



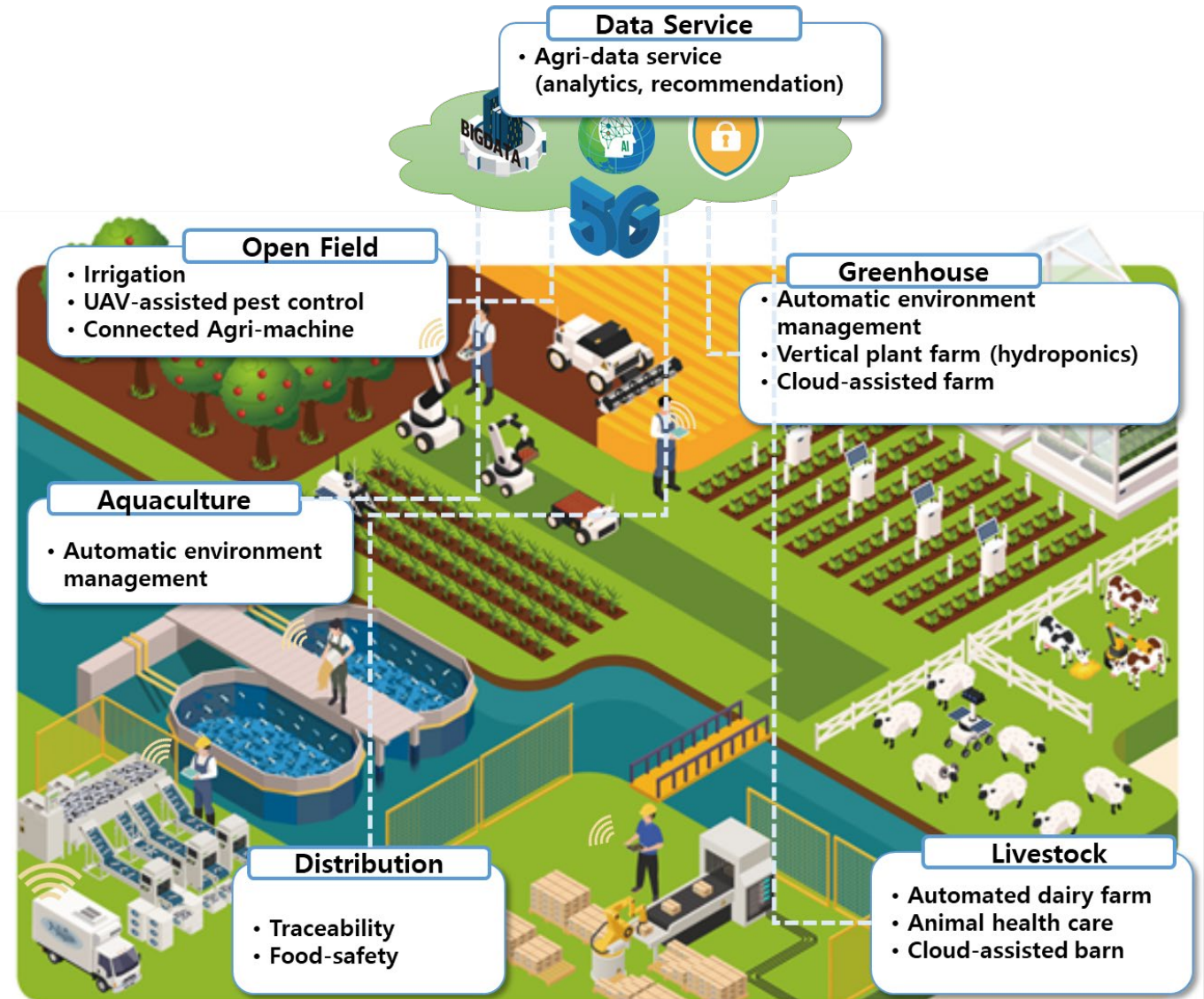
Episode #8 "Network capabilities and emerging technologies to support IoT-enabled verticals"

'IoT & AI' to support Smart Agriculture

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What is “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/)
- 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)



Why “Smart Agriculture” is important?

- One of the possible methods to fulfil **2nd Goal from UN’s 17 Goals** (<https://sdgs.un.org/goals>)



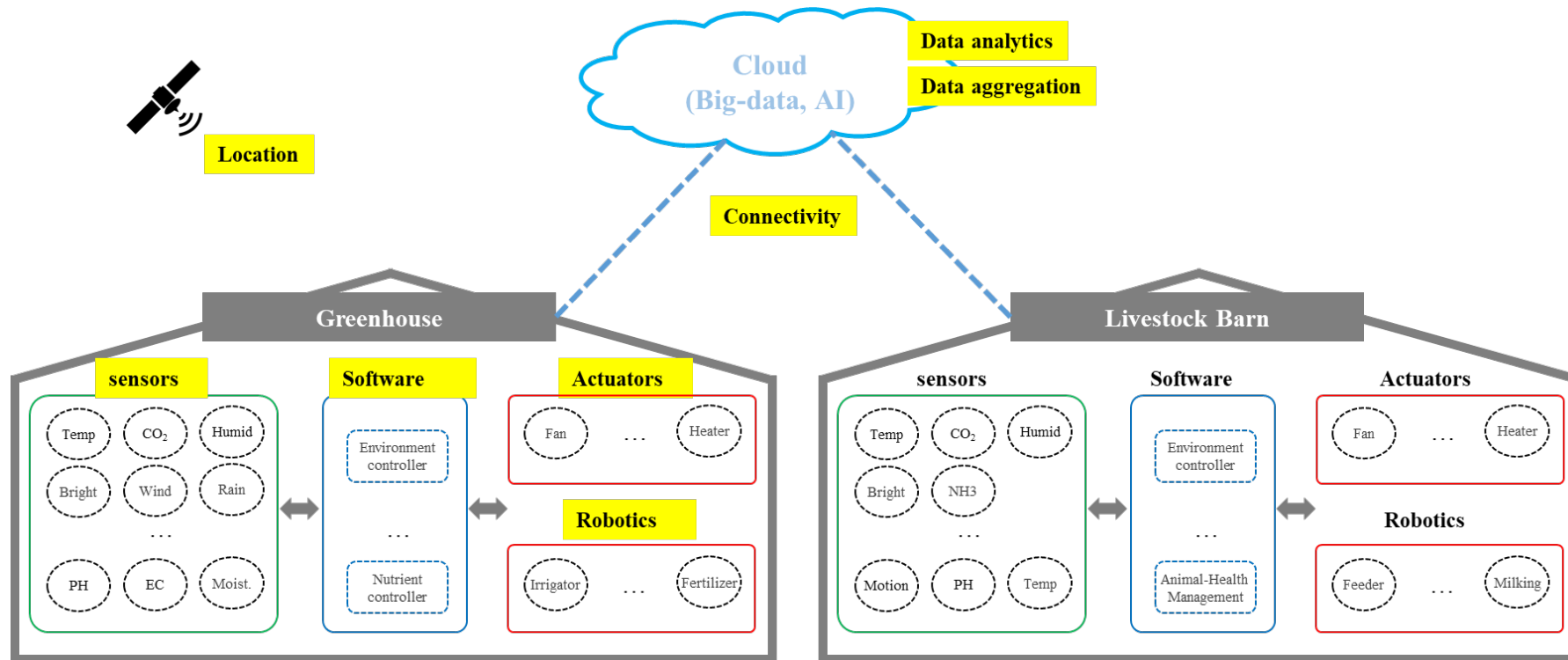
THE SUSTAINABLE DEVELOPMENT GOALS REPORT 2021: UNSTATS.UN.ORG/SDGS/REPORT/2021/

- A key to **achieve global food security** is “Smart Agriculture”
 - In the next 20 years, **increasing the productivity** and incomes from smallholder crop, livestock, fishery and forestry production systems will be key to **achieving global food security**.
 - Most of the world’s **poor population** is directly or indirectly **dependent on agriculture**, and experience has shown that growth in agriculture is often the most effective and equitable strategy for reducing poverty and increasing food security.
 - **Climate-smart agriculture** is an approach to help guiding actions to transform and reorient agricultural systems to effectively and **sustainably support development and food security** under a changing climate.

(17 January 2015, Accra, Ghana, <https://www.fao.org/africa/news/detail-news/en/c/275164/>)

Key technologies available

- Smart Agriculture uses ‘Comprehensive **IoT/AI/Network/Robot** technologies’
 - **IoT** (sensors and actuators)
 - **AI** (data aggregation, analytics, recommendation and prediction)
 - **Connectivity, Location, Robotics**

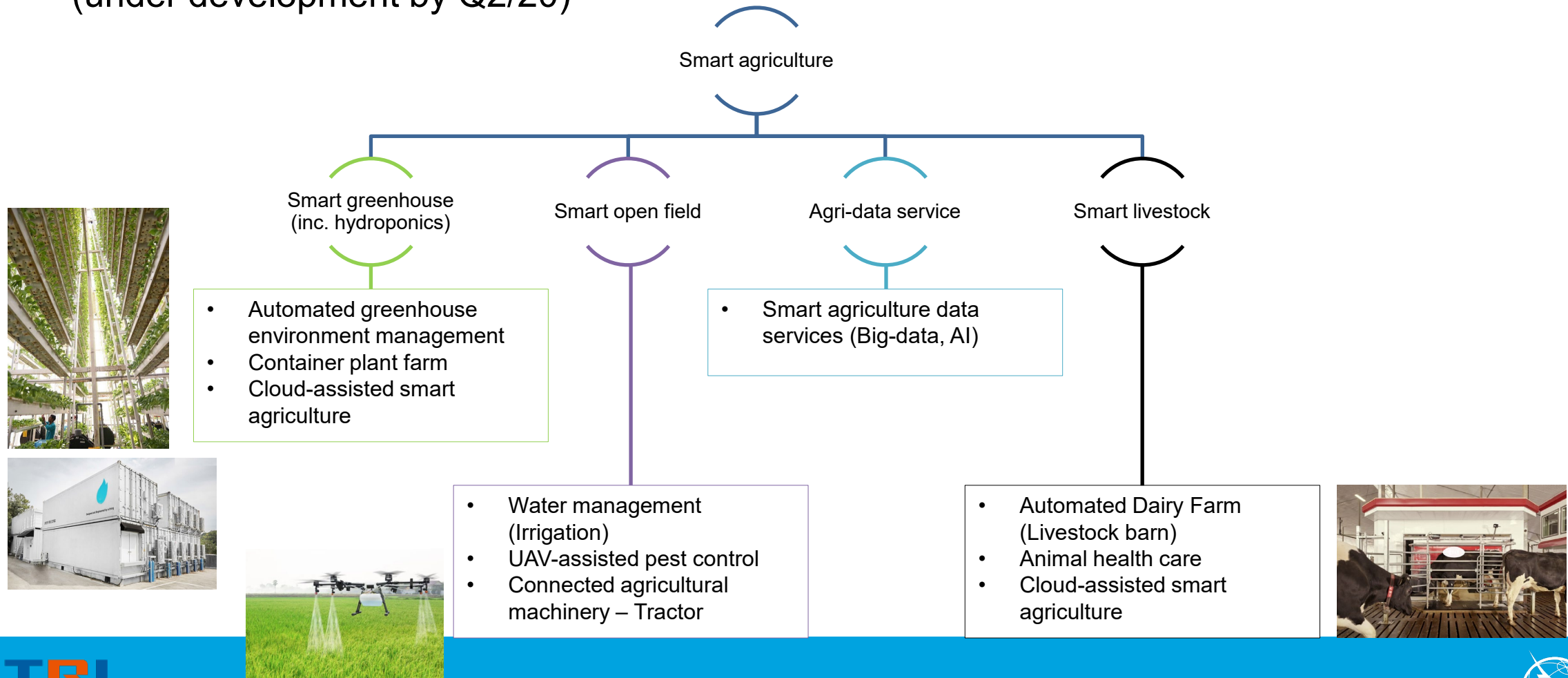


Standardization works on “Smart Agriculture” in ITU-T

- 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.IoT-SLF** “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.SRC** “Requirements for deployment of smart services in rural communities” is under development by Q2/20, it will address the digital divide by establishing the requirements for deployment of smart services (such as e-governance, tele-health, tele-education, precision agriculture etc.) in rural communities.
 - **ITU-T Y.Sup.SmartAgri-usecases** “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.
- At its last October 2021 meeting, ITU-T SG20 has agreed to establish a new **Focus Group on “Artificial Intelligence (AI) and Internet of Things (IoT) for Digital Agriculture” (FG-AI4A).**

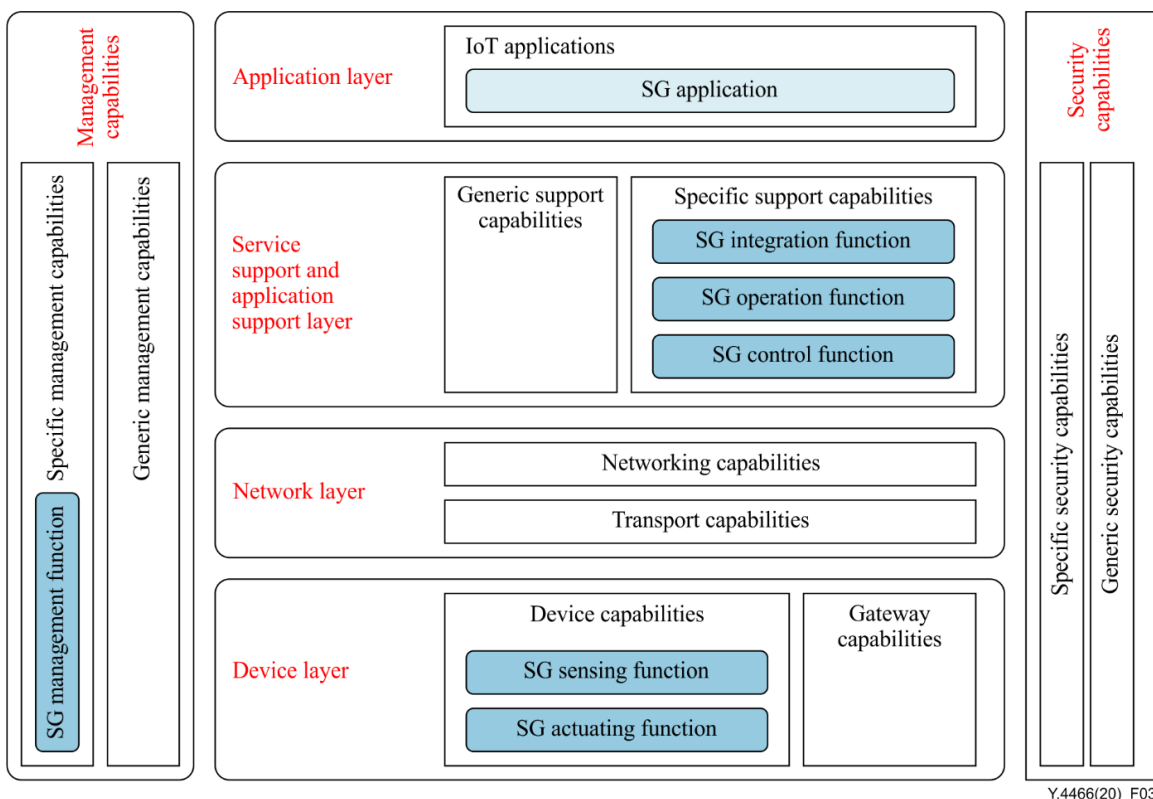
Closer look in SG20's works on Smart Agriculture

- 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)

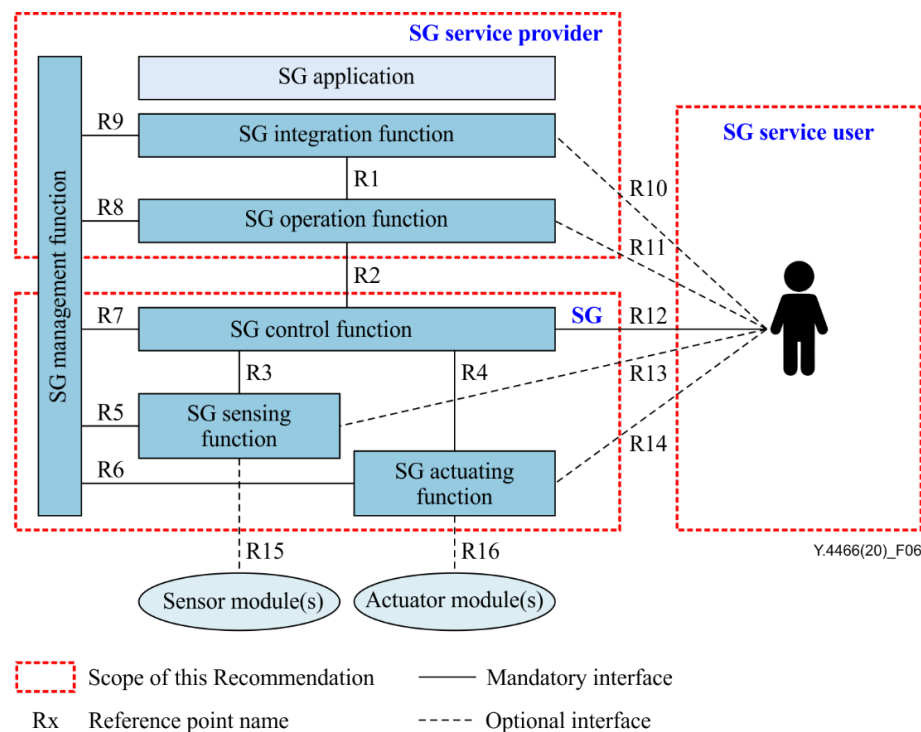


Closer look in SG20's works on Smart Agriculture

- ITU-T Y.4466 provides Smart Greenhouse service reference model in accordance with the IoT reference model as well as reference points between relevant functions. (developed by Q4/20)



Y.4466(20)_F03

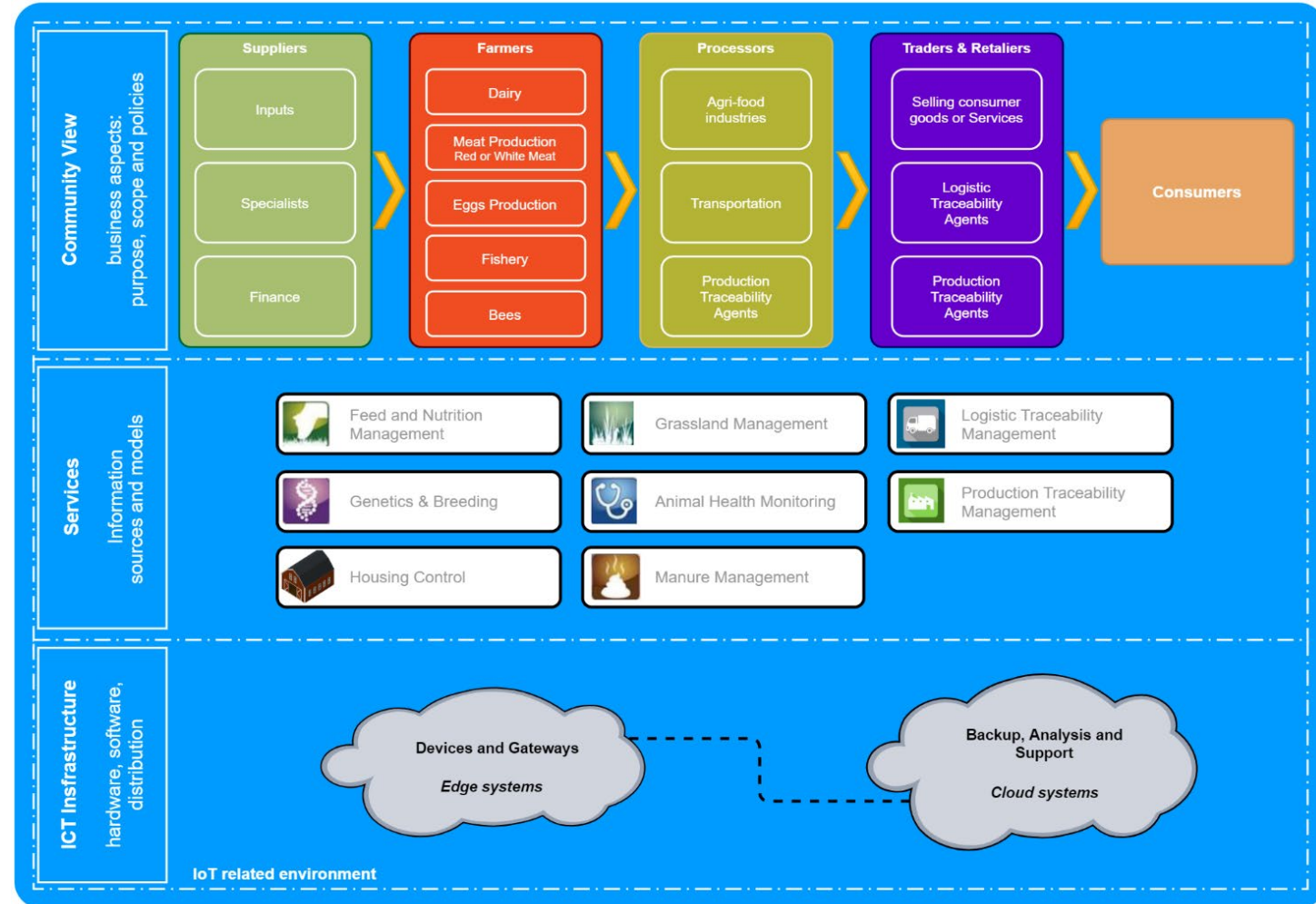


Y.4466(20)_F06

Closer look in SG20's works on Smart Agriculture

- ITU-T Y.IoT-SLF provides a three tier conceptual model of the Smart Livestock Farm.
 - 1st tier (the community view) represents the main stakeholders such as suppliers, farmers, processors, traders & retailers and consumers;
 - 2nd tier (services) presents services supporting the community operations;
 - 3rd tier (ICT infrastructure) describes technological devices and infrastructure.

(under development by Q2/20)





Thanks for your attention.