FIELD system

Industrial IoT platform

Hannover, 19 September 2019

FANUC Global Service Network

Service First

FANUC Global Service Network

263 locations supporting **108** countries worldwide
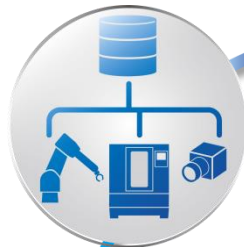
FANUC Service Policy

- Reliable
  Predictable
  Easy to Repair

- lifetime maintenance

FANUC aims to minimise downtime in all factories all over the world

Concept

Connect

Connect various devices across manufacturers and generations.

Monitor

Integrated data visualization, analysis and improvement.

Smart Machine Smart Factory

Drive the machines at site smartly and efficiently to create a smarter factory.

Edge Heavy

Most data are processed in Fog; user-data are stored on-premise.

Open Platform

Develop and sell applications and converters freely.

Control and drive edge equipment with better realtimeness.

Think with AI to realize smart automation and optimization.

Drive

Think

Conceptual Diagram of Connection

FIELD system Manager
License information, user management information, etc.
*Only this network requires always –on connection

FIELD system Store
Purchasing and downloading of applications and converters

Cloud

User data (according to user request)

Open Platform

PMA ZDT

Various applications

FIELD system
FANUC **I**ntelligent **E**dge **L**ink & **D**rive system

Fog

Edge Heavy

MTConnect OPC UA **Exclusive Converter**

User data (on-premise)

Edge

FANUC's products

Machine tools, Industrial machines, PLC etc.

Sensors, Exclusive machines etc.
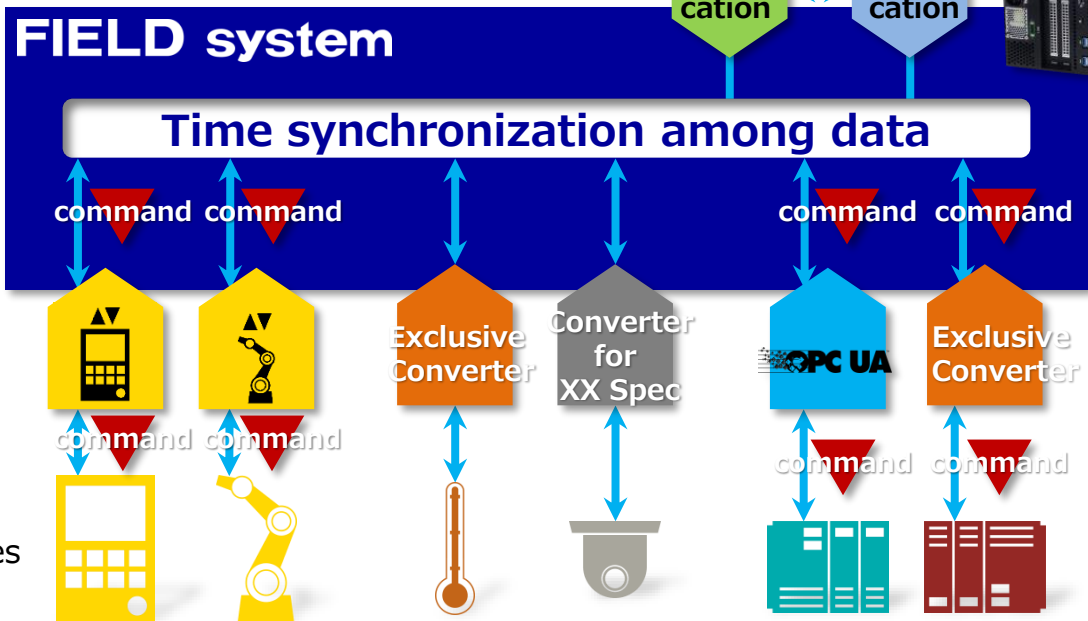
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Open Platform SDK （for Application, Converter)

*SDK=Software Development Kit

- ✓ Develop applications and communication converters freely
- ✓ Possible to input command or data into edge devices (depending on device specifications)
- ✓ Easy analysis with synchronized time in collected data
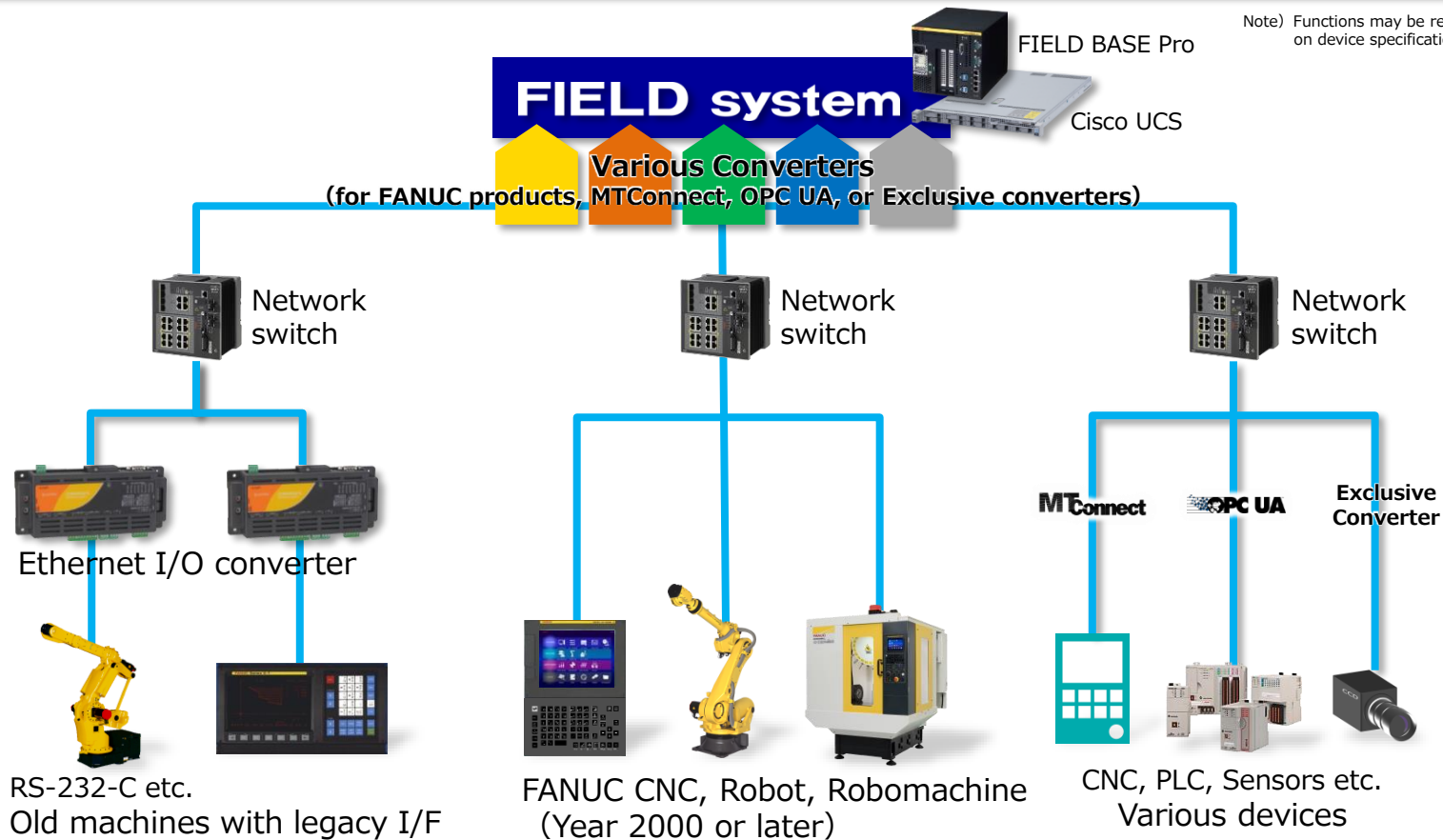- ✓ Linkable between applications

Linkage between applications

Appli-cation ↔ **Appli-cation**

FIELD system Partners

SDK for Application

Application

FIELD system

Time synchronization among data

command command   command command

SDK for Converter

Converter

Exclusive Converter

Converter for XX Spec

OPC UA

Exclusive Converter

command command   command command

Edge devices

Connectivity Across Manufactures & Generations

FIELD BASE Pro

FIELD system

Cisco UCS

Note) Functions may be restricted depending on device specifications

Various Converters
(for FANUC products, MTConnect, OPC UA, or Exclusive converters)

Network switch

Network switch

Network switch

Ethernet I/O converter

MTConnect

OPC UA

Exclusive Converter

RS-232-C etc.
Old machines with legacy I/F

FANUC CNC, Robot, Robomachine
(Year 2000 or later)

CNC, PLC, Sensors etc.
Various devices

Connectivity Integrate Applications & Systems

Conventional design

Connect and use Existing systems

System A

System C

System B

System C

App.

App.

Connection App.

FIELD system

Integrated Database

Conv. Conv. Conv. Conv. Conv. Conv.
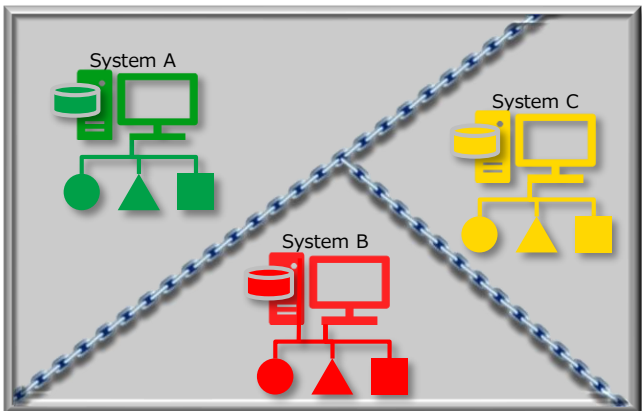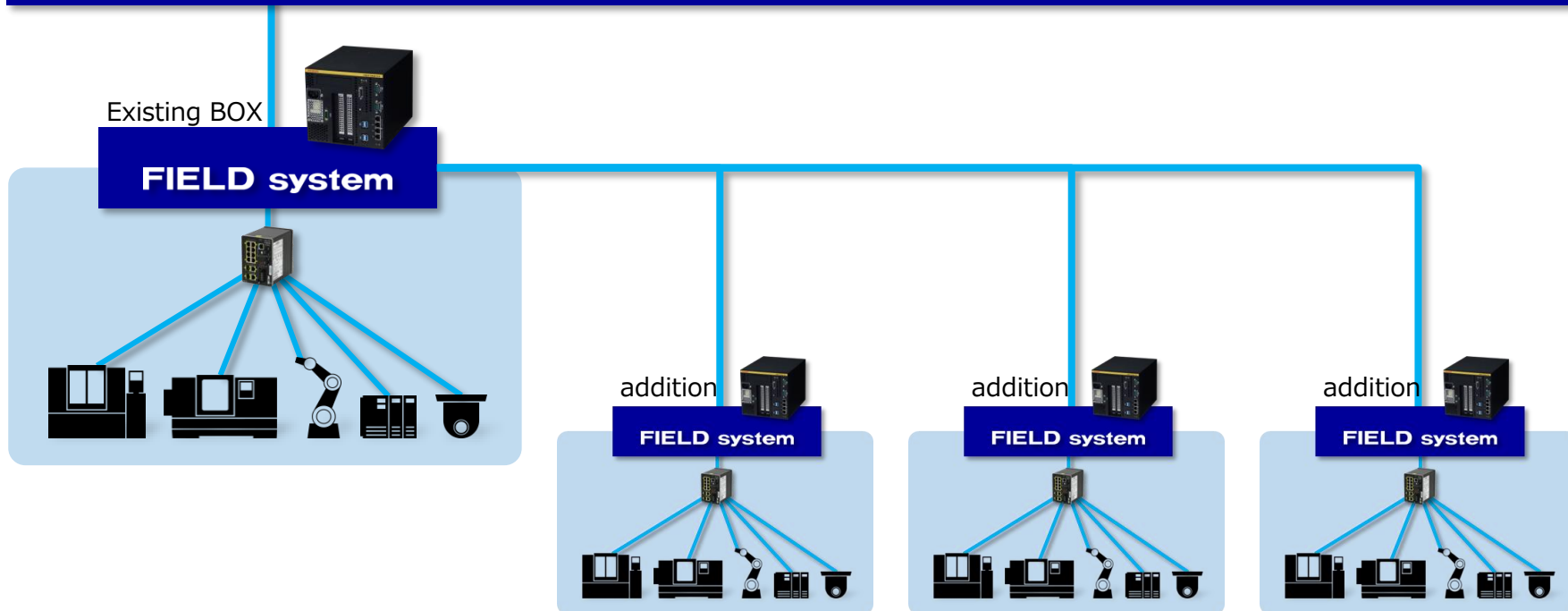
(System A)   (System B)

- System is separated by each manufacturer and application.
- Data are collected but not centralized.
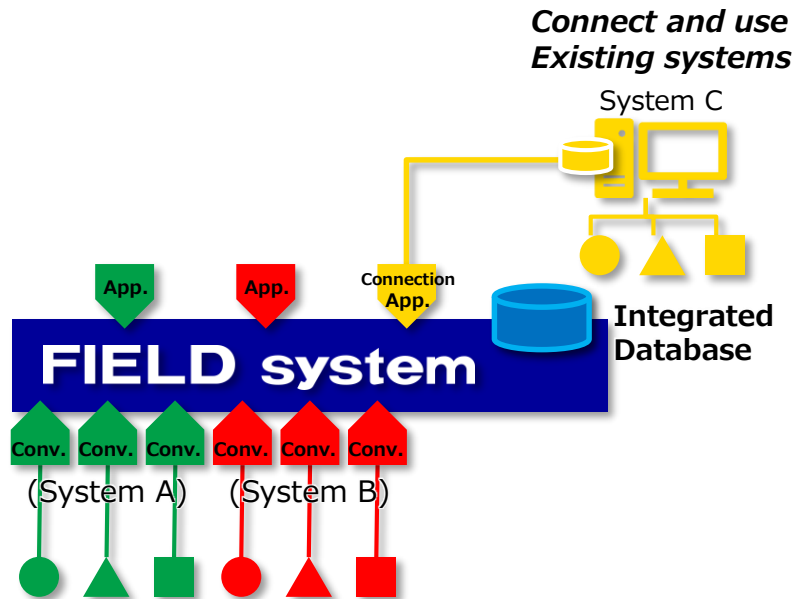
Unify all systems, applications, data in FIELD system

Scale Out of FIELD system BOX

Existing BOX

FIELD system

addition

FIELD system

addition

FIELD system

addition

FIELD system

Cooperation between FIELD system BOXes
makes scale out easy when the number of connected devices increases

Connection with Cloud Systems

Cloud A

Cloud B

Cloud C

Cloud D

Connectors for cloud by various manufacturers

FIELD system

Collect data from multiple sites and make commands based on the data

Data collection (only under user permission)

Command for FIELD system

High speed data collection and control based on the data

Data collection from edge devices

Control edge devices
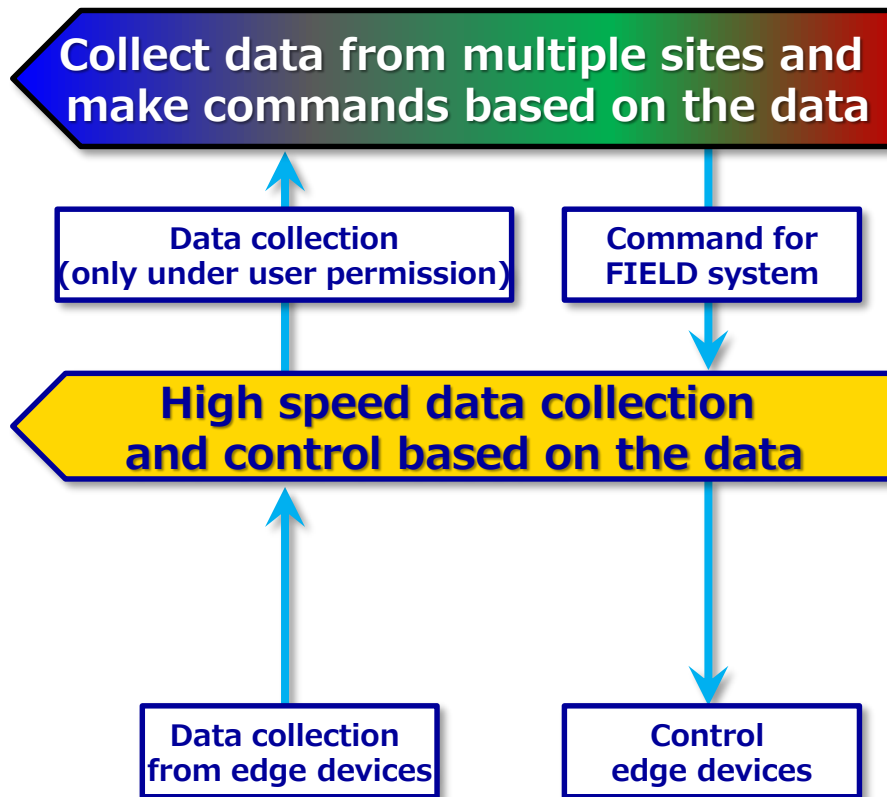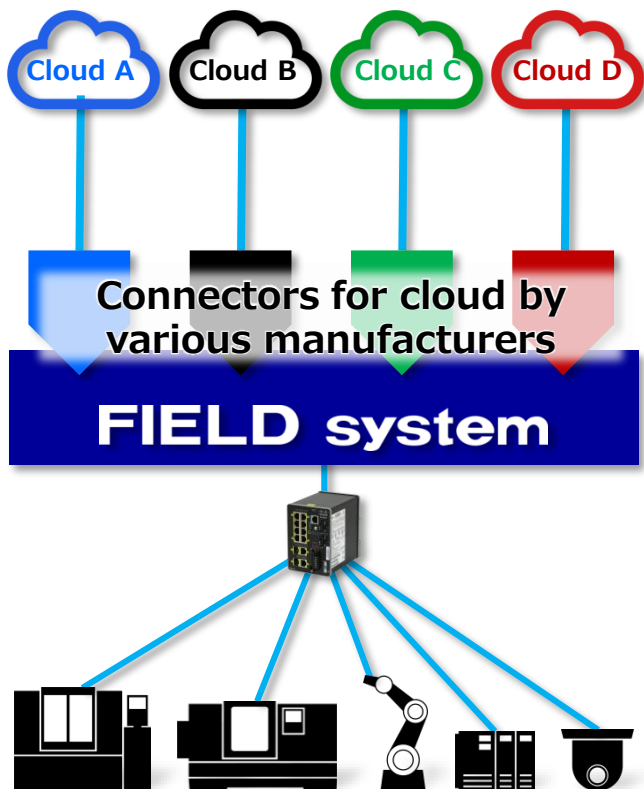
FIELD system

MAIN APPLICATIONS

Monitor the operation of production equipment anytime
Operation analysis, productivity improvement, factor analysis

*PMA=Production Monitor & Analysis

✓ Information collection from equipment operation
✓ Bulk collection of high-speed data such as servo information from inside the controller
✓ Time-based analysis by superimposing multiple information
✓ Analysis powered by AI and Fourier transform
✓ Customization of screen layout and skin (in development)
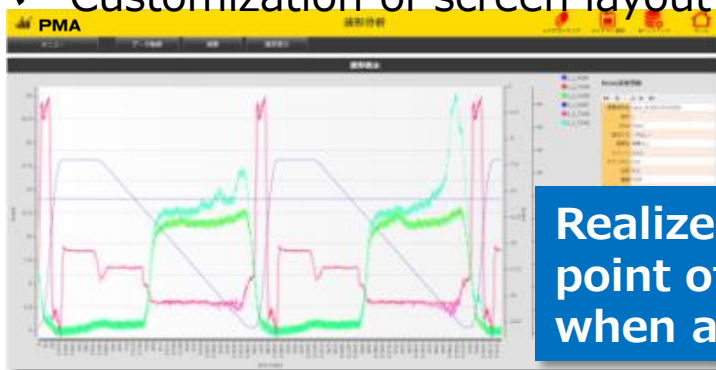
Realize the visualization of point of change or changes over time when a problem occurs
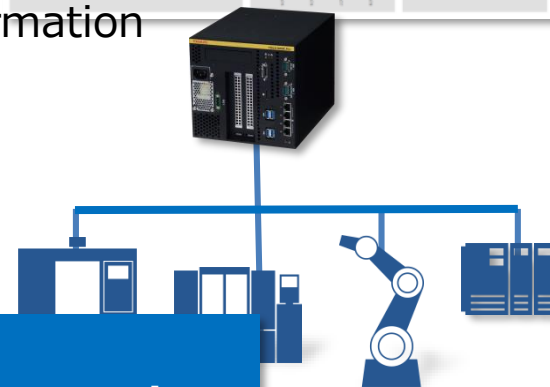
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*ZDT=Zero Down Time

Reduce unexpected downtime of production equipment

Abnormality monitoring, Abnormality alarm, Preventive maintenance, Maintenance support

✓ Monitor abnormalities and changes from normal condition of equipment
✓ Enable remote maintenance by utilizing collected data
✓ Obtain recommendation on alarm/maintenance from Knowledge System

Service First
Service DB
Knowledge System

Realize the improvement of quality and efficiency of maintenance service
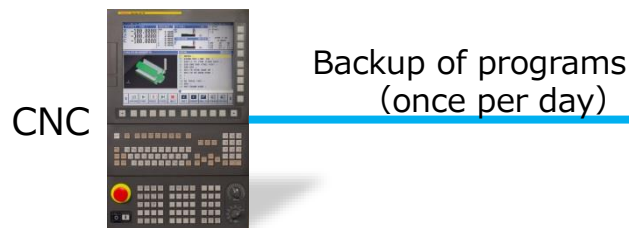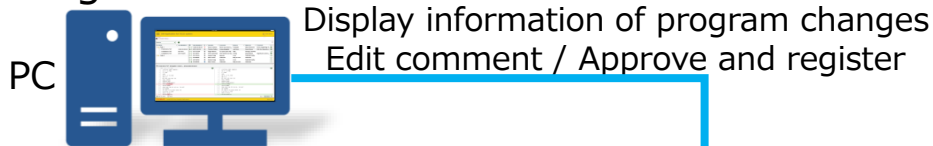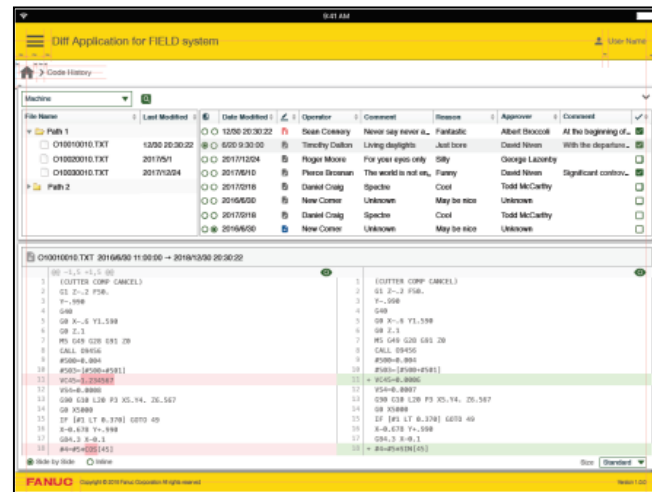
Logging and utilizing CNC program edit history

Identify users, approvers, editing reasons, editing errors

- ✓ Log and display edit history of CNC programs
- ✓ Log edit data such as who edited, what was edited, why, and who approved
- ✓ Identify defect causes resulted from program change

Display information of program changes
Edit comment / Approve and register

PC

CNC

Backup of programs
(once per day)

FIELD system

Easy and reliable execution & recording of daily checks

Easy execution with instructions on mobile terminals

✓ Record and display the history of daily check of equipment

✓ Check items will be displayed by reading the QR code on equipment

✓ Record can be input by selecting, filling-in, or photo-taking, etc.

✓ The check results can be confirmed from remote PC

PC

• Confirm check results in the list
• Create check items
• Create QR code

Check→Upload the check results

FIELD system

Operate on iPad

Enhance security by personal authentication by user

Provide appropriate operation environment according to authority
(*for machine tools with FANUC CNC with Ethernet)

✓ Personal authentication by CNC
✓ Operation restriction according to user authority
✓ Unified management of operator information
✓ Operation history is periodically acquired and can be referred

Application screen sample
- Display by Operator ID
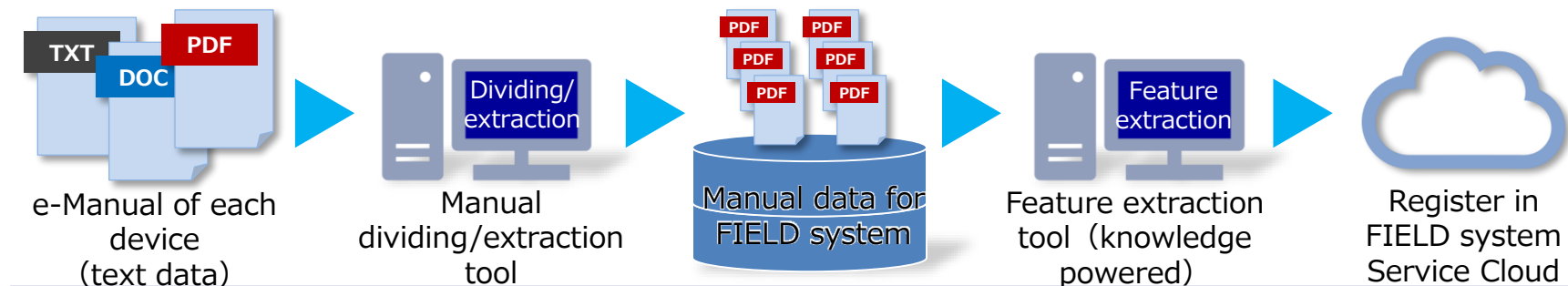- Reference of operation history

FIELD system Authentication Application

FIELD system

Operator ID info →
← Operation Permit

ID Info

Auth. Request

Operator ID

Authentication device and tag

Machine tools with FANUC CNC
（CNC with Ethernet）

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AI Manual Reference

Scheme to search manuals of machines from different companies in natural language

e-Manual of each device (text data) → Manual dividing/extraction tool (Dividing/extraction) → Manual data for FIELD system (PDF) → Feature extraction tool (knowledge powered) (Feature extraction) → Register in FIELD system Service Cloud

FIELD system Service Cloud

Manual Reference App. (supports natural language)

FIELD system

検索文を入力してください。

：	Company A
マニュアル:	Company A　Machine B manual
検索文:	Abnormal noise from telescopic cover

検索

Only user's machines can be selected

Supports natural language

関連記事： 3件

X軸テレスコピックカバー

(a)　(XカバーR, XカバーL)　(α-T14iB, T14iBL)

Sample of application search screen

Refer to the details in PDF
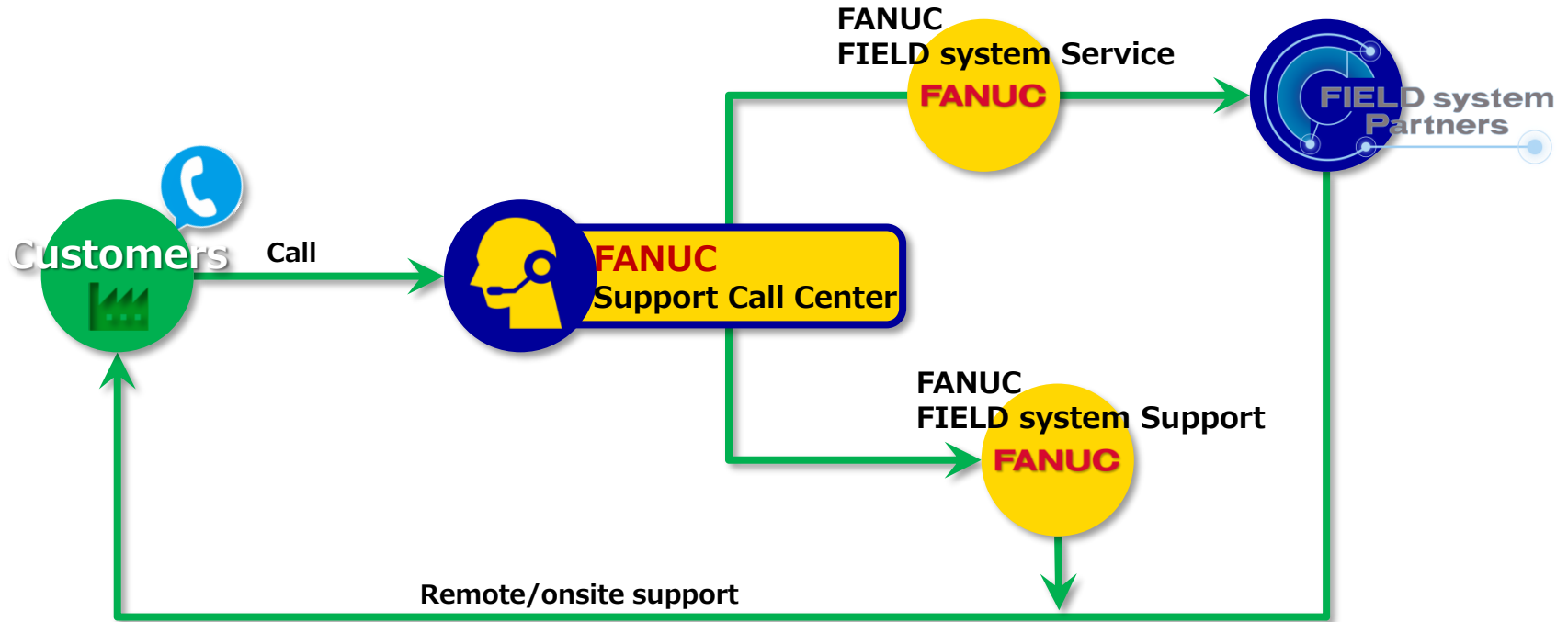
✓**Realize digitalization easily by using FIELD system infrastructure**
✓**Increase user's merit by utilizing exclusive tool to register data**

Support System

Customers

Call

FANUC
Support Call Center

FANUC
FIELD system Service

FANUC

FIELD system Partners

FANUC
FIELD system Support

FANUC

Remote/onsite support

Service First

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App & Converter Developers – EMO Partners

The following is a list of App Developers who are present at FANUC Booth during EMO:

1. AI Smart (Germany)
2. ALASCOM (Italy)
3. IGUS (Germany)
4. Kogifi (Poland)
5. Marposs (Italy, Germany, Japan)
6. Mitutoyo (Japan, Germany)
7. OPEN DATA (Italy)
8. Ruhrbotics (Germany)
9. SAUTER (Germany)
10. Schmalz (Germany)
11. Senseye (UK)
12. SKF (Sweden)

Applications made on FIELD system @ EMO 2019 (1-6)

1. **Fieldview App by company AISMART – to automate quality assurance checks, inventory management and assembly processes with computer vision;**

2. **APM (Advanced Plant Monitoring) App by company ALASCOM - Advanced solutions and artificial intelligence for automation;**

3. **Igus smart plastics App by IGUS – for zero downtime;**

4. **AIDAR Digital App by KOGIFI – for Industry 4.0;**

5. **ARTIS C-DASHBOARD App by company MARPOSS - for optimizing your manufacturing turn monitoring data into actionable information;**

6. **Connection for measuring instruments (Converter) by MITUTOYO - state-of-the-art Metrology Instruments & Software seamlessly connecting all worlds;**

Applications made on FIELD system @ EMO 2019 (7-12)

7. **OPERA PREDICTIVE App by company OPEN DATA - Intelligent MES Apps Connect, Monitor, Analyze, Predict;**

8. **OPERA SMART OEE App by company OPEN DATA;**

9. **Converter FT-AXIA by company RUHRBOTICS - We connect you to FIELD system with FIELD system converters;**

10. **SAUTER IQ-Turret Environment App by company Sauter Feinmechanik GmbH – for turret condition monitoring;**

11. **The Energy and Process control App by company SCHMALZ**

12. **Senseye PdM App by company SENSEYE - the Predictive Maintenance solution to achieve Industry 4.0 best practices;**

13. **Multilog On-line surveillance device App by company SKF - Predicting spindle health performance using IMx8 with SKF edge solution.**

FIELD system Partners presenting at their booths at EMO 2019

1. **Biglia (Italy)**

2. **DMG-MORI (Japan-Germany)**

3. **Marposs (Germany)**

4. **MATSUURA (Japan)**

5. **Mitutoyo (Japan)**

6. **RAIS (Bulgaria)**

7. **SAUTER (Germany)**

8. **TSUGAMI (Japan)**

Thank you

Do you have any questions?