The direction of standardization in digital agriculture in the mid- and long- term view

(24 Aug. 2022)

Eun Kyeong JEE
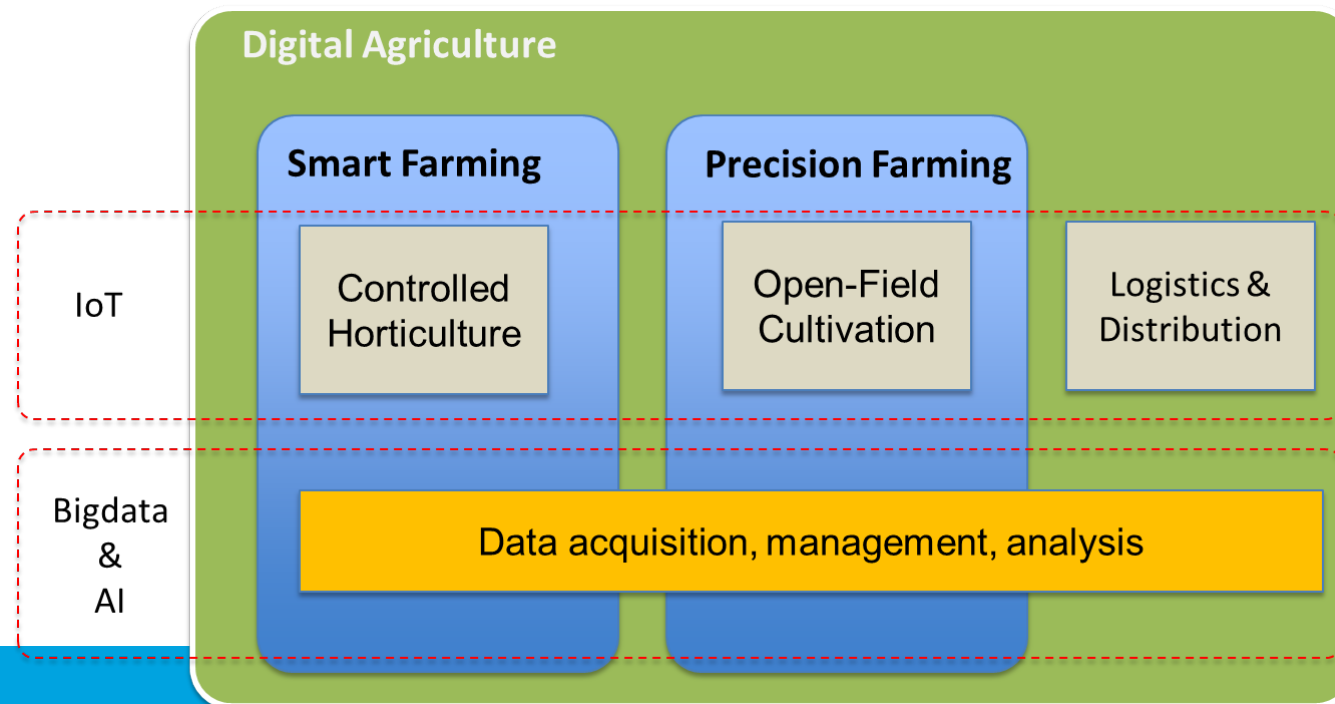Programme Coordinator, ITU-T

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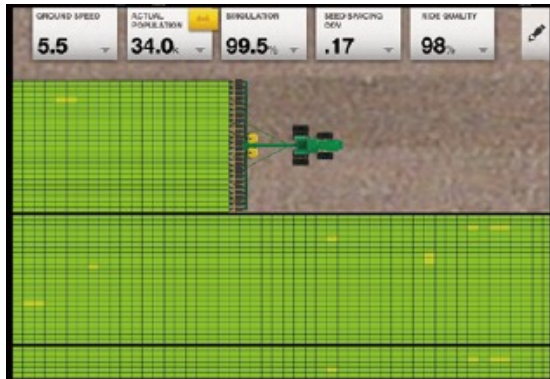
- ## The term of "digital agriculture"

  - A way of sustainable agriculture that improves productivity, economy, accessibility, etc. by utilizing data and cutting-edge technology.

  - Similar terms include "precision agriculture," "smart farming," "smart farming," and "smart farm."

  - Applicable fields are "controlled horticulture," "open field," and "livestock."

  - IoT, AI, Big data, and autonomous machineries are highly involved technologies.

Digital Agriculture

Smart Farming	Precision Farming	
Controlled Horticulture	Open-Field Cultivation	Logistics & Distribution

IoT

Bigdata & AI

Data acquisition, management, analysis

Technologies highly involved in digital agriculture (1/2)

IoT

- Real-time farm management system combining cultivated land data and weather information (Pioneer Field360, USA)

- Collection of weather and soil information in real-time through sensors and provide them to artificial intelligence (AI) analysis solutions (KT, KOREA)

AI

- Weeding robots that can distinguish plants and weeds in real time using plant image DB (LettuceBot2, USA)

- A system that uses seed genetics and precise equipment to present suitable varieties and sowing volumes for cultivated land (Monsanto, USA)

(Pioneer Field360, USA)
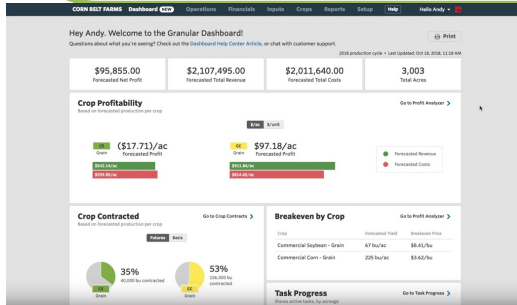

(KT, KOREA)

(LettuceBot2, USA)

(Monsanto, USA)

Technologies highly involved in digital agriculture (2/2)

Big data

- Cloud-based Farm Management Software (FMS) provides information on the distribution status, climate, and crop growth status of agricultural products (Granular, USA)

- Smart agricultural management system using telemetics system (CLAAS, EU)

Autonomous machineries including farm robots

- Automatic cultivation bed transfer system (Hortiplan, Belgium)

- Automated Milking System (Lely, Netherlands)

- High-performance intelligent farming platform - Farmbot (KIRO, Korea)
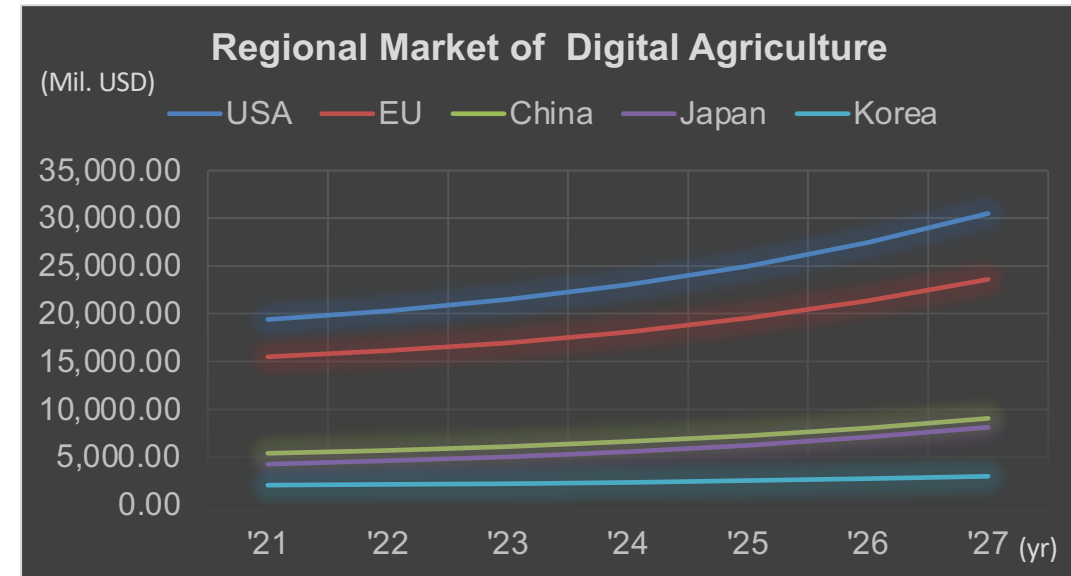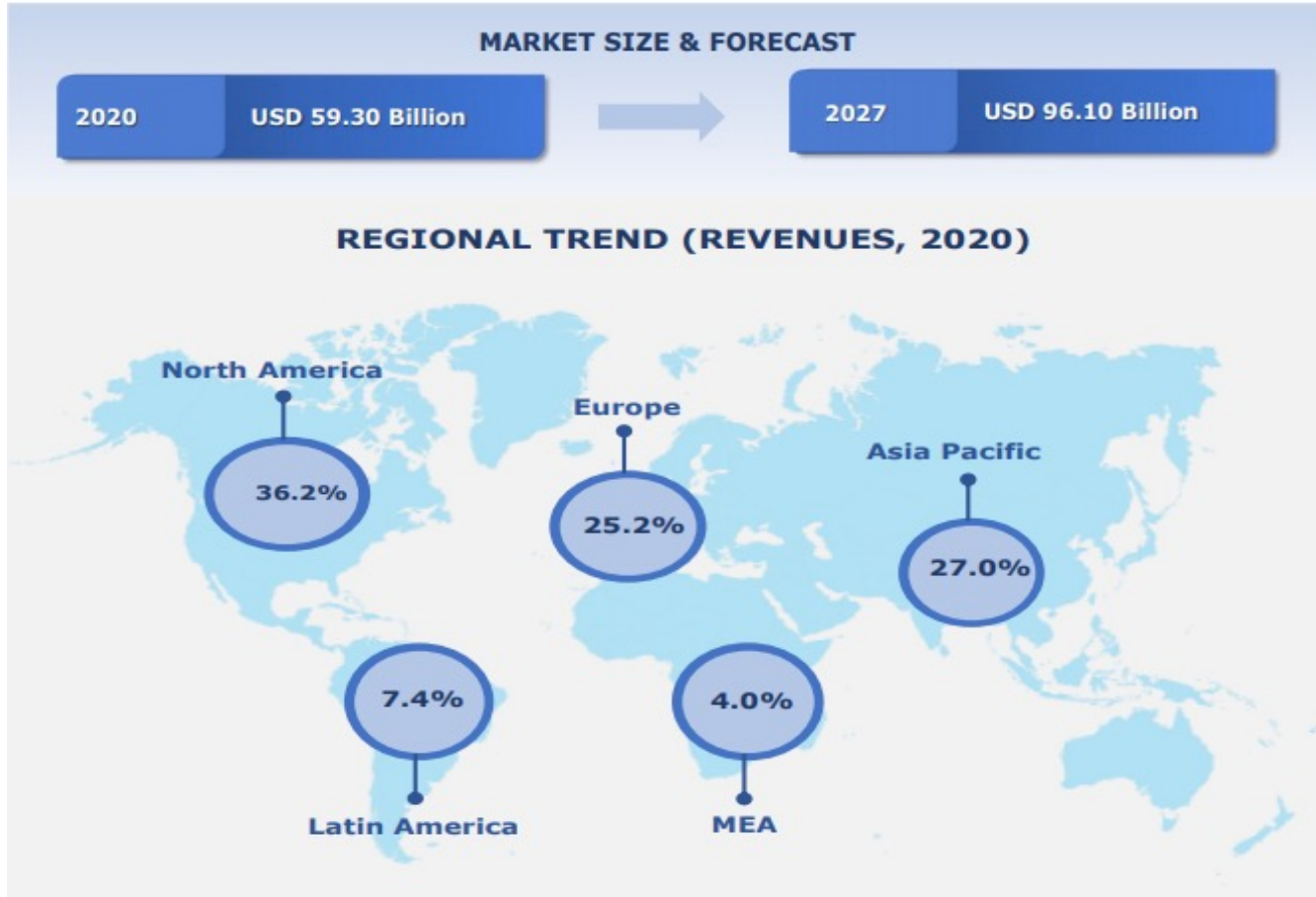

(Granular, USA)

(CLAAS, EU)

(Hortiplan, Belgium)

(Lely, Netherlands)

(KIRO, Korea)
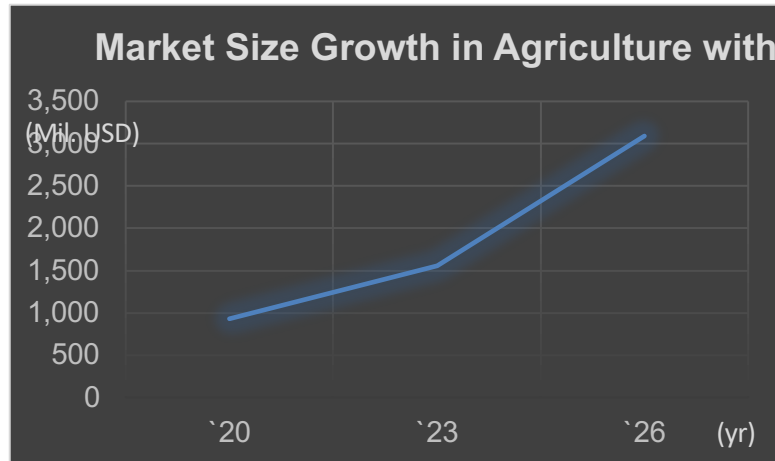
MARKET SIZE & FORECAST

| 2020 | USD 59.30 Billion | → | 2027 | USD 96.10 Billion |

REGIONAL TREND (REVENUES, 2020)

North America 36.2%
Europe 25.2%
Asia Pacific 27.0%
Latin America 7.4%
MEA 4.0%

Global Market of Digital Agriculture

Regional Market of Digital Agriculture

(Mil. USD)

USA — EU — China — Japan — Korea

35,000.00
30,000.00
25,000.00
20,000.00
15,000.00
10,000.00
5,000.00
0.00

'21 '22 '23 '24 '25 '26 '27 (yr)

*) Global Market Insight(2021), Autonomous Farm Equipment Market Report,2027

Market Size Growth in Agriculture with

Market Size Growth in Agriculture with

Market Size Growth in Agricultural Machineries
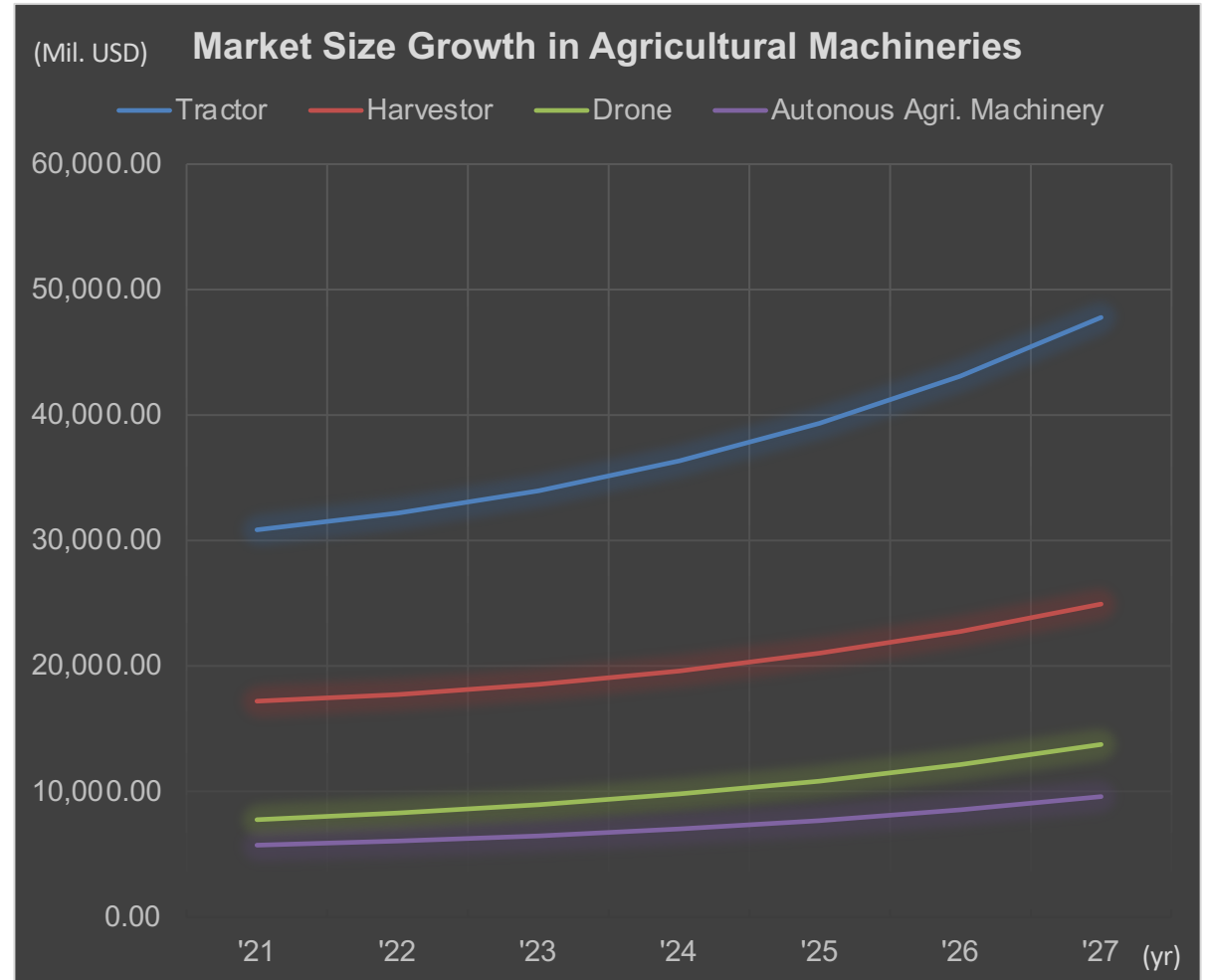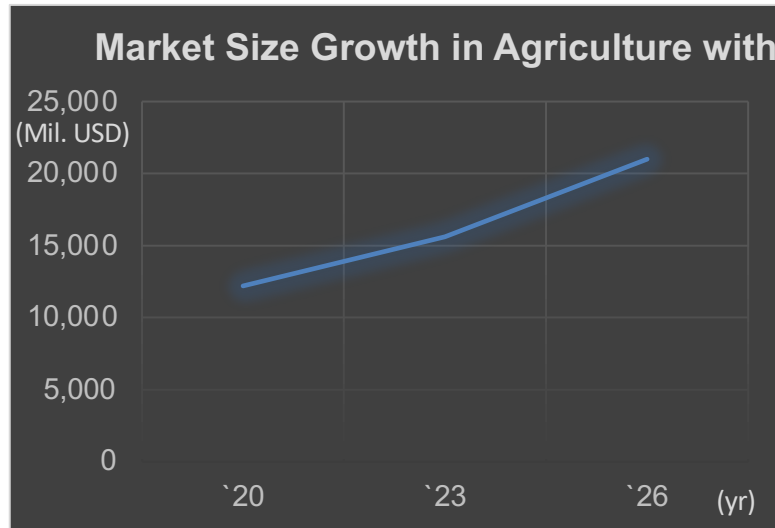
*) Global Industry Analysis(2022), Smart Greenhouse Global Market Trajectory & Analytics

Brief of ITU-T FG-AI4A (1/2)

- **ITU-T FG-AI4A**

  – A Focus Group, established in October 2021 under ITU-T SG20.

  – Pre-standardization items for realizing the digital agriculture utilizing AI and IoT technologies are:

  ▪ Terms, key concepts, framework;
  ▪ Intelligent infrastructure;
  ▪ Information collection;
  ▪ Data acquisition;
  ▪ Data interface, information transfer and network;
  ▪ Central decision-making and edge computing;
  ▪ Lightweight AI/ML (TinyML)
  ▪ Distributed Artificial Intelligence-as-a-Service (DAIaaS)
  ▪ Independent working;
  ▪ Robotics (UAVs and UGVs);
  ▪ Information and cyber security.

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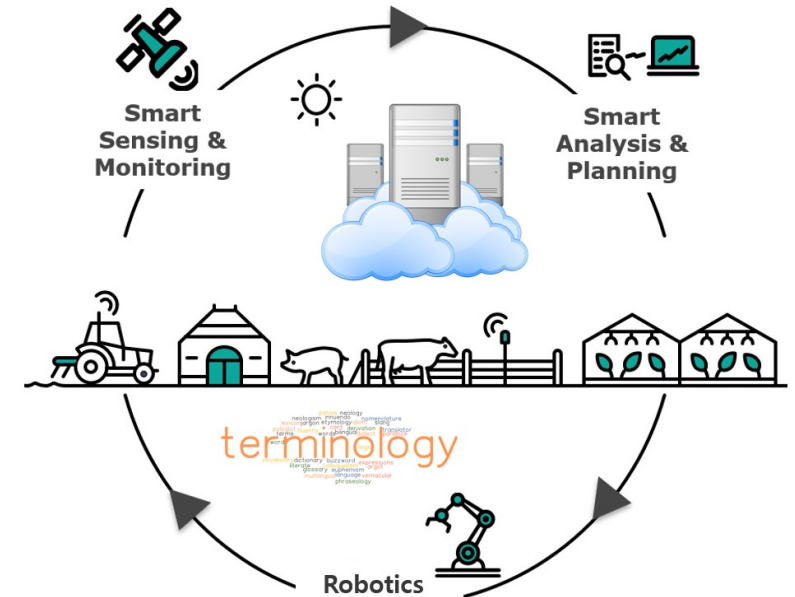
Brief of ITU-T FG-AI4A (2/2)

- **Current FG-AI4A Structure**

 – SIX Working Groups and FIVE Topic Groups

ITU-T FG-AI4A's SIX Working Groups:

- WG on "Glossary"
- WG on "Digital Agriculture Use Cases and Solutions"
- WG on "Data Acquisition and Modelling for digital agriculture"
- WG on "Mapping and Analyzing AI and IoT standards related Activities in Digital Agriculture"
- WG on "Ethical, Legal, and regulatory Considerations relating to the use of AI for agriculture"
- WG on "Collaboration and Outreach"

ITU-T FG-AI4A's FIVE Topic Groups:

- TG on "Data Science for surface and underground water monitoring"
- TG on "Georeferenced Data Management"
- TG on "Weather modelling and forecasting"
- TG on "Yield monitoring and Prediction"
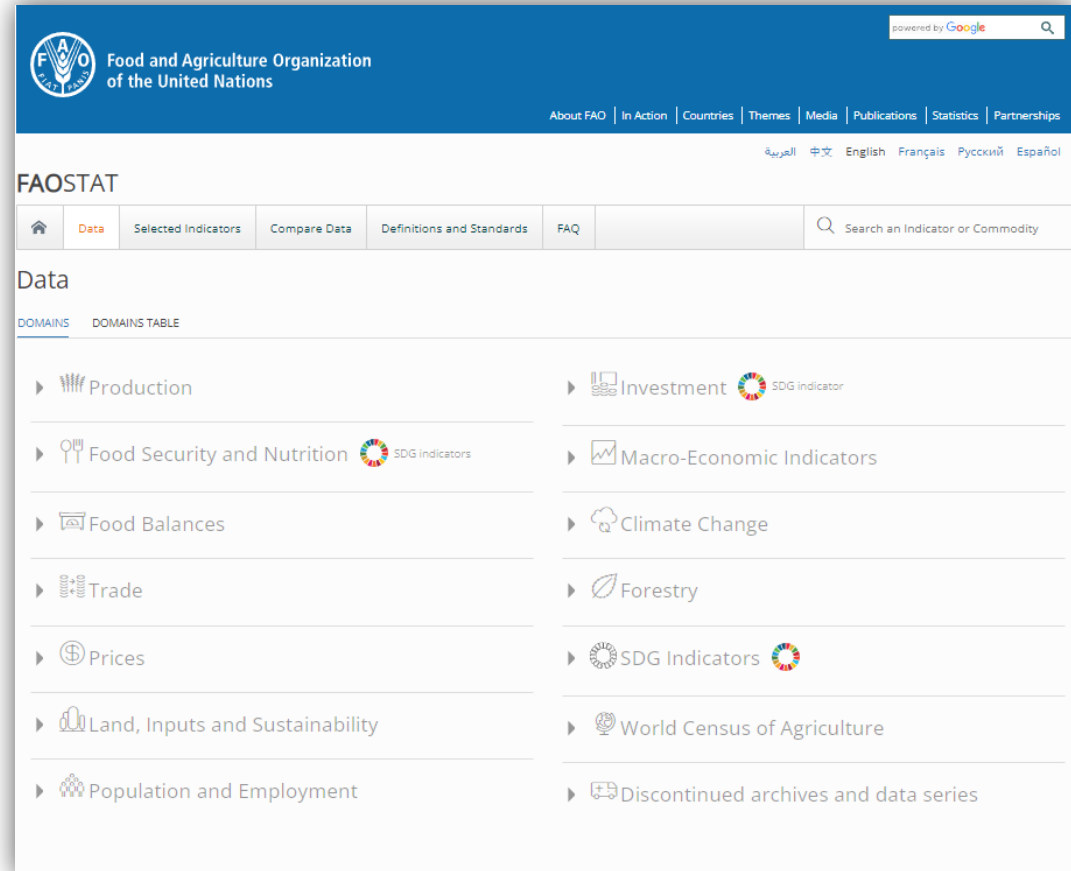- TG on "Irrigation strategy and smart water management"
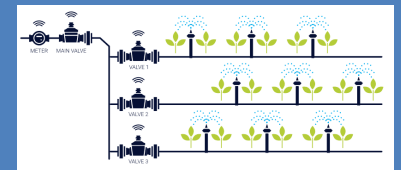
Brief of a related org. (FAO)

- Food and Agriculture Organization (FAO)

  – A specialized agency of the United Nations that leads international efforts to defeat hunger.

  – One of data sets collected by FAO, "Crop and Livestock Production and Utilization" as follows:

  - Primary crop production data;
  - Primary crop utilization data;
  - Area harvested;
  - Live animals number data;
  - Primary livestock production and loss data;
  - Oils utilization data;
  - Selected derived agricultural commodities production data.

  *) disseminated on FAOSTAT (https://www.fao.org/faostat/)

The direction of standardization in digital agriculture

Securing reliable and confidential agricultural data

- Guidelines of digital agricultural **data acquisition**;
- Standards on the **reliability** of digital agricultural data;
- Standards on the **confidentiality** of digital agricultural data;
- Standards on the **secure distribution** of digital agricultural data;
- Standards on **PHM** of **automated agricultural machineries** in digital agriculture.

Vertical-/horizontal- data convergence

- Standards for data convergence across **the AI procedure using agri-data**;
- Standards for data interoperability between **heterogeneous technologies;**
- Standards for data convergence across **the digital agricultural value-chain**.

Cooperation with other SDOs and Agro-organizations

- Collect more **general use-cases** from the world-wide including developing countries;
- Development of **roadmap for disabled farmers**.

Thanks for your attention.