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“Digital Twin Solutions for Smart Farming”, the III Development AI+HI Total Solution, Awarded R&D 100.

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Caption: III "Digital Twin Solutions for Smart Farming" was awarded for the US R&D 100 Awards. The picture shows how fishermen acquire decision-making suggestions by the “Digital Twin Solutions for Smart Farming” technology.

Known as the Oscar of the science and

technology industry, the R&D 100 Awards announced its 57th winners recently. This year, supported by the science and technology special project of the Department of Industrial Technology (DoIT) of the Ministry of Economic Affairs, the Institute for Information Industry (III) Digital Service Innovation Institute (DSI), with the technology of “Digital Twin Solutions for Smart Farming”, stood out from more than 1,000 innovative technologies in the world and won this year's US R&D 100 Award. The Ministry of Economic Affairs held the "2019 R&D100 Awards Press Conference" on November 1st. The organizer will hold the awards ceremony on December 5th in San Francisco.

Taiwan's agricultural technology is world-famous, but the industry is limited by the lack of manpower. The government is proactively introducing intelligent agricultural solutions through technology applications. Since the development of digital technology has advanced dramatically, how to provide the most suitable solution as well as select and introduce technologies that work effectively are the critical issues of digital transformation in the field moving from the traditional form to the "intelligent industry". However, it is a

tough financial burden for the agricultural industry in Taiwan to deploy smart farming solutions since 80% of the farming enterprises are small-holder farmers. To this end, under the “Digital Twin Project” of DoIT, MOEA and the “Smart Agriculture R&D program” of Taiwan Agricultural Research Institute of the Council of Agriculture, the team of III combines human intelligence (HI) with artificial intelligence (AI) to help fishermen develop accurate digital decision-making process for production management by “Digital Twin Solutions for Smart Farming”, which increased production efficiency by 30%.

In fact, since 2011, along with this year, III has won a total of 8 US R&D 100 Awards. These eight technologies have already put into real practice to assist various industries in the process of digital transformation and upgrading. III President CH Cho pointed out in the speech today that III will continue to cooperate with enterprises in the industries and make good use of domestic digital innovation energy. With technological strength and innovation capacity, III is able to tighten the relationship with the international world, assist the industries in response to the challenges of the coming digital economy era,

and provide the strongest support for Taiwan’ s industries.

Ted Hsieh, the vice president and director general of III said that the collaboration between AI and HI is the future trend at workplace. Artificial intelligence can become the strongest logical left brain of human beings, helping humans to make the most intelligent decisions. Take Taiwan's aquaculture industry as an example. Facing the lack of manpower in the industry mainly constructed by small-scale farmers and the high cost of introducing new technologies, the Ministry of Economic Affairs and the Council of Agriculture came up with the specific plan to combine the AI applications of smart farms with the HI of smart fishermen and create the solution package with intelligent monitoring capability and accurate production ability to assist in the digital transformation of aquaculture industry.

“Digital Twin Solutions for Smart Farming” Technology Keeps Optimizing

"Digital Twin Solutions" is an emerging technology that combines artificial intelligence (AI) and human intelligence (HI).

Gartner, an international research company, has rated them as one of the top ten critical technologies in the global future for three consecutive years. The DoIT of the Ministry of Economic Affairs began to support the development of the technologies by mapping out resources in the forward-looking technology research and development plan in the year 2016. According to the plan, in addition to the automation efficiency, the industry also needs digital preservation techniques to conserve industrial skills so as to construct the human-machine collaboration technology for the interactive learning between AI and HI as well as the optimization of the learning process.

Su Wei-Jen, the assistance vice president of III pointed out, "The technology of Digital Twin Solutions is applied in the field of agriculture to assist the small-holder farmers accumulate digital transformation experience, and by utilizing the data collected from the interaction between group experience and artificial intelligence, agricultural skills of each farmer could be improved and therefore, the biggest challenge of smart agriculture is solved." Although there are many IoT big data in the agricultural field, too many

uncertain factors are still there in the environment, such as climate change, crop growth performance, water quality changes, etc. Even if big data are provided, it still depends on the farmers' own experience to decide the next step for planting and breeding. Since the process is highly dependent on individual experience of each farmer, the stable provision of crops with certain quality and quantity could hardly be maintained. Additionally, facing the impact of low birth rate, the industry will encounter the problem of finding successors.

With the " Digital Twin Solutions for Smart Farming" technology, farmers not only can modify equipment parameters based on experience and on-site observation, but also can make predictions by simulation before any modification so as to make the best decision. In the digital twin technology, AI will also dynamically learn the experience and knowledge of farmers, and then achieve the desired effect of coordinated operation and optimizing the decision-making process.

Delivering Precision Production, Smart Farming Undergoes Transformation and Upgrading.

It is worth mentioning that the cross field research and development team of III worked so hard trying to introduce the “Digital Twin Solutions” technology into the field of digital agriculture application. After extracting and recording outstanding farmers' farming management behavioral techniques, the ” Digital Twin Solutions for Smart Farming” technology is expected to help farmers reduce the introduction cost by 50% and increase production efficiency by 30% after productization. Currently, in the application cases around the world, the “Digital Twin Solutions” technology is mostly used in aerospace and manufacturing industries. Until now, Taiwan and the Netherlands are the only two countries first to invest in the research and development of the application of “Digital Twin Solutions” for smart farming.

In the future, the technology of “Digital Twin Solutions” can be applied in various fields such as agriculture, fishery and tea. By establishing a digitized process from the beginning to the end, quality analysis could be conducted with solid data. With traceable production and sales history and quality grading technologies, it is possible to achieve

the goals of "smart monitoring" and "precise production" for farmers applying high tech applications. By introducing the technology, not only could the productivity of the traditional agricultural and fishery industry be enhanced, but also the sustainability of them could be achieved, which brings new value to Taiwan's agriculture and fishing industry with regard to industrial upgrading.

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