

Smart Places in a Covid-19 Context

Working to make Norfolk the **best connected** rural county in the UK



WAN
Fibre
Mobile
LoRaWAN
5G

Covid-19 Response & Recovery Context

Norfolk is largely out of “response” mode now, but anticipating one or more waves

NCC internal focus is shifting to how we realise budget savings this year and next... £35-55M

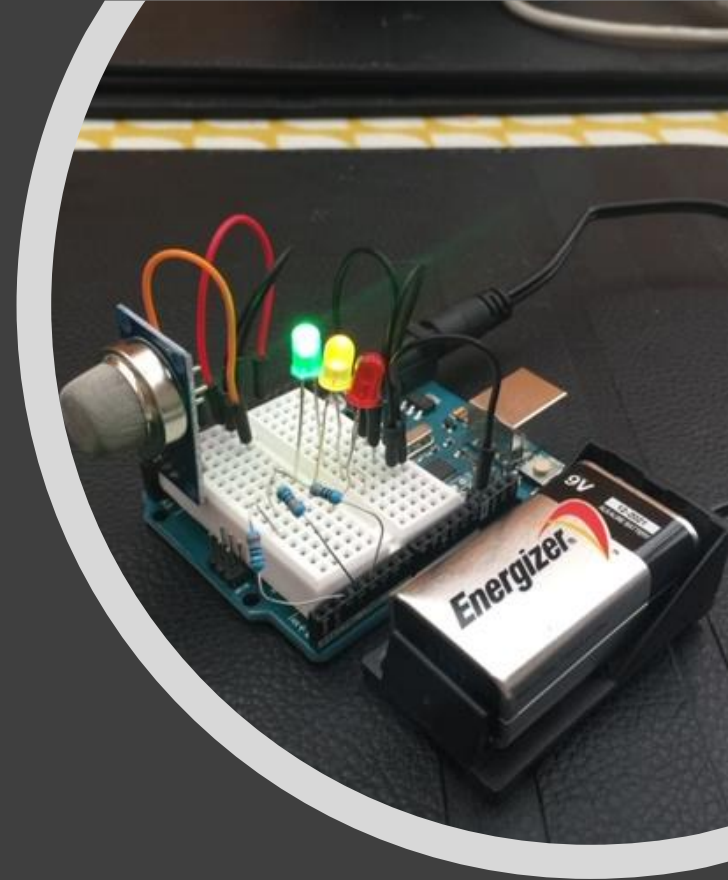
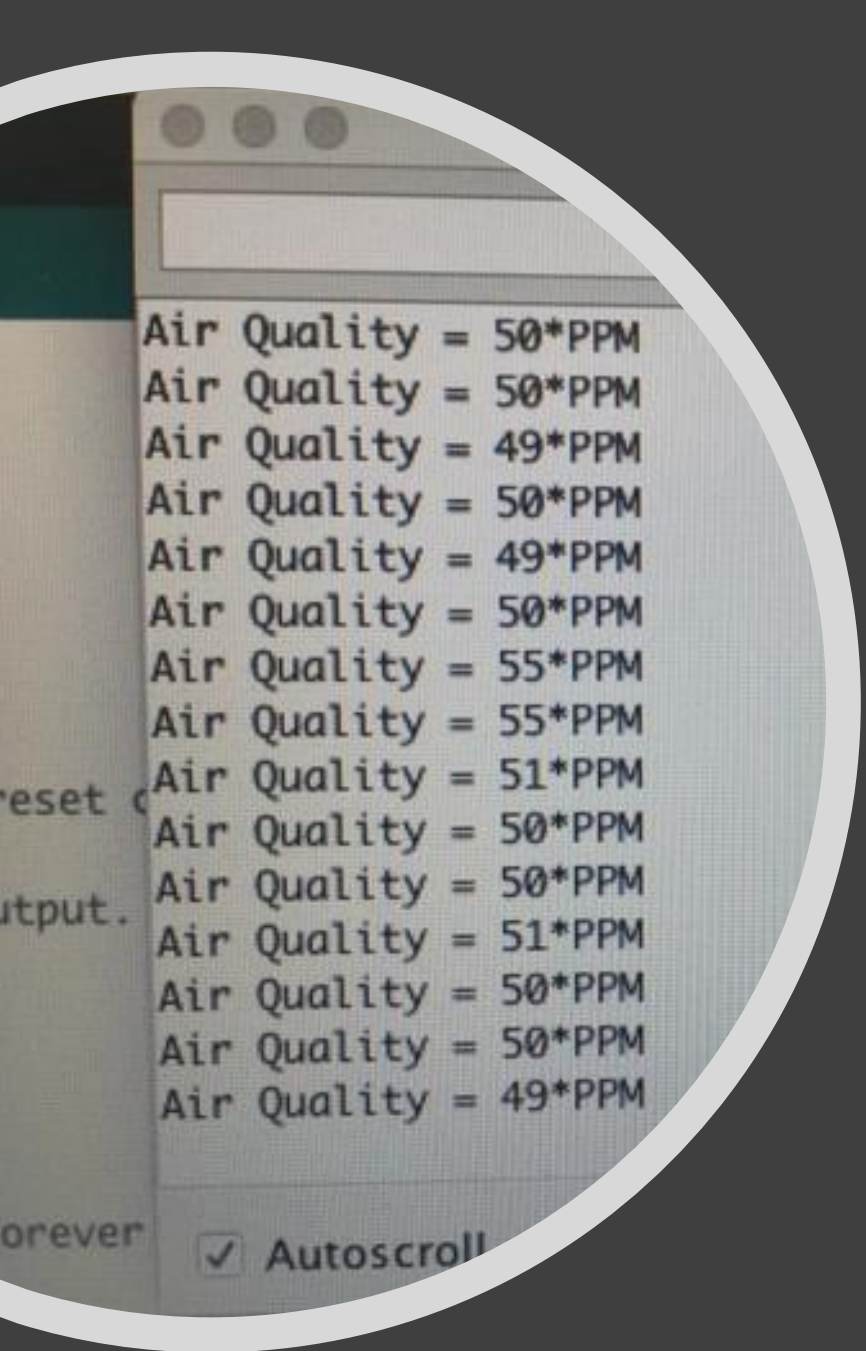
Wider Norfolk focus on restarting the economy, including digital connectivity & innovation
- £900k bid with the New Anglia Local Enterprise Zone for LoRa phase 2 (inc. use cases)

Digital Connectivity

www.norfolk.gov.uk/digital



geoff.connell@
norfolk.gov.uk



**It all started at a Hackathon on
24th July 2018**

LoRaWAN

Long Range Wide Area Network

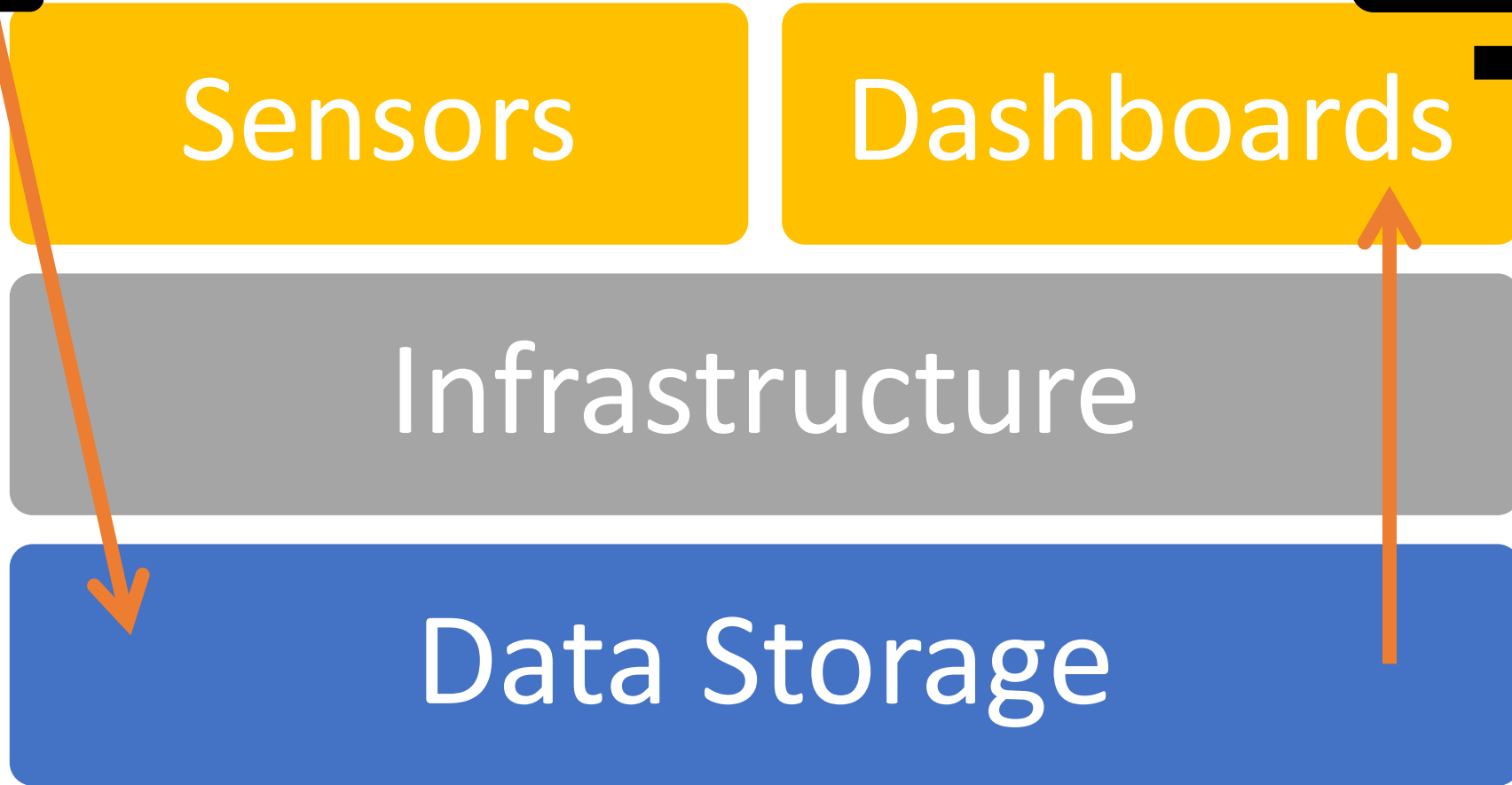


Sensors

Dashboards

Infrastructure

Data Storage



Our first use case for LoRa

£3.4m

£25k per run

HOT TOPICS: [MENTAL HEALTH INSPECTION REPORT](#) | [NORFOLK CHRISTMAS OFFERS](#) | [CHRISTMAS](#)

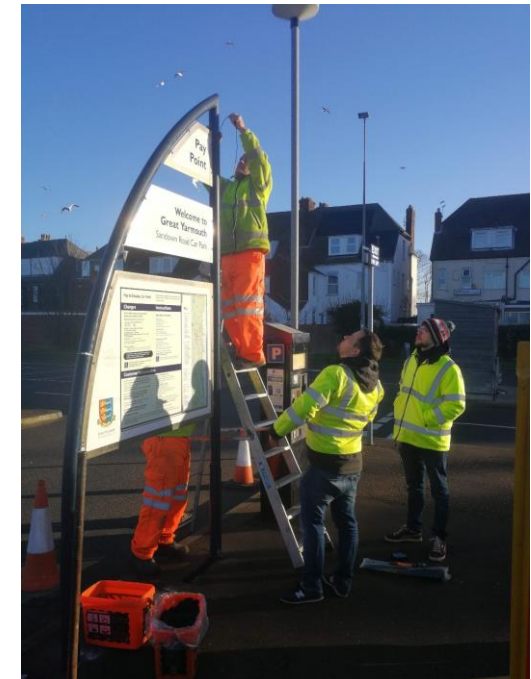


TICKETS ON SALE NOW!

Temperature sensors to be installed on Norfolk roads in trial to see if grit runs can be cut

Dan Grimmer dan.grimmer@archant.co.uk [@dangrimmer24](#)

PUBLISHED: 10:58 14 November 2018 | **UPDATED:** 10:58 14 November 2018



Latest Road Surface Temperatures



Data History Table

Sensor	Time	In Road Sensor	In Box Sensor
ncc-rt-001	07/05/2019 07:45	9.1 °C	9.3 °C
ncc-rt-001	07/05/2019 07:05	9 °C	9.7 °C
ncc-rt-001	07/05/2019 06:25	8.3 °C	8.8 °C
ncc-rt-001	07/05/2019 05:45	8 °C	8.3 °C
ncc-rt-001	07/05/2019 05:25	8 °C	7.9 °C
ncc-rt-001	07/05/2019 05:05	7.8 °C	7.7 °C
ncc-rt-001	07/05/2019 04:45	7.7 °C	7.5 °C

View & Download Individual Sensor Data

Location	Current Temperature	Last Reading	
Fullers Hill Car Park	9.1 °C	8 Minutes ago	View more details
Coach Station Car Park	10.4 °C	10 Minutes ago	View more details
Pleasure Beach Car Park	8.2 °C	1 Hours and 34 Minutes ago	View more details
Greyfriars Car Park	10.1 °C	7 Minutes ago	View more details
Caister Lifeboat Carpark	9.1 °C	3 Minutes ago	View more details

Key Note

The Things Network Conference



The bid...

Norfolk and Suffolk Innovation Network – LEP Funded

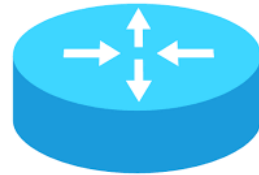
**Nodes
(Sensors)**



**Gateways
Semtech Packet
Forwarder**



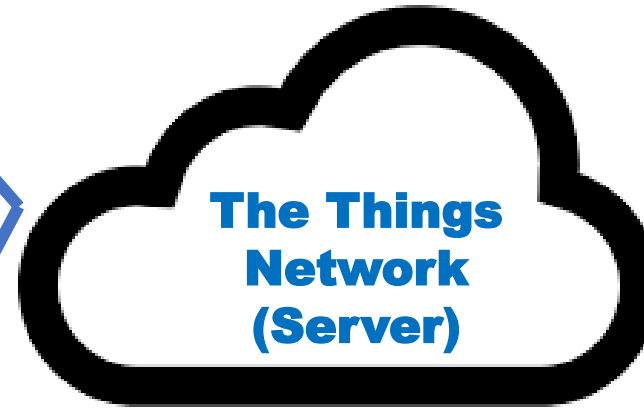
NCC Network



Broadband



Internet

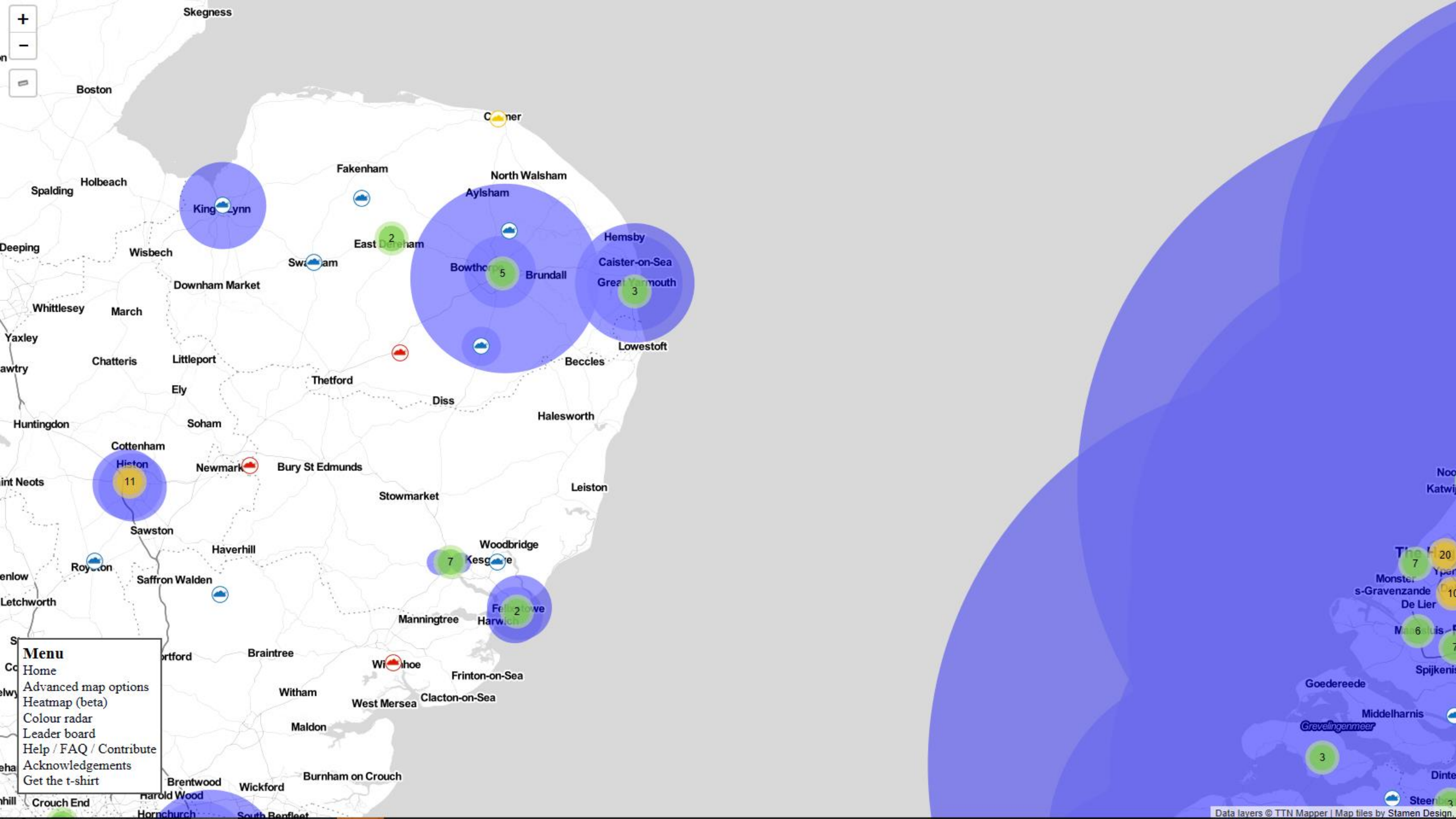


**Applications
Dashboards**



LoRaWAN

TCP/IP



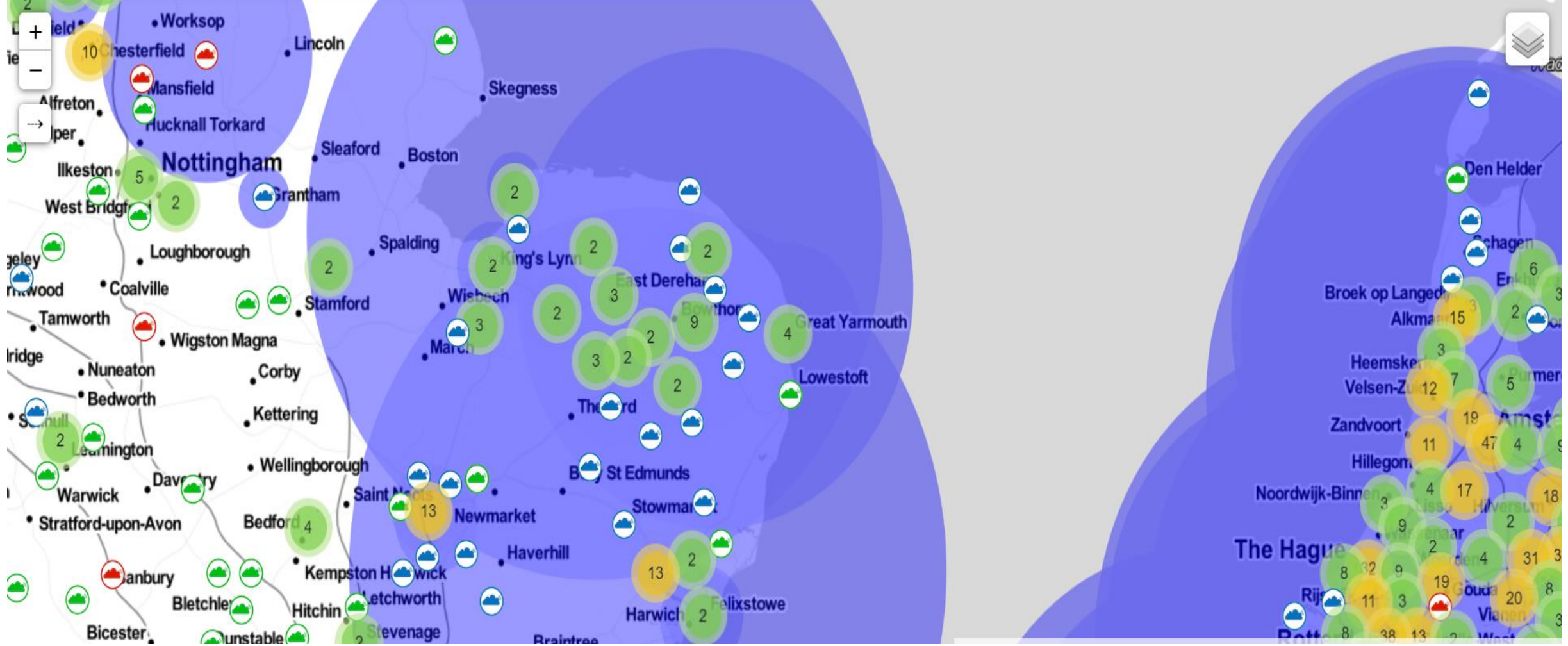
- Menu**
- Home
 - Advanced map options
 - Heatmap (beta)
 - Colour radar
 - Leader board
 - Help / FAQ / Contribute
 - Acknowledgements
 - Get the t-shirt

The **largest** free public sector LoRaWAN deployment in the UK

220 External gateways
50 Internal Gateways



Base Stations in January 2020



Coverage Now from 46 Deployed Gateways

22/07/2020

<https://ttnmapper.org/>

Early Use Cases...



[USED MACHINERY](#)

[NEW MACHINERY](#) ▾

[HIRE MACHINERY](#) ▾

[SERVICES AND SUPPORT](#) ▾

[USED MACHINERY](#)

[ONLINE SHOP](#)

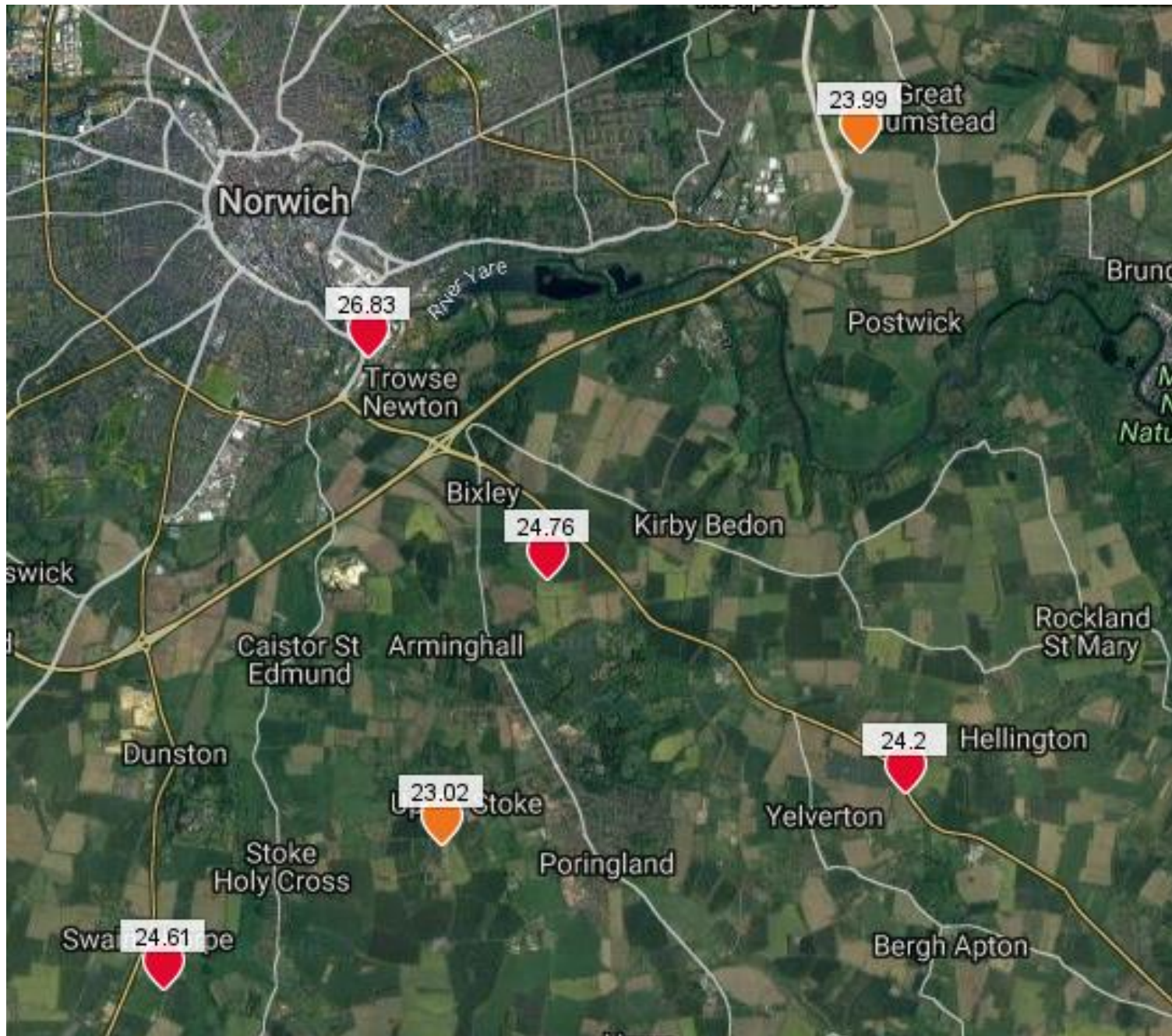
[CONTACT US](#)


8 REASONS TO BUY

A brand new John Deere combine for next harvest

[CLICK HERE FOR FURTHER](#)





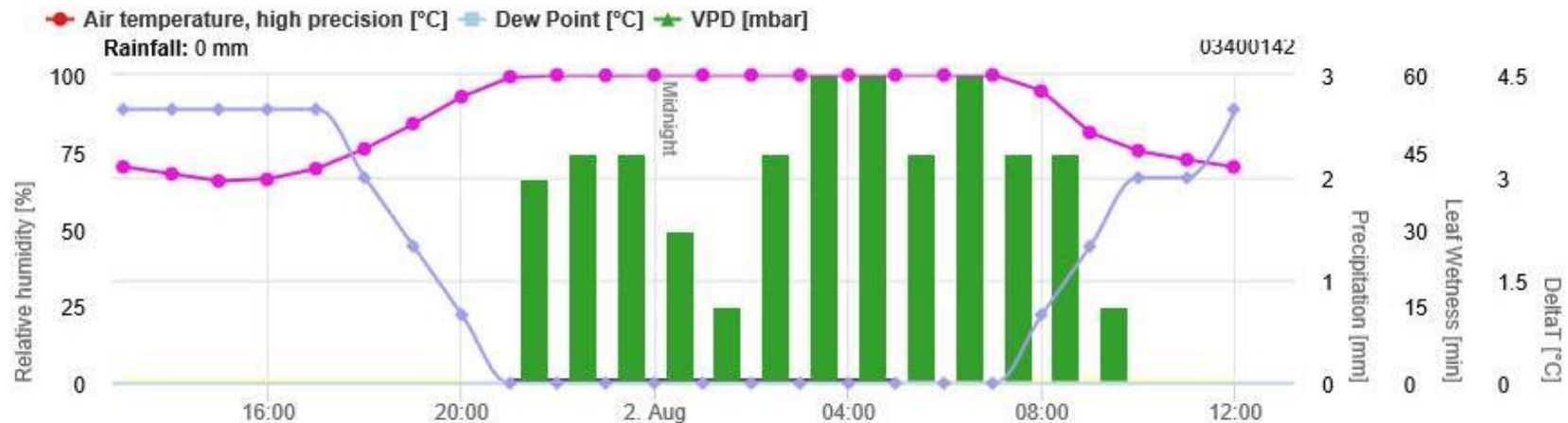
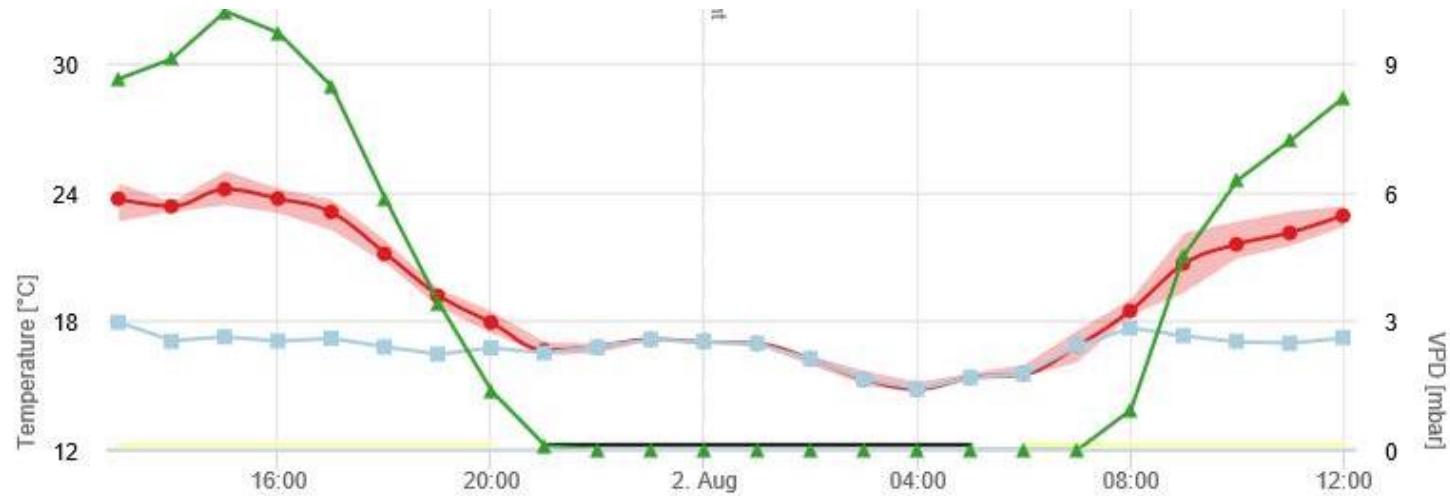


LoRain 3 / 03400142

ALL SENSORS ▾

03400142

- Air temperature, high precision [3]
- Dew Point [6]
- VPD [7]
- Relative humidity [4]
- Precipitation [2]
- Leaf Wetness [8]
- DeltaT [5]
- Battery
- Solar Panel [1]



Ben Burgess Depot

12.20 °C
0.00 mm/h
Last Data Reading: 2019-10-02 16:00:00

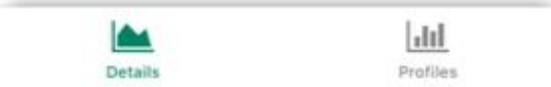
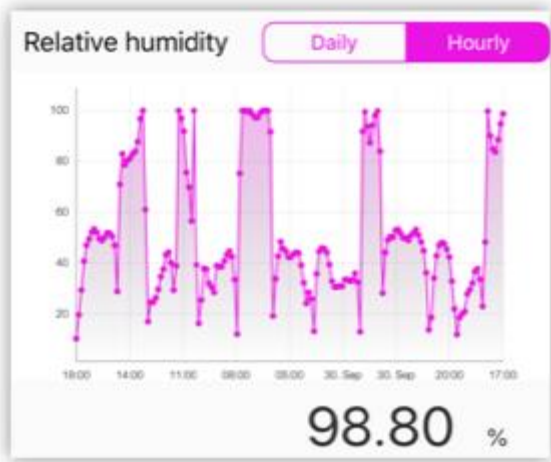
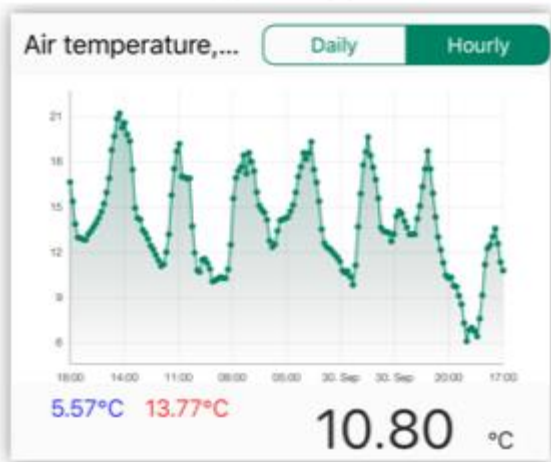


LoRain 1

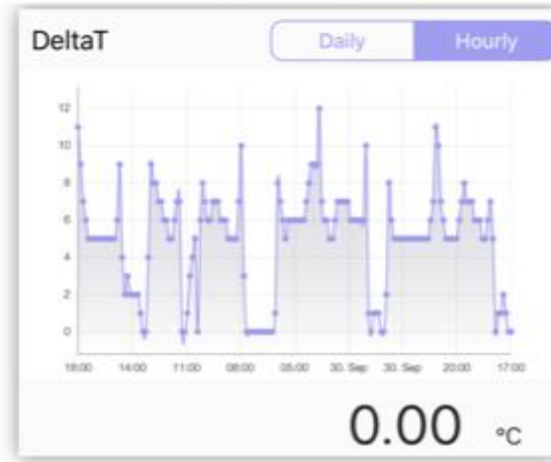
10.76 °C
99.10 %
0.00 mm/h
30.00 min
Last Data Reading: 2019-10-02 17:22:00



LoRain 1

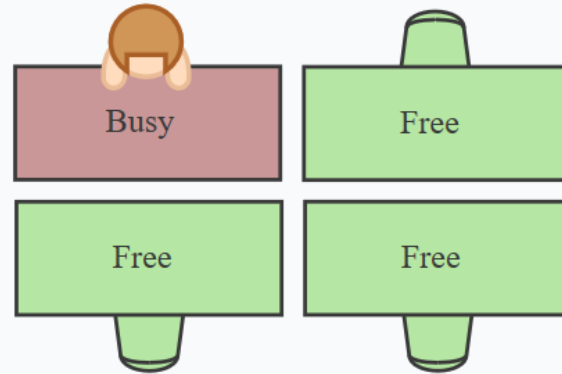
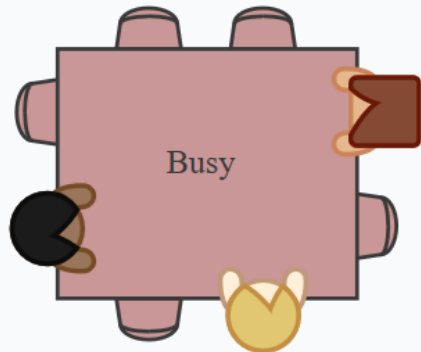
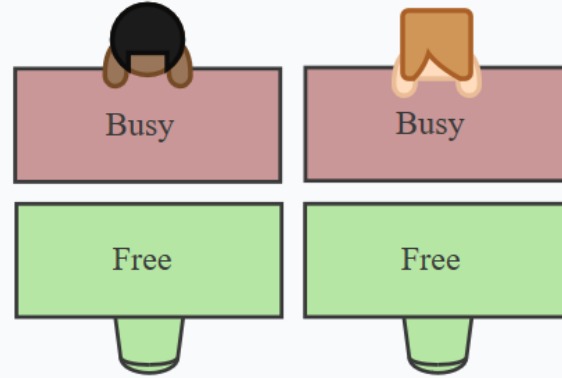
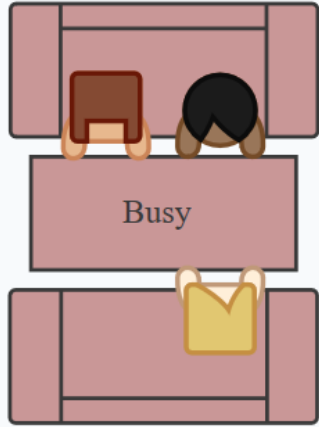


LoRain 1

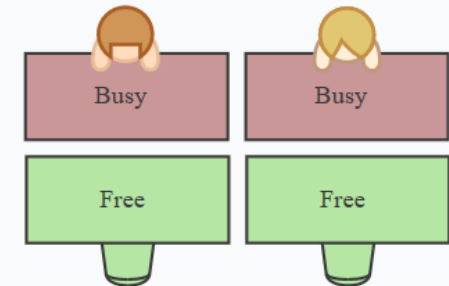
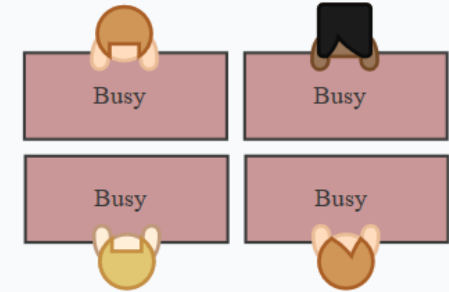
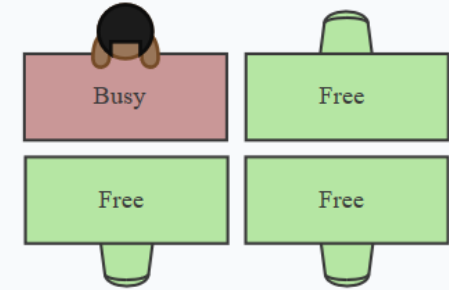




Innovation Centre



Property Office

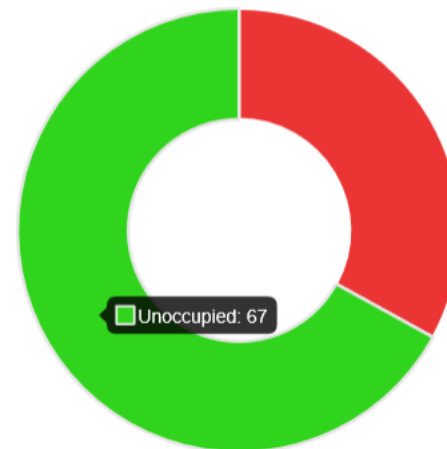


All Desks

Desk Name	Desk Location	Desk Availability	Desk Total Sessions	Temperature	Humidity	Battery
Desk One	Innovation Centre	Available	660	22.6 °C	54.5 %	
Desk Two	Innovation Centre	Occupied	751	23 °C	62.5 %	
Desk Three	Innovation Centre	Available	669	22.2 °C	54 %	
Desk Four	Innovation Centre	Available				
Desk Five	Innovation Centre	Occupied				
Desk Six	Innovation Centre	Available				
Desk Seven	Innovation Centre	Available				
Desk Eight	Innovation Centre	Available				
Desk One	Property Department	Occupied				
Desk Two	Property Department	Available				

Innovation Centre

Room Capacity: 10 desks

Occupied Unoccupied

Occupancy is calculated between the hours of 8am and 6pm



GPS Tracker



Scottow Temperature and Humidity Monitoring

Current Status

[Historic Overview](#)

Sensor 1

9 minutes, 49 seconds ago

🌡️ 19.8 °C

💧 48 %

🔋 3.01 V

Sensor 2

9 minutes, 24 seconds ago

🌡️ 15 °C

💧 49.5 %

🔋 2.96 V

Sensor 3

11 minutes, 52 seconds ago

🌡️ 13.3 °C

💧 52.5 %

🔋 2.95 V

Sensor 4

28 minutes, 41 seconds ago

🌡️ 15.1 °C

💧 52.5 %

🔋 2.95 V

Sensor 5

38 seconds ago

🌡️ 13.1 °C

💧 81 %

🔋 2.96 V

Sensor 6

8 minutes, 10 seconds ago

🌡️ 16 °C

💧 51.5 %

🔋 2.95 V

Sensor 7

7 minutes, 30 seconds ago

🌡️ 12.9 °C

💧 58.5 %

🔋 2.88 V

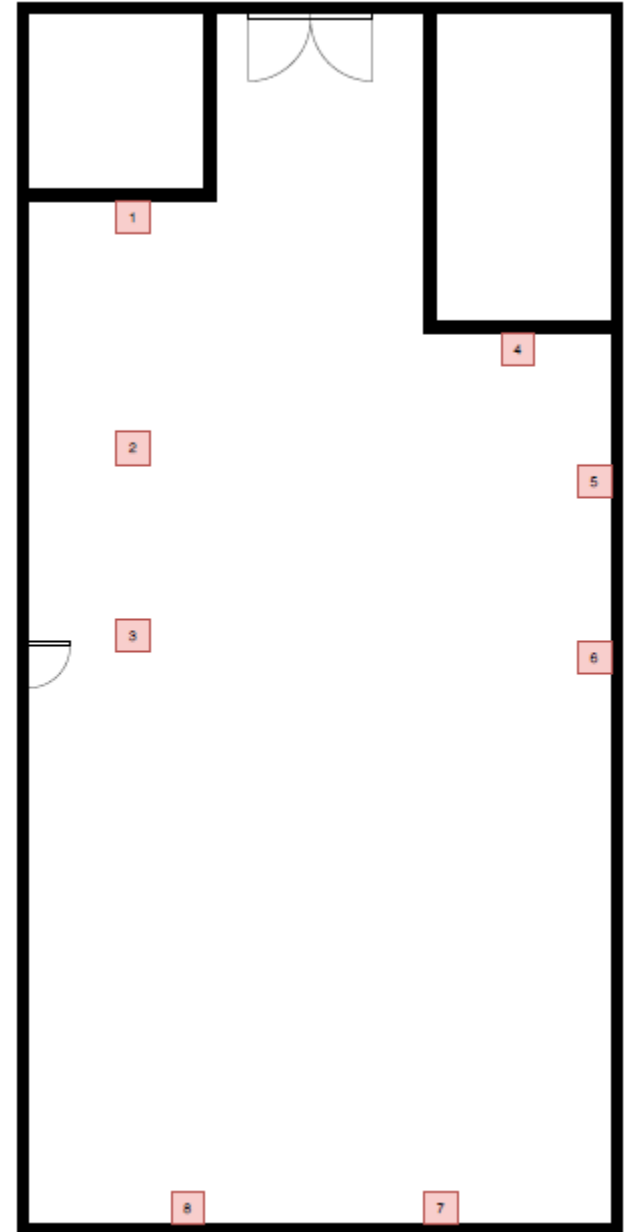
Sensor 8

12 minutes, 28 seconds ago

🌡️ 12.7 °C

💧 54.5 %

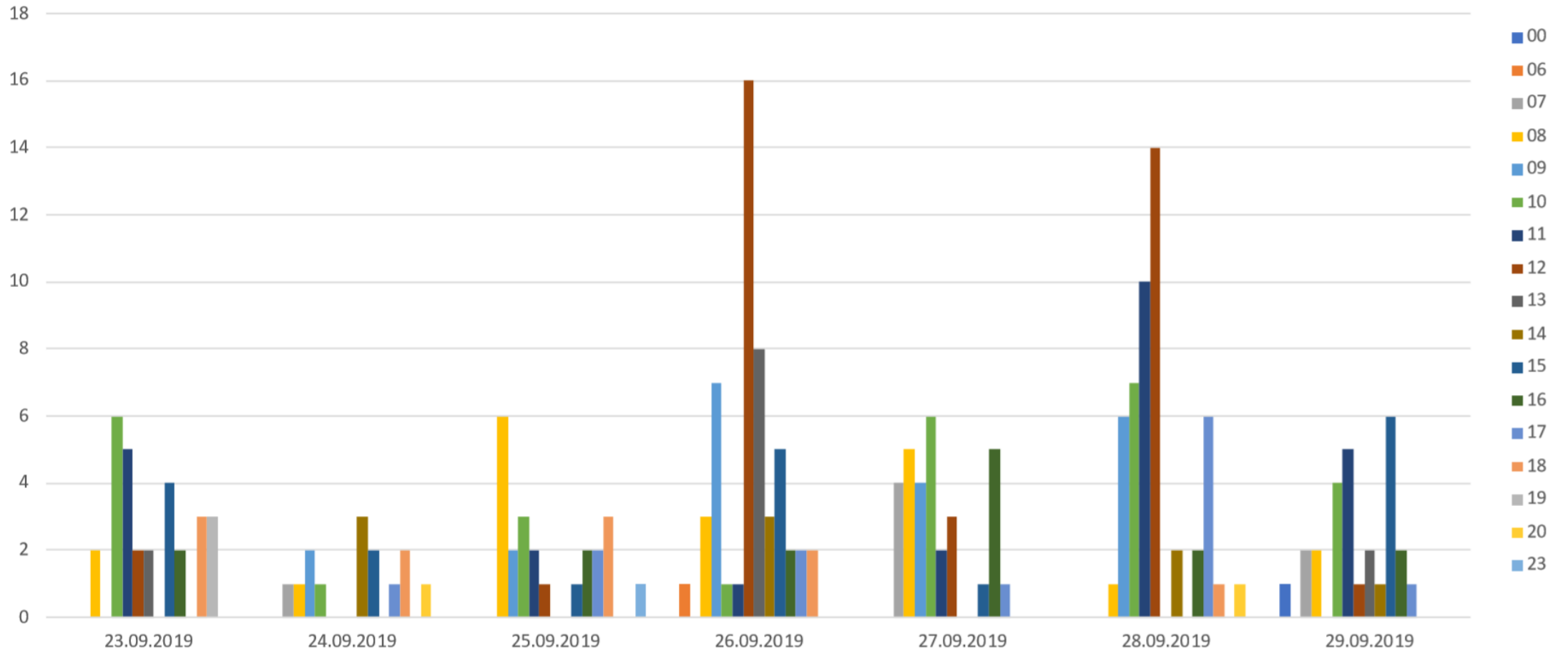
🔋 2.96 V



Environmental



Hourly People Count By Day



Boats





Fire!

Schools

Digital

Skills





**Step Into Tech
to develop digital skills**

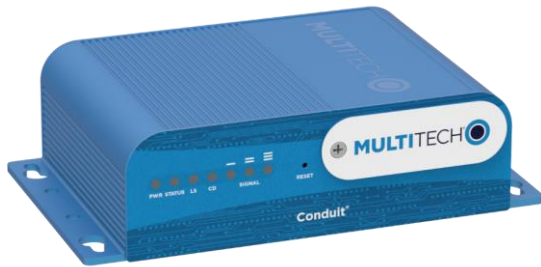
The kit...

Gateways



Outdoor

<https://www.multitech.com/brands/multiconnect-conduit-ip67>



Indoor

<https://www.multitech.com/brands/multiconnect-conduit>

Sensors

A Things Uno

This is an Arduino board with a Lora Radio chip on



Grove Arduino Starter Kit

This will provide a basic box of plug and play sensors with no soldering





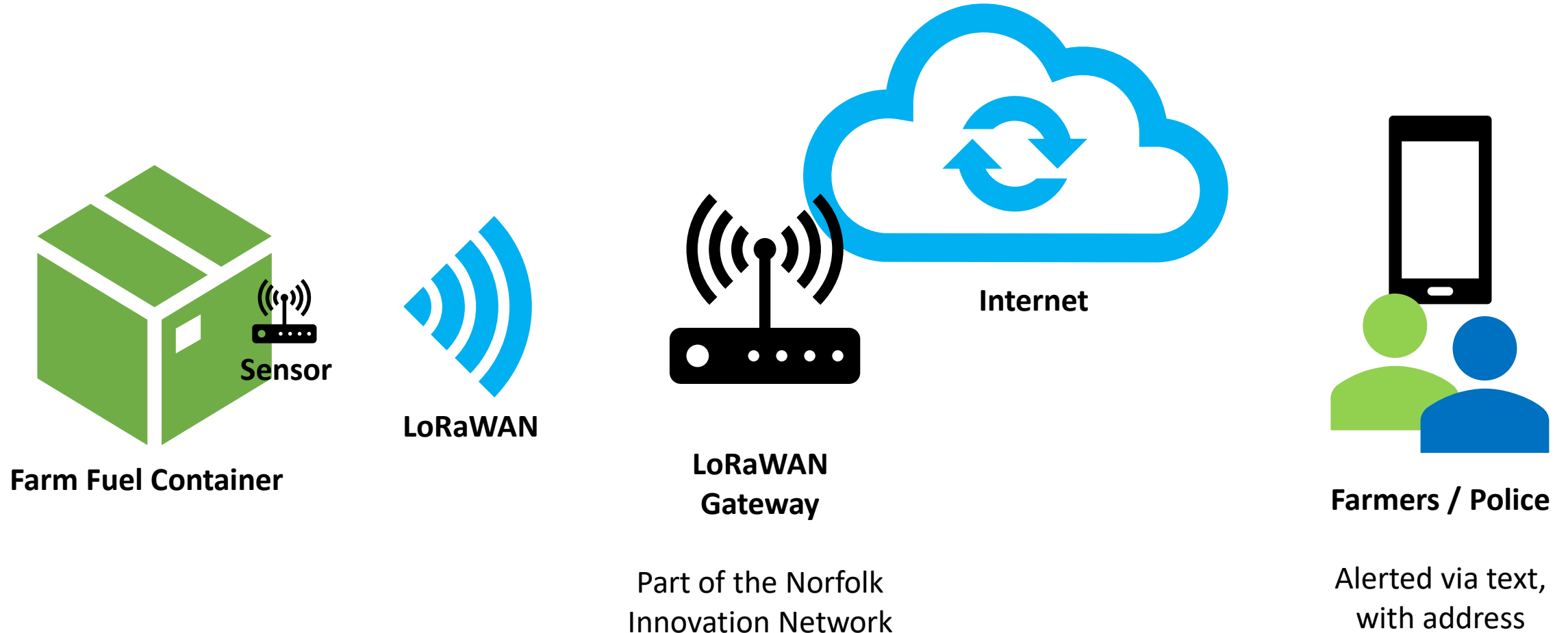
NORFOLK & SUFFOLK
INNOVATION
— NETWORK —



Some Recent Use Cases

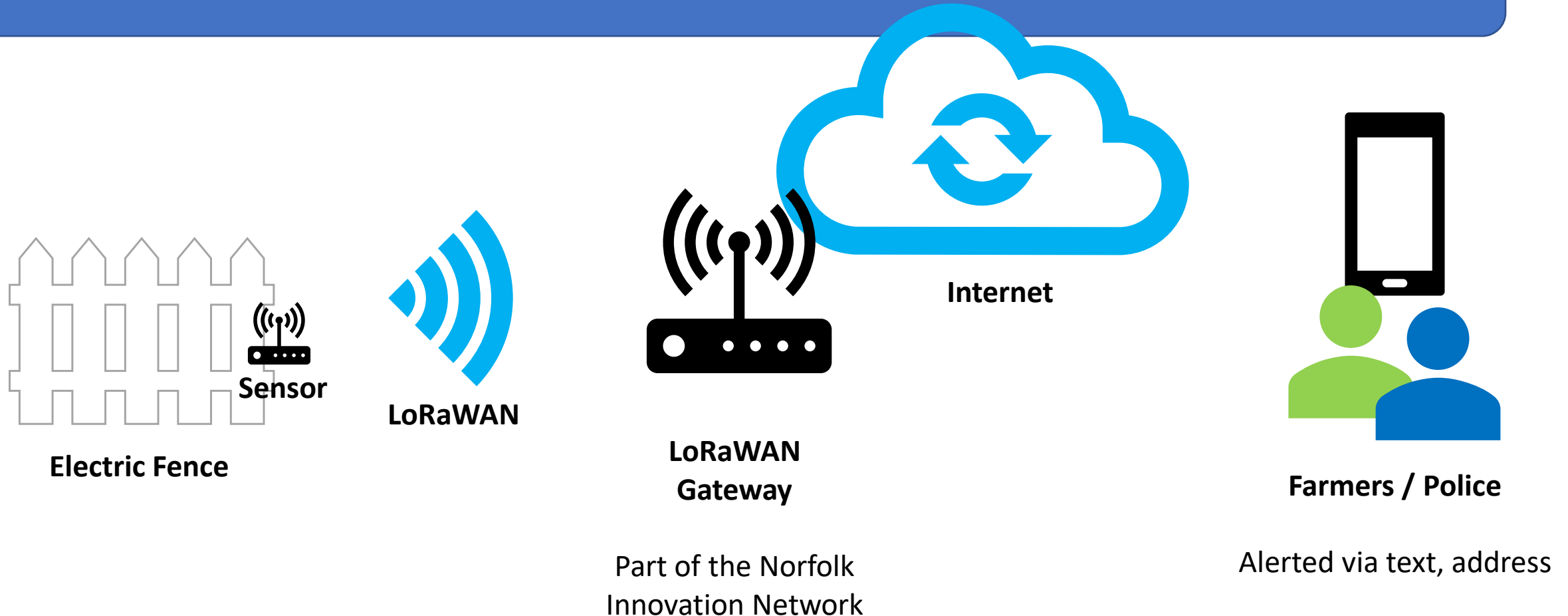
Vision Norfolk Farmers and Police alerted if Fuel levels drops.

To help prevent Agricultural theft on Norfolk we would like to monitor farm fuel storage and alert the farmer and / or police when the fuel levels reduce very quickly.



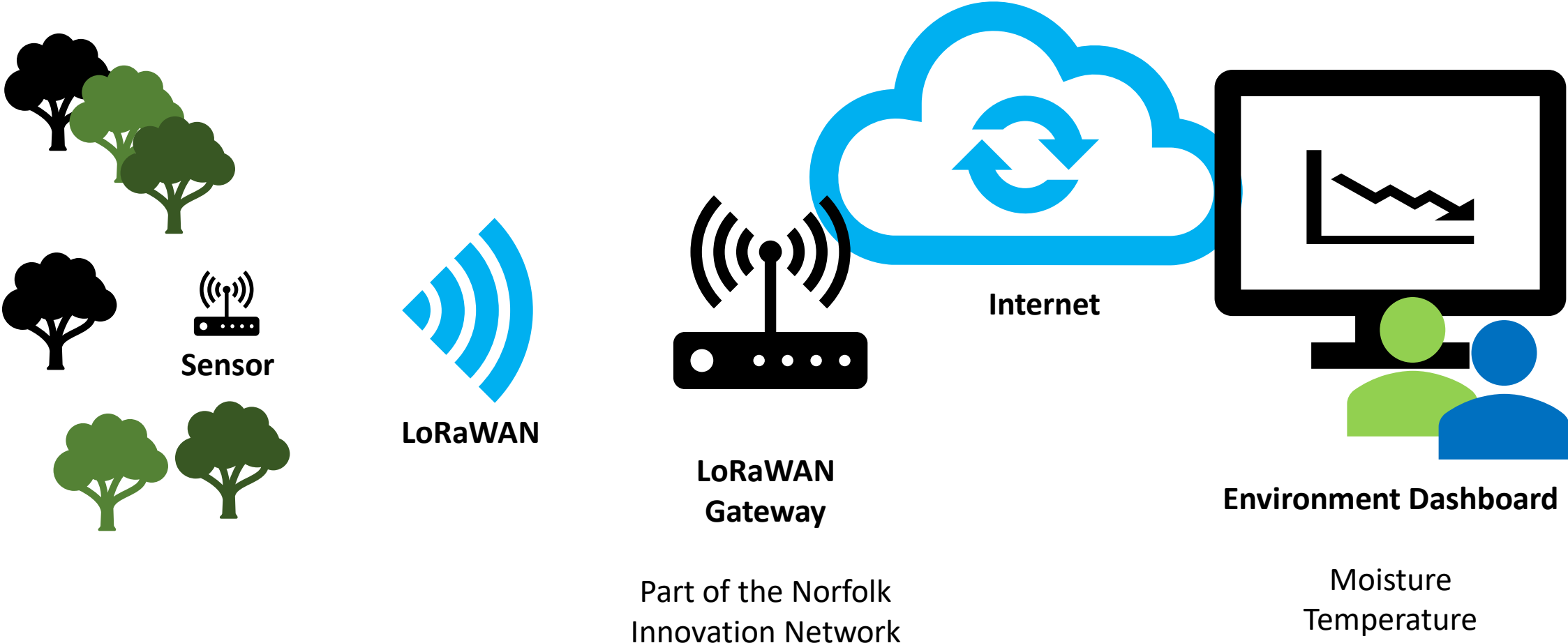
Vision Norfolk Farmers and Police alerted if electric fence is not working

To help prevent Agricultural theft, protect livestock and reduce collisions on Norfolk roads we would like to monitor electric fences to alert the farmer and / or police when the fence is not operating due to theft or dead battery.



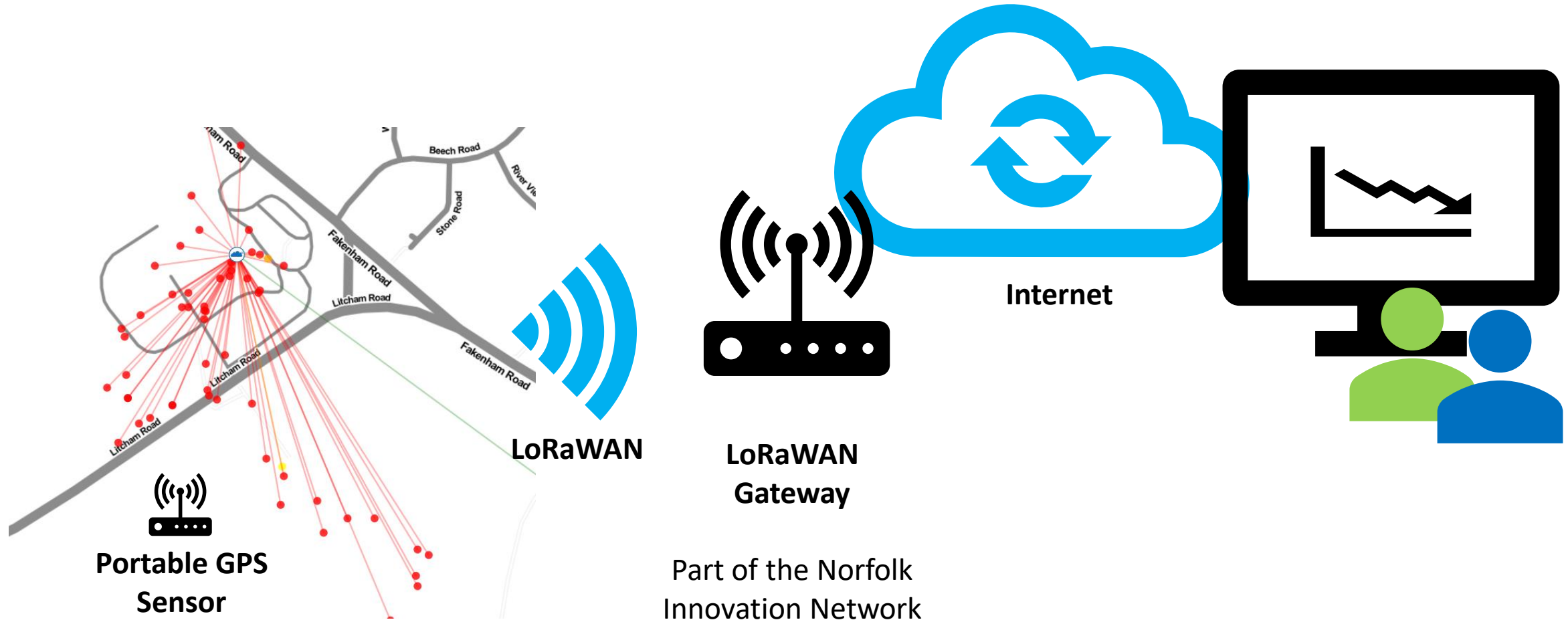
Vision Norfolk County Council using a Smart County Dashboard

To help plant £1m tree's, provide environmental data to public, business and the public sector.

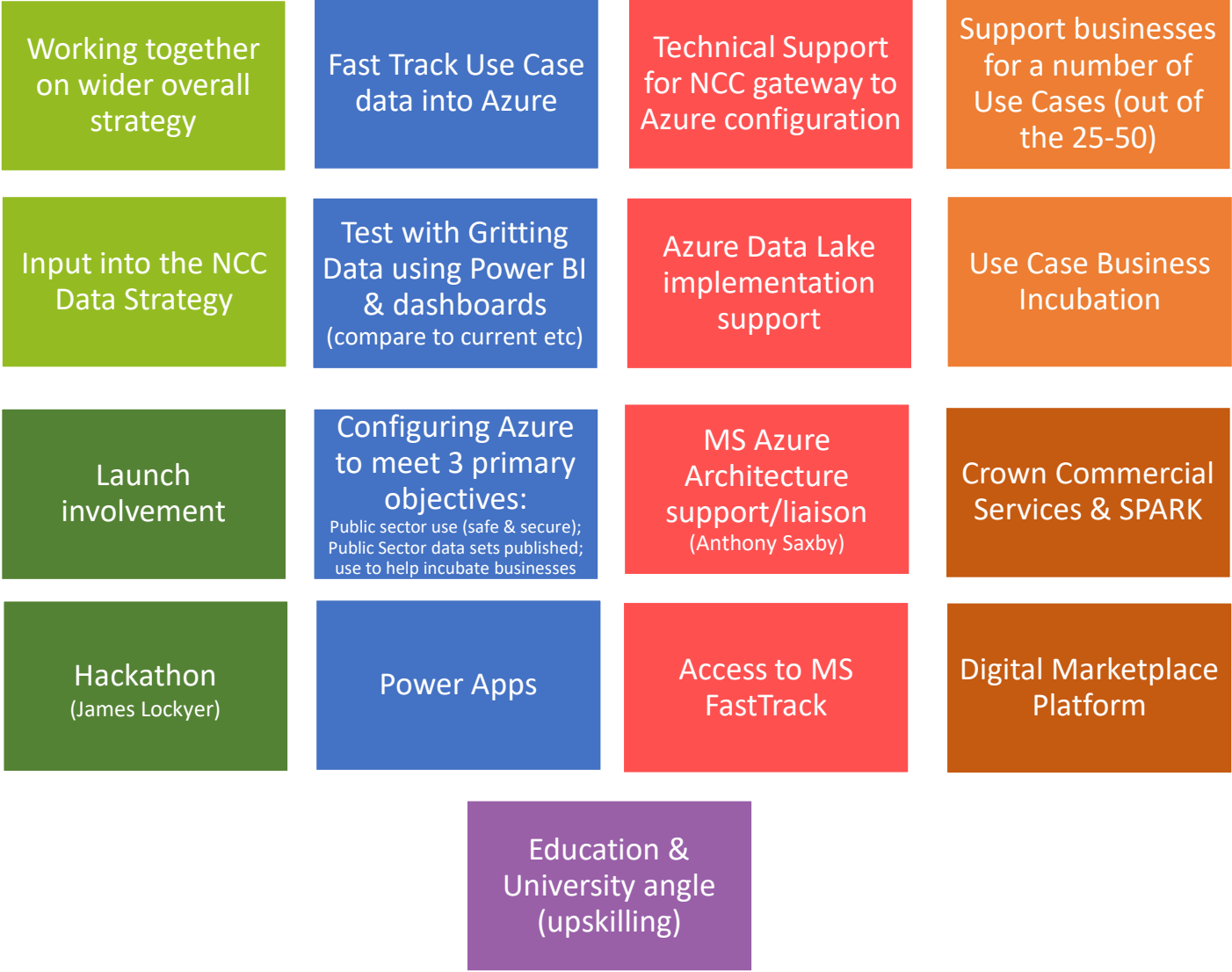


Vision Norfolk County Council using Portable Sensors to Inform Museum Decisions

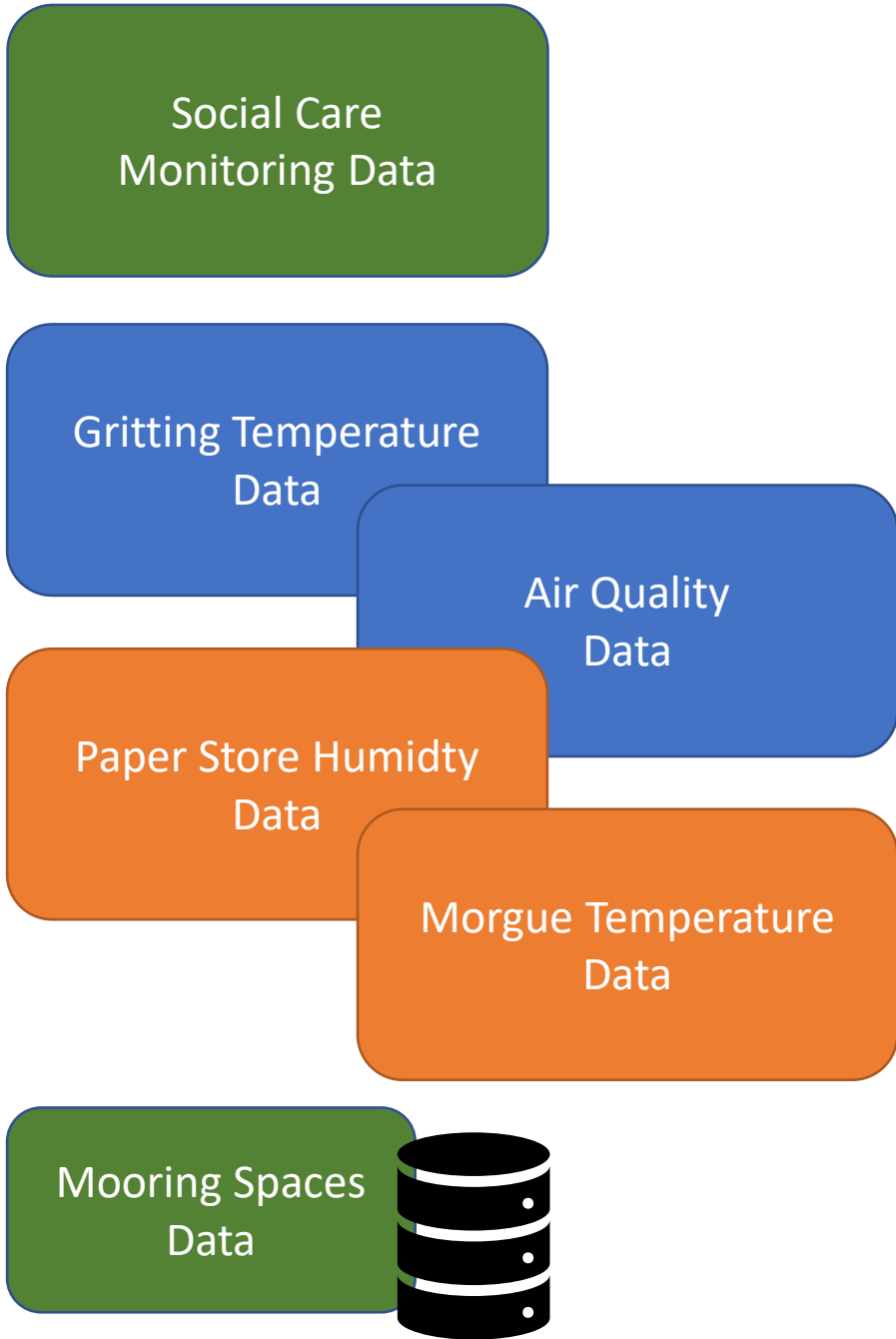
Provide the general public with a sensor to carry that tracks their movement around the external museum.



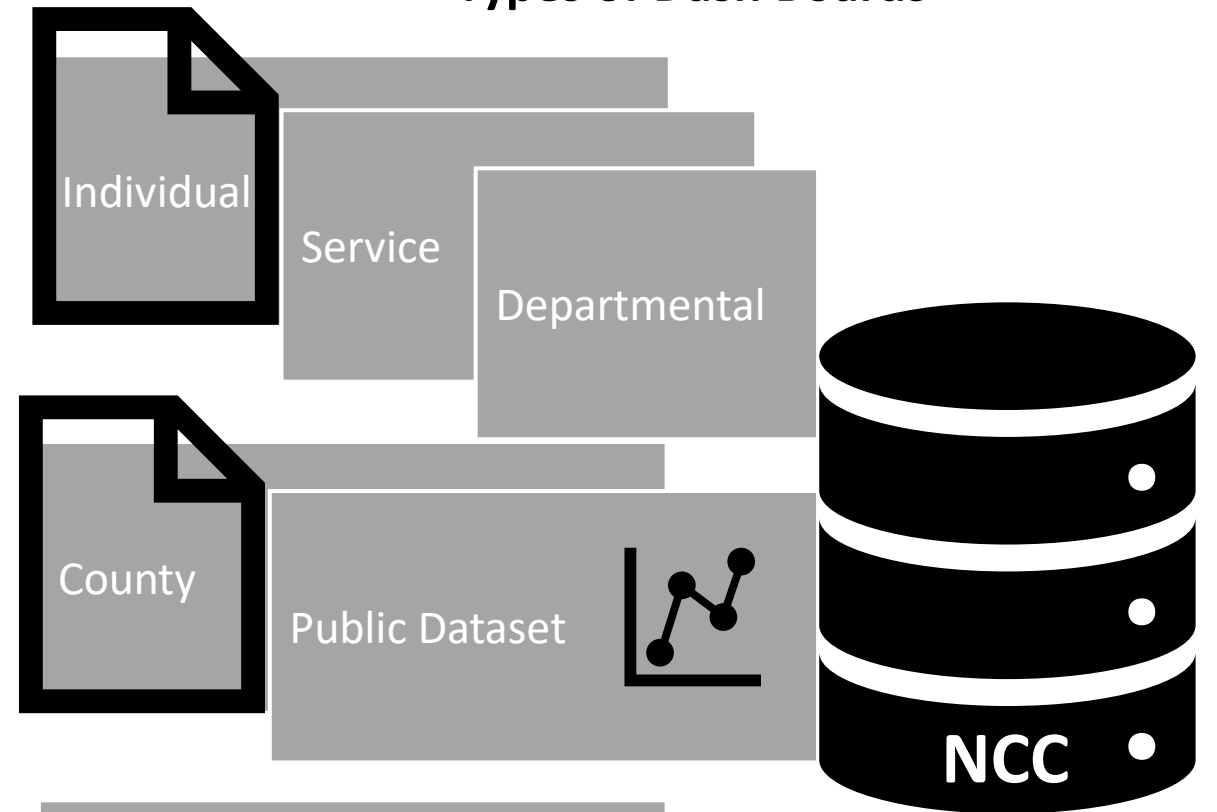
NCC Working with Microsoft on IoT/LoRaWAN - Workstreams



Workstreams: strategy, promotion, data/platform, support, use cases, business, education

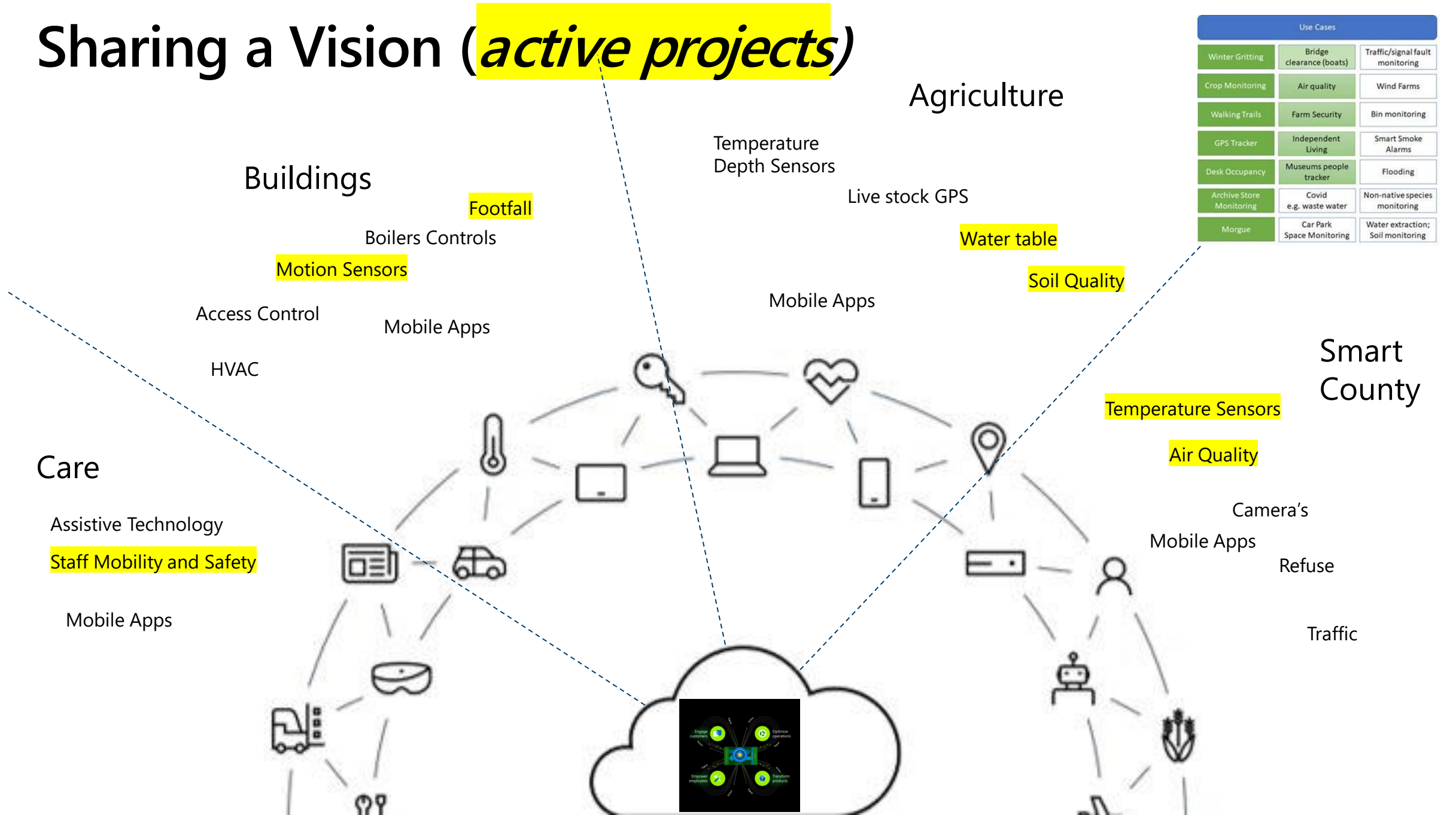


Types of Dash Boards



- What does it look like?
- Standards / API's?
- UK wide, Norfolk Leading
- Security
- Where do we start gritting?

Sharing a Vision (*active projects*)





Norfolk
County Council

Reference Material

Digital Connectivity

- <https://www.norfolk.gov.uk/digital>
- <https://socitm.net/download/in-our-view-issue-18-fields-of-dreams-sprouting-innovation-in-norfolk/>

The Things Network

- <https://www.thethingsnetwork.org/>
- <https://ttnmapper.org/>

Digital Skills

- <http://stepintotech.org/>
- [T Level industry placements - digital, Norfolk County Council](#)

Summary & Conclusion

Our focus is on use of IoT / Smart Places technology to reduce the cost of delivering public services & stimulate economic growth across the county.

LoRaWAN Technology is very cheap and quick to deploy compared to other digital connectivity options, so we recommend to consider it in your area.

Digital Connectivity

www.norfolk.gov.uk/digital



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norfolk.gov.uk