



Exchange event between the European phenomic community and industry

European landscape (EMPHASIS)

Ulrich Schurr (Forschungszentrum Jülich, DE)



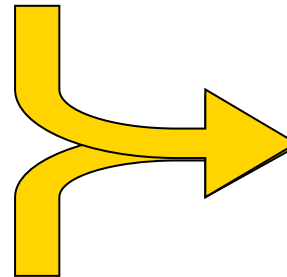
Exchange event - 19 March 2021

# EMPHASIS: European Infrastructure for Multi-Scale Plant Phenotyping And Simulation for Food Security in a Chancing Climate

# Global Challenges require sustainable agriculture



Sustainable agriculture



Plant performance and production

- Higher quantity and quality of plant biomass production
- Novel characteristics and products
- Yielding in stressful environments
- Sustainable production / intensification
- Lowering environmental footprint



# Growing demand for plant phenotyping as a tool

- Addressing diverse crops and conditions
- Integrated (multi-disciplinary) approaches
- Expertise is required, e.g. analysis pipelines, modelling, data re-usability
- Specialized infrastructure
  - plant characterization
  - environmental simulation
- Embedding in breeding and precision farming



# Plant phenotyping initiatives to address the demand



PPN-Ireland



NATIONAL  
INFRASTRUCTURE



Belgian  
Plant  
Phenotyping  
Network



REGIONAL  
PROJECTS /  
NETWORKS



# Plant phenotyping initiatives to address the demand



PPN-Ireland

EUROPEAN  
NATIONAL  
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Belgian  
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Network



More projects in  
development

EUROPEAN  
REGIONAL  
PROJECTS /  
NETWORKS



EMPHASIS

Long-term and stable organization

- integrating and operating a pan-European infrastructure
- listed on ESFRI roadmap since 2016

# Mission

## What?

Facilitating multi-scale plant phenotyping to analyse genotype performance in diverse environments and quantify the diversity of traits

## How?

By developing infrastructure and providing access to facilities, services and resources

# Objectives

DEVELOPING INFRASTRUCTURE AND PROVIDING ACCESS

Develop an integrated pan-European infrastructure of instrumented facilities

Link data acquisition to a European-level data information system and modelling

Develop, evaluate and share knowledge and novel technologies



# EMPHASIS - A European Approach

24 national communities associated with EMPHASIS

## SYNERGY

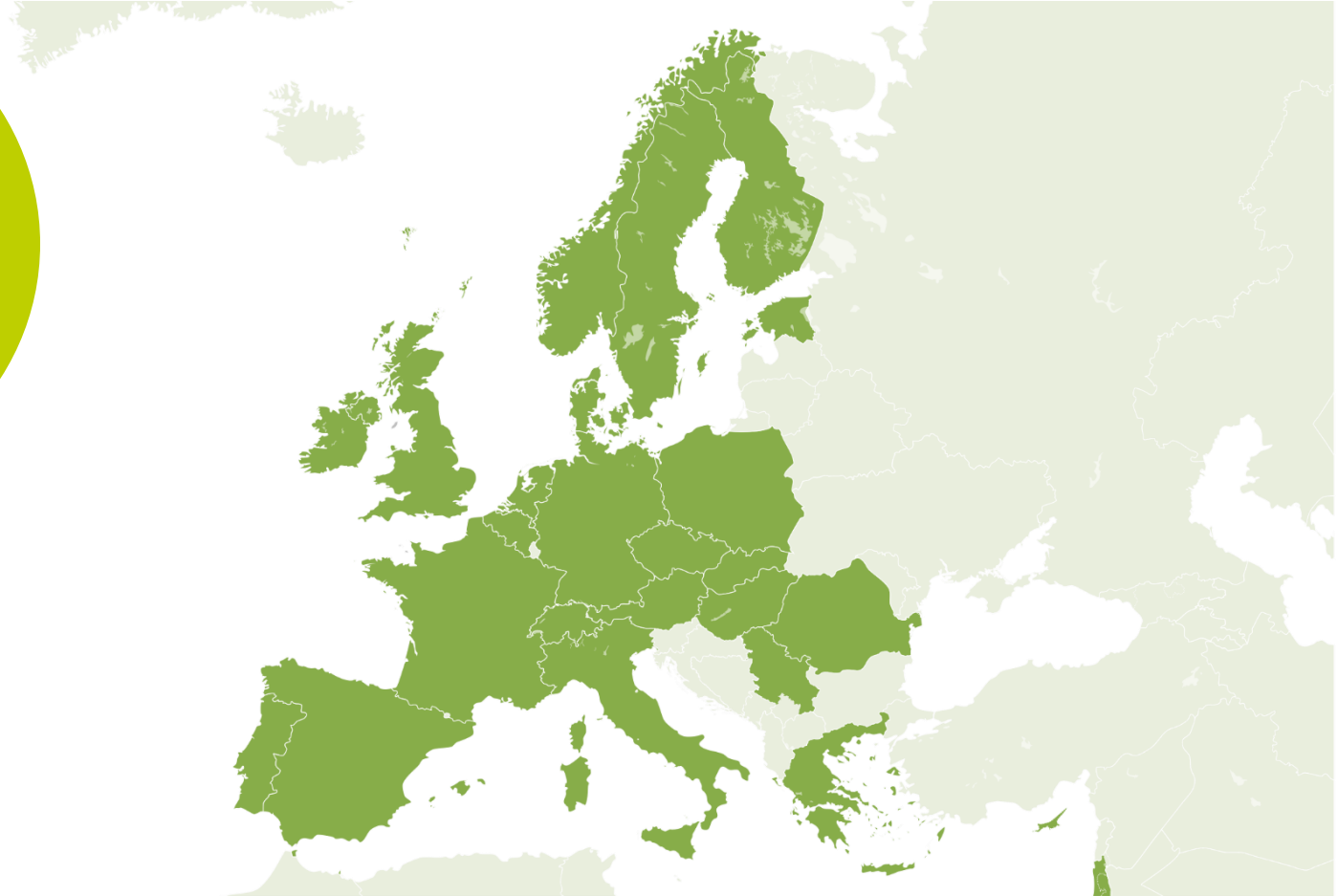
- Investments
- Data Management
- Education/ Training

## INNOVATION

- Unique Installations
- From Academia to Industry

## ACCESS

- Development
- Use
- Translation/ Dissemination

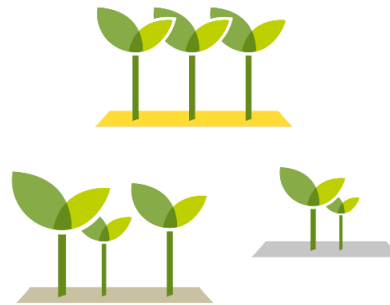


# Infrastructure categories in EMPHASIS

PLANT PHENOTYPING REQUIRES INTEGRATED CONCEPTS TO FULLY EXPLORE ITS POTENTIAL



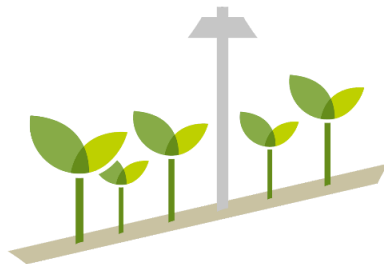
CONTROLLED CONDITIONS



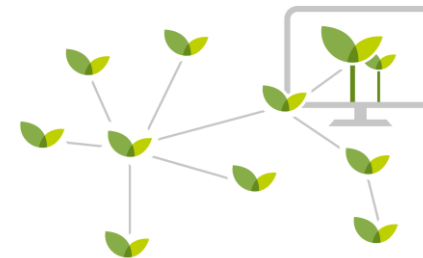
LEAN FIELD



MODELLING



INTENSIVE FIELD



DATA & COMPUTATIONAL SERVICES

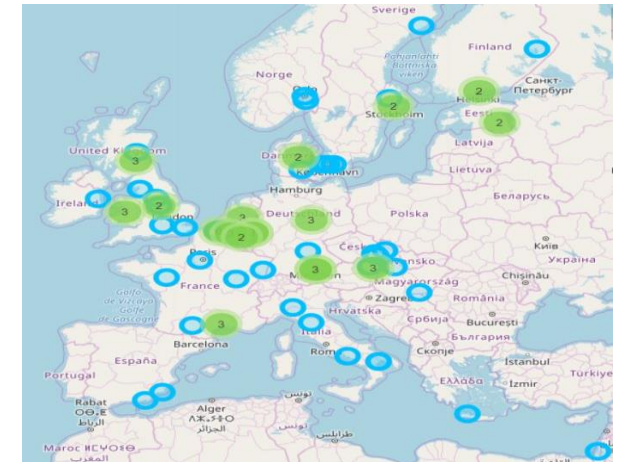
# Infrastructure: CONTROLLED ENVIRONMENT



- ✓ Greenhouses and growth chambers
- ✓ Simulation and monitoring of the environment
- ✓ High level of automation
- ✓ Deep phenotyping
- ✓ Throughput typically between 100-1000s plants



112 installations in  
19 countries



# Infrastructure: LEAN FIELD

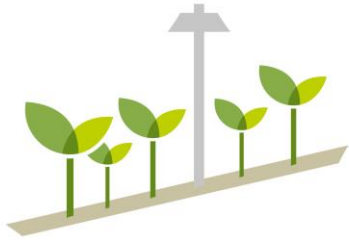


70 sites in 14 countries  
(lean+intense)



- ✓ Field sites with environmental monitoring
- ✓ Phenotyping equipment for basic traits
- ✓ Potentially ground based or airborne sensing systems
- ✓ Networks of fields

# Infrastructure: INTENSIVE FIELD



- ✓ Detailed environmental monitoring
- ✓ High quality, details measurements
- ✓ Field sites enabling environmental simulation



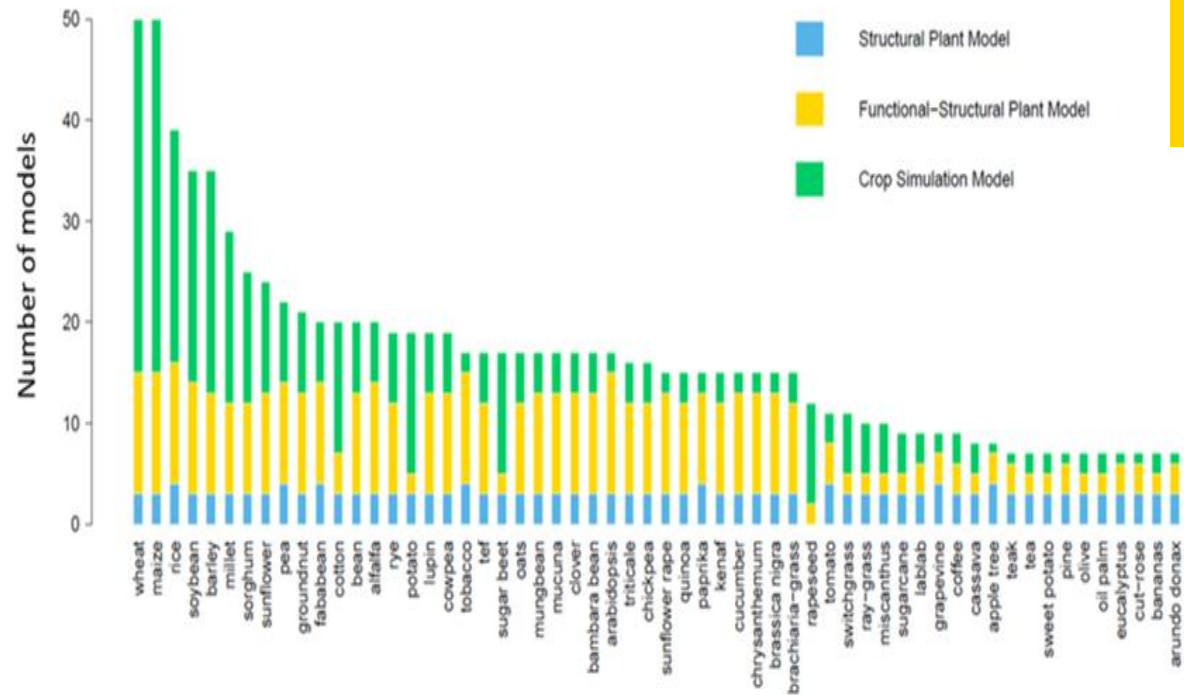
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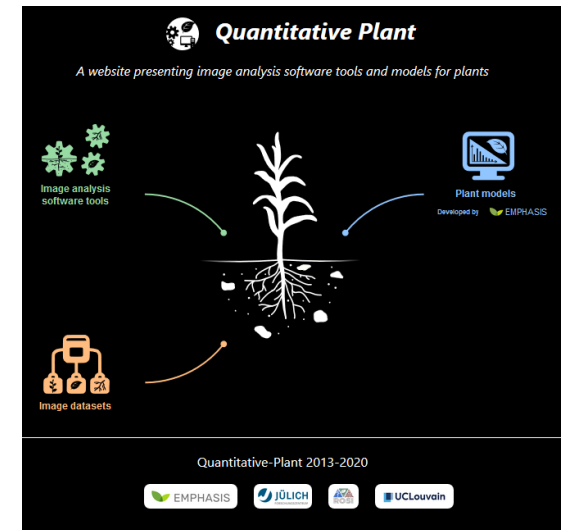
# Infrastructure: MODELLING



- ✓ Virtual platforms
- ✓ Different types of models: Crop Models, FSPM
- ✓ Integrated or interfacing with phenotyping installations

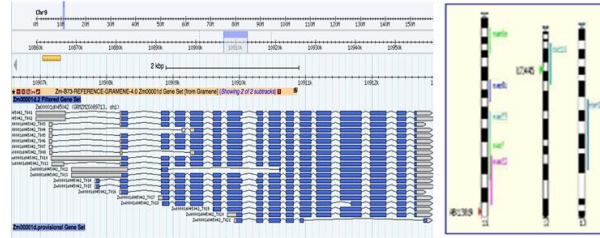
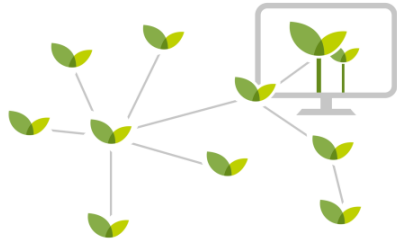


126 models relevant for plant phenotyping

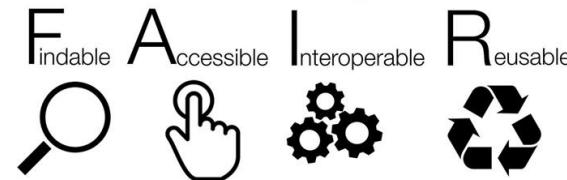


<https://www.quantitative-plant.org/model>

# Infrastructure: DATA AND COMPUTATIONAL SERVICES



- ✓ FAIR Information systems plant phenotyping data
- ✓ Access to data
- ✓ Local installation data-management
- ✓ EMPHASIS installations should have integrated information systems



- Climate change adaptation
- Variety improvement
- Cultural Practices adaptations
- ...



# The road to a long-term and stable operation

## Operational Phase (2022 onwards)

## Implementation Phase (2019-2021)

## Preparatory Phase (2017-2021)

- Funded via a H2020 grant (€4m)
- Work undertaken as per the EC proposal
- Evaluate the phenotyping landscape in Europe
- Development of business plan with user strategy, governance, ...

- Aligned to the long-term operations
- Formal decision making for EMPHASIS future of operations
- Official representation of ministries/funders (currently 11 ministries)
- Set up of EMPHASIS pan-European Services

- Long-term legal framework is in place
- Fully function governance bodies (decision-making, advisory etc.)
- Annual membership contributions to support operation
- Full access for EMPHASIS members to facilities and services



# Service portfolio

- EMPHASIS services in the operational Phase will address:

User Access

Infrastructure Quality

Data management

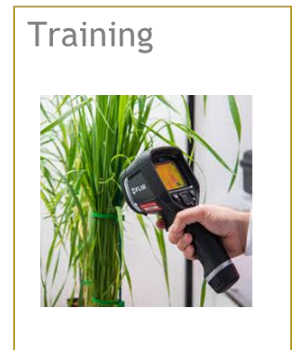
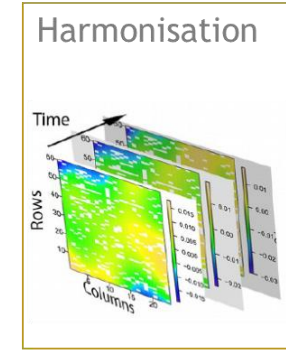
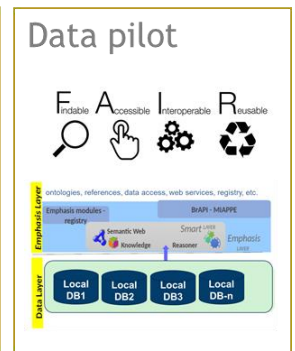
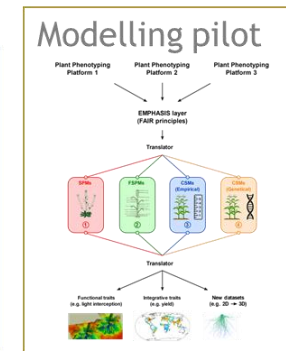
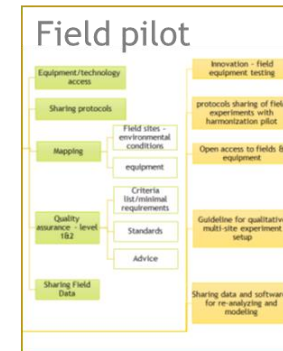
Innovation

Communication

Training and education

Support and Coordination

- A subset of specific services is currently teste as pilot services based user demand





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ANR

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🐦 [EMPHASIS\\_EU](#)

📘 [EMPHASIS.EU](#)

🌐 [EMPHASIS on Plant Phenomics](#)



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EUROPEAN INFRASTRUCTURE  
FOR PLANT PHENOTYPING