Economic, environmental and social impacts (part 2)

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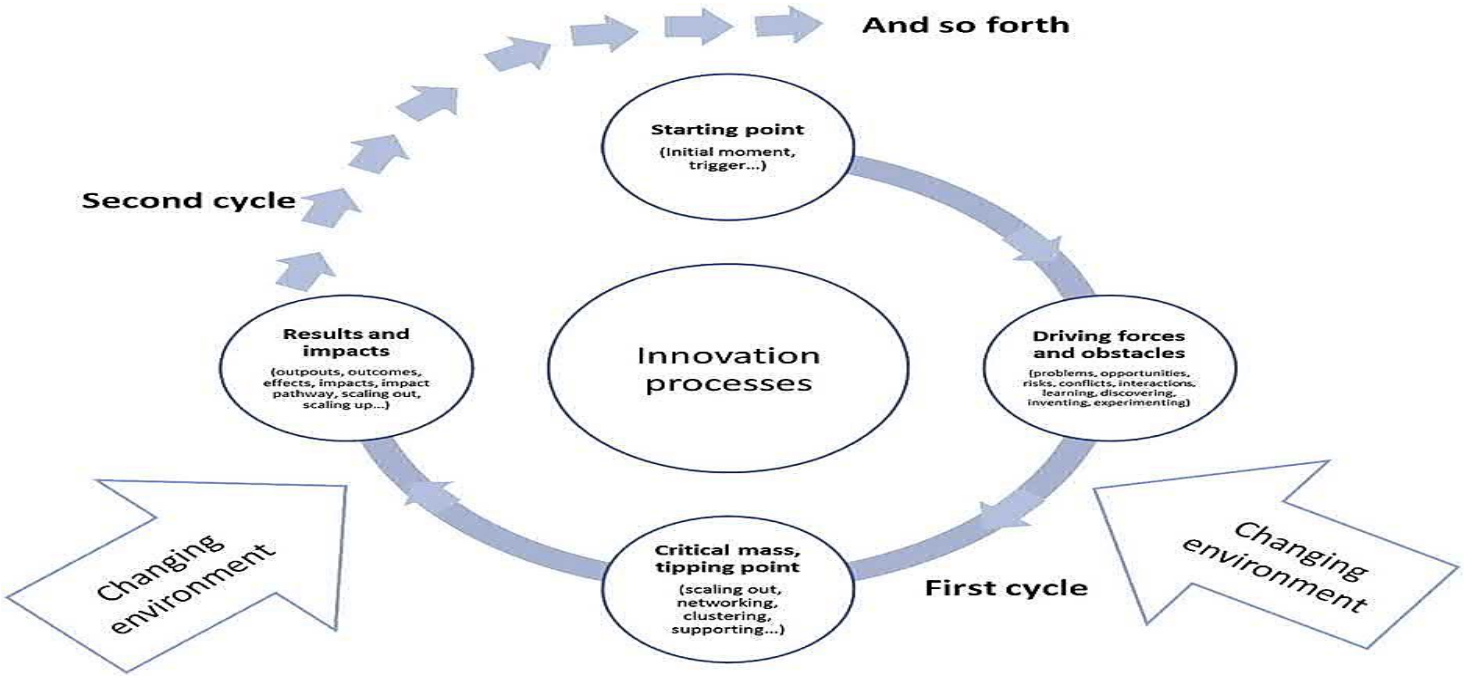
Successful innovation processes and best practices around SFT

- The development and the implementation of two SFT (Trecker and Farm Management App FMA) are presented, as real examples in the smart farming businesses.
- Development shifts from mechanical to digital farm tools and machinery have increased the variety of potentially interconnected tools and technologies that make up SFTs and thus have broadened the spectrum of actors involved in agricultural innovation processes
- To better understand the interactions that constitute innovation processes, it is important to closely explore the organizations and actors involved in innovations, specifically the links and interactions between them
- Understanding the interactions that make up innovation processes can provide insights to SFT development so that the innovation process is inclusive, appropriate and relevant to farms and farmers at different levels

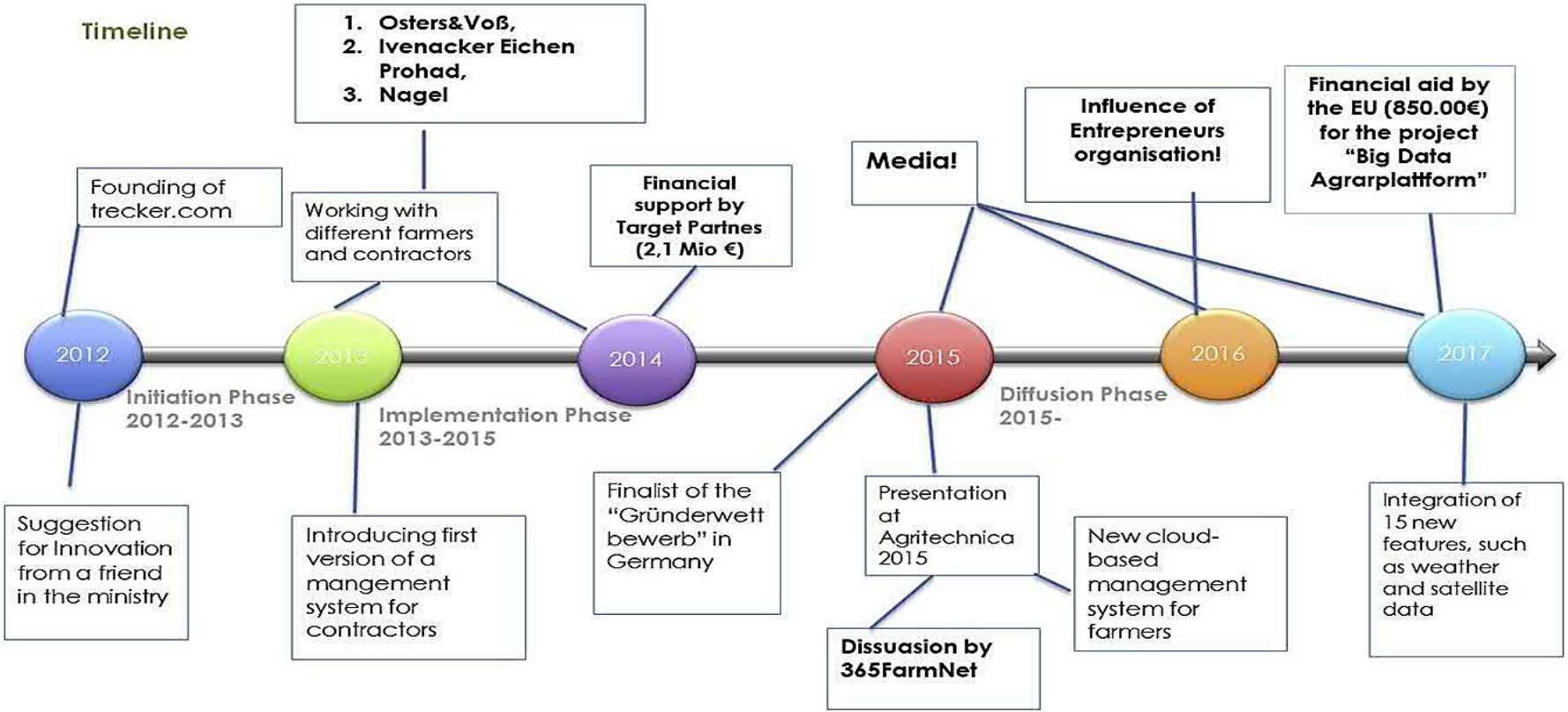
Dynamic perspective of innovation processes



Innovation profile: Trecker.com

- Trecker.com is a German cloud-based farm management software that captures and documents information via smartphone while working on the field
- It processes automatically collected data on tasks, working time, costs, machines, supplies and other information into precise key figures for farmers' costs and revenues
- All data regarding finished tasks, incurred costs and working hours are automatically transferred to the acreage index
- Farmers can also use the software to create tasks, assign them to specific employees and select fields, machines and resources

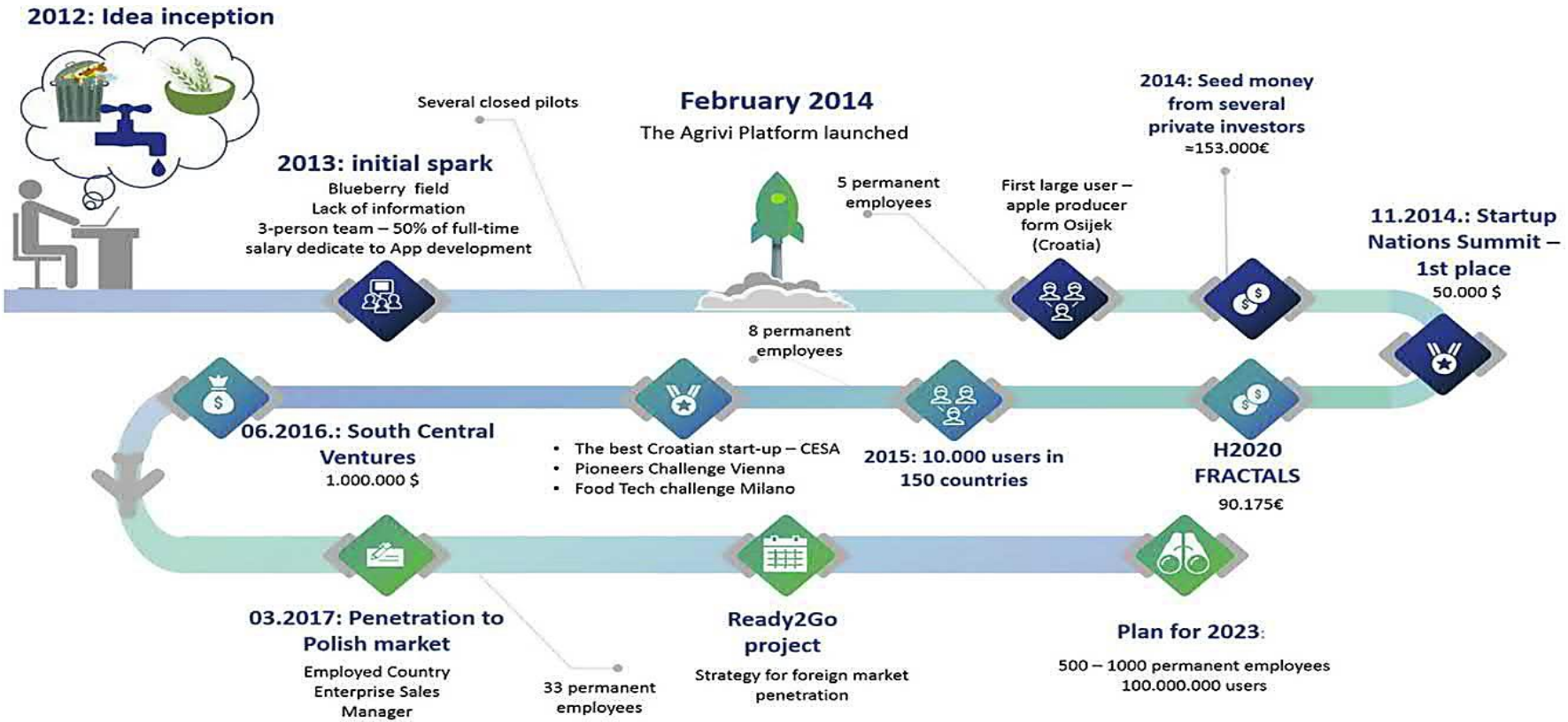
Timeline of trecker.com



Innovation profile: agrivi

- FMA is a cloud-based farm management software for fruit, vegetable and grain producers, which refers to best farming practice knowledge
- Agrivi was first developed in Croatia and is now available in a range of EU countries and beyond
- With Agrivi, farmers can plan all seasonal activities and track their execution and related costs
- Advanced reports and dashboards help farmers to make data-driven decisions needed for improving their production
- The software also integrates weather data to alert farmers about optimal times for spraying and pest control measures

The Agrivi innovation process



Farm management and decision-making

- Although the business case for a single use may lack economic viability, the business case becomes better when some of the investment costs can be split over many different uses, i.e., the investment in positioning systems can be used for site-specific application of nitrogen AND also many other things
- The potential benefits from PA is mainly related to either input savings from saved fertilizers, lime, pesticides, seeds and saved labor time or alternatively from increased yields in relation to better site-specific distribution of limited factor such as nitrogen or water in the field
- The financial potential from using PA and site specific input application technology will depend on field size and shape, in-field yield variability, soil structure and soil water capacity as well as expected precipitation
- If, conversely, the variation is significant, it is likely that economic benefits can be obtained from using site specific application

Potential cost of precision agriculture systems

- The costs of this information depend on the system design, its scope and accuracy
- Simple smart farming decision support systems may only require a tablet or a mobile phone unit and take some time for manual observations in the field
- Decisions may then be supported by an advanced web tool based FMIS. A system like this may not be very costly
- In the following, a description of equipment and information needed to conduct various tasks with precision farming systems and the costs associated with these different practices is provided
- The required information to conduct variable rate application includes beside advanced GPS systems the following three sources: satellite information, sensor information, manual observations and registrations

Satellite information and sensor information

- Four common systems are available: N-sensor from Yara, GreenSeeker from Trimble, Crop Circle from Holland Scientific, CropSpec from Topcon. All of these systems are, however, relatively expensive compared with the low cost or freely available satellite images

- A number of handheld systems with software solutions are also available such as Yara ImageIT and Yara N-TesterTM, to make a low cost assessment of N needs in the field

- CropSpec sensor from Topcon, developed together with Yara, is mounted on the roof of the tractor

- The sensor measures crop reflectance to determine chlorophyll content and thereby provide information on N requirements and to conduct variable rate application on the go

- Most modern harvesters already have a yield meter pre-mounted as well as accurate RTK-GPS systems to conduct auto steering

Potential environmental impact with different smart farming systems

- Until now, profitability, cost efficiency and labor saving have been mentioned as main drivers for investments in smart farming, but also socioeconomic interest and environmental concern could be direct or indirect drivers for smart farming
- In a free market economy, the market so-called invisible hand, will take care that the socioeconomic costs of capital, labor, energy, manufactured goods and land are internalized in the private, farm economic decisions also including investment decisions regarding smart farming
- Increasing labor costs and low interest rate will encourage farmers to invest in labor saving smart farming
- The environmental effect of smart farming is however arbitrary
- Spraying from airplane, once a smart farming technique, is now banned in most countries while the precision and functionality of sprayers and nozzles etc.

Future perspectives

- An intelligent use of SFT can provide a targeted production of inputs that can likely reduce negative environmental effects and increase yields with less inputs
- SFT will enable the consumer to trace products from farm to fork with all relevant production processes such as timing, location and source of input to make a high-value product
- SFT have shown a great development during the last two decades
- The majority of the SFT available on the market are directed to monitoring and recording, but in the recent years, there is a tendency of the SFT providers to design and manufacture actuation technologies that interpret the recorded data into valuable information and differentiate the input quantities within the field based on the soil and crop characteristics

Summary

- There are still some barriers that need to be addressed, so that SFT adoption can be increased in a pace that can transform agricultural production into a `smart` sector
- This can be achieved by ensuring rural broadband connectivity, developing user friendly solutions and promoting interoperability standards
- There is a need for agricultural data fueling growth and meaning production of the appropriate conditions for the right ways to record, store and use agricultural data
- The steps to achieve this goal include the promotion of a transparent framework for agricultural data and activities for spurring growth from agricultural data
- To do so, the most important actions to be taken are mainstreaming smart farming into education and training and strengthening the agricultural knowledge and innovation systems role for the digital era

Session Q&A