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Fujitsu Group's Agricultural IoT Challenges

August 29th,2016

Fujitsu Kyushu Systems Ltd.

Tetsuya UCHINO

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Who we are

- Overview of Fujitsu
- Fujitsu Group in Thailand and Kyushu

Overview of Fujitsu

- Global scale in technology and service capability yet with a local face
- We integrate solutions in response to our customers' business needs

IT Service

#1 in Japan　　#5 globally

Employees

156 thousand

Data Centers

121

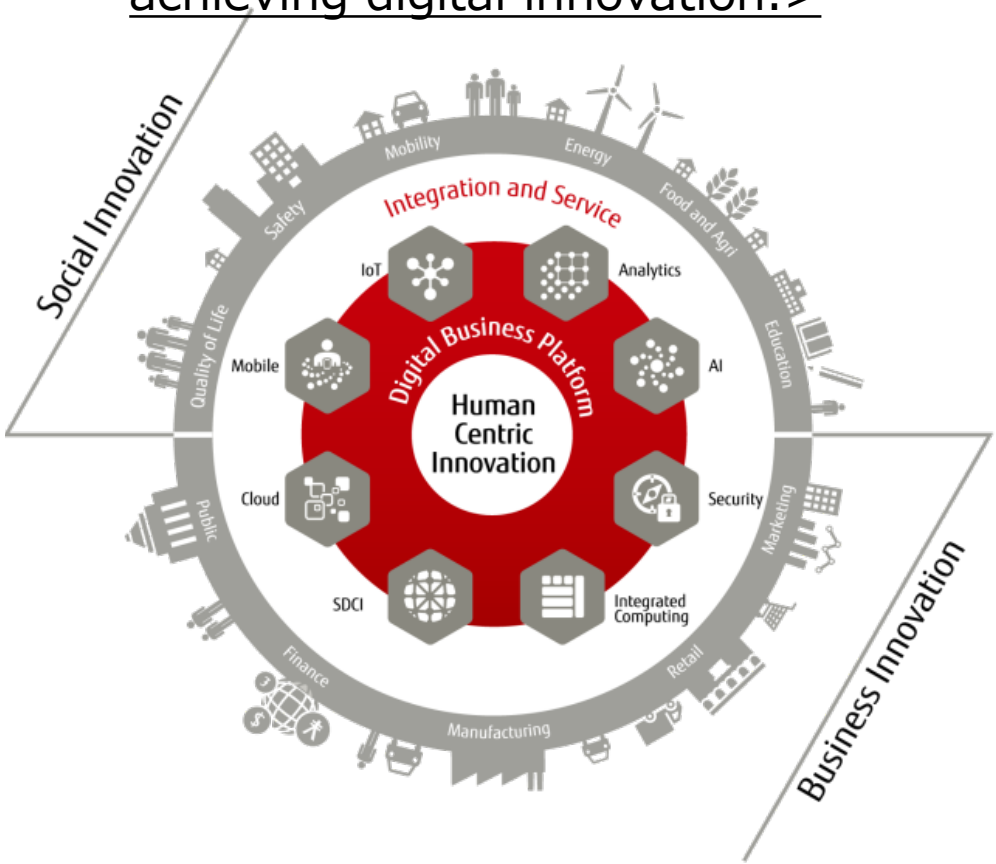
Service Desks

74

FORTUNE named Fujitsu as "one of the World's Most Admired Companies for 4th consecutive year.

Fujitsu Chosen for the Dow Jones Sustainability World Index for 16th time in 2015.

<Fujitsu's technology and services for achieving digital innovation.>



Fujitsu is a global Japanese ICT vendor, with the goal of social affluence together with our customers by leveraging our experience and ICT technologies.

Fujitsu groups in Thailand & Kyushu

Fujitsu (Thailand) Co., Ltd. (FTH)

Founded: September 1990
Capital: 50 million Baht
Employees: 475
HQ: Bangkok
Offices: Eastern Branch (Sriracha-Chonbori)

Fujitsu Kyushu Systems Ltd. (FJQS)

Founded: July 20, 1981
Capital: 300 million Yen
Employees: 1,483 (as of July, 2016)
Revenue: 42.6 billion Yen

Wholly owned subsidiaries of FJQS:

- Fujitsu Kyushu System Service Ltd. (FQSS)
- FQS Poland Sp. z.o.o

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Environmental Change Occurring in the World

- Everything is connected the Internet
- Utilization of IoT in Agriculture

Everything is connected the Internet

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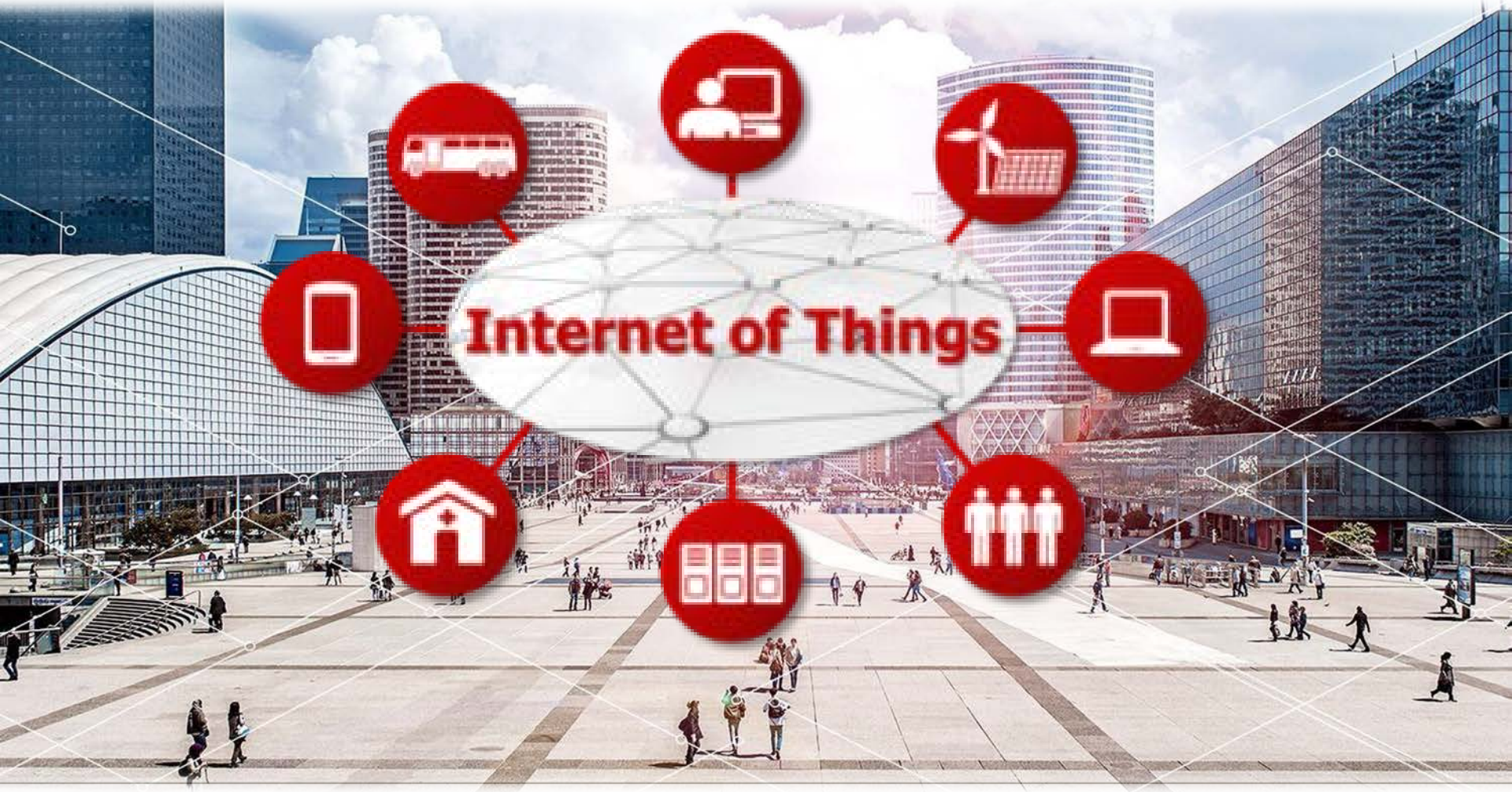
- This is the arrival of the "Hyper-Connected World"; networking together people, things, and information.



Utilization of IoT in Agriculture

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Know the state

- ✓ **Environment**(Temp, Humidity, CO_2, Sunlight, Wind Speed & Direction, Rain, etc.)
- ✓ **Position**(Open/Close, On/Off, Locked, Movement, Steps...)
- ✓ **Condition**(Photosynthesis, transpiration, stress, sugar, Diseases...)
- ✓ Predict growth conditions and crop yields

Change the state

- ✓ Open or close windows and curtains
- ✓ Switch heating/cooling, lighting, irrigation and pumps on or off
- ✓ Supply fuel(kerosene, heavy oil, chips, pellets, etc.)
- ✓ Human interaction(labour, planning and execution of plans)

Execution of agriculture based on science, and not relying on experience or intuition.

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Agricultural IoT designed for Greenhouse Horticulture Farms

～Greenhouse Horticulture SaaS/Environment Control Box～

- Challenges agricultural companies face
- Overview of the Greenhouse Horticulture SaaS
- Greenhouse Horticulture SaaS Hardware
- Implementation Status by Country

Challenges agricultural companies face

- Challenges
  - Limited ability to manage due to a lack of experience and intuition in individual employees.
  - Uneven growth due to location.
  - Difficulty managing and sharing information with a large number of employees.

- Solution

Use “Greenhouse Horticulture SaaS” to stabilize production and manage better

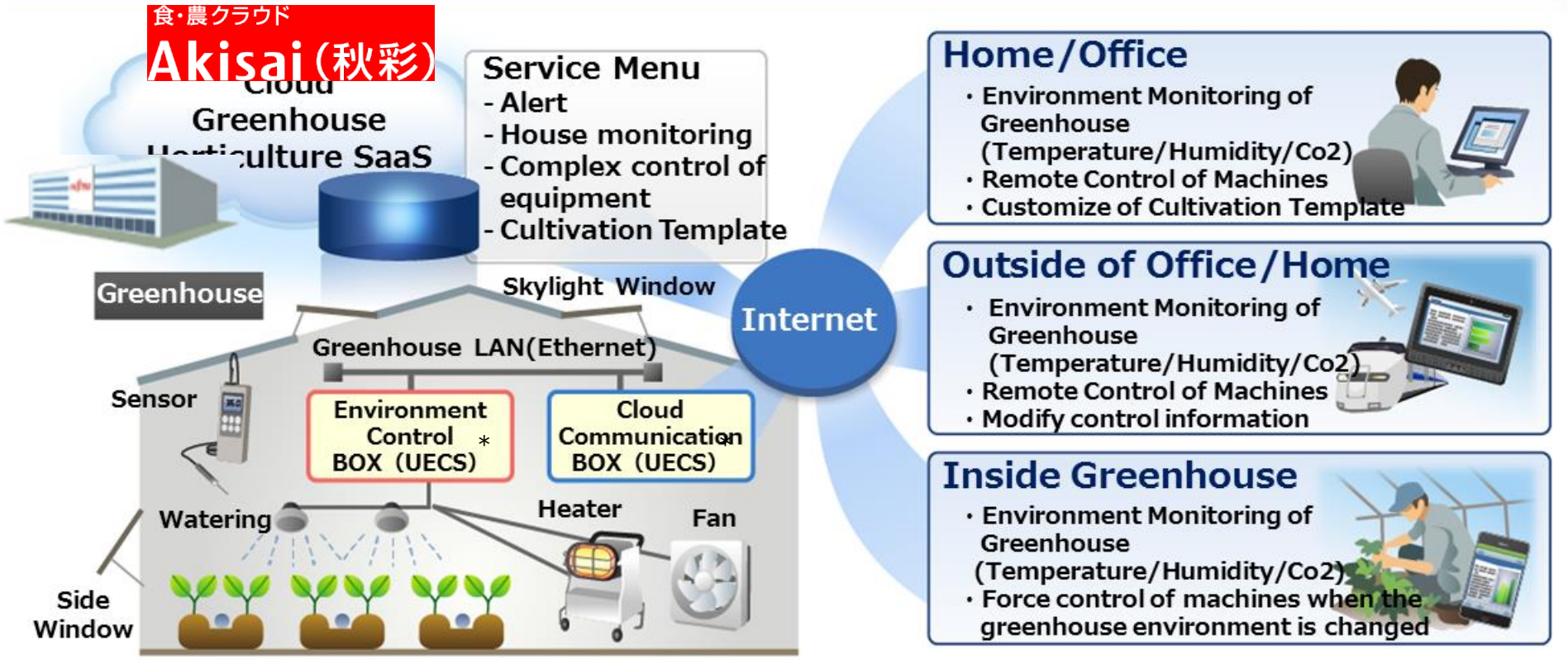
Environmental Control

Visualization of environment and growth

Use of mobile devices

Greenhouse Horticulture SaaS

- A cloud service utilizing data stored in the cloud.
- Visualization of the production process, remote monitoring of the greenhouse, and remote control of equipment. Help stabilize the supply of high-quality crops with a low opportunity cost.



* UECS: Ubiquitous Environment Control System

Hardware used for Greenhouse Horticulture SaaS

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Sunlight Sensor

Data Converter

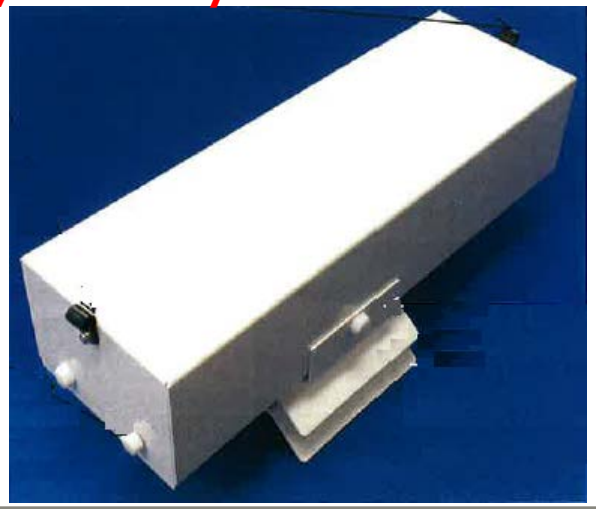
Environment Control Box

Outdoor Weather Sensor (Sunlight, Wind Direction & Speed, Rain, Temp, Humidity)

PoE-HUB

Cloud Communication Box

Temp, Humidity & CO_2 Sensor



Soil Sensor

Implementation Status by Countries

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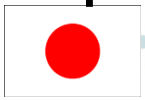
- Japan : 40 farms, 140 Houses



- Taiwan : Jade Beauty Bio-Tec Co., Ltd (PoC)
  : Arranging other PoC

- Vietnam : Akisai Showroom in Hanoi

- Turkey : Ankara University (PoC)

As of end of July, 2016

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Agricultural IoT designed for Livestock Farms

～GYUHO SaaS (Connected Cow)～

- Challenges livestock farmers face
- Overview of the GYUHO SaaS “Connected Cow”
- Connected Cow Hardware
- Standard Configuration
- Characteristics of Connected Cow
- Implementation Status by Country

Challenges livestock farmers face

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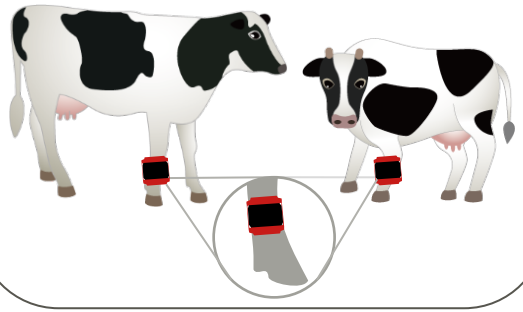
- Challenges
  - Difficultly detecting estrus.
  - Cost of missed insemination timing.
  - Difficult to efficiently manage cow information, including estrus periods and number of births.

- Solution

Use “Connected Cow” to detect estrus and reduce the missed opportunities

Estrus Detection

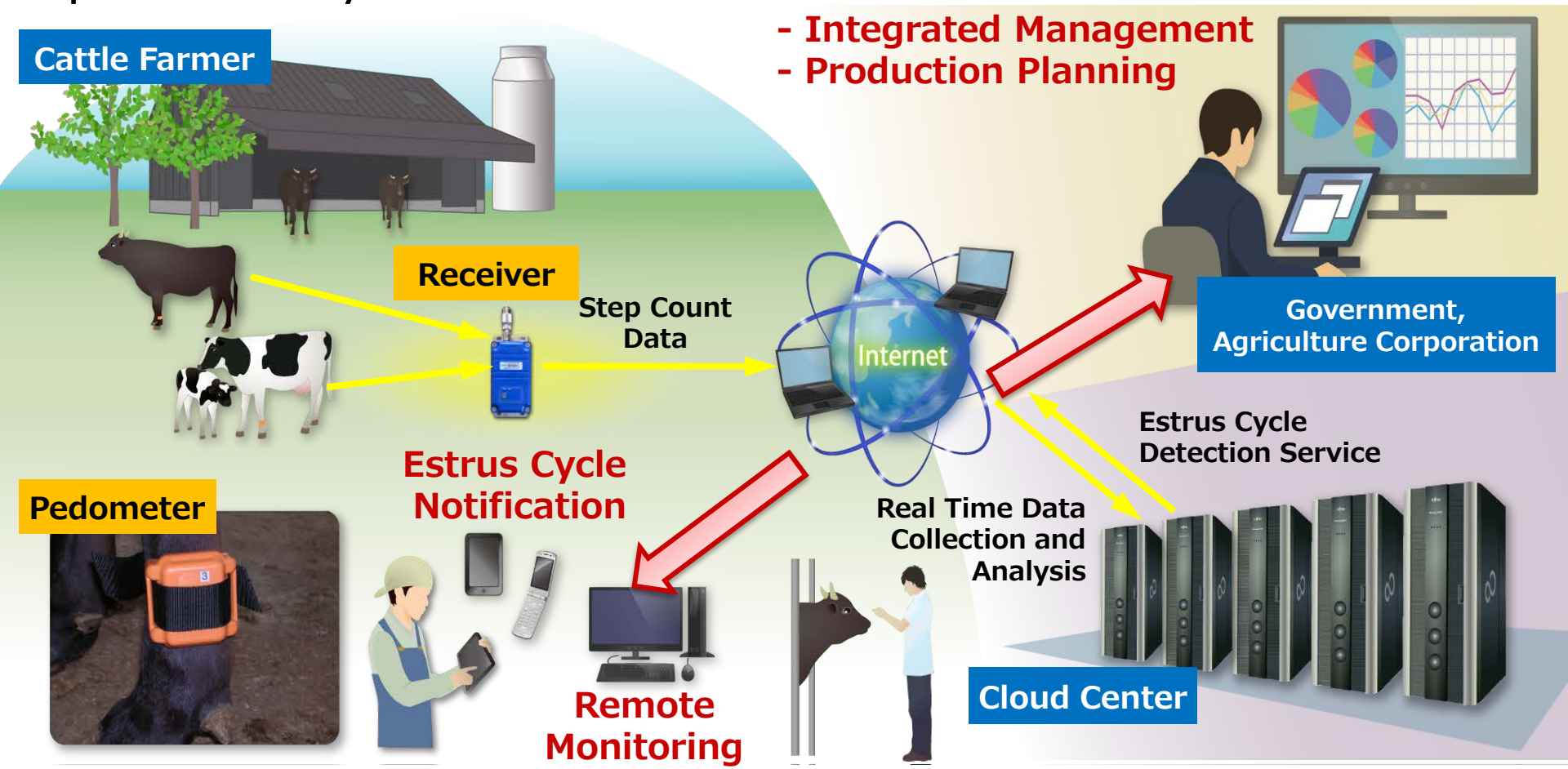


Visualization

Use of mobile devices

GYUHO SaaS “Connected Cow”

- Could based solution.
- Detection and push notification of estrus signs in real time.
- Protect missing opportunities for AI and make high productivity and reduce the cost.



Hardware used for Connected Cow

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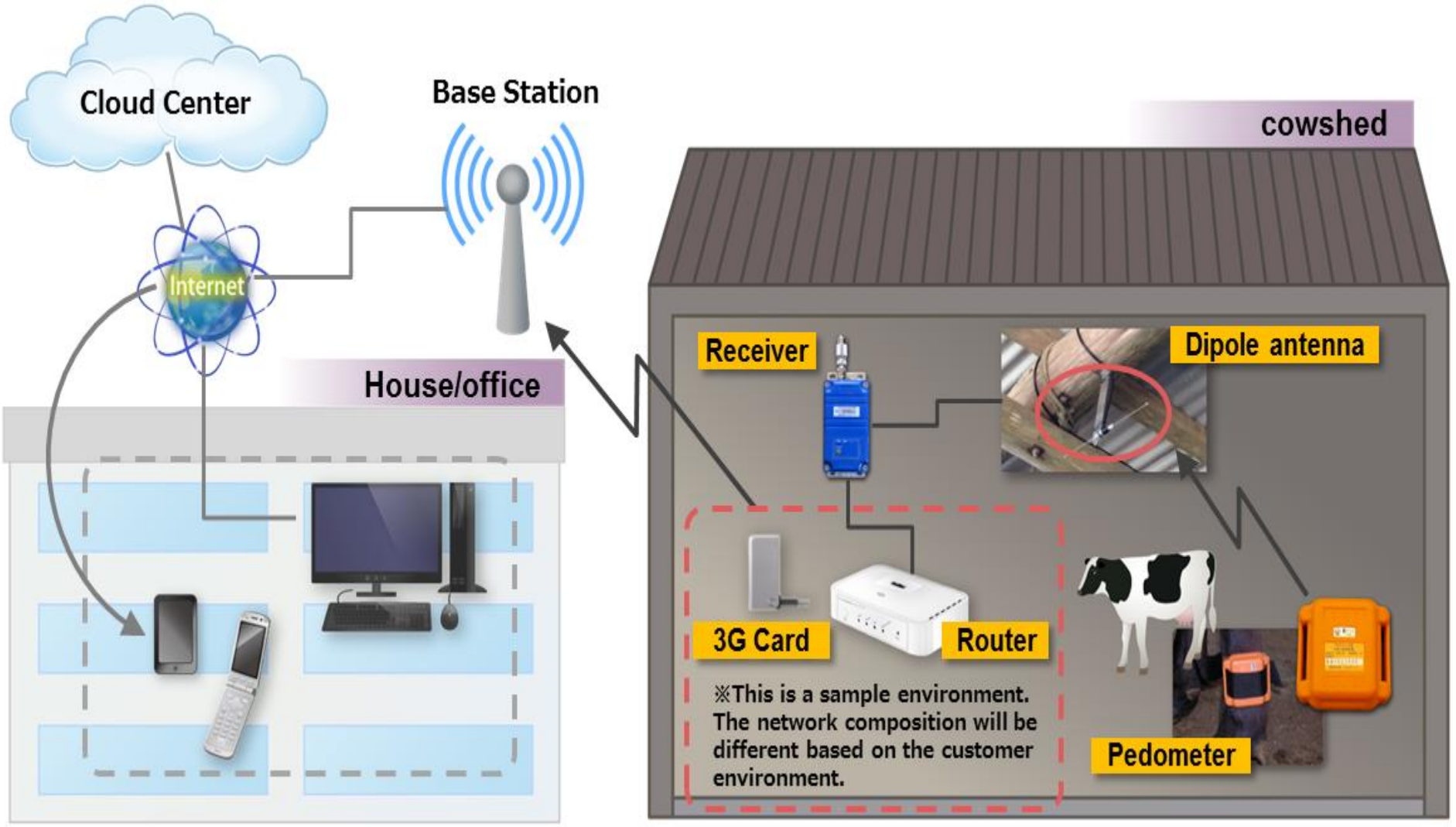
Pedometer

Receiver

Dipole Antenna

Standard Configuration



Characteristics of Gyuho SaaS

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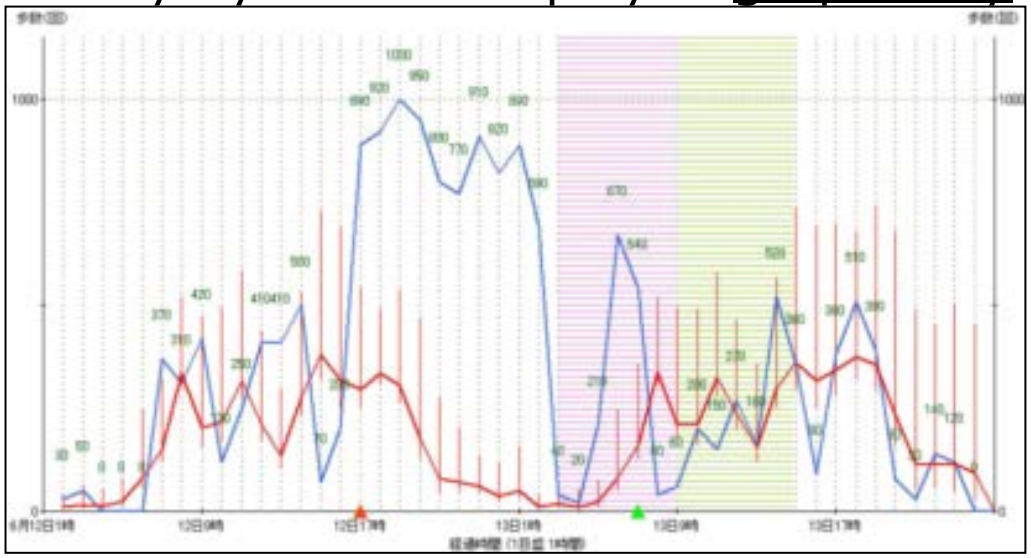
① Determine estrus based on activity (step count) in cattle wearing a pedometer.

You won't miss estrus, even in the middle of the night.

② Activity by hour is displayed graphically in real-time.



You can also detect faint signs and abnormal behaviour.

③ Detection notifications are sent to mobile devices or PCs.

Even when you're not home, you won't miss the chance.

Implementation Status by Countries

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- Japan :61farms, 5,363cows implemented
  :14farms, 1,000cows on plan in 2016
- Korea :4 farms, 85 cows implemented
- Poland :National Research Institution of Animal Production(IZ) (PoC)
  :4 farms, 670cows will be implemented
- Romania :National Research Development Institute for Animal Biology and Nutrition(IBNA) (PoC)
- Turkey :CATTLE BREEDERS' ASSOCIATION OF TURKEY(CBAT) (PoC)
- UK/US :PoC in development

As of end of July, 2016

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Smart Rice Paddy Agriculture (New Initiatives)

- Introduction to our Approach
- Our Challenges

Background

◇Smart Agriculture Challenges

- Strengthening the international competitiveness of domestic rice
- Expanding exports (based on TPP and Agricultural Free Trade situation)

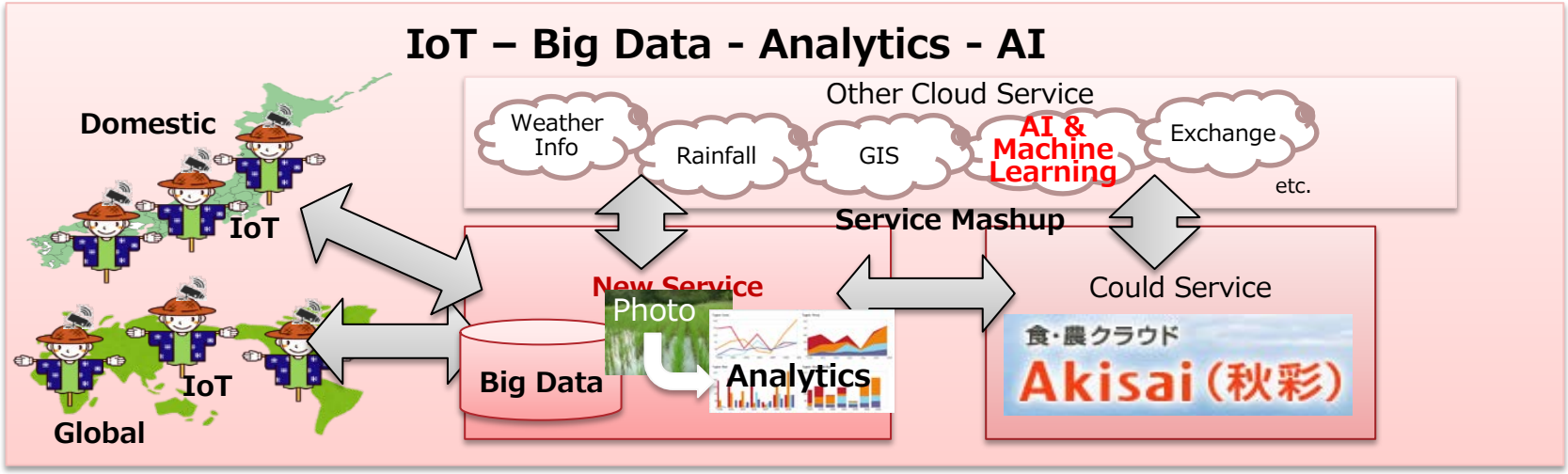
⇒ Labor-saving, low-cost and high-value-added rice production

◇Expectations and participation in research projects with a certain university

- Environment, Growth and Soil data measured from 1000 farms(2014)

⇒ Be aware of Productivity, Quality and Yield improvements using data mining and machine learning

→ Utilizing Fujitsu's Agricultural ICT in order to disseminate project results



Research Project Overview (under consideration)

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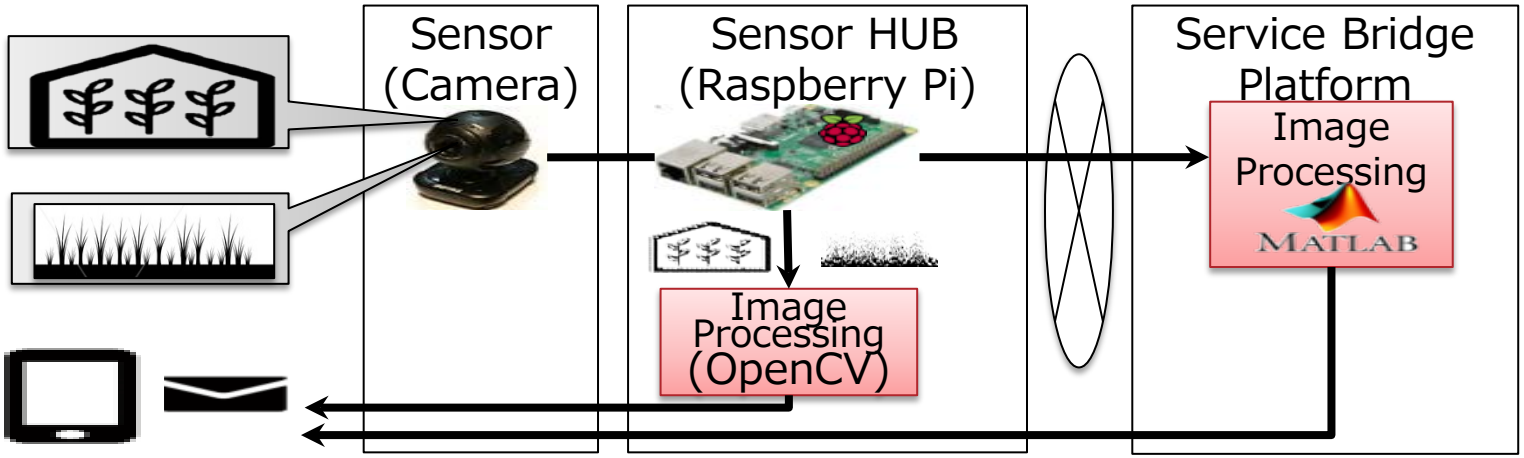
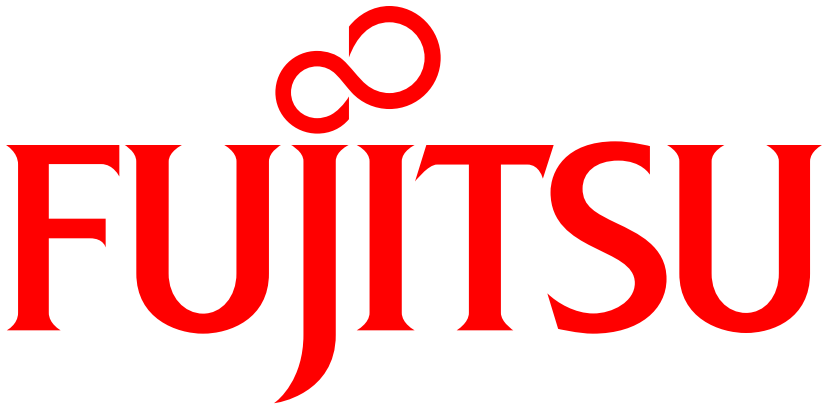
◇Investigation of the “things“ that are required for “watching over“ seedlings during cultivation in rice paddies.

[Premise] Rather than **expensive Smart Agriculture** ICT robots and various sensors, but **provide a simple and low cost "Agricultural Assist"** support solution.

◇ Themes

① Water Management	:	Manage water depth of rice paddies
② Temperature Management	:	Camera digitization of analog thermometer
③ Growth Management	:	Recognize seedlings in an **image** and verify the growth rate
④ Pest Management	:	Determine damage in the early stages by **image analysis**
⑤ Disease Management	:	Verify the possibility of disease detection. Determine whether monitoring temperature, humidity (by discomfort index) and condensation on rice plants can lead to detection of onset or prevention.





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