Versuchszentrum
Centro di Sperimentazione
Research Centre
LAIMBURG
NATURE & SCIENCE: HAND IN HAND

LIDO
LAIMBURG INTEGRATED
DIGITAL ORCHARD

efre·fesr
Südtirol · Alto Adige
Europäischer Fonds für regionale Entwicklung
Fondo europeo di sviluppo regionale

EUROPEAN UNION

AUTONOME
PROVINZ
BOZEN
SÜDTIROL

PROVINCIA
AUTONOMA
DI BOLZANO
ALTO ADIGE

OPEN DAY LIDO
autumn 2023

Smart irrigation
&
water stress sensors

10.10.2023, 08:30-12:00

Aula Magna
Laimburg Versuchszentrum, Pfatten (BZ)
Centro di Sperimentazione Laimburg, Vadena (BZ)

14 Partner

alperia Smart Land

bluetentacles
USE LESS, GROW MORE

ELMED

IMKO
Endress+Hauser
People for Process Automation

eurac research

feldfühler
- Sensoren für die professionelle Landwirtschaft -

life from cosmos finapp

FloraPulse

Fyllo Clip

likeM13
IoT solution provider

NEXT Farming

F&R BEREGNUNGSBAU

ODIS

PROSPECTO

WiseConn EUROPE


alperia
Projekt Smartland
wir sind
südtiroler
energie
siamo
l'energia
dell'alto adige

WAS IST SMARTLAND?

Sensortechnik für Fernmessung von Bodenfeuchtigkeit:

- **Reduzierung des Wasserverbrauchs**
- **Bedarfsgerechte Bewässerung**

Weinbau
W440

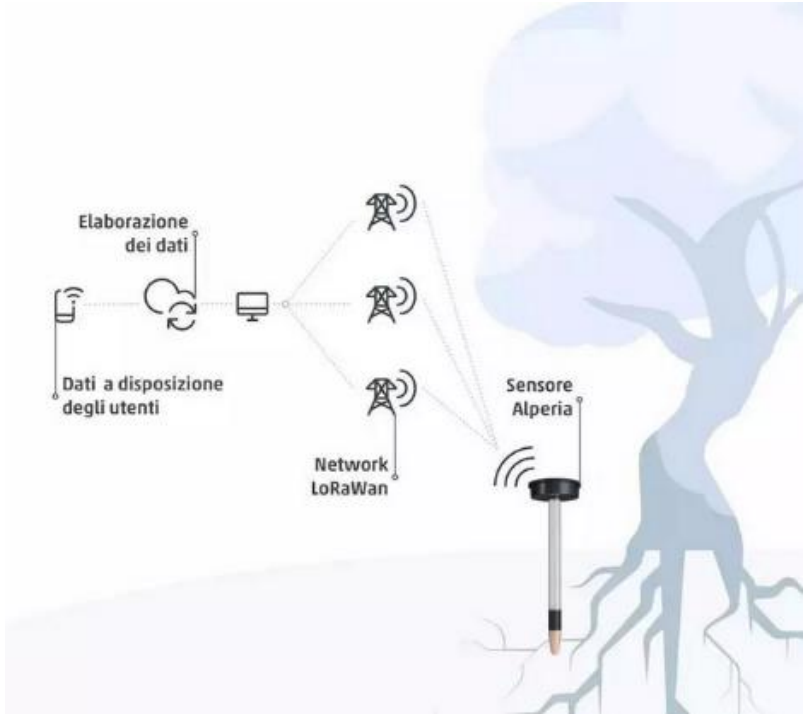
Obstbau
T360

DIE KOMPONENTEN VON SMARTLAND

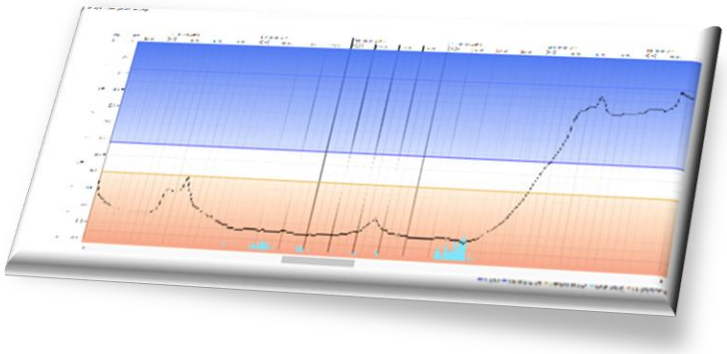
alperia

Sensoren

LoRaWan™ Funknetz



APP



Datenerfassung im Feld

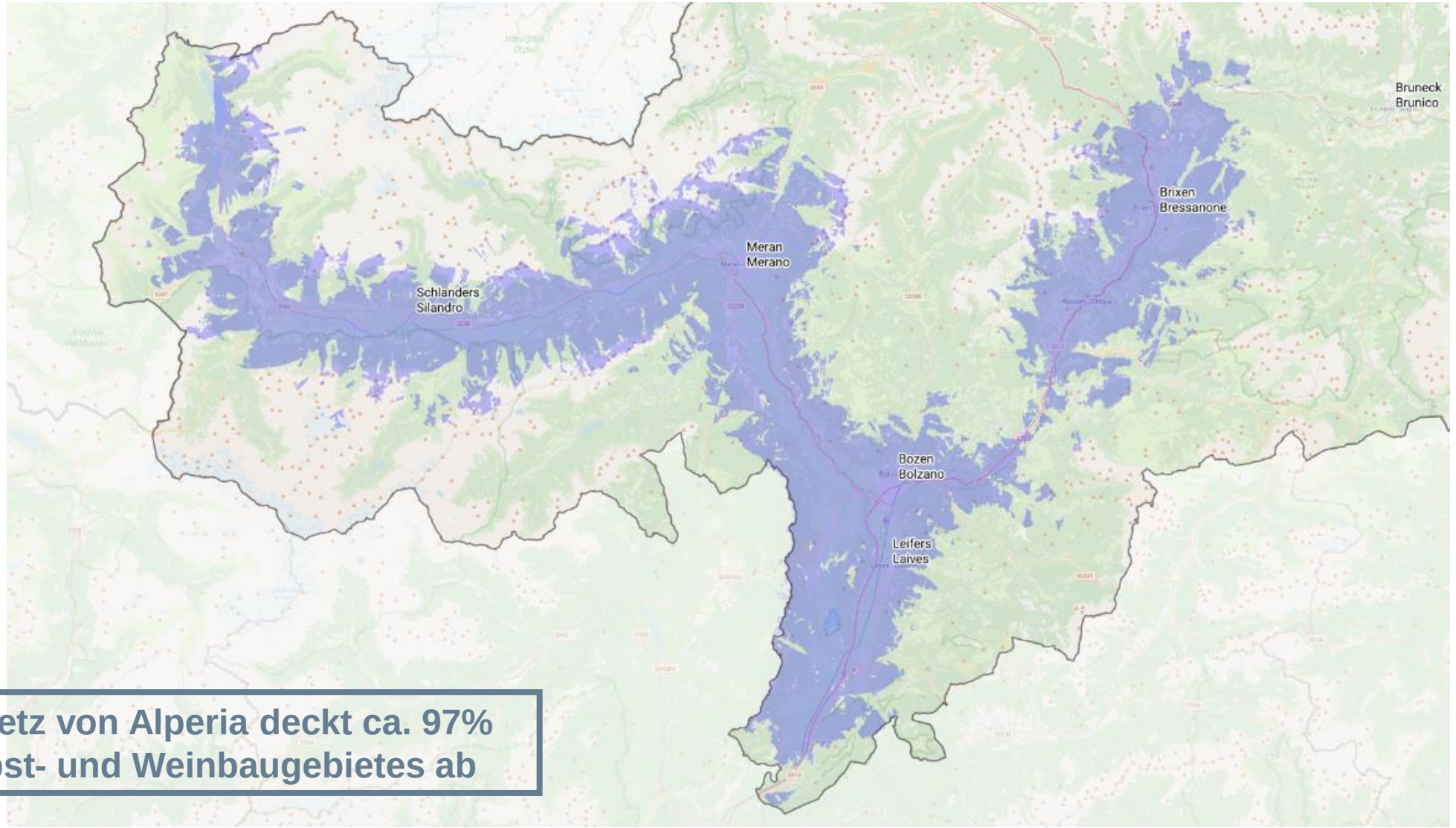
Datenübertragung

Datenverarbeitung und Bereitstellung

NETZABDECKUNG

alperia

Alperia betreibt ein eigenes LoRaWan™ Funknetz mit dem Zweck, IoT Geräte anzusteuern (Sensoren, Aktuatoren)



Das LoRaWan™ Netz von Alperia deckt ca. 97% des Südtiroler Obst- und Weinbaugebietes ab

PROJEKTENTWICKLUNG UND PARTNER

alperia

BESCHREIBUNG

Pilot Projekt

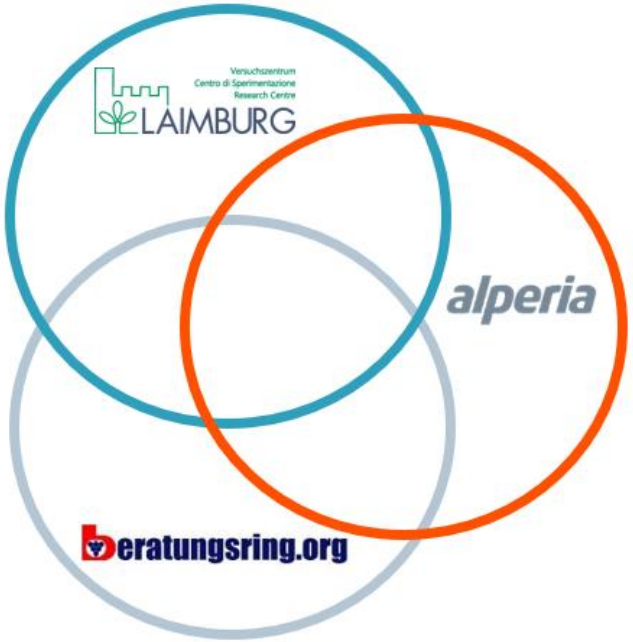
- 2017: Beginn
- 2019: Tests Prototypen

Start

- 2021: Start Verkauf Obstbausensor
- 2022: Start Verkauf Weinbausensor

Verkaufte Sensoren: knapp 500

PROJEKTPARTNER



EVOLUTION DES PROJEKTES

alperia

AUSBAUEN

Neue Anwendungsbereiche (Kirschen, Kastanien, Schwarzbeeren, Mais usw.)

VERBESSERN

Automatisierung der Bewässerung durch ferngesteuerte Ventile

ERWEITERN

Neue Sensortechnik (Ventilsteuerung, Niederschlagsmessung, usw.)

alperia

smartland@alperia.eu


bluetentacles
WATER LESS,
GROW MORE
L’irrigazione di precisione per l’Agricoltura di precisione

Hardware Bluetentacles

Controller-BlueC

Comandiamo
fino a **4 elettrovalvole**
(solenoide latch)

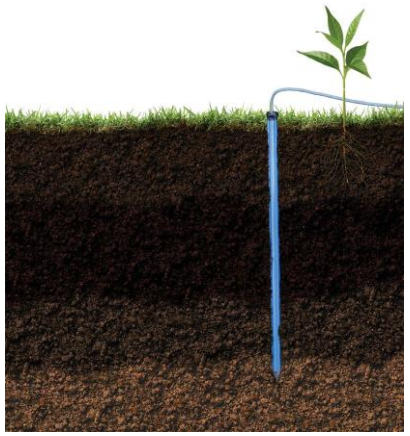
Leggiamo
fino a **4 sensori analogici contemporaneamente**
in canali di alimentazione separati
(3,3/5/24V)

3,3V

5 V

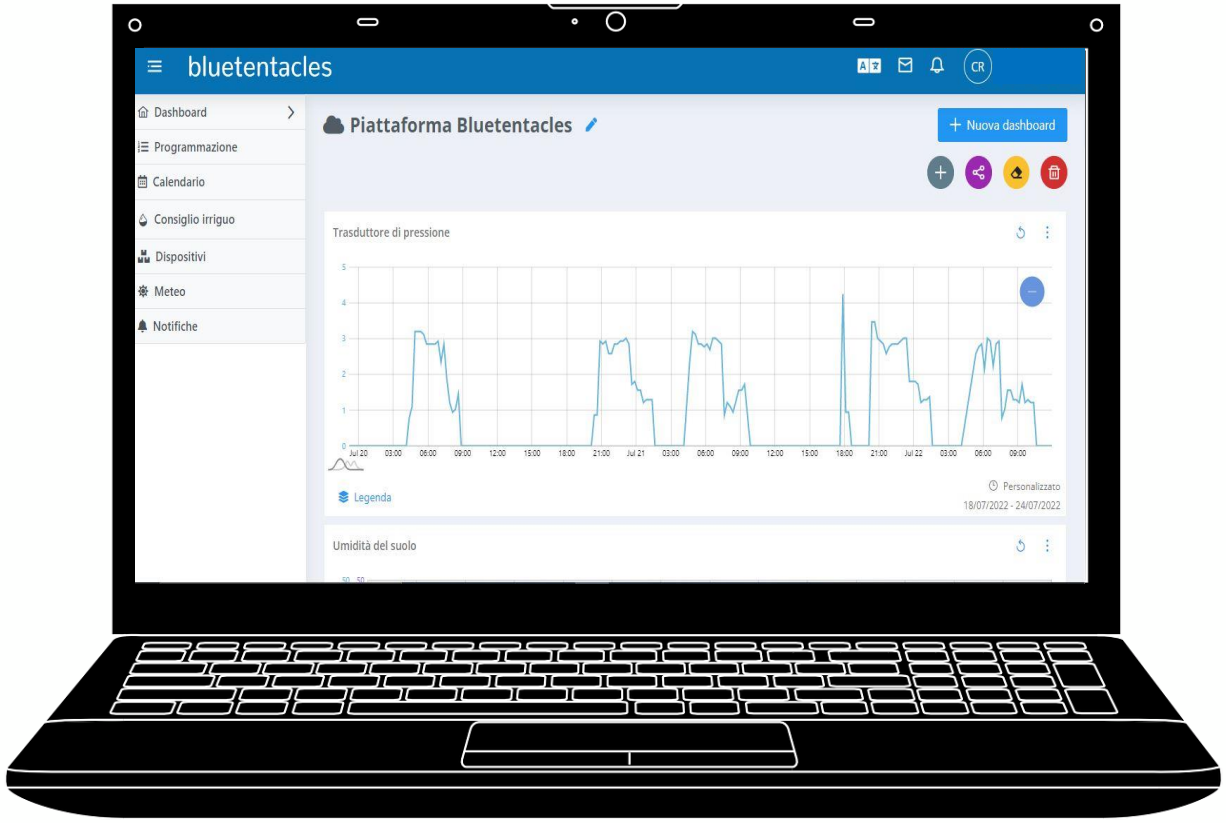
24 V

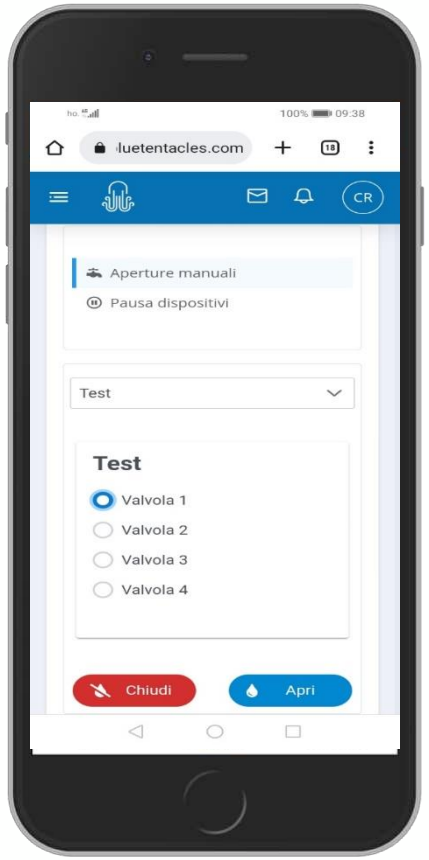
Leggiamo un
numero illimitato di sensori digitali
i2C



Web Application

accendere, spegnere, programmare e verificare l’irrigazione e la sensoristica in campo





Bluetentacles permette di avere il controllo completo e di poter accendere o spegnere il proprio impianto irriguo da qualsiasi dispositivo collegato a internet e aiuta l'agricoltore nel prendere decisioni mediante l’integrazione dei diversi tipi di dati di input prelevanti dai dispositivi in campo.

Vantaggi derivanti dall'utilizzo della soluzione Bluetentacles

- Miglioramento della resa
- Risparmio di tempo
- Risparmio energetico
- Limitazione degli eccessi di irrigazione (esempio ciliegia)
- Limitazione e contenimento delle malattie fungine con il monitoraggio della bagnatura fogliare
- Creazione di archivi storici e ottimizzazione delle rese, con la possibilità di individuare a posteriori eventi o situazioni da non ripetere

Bodenfeuchte

Endress+Hauser & IMKO

Vorstellung **Florian** Falger und **Cornelius** Jantschke

Florian Falger

Business Development Manager
Innovation Lab

Wirtschaftsingenieur

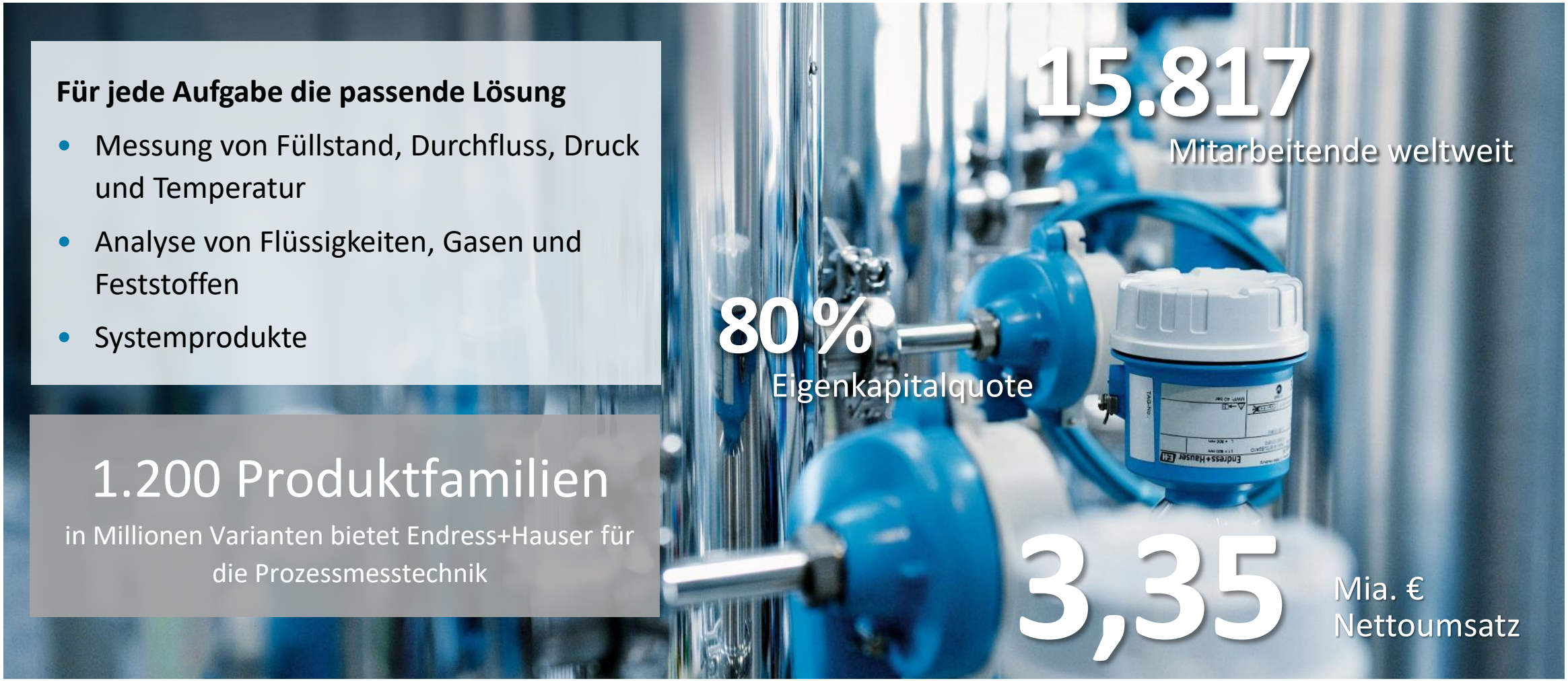
Dr. sc. agr. Cornelius Jantschke

Leitung Marketing und Vertrieb

Agrarwissenschaften (Hohenheim)

Fachrichtung Agrartechnik Tropen-Subtropen, Kommunaltechnik, Sensortechnik

Das umfassendste Angebot in der Prozessmesstechnik



Für jede Aufgabe die passende Lösung

- Messung von Füllstand, Durchfluss, Druck und Temperatur
- Analyse von Flüssigkeiten, Gasen und Feststoffen
- Systemprodukte

1.200 Produktfamilien

in Millionen Varianten bietet Endress+Hauser für die Prozessmesstechnik

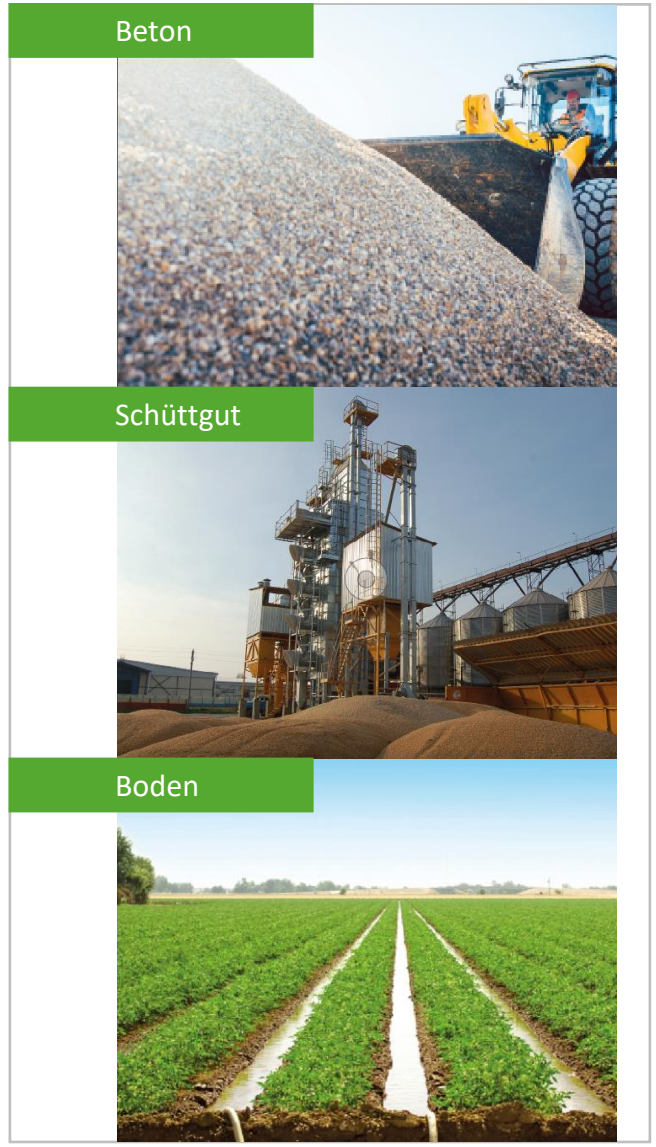
15.817
Mitarbeitende weltweit

80 %
Eigenkapitalquote

3,35
Mia. €
Nettoumsatz

Feuchtemessung seit 40 Jahren

- 20 Mitarbeiter
  - F&E, Produktion, Service, Marketing, Vertrieb
- Materialfeuchtemessung in allen Industrien
- Bodenfeuchtemessung mittels TDR
  - Zusätzlich Leitfähigkeit und Temperatur
- Vorteile:
  - sehr großes Messfeld von ca. 2,5L
  - kein Einfluss durch Salinität
  - kein Einfluss durch große Wurzeln im Messfeld



Time Domain Measurement with the TDR Method

0,000 000 000 001

- 1/10-Second
- 1/100-Second
- 1/1000-Second (Milli-Second)
- Micro-Second
- Nano-Second
- One Pico-Second

$$c = \frac{c_0}{\sqrt{\varepsilon * \mu}} = \frac{2l}{t}$$

$$t = \frac{2l}{c_0}\sqrt{\varepsilon_r}$$

c_0 = Light Speed ($3x10^8$ m/sec)
μ = 1 (magnetic Permeability)
ε = Dielectric Constant
t = Time Duration
$2l$ = Length of Radar line (back and forth)

Moisture Sensor Experts

eurac research

Center for Sensing Solutions

eurac research

Smart Irrigation Monitoring System

R. Mendicino, S. Tritini, A. Mejia-Aguilar, R. Monsorno

LIDO OPEN DAY 10.10.2023

Eurac Research Overview

Eurac Research

- Private non-profit research institution
- Founded 1992
- Ca. 700 employees
- 11 research institutes and 5 research centres

Institutes

- Institute for Alpine Environment
- Institute for Applied Linguistics
- Institute for Biomedicine
- Institute for Comparative Federalism
- Institute for Earth Observation
- Institute for Minority Rights
- Institute of Mountain Emergency Medicine
- Institute for Mummy Studies
- Institute for Public Management
- Institute for Regional Development
- Institute for Renewable Energy

Administrative Departments

- Communication
- Controlling & Accountancy
- Education & Training
- Facility Management
- Health, Safety & Environment
- Human Resources
- Information Technologies
- Legal Office
- Library
- Meeting Management
- Procurement
- Research Support Office
- Statistics Office
- Team Assistants

Centers

- Center for Advanced Studies
- Center for Autonomy Experience
- Center for Climate Change and Transformation
- Center for Global Mountain Safeguard Research
- Center for Sensing Solutions
- terraXcube

Representing Offices:
Rome, Vienna

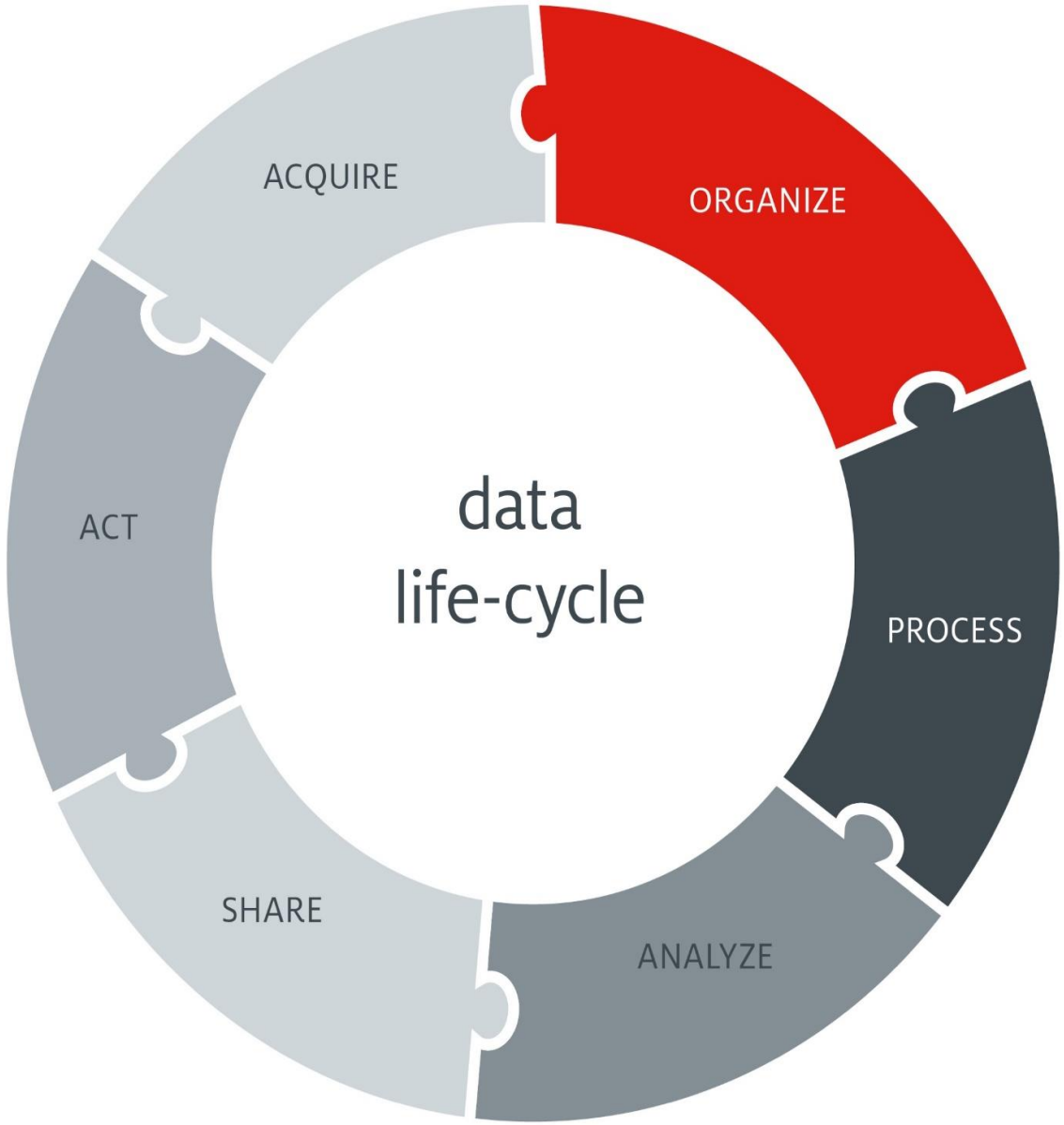
http://www.eurac.edu

Center for Sensing Solutions

Il Center for Sensing Solutions è in grado di gestire l'intero ciclo dei dati.

Il nostro approccio orientato ai dati segue i principi FAIR (Findable, Accessible, Interoperable and Reusable) e si basa principalmente su tecnologie open source.

Progettiamo e sviluppiamo soluzioni ad alta tecnologia ma facili da usare che potranno diventare la base per una produzione standardizzata.



Eurac - EDP

Network capabilities

Application layer

WebGIS applications

APIs

Analytics web tools

Data catalog

User authentication and authorization

Privacy

Service and support layer

Data processing

Data platform

Data collection

Long term storage

Data ownership (openSource, licensed)

Data protection

Middle layer

Network manager

Data transfer and check

Device authentication

Device layer

Devices

- Cameras
- Enviromental sensors
- Microcontrollers

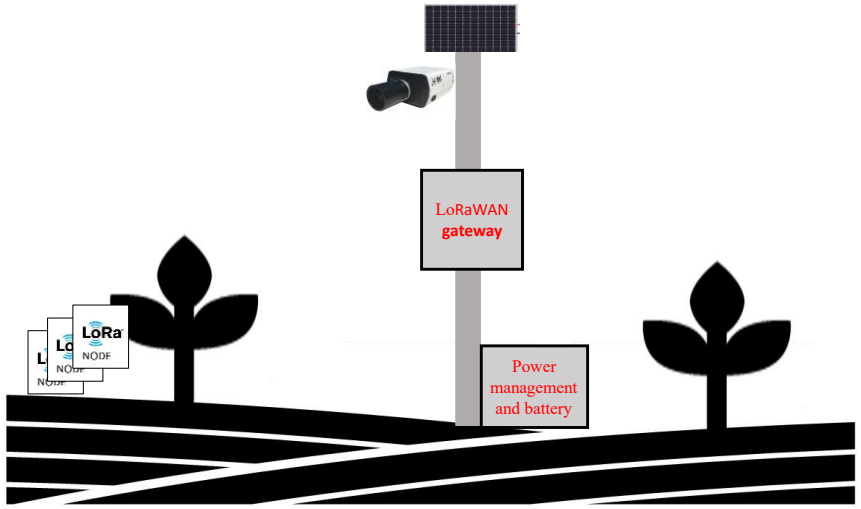
Gateways

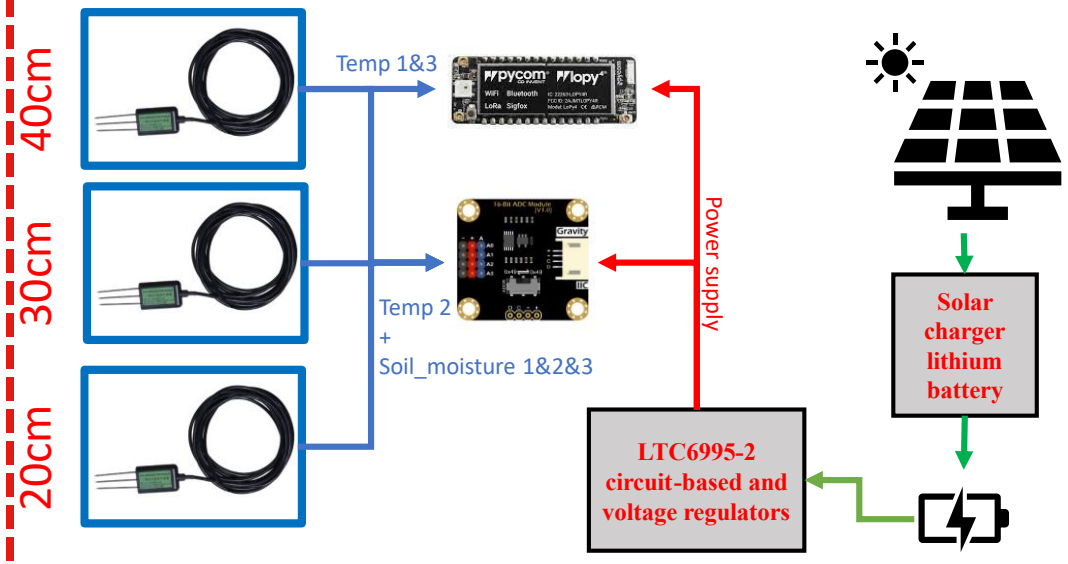
- Communication protocols
- Short term storage

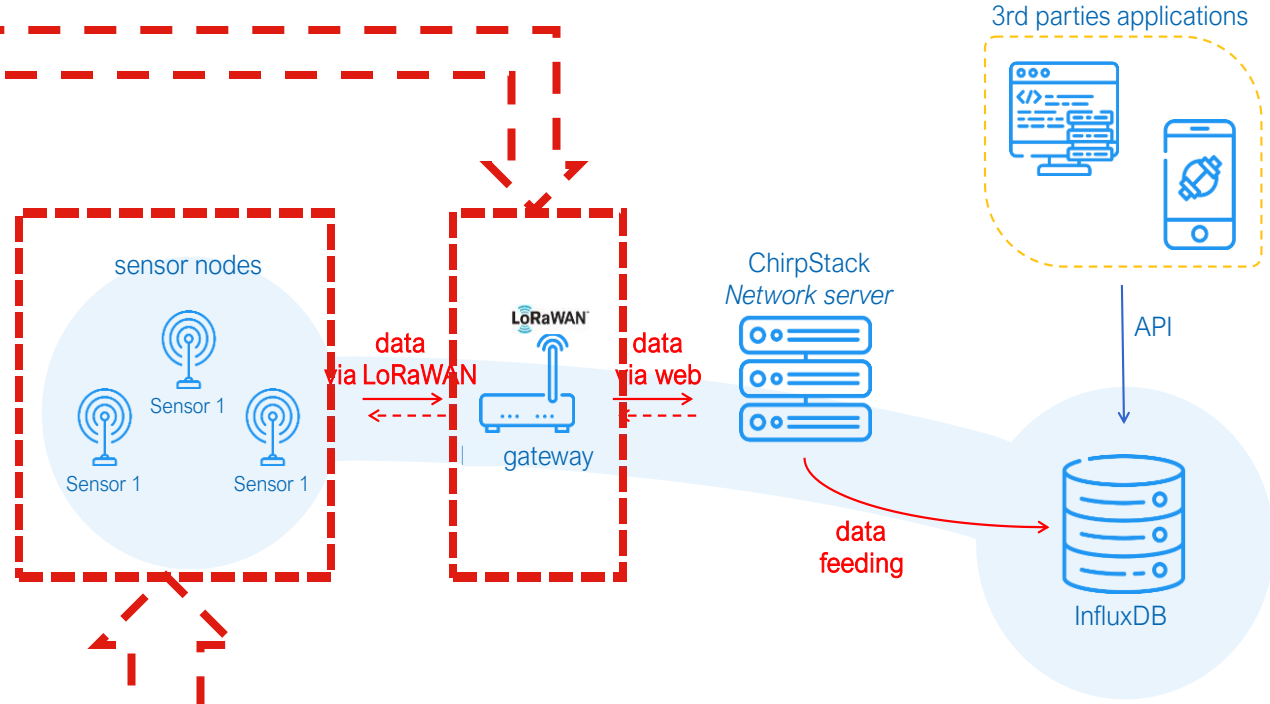
Security capabilities

Architecture

Architettura del Sistema



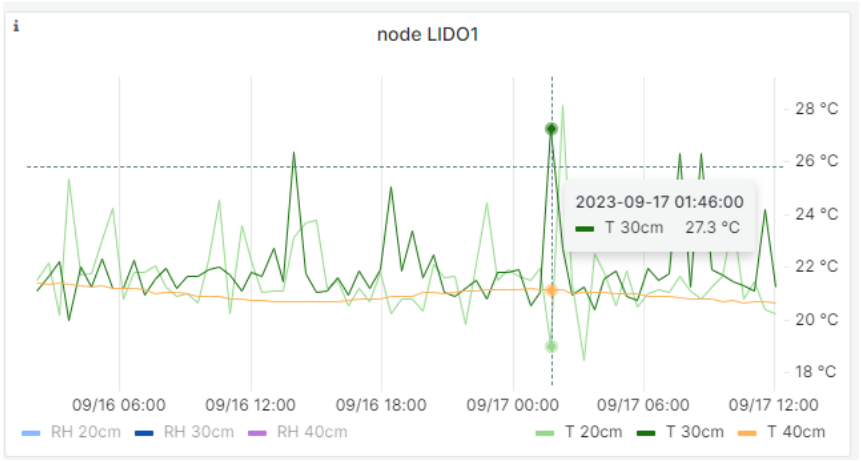


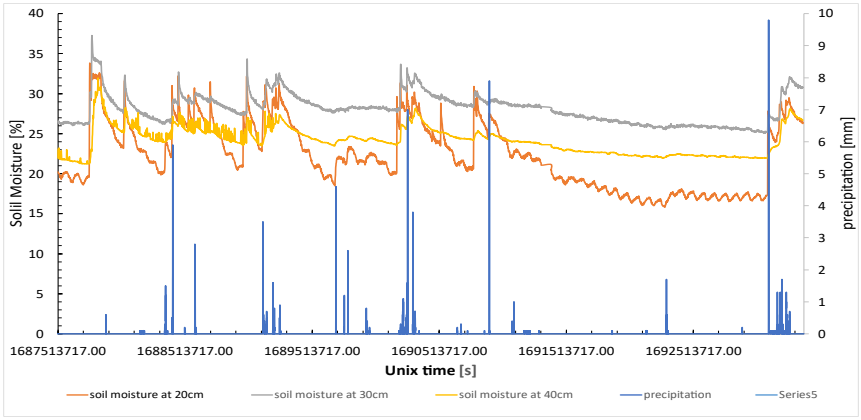


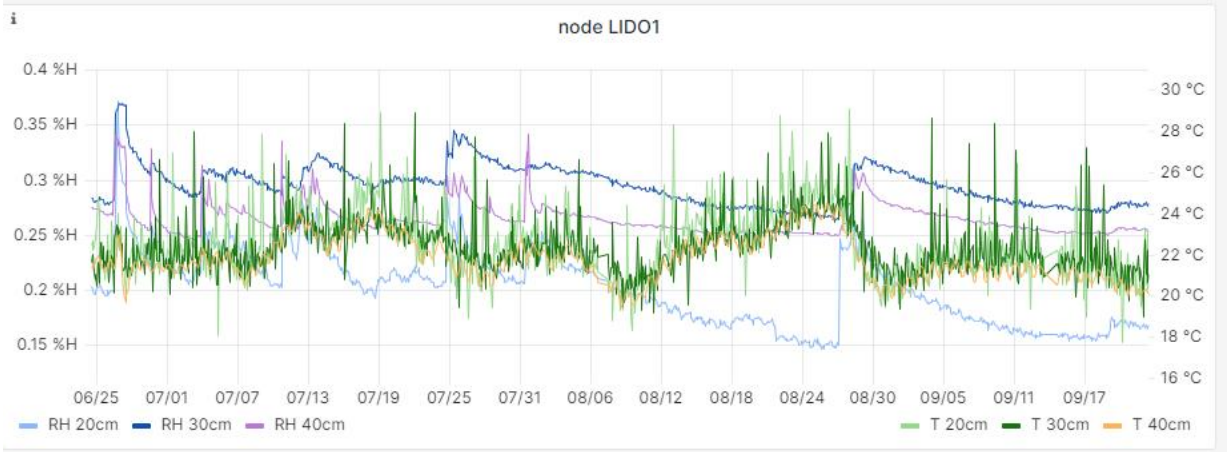
The gateway will switch on the phenocam and send the data (images and LoRaWAN packet) using an LTE internet connection.

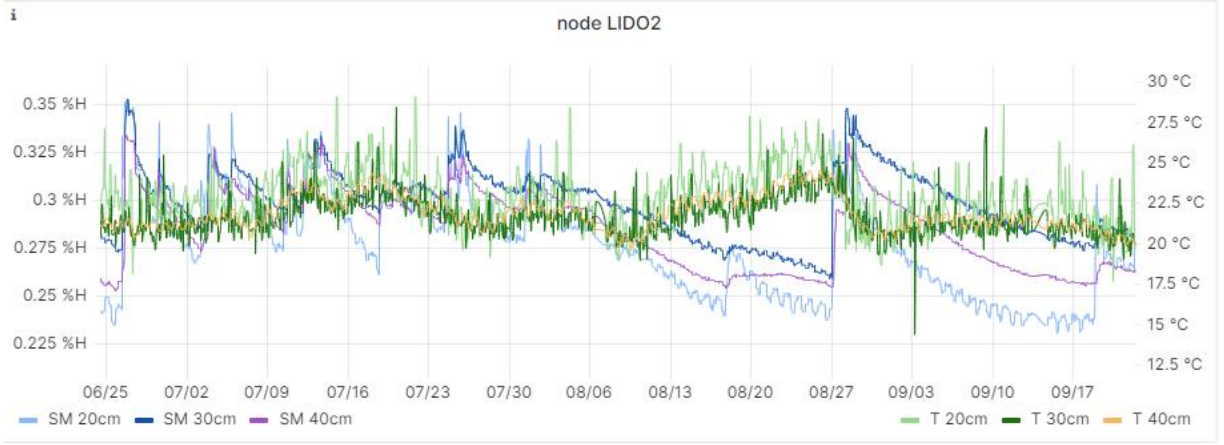
Misure Nodi LoraWAN

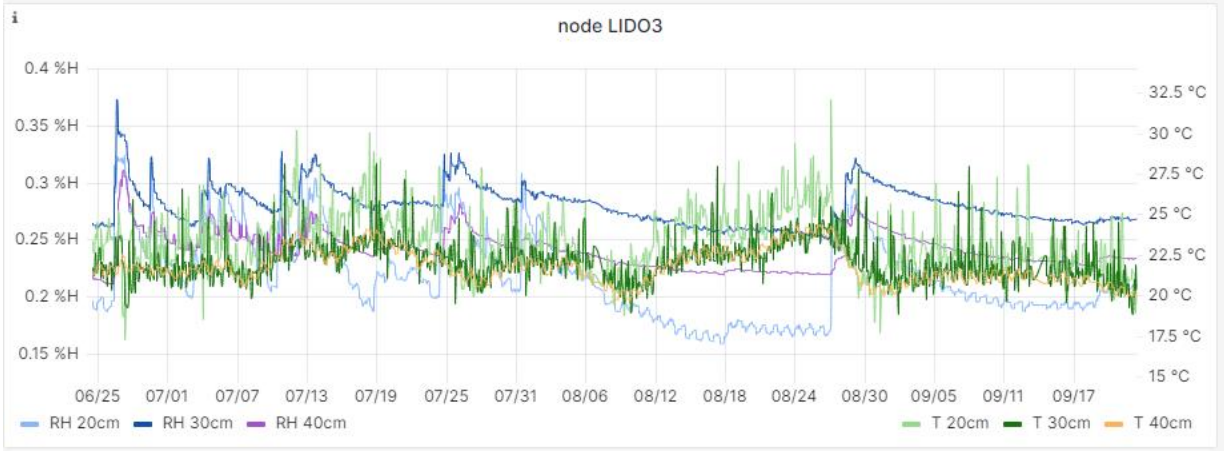
Dashboard


node LIDO1
2023-09-17 01:46:00
T 30cm 27.3 °C
28 °C
26 °C
24 °C
22 °C
20 °C
18 °C
09/16 06:00
09/16 12:00
09/16 18:00
09/17 00:00
09/17 06:00
09/17 12:00
RH 20cm
RH 30cm
RH 40cm
T 20cm
T 30cm
T 40cm


Solil Moisture [%]
precipitation [mm]
1687513717.00
1688513717.00
1689513717.00
1690513717.00
1691513717.00
1692513717.00
Unix time [s]
soil moisture at 20cm
soil moisture at 30cm
soil moisture at 40cm
precipitation
Series5

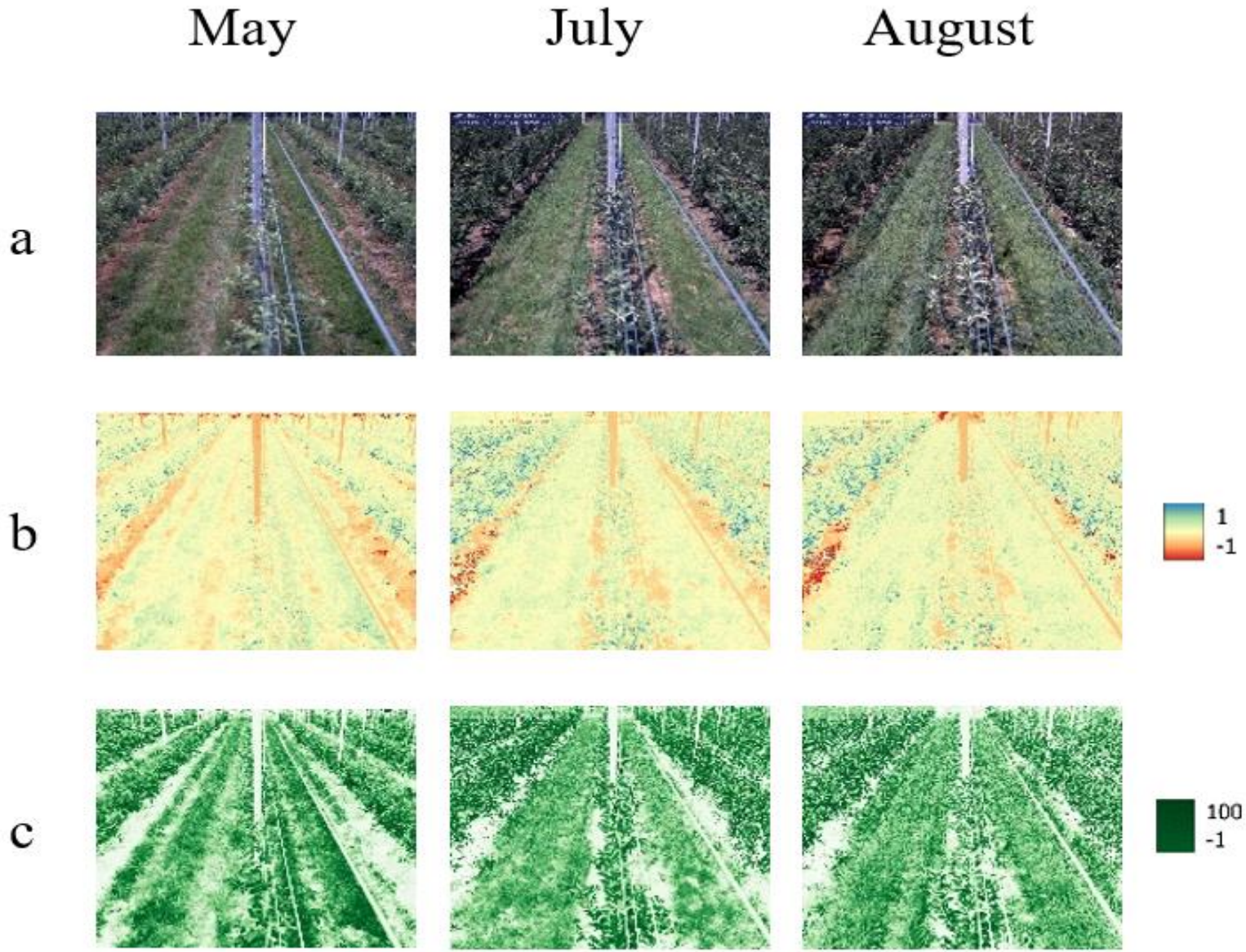

node LIDO1
0.4 %H
0.35 %H
0.3 %H
0.25 %H
0.2 %H
0.15 %H
30 °C
28 °C
26 °C
24 °C
22 °C
20 °C
18 °C
16 °C
06/25
07/01
07/07
07/13
07/19
07/25
07/31
08/06
08/12
08/18
08/24
08/30
09/05
09/11
09/17
RH 20cm
RH 30cm
RH 40cm
T 20cm
T 30cm
T 40cm


node LIDO2
0.35 %H
0.325 %H
0.3 %H
0.275 %H
0.25 %H
0.225 %H
30 °C
27.5 °C
25 °C
22.5 °C
20 °C
17.5 °C
15 °C
12.5 °C
06/25
07/02
07/09
07/16
07/23
07/30
08/06
08/13
08/20
08/27
09/03
09/10
09/17
SM 20cm
SM 30cm
SM 40cm
T 20cm
T 30cm
T 40cm

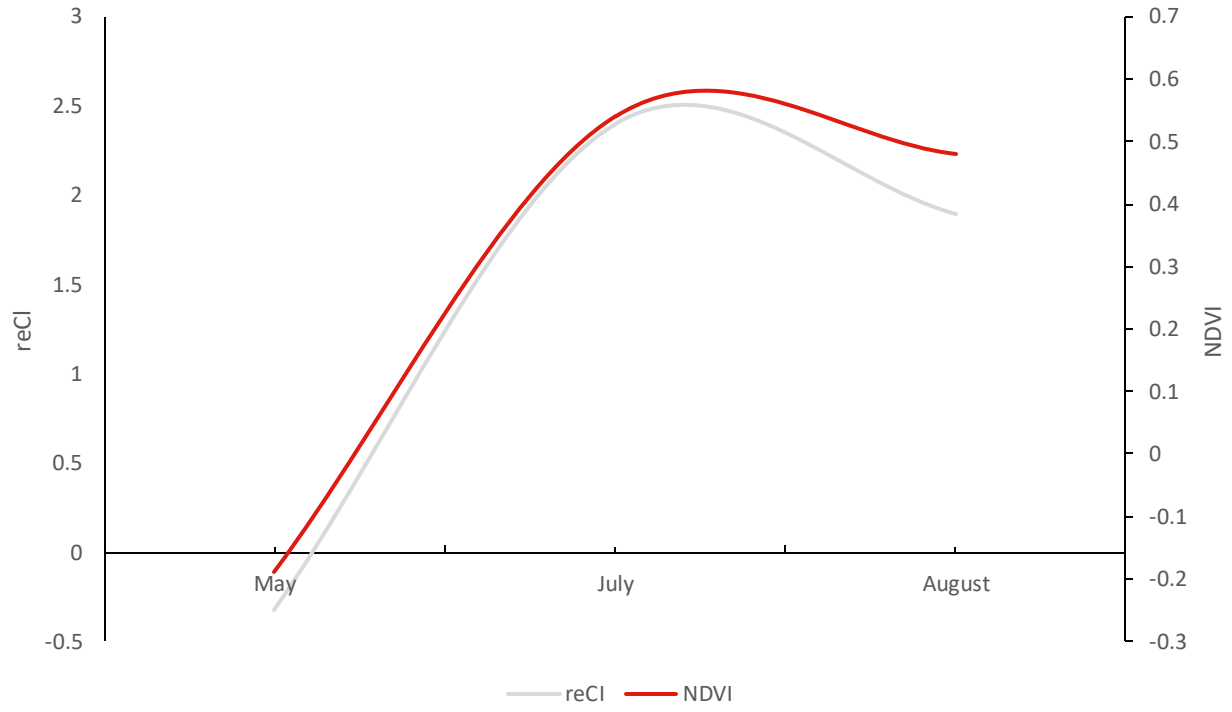

node LIDO3
0.4 %H
0.35 %H
0.3 %H
0.25 %H
0.2 %H
0.15 %H
32.5 °C
30 °C
27.5 °C
25 °C
22.5 °C
20 °C
17.5 °C
15 °C
06/25
07/01
07/07
07/13
07/19
07/25
07/31
08/06
08/12
08/18
08/24
08/30
09/05
09/11
09/17
RH 20cm
RH 30cm
RH 40cm
T 20cm
T 30cm
T 40cm

Indici Vegetazione

NDVI



NDVI and reCl timelines



Reduction in NDVI between July and August: pruning?

Contact us

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T +39 0471 055 930

eurac
research

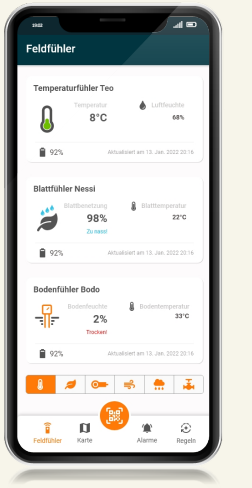
feldfühler

- Sensoren für die professionelle Landwirtschaft -

VISION

- Sensorik für Jeden
- Steigerung Arbeitseffizienz
- Senkung Anbaukosten

Frostüberwachung



JETZT BEI Google Play

Laden im App Store

1

2

3

feldfühler

Pflanzenschutz

1

2

3

JETZT BEI Google Play

Laden im App Store

feldfühler

Bewässerung

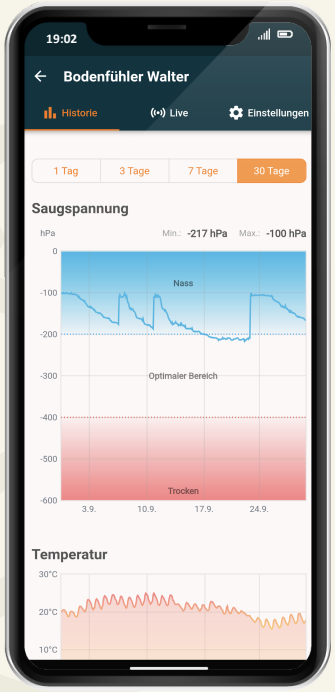
1

2

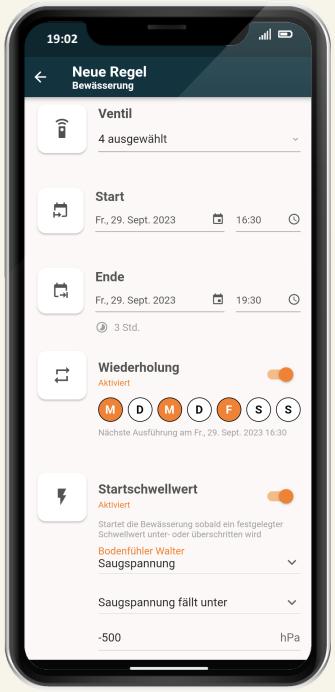
3

feldfühler

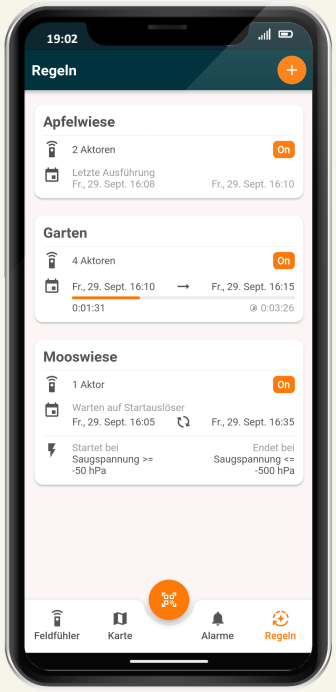
Bedarfsgerechte BEWÄSSERUNG



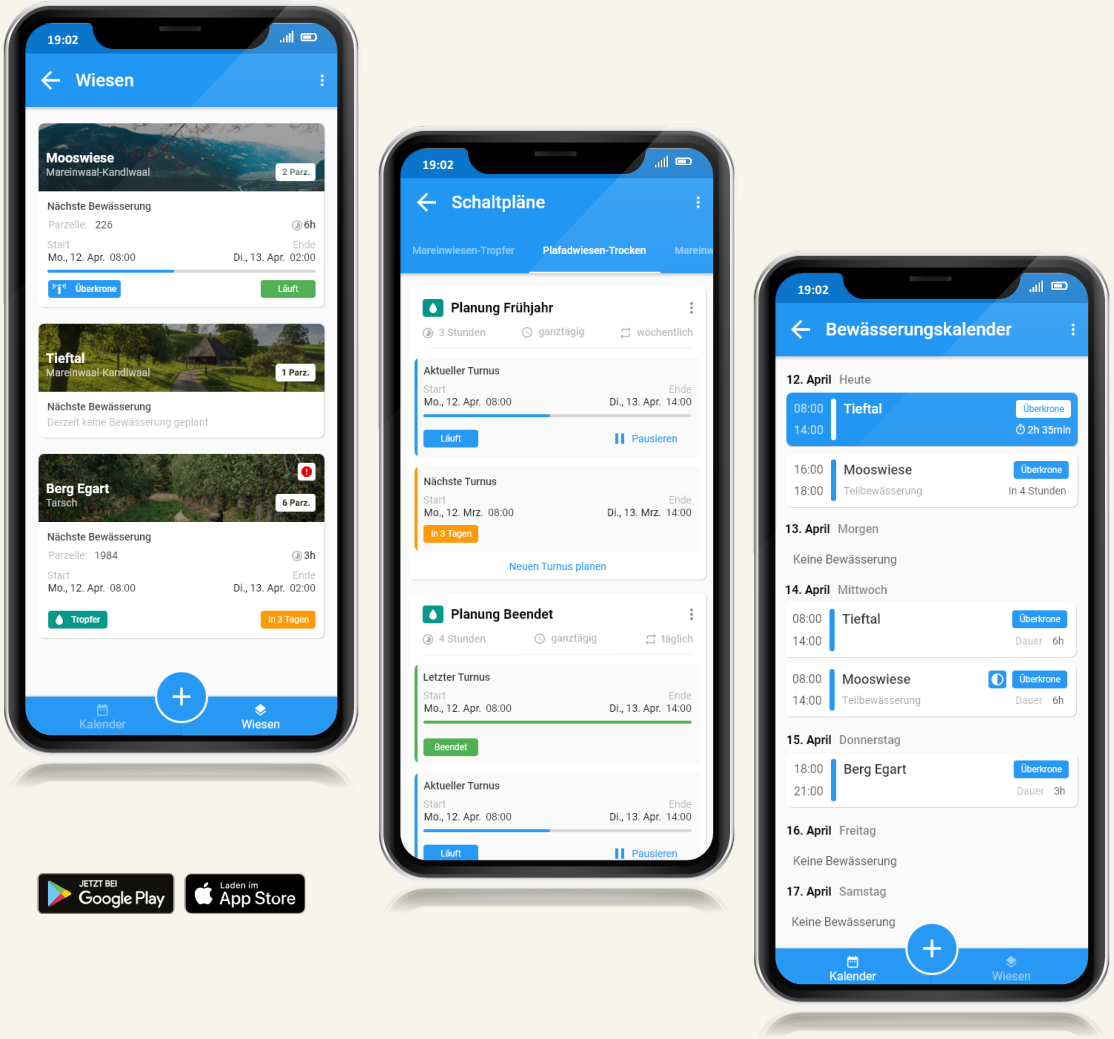
Informieren



Planen



Steuern



JETZT BEI Google Play

Laden im App Store

KONSORTIALE BEREGNUNGS-ANLAGEN

- Automatisierung
- Überwachung
- Mitglieder Informieren

KÜNSTLICHE INTELLIGENZ

Digital Twin

Digitales Feld

Reinforcement Learning

Neue Bewässerungsstrategien

feldfühler

- Sensoren für die professionelle Landwirtschaft -

Christian Stolcis
Dr.-Ing.

+39 0473 711108
christian@feldfuehler.app

feldfühler.app

Open day LIDO
Laimburg – 10 Ott. 2023

Innovative soil moisture Finapp probe advantages in measuring water in orchard field

Stefano Gianessi[1]

Andrea Sala[1]

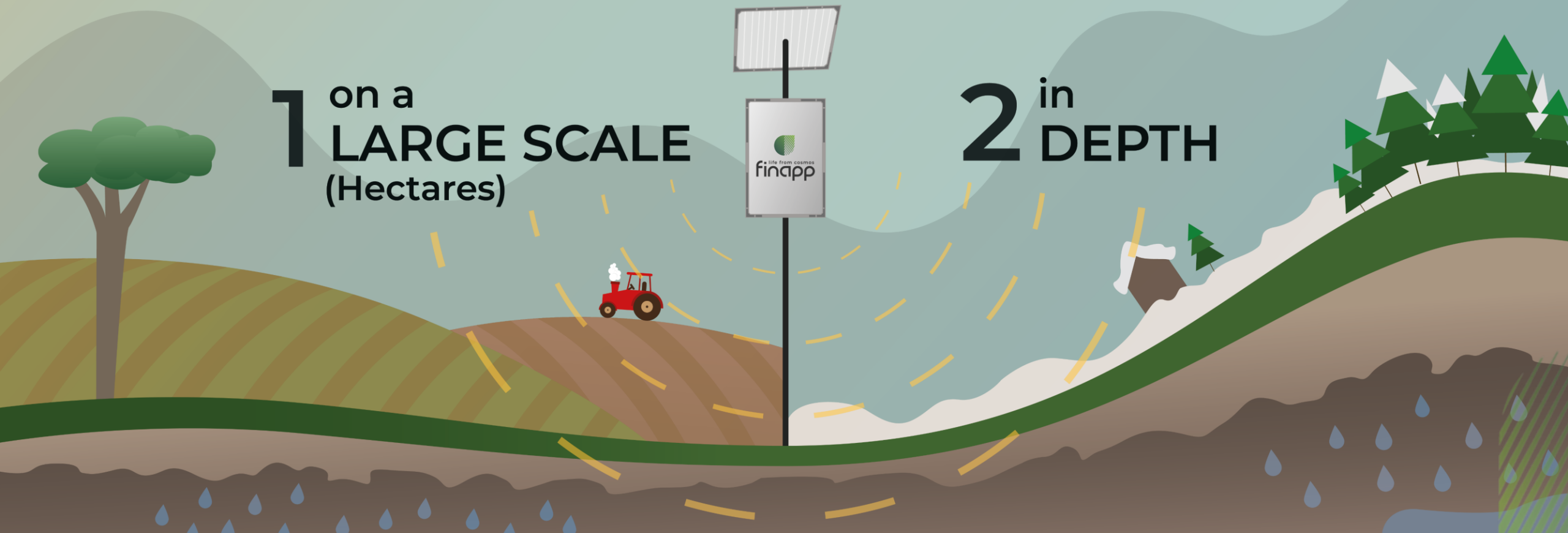
1 Finapp S.r.l., via del Commercio, 27 Montegrotto Terme (PD)

FOCUS

We measure **WATER**

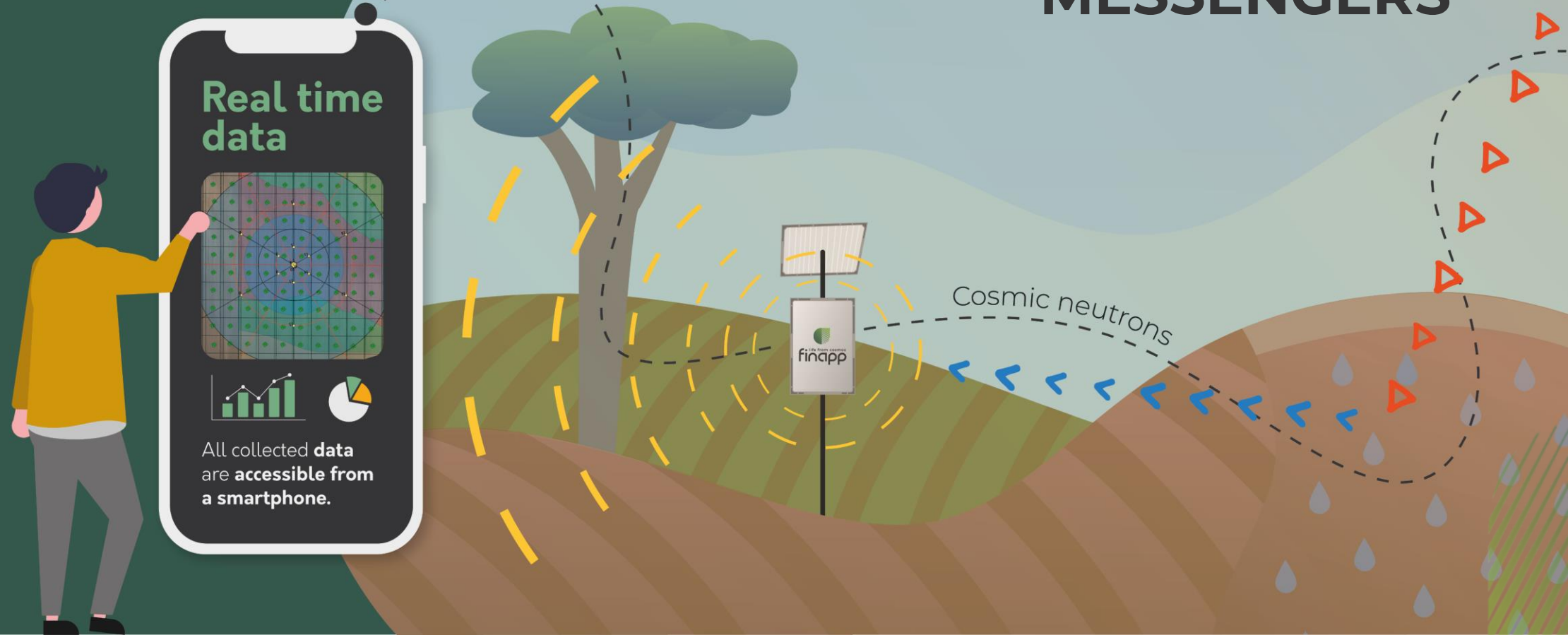
1 on a **LARGE SCALE** (Hectares)

2 in **DEPTH**



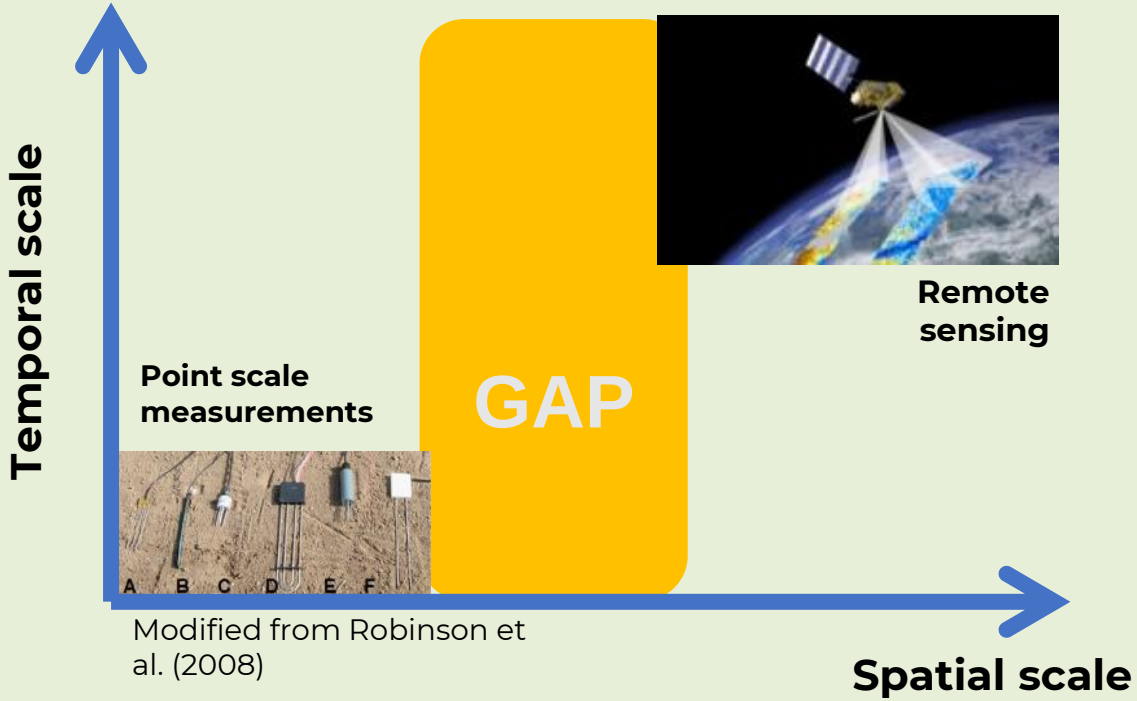
How does **CRNS technology** work?

COSMIC NEUTRONS are our MESSENGERS



“Filling the gap” in measuring soil moisture

	Real Time	In Depth	Large Scale	Resilience
finapp	✓	✓	✓	✓
Point Probe	✓	✓	✗	✗
Satellite	✗	✗	✓	✓



Modified from Robinson et al. (2008)

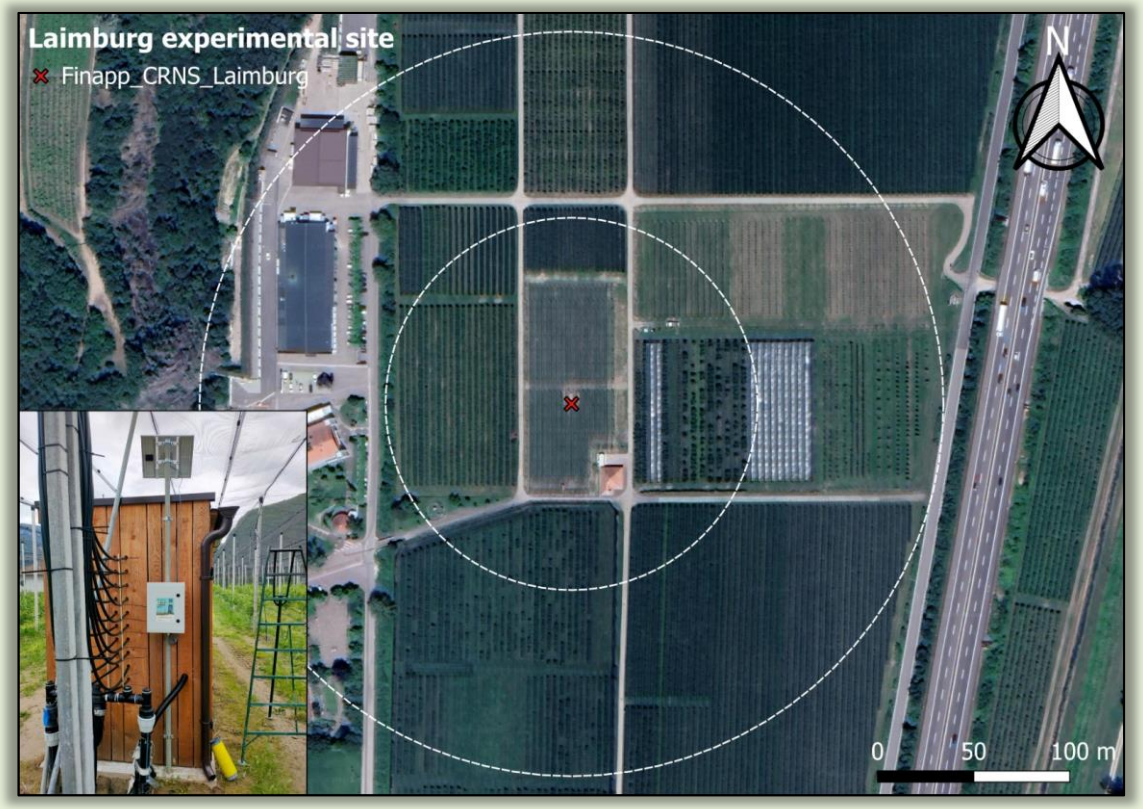
Value proposition

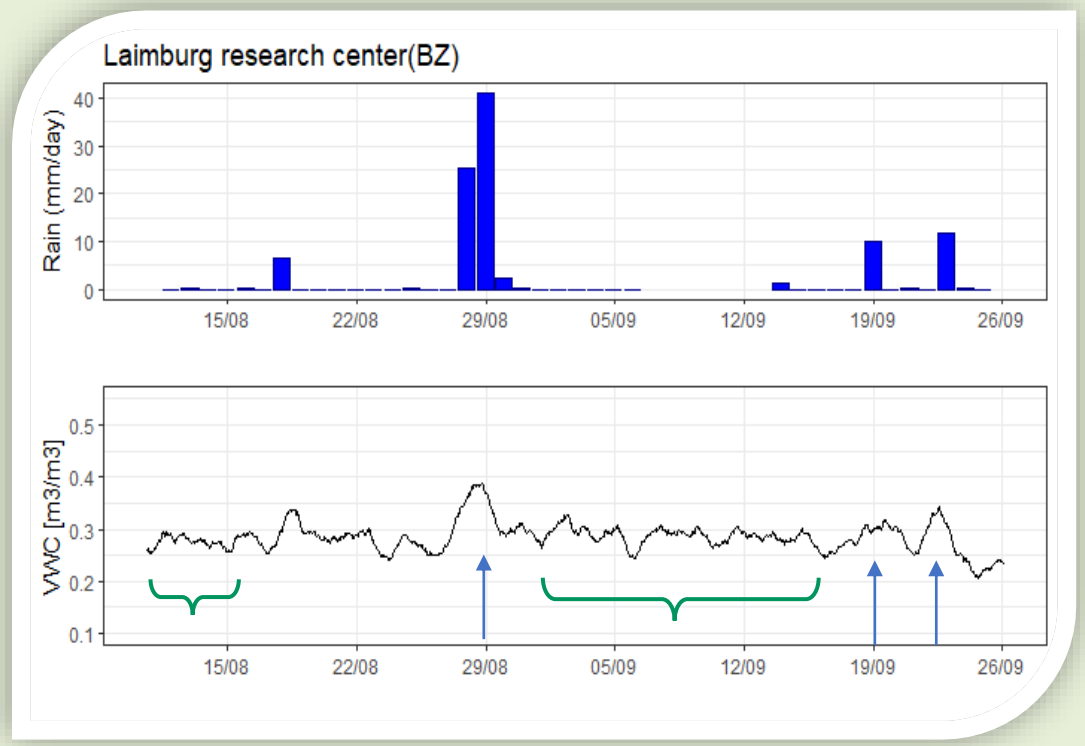
Save Water

Increase crop yield

Save money

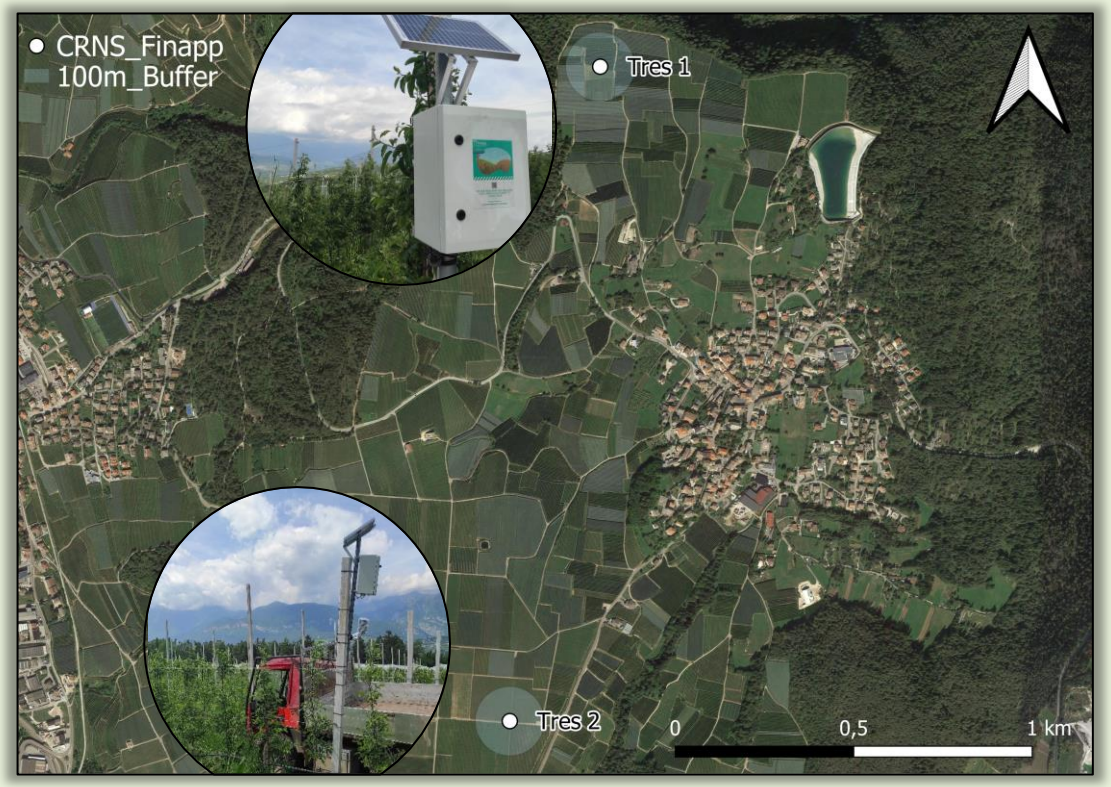
Laimburg Integrated Digital Orchard (LIDO)

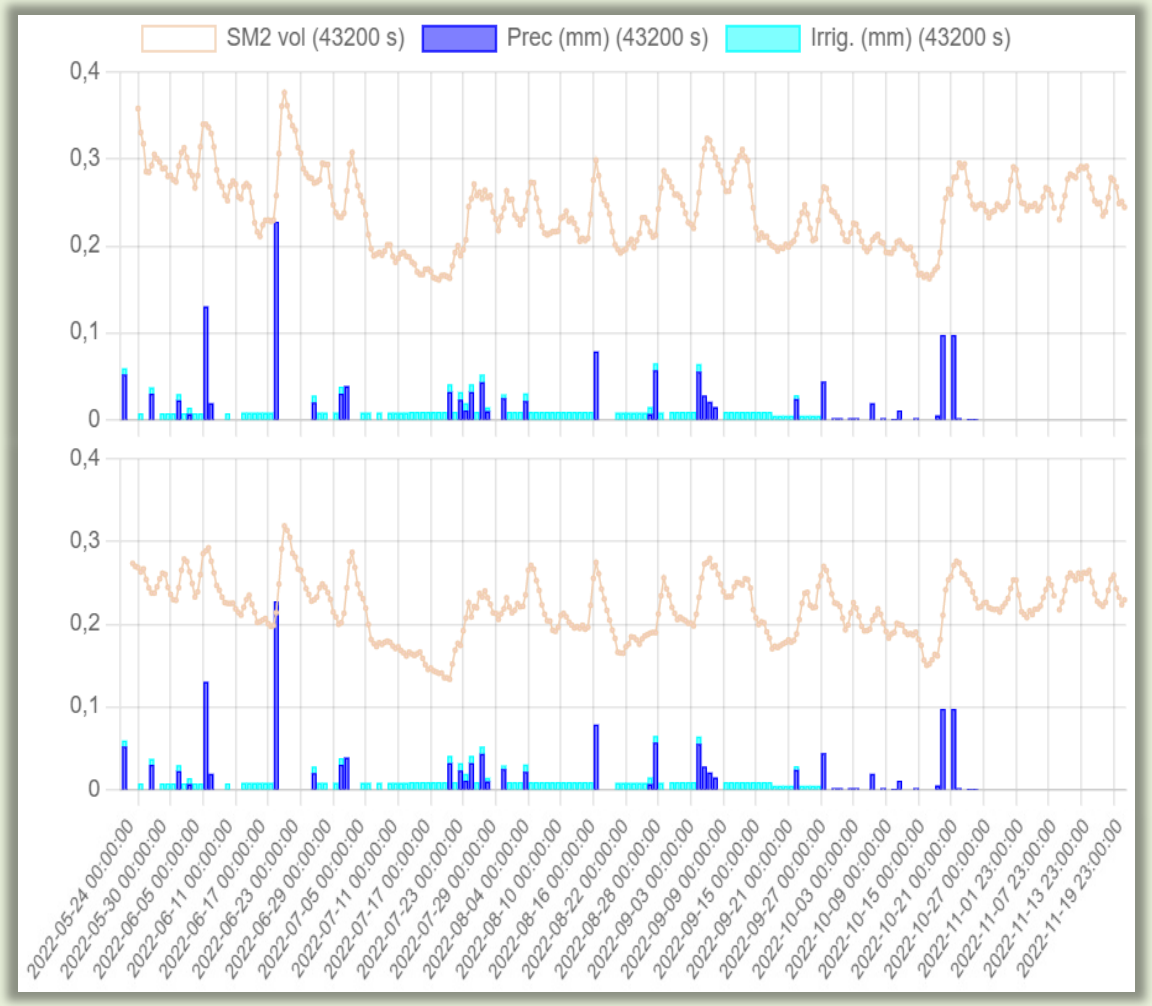




CRNA-Finapp volumetric soil moisture in agreement with precipitation
In green, possible irrigation periods?

Finapp probe testing with FEM in apple orchards (Tres, Val di Non)



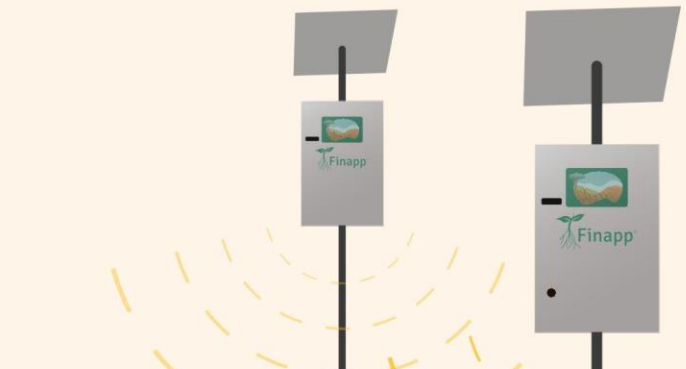


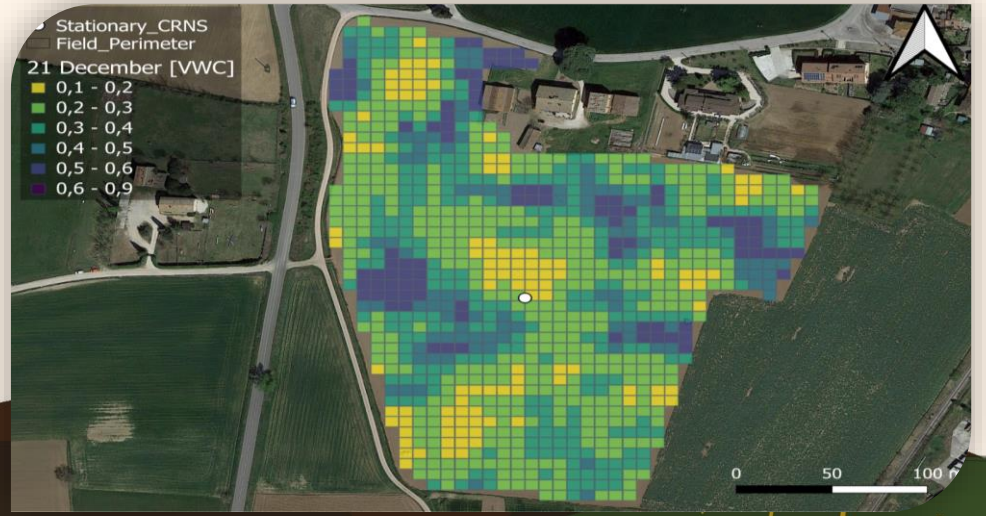
- Ease of installation and reliability of the system during the measurement period
- Monitoring of stress periods and irrigation effectiveness

Rover application – mapping moisture spatial variabilities

Field smart management

Acquiring moisture variability maps while doing agronomic practices





Thank you for your attention

Life from Cosmos

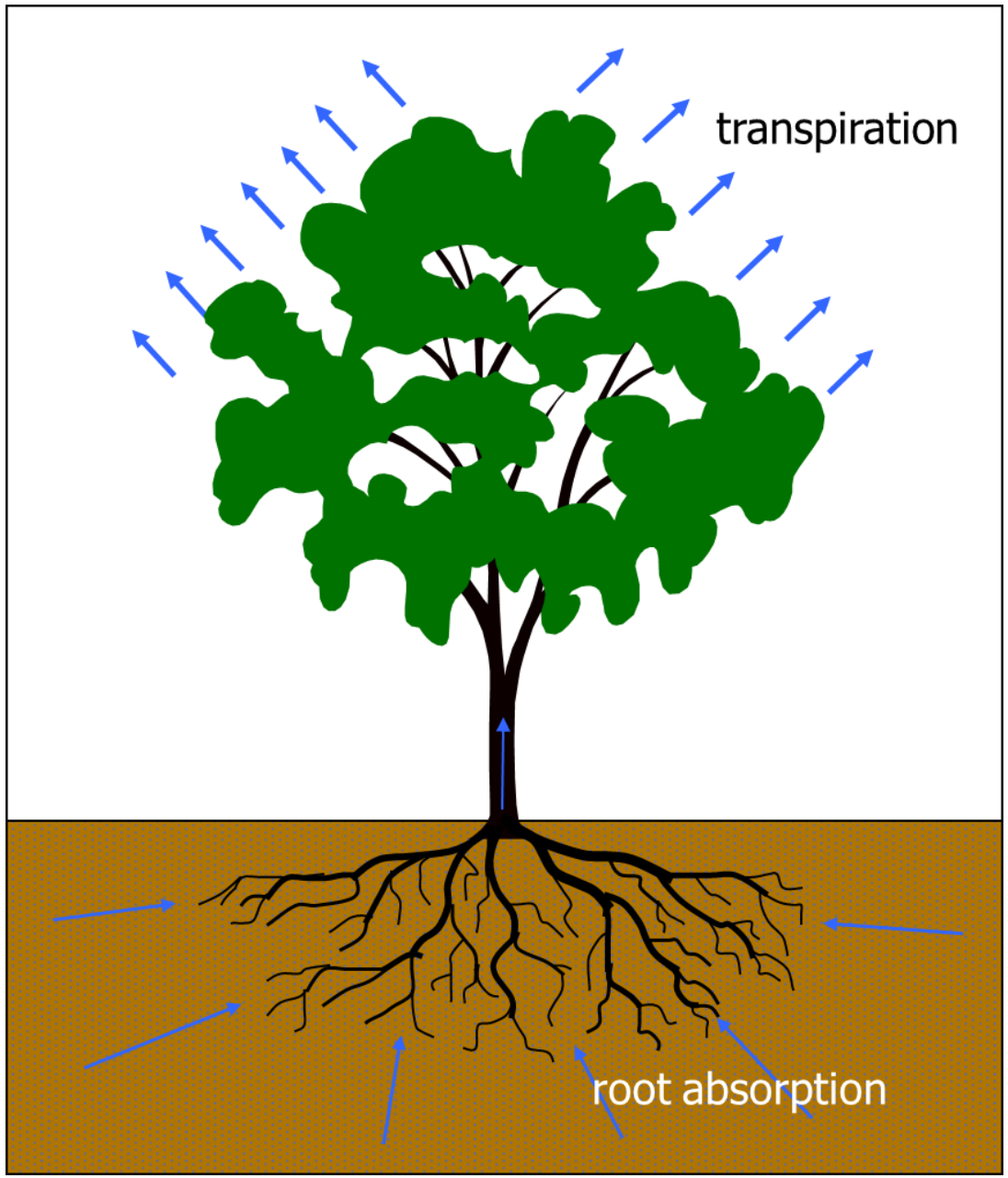
Via del Commercio 27 - Montegrotto Terme (PD) - IT
www.finapptech.com
info@finapptech.com

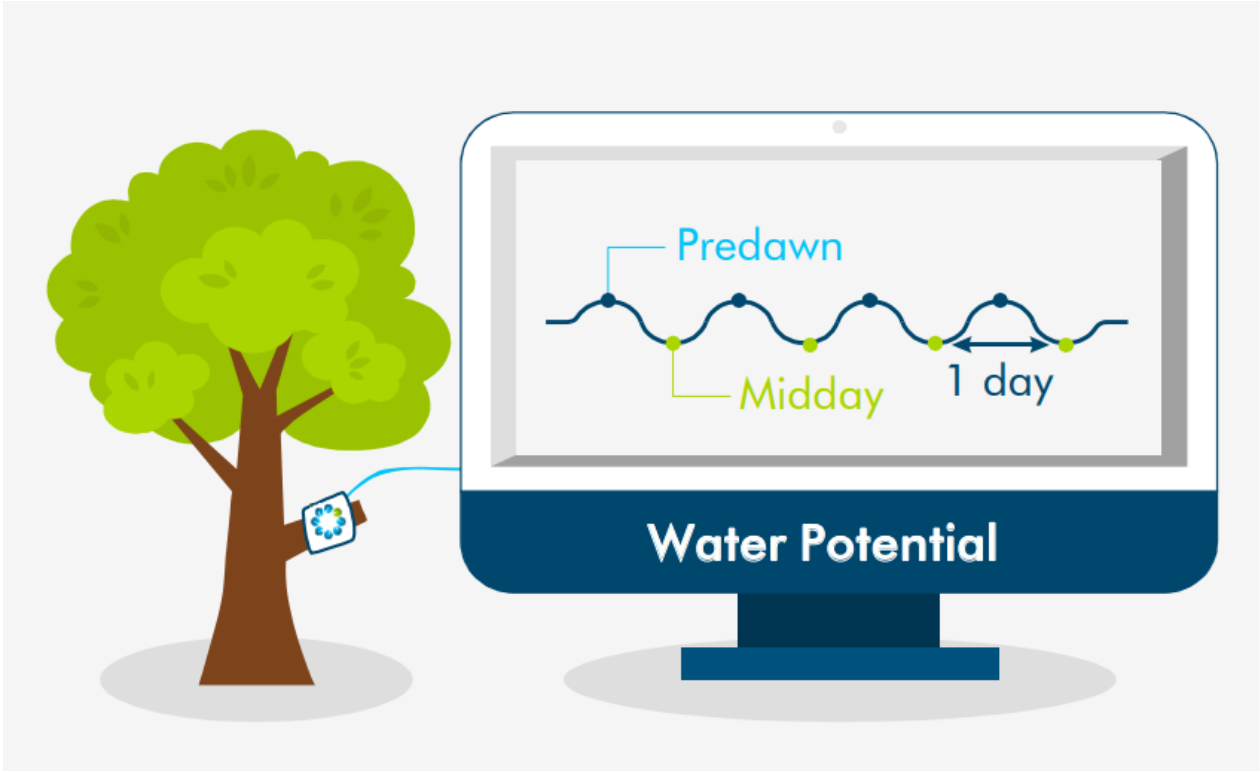
FloraPulse

stem water potential sensors

FloraPulse

Versuchszentrum
Centro di Sperimentazione
Research Centre
LAIMBURG
NATURE & SCIENCE: HAND IN HAND





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Lakso, Alan N., Michael Santiago, and Abraham D. Stroock. "Monitoring stem water potential with an embedded microtensiometer to inform irrigation scheduling in fruit crops." *Horticulturae* 8.12 (2022): 1207.

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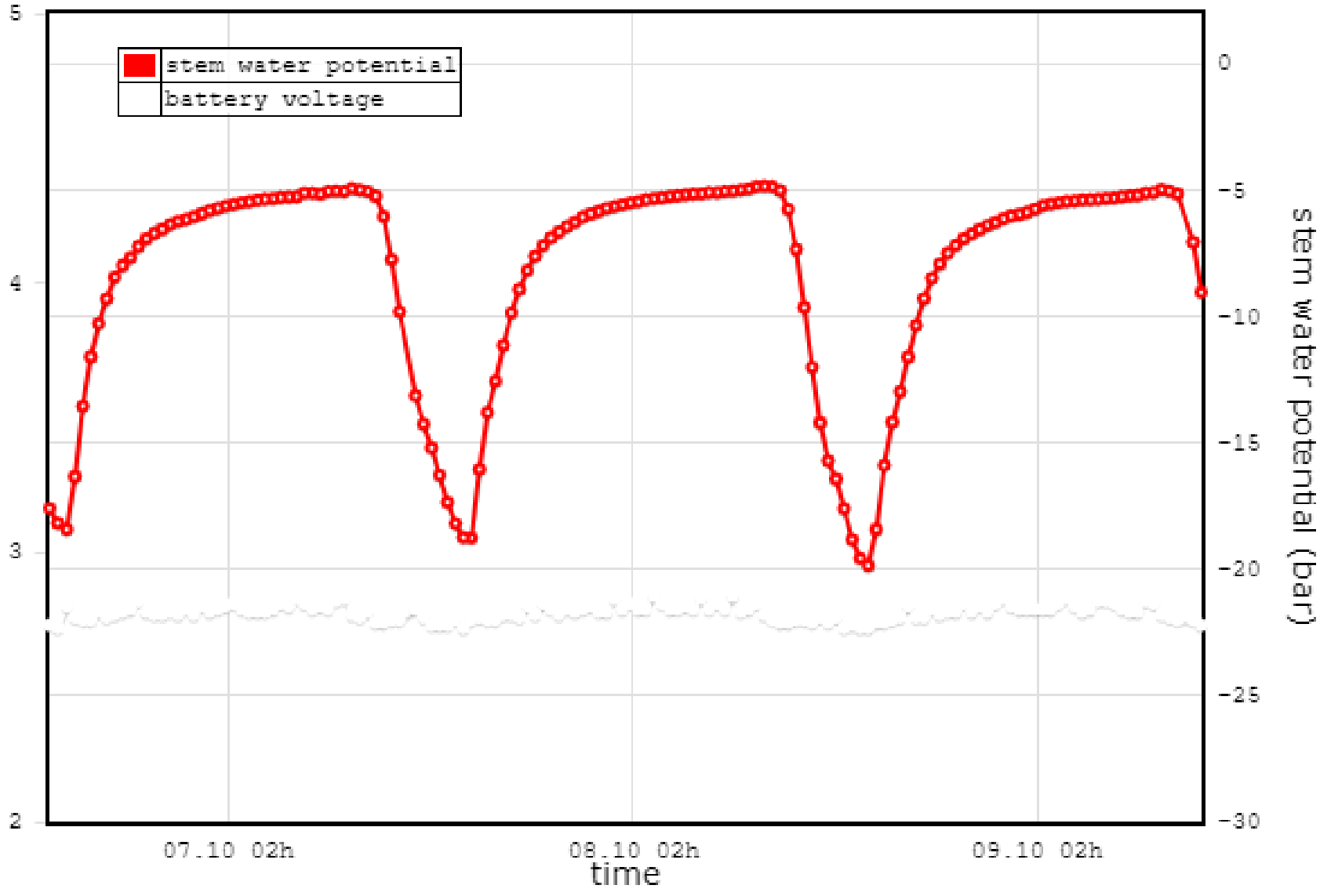
Stem water potential pattern in LIDO orchard



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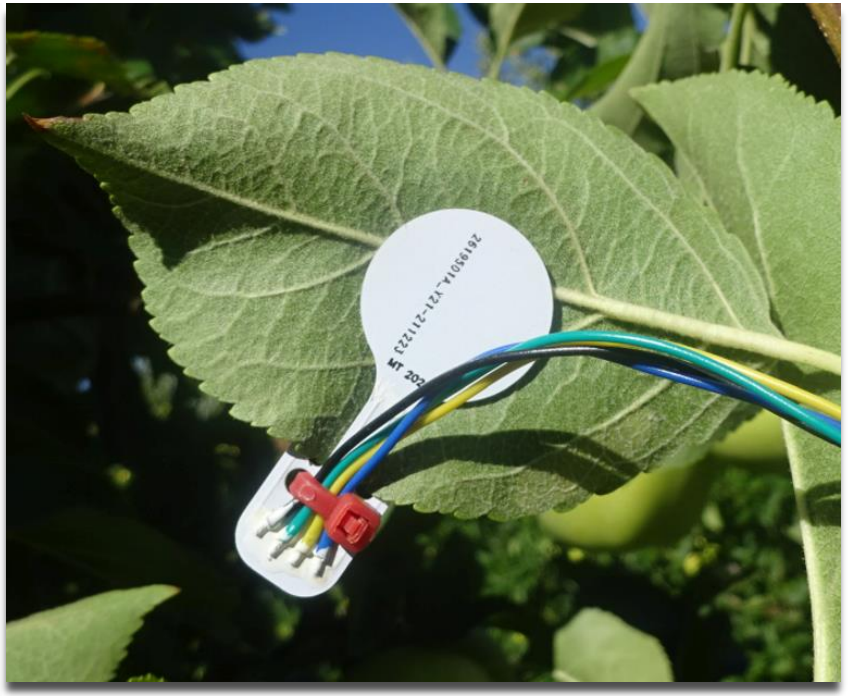
FylloClip

a new sensor for monitoring plant water status



Fyllo Clip

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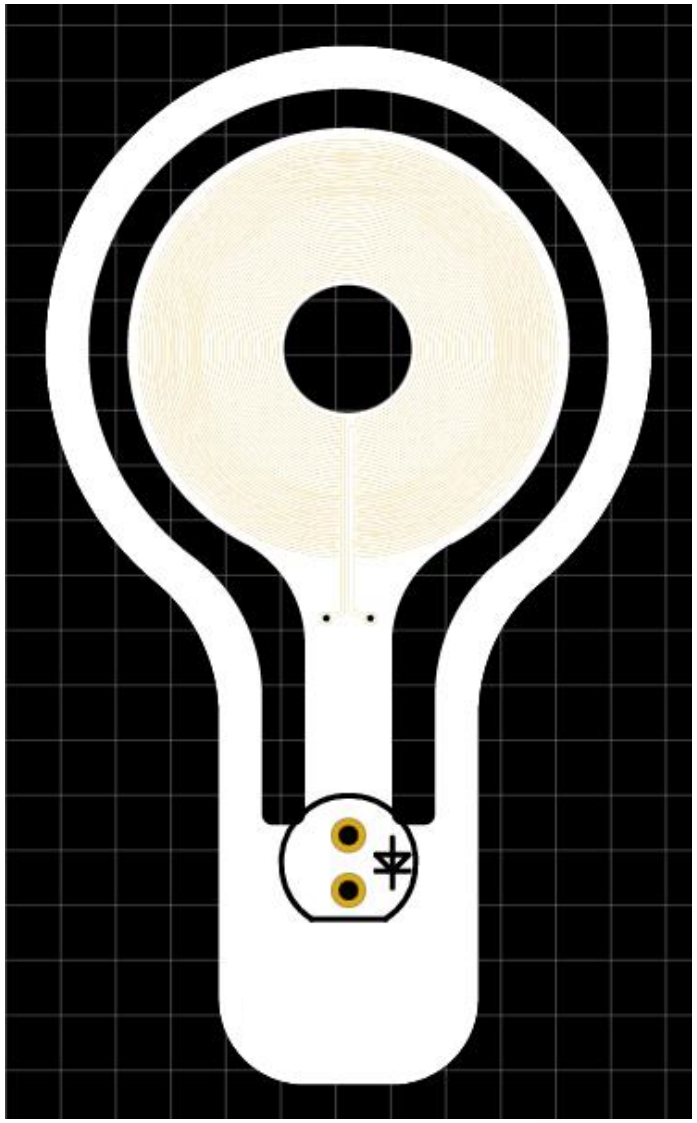
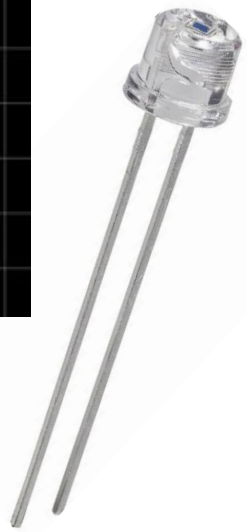


Sensor layout

Central part: capacitance sensor for detecting condensed water vapour



Photodiode as sensor for solar radiation

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Leaf transpiration leads to condensation of water on the sensor plate

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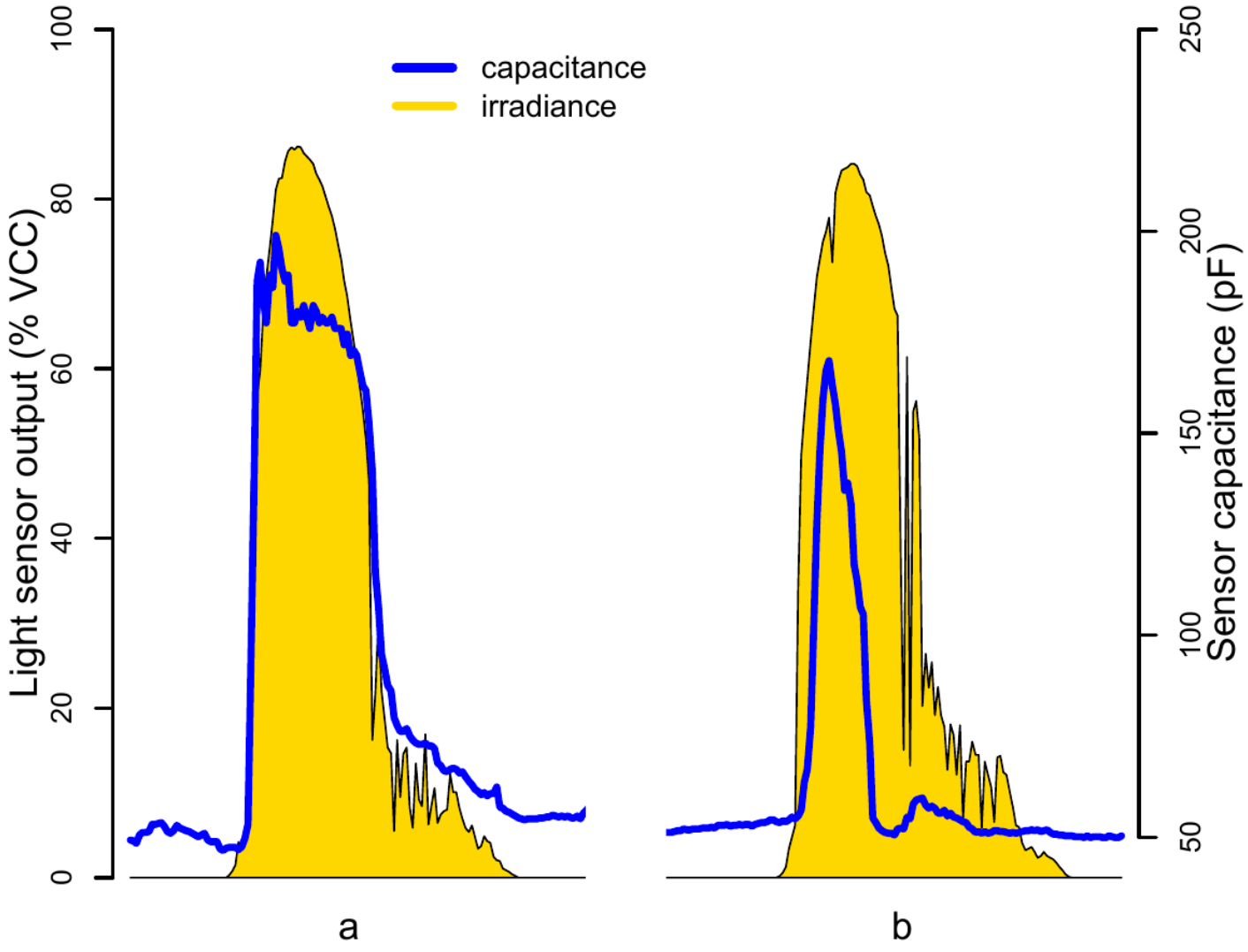

unrestricted water supply

incipient water stress

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likeM13

IoT solution provider

Open Day LIDO – Smart irrigation & water stress sensors

Laimburg, 10.10.2023

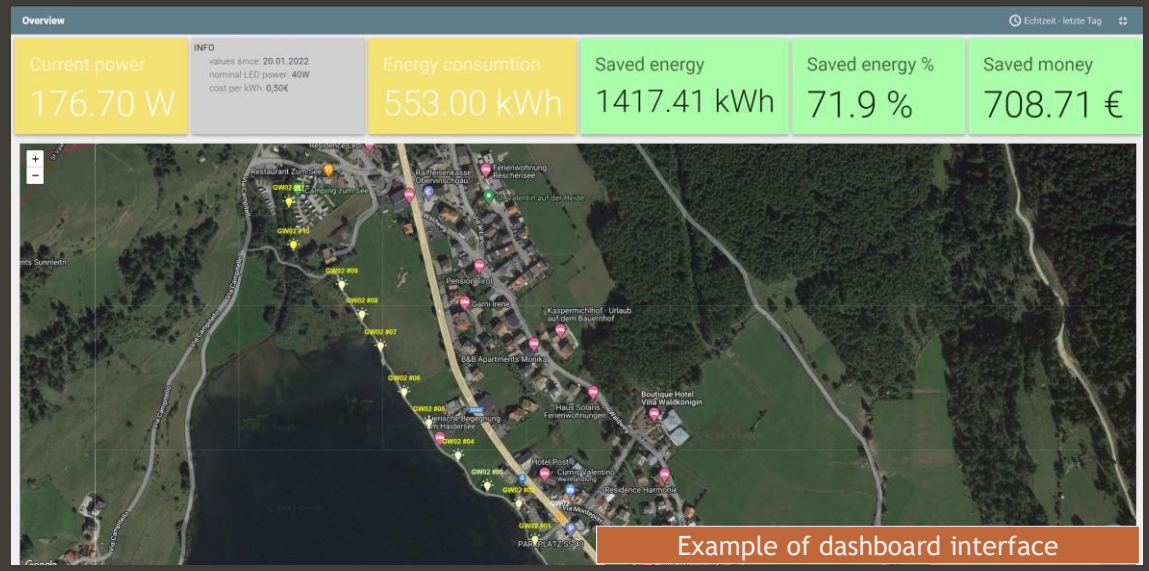
About us

Hardware

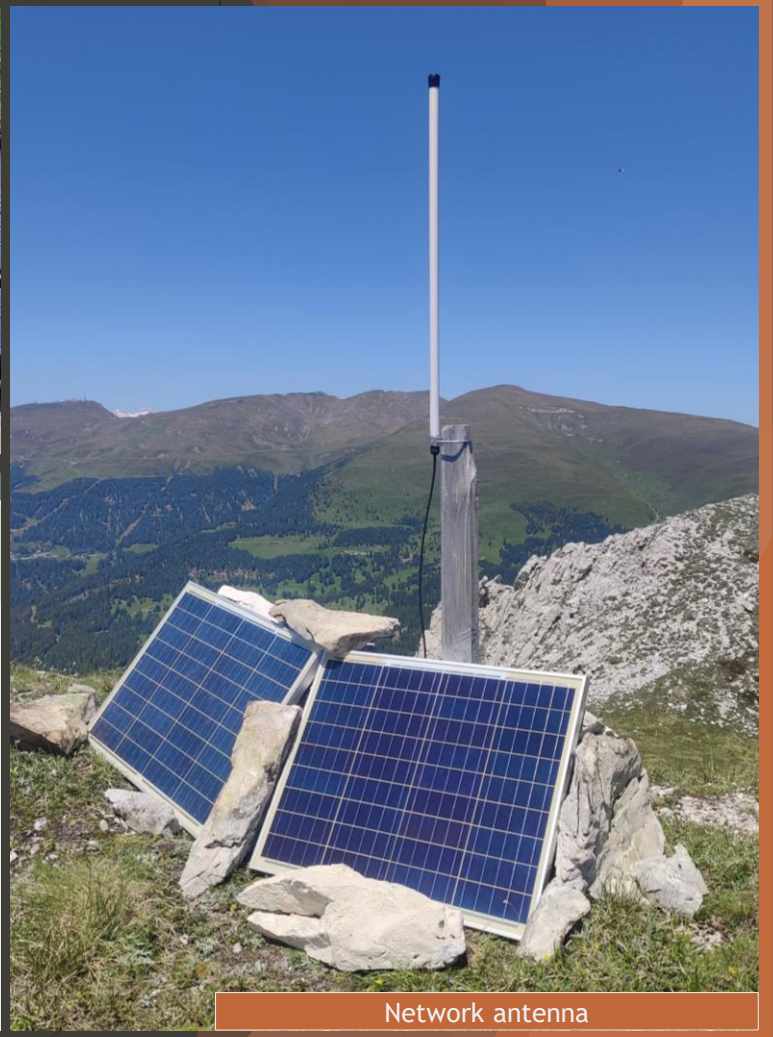
Network

Software

Examples of our self-developed devices



Example of dashboard interface


Network antenna

likeM13
IoT solution provider

Our solutions

Street light

Smart City

Street lights, Water management, Access control, Smart building, Waste management,Remote control and monitoring solutions

GPS-Tracking

Sheep and cattle herds

R&D

Research and Development
Custom projects for private entities and Research Institutions (e.g. UNIBZ)

Smart Irrigation

fully comprehensive application for smart irrigation in agriculture

… and more!

Sheep with GPS tracker

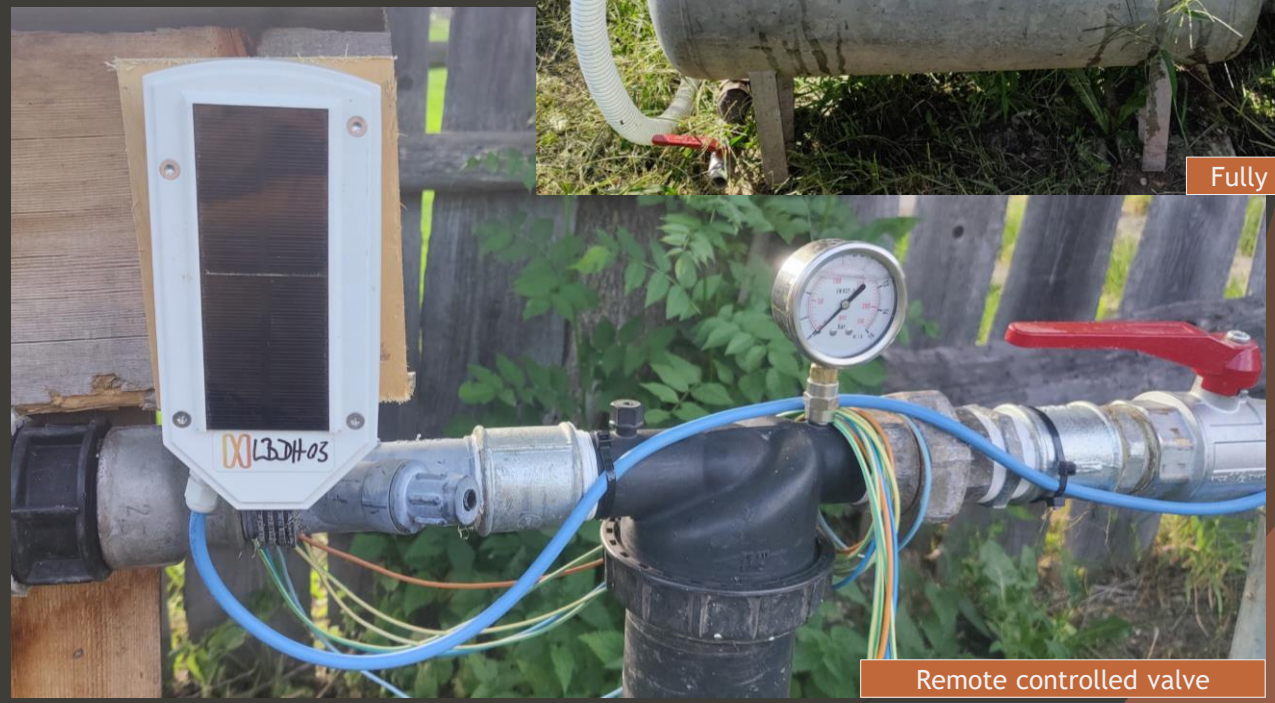
Smart-City and irrigation device

likeM13
IoT solution provider

Smart irrigation

solar powered

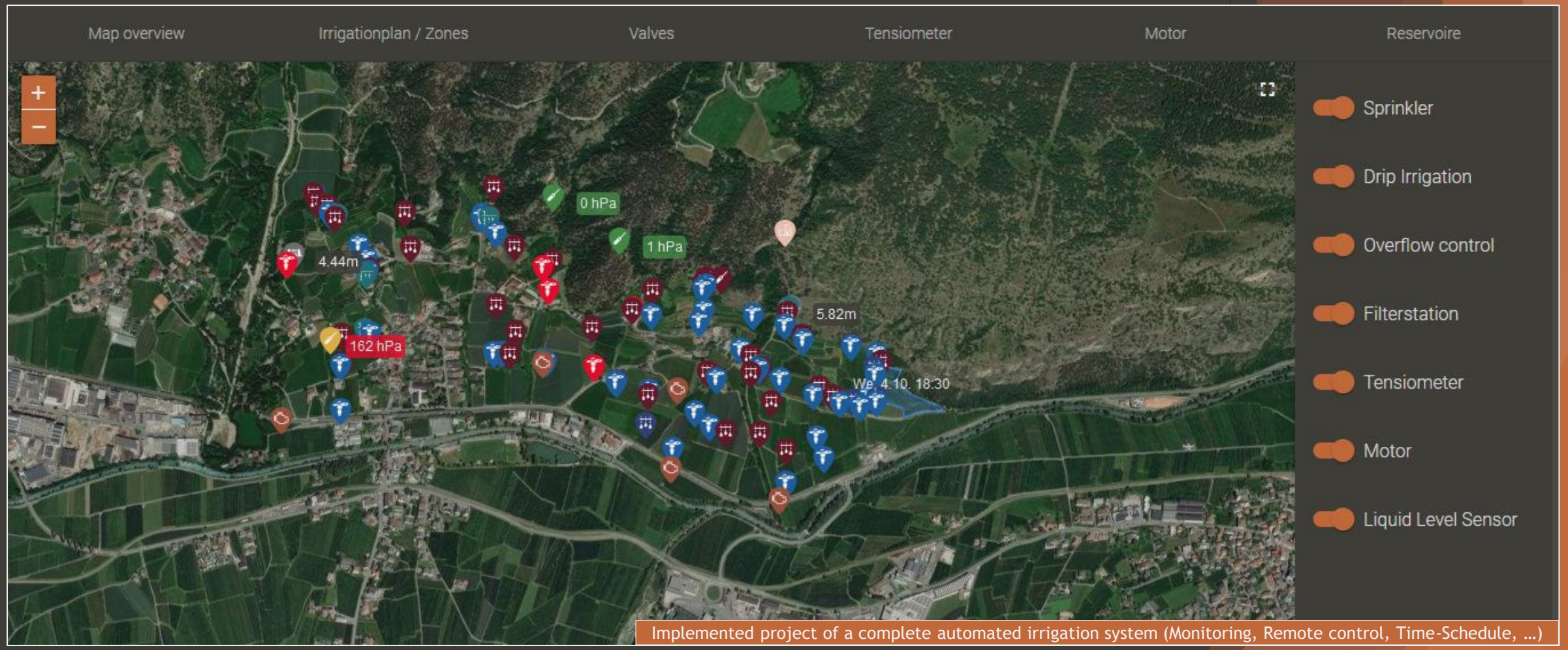
Fully automated filter station



Remote controlled valve

likeM13
IoT solution provider

Smart irrigation



Implemented project of a complete automated irrigation system (Monitoring, Remote control, Time-Schedule, ...)

likeM13
IoT solution provider

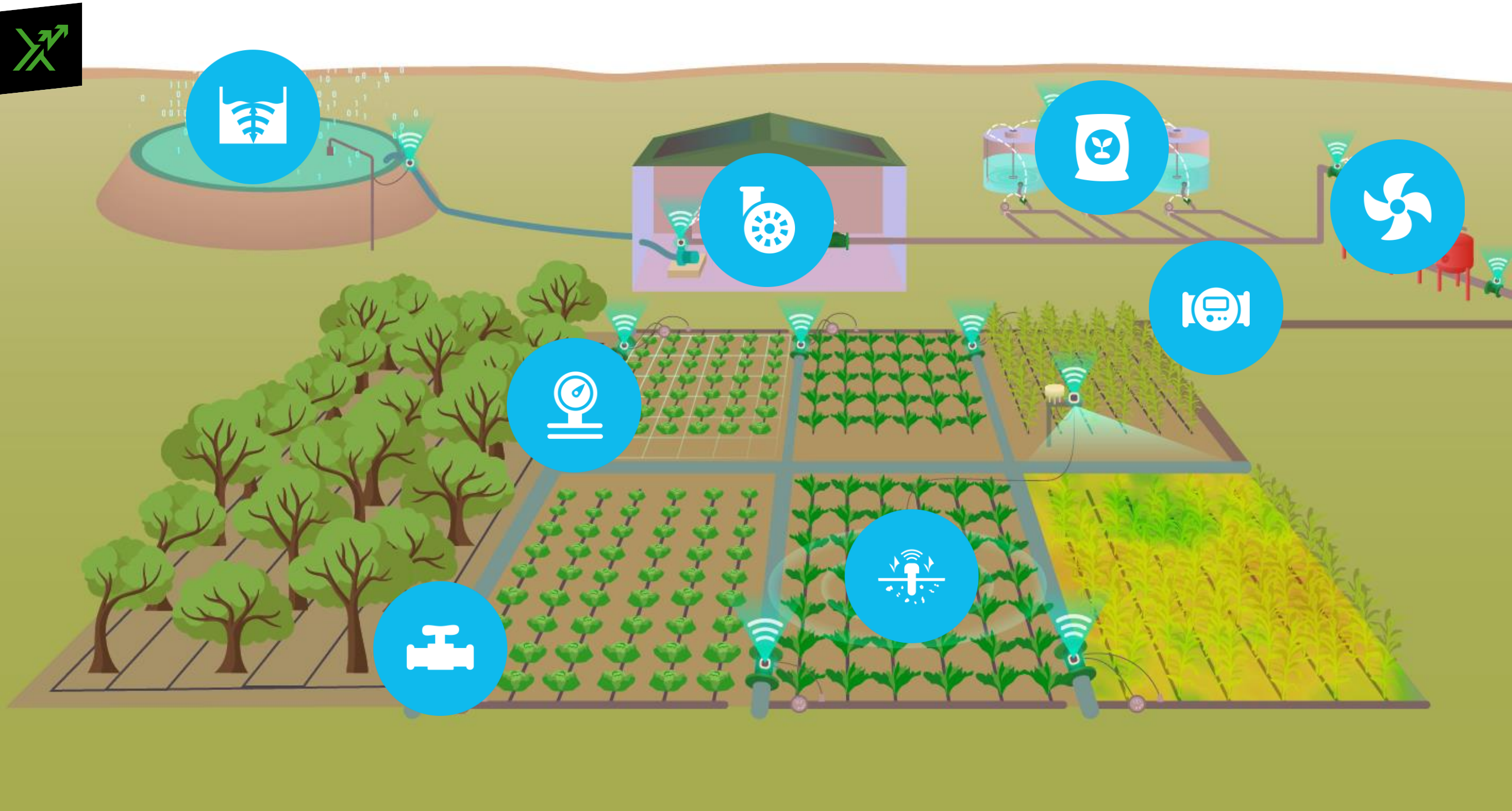
likeM13

IoT solution provider

NEXT WaterControl

„Digitale Revolution für Ihr Bewässerungsmanagement“

NEXT Farming



NEXT WaterControl

100 % SOLAR

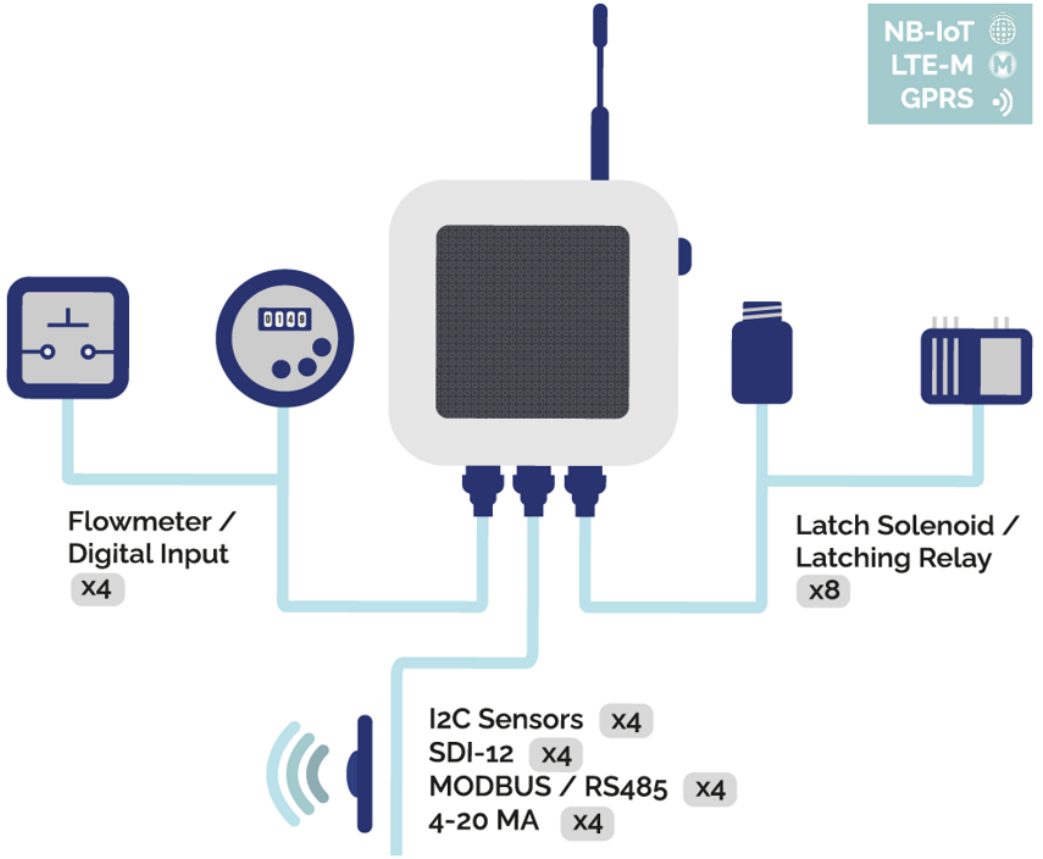
100 % AUTARK

ECHTZEIT

MOBILFUNK

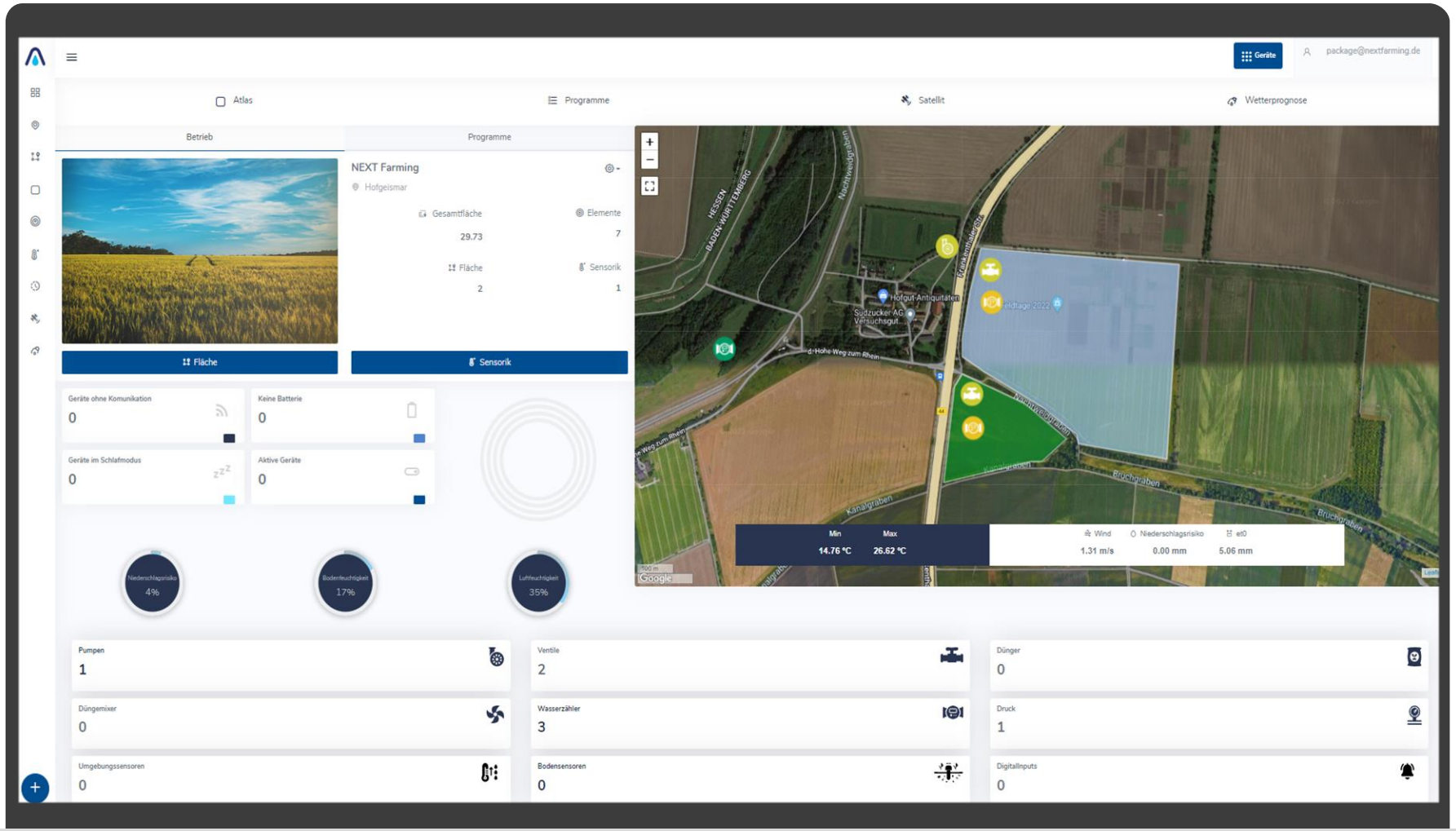
EDGE INTELLIGENCE

DRAHTLOS



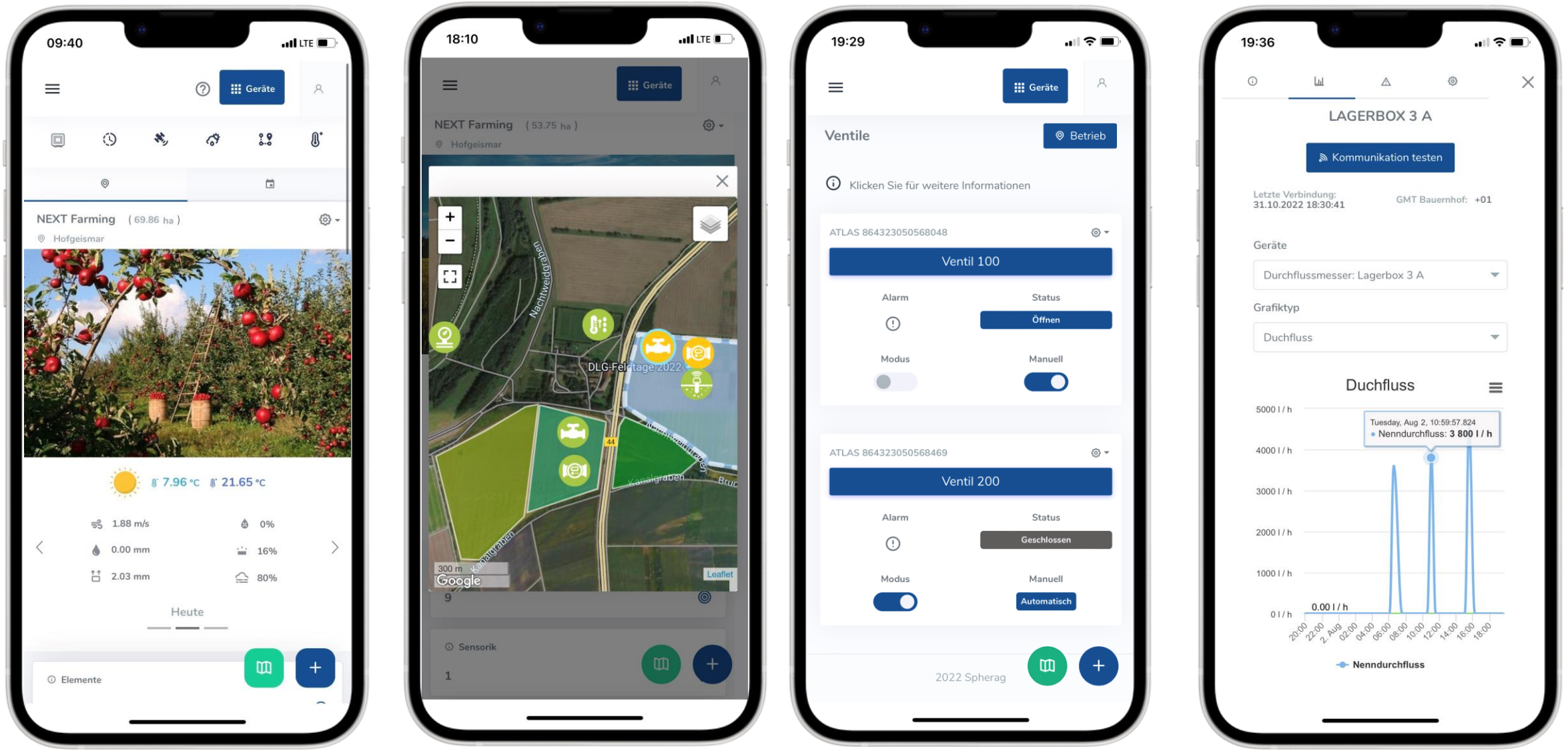
Installationsbeispiel „Plug & Play“

Web-Dashboard

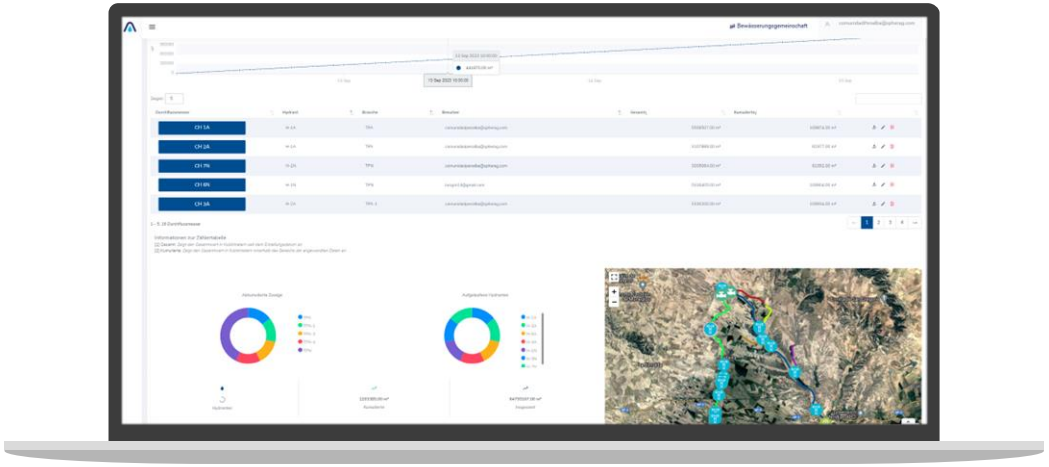


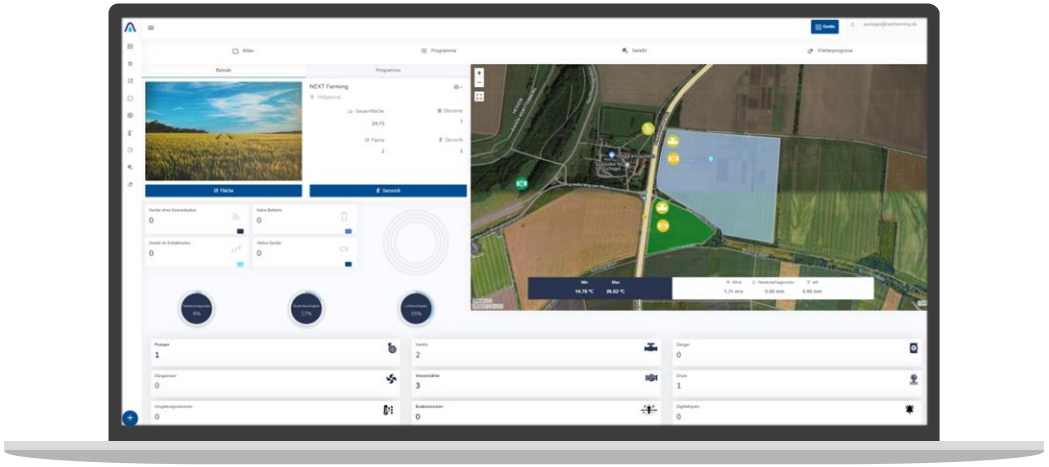
- Umfangreiches Webportal zur Steuerung und Überwachung
- Dashboard als Bewässerungszentrale
- Unbeschränkte Nutzerzahl
- Verschiedene grafische und tabellarische Darstellungen
- Anlegen und Zuweisen von Feldern
- und viele weitere Funktionen

App für Android und iOS



Plattform für Verbände, Versorger und Konsortium





ADMIN

- Übergeordneter Nutzer
- Verwaltung der User und Geräte
- Verwaltung von Hydranten, Leitungen und allen weiteren Komponenten wie Ventile, Zähler und Drücke
- Steuerung und Festlegung von Nutzungszeiten für die User
- Auswertung und Abrechnung

USER

- Untergeordnet dem Admin
- Steuerung und Nutzung von Ventilen, Zähler & Sensoren
- Auswertung

Umfassende Lösung

NEXT WaterControl

Mit der nächsten WaterControl ist es möglich, Intelligenz in bestehende und neue Systeme zu bringen.
Ein einfaches Upgrade zur Optimierung und Verbesserung Ihres Arbeitsalltags!

Ventil

- manuelles oder automatisches Öffnen und Schließen der Ventile per App und Webportal
- Programme nach Zeit und Dauer
- intelligente Steuerung mit Sensoren
- Plug and Play für alle 9 – 12 V DV-Ventile

Pumpe

- manueller oder automatischer Start und Stopp der Pumpe per App und Webportal
- Programme nach Zeit und Dauer in Verbindung mit den Ventilen
- Plug and Play mit Impuls-Relais

Düngung

- in Verbindung mit den Ventilen
- manuelle und automatische Programme nach Zeit und Dauer
- automatische Dokumentation
- Plug and Play für alle 9 – 12 V DV-Ventile

Wasser

- automatische Erfassung des Wasserverbrauchs
- Assistent zur Überwachung des Flusses mit Benachrichtigungs- und Stoppfunktion
- Bewässerung nach Wasserdurchfluss
- als .xls exportieren
- Plug and Play für alle Wasserzähler mit Reed-Impuls

Bewässerung- und Wassermanagement **4.0**

Ergebnis:

- optimierter Einsatz von Ressourcen und Betriebsmitteln
- sichert den Ertrag
- spart Installations- und Betriebskosten
- erleichtern die Arbeit
- spart Zeit

Wir freuen uns auf das Gespräch mit Ihnen!

F&R BEREGNUNGSBAU

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Beregnungsbau / irrigazione
Bereich Elektrotechnik / Automation

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Produktmanager Hof- und Feldüberwachung

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NEXT Farming
nextfarming.de/watercontrol

ODIS

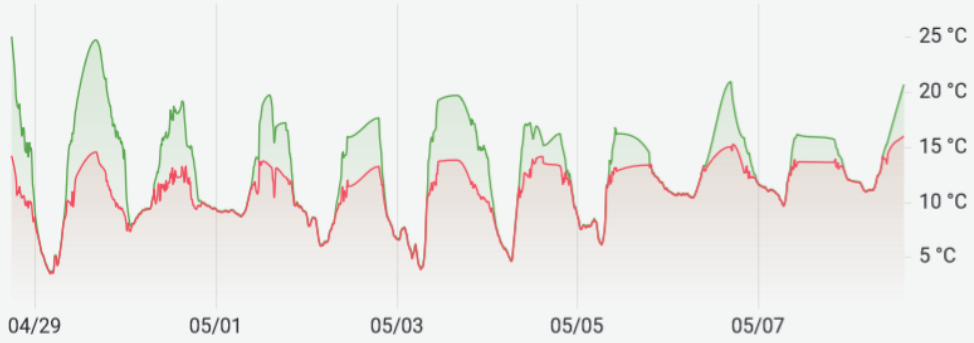
SMART FARMING LÖSUNGEN

WETTERSTATION

- Modular mit verschiedenen Sensoren erhältlich
- Hilfe bei Frostberegnung
- Vorbeugung von Krankheiten

ODIS - Wetterdaten

Umgebungsttemperatur

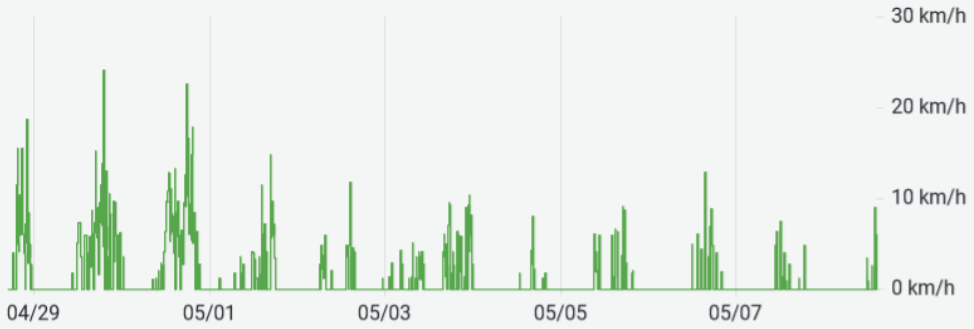


	Min	Max	Mean
Normaltemp. (right y-axis)	3.65 °C	25.0 °C	11.5 °C
Feuchttemp. (right y-axis)	3.54 °C	16.1 °C	10.1 °C

Luftfeuchtigkeit

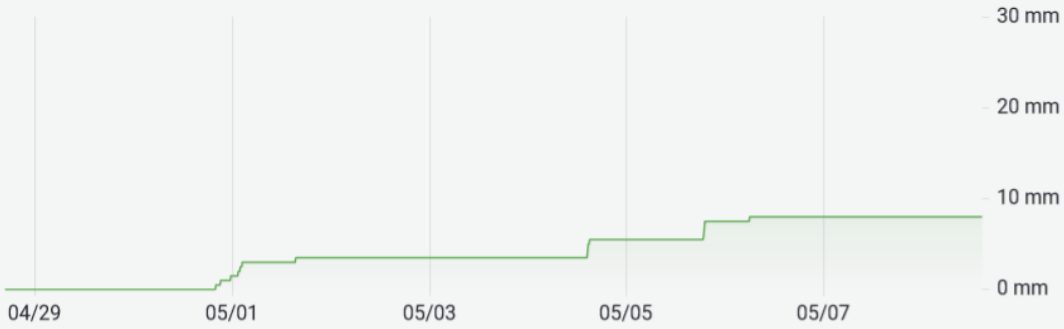
	Min	Max	Mean
Luftfeuchtigkeit (right y-axis)	28%	100%	88%

Windstärke



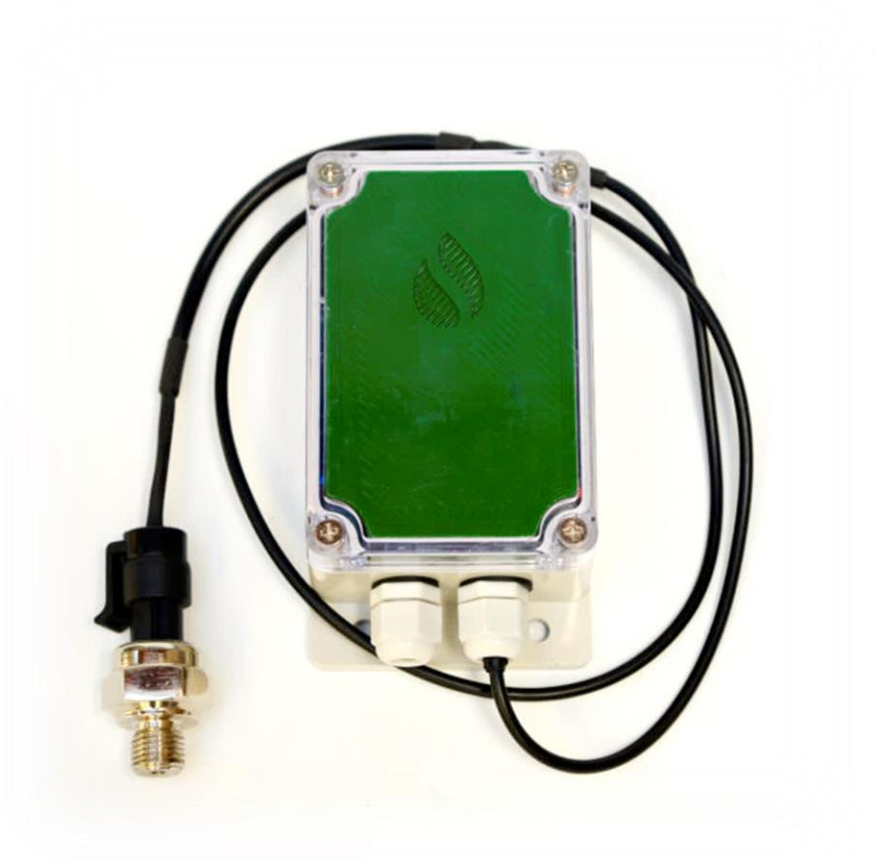
	Min	Max	Mean
Windstärke (right y-axis)	0 km/h	24.2 km/h	1.22 km/h

Regen



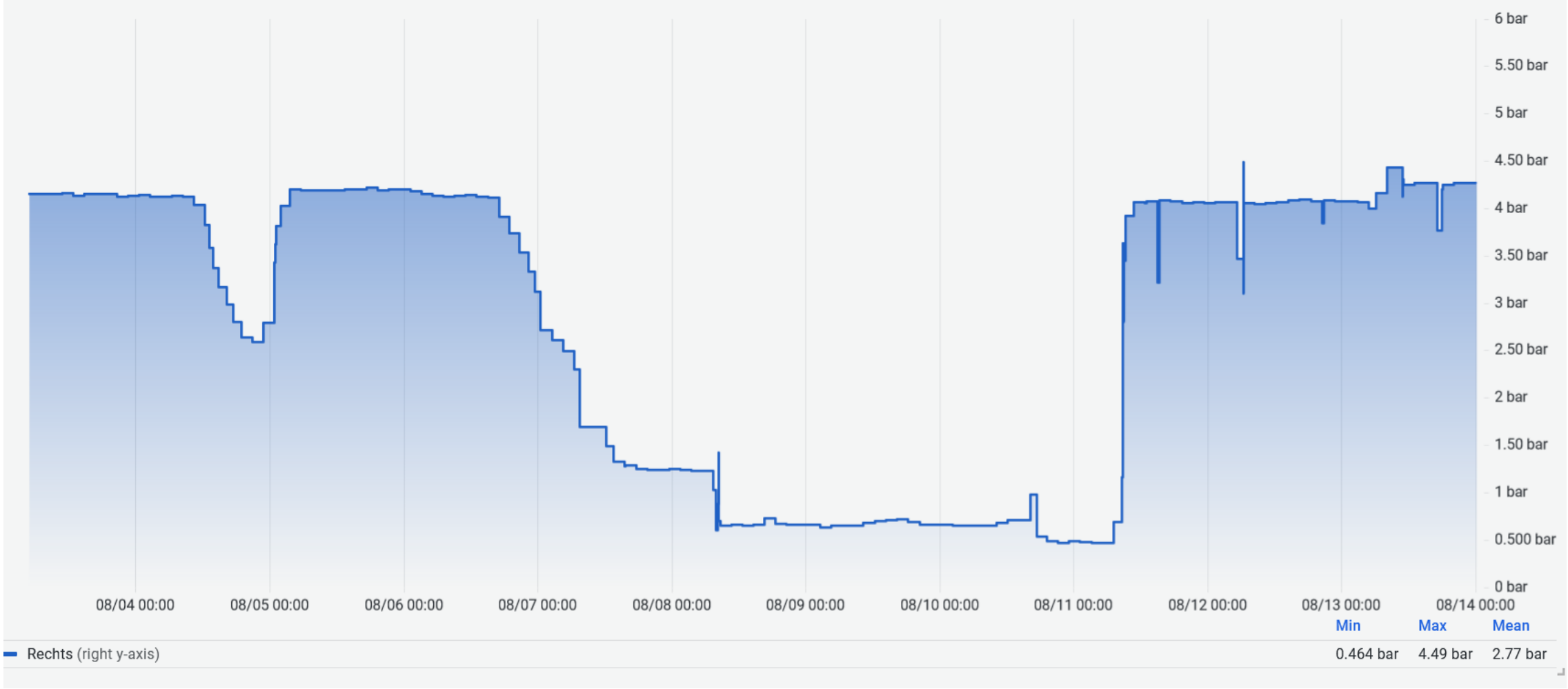
	Min	Max	Mean
Regen mm (right y-axis)	0 mm	8 mm	4.28 mm

DRUCKSENSOR



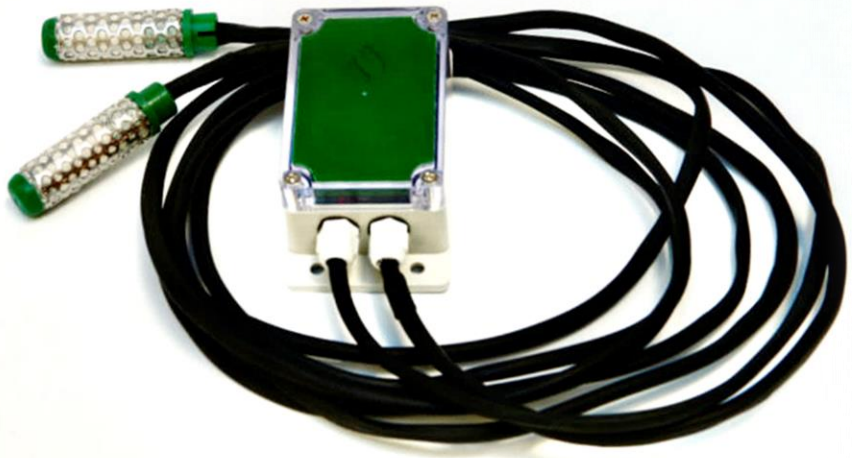
- Überwachung von Pumpen und Druckleitungen
- Schnelles erkennen von Änderungen im Druck (<10s)
- Version mit ein oder zwei G1/4 Drucksensoren

Druck in Zuleitung

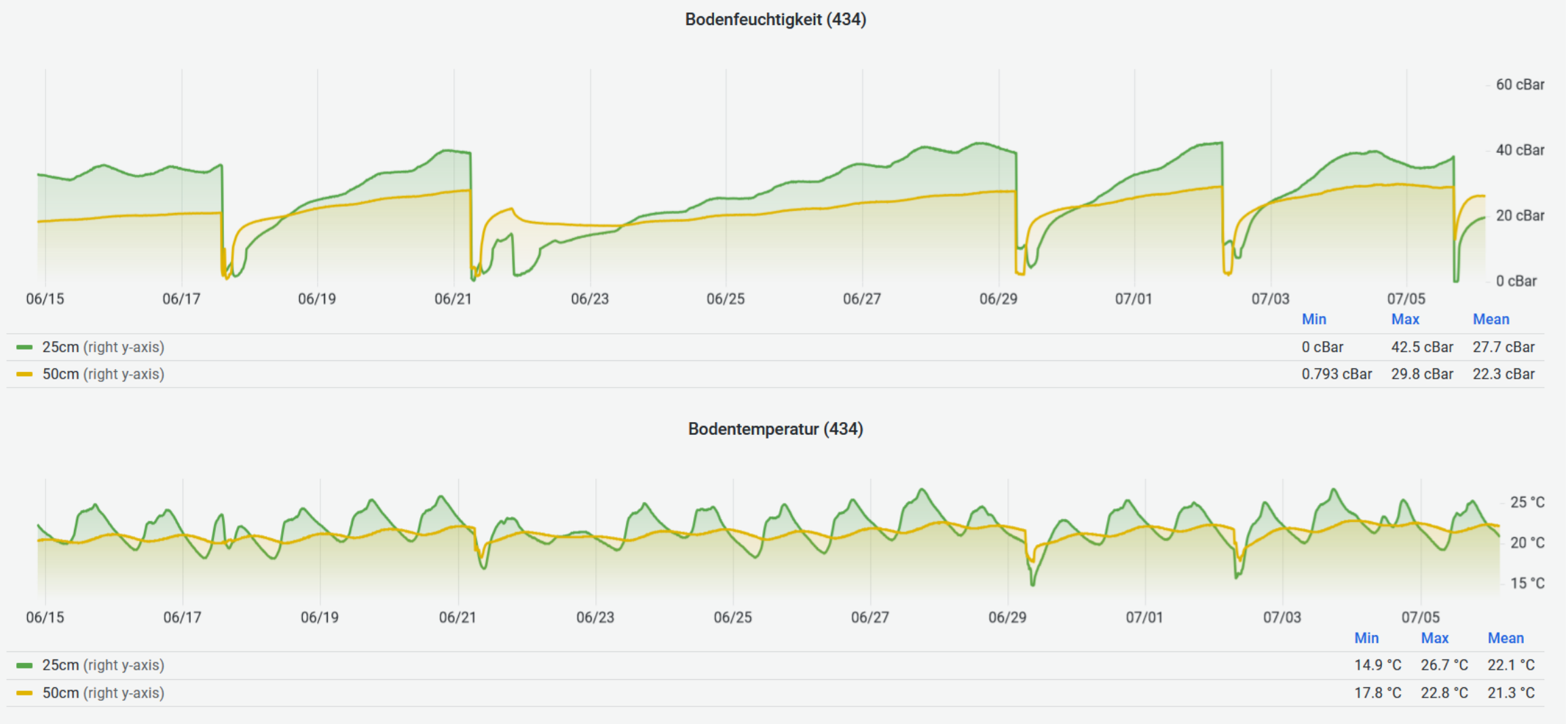


BODENFEUCHTESENSOR

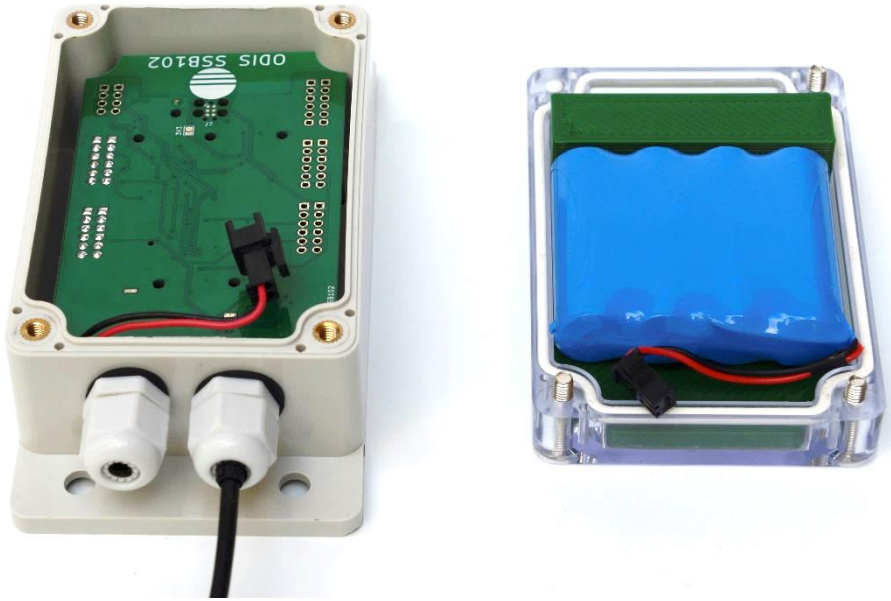
- Optimierung der Bewässerung
- Prävention von Wurzelkrankheiten
- Messungen in zwei verschiedenen Tiefen



Saugspannung und Bodentemperatur



ODIS - Sensorgeräte



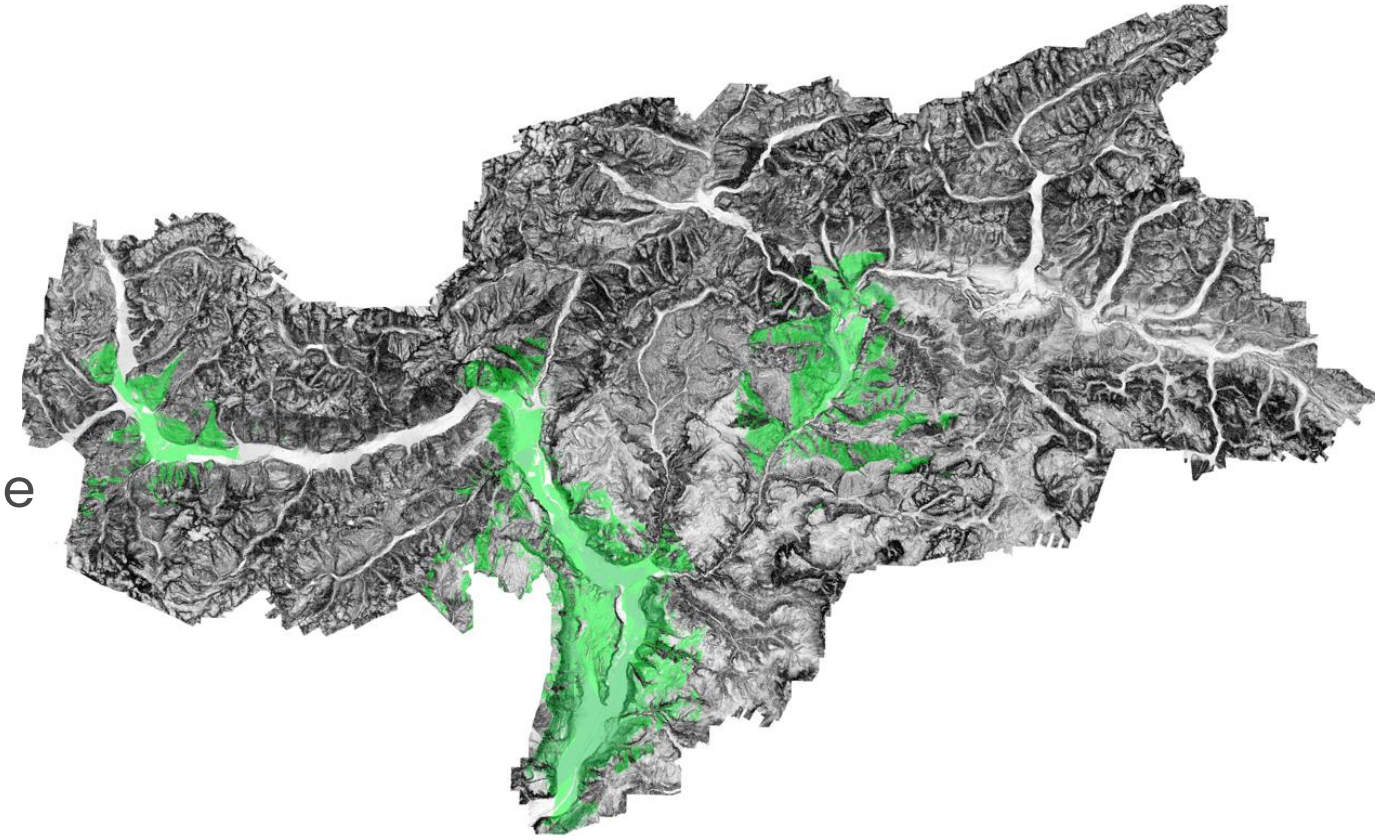
- Wireless und batteriebetrieben (> 3 Jahre)
- Wartungsfrei und einfach zu installieren
- Keine laufenden Kosten

Neu

- Blattfeuchtesensor
- Steuergeräte für elektrische Pumpen
- Feuchttemperatursensor (klassisch)
- Wasserstandsensor

Netzabdeckung

- 14 Gatewaypositionen
- 80% der landwirtschaftlichen Flächen
- Ausfallsicherheit durch mehrfache Abdeckung



ODIS - Datenaustausch

- Austausch Sensordaten zwischen Nutzern
- Direkte Übertragung ins Betriebsheft
- Steuerung der Bewässerung in Abhängigkeit der Bodenfeuchte

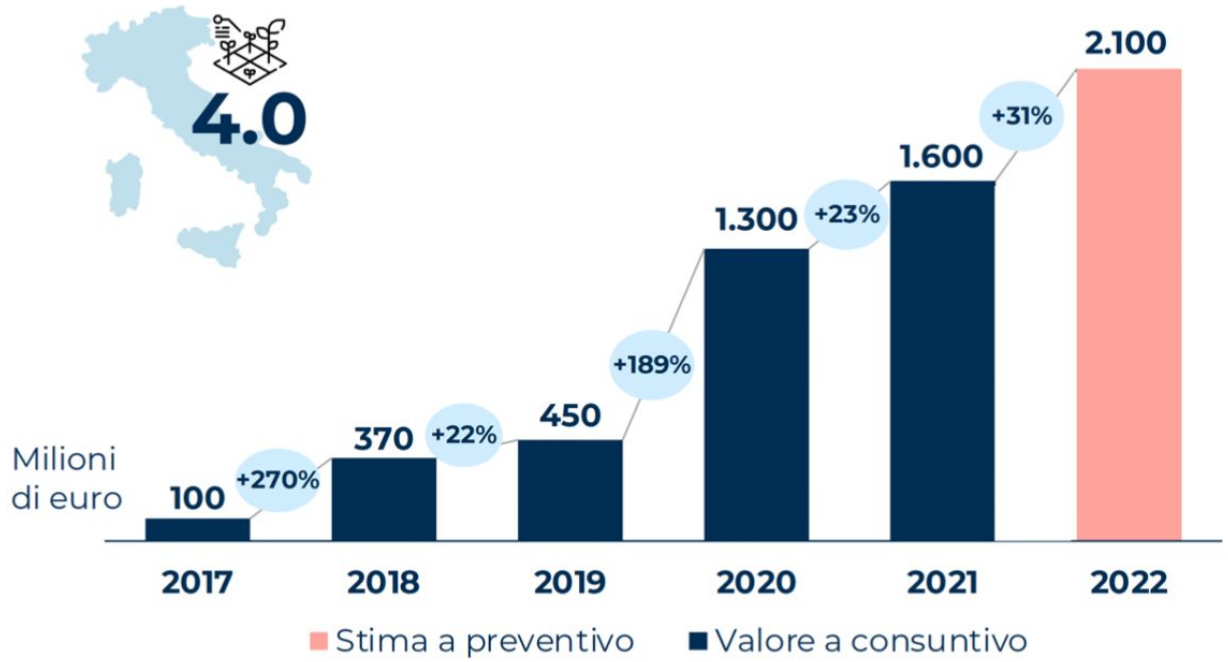
PLANTECTION

SmartFarmer

WiseConn®

MARCO BEZZI
mbezzi@wiseconn.com

2017 - 2023 - AgTech and Digital Irrigation

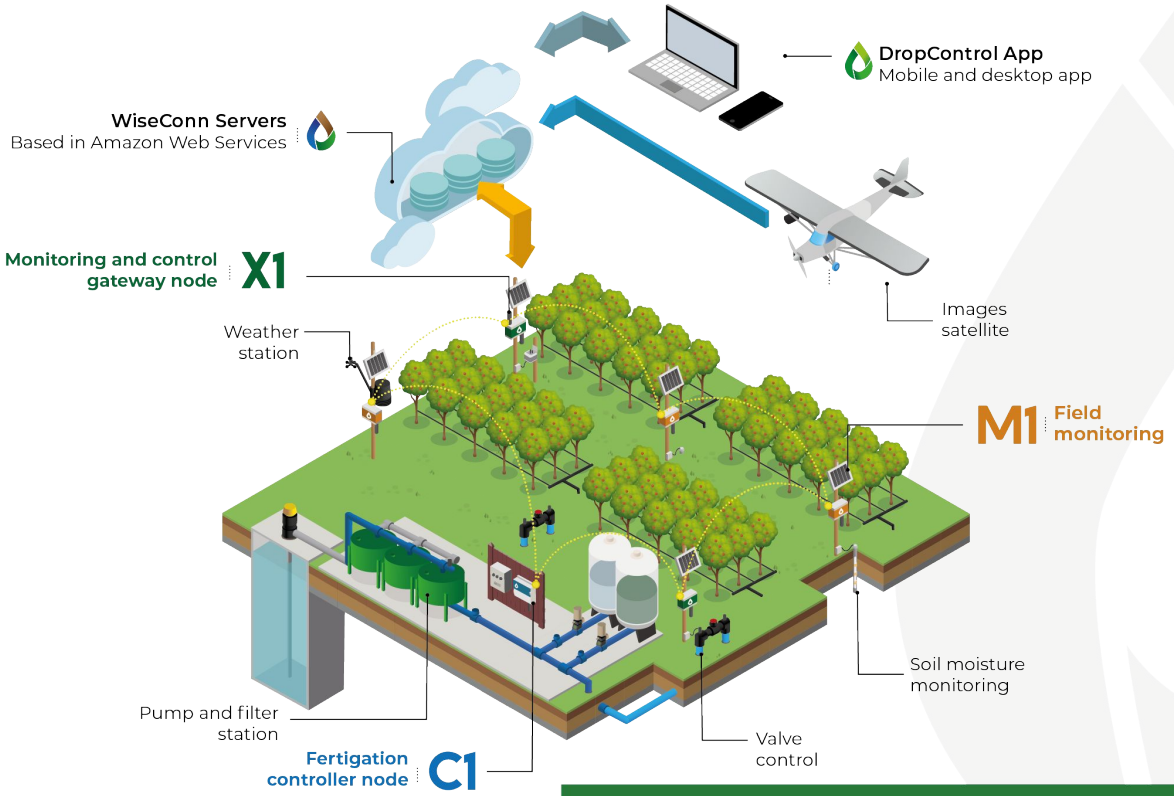


Decision Support Services

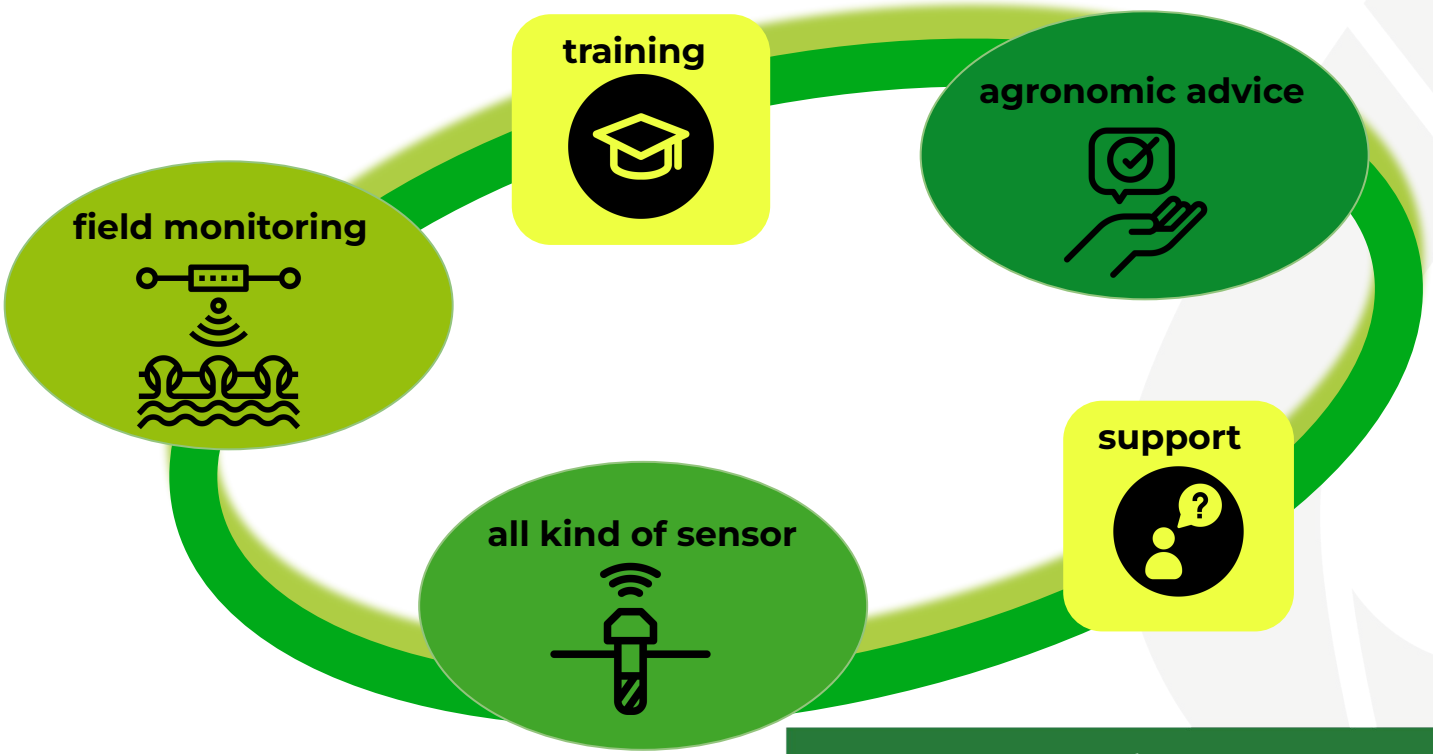
Fonte dati: Osservatorio Smart AgriFood

DropControl®

DropControl® technology



DropControl® closing the loop



DropControl® the added values

Support

Customer care

Partnership with installer

TRENTO, ITALY

Marco Bezzi
Regional Manager

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Tento (TN) 38123 - Italy

THANK YOU