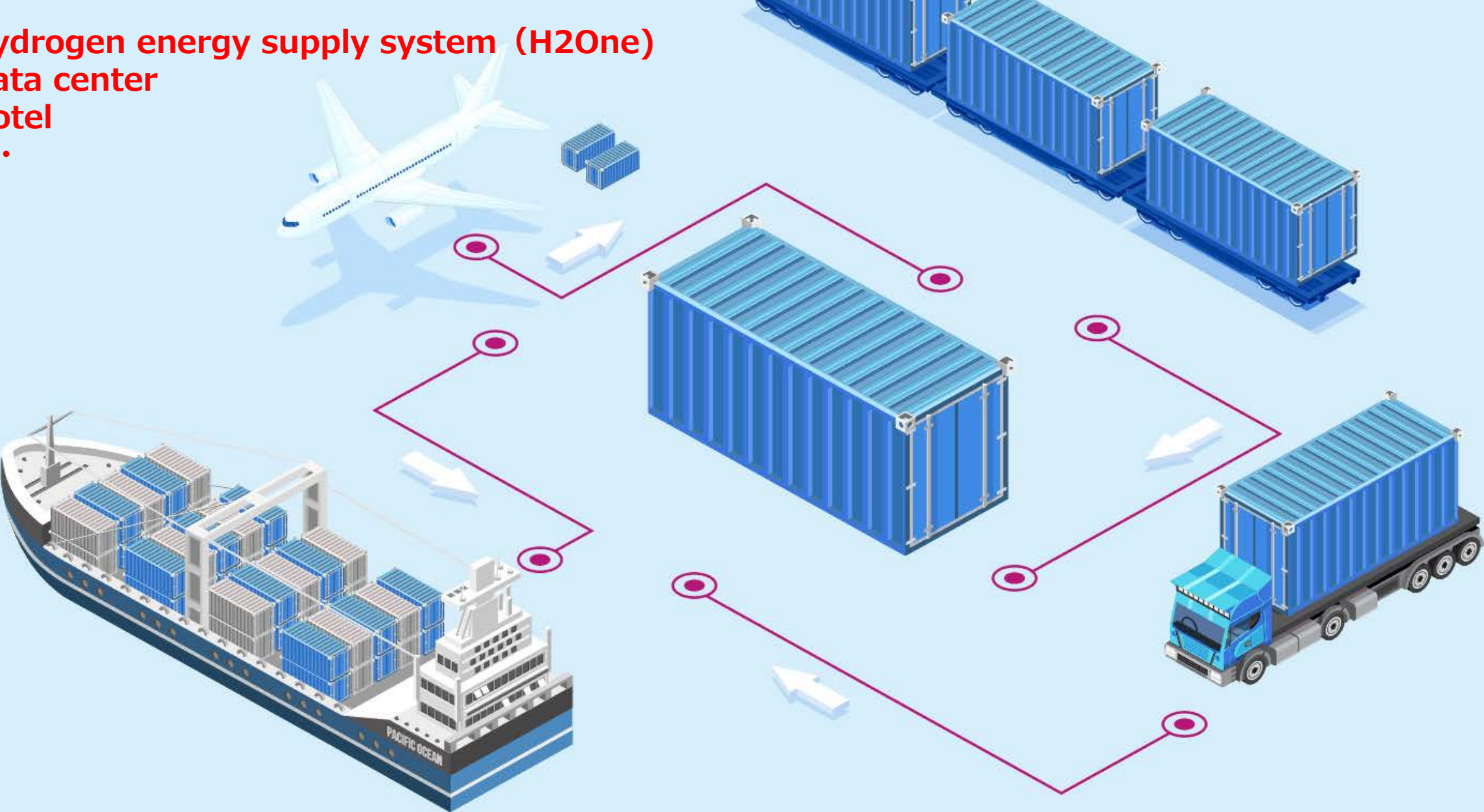


## Information model



# IoT - Container Portability and Expandability

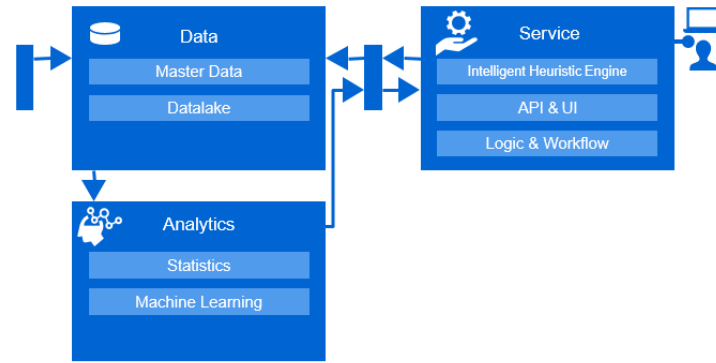
Hydrogen energy supply system (H2One)  
Data center  
Hotel  
...



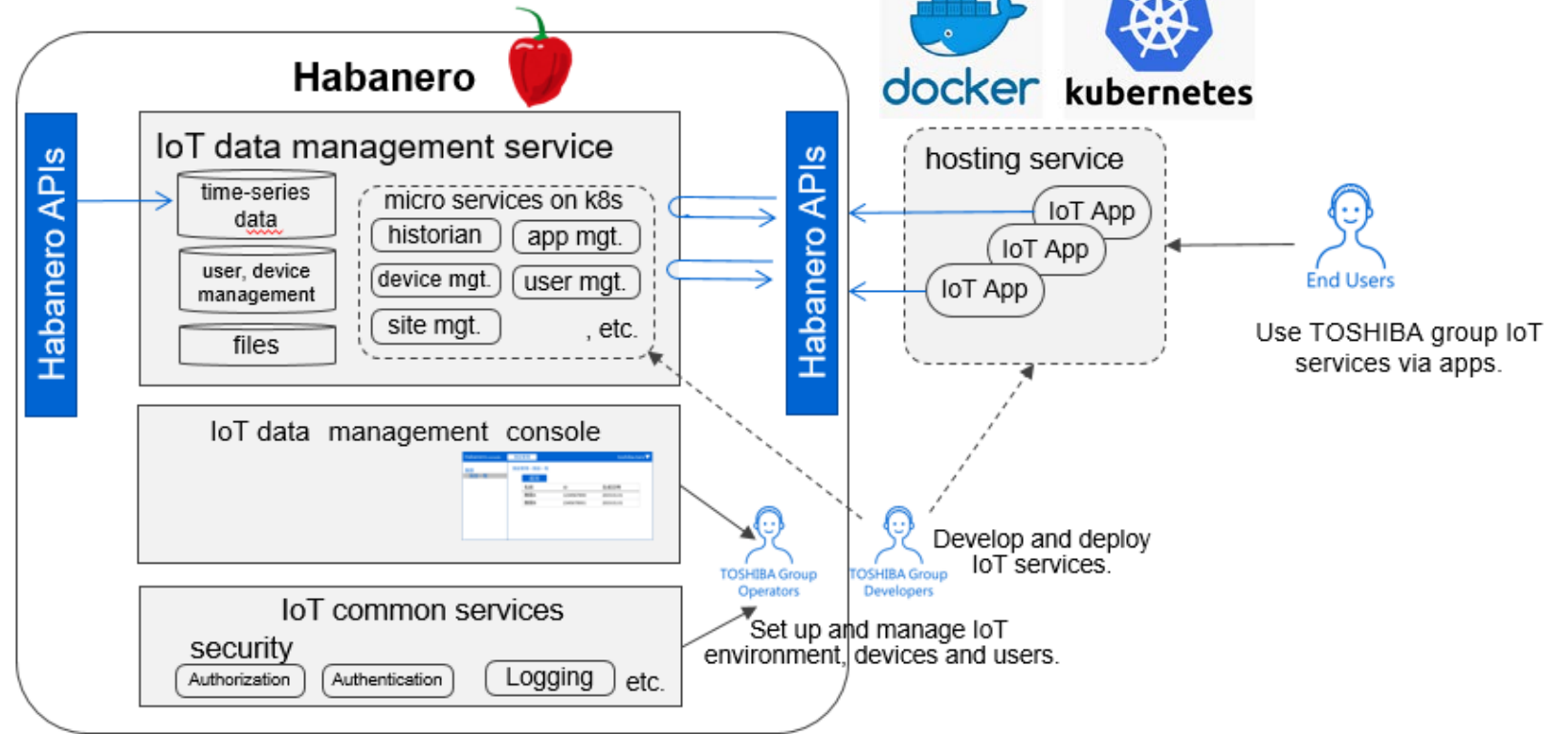
# IoT – Container-Based IoT



IoT Data



The number of devices increases explosively



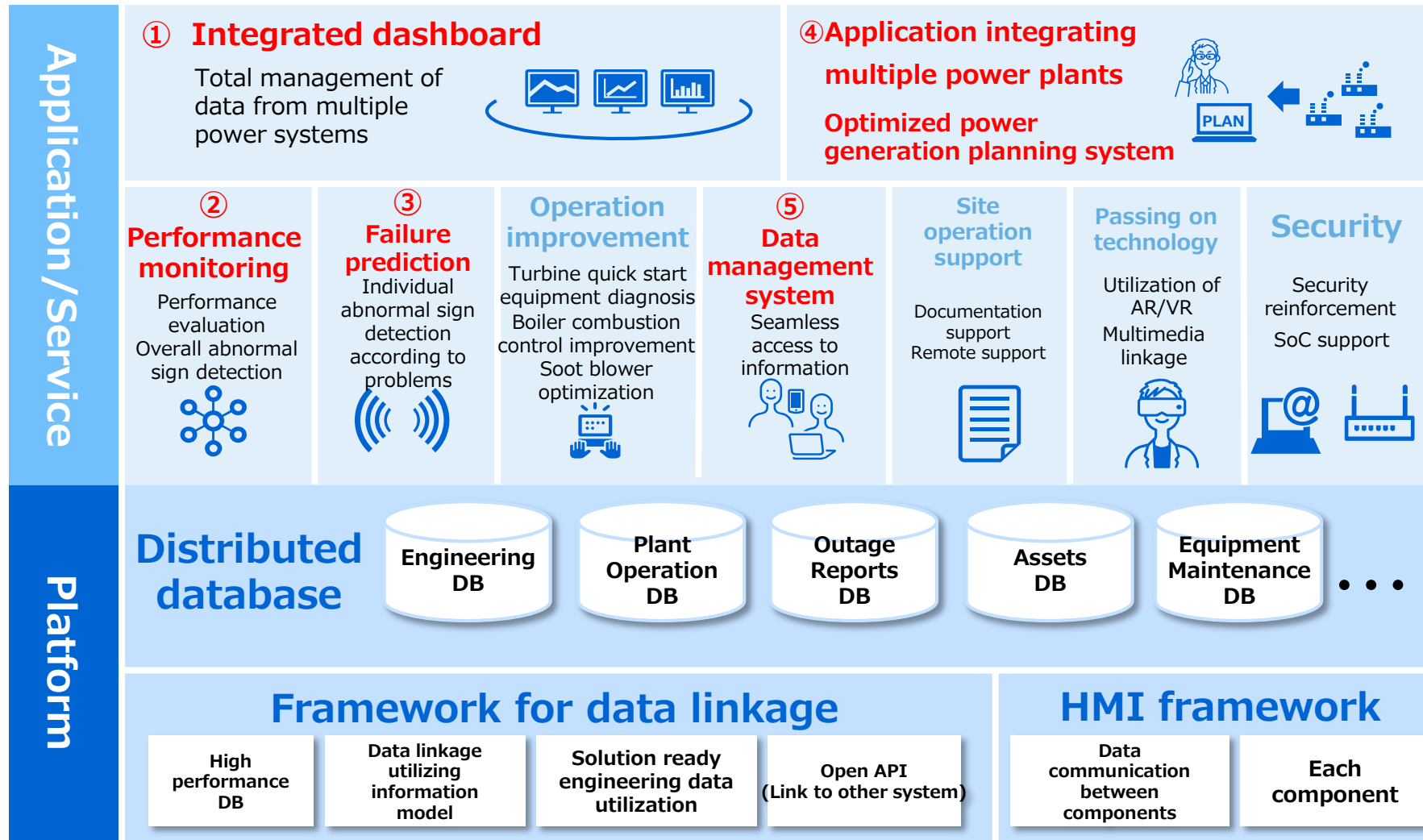
# Solutions for Power System

ESDX

DITC

TSIP

CSTC



← **Micro service**

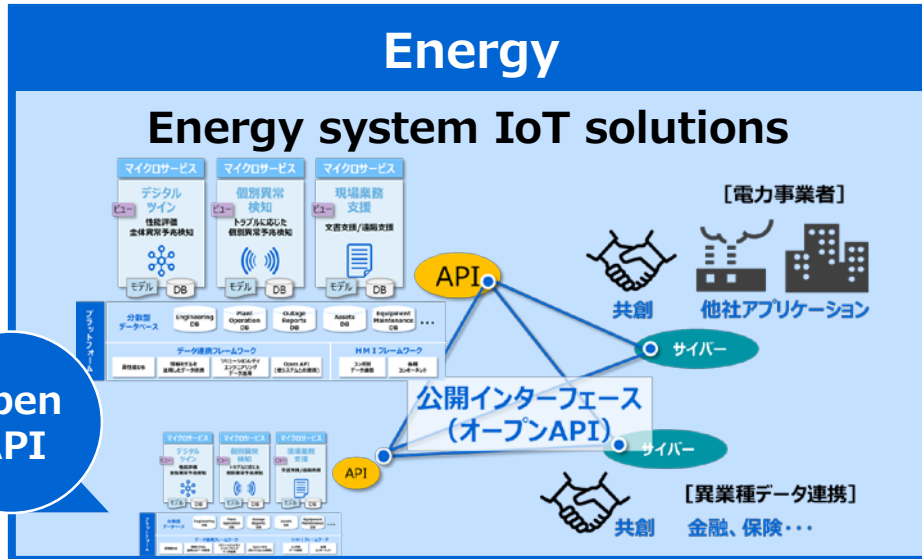


Equipment information model      API linkage

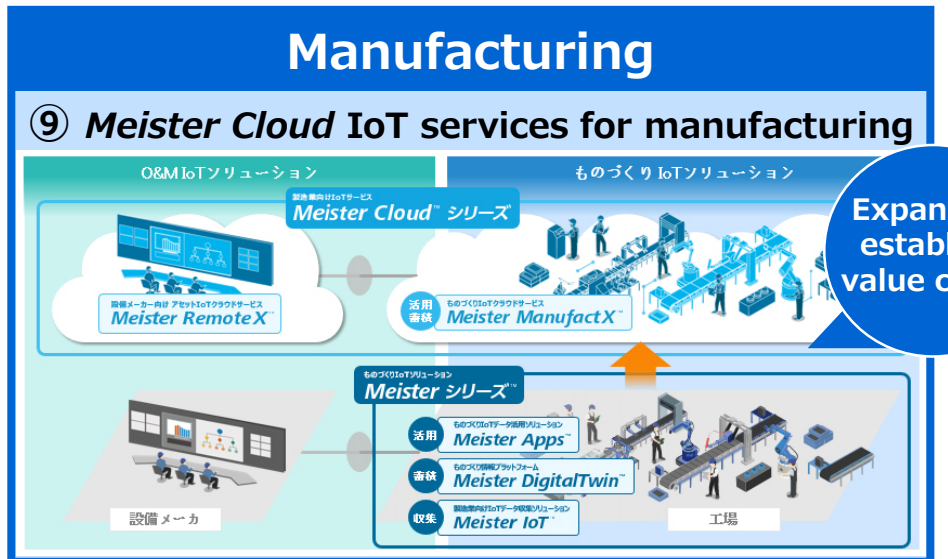


# Toshiba IoT Reference Implementation (part of 12 services)

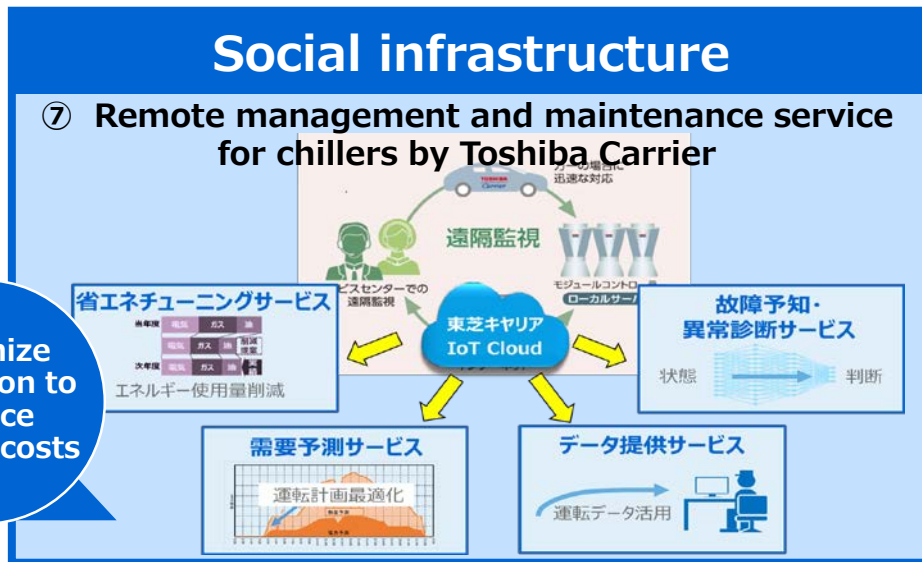
Develop services for energy, social infrastructure, building facilities and manufacturing



Open API



Expand to establish value chain



Optimize operation to reduce energy costs



Focus on people who use the building

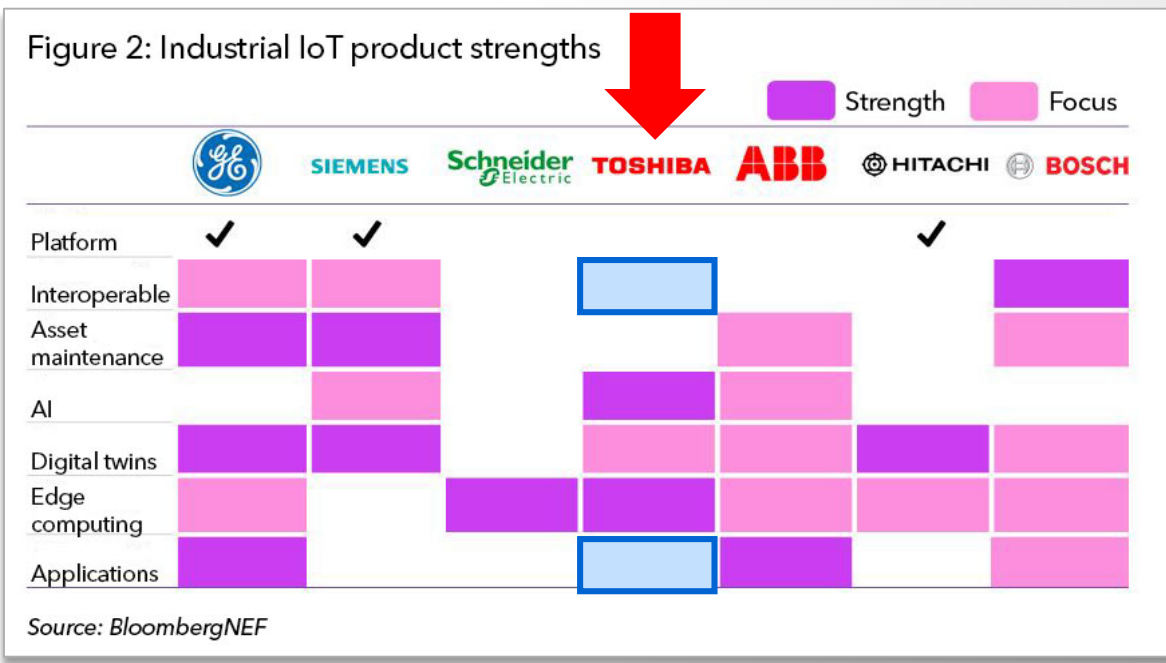
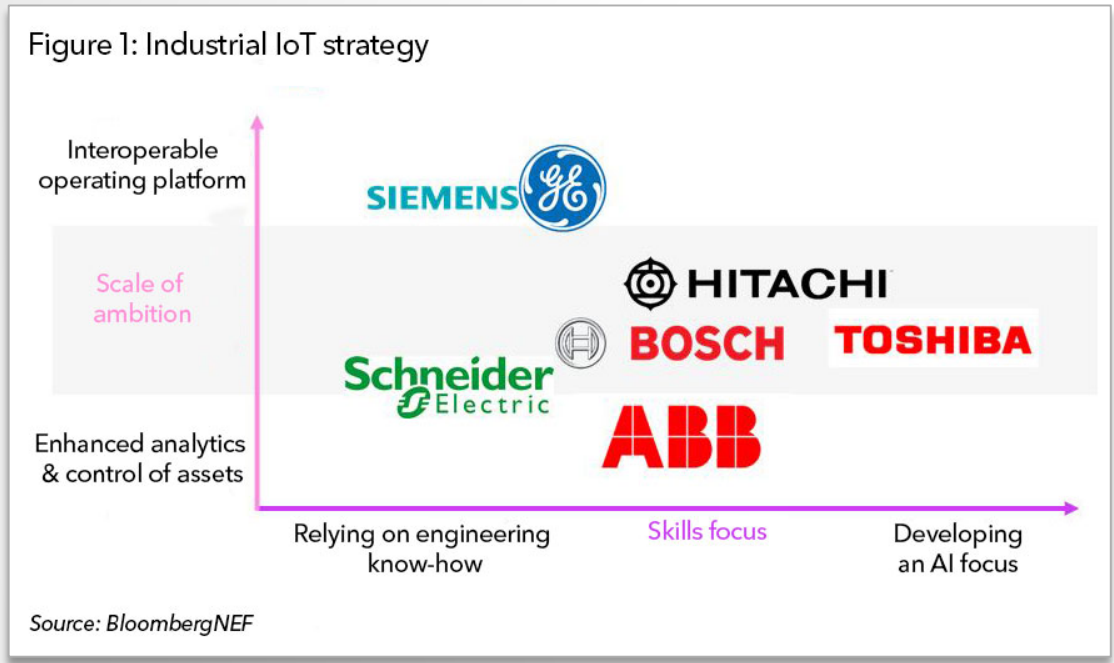
# 3

## Where does Toshiba want to position itself?

- Industry leader
- Focus in 2020 (Execution)
- Establish Thought Leadership (Vision)

# Bloomberg's Evaluation of World's Major Industrials' Industrial IoT Strategy

Strong AI and Edge – Reinforcement of mutual connectivity (Open) and application (service)

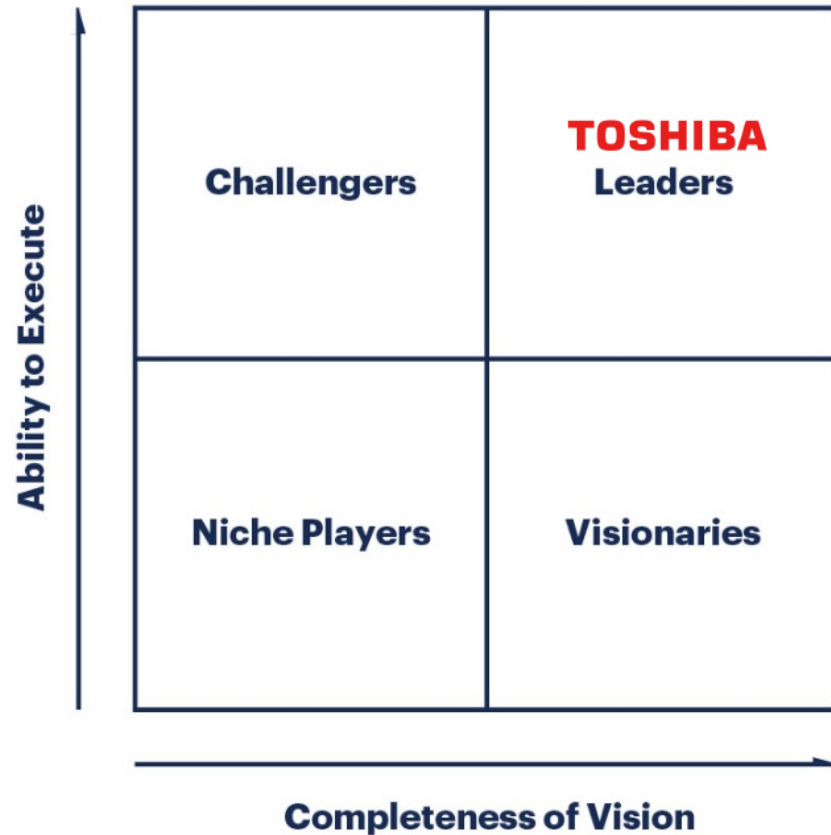


**Bloomberg NEF says**

*“Toshiba is looking to leverage its knowledge of chips to build an IoT product based on machine learning, practicing on its own assets and buildings first.”*

Source : Bloomberg NEF  
<https://about.bnef.com/blog/ges-digital-division-spin-off-lead-industrials-following-suit-looking-sustained-growth/>

# Magic Quadrant for Industrial IoT Platforms



## Magic Quadrant for Industrial IoT Platforms

No company is positioned in the Leaders Quadrant

Source and disclaimer

Gartner, Magic Quadrant for Industrial IoT Platforms, Eric Goodness et al., 25 June 2019

Gartner does not endorse any vendor, product or service depicted in its research publications, and does not advise technology users to select only those vendors with the highest ratings. Gartner research publications consist of the opinions of Gartner's research organization and should not be construed as statements of fact. Gartner disclaims all warranties, expressed or implied, with respect to this research, including any warranties of merchantability or fitness for a particular purpose.

Source: Magic Quadrant by Gartner

<https://www.gartner.com/en/research/methodologies/magic-quadrants-research>

**Gartner**

# Execution – Past, Now, Future

2018~

**Toshiba IoT  
Reference  
Architecture**



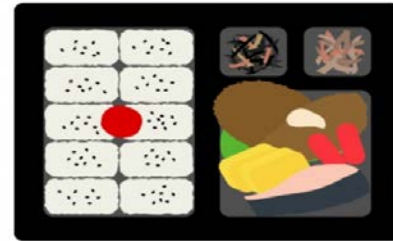
Status of international  
standardization



JTC-1/SC41

2019~

**Toshiba IoT  
Reference  
Implementation**



(12 IIoT Service)

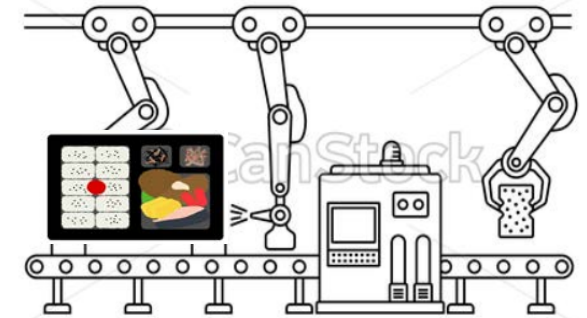


**Reusable service  
components**



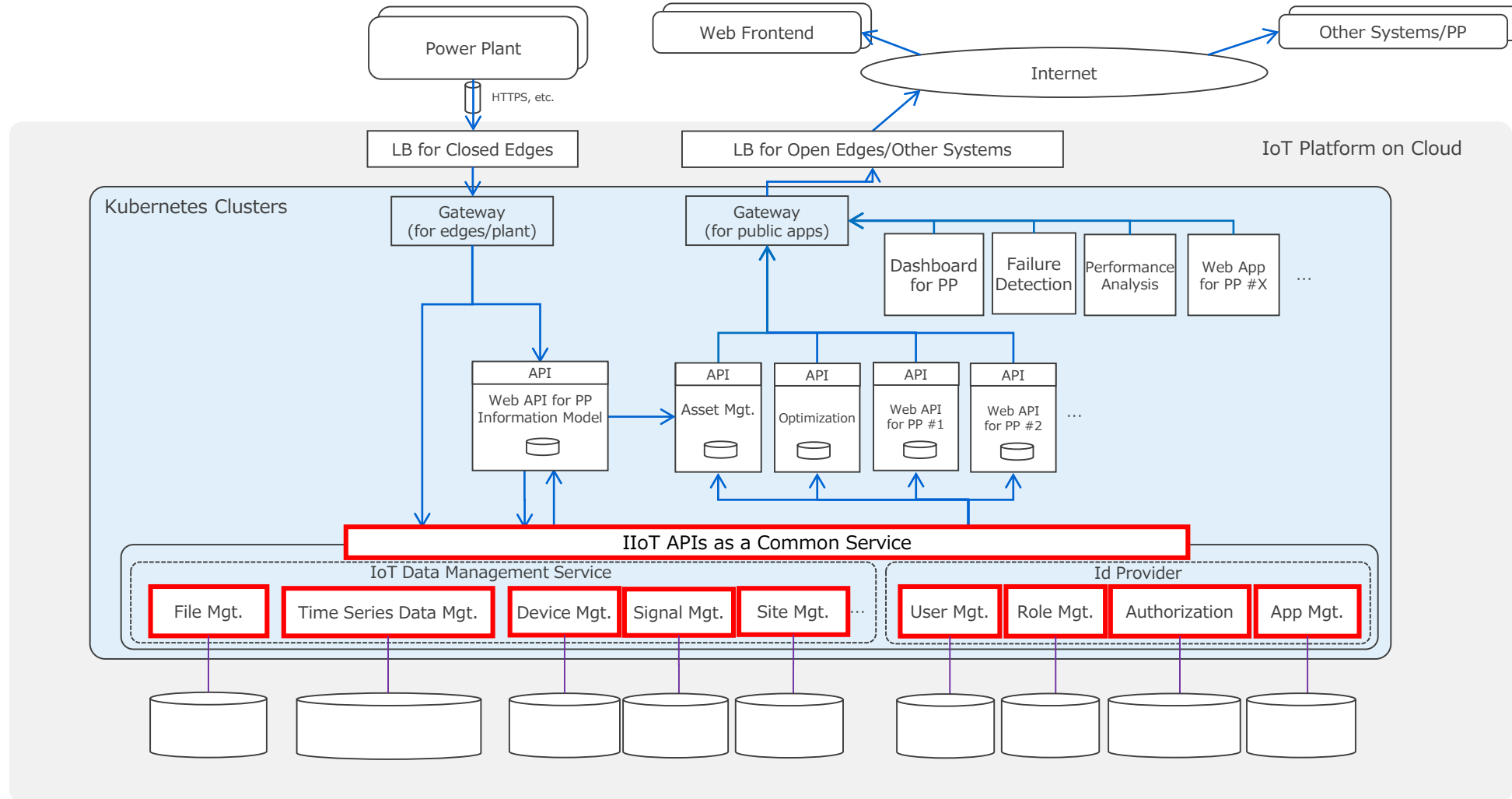
2020~

**Toshiba IoT  
Service  
Factory**

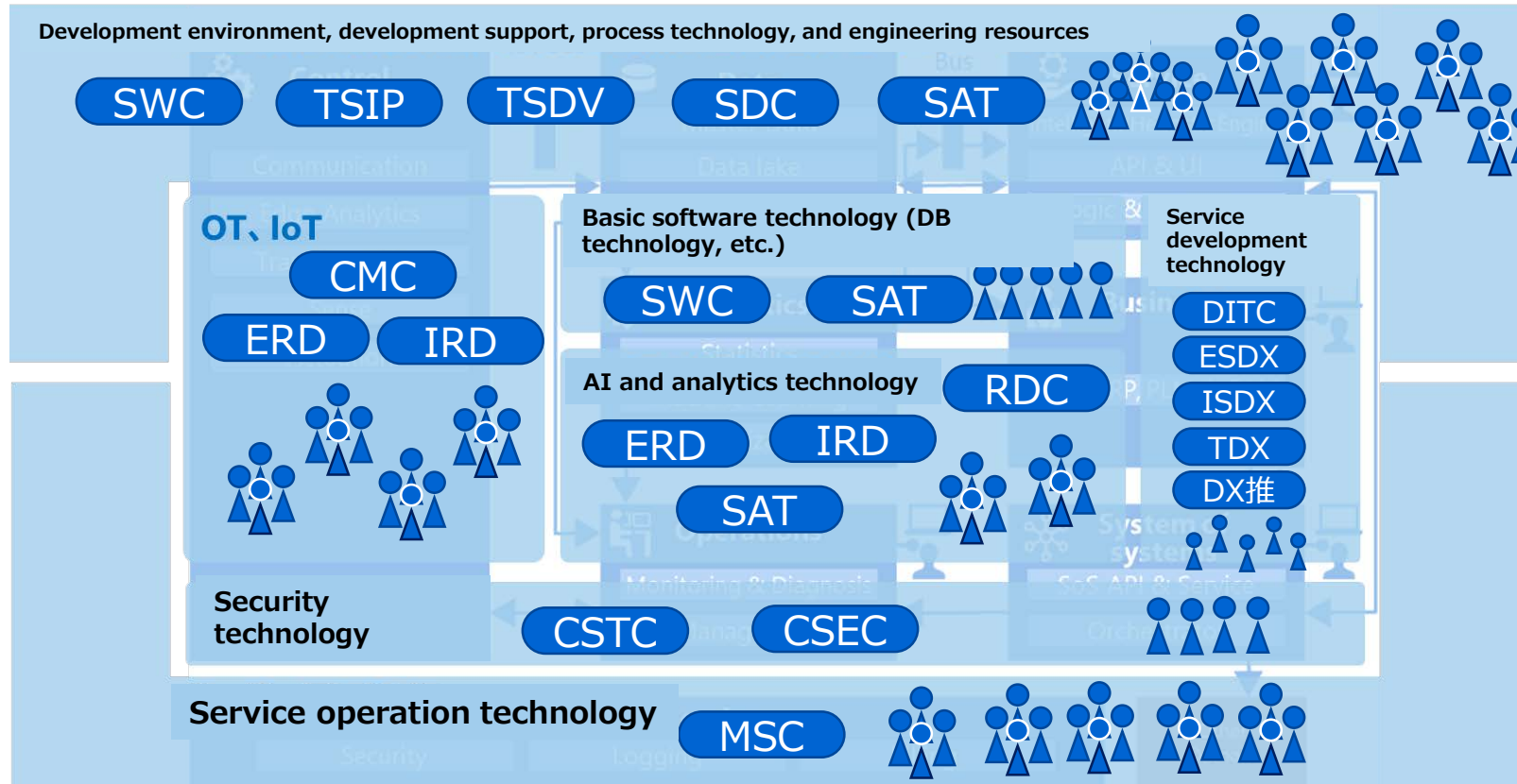


# Common Parts – Energy Service Architecture Overview

 : Common parts (micro services)



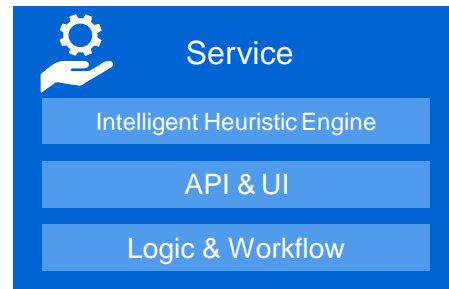
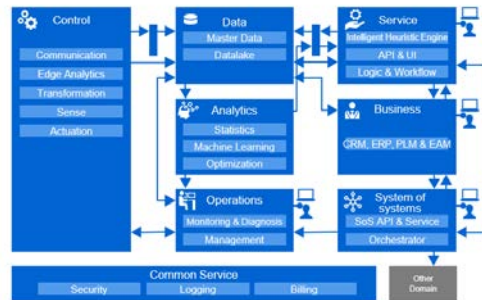
# Organization for a Home Run



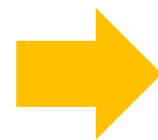
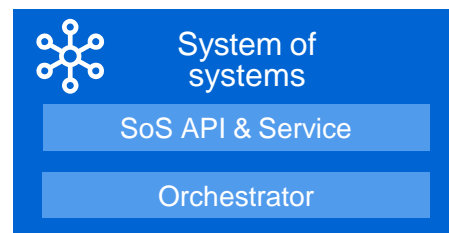
- |   |   |   |   |
|---|---|---|---|
| <b>RDC</b> Corporate Research & Development Center            | <b>CSEC</b> Cyber Security Center                                 | <b>SAT</b> Software & AI Technology Center                    | <b>TDX</b> Toshiba Digital & Consulting Corporation   |
| <b>SWC</b> Corporate Software Engineering & Technology Center | <b>ESDX</b> DX Business Design Project Team                       | <b>SDC</b> Software and Service Technology Development Center | <b>DX推</b> Digital Transformation Business Department |
| <b>CMC</b> Corporate Manufacturing Engineering Center         | <b>ERD</b> Energy Systems Research and Development Center         | <b>MSC</b> Managed Service Center                             |   |
| <b>DITC</b> Digital Innovation Technology Center              | <b>ISDX</b> DE & DX Development & Promotion Division              | <b>TSIP</b> Toshiba Software India Pvt. Ltd.                  |   |
| <b>CSTC</b> Cyber Security Technology Center                  | <b>IRD</b> Infrastructure Systems Research and Development Center | <b>TSDV</b> Toshiba Software Development(Vietnam)             |   |

# Vision – Establish Thought Leadership

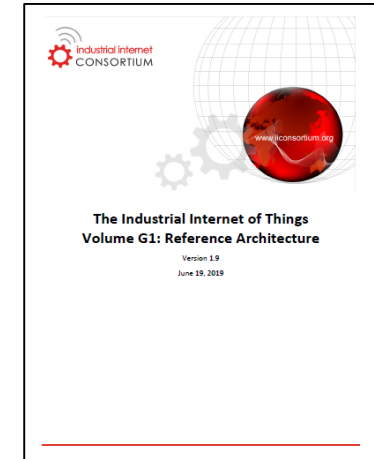
By contributing to international standards, establish Toshiba thought leadership (opinion leader) in the market



**6.10 THE HUMAN ROLES IN THE CREATION AND OPERATION OF AN IIoT SYSTEM**



**7.1.4 System of Systems Architecture Pattern**





## Hannover Messe 2019

Toshiba CTO Hiroshi Yamamoto spoke at Industrie 4.0 Forum event about how digital transformation has upended traditional business models: "Today, our competitors can be tomorrow's partners, in other words competition and collaboration will coexist as we further develop new IoT solutions, this is especially true for B2B industries."



<https://www.linkedin.com/feed/update/activity:6518805171374485505/>

## IoT World Congress 2019



[https://www.youtube.com/watch?v=K8s\\_TTMQzSI&feature=emb\\_title](https://www.youtube.com/watch?v=K8s_TTMQzSI&feature=emb_title)



A request for everybody



**Committed to People,  
Committed to the Future.**

**TOSHIBA**