Breakout Session
Digitalization

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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.

- **Farming 1.0**
  - The old days
  - Prevalence of physical labor
  - Small-scaled, family-owned farms
  - Regional, rooted families

- **Farming 2.0**
  - The Green Revolution
  - Prevalence of vehicle fleet
  - Mid-scaled farms
  - Family-owned or cooperative farms

- **Farming 3.0**
  - Precision farming
  - Prevalence of vehicle fleet
  - Increased technical capabilities
  - Mid-scaled farms

- **Farming 4.0**
  - Personalized farming
  - Prevalence of managing fields
  - Big-scaled farms
  - More cooperative farms

- **Farming 5.0**
  - Robotics and A.I.
  - Prevalence of automated labor
  - Small-scaled, family-owned farms or big-scaled, cooperative farms

[Diagram showing the timeline from 1930 to 2030 with different stages of farming evolution]
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

- New ways of working enabled by digital foundation

- 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

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<thead>
<tr>
<th></th>
<th>today</th>
<th>mid-term</th>
<th>long-term</th>
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<tr>
<td>Integration</td>
<td>65%</td>
<td>60%</td>
<td>&lt;50%</td>
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<tr>
<td>Enterprise</td>
<td>35%</td>
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<td>Technology</td>
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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

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

- 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

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
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

Farmers supported by xarvio™ achieve a risk-adjusted total increase in yield of nearly 1 t/ha\(^1\) 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., Nutrien and AgroStar.

Several other distribution partnerships are currently in negotiation.

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**Field yield curve comparison**

Yield, t/ha\(^1\)

- **Yield (with Healthy Fields)**
- **Yield (Grower alone)**

Total increase in risk-adjusted yield of **0.94 t/ha\(^1\)**

Risk adj. yield: **8.0 t/ha\(^1\)**

Risk adj. yield: **8.9 t/ha\(^1\)**

**Probability, %**

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\(^1\) Refers to tons per hectare
Outcome-based products are intended to be launched in 2020

Sell a “field free of diseases, pests, weeds”\(^1\) instead of physical inputs

Interface to farmers and custom applicators/channel partners; technology for disease- and pest-free approach

Technology to ensure fully automated feedback-loops with farmers

Technology to deliver future state-of-the-art weed management

Go to market through existing custom applicators, distributors and BASF channel partners

\(^1\) Thresholds to be defined, e.g., for biodiversity
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