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FARM MACHINE INTEROP

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Farm Machine Interoperability is an application developed under the Internet of Food and Farm 2020 (IoF2020) project, funded through Horizon 2020. It strives to facilitate efficient machine-to-machine communication and data sharing between farm equipment and management information systems. Moreover, its design will stimulate future developments in agricultural machinery communication. In particular, it will enable further progress in communication standards between vehicles and platform for seamless data transfer, and for cross-communication between various models and brands of farming machinery.

In this sense, Farm Machine Interoperability contributes to the development of precision agriculture, by making information transfer easier and by helping farmers to access more data services and ultimately harness their potential. Furthermore, this smart application contributes to the overall sustainability of farming activity, since the improved use of machinery decreases energy consumption and enables the more efficient use of resources.

More specifically, Farm Machine Interoperability aims to implement real-time communications between farming management information systems (FMIS) cloud solutions and equipment manufacturers, test harvest logistics applications compliant with interoperable solutions, and share technical solutions with the standards development organisations for agricultural machinery.

The platform works by applying communication standards, such as ADAPT and NGSI-LD, for effective offline and cloud communication between farm and machine, and vice versa. Unified data models facilitate easy data transfer and conversion. Service providers can add value to data based on a single API.

Application scenario

Smart farming and agricultural machinery communication towards interoperability of farming equipment

Digital technologies

IoT, cloud/edge computing, connectivity services, unmanned vehicles

Socio-economic impact

- Economic: yield increase, net worth of machinery increase, improved farming efficiency
- Environmental: optimisation of inputs and resources used, less fuel consumption
- Social: faster IoT uptake

More info:
https://www.iof2020.eu/trials/arable/farm-machine-interoperability

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Purpose of the tool

Farm Machine Interoperability creates a framework for farmers to connect their work equipment through one interoperable and integrated system, regardless of the type and vendor of the equipment. This tool strives to address the challenge of unifying different, vendor specific, digital standards to make farming devices work together in the digital space. By bridging the interoperability gap for farming machinery, it will not only facilitate the adoption of new Internet of Things (IoT) technologies and boost their uptake in the European market, but it will also allow more efficient smart farming methods to be implemented. These smart methods will subsequently lead to better outcomes in terms of gross production, net income and optimal use of resources.

The specific goals are to increase interoperability of agricultural machinery by optimising digital communication standards; demonstrate the benefits of agricultural machinery interoperability; and demonstrate the economic impact of data valorisation from optimised IoT technologies.

Description of the tool

Farm Machine Interoperability is designed to enable the exchange of data between field machinery and farm management information systems for supporting crossover pilot machine communication. The tool is based on ADAPT and NGSI-LD communication standards for easy data transfer and conversion, enabling cloud and offline communication among farming fields and machinery. Still, the low maturity level of available standards remains as the main challenge, since presently there are no real usable solutions that enable real-time communication from the standardisation organisations involved in agricultural machinery. Therefore, this use case is focused on finding universal frameworks and to modify them in a way that will be applicable for interoperating farming machinery. In this regard, the developers of this tool aim to perform a proof of concept and liaise with the most prominent API developers to speed up the development of data standards in the agricultural sector.

Areas of socio-economic impacts

Social	• Faster IoT uptake +15% in farming communities
Economic	• Yield +10% • Gross margin +5% • Cost-benefit of IoT (e.g. soil fertility) +10% • Yield in compaction-sensitive areas +16% • Fuel consumption -10% • Machinery sales +15% • End-user costs of IoT +5%
Environmental	• Estimated improvements in farming efficiency +15-20% • Crop produced/input resources ratio +15% • Reduced pollutant/greenhouse gas emissions