Monozukuri Innovation Using IoT

Hitachi Metals IR Day 2017

May 31, 2017

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1-1. Overview of the *Monozukuri* Innovation Project

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Monozukuri skills to achieve greater organic growth

Build innovative *monozukuri* through IoT

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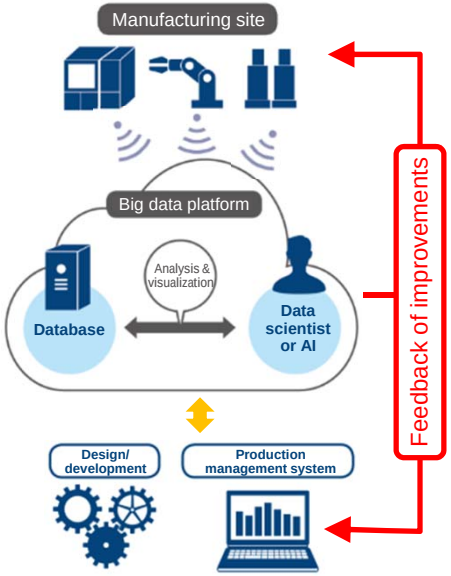
Achieve innovation in manufacturing technology throughout the entire material flow

Improve cash flow by rolling out company-wide activities

Company-wide activities	Reduce lead time and inventories.
Analysis of manufacturing conditions	Reduce loss costs and defect rate. Launch new products quickly.
Establishment of new production line using IoT	Establish an innovative production line for magnets. (Scheduled for operation in FY2018) Establish a new continuous casting and rolling line for wires/cables. (Scheduled for operation in FY2018)
Visualization of manufacturing data	Establish a highly efficient production management system.

IoT and *monozukuri*



Impact in FY2016: ¥3 billion → FY2017: ¥10 billion → FY2018: ¥20 billion

1-2. Overview of Initiatives in IoT

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Build *monozukuri* skills that are among the best in the world by utilizing IoT*

Improve quality	▪ Reduce loss costs ▪ Eliminate mega recalls ▪ Improve risk management
Traceability	▪ Improve risk management ▪ Strengthen the customer base
Symptoms diagnosis	▪ Ascertain anomalous conditions quickly ▪ Roll into the business model

*IoT: Internet of Things

1-3. Roadmap

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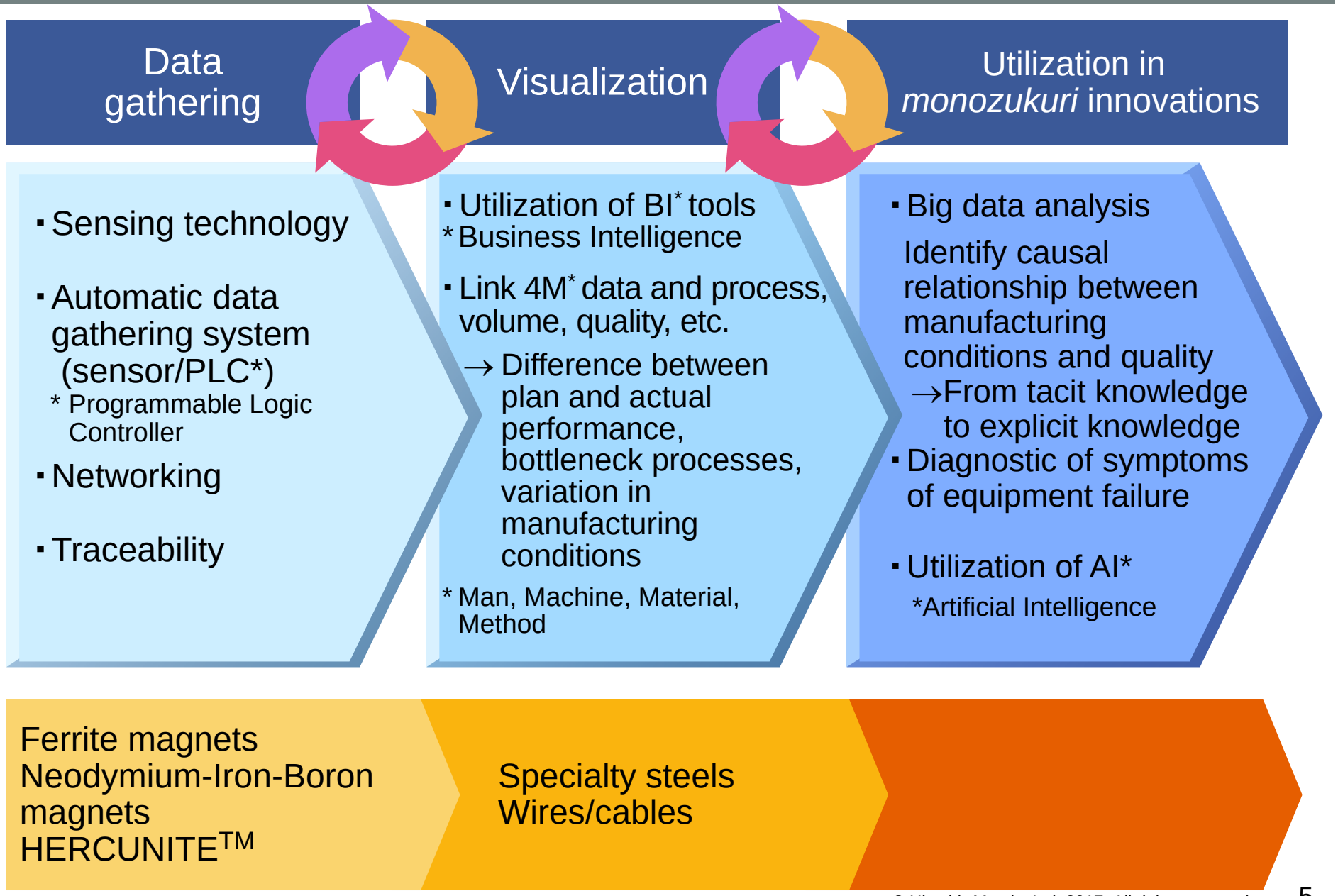
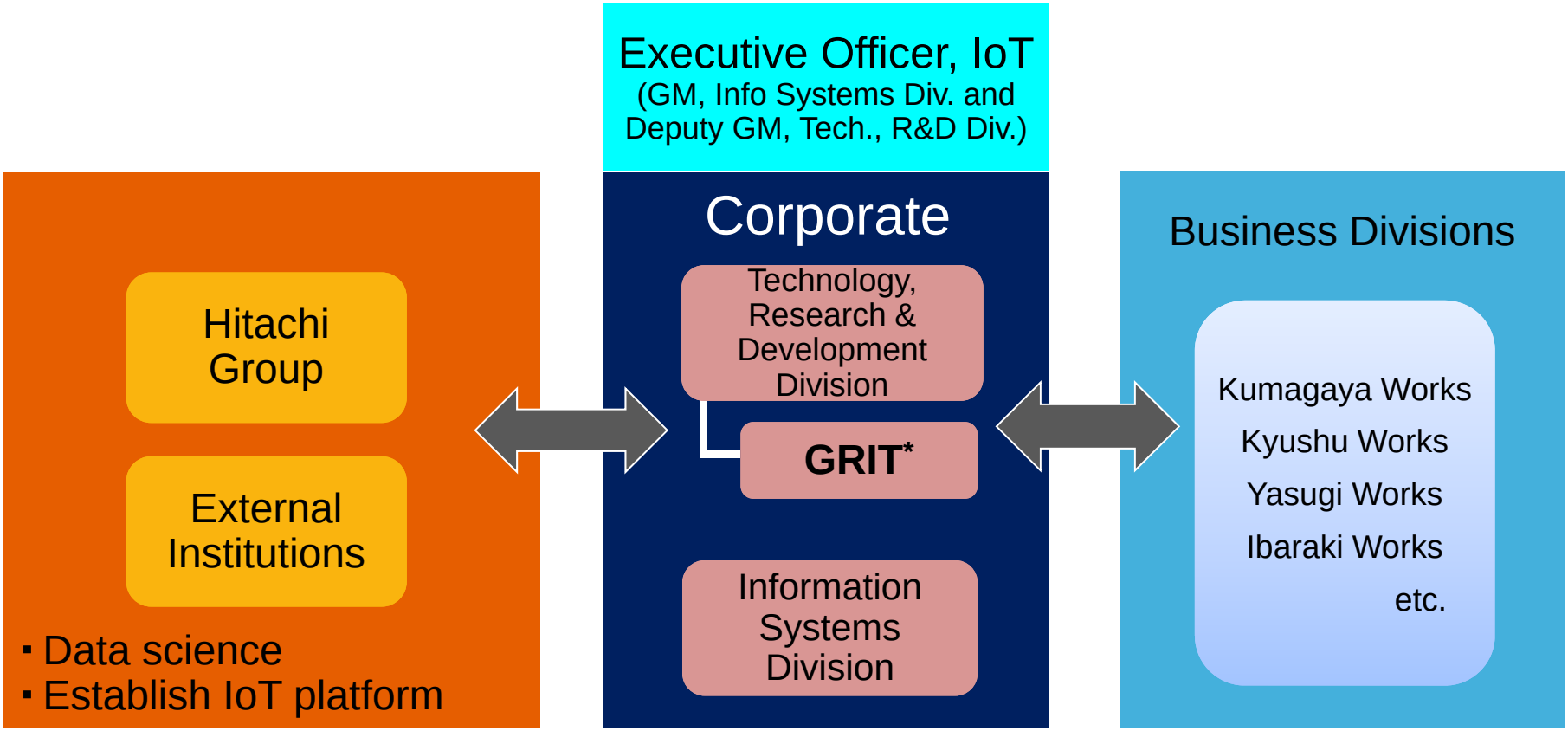


1-4. Promoting System

Promoting System with Corporate as the Core

- Aggressive investment led by Corporate, rapid developments
- Introduction of advanced expertise from within and outside the Hitachi Group



*GRIT: Global Research & Innovative Technology Center

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2-1. Example 1: Quality Stabilization of Magnetic Materials

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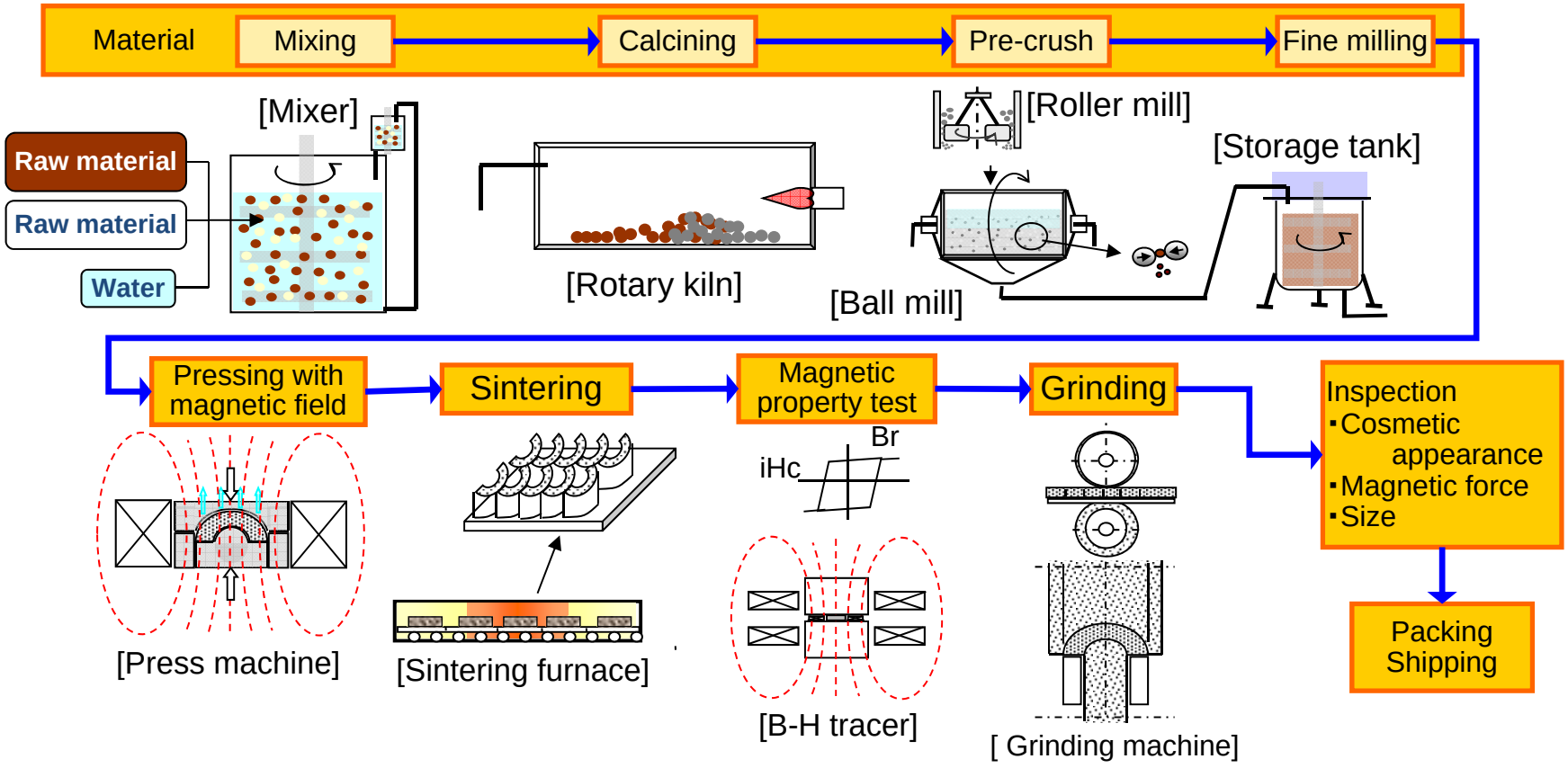
Visualization	Instrumentation of material, pressing, sintering, and grinding process (FY2016)
Technological innovation	Quality stabilization based on big data analysis (FY2017)



Establish innovative production line at Kumagaya Works (Operation in FY2018)

⇒ Global rolling out of achievements

2-2. Example 2: Heat-Resistant Cast Steel Establish Highly Robust Manufacturing System

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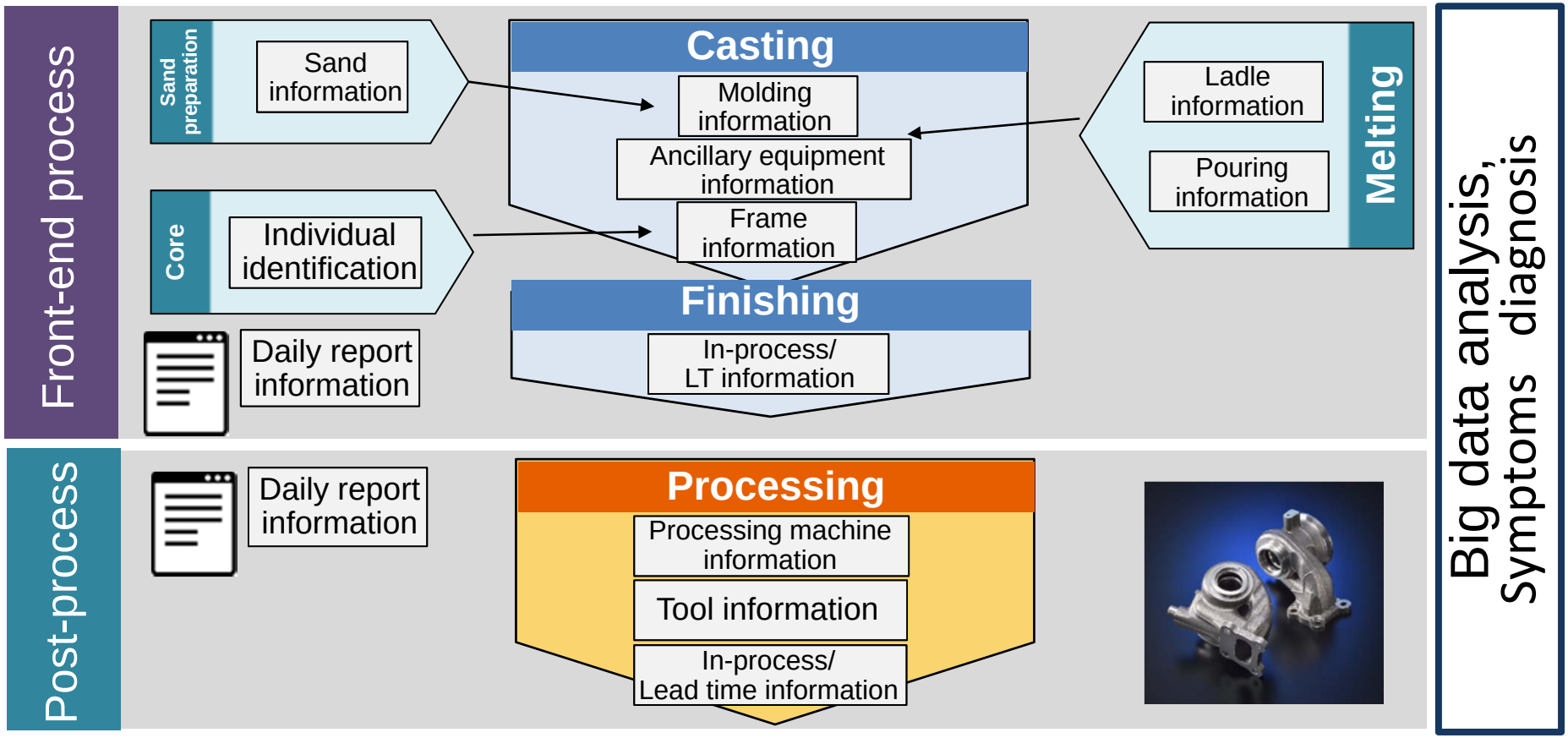
Data gathering	Establish IoT platform (FY2016)
Visualization	Analyze manufacturing data (FY2017)



Production innovation that links analysis with symptom (FY2018)

2-3. Example 3: Visualization of Specialty Steel Production Track Record Data

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Visualization	Visualization of operation ratio, work-in-process, lead time (FY2016)
Production innovation	Establishment of data integration system using BI tools (FY2016)

	1. Existing tools	2. Cross-organizational analysis BI	3. Originally developed screen
	・Quality visualization tool, etc.	Yasugi Insight Qliker	・Flow of goods, utilization track record, etc.
Analysis system structure: Data indication	All-in-one Define within one product	Leading BI software	Original development 
Analysis system structure: Data acquisition /editing		Hitachi's data integration/ analysis platform Open source but high performance — pentaho A Hitachi Group Company	
Analysis system structure: Data source	There are no constraints to data subject to analysis; right material in the right place: Sales; Accounting; Production management; Equipment utilization; Human resources, goods		Efficient track record collection with smart devices
Achievement	・Visualize quality information & production volume ・Reduce indirect divisions' data collection	・Develop cross-organizational analysis screen for plant-wide revenue, LT, volume of work in process	・Develop screen that visualizes the flow of goods and equipment utilization track record

Refine production plans under complex constraints

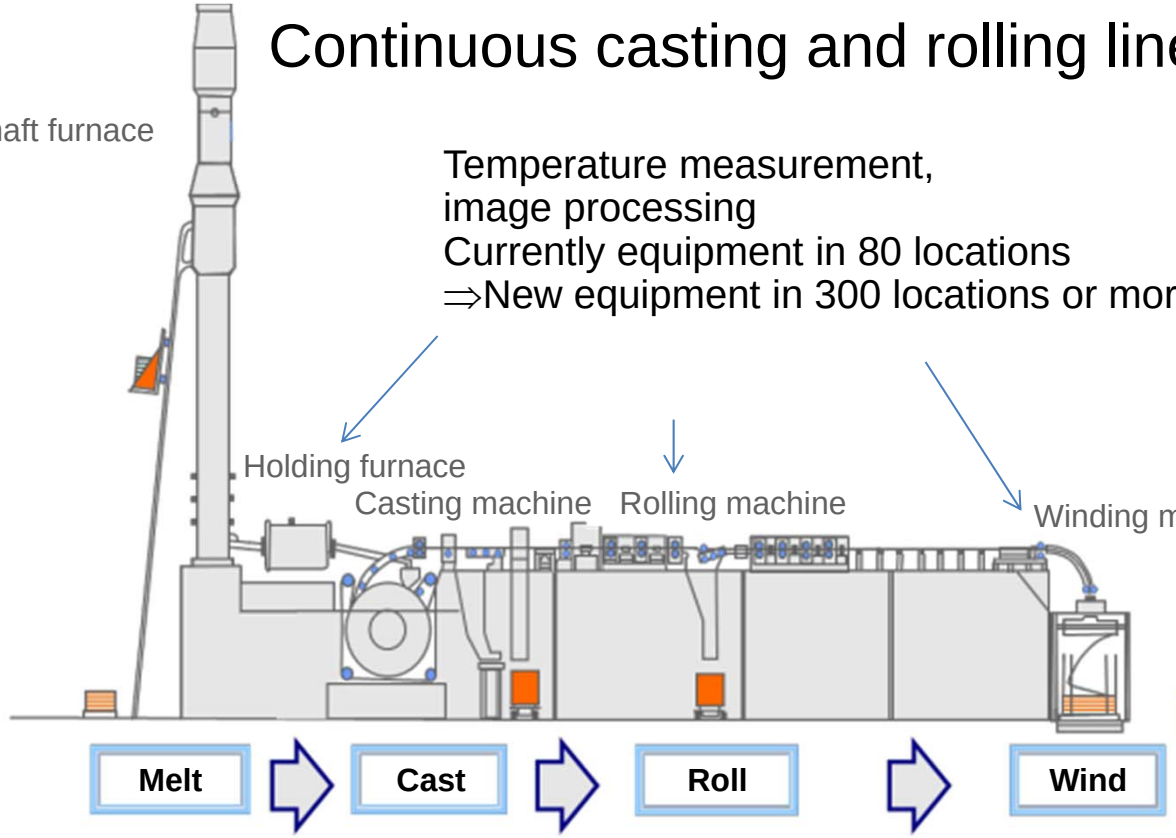
2-4. Example 4: Wires, Cables & Related Materials Develop Highly Efficient Technology

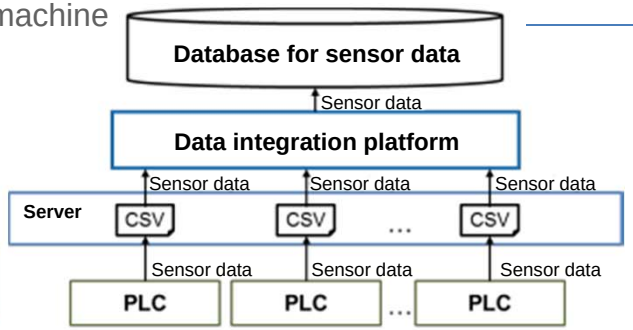
Visualization	Sensor data analysis in a current production line (FY2016)
Technological innovation	Develop dashboard with BI tools (FY2017)

Continuous casting and rolling line

Shaft furnace

Temperature measurement,
image processing
Currently equipment in 80 locations
⇒New equipment in 300 locations or more





Build innovative line at Ibaraki Works (Operation in FY2018)
⇒ Roll out to HiFC™* and other high-quality copper wires

*HiFC™: A new copper alloy developed by Hitachi Materials with a properties equivalent to high-purity copper

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3-1. Further Developments in Utilization of Information Technology

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Accelerate four innovation projects using information technology

Monozukuri innovation	**Build innovative *monozukuri* through IoT**
Sales innovation	**Strengthen sales data linkage within the Group**
R&D innovation	**Material Informatics** **(Participation in IBM Research Consortium)**
Work-style innovation	**Improve work efficiency** **Focus on more innovative work**

Utilization of AI

Information on Risks Inherent in Future Projections

This document contains forward-looking statements—such as results forecasts and management plans—that are not historical facts. All such forward-looking statements are based upon all available information and upon assumptions and projections that were deemed reasonable at the time the Company prepared this document. Changes to the underlying assumptions or circumstances could cause the actual results to differ substantially. The factors causing such differences include, but are not limited to, the following:

- Changes in economic conditions and regulations in the main markets where the Company operates, particularly Japan, the United States, Asia and Europe
- Sudden changes in technological trends
- Changes in competitive advantage and the capabilities of the Company and its subsidiaries and affiliates to develop and commercialize new products and businesses
- Fluctuations in the status of product markets, exchange rates and international commodity markets
- Changes in financing environment
- The capability of the Company and its subsidiaries and affiliates to cope with fluctuations in product supply and demand, the status of product markets, exchange rates and international commodity markets
- Protection of the Company's intellectual property, and securing of licenses to use the intellectual property of other parties
- Changes in the status of alliances with other parties for product development, etc.
- Fluctuations in Japanese stock markets

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