New generation connectivity for agriculture

DIGITAL DAYS

BOSCH
Tecnologia per la vita

Bosch Start-Up GmbH and Deepfield Robotics

Mission and Vision

Mission:

- Create new Bosch business by means of …

  Exploration and **Validation** of business models

  ➔ profitable and scalable

Vision:

- Innovations to enable more sustainable farming

Products:

- Connectivity solutions
- Robotics

Agriculture – a prime example industry for IoTS

Why?

- Increasing scarcity of water and energy.
- Regulations are getting more and more restrictive (esp. regarding chemicals).
- It has a huge impact on our enviroment. It‘s footprint must be actively reduced.
- Fields are often far apart. Monitoring them is crucial but expensive.
- High pressure to reduce production costs and optimize processes.

Finally, it is our food out there:
- There is a need to know where it comes from and how it has been produced.

“Internet of Things” has been around in the agriculture since the 1990s!

Agriculture – a prime example industry for IoTS

Why is IoT in the agriculture not widespread by now??

Today‘s IoT-products in the agriculture

- „One fits all“ – solutions

- Unclear value proposition

- High costs

- High complexity and low reliability

- Inadequate sales channels

But: vast number of start-ups tackling these issues!

Agriculture – an excellent field for IoTS

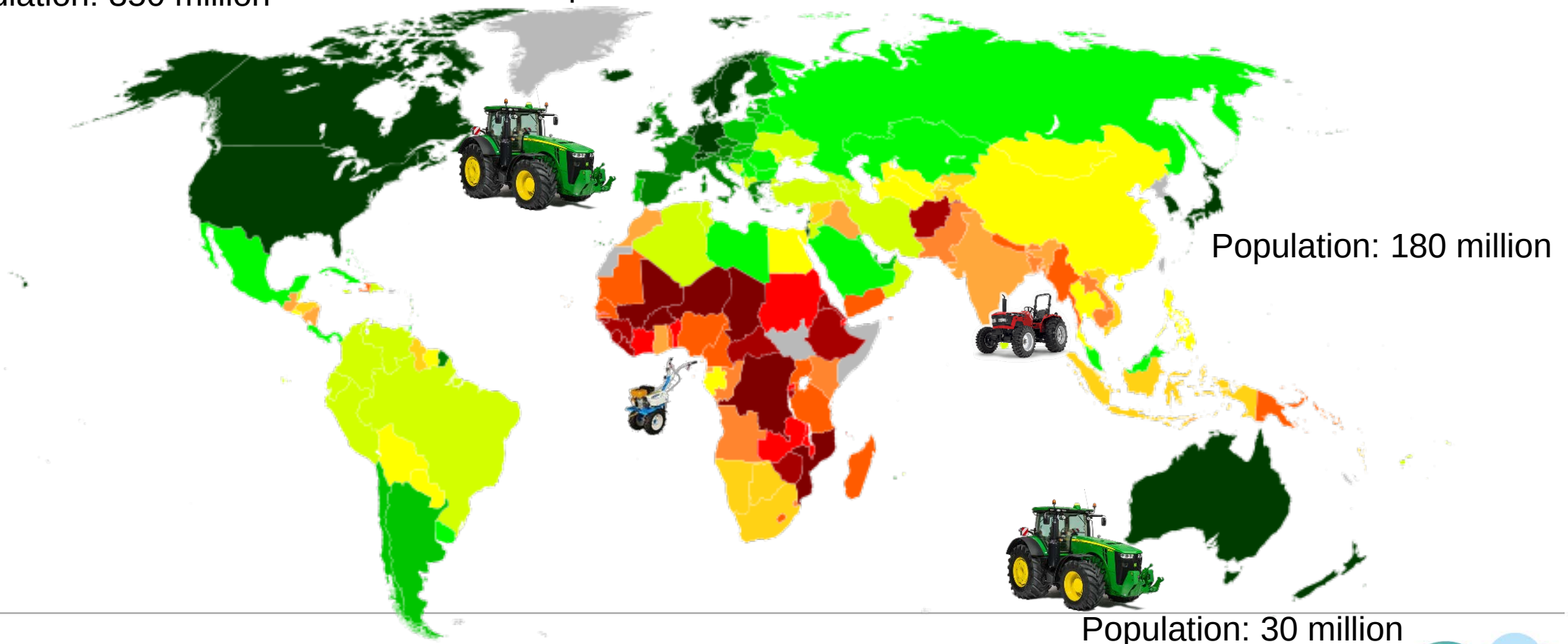
Scale globally but: is there a “global” agriculture?

Population: 350 million

Population: >500 million

Population: 180 million

Population: 30 million



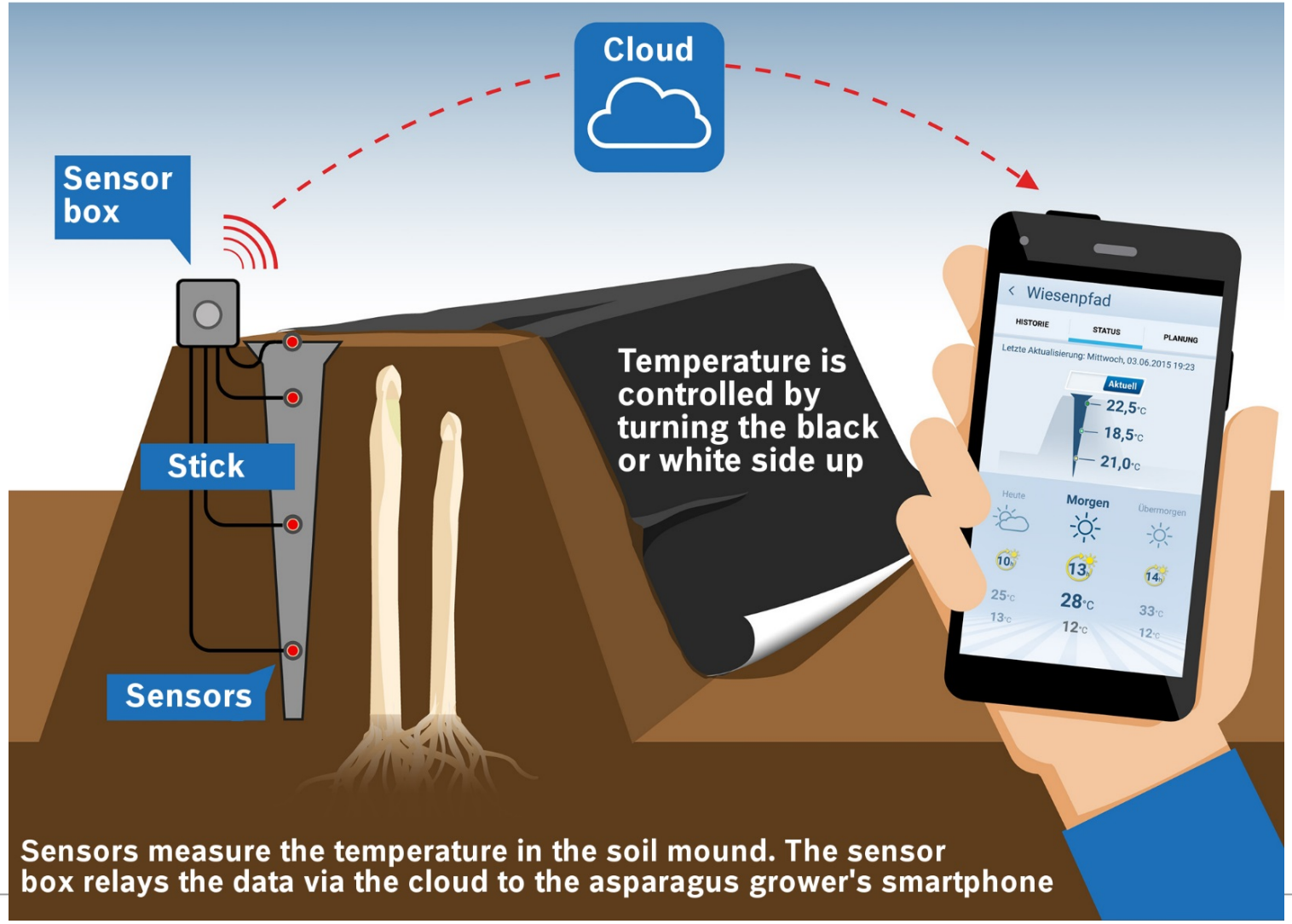
HDI-Weltkarte der Rangliste 2013[1] 0,900 und mehr | 0,850–0,899 | 0,800–0,849 | 0,750–0,799 | 0,700–0,749 | 0,650–0,699 | 0,600–0,649 | 0,550–0,599 | 0,500–0,549 | 0,450–0,499 | 0,400–0,449 | 0,350–0,399 | 0,349

Map: Human Development Index 2013

Ag - a complex interconnected system of systems

Deepfield® Connect – Asparagus Monitoring

Service Principle



For illustration only

Deepfield® Connect – Asparagus Monitoring

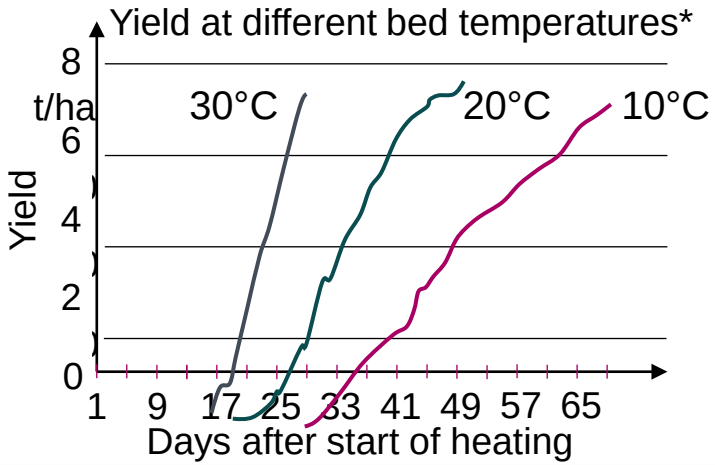
Asparagus – short overview

Plant

- Perennial plant (approx. 7 years of useful life)
- Average yield: 7-8 t/ha raw product, app. 6 t/ha marketable
- White asparagus value: app. 30000 €/ha and year
- Early asparagus achieves higher prices

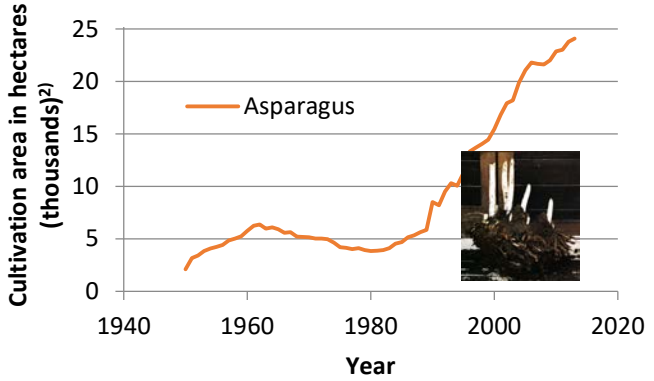
Strong temperature influence

- Higher temperatures lead to earlier start of harvest



Cover the field and heat it up!

Start early!



Increasing importance in Germany[1)]

But be careful:
too warm means low quality![2)]

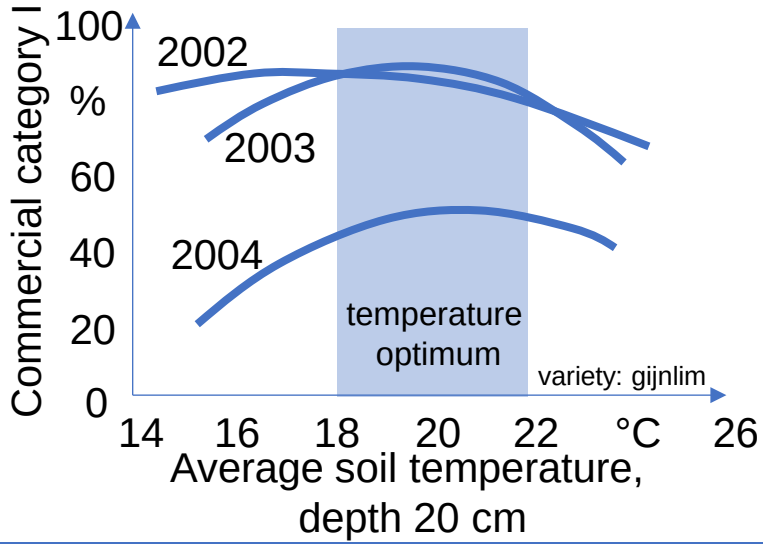
* Schreiner, M., Schmidt, S. and I. Schonhof: Beeinflussung des Ertragsverlaufes, des Ertrags und der Qualität von Bleichspargel über gezielte Steuerung der Dammtemperatur, KTBL-Schrift 450, Darmstadt 2007.

1) Ernte- und Betriebsbericht: Gemüse und Erdbeeren, Statistisches Bundesamt 2014
2) Aldenhoff, L.: Richtiges Folienmanagement durch temperaturabhängige Steuerung

Deepfield® Connect – Asparagus Monitoring
Temperature Control

Strong temperature influence on the quality and the growth
(high temperature: early yield but lower quality)

Impact of the bed temperature on the commercial category*



Measure the temperature

Improve quality!

Adjust the cover foil

Temperature control can improve the yield quality significantly.
10% more “category I” asparagus means 3000 €/ha higher **profit (+50%)**!

* Schreiner, M., Schmidt, S. and I. Schonhof: Beeinflussung des Ertragsverlaufes, des Ertrags und der Qualität von Bleichspargel über gezielte Steuerung der Dammtemperatur, KTBL-Schrift 450, Darmstadt 2007.

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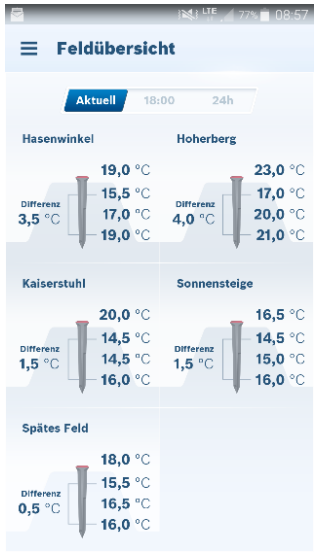
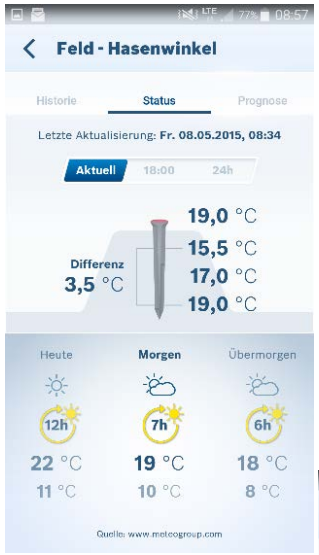
Get an overview

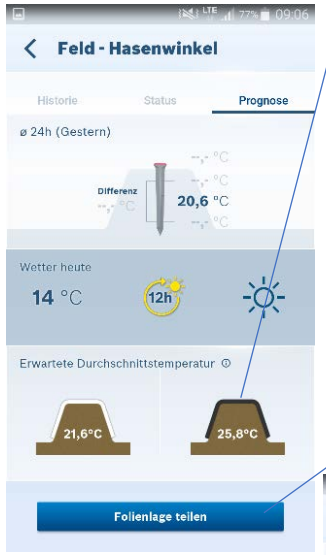


Check the fields

Weather forecast

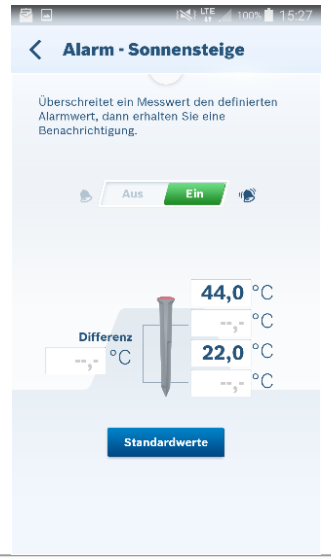


Decide



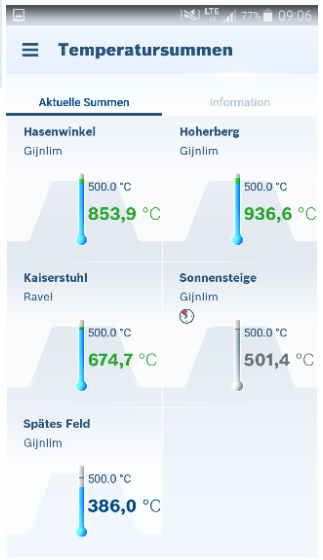
Choose a cover

Delegate via SMS, WhatsApp, Viber etc…



Set alarms

Learn from history

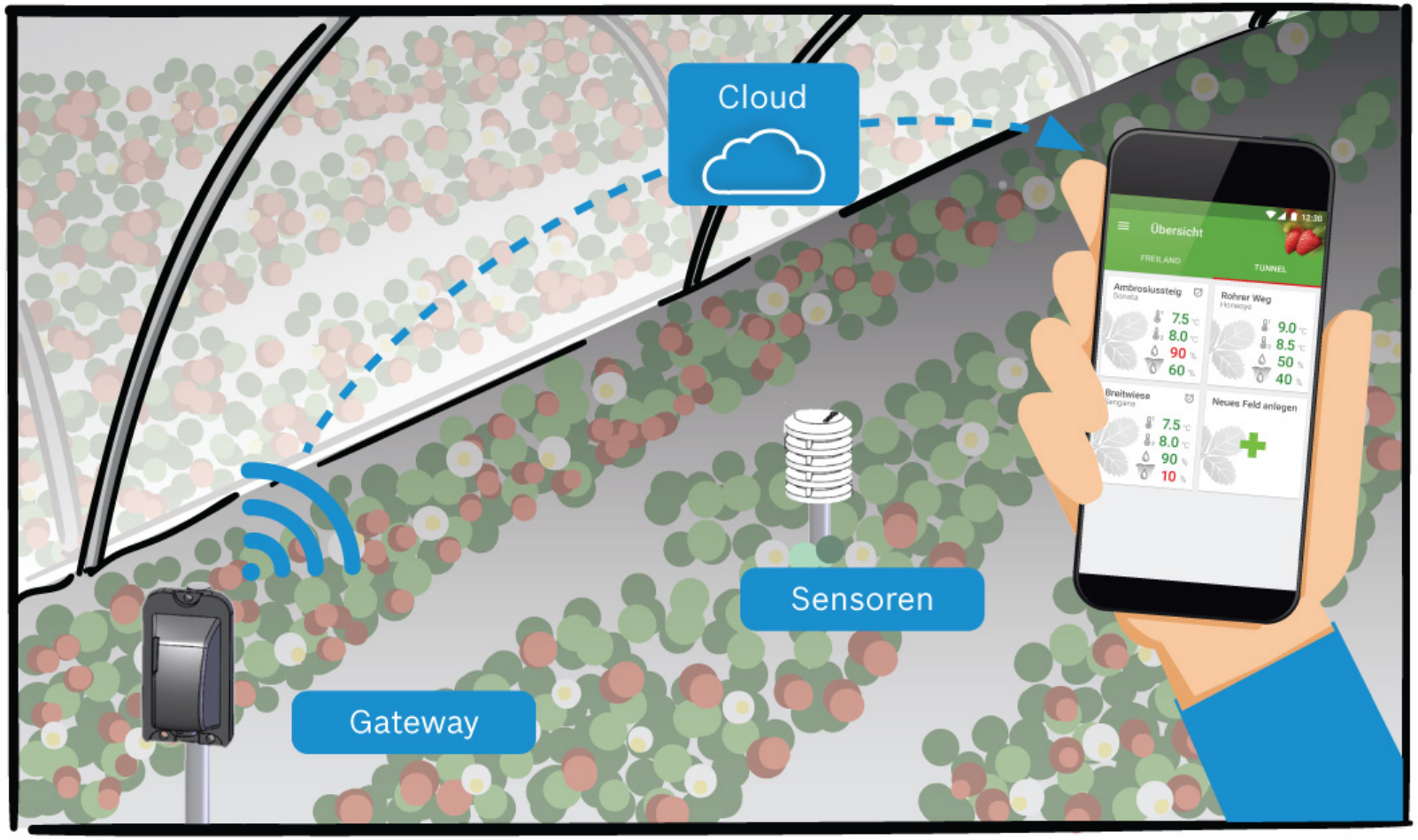


Prepare for the harvest

Access for employees or advisors

Deepfield® Connect – Field Monitoring

Internet of Things in fruits and Vegeta



- Sensors measure air temperature, relative humidity and soil moisture in the fields or tunnels.
- A gateway transmits data via the cloud to the smartphone or tablet of the grower.
- The grower can easily monitor the status of his fields; anytime, anywhere!


Schwarzweg
Historie
Klima
Alarm
Sensor
Luftfeuchte:
min
aktuell
max
20 %
35 %
40 %
Temperatur an der Pflanze:
min
aktuell
max
13,0 °C
22,5 °C
21,5 °C
Feuchttemperatur an der Pflanze:
min
aktuell
max
10,5 °C
15,0 °C
19,5 °C
Bodenfeuchte:
trocken
feucht

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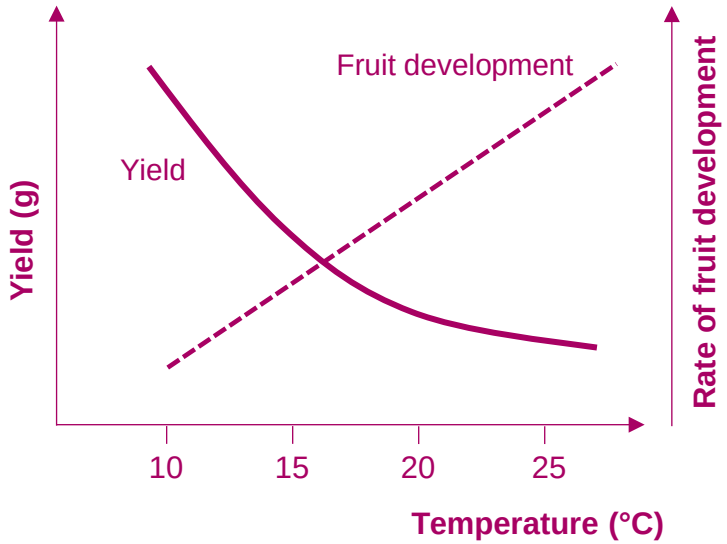
Temperture Management – Overheating

- **Consequences of heat stress:**
  - High temperatures lead to yield reduction,
    yet simultaneously induce faster fruit development
  - Optimal conditions for …
    pollen germination lie in the range of 18 – 20 °C
    fruit set lie in the range of 17 – 26 °C

- **Countermeasures:**
  - Remove film and fleece
  - Offer shading by applying hail nets / cover
  - Ventilate tunnels

- **Identification of critical situation(s):**
  - Measuring the micro-climate in the vicinity of the plants



Source: Werner Dierend (Hrsg.) (2012): Erdbeeranbau

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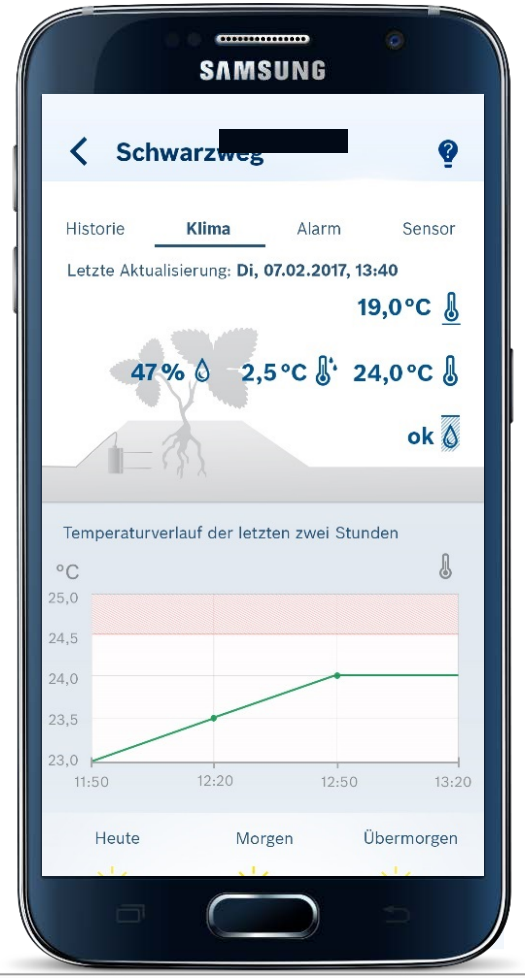
Temperature Management



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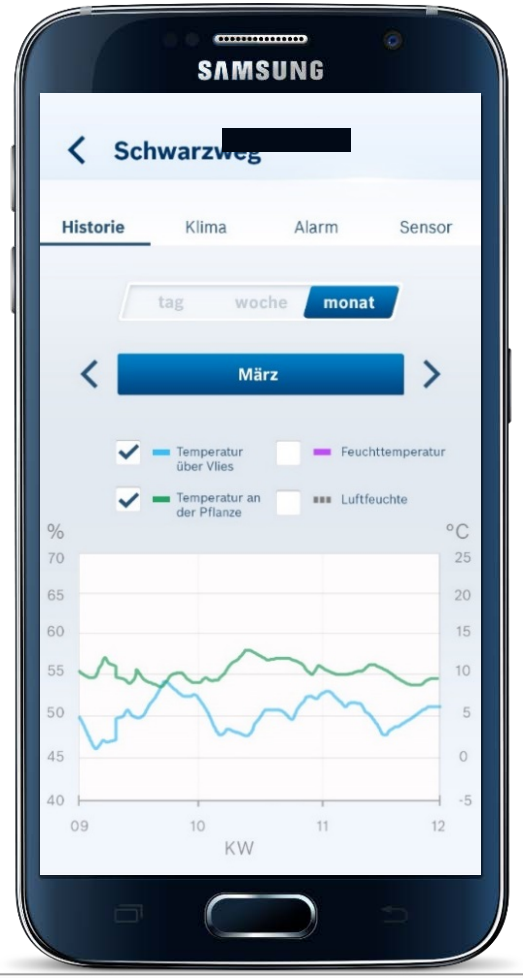
Temperature Management



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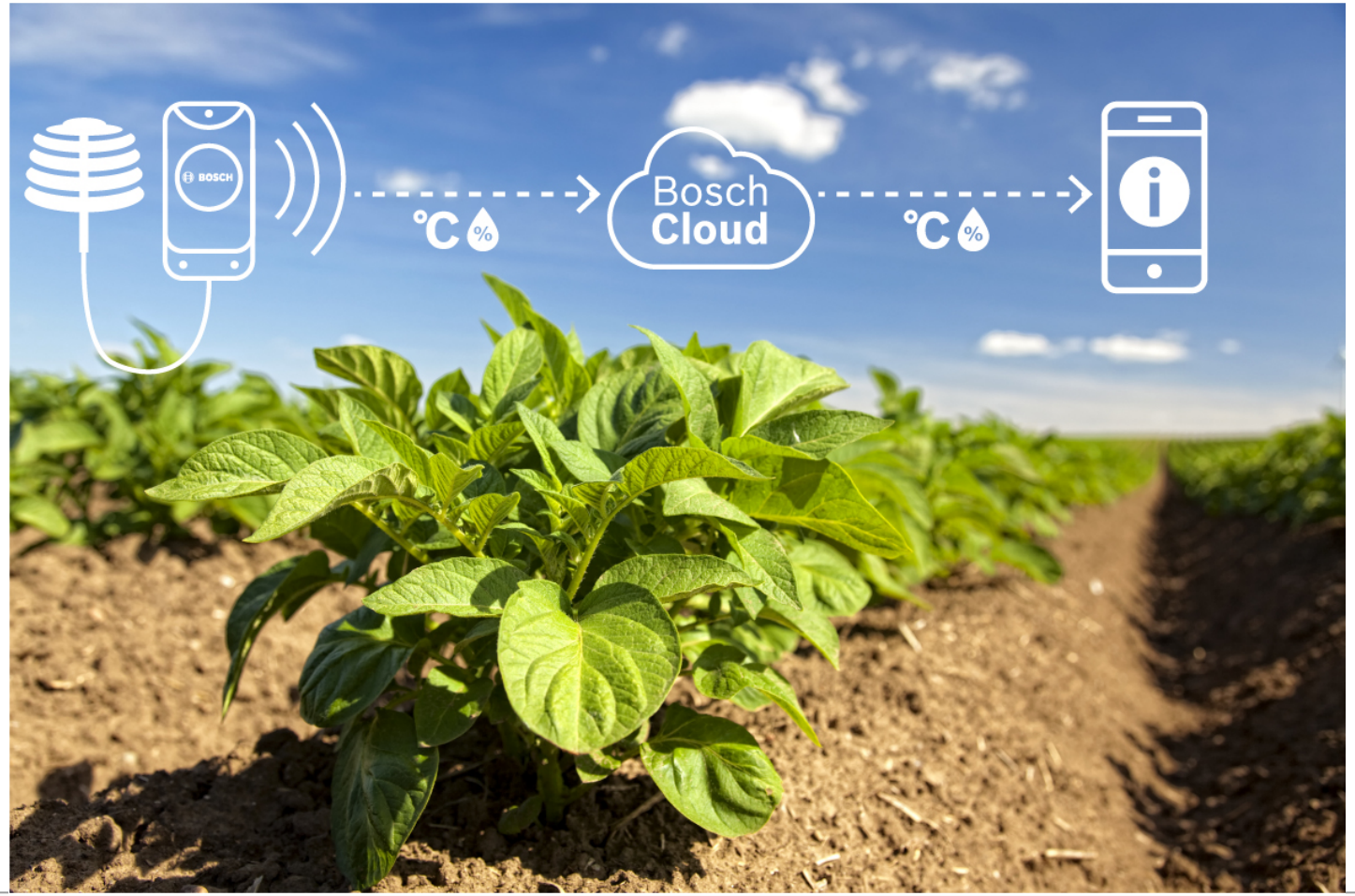
Irrigation management



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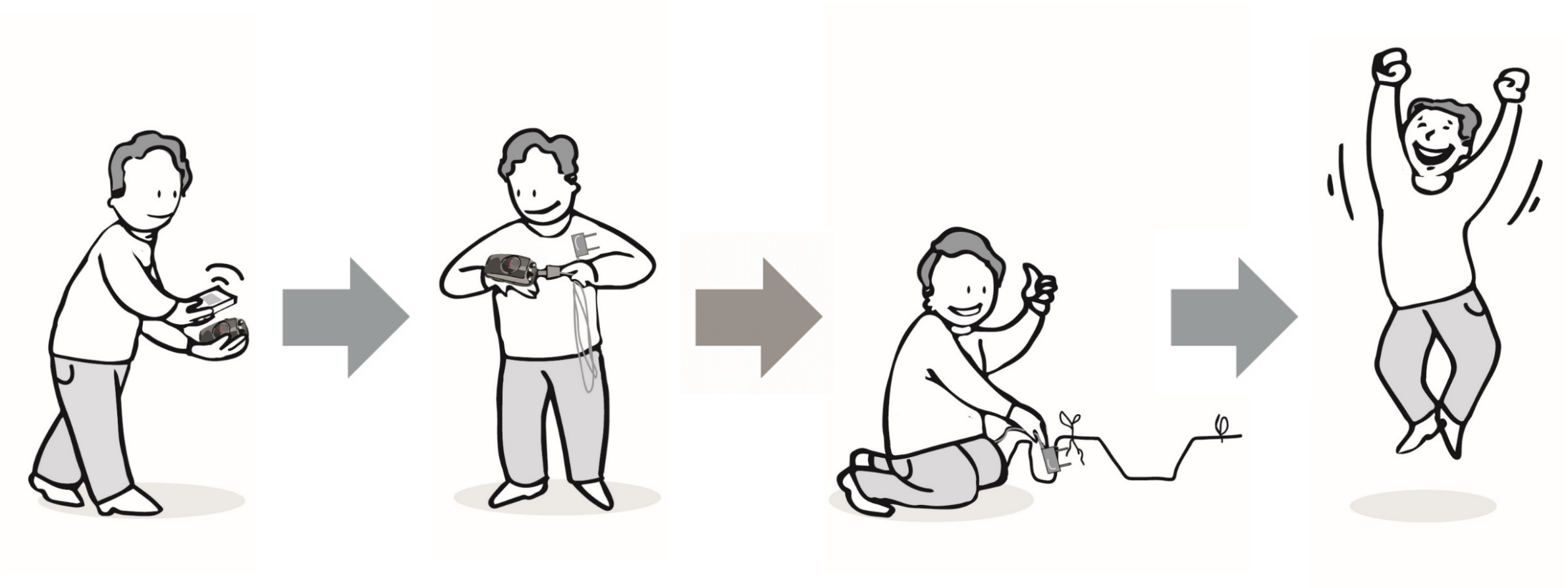
Installation procedure



Deepfield® Connect – New Generation IoT for Agriculture

Conclusions

The agriculture is extremely heterogeneous. However, some things are common for many of it's branches:

- **Simplicity and focus** on specific problems is key.

- **Robust and affordable** solutions needed to reach the mass market.

- The farmers need **very clear and SIMPLE value proposition** to invest in IoT. Without a on obvious and direct benefit, farmers will **NOT** embrace IoT-solutions.

The agriculture is the prime example industry for IoT:
clear problems, long distances and a huge potential market.
SIMPLICITY is key!

ContaCt

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