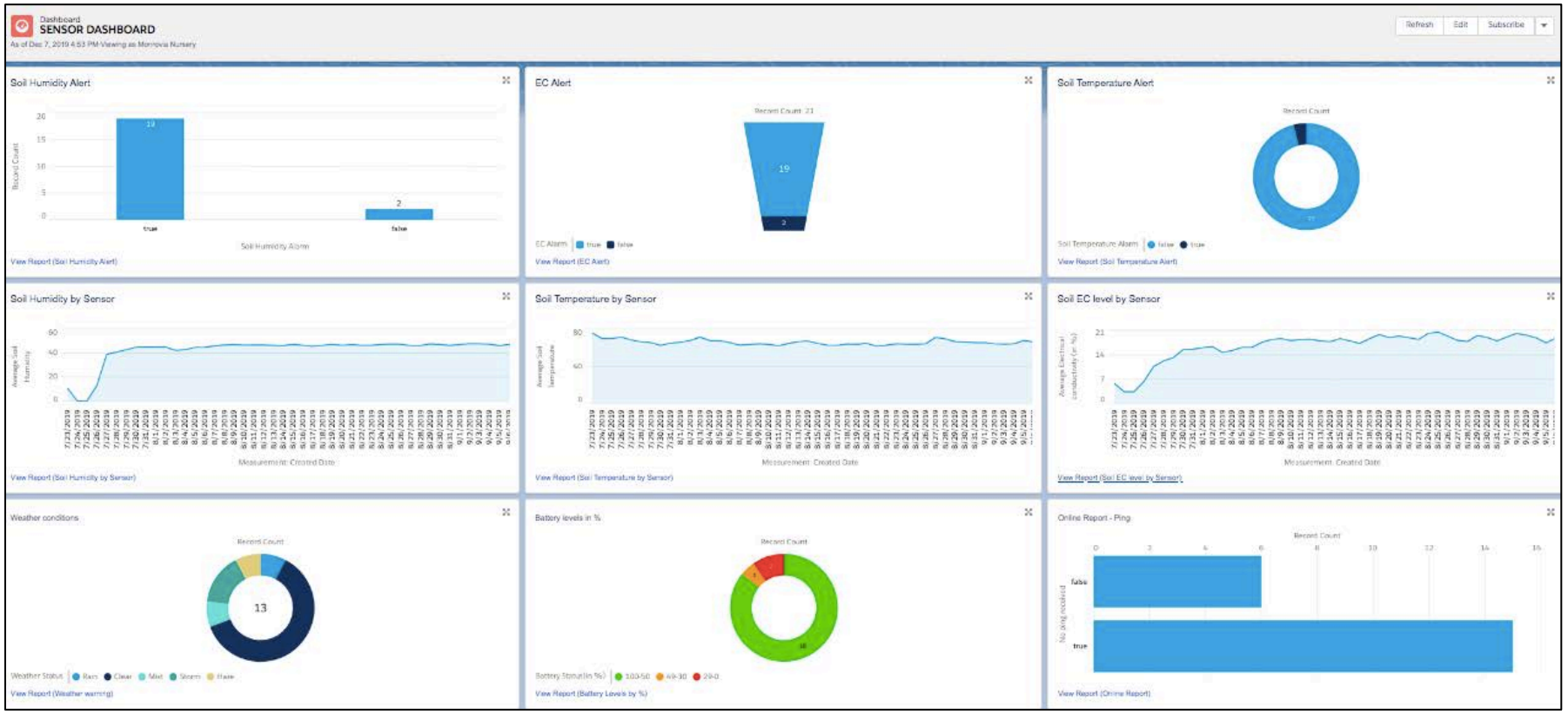
Production Dashboard

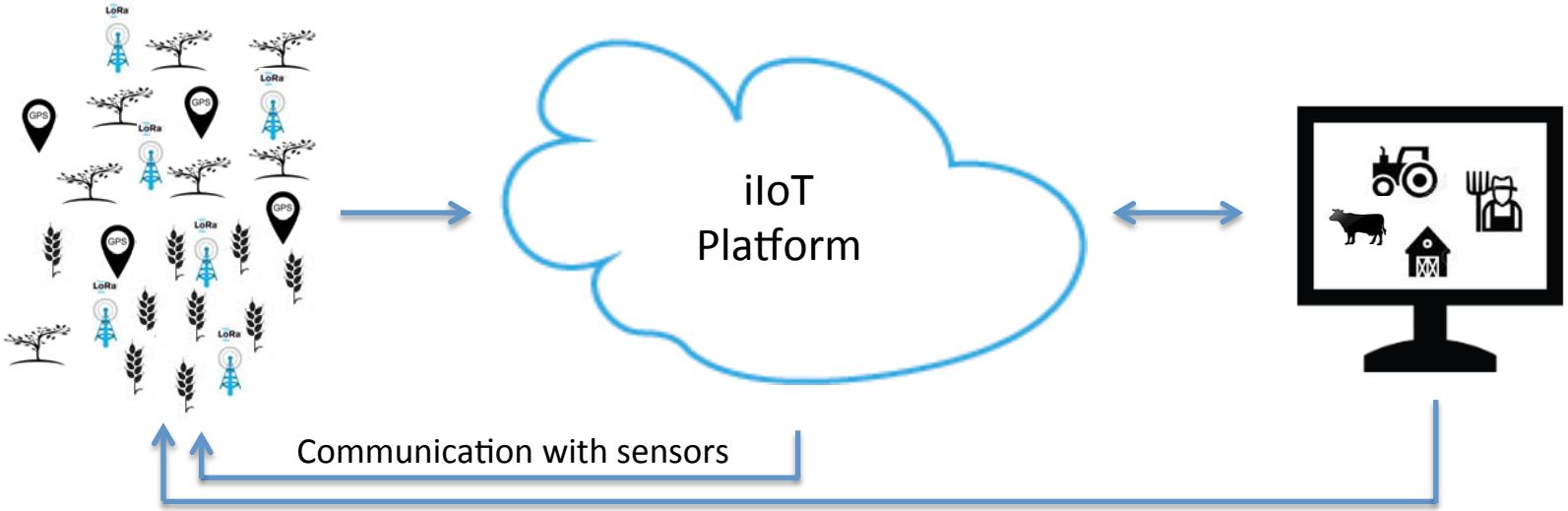


Production Process with Florja

Sensors are distributed across growing areas
(range up to 10km)

Platform takes over location, rules and other data from sensor
(external information can be integrated)

User can combine any data and business processes
(manual or automated)



EXAMPLES

By combining the location (GPS), the measured values and external data, "intelligent" decisions can be made as to whether, when or how much irrigation really makes sense.

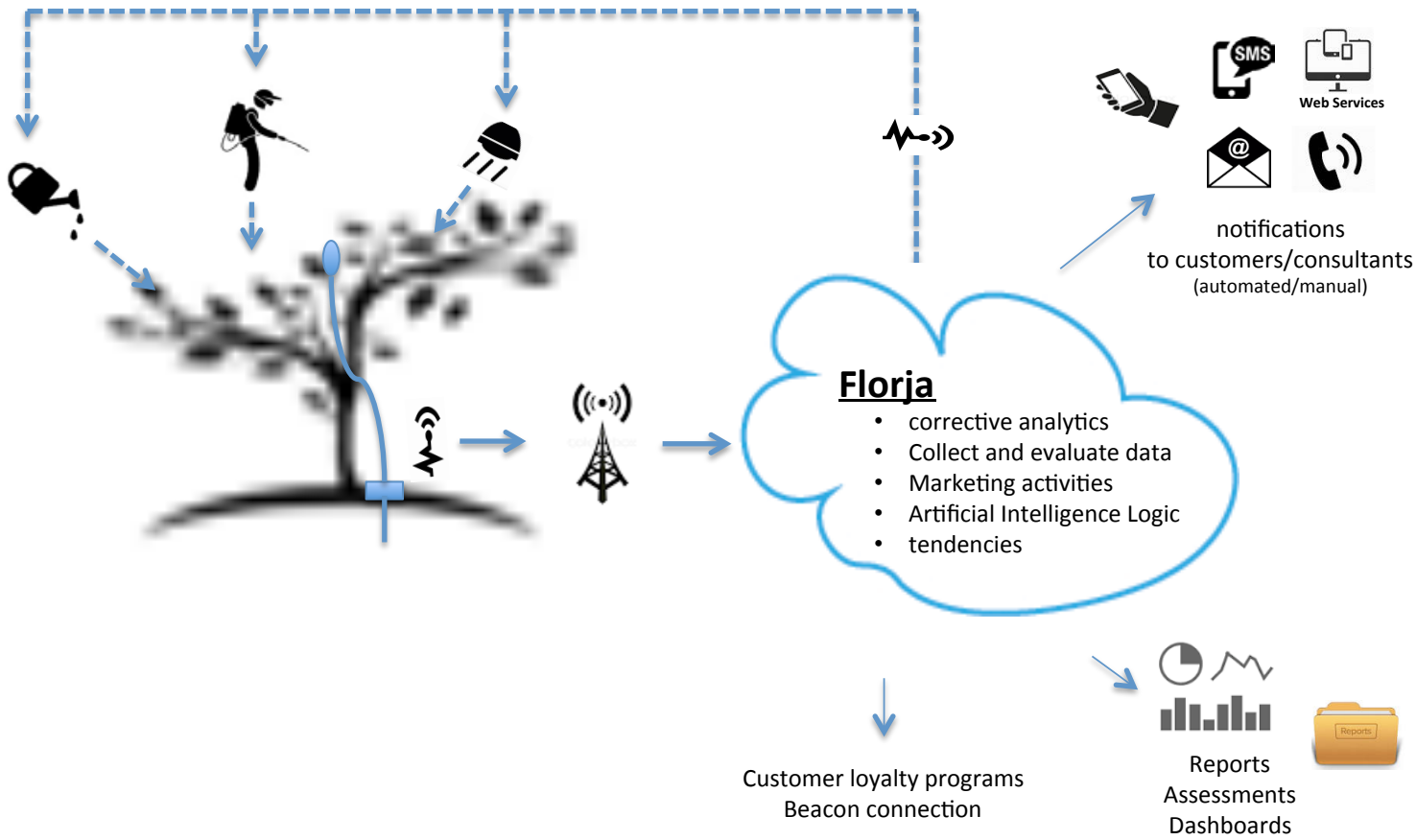
"Open" IoT devices (e.g. irrigation systems) can be controlled and positioned and switched on or off as required.

Current and historical data can be viewed at any time, planning decisions are based on real data.

Production components

- WLAN Sensors
- NB-IoT Sensors
- Intelligent Irrigation Module
- Imminent Business Cases
  - Intelligent Irrigation
  - Relay Switch Module (I/O)
    - Range 5
    - Propagation Glasshouse
  - Artificial Intelligence platform
    - Predictive Production
    - Plant Health Dashboard

ONE system


SMS
Web Services
notifications
to customers/consultants
(automated/manual)
Florja
corrective analytics
Collect and evaluate data
Marketing activities
Artificial Intelligence Logic
tendencies
Customer loyalty programs
Beacon connection
Reports
Assessments
Dashboards

Numerous use cases

Support watering teams
Avoid over- AND under watering by implementing an “irrigation traffic light”
i.e. plant care in retail shops, office buildings…

Schedule work assignments
Efficient resource allocation based on real-time measurements and external data
i.e. tree care within municipalities

Offer additional services
Value added services based on season and weather monitoring.
i.e. landscapers offer pruning in spring, additional care in heat waves

Customer Loyalty Program
Create a platform for existing customers with expert advice.
i.e. garden centers reach out via an app and communicate

Retail
landscapers
Garden-centers

and many more….

Slide 1: Intelligent Irrigation - Overview

Process:

1. Florjas measure in defined Intervals and send data to platform
2. Based on defined rules platform switches irrigation on/off

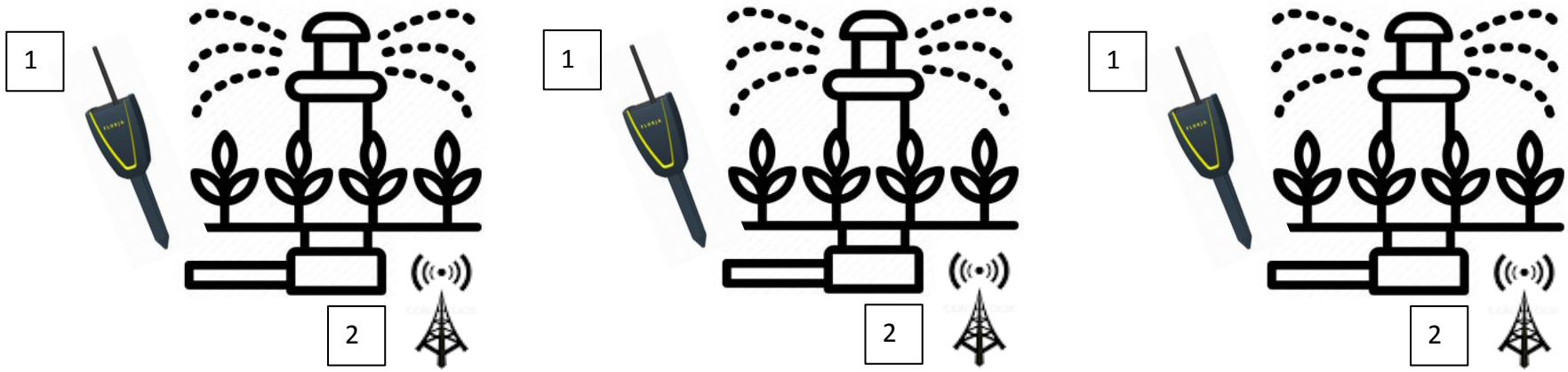
Requirements:

1. Rules can be adjusted and if needed "overwritten"
2. "Security Loop" – if sensors don't report in defined intervals alerts are issued to system owner

= wireless LoRa irrigation switch

1 = wireless LoRa sensor (Florja)

2 = existing irrigation valve, simple on/off switch logic, AC powered



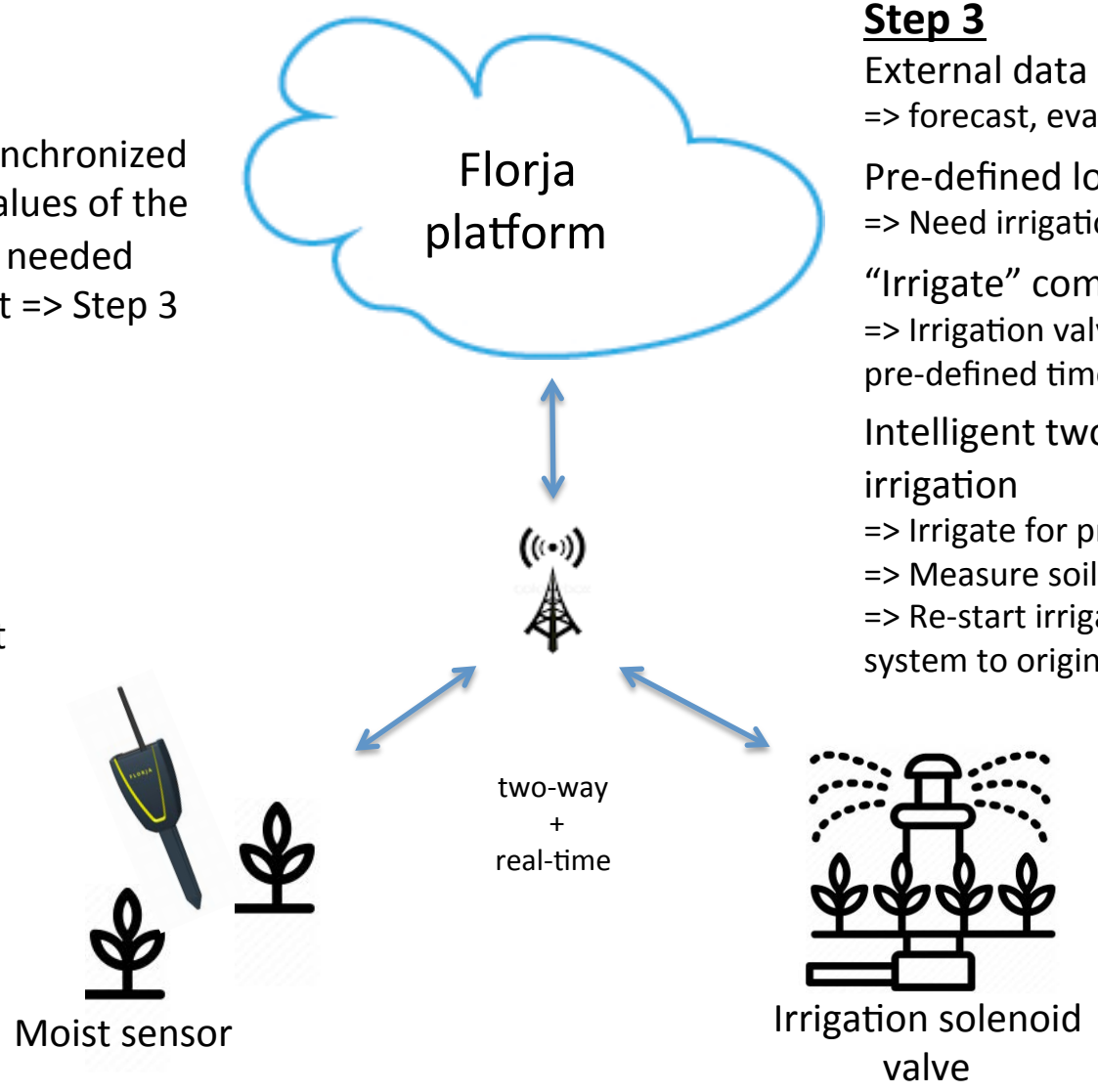
Slide 2: Intelligent Irrigation - Architecture

Step 2

Incoming data is synchronized with pre-defined values of the monitored plant, if needed watering alert is set => Step 3

Step 1 (ongoing)

Sensors measure at the plant and send data to platform



Step 3

External data check
=> forecast, evapotranspiration etc.

Pre-defined logic applied
=> Need irrigation YES/NO

"Irrigate" command issued
=> Irrigation valve opens for pre-defined time period (i.e. 15 min)

Intelligent two-way and real-time irrigation
=> Irrigate for pre-defined period
=> Measure soil moist again
=> Re-start irrigation loop or reset system to original measurement setting

Slide 3: Intelligent Irrigation - Technology

Moist Sensors

Tinovi

Sensoterra

Outdoor Gateway

TheThingsNetwork

Solenoid LoRaWAN Valve

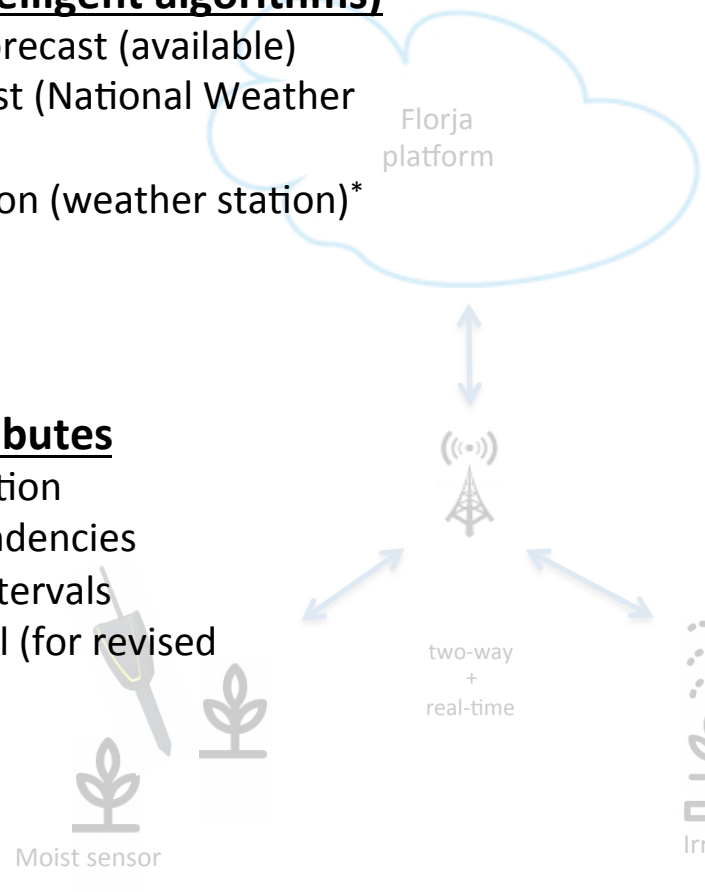
Tinovi

STREGA

Slide 4: Workshop – What is **YOUR** process

External data (intelligent algorithms)

- 3 day weather forecast (available)
- mid-term forecast (National Weather Service)*
- Evapotranspiration (weather station)*



Irrigation valve attributes

- Make and ID
- Location (GPS data)
- Security loop*

Internal Process

- Available capacity
  - Rules and regulations
- Irrigation rules*
  - Time window
  - Capacity
- ……

Sensor/plant attributes

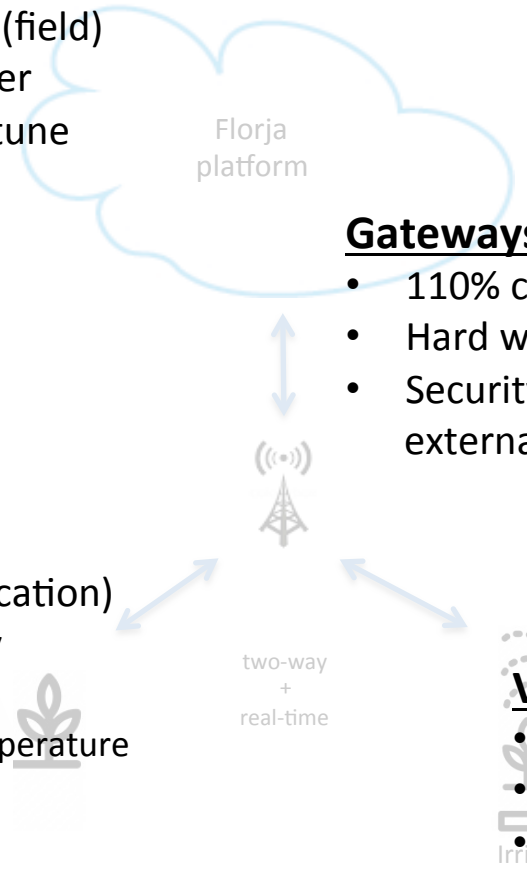
- MIN value definition
- MIN value dependencies
- Measurement intervals
- Irrigation interval (for revised measurement)
- Security loop *
- ……

* = not part of initial pilot

Slide 5: Workshop – What is **YOUR** setup

Fields and resources

- Define pilot location (field)
- Assign platform owner
- Pilot setup and fine-tune activities
- "human controller"
  - person
  - process



Gateways

- 110% coverage
- Hard wired Ethernet and power supply
- Security loop (i.e. 5 minute pings from external sensor – no ping – ALARM)

Sensors / plants

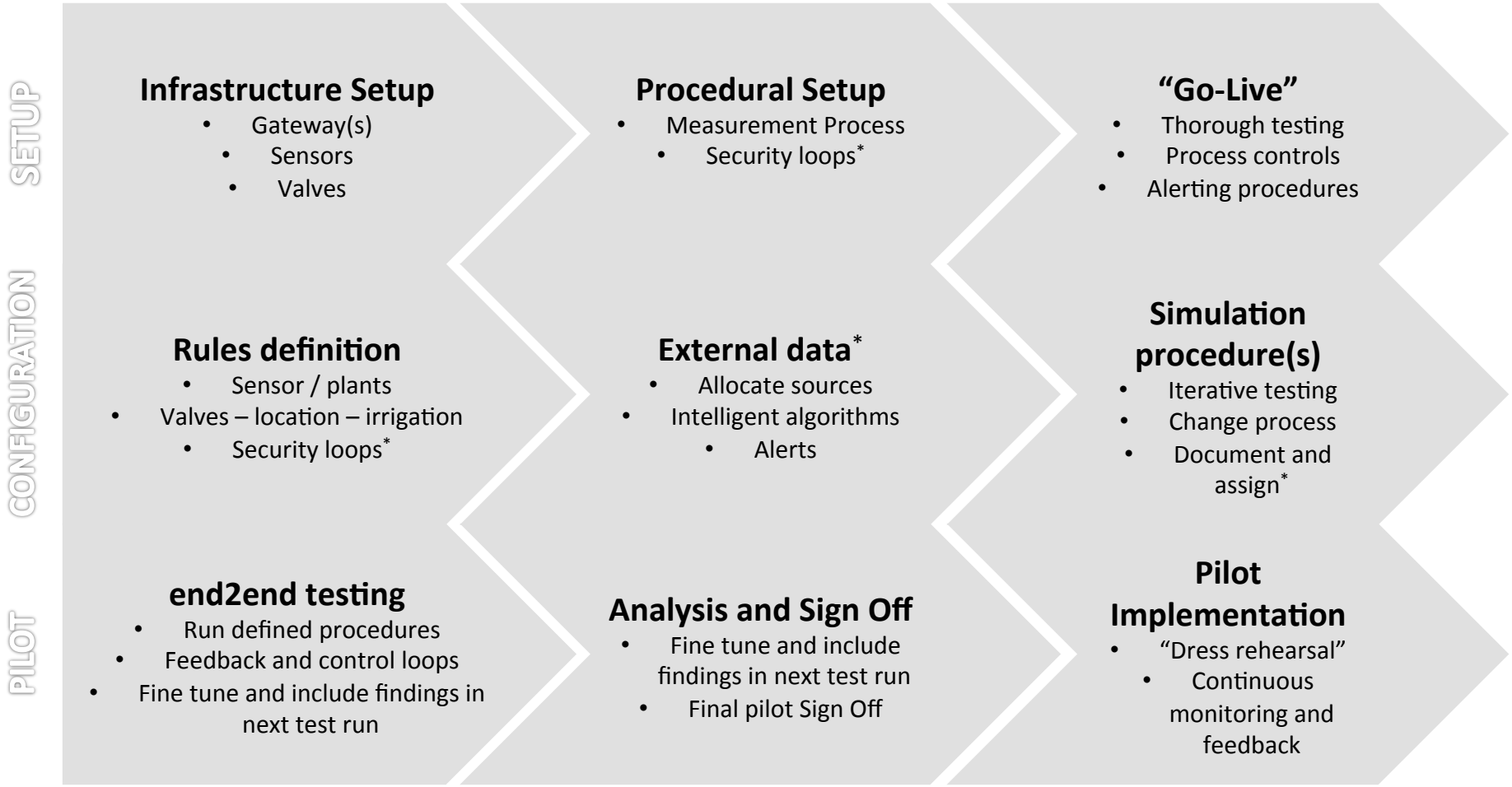
- Where to place (field allocation)
- How many and frequency
- Which sensors
  - Ground moist and temperature
  - Weather station*
  - ???
- Security loop*

Valves

- Make
- Location (field allocation)
- Capacity
- Window*
- Security loop*

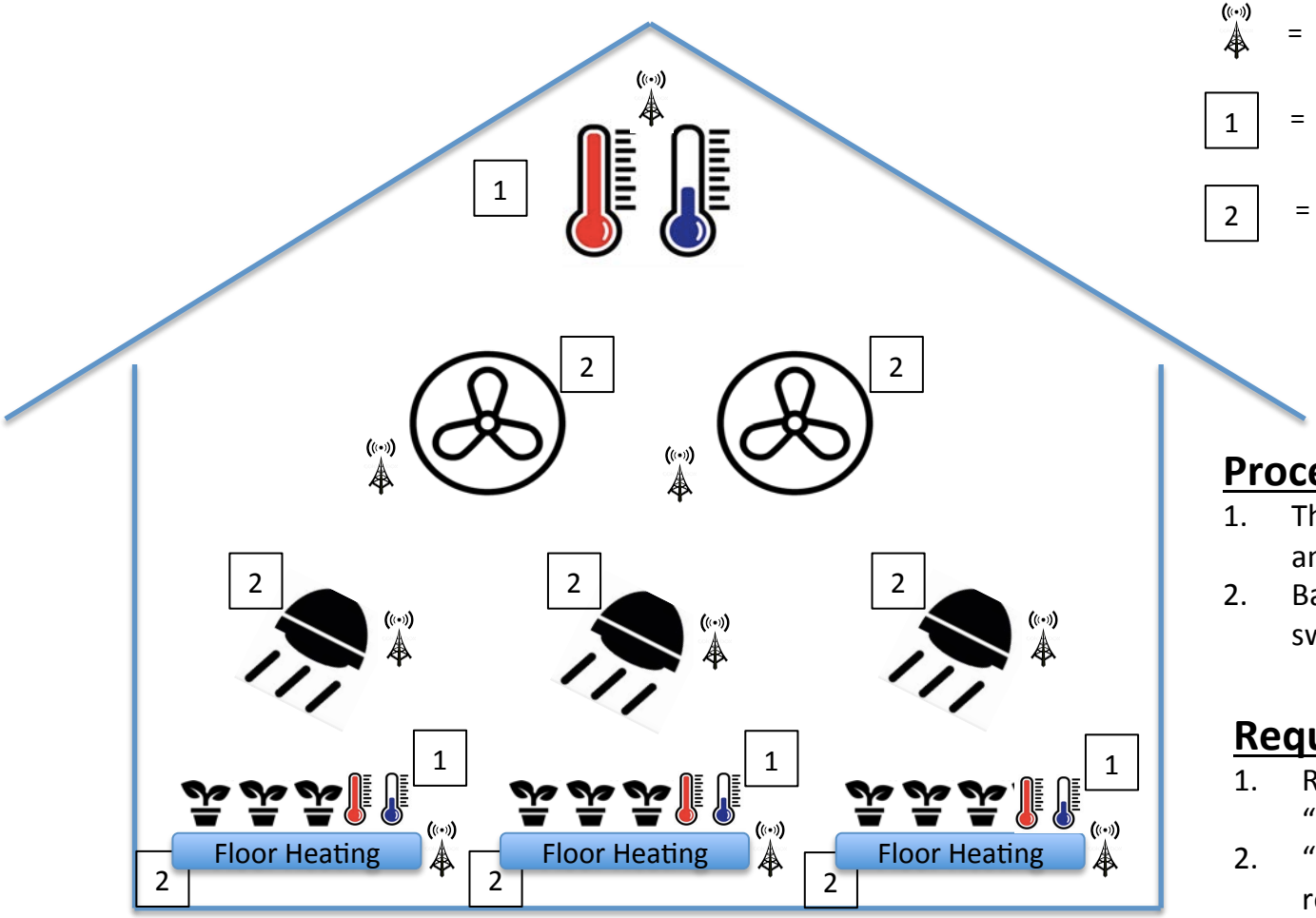
* = not part of initial pilot

Slide 6: Workshop – Approach



* = not part of initial pilot

Glasshouse Control (I/O)



= wireless LoRa relay switch

1 = wireless LoRa thermometers for glasshouse and floor heating

2 = existing machinery, simple on/off switch logic, AC powered

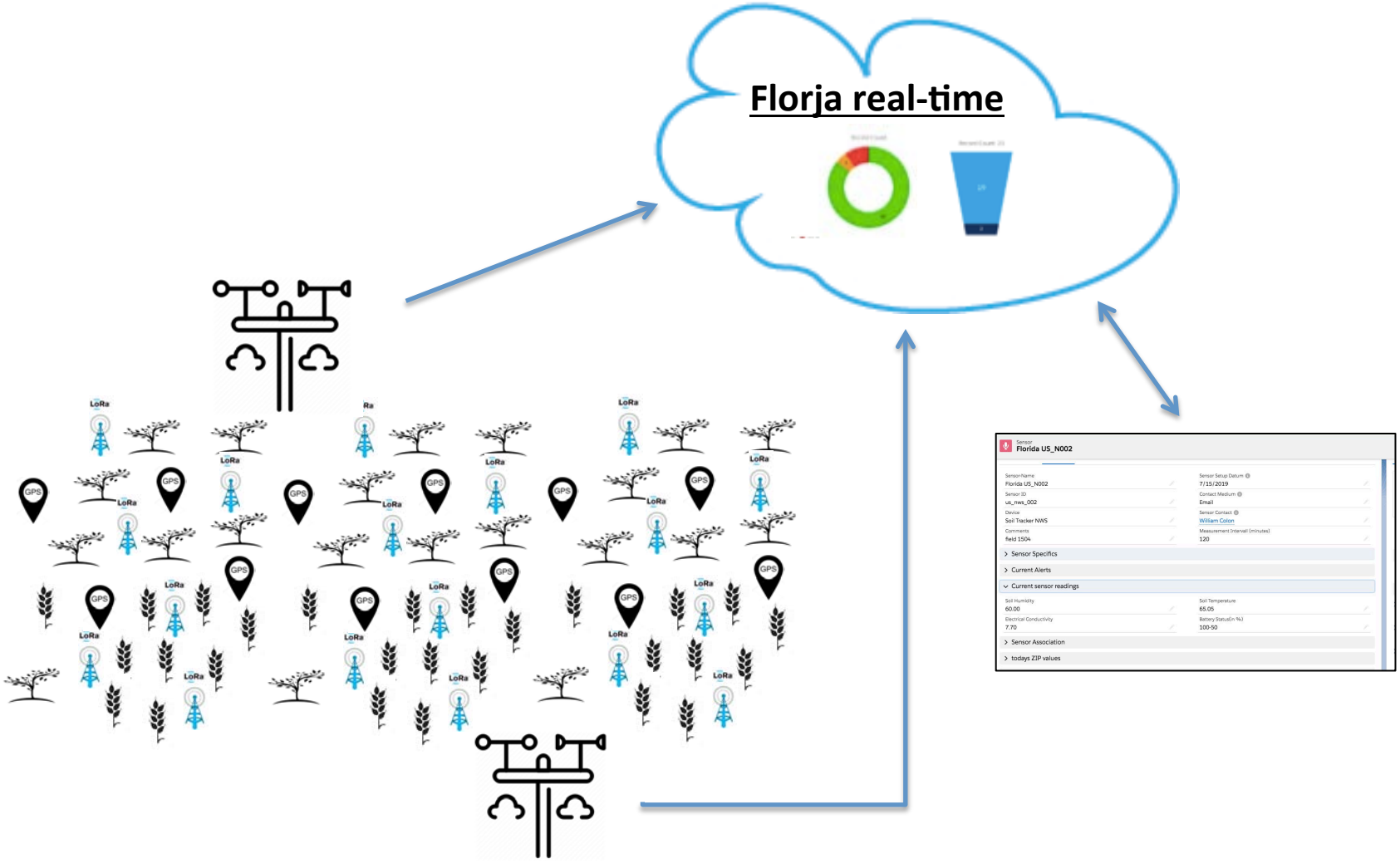
Process:

1. Thermometers measure continuously and send data to platform
2. Based on defined rules platform switches existing machinery on/off

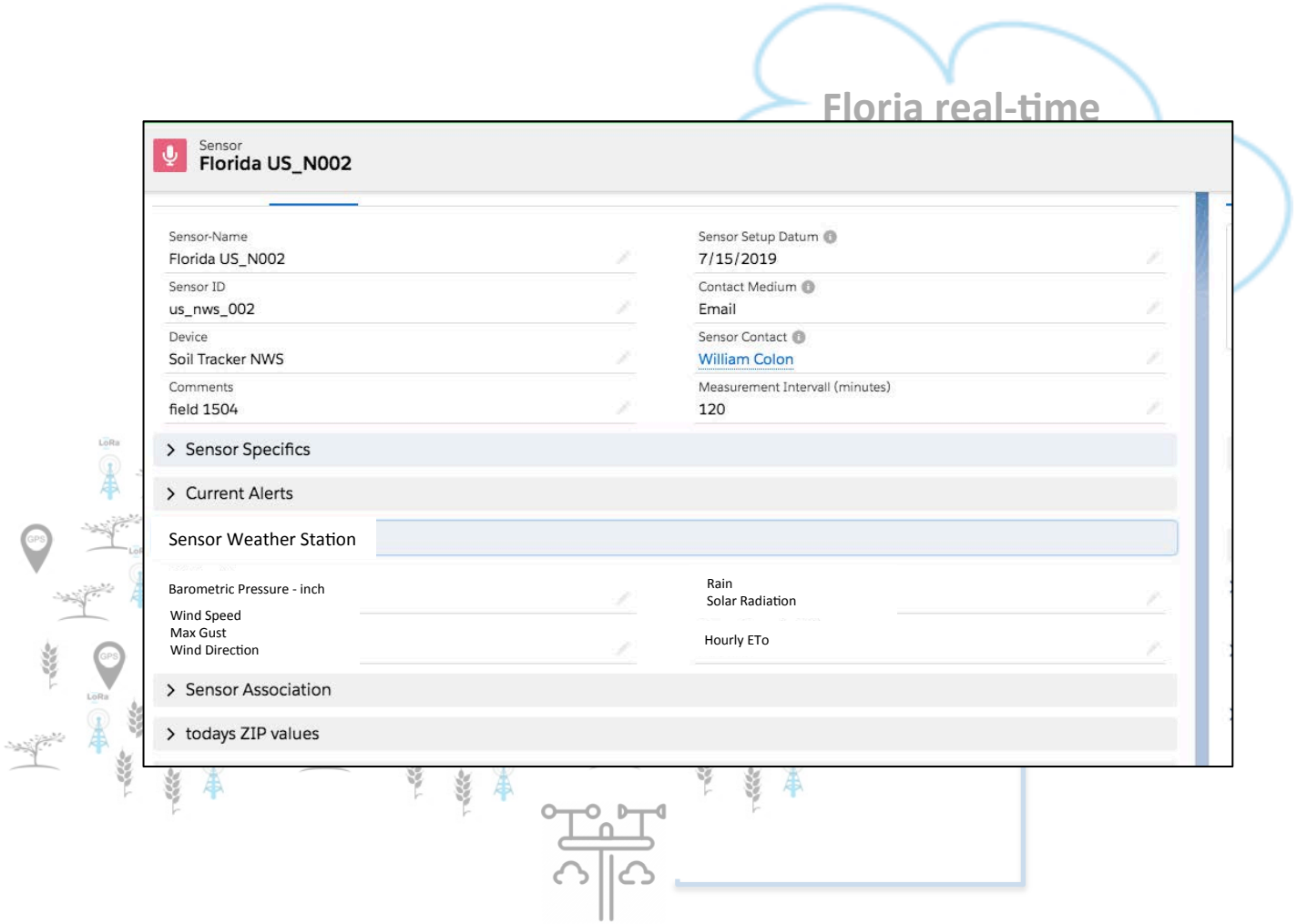
Requirements:

1. Rules can be adjusted and if needed "overwritten"
2. "Security Loop" – if sensors don't report in defined intervals alerts are issued to system owner

Weather Station - Evapotranspiration



Weather Station - Evapotranspiration



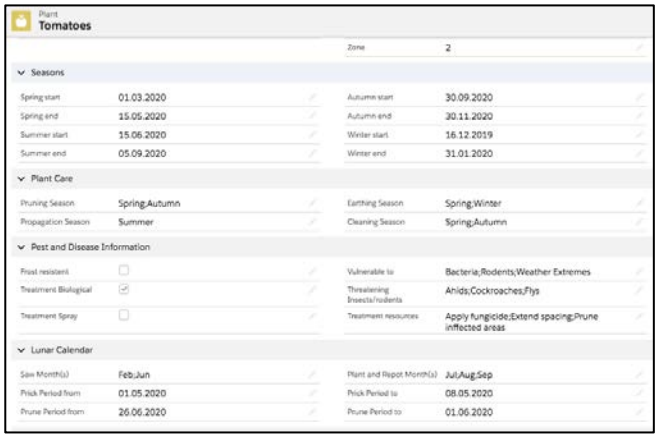
Plant Health Dashboard

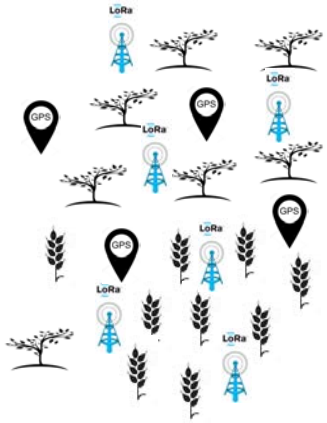
Setup system, define diseases and pests including indicators and parameters

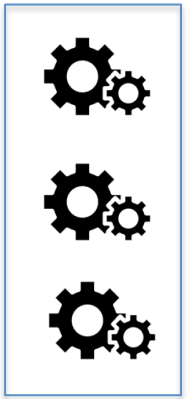
Receive data from sensors and internal/ external sources

Process workflows, combine values

Set alerts, initiate connected systems







Any logic that needs to be monitored and considered to receive meaningful warnings from the system can be included within Florja. Complex “if…then” scenarios running continuously ensuring timely action.

Real-time measurements, calculated values (over time), forecasts as well as experience of senior staff will deliver a regional real-time early warning system - by plant.

The results can be visualized on the dashboard or used for immediate action or long-term research.

Predictive Production

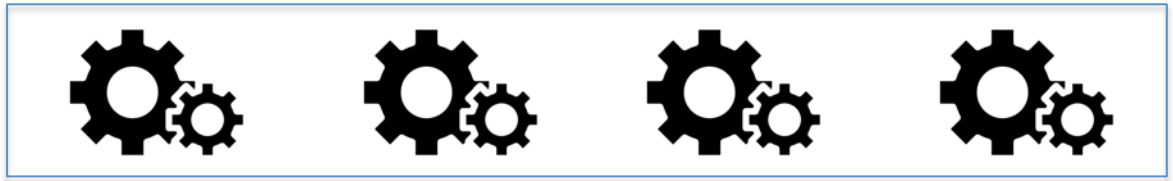
Requirements

- Access to data
- Knowledge “transfer” to VA
- Results documentation
- “ongoing” feed

Virtual Assistant (VA)

Expected Results (6+ months)

- First sensible predictions
- “Learning System”
- Ease of use



Predictive Production

=>> Intelligent Checks
- space and staff available, resource availability
- transport facility, supply chain
- climate patterns (past and future data)
- forecast as long into the future as possible
- comparison same plant into the past as far back as possible

=>> Supply chain control
- from seeding to final customer and beyond

=>> Picture and weight control
- weight gain
- average weight

Ad-hoc checks

ongoing

Florja
- Analyses/Trends
- Collect and evaluate data
- Marketing Activities
- Across location and units
- **External data enrichment**
- **Customer Portal**

Result based feedback – continuous improvement

AI

Virtual Assistant (VA)

Plant
1. Min/Max values
2. Weight and volume
3. Evaporations
4. Degree days?? plant specific?
5. Past issues - good AND bad
6. Care - pruning, earthling etc.
7. Inclusion of moon calendar

.....

Farm
1. Planting capabilities
2. Order and supply structure
3. Dependencies
4. Staff reliability and availability
5. Cost structure

.....

Production Plan
1. When is the delivery window
2. How many plants
3. Requirements (climate, capacity....)
4. Align demand with capacity
5. Set up plan
6. Continuous monitoring , (re) action

.....

External Data

Predictive Production – Scenario by Plant

Ongoing weather and
Min/Max sensor monitoring.

(Dynamic) adjustments to
any parameter if necessary

Florja real-time

Production Plan

Growing Stage 1 (22 d) | Growing Stage 2 (18 d) | Loading/Transport (3 d) | Shop (2 d)

Day "0 - x"

Florja | Weather | Fertilization | Resources | Location (change) | Activity (i.e pruning)

Day "0"

AI

Virtual Assistant (VA)

External Data