

Study on Service model of the Agriculture Information based Convergence Service

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Abstract— Agricultural data is the key foundation for Smart Farm models, in which a wide range of Information and Communication Technology (ICT) such as IoT and Big Data are converged, to be operated and managed. Given the fact that every single stage in Smart Farm models from crop growing to selling requires appropriate data, it is crucial to have a well-established service model for data collection and its provision. This service model should gather and process data before providing it for users to enhance their convenience in farm business. By converging various data collected from each stage of production, the model should ensure higher quality of service. This paper describes the reference architecture of the service model.

Keywords— Smart Farming, Agriculture Information Repository, Agriculture Data Information Service, Data Convergence;

I. INTRODUCTION

The Smart Farming services at all stages demand various types of agricultural information from each service role, which are critically important in that they can support agricultural producers', distributors', or consumers' decisions by providing related information and knowhow when they plan, produce or purchase. The agricultural information can be derived from the convergence of various data. In addition, the data should be collected and updated on a real-time basis, such as cultivation/distribution/consumption data, or knowhow information from agricultural producers, distributors, or consumers. That requires a standardized reference framework for actual service deployments. Therefore, the service model and related service requirements for the Agricultural Information based convergence service are described in this Recommendation.

II. CONCEPT OF AGRICULTURE INFORMATION BASED CONVERGENCE SERVICE

Concept of agriculture information is the major purpose of converging ICT with agri-business is to increase the productivity. To accomplish the purpose, it is necessary to

collect diverse information. Collected information will be analyzed by an algorithm suitably designed for each user. They can be used as a standard for setting the facility horticulture environment to meet the most optimal conditions for crop growth. Greenhouses should be able to provide an optimal environment condition for each different crop. Providing the best condition for crops may lead to reduction of greenhouse energy, minimum control of actuators, and minimization of crop stress.

Data can be categorized into Crop Growth Data, Crop Distribution Data, and Crop Consulting Data. Data is controlled by Agriculture Information Repository (AIR) operated by Smart Horticulture Service Provider. The service provider should be capable of offering the convergence service based on data gathered throughout the entire crop growth stages, via one of the data processing options of user's choice.

The agriculture information based on convergence service gathers cultivating data, purchasing data, selling data and expertise knowhow first. The data gathered in agriculture information repository are to be updated via data processing or data convergence. In addition, the updated data can be provided to service users via information provision.

III. REFERENCE ARCHITECTURE FOR AGRICULTURE INFORMATION BASED CONVERGENCE SERVICE

The Service function of Reference architecture is shown in Figure 1. Raw data is gathered by utilizing the functions. Data is gathered either automatically or manually. While sensors and equipment are used to automatically collect data, manual data gathering requires any developments in crop growth to be observed and measured before data entry to system. The Data Analysis function divides the entire process into Pre-production, Production and Post-production stages. Data required for each stage can be processed within the same stage to become the source of service. The Data Processing function is designed for data convergence and processing to meet user needs. The Data Convergence function is used to prepare a

measure to connect different data gathered at different stages with an aim to provide a service desired by users. The Data Provision function provides useful information to service users, crop producers, distribution managers and related personnel. In order to provide service in a systematic and reliable way, it is necessary to determine how to verify users, control network accesses, and trace the history of use. This will assist system in charging users for their service use.

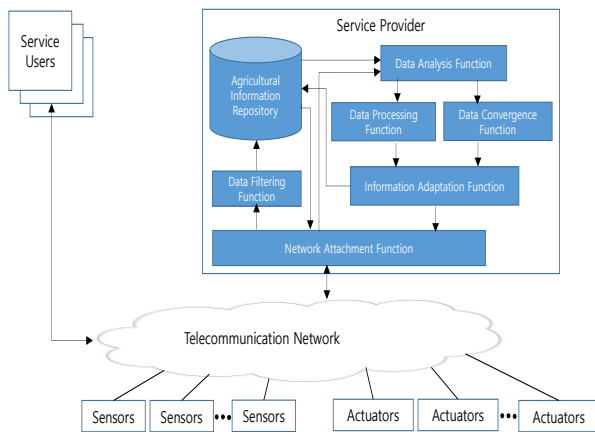


Figure 1. Reference architecture for agriculture information based on convergence service

The Network Attachment Function requires several means that are to use the Agriculture Information Service (AIS), the function needs to be connected to a relevant network for users and managers at farms, distributors, and related companies to have an access. The Data Filtering function needs a mean to store data measured at the Smart Horticulture area (e.g. farm status, internal and external environment, shipment status, etc.) in AIR. The Information Adaptation function requires several means that are to manage data stored in AIR and monitoring users.

The Data Management function requires several means that are to conduct an analysis upon request of user who have joined the Smart Horticulture Agriculture Information Service. The Data Analysis function requires several means that are to conduct an analysis upon request of user who have joined the Smart Horticulture Agriculture Information Service. It also needs a mean to decide which function will be suitable for processing data for each production stage, converging it with data for the entire production stage, and analyzing the converged data, upon user's request (Big Data, machine learning).

The Data Convergence function requires several means that are to converge and process data from each part to meet the demands of users, based on data gathered throughout the entire production process; from crop selection and growth to distribution and selling. It also needs a mean to converge and analyze data from each part to support decision-making on time for crop growth and shipment based on the status of crop

distribution. It needs such mean to provide a consulting service on the basis of crop price fluctuations to farmers who have to select crops to growth next year.

IV. CONCLUSIONS

This provides the service model that Agricultural data is the key foundation for Smart Farm models, in which a wide range of Information and Communication Technology (ICT) such as IoT and Big Data is converged to be operated and managed. Given the fact that every single stage in Smart Farm models from crop growing to selling requires appropriate data, it is crucial to have a well-established service model for data collection and its provision. This service model should gather and process data before providing it for users to enhance their convenience in farm business. By converging various data collected from each stage of production, the model should ensure higher quality of service. As the progress in big data collection and analysis in the field of agriculture has speeded up, technologies to collect a variety of data and utilize them have gradually prospered from basic facilities for farm management to crop growth and distribution.

That is smart farming service which assists farmers to develop proficiency in the management of farms. Smart farming service disseminates to the farmers for the farming contents and perform farmers problem back to service system for solution to help farmers make decision in farm management. That is smart farming service which assists farmers to develop proficiency in the management of farms.

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