Smart-Farming-World

Interplay of Smart Services and Systems to support Potato Harvest

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What do you see here?

A) Mobiles in the dirt
B) Smart devices that support the potato harvest
Agenda

1. Current Situation and Project Target
2. Smart-Farming-World as an Infrastructure for Smart Services and Systems
3. Use Case: Usage of a Digital Potato during Harvest
4. Conclusion and Next Steps
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In the coming decades, the world population will grow by a further 2.5 billion people who need to be supplied with food.

“\textit{The growing world population needs twice as much food in 30 – 40 years for the same amount of cultivated land}”\textsuperscript{2}

Sources:
1) s. United Nations (Hrsg.) 2017
2) s. Bartmer 2016
The complexity of the agricultural production process results from the large number of actors involved.

### Decentralized data system of each actor

- **Data base 1**
- **Cloud 1**
- **Data base 2**
- **Cloud 2**
- **Data base X**
- **Cloud X**

- **Seed producer**
- **OEMs**
- **Fertilizer producer**
- **Field**
- **Contractors**
- **Logistics**

### Agricultural Value Chain

- **Planning**
- **Cultivation**
- **Sowing**
- **Growth/Care**
- **Harvest**
- **Transport**
- **Storage**
The Smart Farming platform enables the exchange of data and connects the participants of the ecosystem.

Functions of the Smart Farming platform

- The general framework of the smart farming platform is based on the model of digital infrastructures of acatech.

- On the smart farming platform, the data of all involved process partners can be exchanged and linked.

- Generic services allow faster development of specific services by using basic functionalities which can be re-used several times in different application areas.

- Specific services are based on the data and/or linkage of several process participants and offer the different user groups specific value-added services that are tailor made to their needs.

- Specific services are divided in applications that are running in the cloud and applications that run directly on the terminals of the farming machines (edge devices).
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The technical development of the platform is separated in the two parts cloud-applications and edge-applications.

- Due to the poor network coverage in rural areas (e.g., in eastern Germany) the data processing is divided into cloud and edge applications.
- All applications have installations on the terminals/communication modules of the machines and the respective cloud instance.
- A safe and secure communication infrastructure is set up via an internet connection with communication gatekeepers, protocols and token systems.
Smart-Farming-World develops four use cases for different parts of the agricultural value chain with a focus on agricultural machinery.
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nPotato – A smart service based on a smart device to support farmers during potato harvest

Major Challenge
The potato harvesting process with harvesting machines is a complex process that needs precise information about the fruit and the current harvesting conditions. Wrong settings can harm the potato and decrease the profit drastically.

Core Product Features
A digital transmitter in shape of a potato provides a detailed digital twin of the current impacts on real potatoes. Recommendations for action are given by real-time data processing and lead to optimally adjusted machines to increase the product output.

Aims of the nPotato
- Increased product quality
- Reduced costs related to scrap

Involved partners

Use case outlook
nPotato will be launched with pilot customers in autumn 2018. The current development will be an aftersales product of Grimme to improve their harvesting machines. In addition, the idea of smart sensor nodes will be used in future projects to extend its application area to other parts of the food chain and other types of fruit.
nPotato – Our product story

Without our Product or Service

Field work decisions made on information from previous years
Potential risk of under/over estimation of field work resources due to no fact/data based decision support

Damages of the potato not detectable
Wrong settings of the harvesting machines have an impact on the potatoes and lead to not visible damages that decrease the profit margin later on

With our Product or Service

Access to data in real time
Dashboard for monitoring farm activities related to potato harvest in real time based on data from vehicles and nPotato

nPotato analyzes in real-time
Measuring of dynamic parameters to sent error messages directly to the driver to optimize machine settings

Value by nPotato

Improved field work efficiency and executional optimization and precision due to the elimination of information latency

Generation of estimated real-time income curves, less damages of the potatoes and increased quality

Target Users: Medium to large size farms or contractors (more than 100 ha)
nPotato – The dashboards show the farmers different information such as a hit summary and estimated revenue curves for a field

Hit summary

Revenue estimations

Image: DFKI
nPotato – Some insights from the first field tests last week

Yield increase 4)
Preliminary test results and interviews show a possible increase in yield of up to 5% per hectare

Business model 5)
5% of yield increase per hectare lead up to a revenue increase of 560 € per hectare

Teaching support 4)
Farmers and drivers see a high potential to use nPotato to teach unexperienced drivers

Autonomous support 4)
Farmers and drivers only want recommendations for their actions no autonomous settings

Sources:
4) Based on interviews conducted with three farmers and drivers on 09.10.2018
5) Based on a rough estimation: 45 tons of potatoes per hectare and 250 € per ton (www.statista.com; www.raiffeisen.com)
Conclusion and Next Steps

Use Case: Usage of a Digital Potato during Harvest

Smart-Farming-World as an Infrastructure for Smart Services and Systems

Current Situation and Project Target
Conclusion and next steps: nPotato is only the first step to smart devices in agriculture to support harvests globally

**Conclusion**

**Interoperability** between existing platforms in agriculture is necessary to increase the data value within the whole value chain and create new services.

nPotato is a **smart service based on a simple smart device** that supports farmers during their potato harvest and increases the yield.

**Next steps**

**Usage** of the nPotato during the **whole value chain** of potato growing – from sowing to supermarkets.

Development of other **digital vegetables and fruits** to support other harvesting activities.

Development of a **global benchmarking system** to compare potato harvests and possible impact factors.
Thank you for your attention!

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