

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

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## Background EDEN-ISS project

Aim: Growing fresh food for future space missions

Designing growing recipes:

- to produce tasty 'ready-to-eat' fresh food
- with limiting factors (space, light, temperature, energy)



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## Context EDEN-ISS

Space missions: future

'Earthy' test: Antarctica: 2018

Tasks Wageningen:

- Tests for designing growing recipes
- Training space engineer
- Remote plant health monitoring

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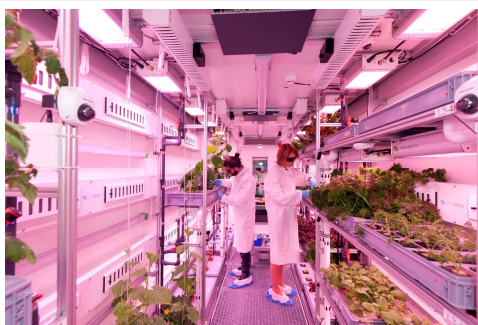
## Background

- 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

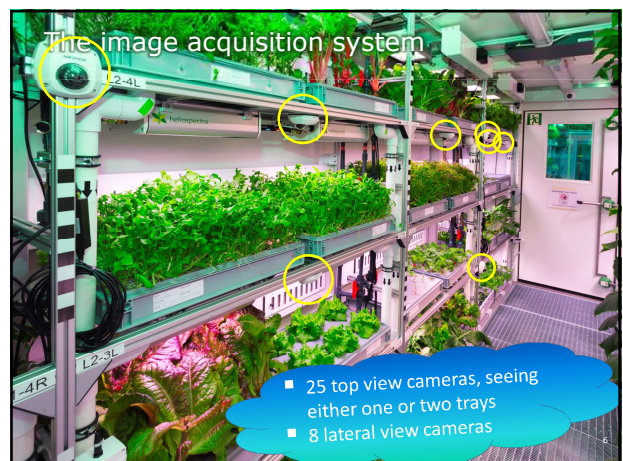
## Future exploration greenhouse



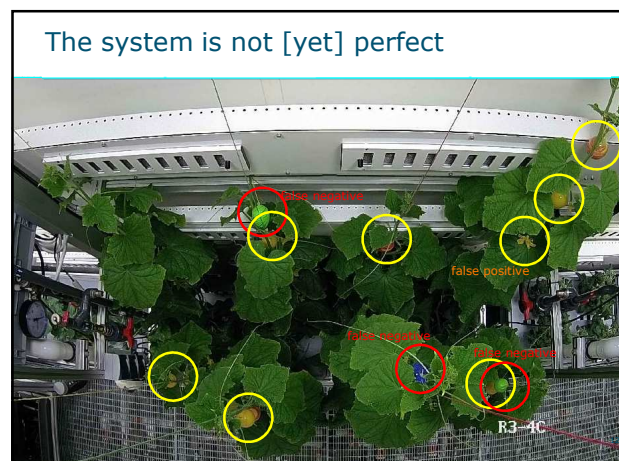
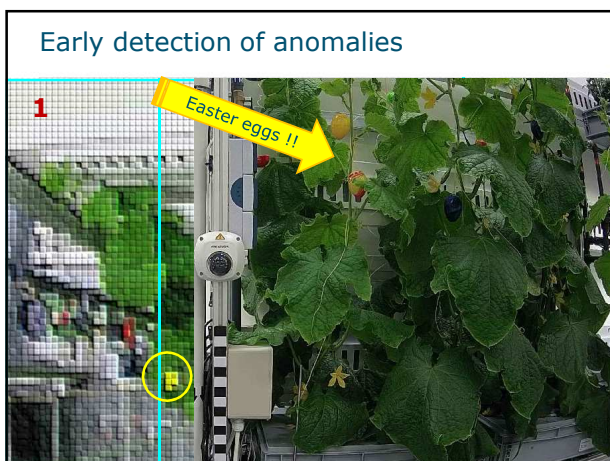
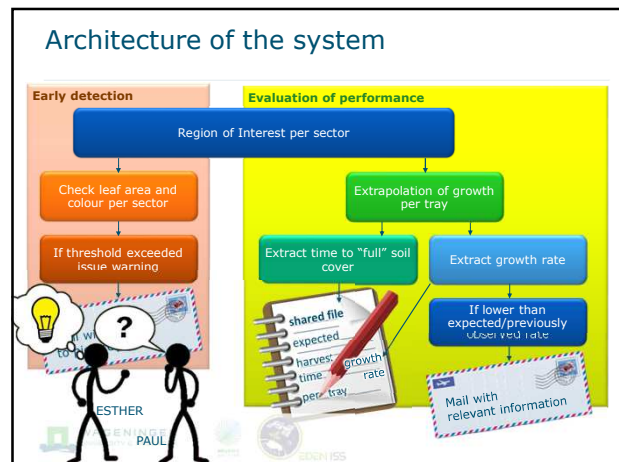
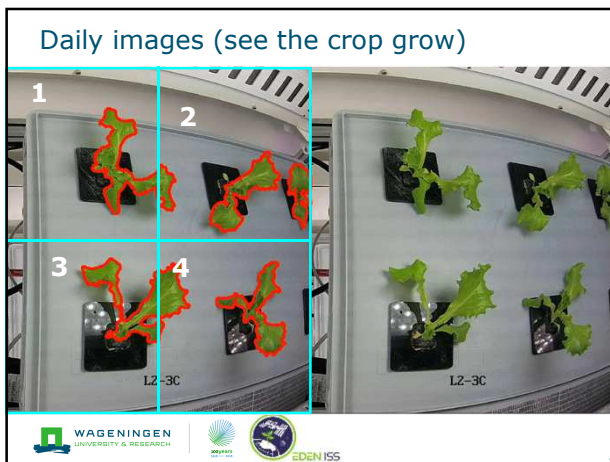
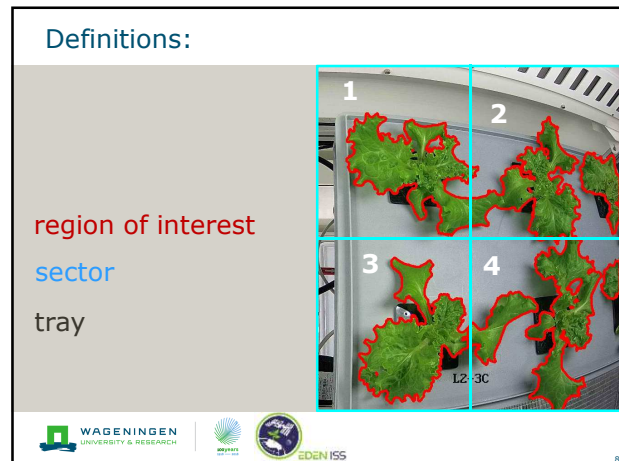
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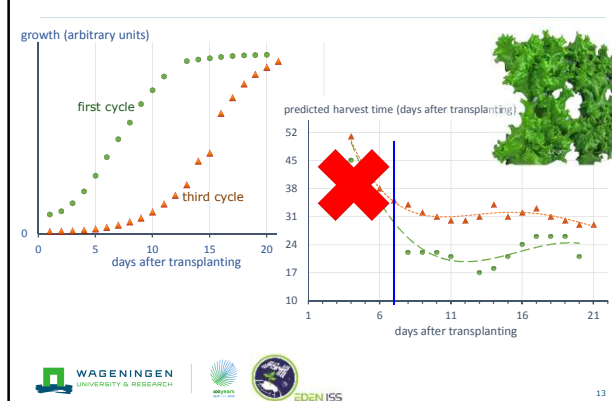


- 25 top view cameras, seeing either one or two trays
- 8 lateral view cameras





### Prediction of harvest time: how reliable?



### 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
  - An "expert system" could be developed in a new project
- 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
- Paul, in Antarctica
- ...and you all for your attention

