

# Remote monitoring of crop welfare and support to astronaut's crop handling

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**EDEN ISS**

 **WAGENINGEN**  
UNIVERSITY & RESEARCH

  
100years  
1918 — 2018

# Background

- EDEN-ISS: simulation of a year-long space mission on Antarctica
- From Wageningen: remote assistance based on image acquisition system
  - Early detection of “anomalies”
  - Evaluation of crop performance
    - Predict harvest timing
    - Propose improvements



# The image acquisition system

- 25 top view cameras, seeing either one or two trays
- 8 lateral view cameras

# The image acquisition system

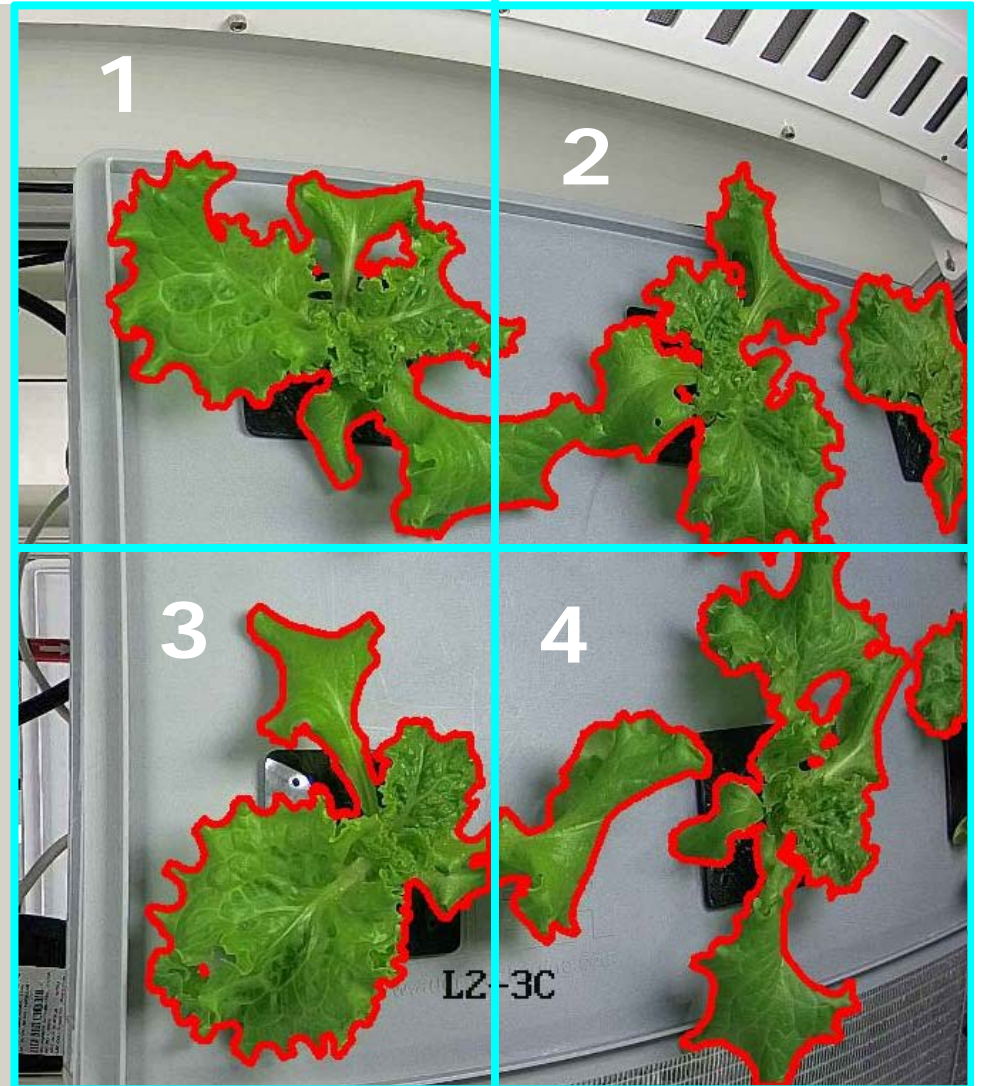
- Only RGB, best compromise between quality and coverage
- Daily schedule for:
  - white-light image acquisition
  - wide-band transfer channel to Bremen
  - images downloading to Wageningen

# Definitions:

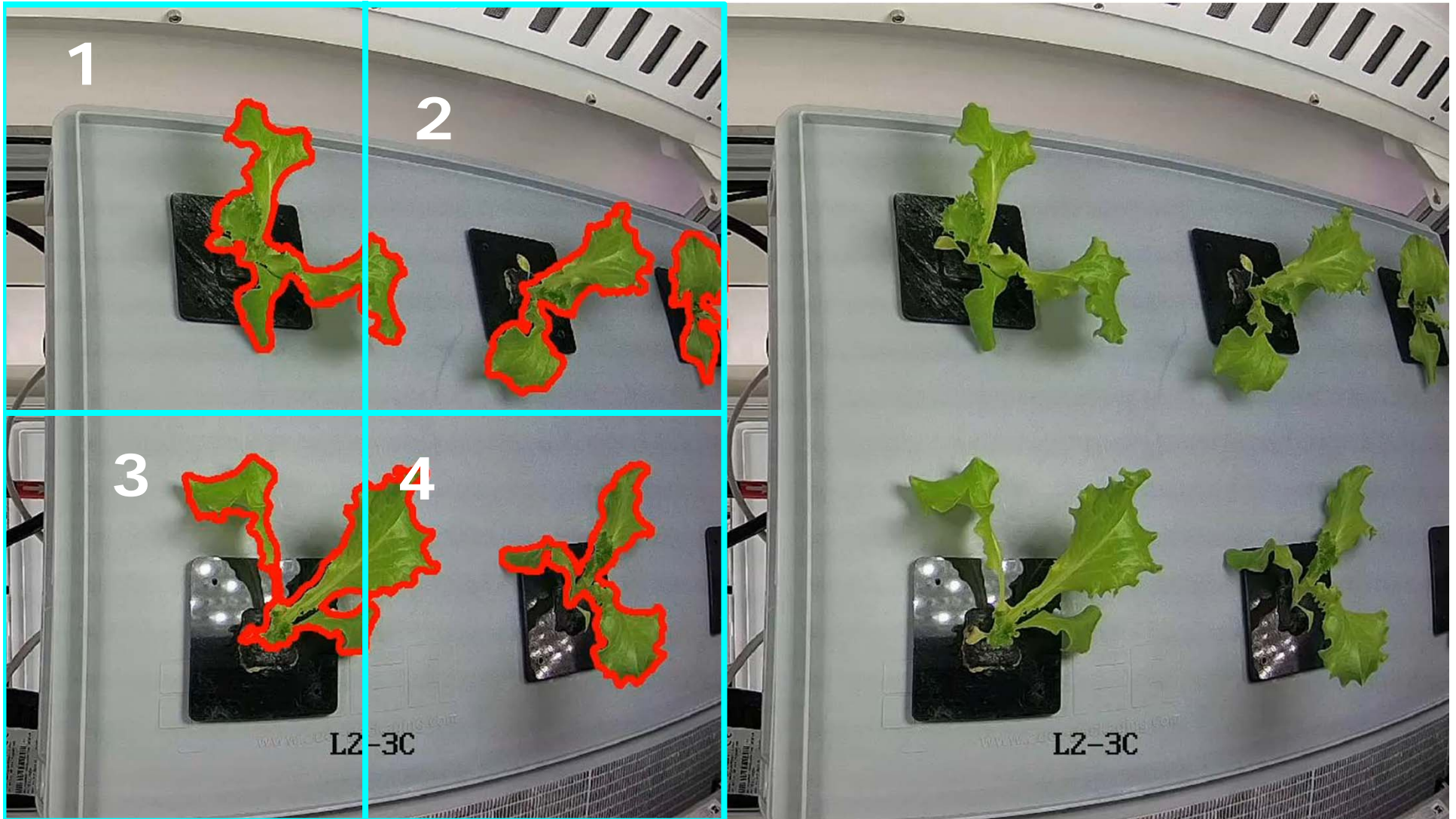
region of interest

sector

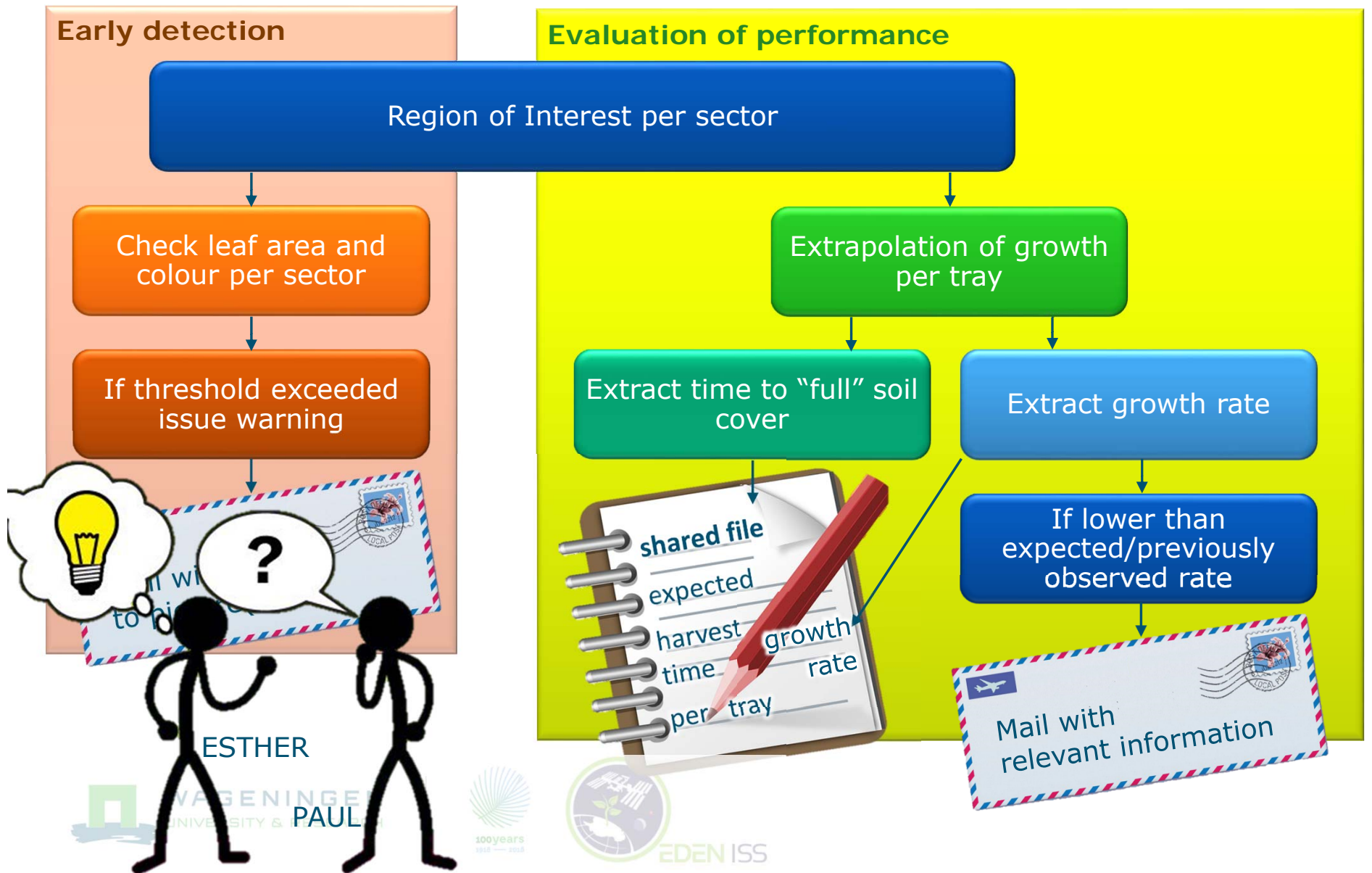
tray



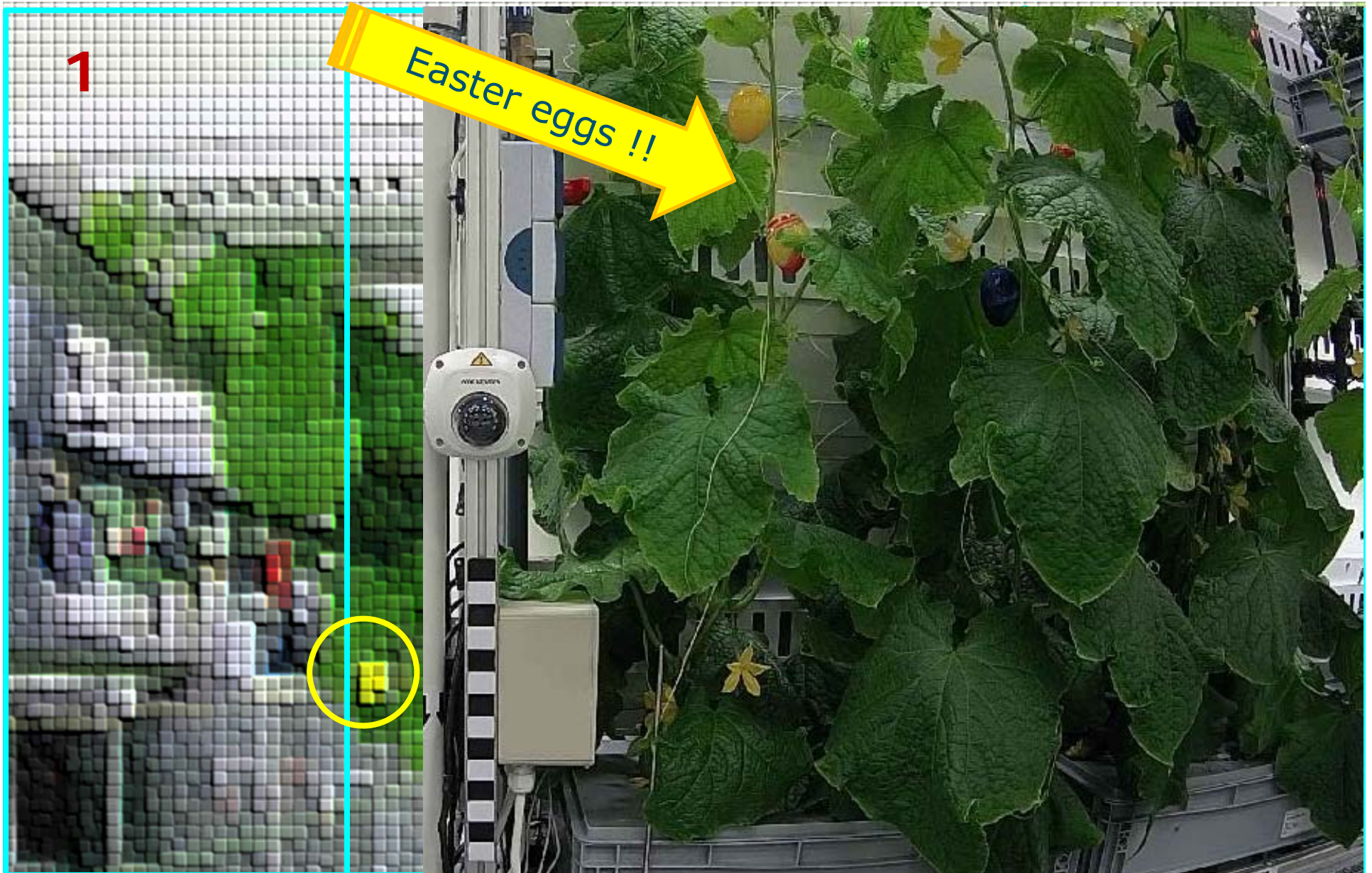
# Daily images (see the crop grow)



# Architecture of the system

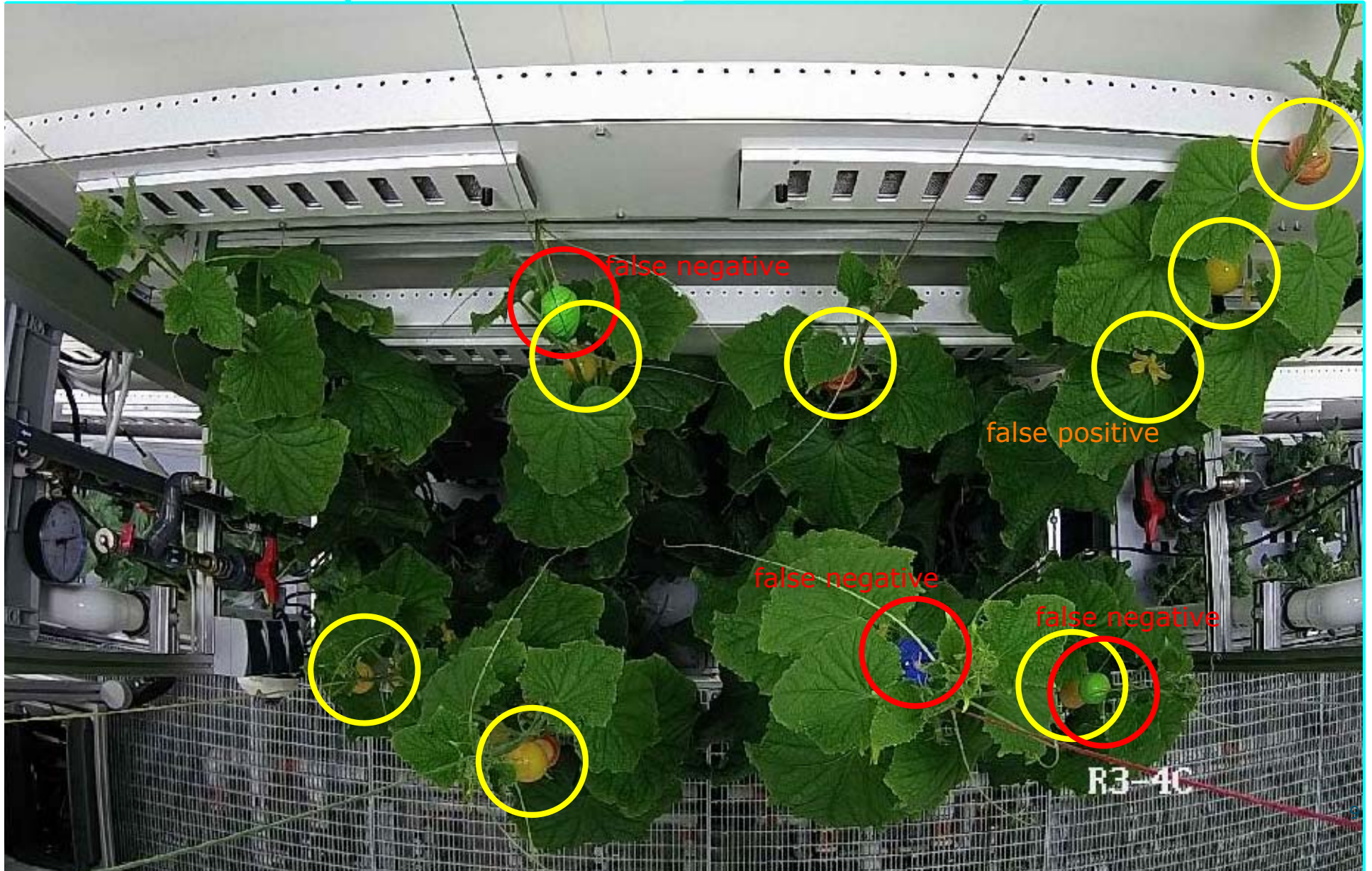


# Early detection of anomalies

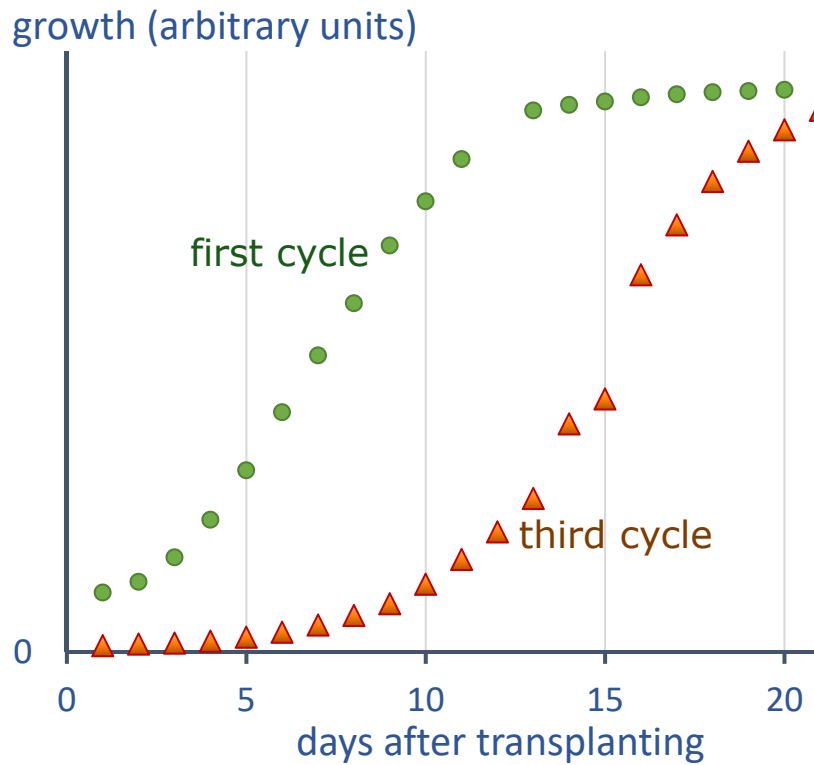




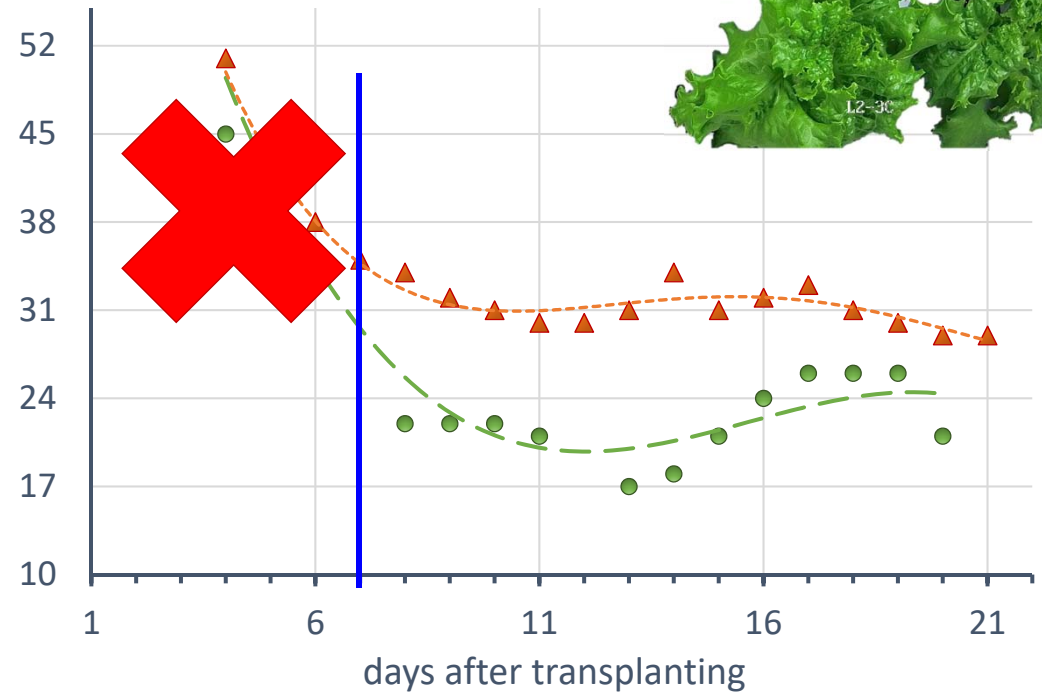
# The system is not [yet] perfect



# Prediction of harvest time: how reliable?

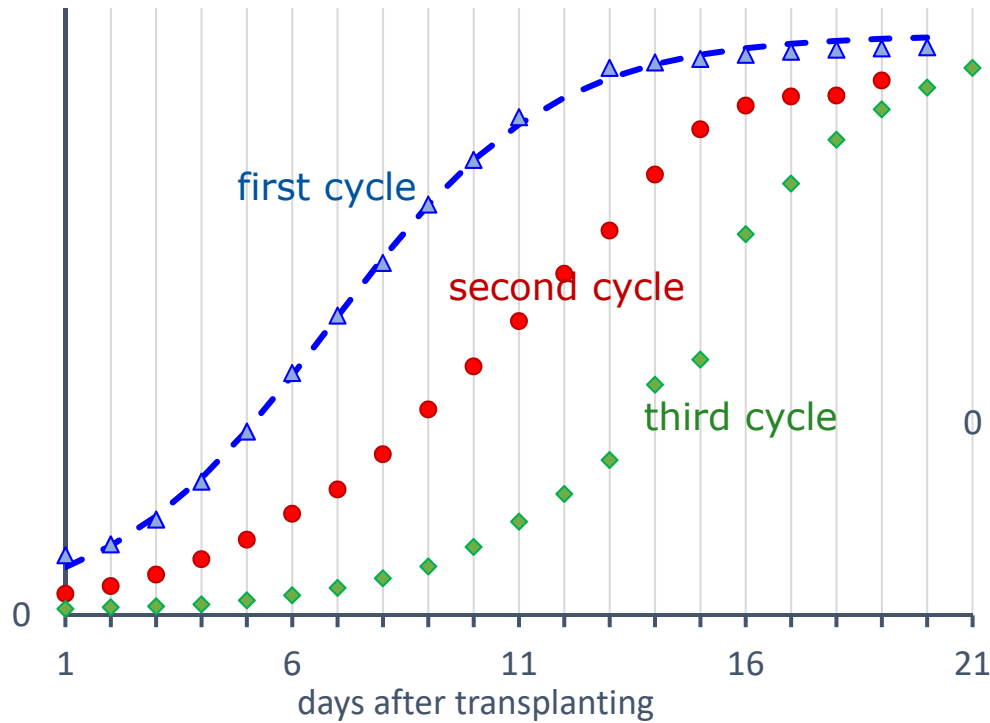


predicted harvest time (days after transplanting)

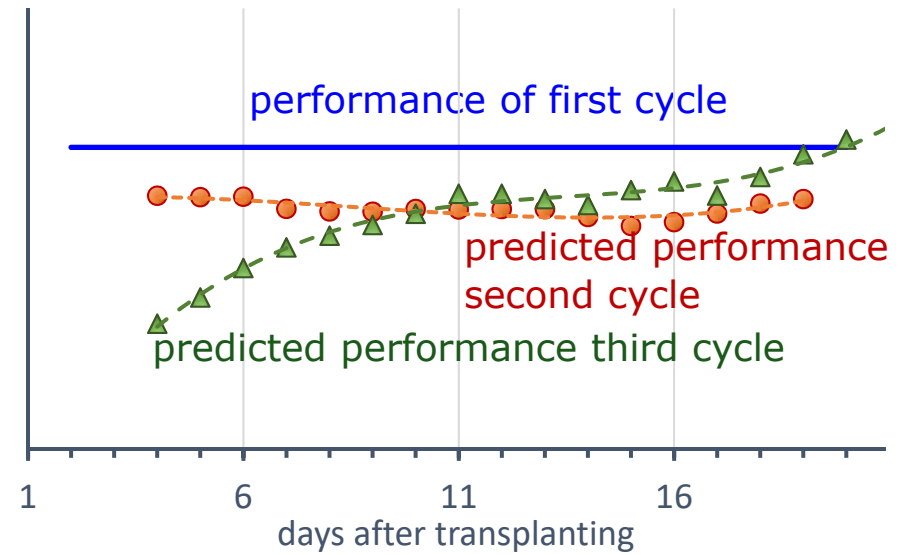


# Performance evaluation

growth (arbitrary units)



predicted performance (arbitrary units)



# Conclusions

- The system detects anomalies timely and reliably
  - More would be possible with other cameras
- It allows for a first evaluation of time of harvest and crop performance within a week after transplanting
- It is an objective evaluation that does not require “green” expertise
- Expertise is (still) required to propose mitigating actions
  - An “expert system” could be developed in a new project
- The system can enhance efficiency of use of scarce resources

# Thanks to...

- The EU-H2020 grant
- The Dutch ministry of Agriculture, Nature and Food Quality
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- ...and you all for your attention

