CLIMMAR

BACKGROUND PAPER TO THE CLIMMAR POSITION PAPER ON SMART FARMING

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SMART FARMING - BIG OPPORTUNITY FOR DEALERS

"Smart Farming" ("Smart Agriculture", "Digital Farming", Agriculture 4.0") stands for the integrated internal and external networking of farming operations. This means that:

- *Information in digital form exists for all farm sectors and processes*
- *Communication with external partners such as suppliers and end customers is likewise carried out electronically*
- *Data transmission, processing and analysis are largely automated. The use of Internet-based portals can facilitate the handling of large volumes of data, as well as networking within the farm and with external partners.*

Smart Farming is about managing variations in the field accurately to grow more food using fewer resources and reducing production costs. All aspects of the environment – soil, weather, vegetation, water – vary from place to place. And all these factors determine crop growth and farming success. Farmers have always been aware of this, but they lacked the tools to measure, map and manage these variations precisely. Thus, Smart Farming can make a difference to food production facing the challenge of a rising world population and can help farmers to achieve:

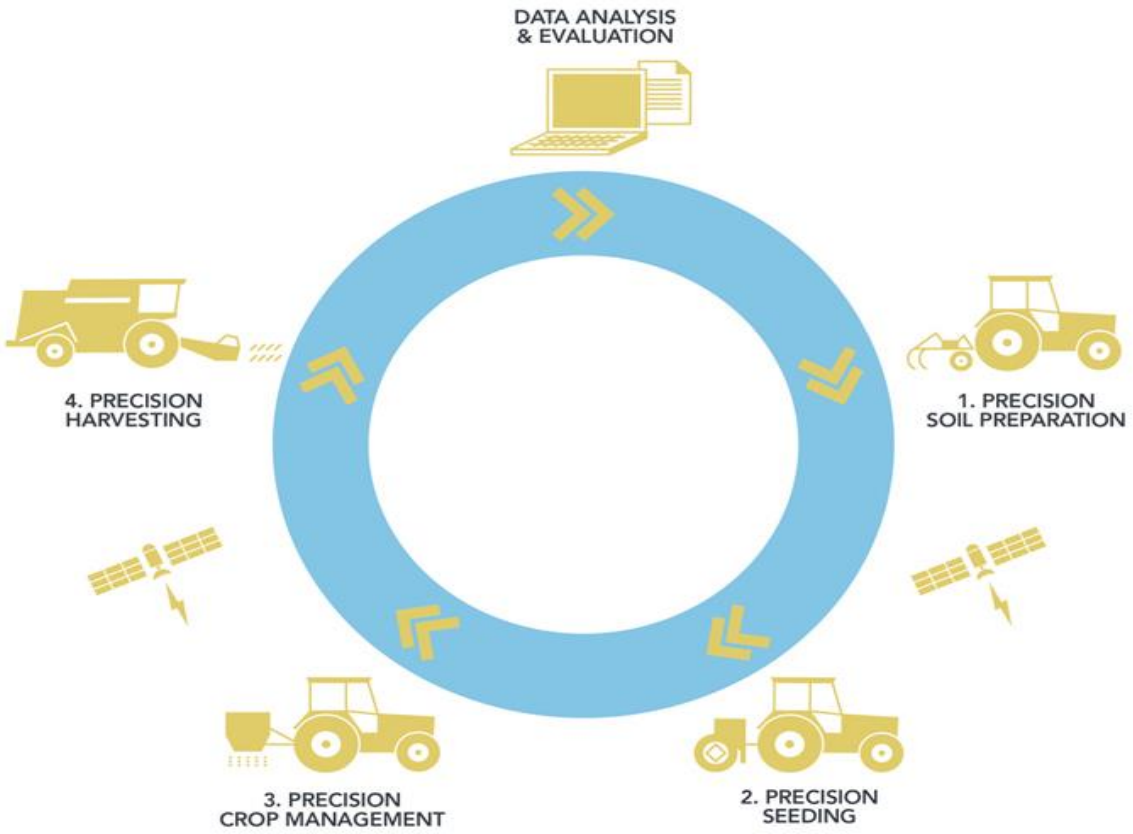
Greater sustainability and environmental protection

Higher productivity

Economic benefits

In the past 10 years, Smart Farming has moved from good science to good practice. It has witnessed unprecedented growth around the globe: 70 to 80% of new farm equipment sold today has some form of Smart Farming component inside. Thanks to cost-effective monitors and controllers and the integration into single data management systems, Smart Farming is becoming more seamless, cost-effective and easier for farmers to install and use.

Smart Farming innovations are present **in the 4 phases of the crop growth cycle**:



A new boost in Precision Agriculture can be observed around the early 2010s based on the evolution of several technologies:

- Cheap and improved sensors and actuators
- Low cost micro-processors
- High bandwidth cellular communication

Precision farming technologies as standard equipment of tractors, harvesters and other equipment use features such as:

- Smart control devices (on-board computers)
- Many sensors for the operation of the machine and the agronomic process
- Advanced automation capabilities (guidance, seed placement, spraying, …)
- Communication technology (telematics) embedded in the vehicle.

In Smart Farming we are at the start of further developments now. Smart Farming has extended Precision Farming by greater use of real-time sensor technology, including data fusion for decision-making support. This is where new components such as:

- Machine to machine (M2M) communication (Internet of Things)
- Cloud computing, and
- Bid-data techniques

will be used in order to make use of existing potential for optimizing complex agricultural production systems.

The services with new algorithms being developed to transform data into value adding information, to optimise the products and the agronomic process, reduce risk and limit vulnerability from external influences like machinery breakdown, weather and diseases.

Agricultural eco-systems have emerged with platforms combining data from several (re)sources, be they sensors or equipment, in the field/farm or external sources. The farmer monitors his operations from a dashboard with real-time or near real-time information and makes decisions based on quantified hypotheses to increase the financial result.

The cooperation across different players in the agricultural and food production chain has developed. Digital data is the glue that **unites the system participants** to provide value to the food supply chain. Based on the same data, service providers offer different services to different stakeholders.

Smart farm machines

As the partners servicing farmers and agricultural contractors, farm machinery dealers are fully committed to realise the concept of Smart Farming and continuously improve and develop it further. Manufacturers and service providers of agricultural machines focus, first of all, on the delivery of highly efficient machines that are suited for Smart Farming. In other words, the industry focuses on the development of machines that are compatible with the digital infrastructure of the farm and can make the required contributions to the optimisation of production processes.

Digitally smart farm machines must:

- Be able to send and receive information via appropriate sensors and communication hardware
- Facilitate automated operations
- Enable the optimal utilisation of machinery, and
- Assist the driver/machinist

Whereas, in the past, the industry's primary focus was on the optimisation of the farm machinery itself, this focus has now gradually shifted towards the optimal integration of the farm machines into the production system (process optimisation).

Service-oriented approach

Manufacturers and dealers of agricultural machines are shifting from a trade- and hardware- oriented towards a **service-oriented approach**. Data not only allows additional services for processes on the farm, but also enables services to enhance the performance of the vehicle. Data allows to make the equipment more suitable for the job, with enhanced maintenance to increase machine uptime and reduce unplanned downtime, thus lowering operational costs for the farmer.

For the manufacturers and dealers of agriculture machines to advance on this path of development, it is important to obtain – provided the end customer agrees – access to farm machinery related data in order to:

- Support the utilisation of machinery, e.g. by providing data for **optimised machinery settings**
- Derive machinery **design optimisations** from utilisation data
- **Facilitate** machine-to-machine (**M2M**) **communication**, to allow machines to communicate with one another via data portals, and to enhance them with additional intelligence (process knowledge) in order to increase efficiency
- **Recognise** additional needs e.g. in relation to functionality or driver training
- **Collect data** from the data management systems, e.g. to optimise the preparation of application maps for the sowing of seeds and the application of fertilisers and plant protection products
- **Use the data** obtained to document the work done and the resources used, e.g. via yield maps and current status maps of applications
- **Develop additional offers**, e.g. in the consultation or service areas

Data exchange

To achieve these goals, dealers (and manufacturers) of agricultural machinery will have to network with data portals, so as to provide the possibility of data exchange. If necessary, portals can also be

offered by manufacturers/dealers themselves. For sustainable utilisation on the part of farmers, it is essential that:

- The different data systems are connected to each other
- End customers, as owners of the data, determine the amount of data, data type (e.g. soil, yield, machinery…) the time period, and the partners with whom they wish to exchange data via the portals
- Data handling occurs in a transparent way
- Data exchange and handling occur in a safe and secure way
- Data elements should be well-defined (a broadly accepted common data model)

Added value for end users

For end users, the main advantage of Smart Farming is the significantly larger information and knowledge base obtained (brand-independently) from sensors, machines and other sources. Specific benefits can be provided by the utilisation of data portals, for example:

- The integrated design of farm data processing solutions means that data (e.g. master data) must be entered and maintained **only once**
- Data **gathering can be automated** without the end user having to insert the data manually
- The quality of decision-making is enhanced by **consistent** data
- There is a reduction of support **complexity** (and costs) for in-house data processing
- There is more rapid **exploitation of high-performance technology** – without investment by the farm
- Professional portal providers have high **security standards** in relation to data protection and security
- **Data mobility** is greatly increased, e.g. information concerning production is available directly in the field
- Farmers can leverage **knowledge** (based on algorithms) **from external parties**

In return for data, farmers will obtain agricultural equipment that is better suited for the job, is more productive, has increased up-time and less unplanned downtime, comes with enhanced automation features to reduce input costs such as agro-chemicals, and provides data to optimise the agronomic and logistics processes further.

Dealers benefits

For dealers of agricultural machinery, networking with a data portal can also provide additional advantages, such as:

- Better & closer **relationships** with end users
- Using data from the vehicles and value chain partners to **optimise products** and internal processes
- Higher **machine efficiency** in terms of both production costs and environmental preservation through intelligent networking
- The utilisation of information made available by **other data portal partners**
- Process **optimisation** for support and dealer activities
- Expansion of product offerings in **non-physical services** related to the equipment or agronomic processes, e.g. in the areas of machine servicing, consultation services, etc.

Necessary external conditions

Digital infrastructure

We need a dedicated joint effort between public institutions, industry actors and the farming community. Above all, EU decisionmakers and national governments need to ensure that the

fundamental digital infrastructure for rapidly growing data flows in terms of network coverage and transmission rates in rural areas is put in place.

Ability to invest
We need supportive public policies that help to address the latent investment gap in agriculture, particularly in times of dire commodity prices like now. Here, we need a forward-looking Common Agricultural Policy (CAP) after 2020 that includes new and more dedicated measures and mechanisms to boost farmers' ability to invest in those innovative digital technologies and equipment that have proven societal and environmental benefits.

Data exchange
Industry and service actors must strive to create a competitive and innovation-friendly landscape that enables the flow of data streams and encourages fair competition at all levels. Here, we need communication and interface standards that facilitate vertical and horizontal communications i.e. permit data exchange between machines, business partners, as well as different data portals and platforms.

Security and ownership of data
Farmers need to be given re-assurances about the security, ownership, and control of their data. The principle that data generated on a farm is the property of the farmer needs to be adequately reflected in contract law. In practice, more and more farm data will be pooled in cloud-based data platforms to facilitate data processing, analysis, and flow of information. Yet the farmer needs to be able to decide on the allocation of access rights and on which partners receive which kind of data, and in this way, retain ownership of the data.

Digital skills
Finally, farmers need to get ready to embrace the upcoming digital change. What is important is to ensure that the necessary digital skills are developed and that there is an openness about potential new business opportunities and models that may be unfolding with the digital transformation.

Initiatives

In order to realise the taken positions CLIMMAR has to take several initiatives

Position	Possible initiatives	CLIMMAR initiatives
1. Supporting awareness and pilots	• Establish awareness project for dealers • Access to EU- and national programs/projects for development of Smart Farming	• Access to EU- and national programs/projects for information and development of Smart Farming
2. Focus towards the optimal integration of the farm machine	• Awareness of farmers • Awareness of dealers • Communication with manufacturers	• Participation in EU Smart Akis project (to organize subsidy for awareness program) • Start round table (and or project) with CEETTAR, COPA and CEMA on conditions to realize compatible machinery
3. Access to farm machinery-related data	• Speed up the RMI process • Realize an independent diagnostic digital tool	• Speed up the RMI process • Start round table (and or project) with CEETTAR, COPA and CEMA on conditions to

	• Participate in national or EU-smart farming programmes	realize compatible machinery related data
4. Dealers have to network with data portals	• Gather information on network data portals	• Start study on the future of telematics in ag-machinery and use in service concepts
5. EU decision-makers need to ensure fundamental digital infrastructure and boost farmers' ability to invest in those innovations	• A new European Agricultural Policy • Intellectual property regulation • Secure RMI diagnostic data and realize RMI regulation with access for dealers • 100% connectivity in rural areas	• Secure RMI regulation that offers dealers affordable access to data of all brands
6. Dealers need communication and interface standards	• Code of conduct on exchanging data and supply-conditions	• Participate in CEETTAR, COPA and CEMA group on conditions to realize compatible machinery
7. Ensure digital and technical skills	• Gathering information on training and skills programme in member-organisations • Renew and adapt training programmes	• Gathering information on training and skills programme in member-organisations • Make long- and shortlist of prioritized competences to develop
8. Elaborate new business models	• Organising a think tank for developing new models • Start working group on new service concept on smart farming • Select Universities, Academies, Colleges in Europe that could provide students for investigations om Smart farming	• Organizing a think tank for developing new models • Select Universities, Academies, Colleges in Europe that could provide students for investigations om Smart farming

Requirements

To fulfil the expectations, CLIMMAR should think of the means and tools we need to get the work done. CLIMMAR needs:

- "Experts" on Smart farming and EU-budgets for new technologies: that could be staff from the national organizations who are dedicated for this project. (could be participants Working group 1)
- One representative to take a seat in the Round Table of CEETTAR, COPA, CEMA (could be the CLIMMAR-President or a representative of Working Group 1)
- Experts/representatives for the forming of a Think Tank of Smart Farming and new business models for Dealers (3 to 4 from the dealer world, 2 from contractors and 2 farmers, 2 from Universities)

- A (part-time) expert-lobbyist on RMI: Train staff of member-organisation or attract a part-time professional

Required is therefore: organising budget; if the national organisations cannot provide experts, then additional staff is required.