

Business opportunities in Precision Farming: Will big data feed the world in the future?

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BUSINESS OPPORTUNITIES IN PRECISION FARMING

Introduction

In recent years the agriculture industry has faced major challenges. Driven by a growing population and economic growth especially in developing countries, the global demand for agricultural products is rising. At the same time supply capabilities are shrinking due to reduced land availability and climate changes. In addition, the industry encounters increased governmental food regulations targeting a more sustainable, secure and transparent agriculture industry.

Enabling the agriculture industry to meet tomorrow's challenges, Precision Farming has evolved into the catchphrase for various methods and practices.

Various definitions of Precision Farming are in use within the industry. Based on our market understanding we derived a comprehensive definition. Precision Farming involves a broad range of technologies (figure 1) that can be clustered into robotics and automation technology, imagery and sensors, digitization and big data as well as bio-engineering. All of these technologies are interlinked via connectivity.



Robotics and automation technology: Autonomous operations are enabled by automated steering technology and high precision positioning systems as well as integrated electronic communication systems



Imagery and sensors: Data for evaluation purposes of soil and crop health, etc. is collected via sensors, remote sensing systems and geo-mapping

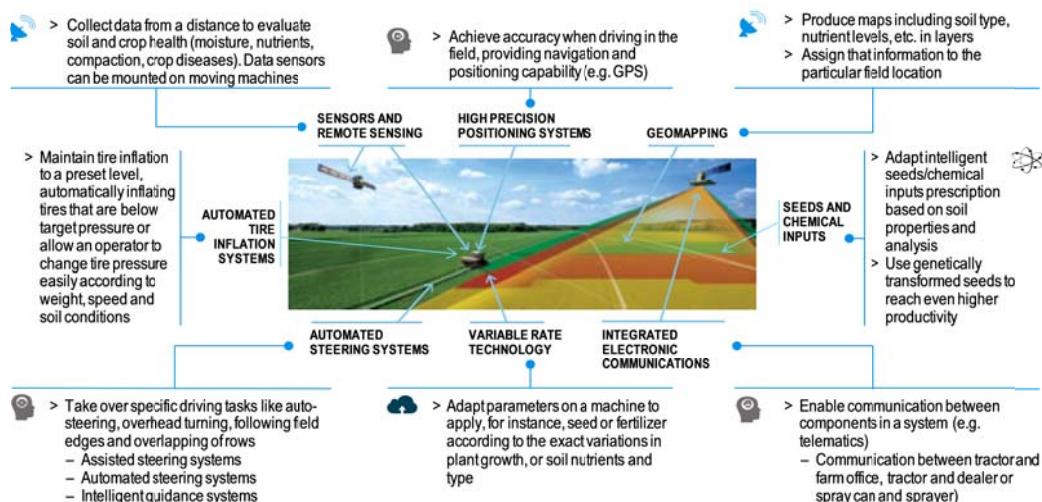


Digitization and big data analysis: Data is analyzed in order to improve climate and soil predictions, performance optimization of equipment as well as remote control in field monitoring



Bio-engineering: Seeds and chemicals are selected based on external conditions and evolution of seeds to enforce resistance to specific farm and/or climate conditions

Figure 1: Precision Farming key technologies



Source: CEMA; Roland Berger

In our recent study we provide an overview of the global and regional development of Precision Farming. We describe all major technologies through the period until 2030 in a roadmap and outline the impact of technology on market players – traditional and new ones alike. Furthermore, we identify new business opportunities along the agricultural value chain and the underlying strategic control points. Finally, three strategic questions give guidance on how to achieve a superior position in a changing world.

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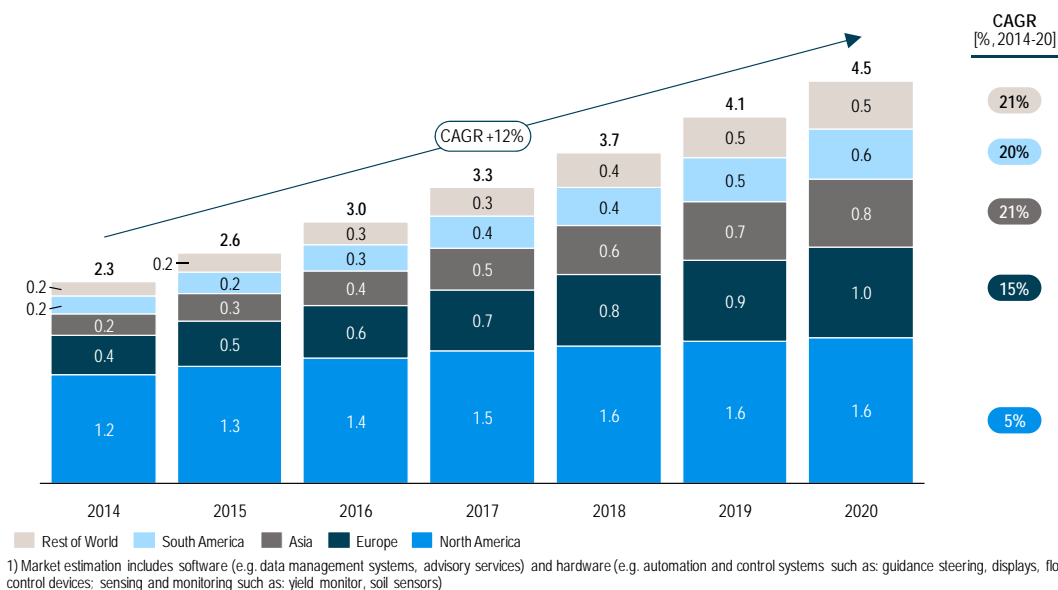
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A. GLOBAL MARKET DEVELOPMENT

The market for Precision Farming is a growth market. Including hardware and software, it amounts to EUR 2.3 bn in 2014 and is expected to grow with a CAGR of 12% through 2020 (figure 2). The Precision Farming market's potential is highlighted by a comparison with the global agricultural equipment market, which is growing at a far slower pace with a CAGR of 4% to 2.4 million vehicles in 2020.

Figure 2: Market estimation of Precision Farming 2014-2020 [EUR bn]



Source: Roland Berger

In the future, the highest relative rise for Precision Farming is to be expected in developing countries due to the lower starting level. Nevertheless, our estimations point to the US and European markets as the most promising markets.

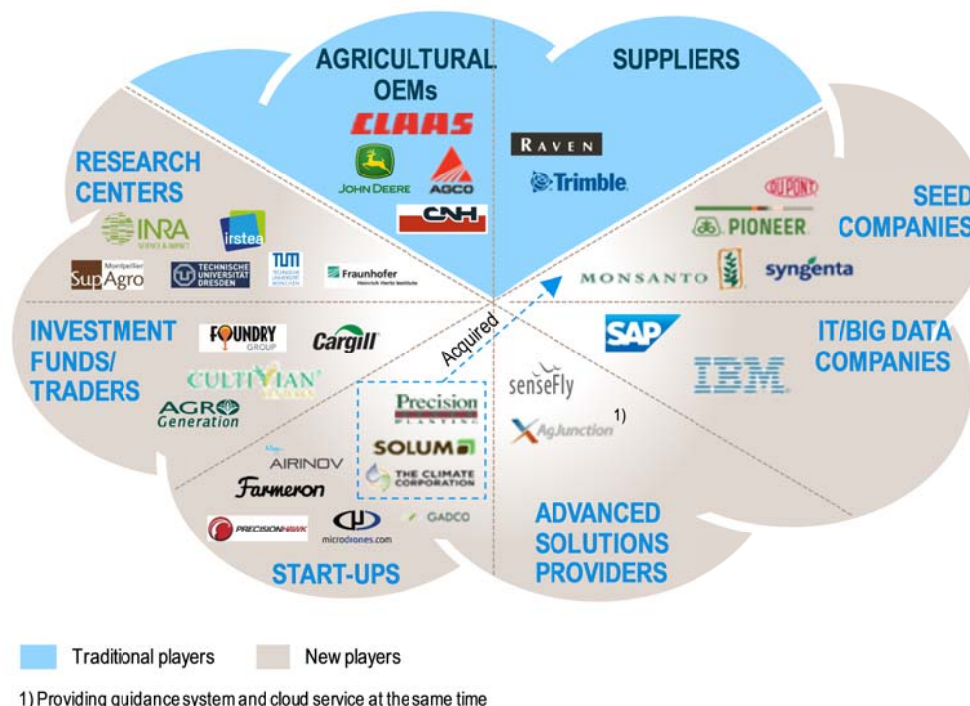
- > **North America:** The North American market is one of the most attractive markets for Precision Farming. The large scale of farmlands and high labor costs offer attractive incentives to apply Precision Farming technologies. In addition, farmers are highly professionalized and willing to learn and adopt new technologies.
- > **Europe:** Like the US market, the European agriculture market exhibits a high degree of professionalism and technology. It can also rely on a well-established ecosystem as well as public and private investment capacities. However, the lack of large-scale farmland and slightly lower input costs create a marginal disadvantage compared to the US market.
- > **South America, Asia and the rest of the world:** Many developing countries face the challenges of extreme climate conditions and limited resource availability paired with an increased demand for food resulting from a growing population and economic growth. Consequently, there is a significant demand for increased yield productivity and improved management of natural resources, resulting in strong market growth rates of >20% p.a. Nevertheless, the lack of sophisticated technology, infrastructure and education as well as low labor costs will most likely slow down the application of Precision Farming technologies.

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B. IMPACT OF TECHNOLOGY ON MARKET PLAYERS

Traditionally the market for agricultural equipment and business solutions has been dominated by agricultural OEMs and suppliers. In recent years the (r)evolution of technology such as data analytics and software solutions has offered completely new market opportunities for non-traditional players. The main market players for Precision Farming technologies can therefore be segmented into eight categories (figure 3).

Figure 3: Key market players



Source: Expert interviews; desk research; Roland Berger

The current market is still dominated by traditional companies but new, disruptive players are increasingly entering the market and strengthening their market position. Each type of market player has a dedicated offering:

1. **Agricultural OEMs:** Traditional agricultural OEMs offering both hardware (machinery, sensors) and software solutions.
2. **Suppliers:** Traditional suppliers providing a broad portfolio of advanced components (auto-steering, planting, etc.) as well as spare parts for the original equipment and aftermarket.
3. **Seed companies:** Seed companies are increasingly moving upstream in the value chain and extending their offerings into advisory and insurance services.
4. **IT/big data companies:** Large global IT infrastructure providers are beginning to offer big data analysis and software solutions for Precision Farming technologies.

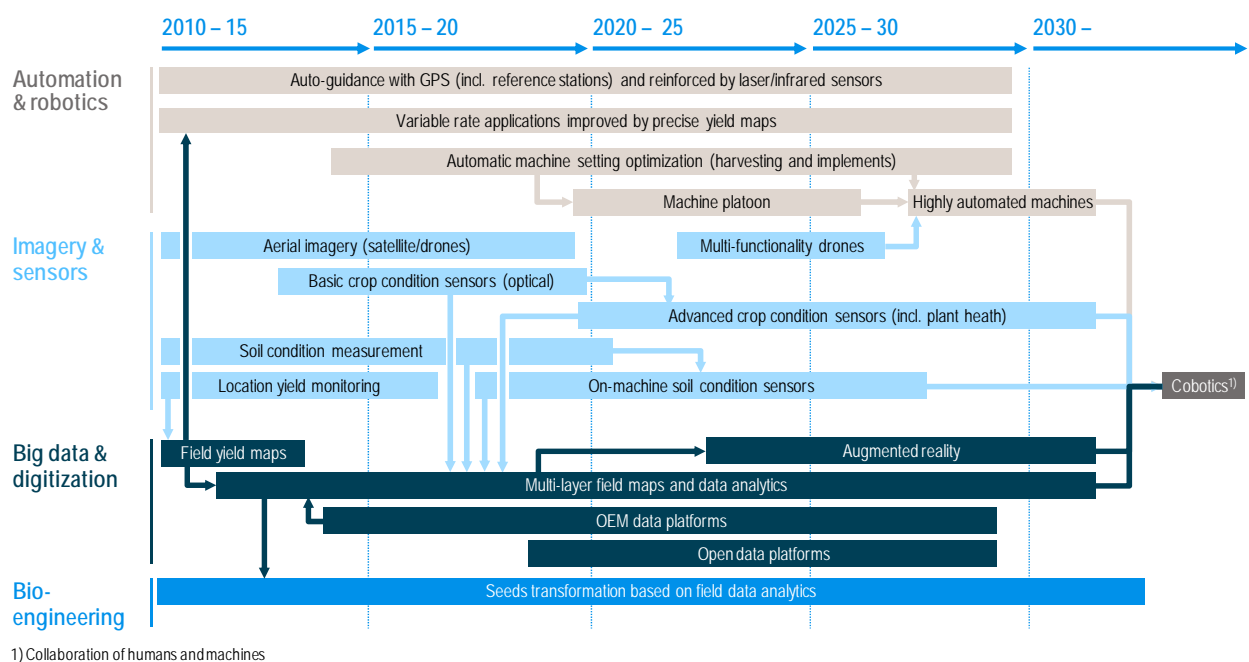
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5. **Advanced solutions providers:** These providers offer high-tech solutions like drones, sensors and control systems that support the application of Precision Farming technologies.
6. **Start-ups:** The start-up scene concentrates on the development of smart devices and apps.
7. **Investment funds/traders:** Private fund/trading companies focus on farmland investments and commodity financial trading.
8. **Research centers:** Universities and research centers publish studies and develop prototypes of future applications.

Based on the current developments within Precision Farming, new players will increasingly strengthen their position and find their niche in the market. New players have the chance to co-develop or combine single technologies, occupy strategic control points in the value chain and benefit from the new value pockets. To identify the most promising technologies we developed a technology roadmap through 2030 of all major Precision Farming technologies.

The technology roadmap (figure 4) predicts all developments driven by enhanced connectivity. Farming processes will be further automated, the application of imagery and sensors will increase, big data and digitization will become more important and bio-engineering will be further developed.

Figure 4: Technology roadmap 2010-2030



Source: Expert interviews; desk research; Roland Berger

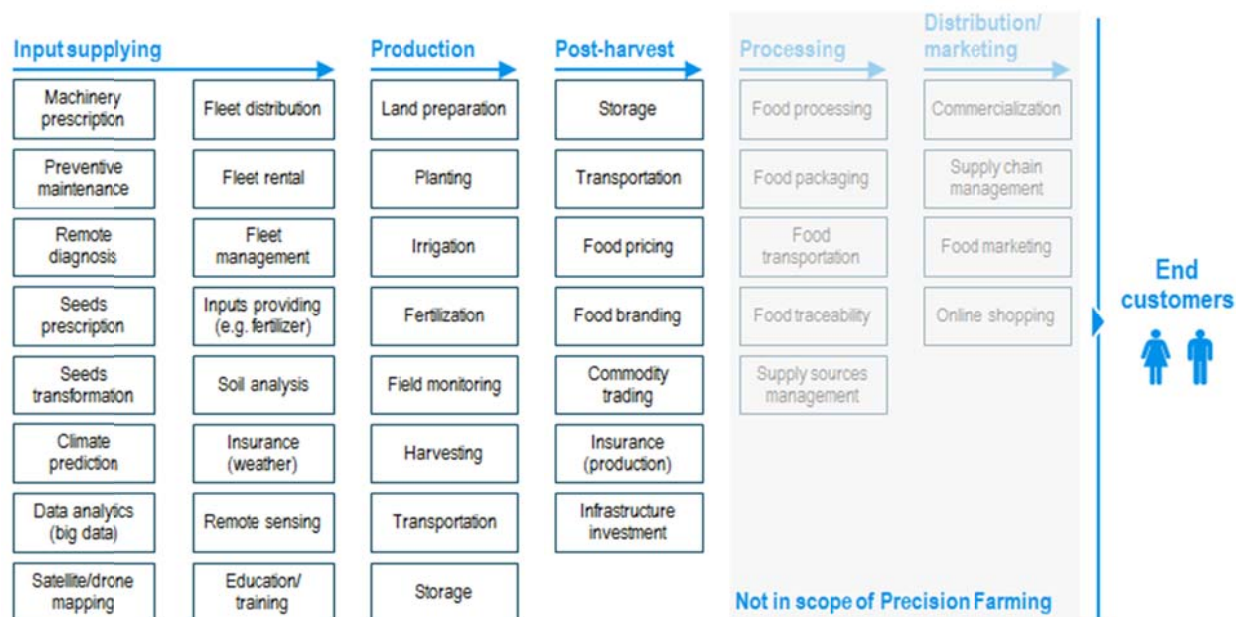
Extrapolated into business opportunities, these developments tremendously impact the agricultural value chain and various disruptive business opportunities will occur at all points in the chain. To enable companies to be prepared and able to recognize these new opportunities as they come up in the future, we derived five major business opportunities.

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C. NEW BUSINESS OPPORTUNITIES ARISE

Along the agricultural value chain several strategic control points can be identified which are allocated to the steps input supplying, production, post-harvest, processing and distribution/marketing. From a Precision Farming perspective only the first three steps of the value chain are of interest (figure 5). In the future, it will be key to occupy the right strategic control points to guarantee the company success and sustain an attractive market positioning.

Figure 5: Strategic control points along the agricultural value chain



Source: Roland Berger

The combination or selection of certain strategic control points offers different sets of business opportunities for traditional and new, disruptive players. In total, we identified five potential business opportunities including their value proposition (figure 6) that are described in the following:

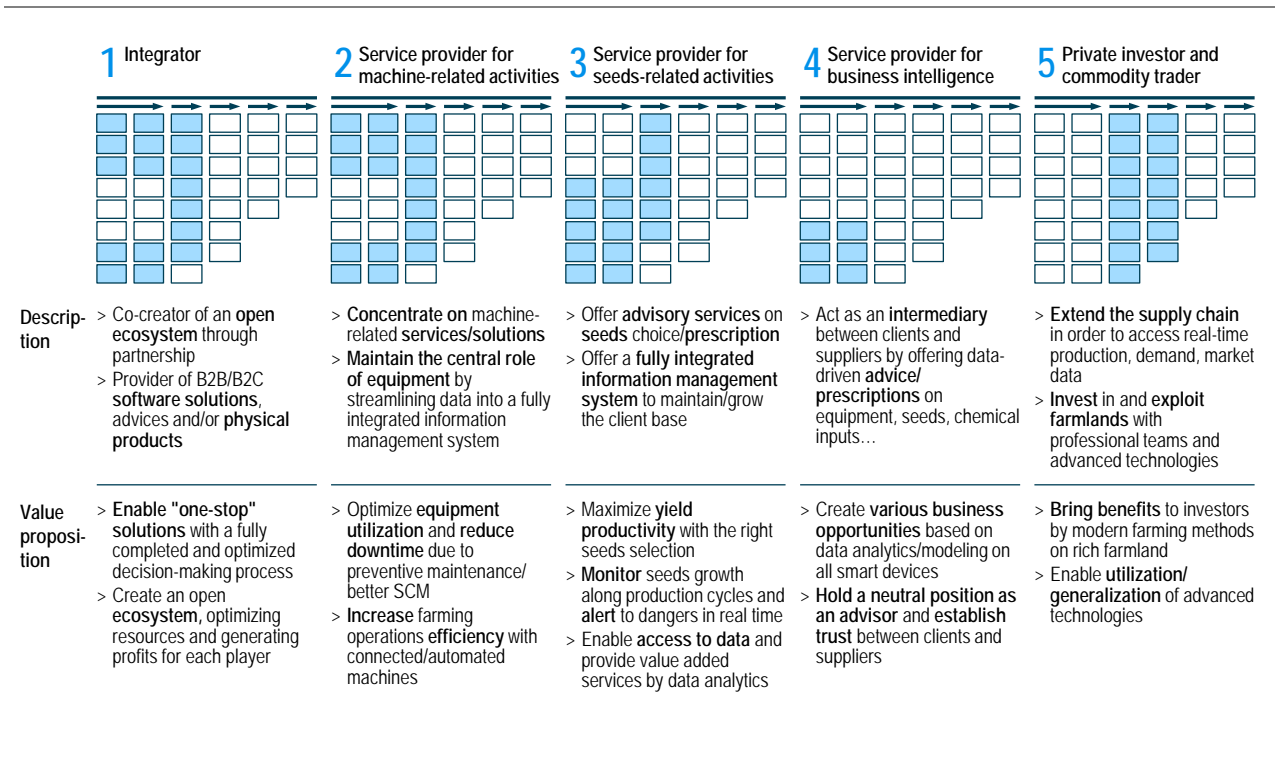
1. **Integrator:** The integrator concentrates on strategic control points covering input supplying and production. Within these fields the integrator operates as a co-creator of an open ecosystem through partnerships or as a provider of B2B/B2C software solutions, advice and physical products. As major value propositions, the integrator enables "one-stop" solutions and creates an ecosystem for major market players.
2. **Service provider for machine-related activities:** Service providers for machine-related activities focus on strategic control points covering input supplying and production. The service providers offer machine-related services and solutions by streamlining the collected data into fully integrated information systems (e.g. predictive maintenance). As a result, increased equipment utilization and reduced downtime can be achieved. In addition, vehicle-to-vehicle communication promotes operational efficiency.
3. **Service provider for seeds-related activities:** Service providers for seeds-related activities concentrate on strategic control points covering input supplying and production.

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These providers offer advisory services for seed selection as well as a fully integrated information management system to organize the customer's client base. As their value propositions, these players maximize yield productivity with the right seed selection, monitor seed growth as well as provide value added services by data analytics.

4. **Service provider for business intelligence (big data):** Service providers for business intelligence focus on only a few strategic control points within input supplying. They act as intermediaries between clients and suppliers by providing data-driven advice and prescriptions on equipment, seeds and chemical inputs. Based on their neutral position as an advisor, various business opportunities arise in data analytics (big data) and modeling on all devices.
5. **Private investor and commodity trader:** Private investors and commodity traders concentrate on all strategic control points within production and post-harvest. They extend the supply chain in order to access production, demand and market data. Further, they invest and exploit farmlands with professional teams and advanced technologies. As a value proposition, these players bring benefits to investors by means of modern farming methods on rich farmland and the utilization of advanced technologies.

Figure 6: Business opportunities



Source: Roland Berger

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D. RIGHT TO PLAY

In order to exploit the emerging business opportunities, established agriculture players have to act fast. In 2014 investors including disruptive big data players such as Google were investing in total ~\$2.4 bn in agricultural technology start-ups. Technology companies have realized the enormous extent of potential that is present in the agriculture industry and they are pushing forcefully toward conquering the key positions. In the future, traditional agricultural companies will face intense competition from these new players. Achieving a positioning at the strategic control points will be essential for competing successfully in the 21st century agriculture market. To reach a superior market position a company has to find answers to the following three questions:

1. **What sweet spots are attractive for the company?** Which strategic control points along the agricultural value chain can be identified as most valuable for the company? The company's own current functions and capabilities need to be matched with the requirements of the emerging business opportunities.
2. **How to attain the right to play?** The implications resulting from the company's current capabilities and future market position have to be addressed. Investment opportunities need to be developed and evaluated (build up expertise internally or through external smart partnering) as well as divestment opportunities.
3. **What is the company's target vision?** Finally, the company needs to aggregate the findings of questions 1 & 2 into a strategic vision and put in place work packages to help it reach the desired positioning.

Precision Farming will reshape the industry. It offers huge potential for all players. Companies that strive for a right to play have to identify future business opportunities and need to cover the relevant strategic control points. But the transformation needs to be conducted fast, otherwise the answer to the question raised in the title is almost obvious: Big data will feed the world of tomorrow.

Roland Berger Strategy Consultants, founded in 1967, is one of the world's leading strategy consultancies. With around 2,400 employees working in 50 offices in 36 countries worldwide, we have successful operations in all major international markets. Within our Global Automotive Practice we have a dedicated team of agricultural experts advising our clients on strategic and performance improvement programs.

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