Project SMARAGD - Farmtronics

Towards a new way of farming

July, 10th - 2018 – Jan Kamp / Herman Schoorlemmer

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- Goals
- Why did we start?
- Choices made by ....
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Ambition

- Developing a new Controlled Traffic Farming system based on lightweight, autonomous and innovative technologies instead of big and heavy machinery

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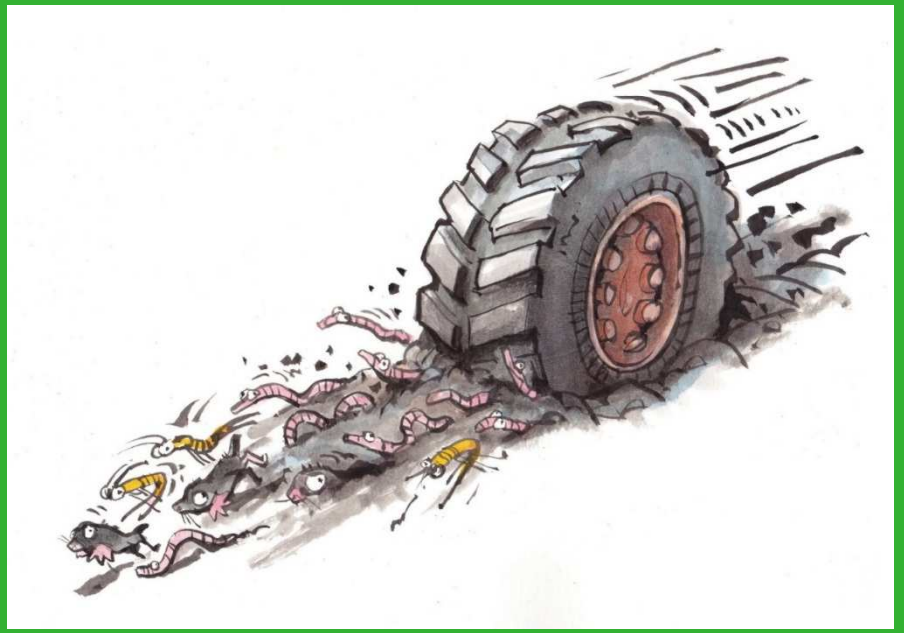
Objectives

- Reduce soil compaction and increase soil quality by using small and lightweight machinery
- Enable systems for intercropping
- Reduce the use of fossil fuel through more focus on electric drivetrains and battery management



Result of sector discussions:
- choice = focus on level 2

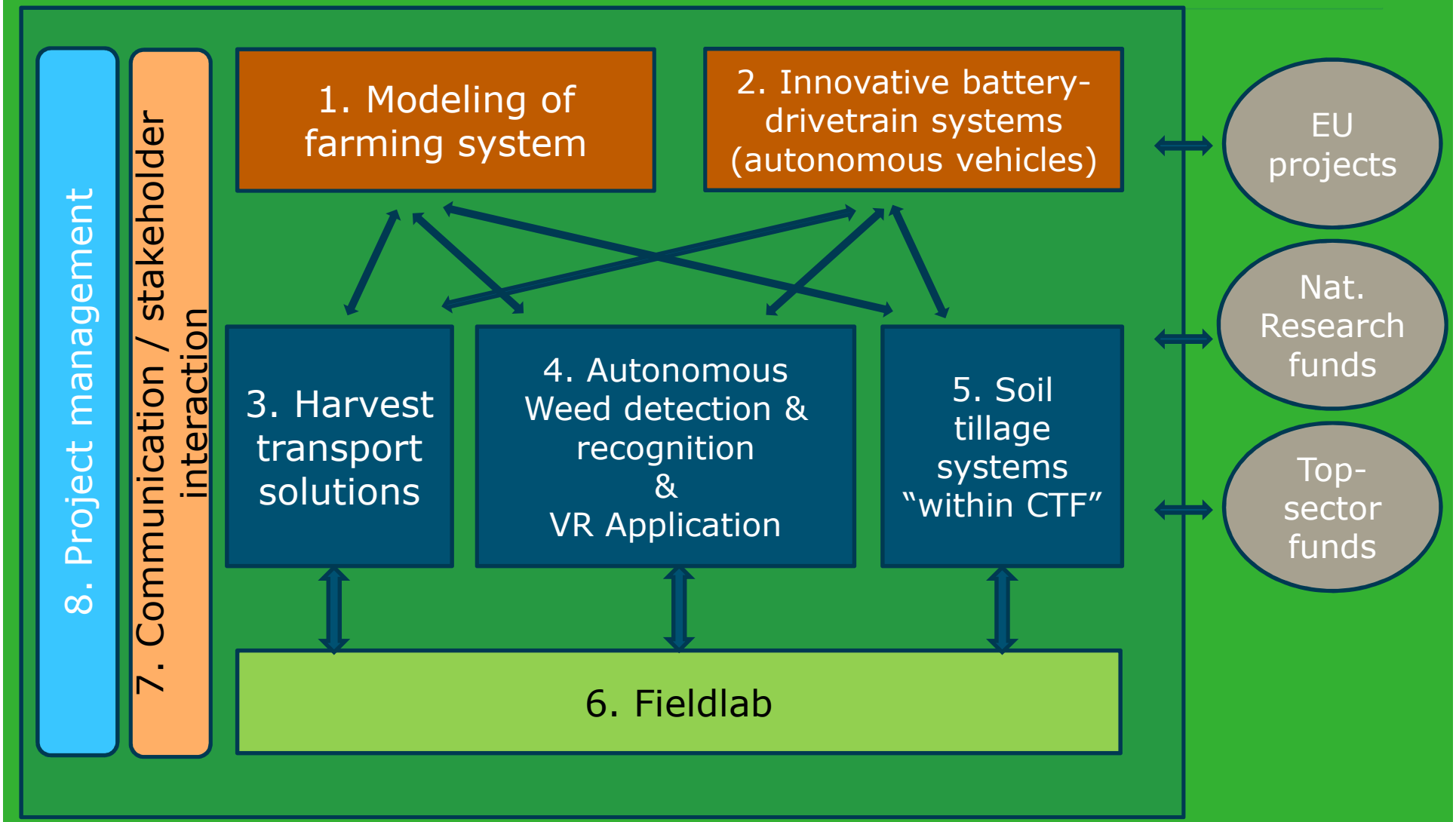
3 levels of scaling + possible system improvements:

1. Current farming practise (field size)
    - Lightweight machinery, data collection with machine based sensors and drones, non-fossil energy
2. Controlled Traffic Farming (CTF with intercropping)
    - Intercropping on fixed strips, improved agro-biodiversity, lightweight and autonomous, precision farming (per strip)
3. Individual plant cultivation
    - Optimised ecology, mechanisation and management is based on individual plant

Design and innovation challenges (of option #2)

- Challenges identified:
  - Low soil pressure harvest and field transport
  - Autonomous control of mechanisation
  - Multi-agent and machine interaction intelligence
  - Soil preparation in CTF system
  - Precision Farming from plots to individual plants
  - Automated sensing – modelling - action - control
  - Plant specific decision support systems
  - recognition of individual crops, weeds and diseases

Project structure



Work Packages SMARAGD

- WP1 – Modelling a new farming system
- WP2 – Battery and drivetrain systems for autonomous machinery
- WP3 – Design harvest – on field transport solutions
- WP4 – Autonomous detection and application of crop protection
- WP5 – Soil tillage systems in controlled traffic farming systems
- WP6 – Test facilities in a Field Lab

Partners involved in SMARAGD

- Technology/agro business:

Multi Tool Trac

agrifac

Rabobank

steverink techniek

protonic holland

PRECISION MAKERS

BAYER

AGROINTELLI

- Research:

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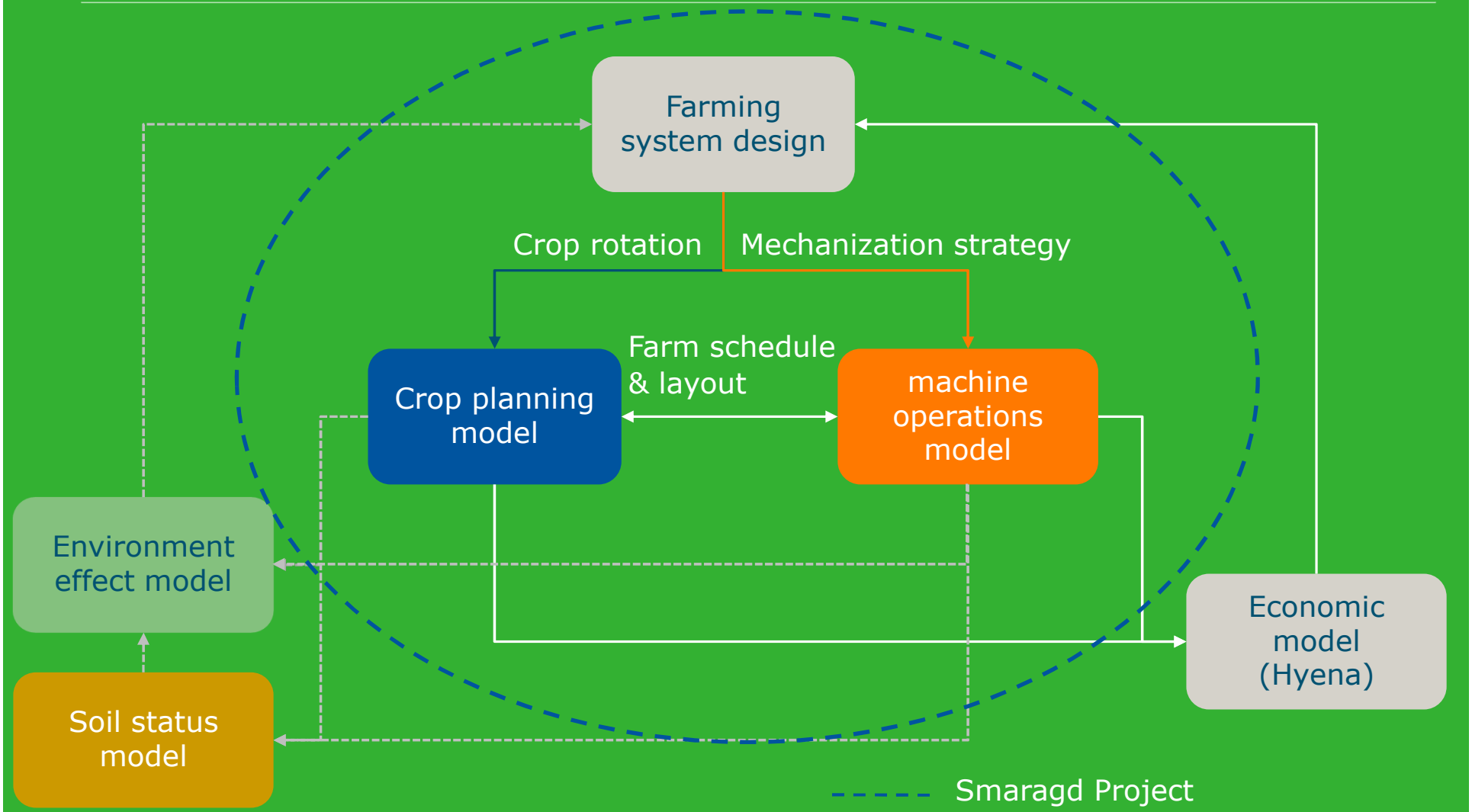
TU/e Technische Universiteit Eindhoven University of Technology
Where innovation starts

WP1 - Modeling – Farming system design



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Bron: Xavier Hartmann

WP2 – Battery and drivetrain systems

- Development of electrical drivetrains specific for autonomous agricultural vehicles (robots/drones)
- Optional smart-grid solutions
  - E.g. bi-directional charging, use of renewables
- Communication between autonomous vehicles (related to power management)

WP3 – Design harvest systems

- Design of a harvest - transport system (“traditional” technologies)

- Development of a harvest system with autonomous transport

- Final solution should:
  - Minimise soil compaction
  - Be flexible and scalable
  - Separate field and road transport
  - Be fit for use in CTF and intercropping

WP4 – Autonomous detection and intervention of crop protection

- Development of a self-learning crop and weed identification system
- Development of an autonomous platform for site-/plant specific crop protection
- Optional: Design and development of a self-learning monitoring system for pests and diseases

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WP5 – Soil tillage within controlled traffic farming systems

- Research on the long term effects of CTF of soil quality characteristics (NL specific)

- Development of soil tillage applications fitting CTF
  - Eg. ploughing of CTF strips

- Development of CTF techniques to minimise soil compaction under traffic lanes (and just beside them);

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CTF Plough

WP6 – Test in a Field Lab

- The SMARAGD project is applied research.
  The goal is therefore to design, develop and test innovations in practice

- Available: the research farm of Wageningen Plant Research in Lelystad, providing testing facilities
  - 850 ha of conventional farming
  - 50 ha of Organic farming
  - A CTF system - organic and conventional
  - Mechanical workshop

Invitation

- Do join the Field excursion on Thursday to Lelystad
- More than welcome!

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Invitation (2)

- We look for cooperation:
  - Swarm technology
  - Mixed cropping -> effects
  - Technical solutions for light weight harvesting and transport
  - ...

Thanks for your attention

Questions or remarks?

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