



We create chemistry

## Breakout Session Digitalization

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Digital Farming

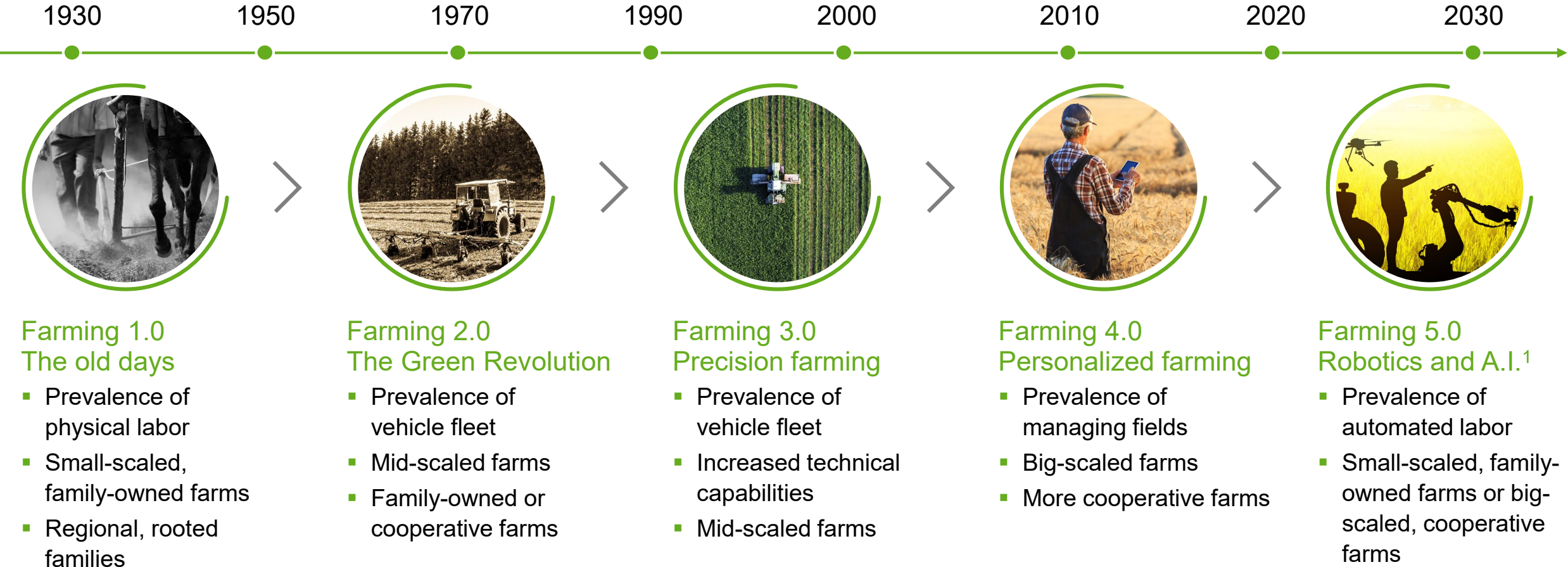
**Elmar Groiss**  
Divisional  
Digital Officer

BASF Capital Markets Day  
Ghent, Belgium, September 27, 2019

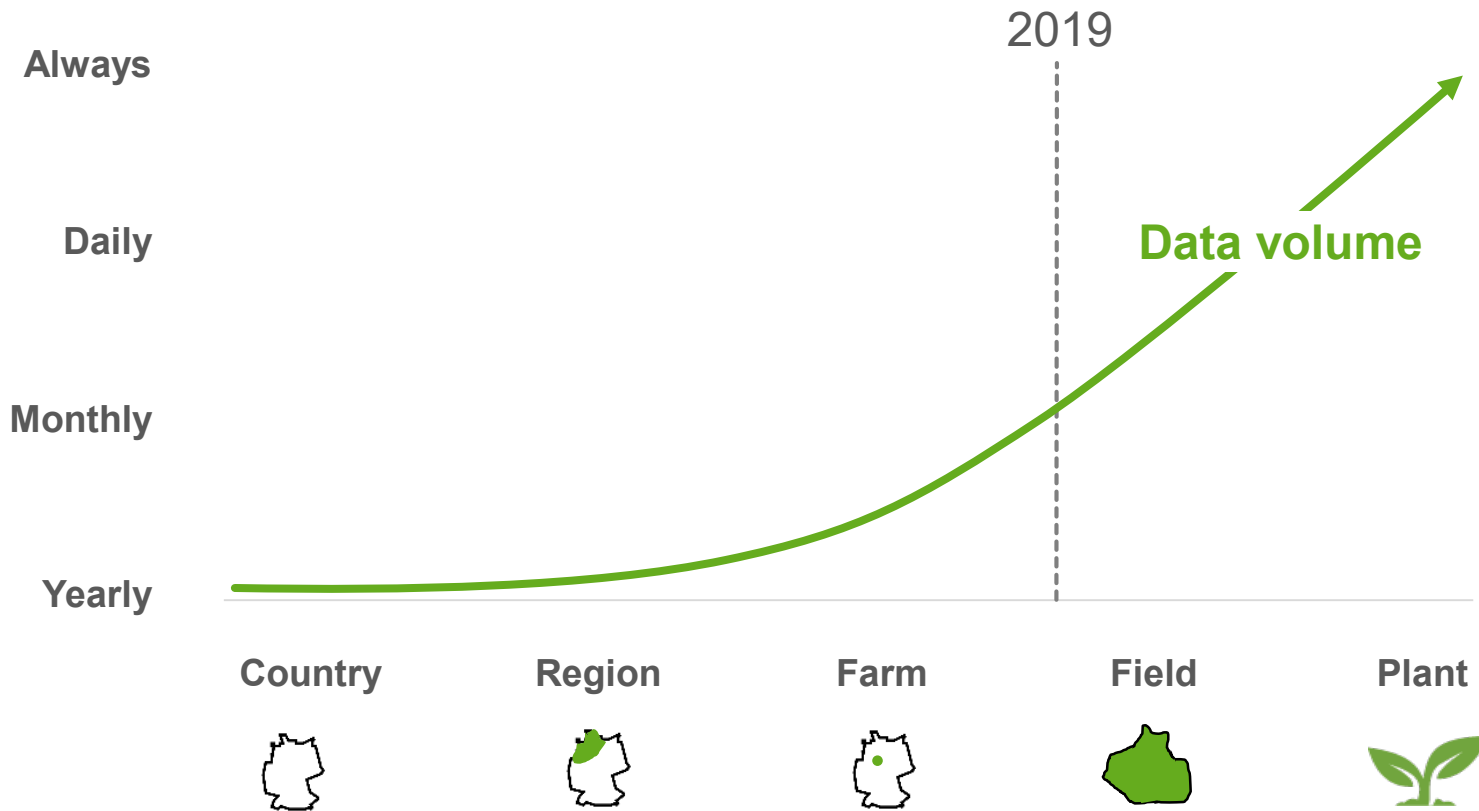
# Cautionary note regarding forward-looking statements

*This presentation contains forward-looking statements. These statements are based on current estimates and projections of the Board of Executive Directors and currently available information. Forward-looking statements are not guarantees of the future developments and results outlined therein. These are dependent on a number of factors; they involve various risks and uncertainties; and they are based on assumptions that may not prove to be accurate. Such risk factors include those discussed in Opportunities and Risks on pages 123 to 130 of the BASF Report 2018. BASF does not assume any obligation to update the forward-looking statements contained in this presentation above and beyond the legal requirements.*

# Environment of farmers has changed over the last centuries driven by new technologies



# Transforming data into knowledge that is valuable and actionable for farmers



Digitalization will fundamentally change crop production by...

...**improvements** in product choice, higher spatial and temporal resolution of seed, crop protection and nutrient applications.

...**automation** which reduces the manpower for surveillance and decision making.

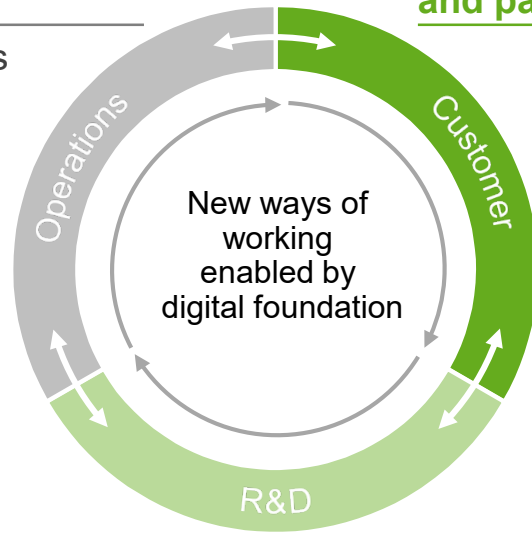
...**outcome-based offerings** (e.g., enabling to offer “yield per acre” instead of crop inputs).

# What digitalization means for BASF Agricultural Solutions: Transforming all parts of the division

## Operational elements of digitalization

### Optimize working capital

- Integrated business planning
- Digital supply and toller management



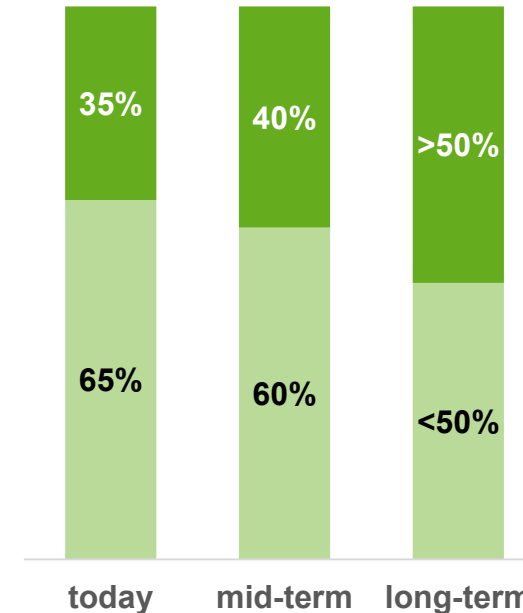
### Value for farmers and partners

- xarvio™
- Scientific know-how along all touchpoints

### Time to market for new products

- Innovation
- Technology development

## Information technology investments



### Specific IT

- **Innovations** for smarter use of crop protection and seeds, new **digital eco-systems and solutions**
- **Automation** through **A.I.**, new insights with **connected data platforms, co-creation** leveraging new digital foundation

### Platform IT

- Enterprise resource planning **system upgrades**, introduction of advanced sales tools, **enhancement** of research and development platforms

# What digitalization means for BASF Agricultural Solutions: Numerous proof points for our efforts



**Connected data platforms**  
(e.g., cloud-based R&D collaboration)



July 10, 2019



**Traceability**  
(e.g., blockchain for rice production)



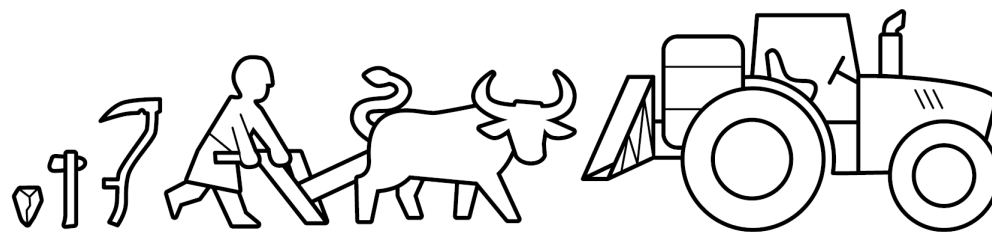
July 25, 2019



**Modelling**  
(e.g., product registration in complex environmental situations)



July 31, 2019



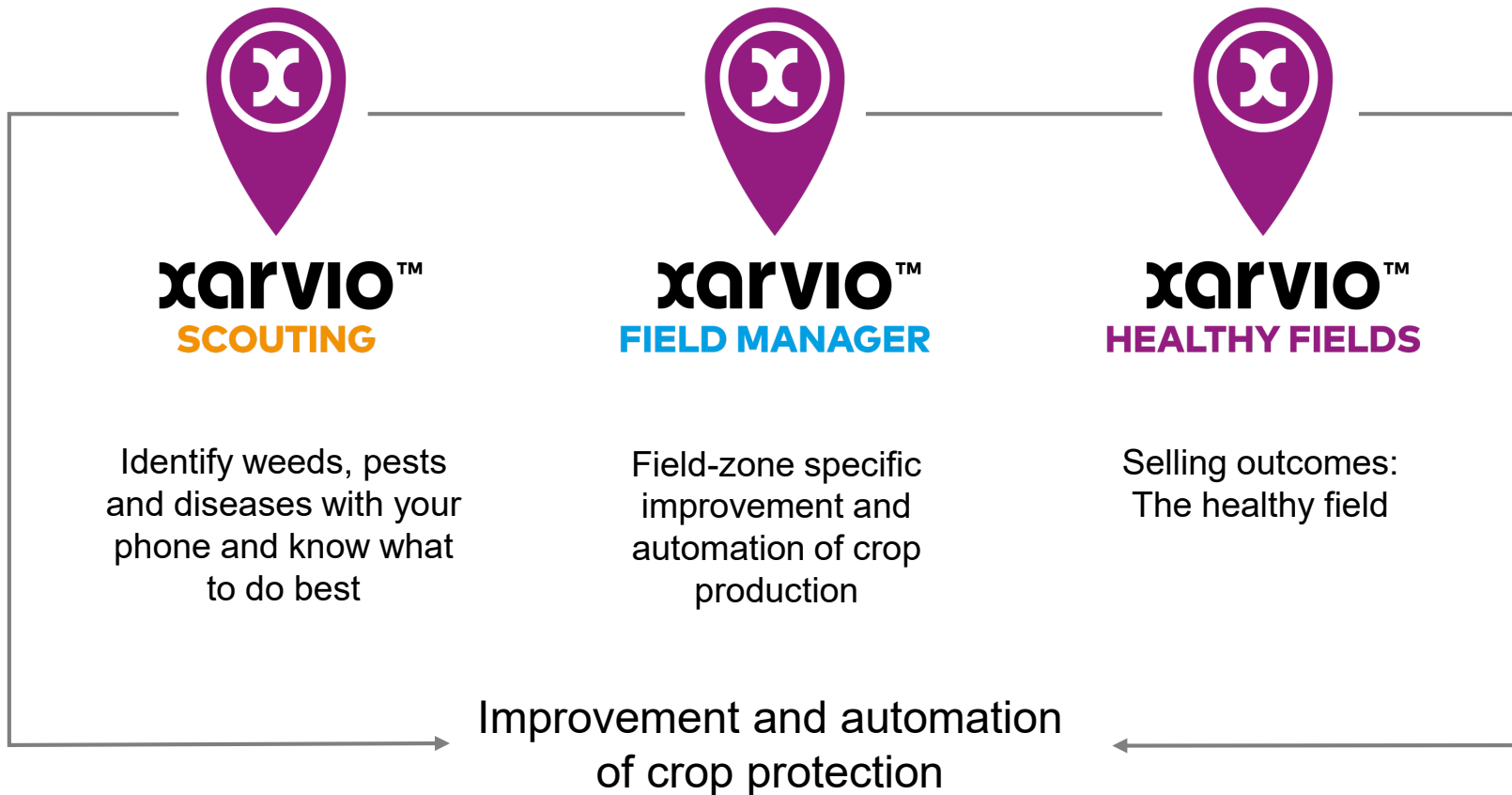
**The Future of Farming is**



**xarvio™**  
**Digital Farming**  
**Solutions**

# xarvio™ digital farming solutions

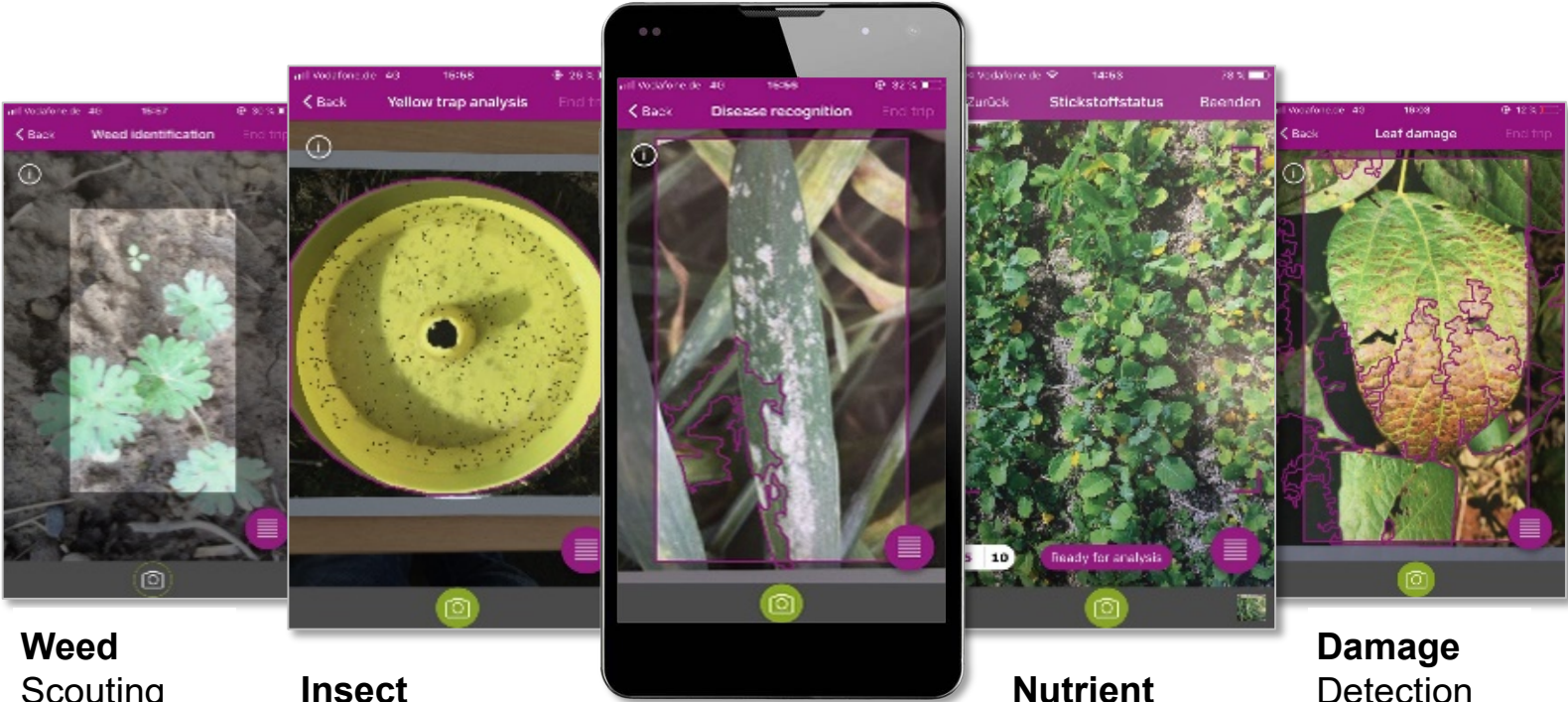
## An ecosystem of products supports our growth



- Our digital farming products marketed under the xarvio™ brand enable farmers to improve and automate their crop production
- Farmers have better oversight, less risk and more reliable planning and decision-making
- xarvio™ HEALTHY FIELDS builds on the technology components of xarvio™ SCOUTING and FIELD MANAGER and the SmartSprayer co-developed with Bosch



# Market access to 625 million farmers around the globe



**Weed Scouting**  
Identify more than 110 weed species

**Insect Monitoring**  
Evaluate and automatically count insects in yellow traps saving time and tedious manual analysis

**Disease Recognition**  
Recognize diseases in over 40 crops

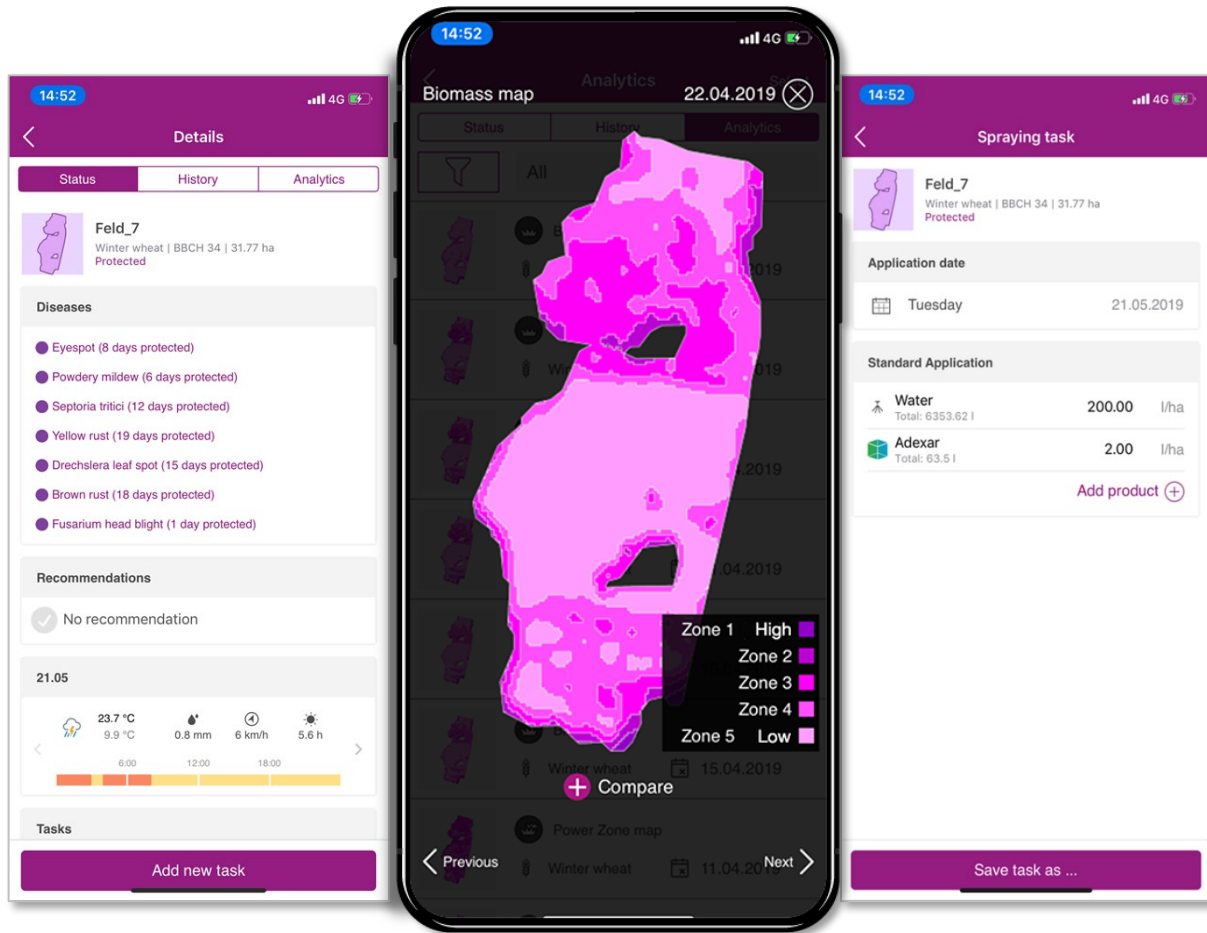
**Nutrient Estimation**  
Measure the nitrogen uptake of crops

**Damage Detection**  
Automatically calculate the damaged leaf area from mechanical, disease or insect damage

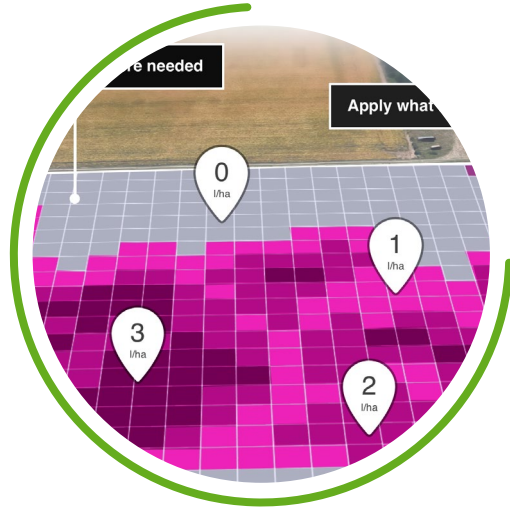
- Potential to enable 625 million farmers to recognize what is happening on their fields
- Today: 1.2 million users in over 120 countries, quadrupled user base compared to 2018
- Unique and leading database for disease, weed and insect data
- World leading recognition algorithms implemented into the xarvio™ SCOUTING application
- Daily user-generated data for granular and most robust disease and insect data
- Scalable market access to millions of growers globally monetized by targeted advertising



# Improvement and automation of crop production: Seeding, crop protection and nutrition solution



- Live in 17 countries, user numbers grow three times year on year; 40% of that growth via organic search
- Fully scalable improvement and automation of crop production
- Real-time analysis which, e.g., disease and pest pressure exists on (sub)field level
- Two thirds of users follow xarvio™ FIELD MANAGER product choice recommendations
- Real-time creation of variable-rate seeding, nutrition and crop protection application maps on mobile phones – based on near-real time satellite data
- Neutral product recommendations – not leaning towards BASF products – open for partnerships
- Various collaborations with channel partners



## Convenience. Assured.

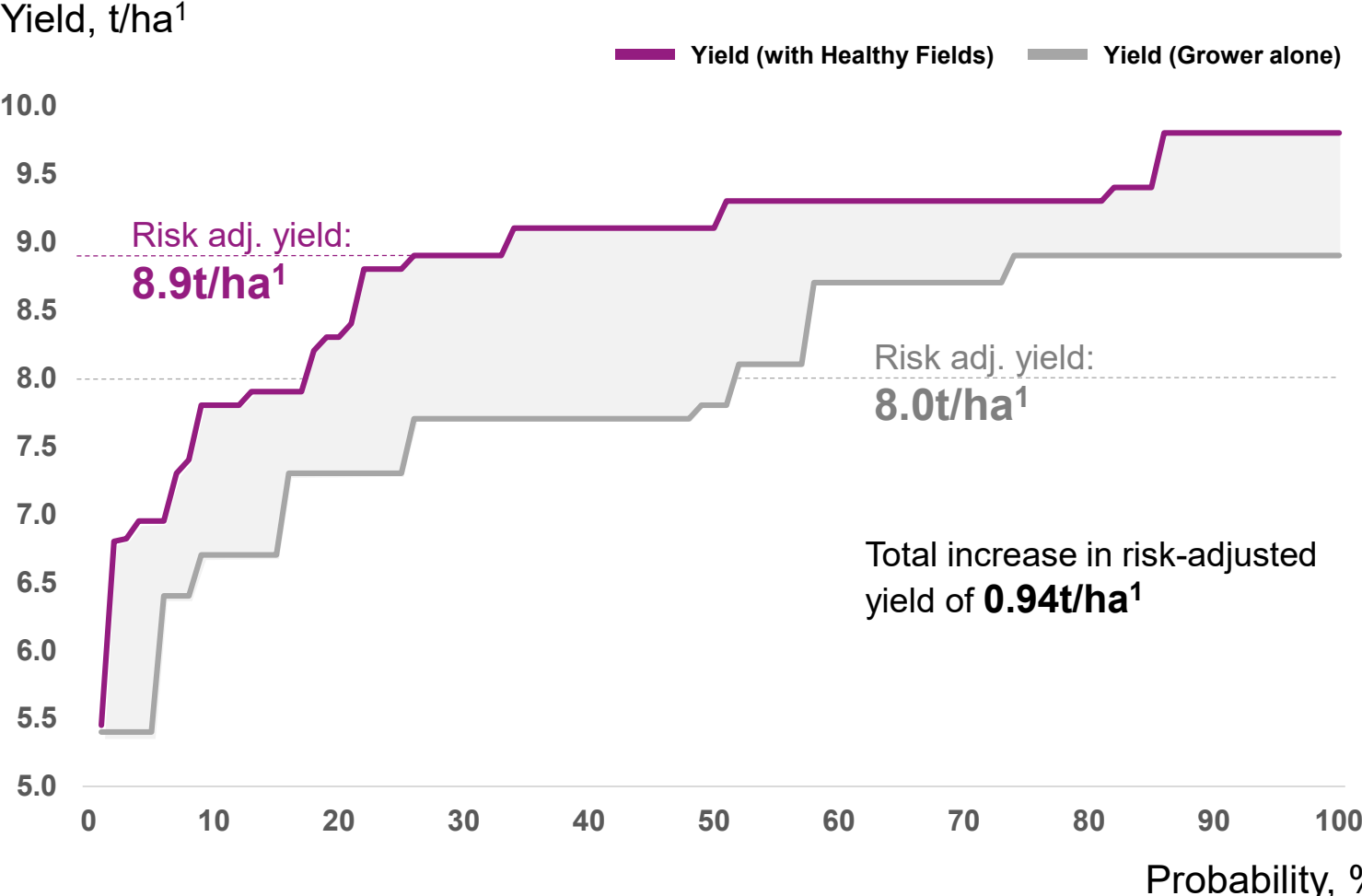
We combine our unique agronomic decision-making system with a targeted, sustainable and zonal-specific plant protection, to assure what is most important for you:

**Your healthy field.**

# Clear evidence how yield is driven by crop optimization



## Field yield curve comparison



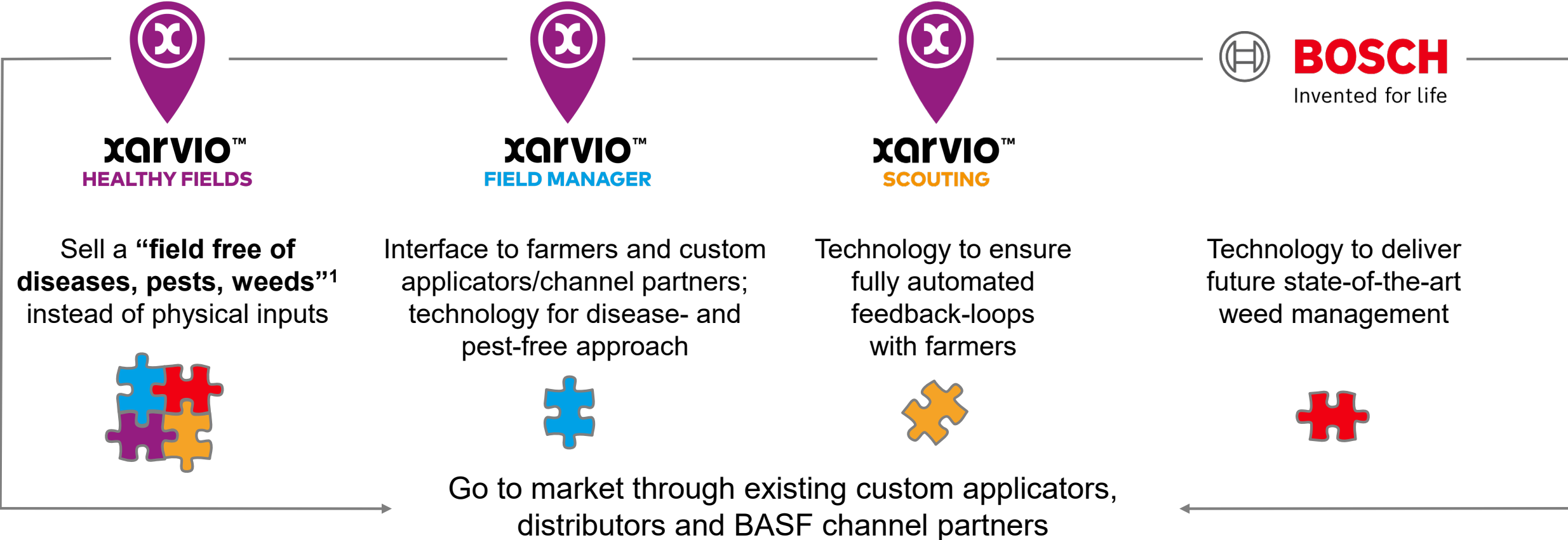
- Farmers supported by xarvio™ achieve a risk-adjusted total increase in yield of nearly 1t/ha<sup>1</sup> compared to a “grower alone” reference
- The combination of existing technology components provides the basis for the xarvio™ HEALTHY FIELDS system which improves its efficacy via data feedback-loops
- The already established market position of xarvio™ will be further enhanced by distribution partnerships with, e.g.,



- Several other distribution partnerships are currently in negotiation



# Outcome-based products are intended to be launched in 2020



# We are combining a strong digital portfolio based on leading science, innovation and new approaches



## Scientific backbone

- >100 years of experience in crop management
- ~€900 million annual R&D spend
- Global workforce of more than 3,000 R&D specialists



## Core digital portfolio

- xarvio™ SCOUTING
- xarvio™ FIELD MANAGER
- xarvio™ HEALTHY FIELDS
- Digital sales and marketing excellence products



## Digital lighthouse projects

- More than 162 digital projects worldwide and more than 400 in implementation
- Acquisitions of hard- and software companies continuously being evaluated



## Partnerships & collaborations

- Knowledge community with around 600 universities, research institutes and companies
- Co-creation approaches



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