Agricultural Data Collaboration Platform
WAGRI

* **WAGRI** is a coined word for the agricultural data platform combining "WA (which means circle in Japanese)" that links various data and services and "WA (which means harmony in Japanese)" that promotes further harmonization of various communities, resulting in expectation for innovation in the agricultural field (WA + AGRI).
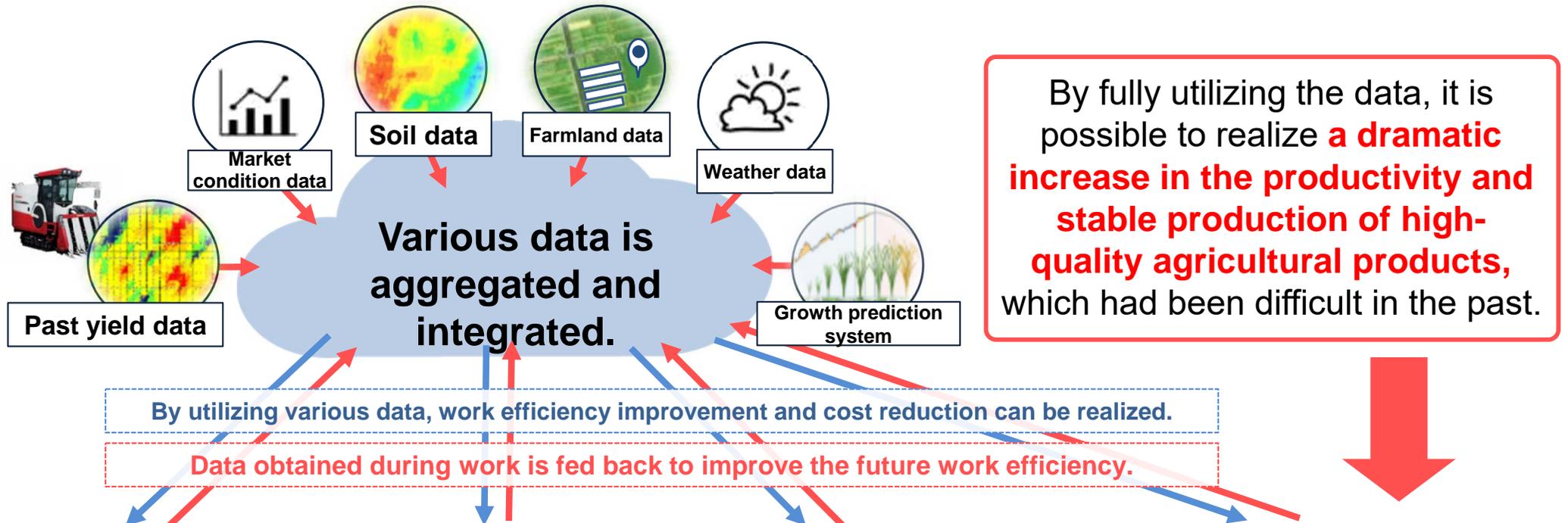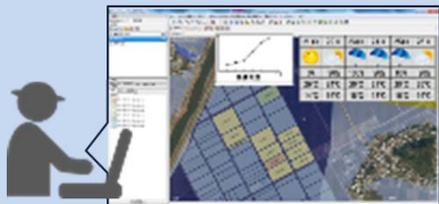
WAGRI

MAFF
Ministry of Agriculture, Forestry and Fisheries

Future image of agriculture that utilizes data

To **dramatically increase the productivity** at agricultural sites, it is essential to improve the environment where **data can be fully utilized.**

Market condition data

Soil data

Farmland data

Weather data

Past yield data

Growth prediction system

Various data is aggregated and integrated.

By fully utilizing the data, it is possible to realize **a dramatic increase in the productivity and stable production of high-quality agricultural products,** which had been difficult in the past.

By utilizing various data, work efficiency improvement and cost reduction can be realized.

Data obtained during work is fed back to improve the future work efficiency.

- **Work plan optimum for the agricultural business style**
⇒ **Maximization of work efficiency and profits**

- **Automation of agricultural work**
⇒ **Significant improvement in work efficiency**

- **Growth check from smartphones**
- **Pinpoint pesticide spraying and variable rate fertilization**
⇒ **Significant reduction in work time and effort**
⇒ **Significant reduction in material cost**

- **Harvest in optimal time**
- **Stable shipping of high-quality agricultural products**
⇒ **Significant increase in profits**

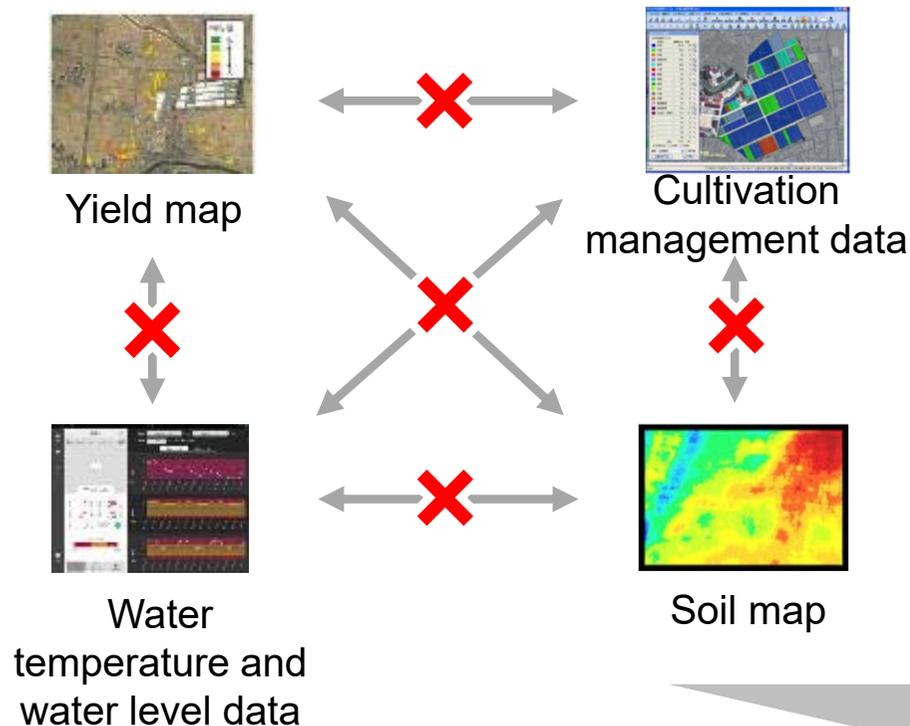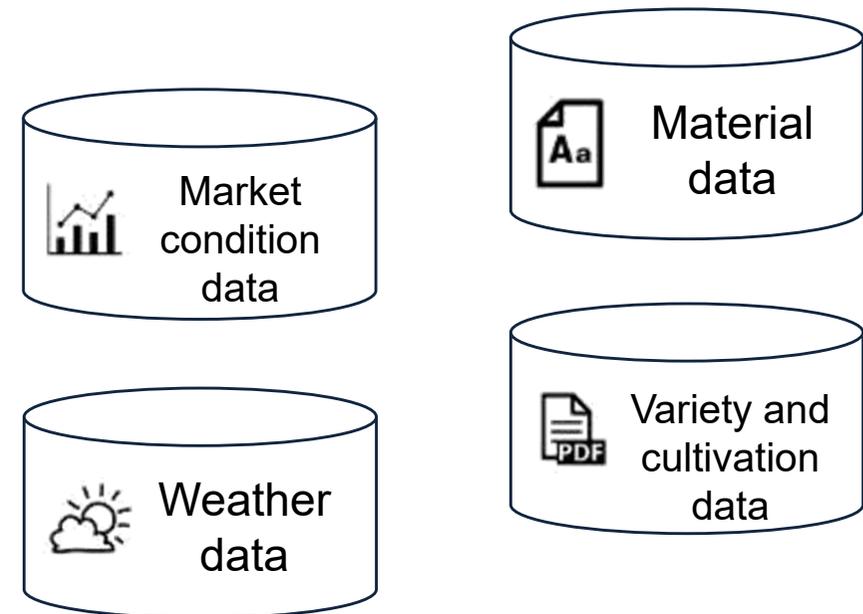**Formulation of work plan**

Tillage / sowing / transplantation
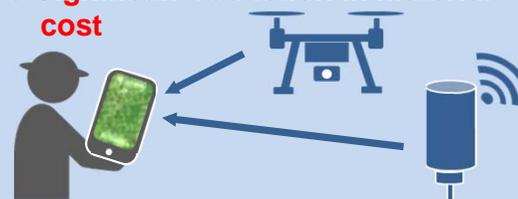
Growth management

Harvest

Overview of "Agricultural Data Collaboration Platform"

○ To solve the issues of ICT and to create an environment where business farmers can work toward improving productivity and management by using data, **a data platform (Agricultural Data Collaboration Platform: WAGRI)** having **data collaboration, sharing, and providing functions** was constructed. **The operation started in April 2019 by the National Agriculture and Food Research Organization (NARO).**

○ **A service** utilizing WAGRI **for farmers was developed and provided by a private operator.**

Three functions of WAGRI

Data collaboration function

The function allows data collaboration of various agricultural ICTs, agricultural machinery, and sensors beyond the of vendors and manufacturers.

WAGRI

Data sharing function

Data can be shared under certain rules, enabling provision of data comparison and service that leads to productivity improvement.

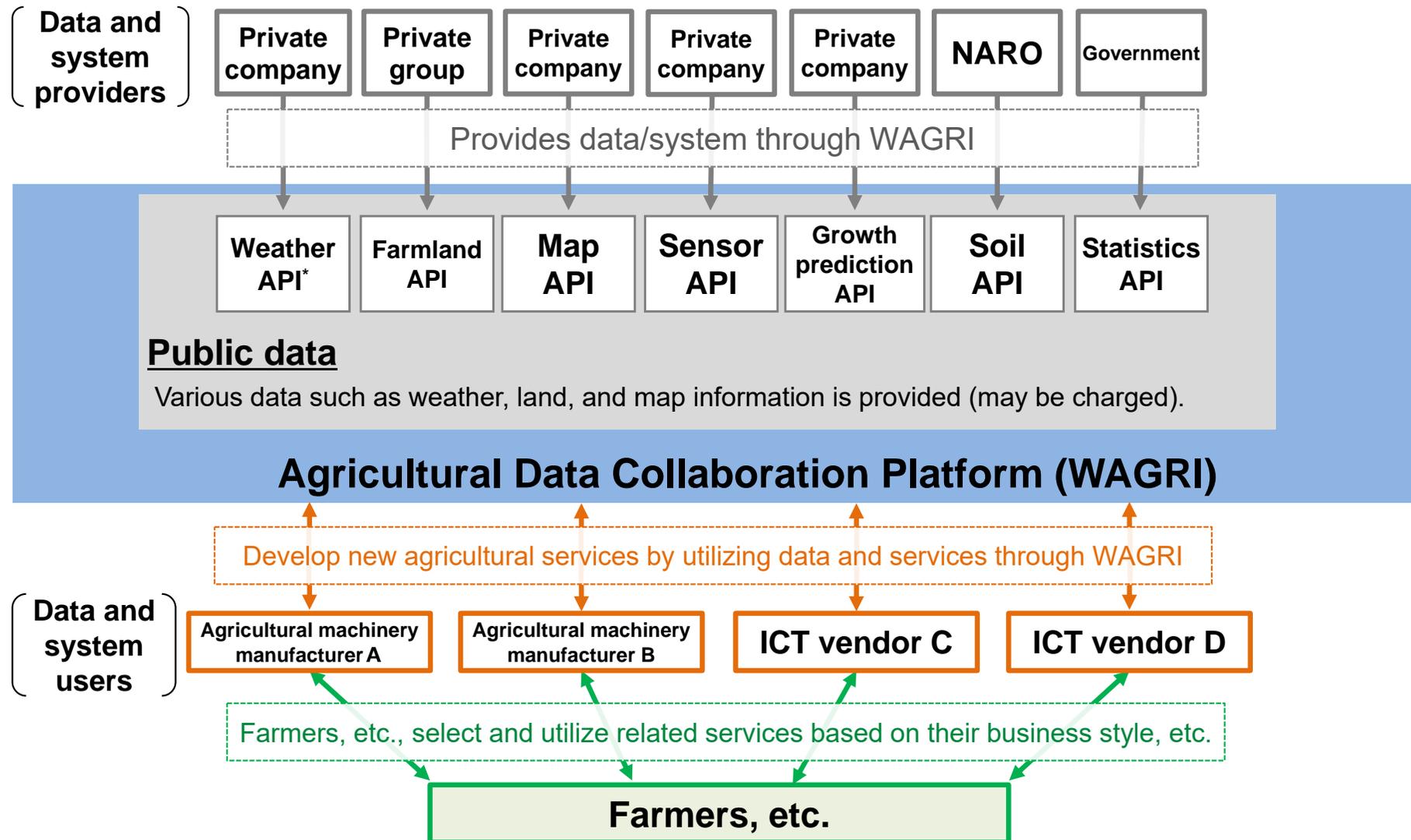**WAGRI**

Data providing function

Various data including soil, weather, and market conditions is managed, and useful information is provided to farmers.

WAGRI

The productivity and management can be improved by utilizing various data.

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Structure of WAGRI

- The WAGRI server has been built as **a collaboration platform of private companies** that provide agricultural ICT services.

- Through WAGRI, **data and systems on climate, farmland, geographical information, etc.,** are provided which **promote evolving new services by private companies to help farmers select and utilize advanced services.**

Data and system providers

| Private company | Private group | Private company | Private company | Private company | NARO | Government |

Provides data/system through WAGRI

| Weather API* | Farmland API | Map API | Sensor API | Growth prediction API | Soil API | Statistics API |

Public data
Various data such as weather, land, and map information is provided (may be charged).

Agricultural Data Collaboration Platform (WAGRI)

Develop new agricultural services by utilizing data and services through WAGRI

Data and system users

| Agricultural machinery manufacturer A | Agricultural machinery manufacturer B | ICT vendor C | ICT vendor D |

Farmers, etc., select and utilize related services based on their business style, etc.

Farmers, etc.

*API: Application Programming Interface. Coding conventions that stipulate programs necessary for connecting (linking) several applications.
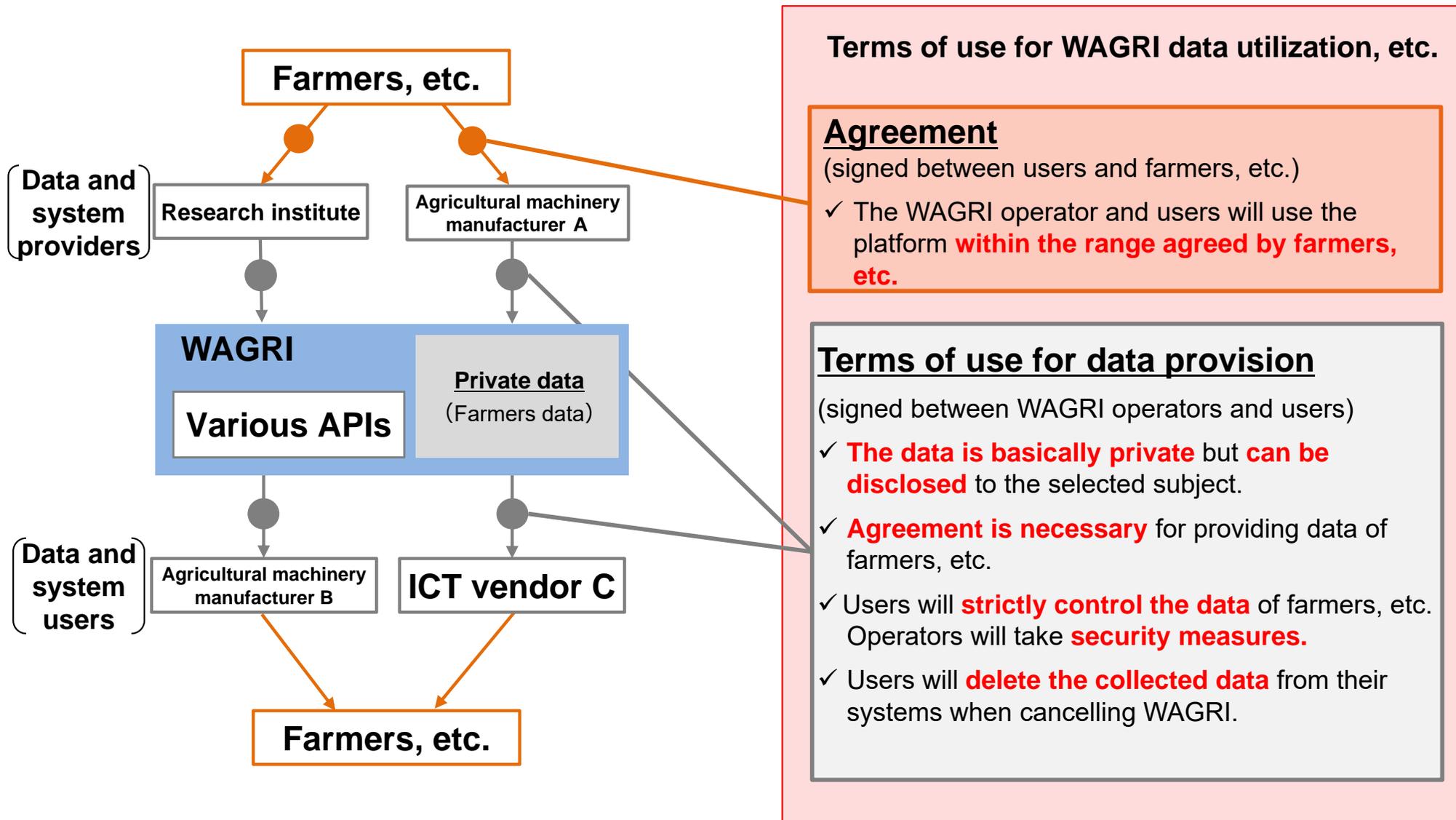
Main data/systems that can be acquired from WAGRI

Data/systems	Description	Provider
Fertilizer	Information on registered fertilizer brands	Food and Agricultural Materials Inspection Center (FAMIC)
Pesticide	Information on pesticide registration	Food and Agricultural Materials Inspection Center (FAMIC)
Map	Image data such as maps and aerial photographs	NTT InfraNet
Farmland	Section information of farmlands (parcel polygon)	MAFF
Farmland	Farmland place and lot number, land category, area, type of lease right, etc. (farmland pin data)	National Chamber of Agriculture
Weather	Weather information of the next 3 days maximum (1-km mesh)	HALEX CORPORATION
Weather	Weather information of the next 26 days maximum (1-km mesh)	Life & Business Weather Inc.
Weather	Weather information of wide areas such as prefectures	Japan Meteorological Agency
Growth prediction	Growth prediction system for paddy rice, wheat, and soy	VisionTech Inc.
Growth prediction	Growth prediction system for vegetables grown outdoors	NARO
Soil	Soil map that shows types and distribution of soil	NARO

*Data and systems that can be acquired from WAGRI can be checked from the website of WAGRI Council (https://wagri.net/).

Data handling in WAGRI

To provide an environment of safe data collaboration and sharing, terms of use between the WAGRI users and operators (terms of use for data provision) and **an agreement between the WAGRI users and farmers, etc.,** were developed based on "Guideline on Contracts Regarding Utilization of AI and Data in Agricultural Sector" established by MAFF.

Terms of use for WAGRI data utilization, etc.

Agreement
(signed between users and farmers, etc.)

✓ The WAGRI operator and users will use the platform **within the range agreed by farmers, etc.**

Terms of use for data provision
(signed between WAGRI operators and users)

✓ **The data is basically private** but **can be disclosed** to the selected subject.

✓ **Agreement is necessary** for providing data of farmers, etc.

✓ Users will **strictly control the data** of farmers, etc. Operators will take **security measures.**

✓ Users will **delete the collected data** from their systems when cancelling WAGRI.

Diagram labels:
- Farmers, etc.
- Data and system providers
- Research institute
- Agricultural machinery manufacturer A
- WAGRI
- Various APIs
- Private data (Farmers data)
- Data and system users
- Agricultural machinery manufacturer B
- ICT vendor C
- Farmers, etc.

○ **"NEC farming guidance support system*" that utilizes parcel polygons, pesticide information, and estimated weather information of 1-km mesh on WAGRI** is provided.

* A system that allows information sharing and guidance based on the growth goal by collecting farming data and grasping the situation of work and growth on maps.

Environment data → NEC farming guidance support system ← Work record

Cultivation data → NEC farming guidance support system ← Shipping data

Data analysis with AI

Production prediction

Work plan/record calendar for each grower

Graphing the environment and growth situation of each field

Harvest plan and record management based on predicted harvest time

Adviser — Check and give advice on the status of growers and production areas — **Growth goal for each item**

Grower **Worker** — Check and share info. on the situation of fields and work — **Environment calendar, etc.**

By the utilization of WAGRI.

WAGRI

Parcel polygon

Display parcel polygon on map
Work plans, pesticide spraying condition, and growth situation are displayed in a certain color for each field

Info. on pesticide use restriction

Warning display of restricted number of uses and period prohibited to use pesticide

Estimated weather info. of 1-km mesh

Display of weather information near the field in a calendar or a graph
Accumulated temperature and precipitation is displayed to support cultivation management in accordance with weather.

It would be more convenient for growers if work plans and growth situations of each field are displayed on the map!

I want to be able to check the amount of pesticide use...

Planning work will be easier if we know the weather conditions.

Support the correct pesticide spraying for the entire production area!

We can check the work plan, pesticide spraying condition, and growth situation for each field!

It is possible to make work plans and manage cultivation by checking the weather.

○ **By linking weather data on WAGRI** and **satellite images and growth prediction models of VisionTech Inc.,** "AgriLook" allows **detailed cultivation management including fertilization and measures against pests** in accordance with the growth stage.

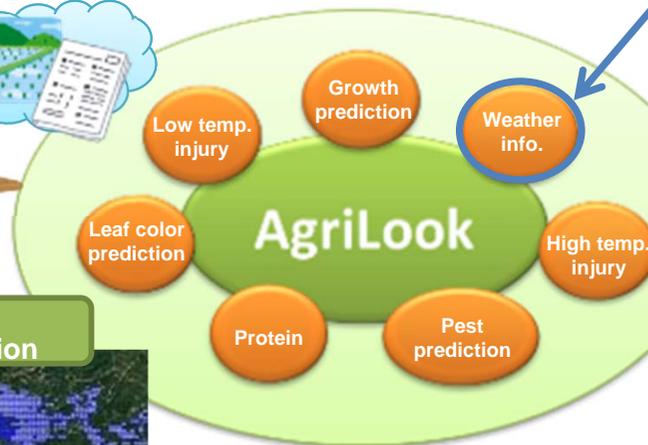I want to manage cultivation in more detail using various data.
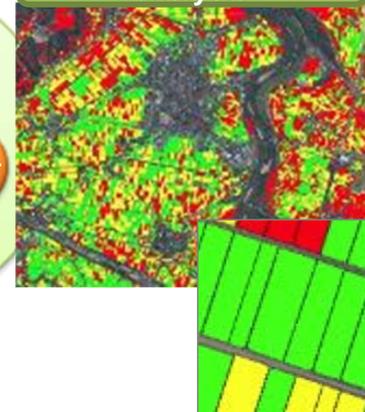
By the utilization of WAGRI…

WAGRI

Weather data
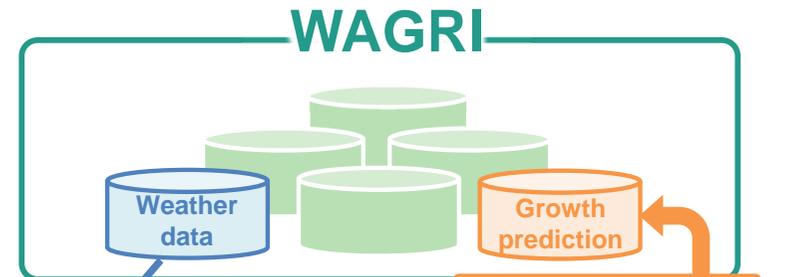
Growth prediction

The growth prediction API is provided by VisionTech Inc.

AgriLook

It is possible to check growth information and pest information that combine and use satellite data and weather data.
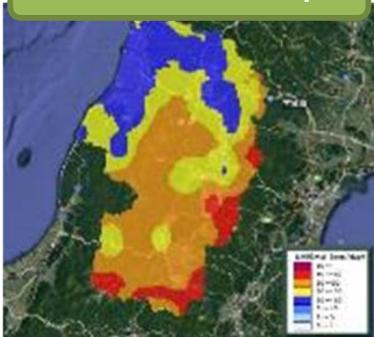
AgriLook

- Low temp. injury
- Growth prediction
- Weather info.
- Leaf color prediction
- High temp. injury
- Protein
- Pest prediction

Additional fertilizer analysis

Accumulated temperature (after ear emergence)
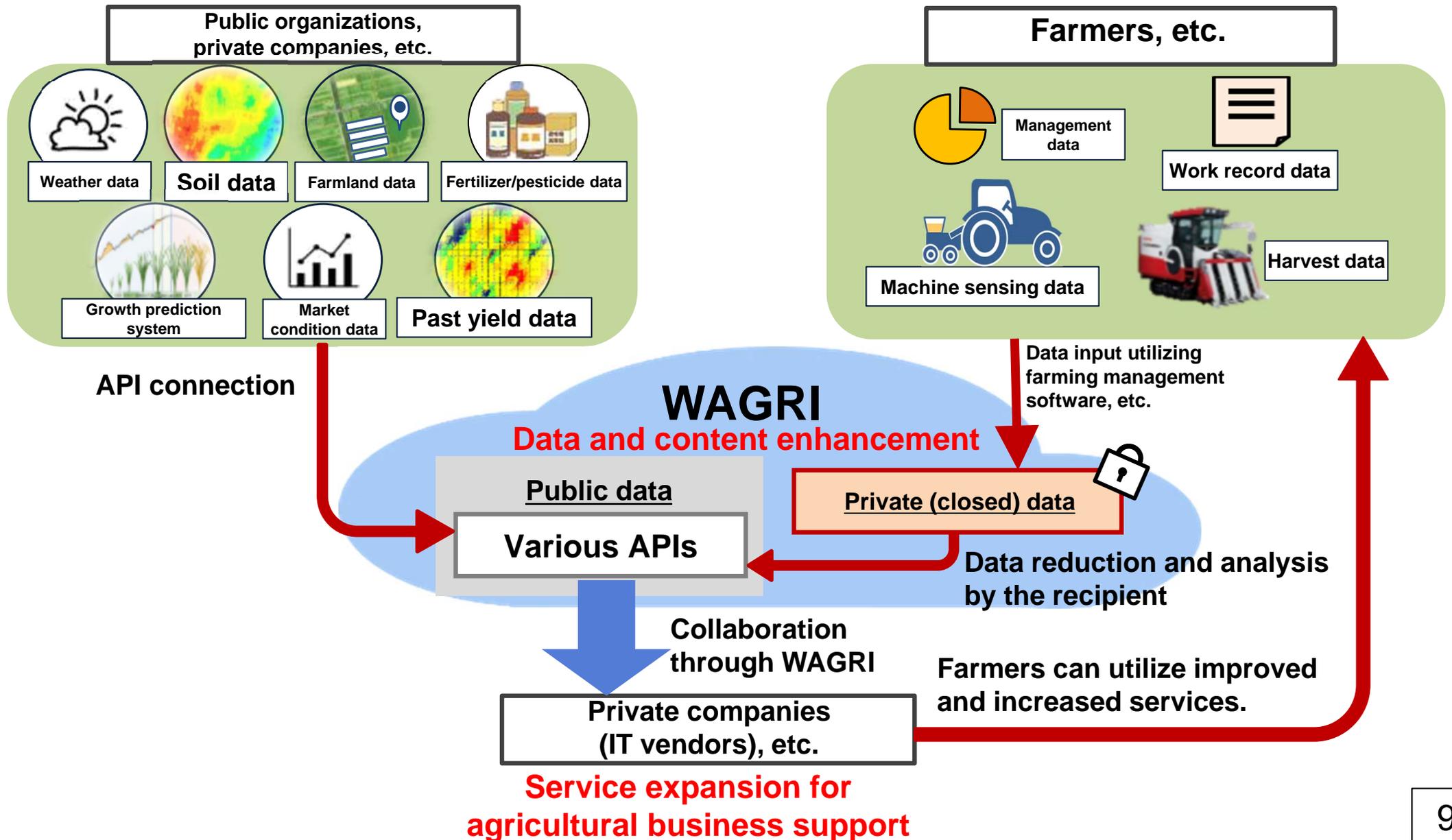
Weather mesh map

Pest prediction

By combining weather data with AgriLook, farmers can manage cultivation in detail such as fertilization and measures against pests.

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Construction of smart food chain

○ The functions of the agricultural data collaboration platform (WAGRI) will be expanded to create **a smart food chain that allows mutual use of data including production to processing, distribution, and consumption.**

Construction of **"Smart food chain system"** that allows mutual use of data including production to processing, distribution, and consumption

| Production (upstream) (production/harvest/sorting) | Distribution/processing (middlestream) (collection/transportation/storage/processing) | Selling/consumption (downstream) |

Things that are realized by the construction of the smart food chain system

Planned production/shipping without waste loss

High-precision **shipping/demand prediction**

Presentation of production plans, etc., that meet the needs of consumers

Production/work plan support based on consumer behavior analysis

Presentation of optimum transportation method, route, etc.

Optimum collection/shipping route based on information on production, receiving/placing orders, and inventories