Precision agriculture 2.0 .......... and more

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Vision on Precision farming
• Right time
• Right place
• Right input
• Right amount
Precision Agriculture

- A farm management concept based on measuring and responding to temporal and spatial variability in crops, livestock and the environment
  - Sensing -> decision making -> actuation/implementation
  - Operational, tactical, strategic (PA 2.0 .... PA 4.0)

- Many enabling technologies are available:
  - GNSS, FMIS, sensors, ICT, IoT, cloud solutions, connectivity, robotics, etc.

- Expected benefits: More with Less & Better (more sustainable agri&food)
EU study: STOA report 2016 “PA Impact on EU Policy”

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- Business development in agri-food chains
- Food security & food safety
- Transparency of agri-food chains
- Sustainable production

+  
- Competitiveness of EU-farming
- Skilled workforces
- Demographic and rural development
- Climate change and action

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- Farm holding size and number
- Multi-functional agriculture

- Jobs on farms in primary production
Barriers

- Skills needed
- Independent data on cost-benefit
- Implementation of technologies in farming practices
- Interoperability
- Standardization
- Interpretation and use of sensor data (generic models, local calibration)
Different levels of precision (by Ard Nieuwenhuizen)

Grid
• In practice

Plant
• On station research

Leaf
• On institute research

Disease
• On institute and university research
And different technologies
(by Tamme v.d. Wal)
PA 1.0: Global Navigation Satellite systems (GNSS) and Controlled Traffic Farming since ca. 2000
PA 2.0 sensing: Satellite image of potato biomass map
PA 2.0: Crop biomass data from light reflection sensor systems, delivering crop biomass maps
PA 2.0: Soil sensors systems for mapping of soil
PA 2.0: yield maps
PA 2.0 use of data in farming: VRA Potato haulm killing
PA 2.0: Use of biomass map to make a variable rate map for PHK (saving 50 % on herbicide use)
PA 2.0: use of data and decision support in variable rate applications

- Weather data, soil moisture
- Herbicide data
- FMIS: management data
- Crop and variety data
- Biomass data (NDVI, WDVI, S1)
- Others, e.g. weed

Model for Biomass dependent minimum effective dosing

Use of data and model in spraying on the go or task map
National FieldLab Precision Agriculture (4-year project to stimulate adoption of PA + nat. PA agenda development)

www.proeftuinprecisielandbouw.nl
Six PA 2.0 applications

Techniek

- Plaats-specifieke beknellingsmethode
- Plaats-specifieke granulaatbehandeling
- Variabel bemesting
- Variabel bodemherbiciden
- Variabel loofdoden
- Variabel poten aardappelen
PA 2.0: Drone image and DSS based NBS VRA map
Future outlook

- **PA 3.0**
  - More and better sensing (see computer vision) at higher resolution
    - Also biodiversity / Nature-inclusive
  - Better decision making
  - More robotics / autonomous machines / mixed cropping
  - Nature-inclusive

- **PA 4.0**
  - Data sharing between farmers and chain partners
  - Better decision making based on shared data
PA 3.0 in strawberries
PA 3.0 and PA 4.0 PPP

PL 4.0
Precision Agriculture is about managing spatial and temporal variation on fields and in livestock.

- What are the main hurdles for application of precision agriculture applications on farms?
  1. Sensors measuring the right data
  2. Data translation into decision support
  3. Actuation / robotics
  4. ICT part of integration: data infrastructure and connectivity
  5. (Lack of )standardisation
  6. Earning model for farmers
  7. Others
Thank you for your attention

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