ITU/FAO Workshop on "Digital Agriculture at Scale: Sustainable Food Systems with IoT and AI"

Standardization Activities on Digital Agriculture

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ITU

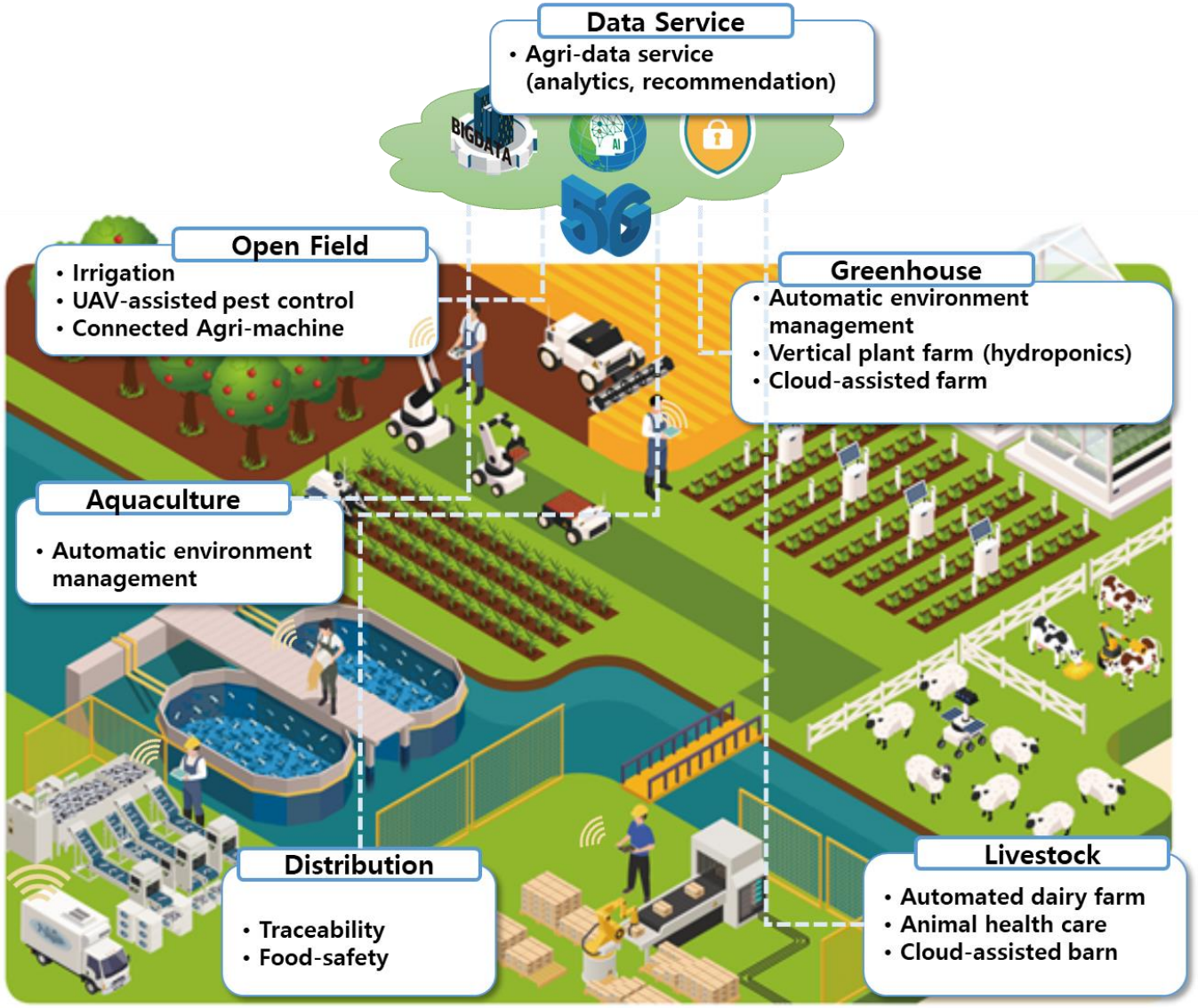
- What is “Smart Agriculture”
- ITU-T SG20’s view on Smart Agriculture
- Standardization works on “Smart Agriculture” in ITU-T
- Standardization works in ISO
- Standardization efforts from KOREA
- Deployment efforts from KOREA

Understanding “Smart Agriculture”

- Definition of “Smart Agriculture”
  - Usage of technologies like **IoT**, **AI**, location systems and robots in farming.
  - The ultimate goal is increasing the quality and quantity of the crops while optimizing the human labour used. (https://ondo.io/what_is_smart_agriculture/)

  ≈ “Digital Agriculture”

- Domains considered in “Smart Agriculture” (Y.SUP.SmartAgri-usecase)
  - Greenhouse (incl. vertical plant farm)
  - Open field (vegetal and animal)
  - Livestock barn
  - Aquaculture (fisheries)
  - Distribution
  - Data service (with AI)



ITU-T SG20's view on Smart Agriculture

- ITU-T Y.SUP.SmartAgri-usecases surveys use-cases relevant to Smart Agriculture, in the perspective of smart greenhouse, smart open field, smart hydroponics and smart livestock. (under development by Q2/20)

Smart agriculture

- Smart greenhouse (inc. hydroponics)
  - Automated greenhouse environment management
  - Container plant farm
  - Cloud-assisted smart agriculture
- Smart open field
  - Water management (Irrigation)
  - UAV-assisted pest control
  - Connected agricultural machinery – Tractor
- Agri-data service
  - Smart agriculture data services (Big-data, AI)
- Smart livestock
  - Automated Dairy Farm (Livestock barn)
  - Animal health care
  - Cloud-assisted smart agriculture

Standardization works on “Smart Agriculture” in ITU-T

- ITU-T SG20 is working to address the standardization requirements of Internet of Things (IoT)
- Recommendations related to Smart Agriculture developed/under development by SG20

  - **ITU-T Y.4450/2238(2015)** “Overview of Smart Farming based on networks” was developed by Q1/13 (2015) and transferred to SG20 (2016), it defines service capabilities for Smart Farming, provides a reference model for Smart Farming, and identifies network capabilities required to support Smart Farming.

  - **ITU-T Y.4466(2020)** “Framework of IoT-based Smart Greenhouse” was developed by Q4/20, it specifies requirements, a reference model, a functional architecture and interfaces for a smart greenhouse service.

  - **ITU-T Y.4482 (2022)** “Smart Livestock Farming Based on Internet of Things” is under development by Q2/20, it will provide a SLF service reference model, and specify SLF services requirements to address the challenges for smart and connected livestock value chains.

  - **ITU-T Y.Sup.SmartAgri-usecases (2023)** “Use cases of IoT based smart agriculture” is under development by Q2/20, it will survey “use cases of smart agriculture” in the **perspective of smart greenhouse, smart open field, smart hydroponics and smart livestock.**

  - **ITU-T Y.DSGS-reqts (2023)** “Requirements and a reference model of data for smart greenhouse service is under development by Q4/20, it will defines requirements and reference model of data for smart greenhouse service in the perspective of data interoperability.

  - **ITU-T Y.DSGS-dms (2023)** “Requirements and functional architecture of data management system for smart greenhouse service” is under development by Q4/20, it will define requirements and functional data management architecture to integrate data of 1) environmental status condition and 2) configuration of greenhouse and involved agricultural equipment/machinery.

  - **ITU-T Y.DM-SLF (2023)** “Conceptual data model of smart livestock farming service” is under development by Q4/20, it will define data entities required for smart livestock service, their relationship, and conceptual data model of smart livestock farming service in order to integrate various domain-specific information.

Standardization works on “Smart Agriculture” in ITU-T

- ITU-T SG13 is working to address Future networks and emerging network technologies,
- Recommendations related to Smart Agriculture developed/under development by SG13

  - **ITU-T Y.2243 (2019)** “Service model for risk mitigation service based on networks” was developed by Q1/13, it describes the service model for risk mitigation based on networks which can provide real time data acquisition, monitoring of risk events, and provision of mitigation services for the identified risks.
  - **ITU-T Y.2244 (2019)** “Service model for a cultivation plan service at the pre-production stage” was developed by Q1/13, it describes a service model for a cultivation plan service including reference architecture, service requirements, and related service capabilities.
  - **ITU-T Y.2245 (2020)** “Service model of the agricultural information based convergence service” was developed by Q1/13, it provides service model for increasement of crop quality as well as yield and reduction of farm maintenance costs by converging various data collected from each production stage.
  - **ITU-T Y.2246 (2021)** “Smart farming education service based on u-leaning environment” was developed by Q1/13, it provides a reference architecture and service requirements for Smart Farming Education about farming knowledge exchange.
  - **ITU-T Y.esm (2022)** “Service model for Entry-level Smart Farm” is under development by Q1/13, it provides the concept of an entry-level smart farm which can provide economic usages and promising benefits to agricultural producers that have not been familiar with smart farms with high-level ICT technologies.
  - **ITU-T Y.ous (2023)** “Overview of Unmanned Smart Farm based on networks” is under development by Q1/13, it is in its very initial stage and it will addresses overview of unmanned smart farm based on networks.

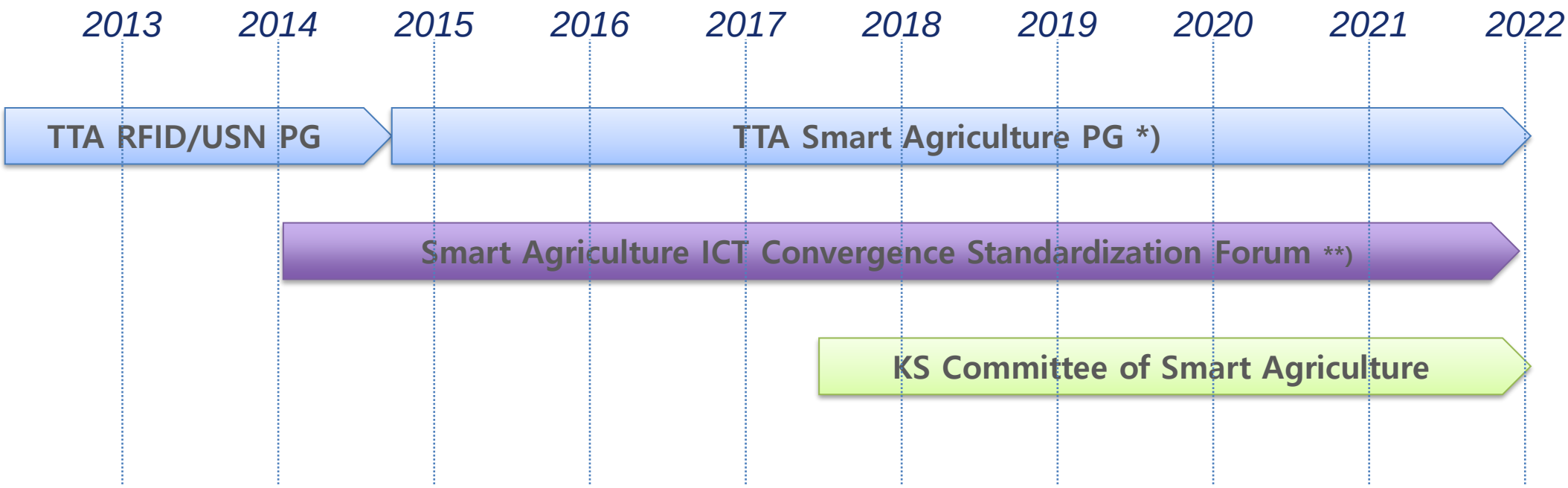
Standardization works in ISO

- ISO TC23 is working for standardization on tractors, machines, systems, implements and their equipment used in agriculture, forestry, gardening, landscaping, irrigation and other related areas. The scope also covers electronic/electrical aspects and electronic identification for all categories of animals.

TECHNICAL COMMITTEES
ISO/TC 23

  - **ISO TC23/SC3 (Safety and comfort)** is developing standards on “Control, communication, safety, and performance test for outdoor autonomous agricultural machinery and robots”
  - **ISO TC23/SC6 (Agricultural equipment for crop protection)** is developing standards such as “Environmental requirements and test methods for pest control using Unmanned Aerial Vehicles (UAVs)”
  - **ISO TC 23/SC18 (Irrigation and drainage equipment and systems)** is developing standards such as “Remote monitoring and control technology for irrigation system”
  - **ISO TC23/SC19 (Agricultural electronics)** is developing standards such as “Extended Farm Management Information systems Data Interface (EFDI),” and “Radio frequency identification of animals”

Standardization efforts from KOREA



*) PG stands for Project Group under TTA

**) It is managed by Korea Agriculture Technology Agency

Standardization efforts from KOREA

- Topic related to IoT
  - RS485 modus based communication for smart greenhouse
  - Sensor interface for smart greenhouse/livestock
  - Functional architecture of smart greenhouse
  - Interface between irrigation & fertigation controller and sensor & actuator node on open field smart farm
- Topic related to AI
  - Interface Standard between Greenhouse Operating System and Artificial Intelligence Server
- Topic related to Data Acquisition
  - Smart field crop big data collections
  - Meta-data of sensors and actuators in smart greenhouse/livestock
  - Meta-data of growth information such as fruits and vegetables, leafy vegetables, cut flowers.
  - Data transfer protocol between farm cloud and its devices
  - Cloud-based smart farm service requirements
- Topic related to robots
  - Air control guideline for Unmanned Aerial Vehicles

Deployment efforts from KOREA

- KOREA is encouraging Smart farm manufacturers' use of standards for interoperability.
  - Project: Support of prototyping and product improvement
  - Target Standards: KS X 3265/3266/3267/3279
  - Examples of Product (more than 32 sensors and 9 actuators used to greenhouse/livestock)

Thanks for your attention.