

The University of Lincoln and IMS Evolve

Industrial Internet of Things for Networked Refrigeration Energy Demand Management

Professor Simon Pearson



UNIVERSITY OF
LINCOLN

IoT: Internet of Things

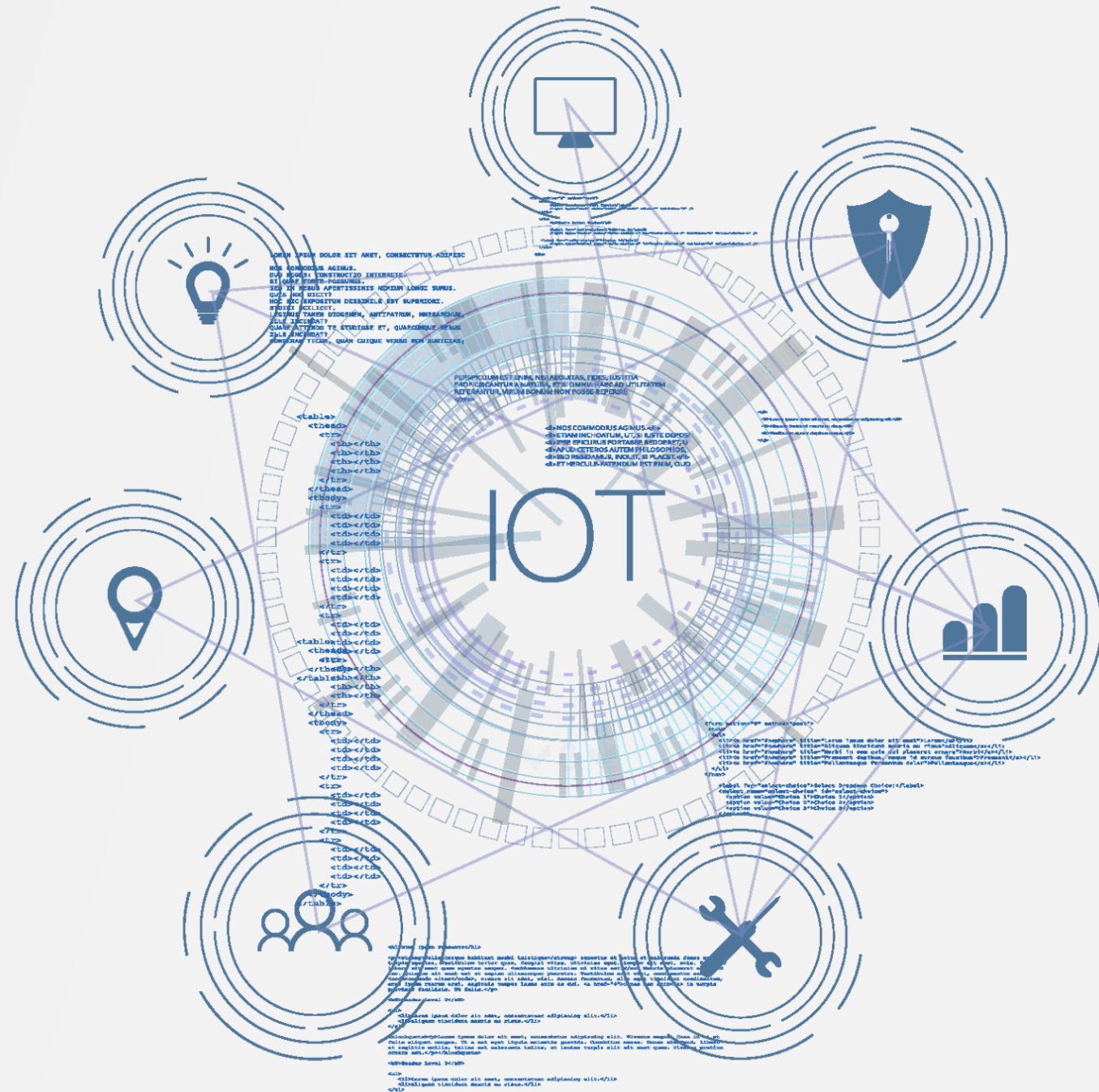
Refers to the system of billions of interrelated physical devices around the world.

From anything from a lightbulb to an aeroplane to an animal, devices can be provided with unique identifiers that give them the ability to transfer data over a network with no human-to-human or human-to-computer interaction required.

IIoT: Industrial Internet of Things

Internet of things is most commonly used for consumer usage such as wearables or smart consumer products.

Industrial Internet of Things is used for industrial purposes such as manufacturing, supply chain monitor and management system.



DSR – Demand Side Response

The Challenge:

National Grid generation margin under huge, increasing pressures

The Opportunity:

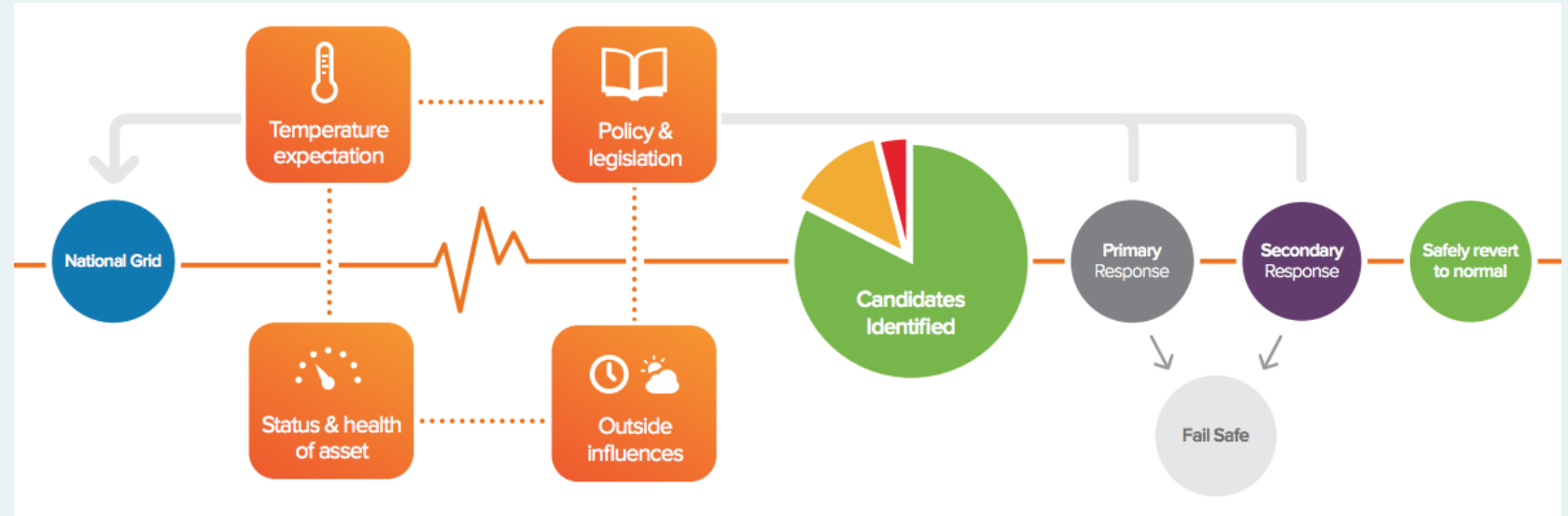
- 14% of UK energy is consumed by the Cold Chain
- Leverage the IMS Evolve and Tesco long-standing relationship

The Vision:

To create a scalable, versatile product that dynamically balances electrical load within food retail to help stabilise the National Grid.

The Solution:

Continuous, dynamic evaluation to enable real-time response



Align power consumption within the cold chain without affecting quality or safety of produce



Leverage diverse technologies and disparate assets within the cold chain

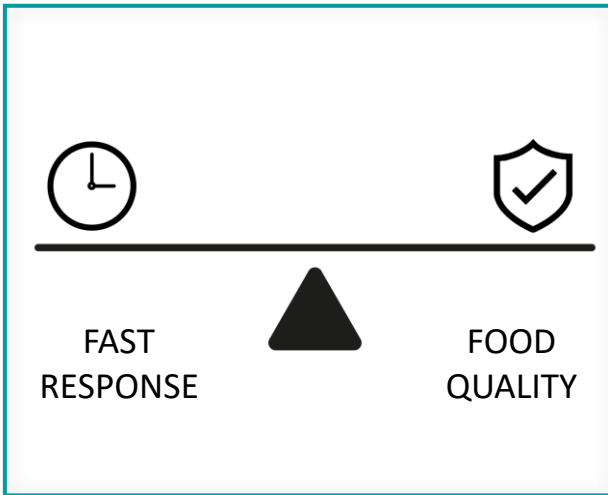


Overcome geographical constraints within National Grid networks

'THE BARN' TEST FACILITY

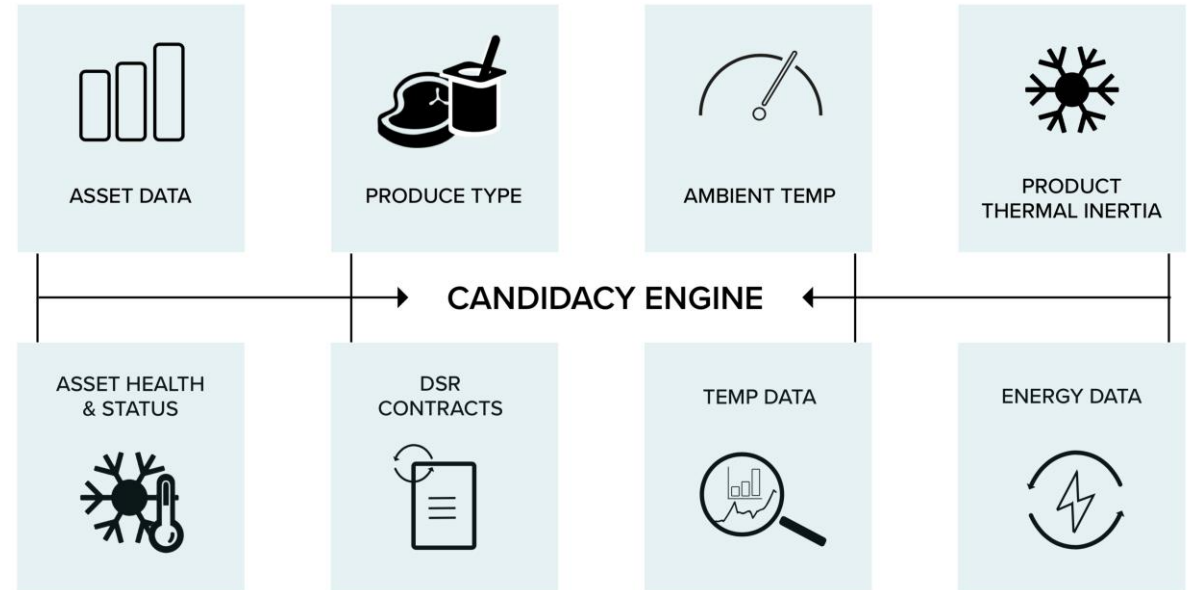
DEVISE DSR METHODOLOGY

- Understand hardware capability
- Test hardware response speeds
- Define necessary fail safe strategy
- Impact on food
- Second by second monitoring

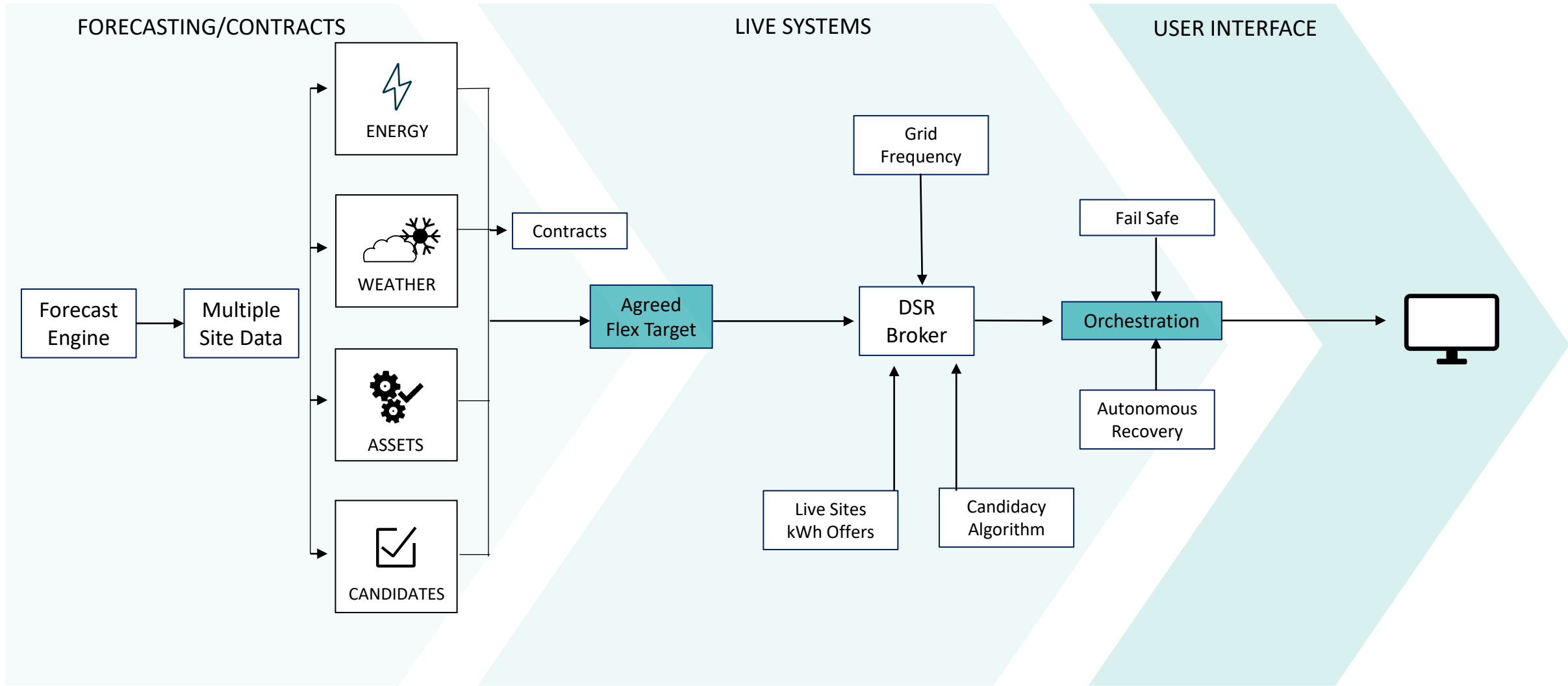


CANDIDACY ALGORITHM:

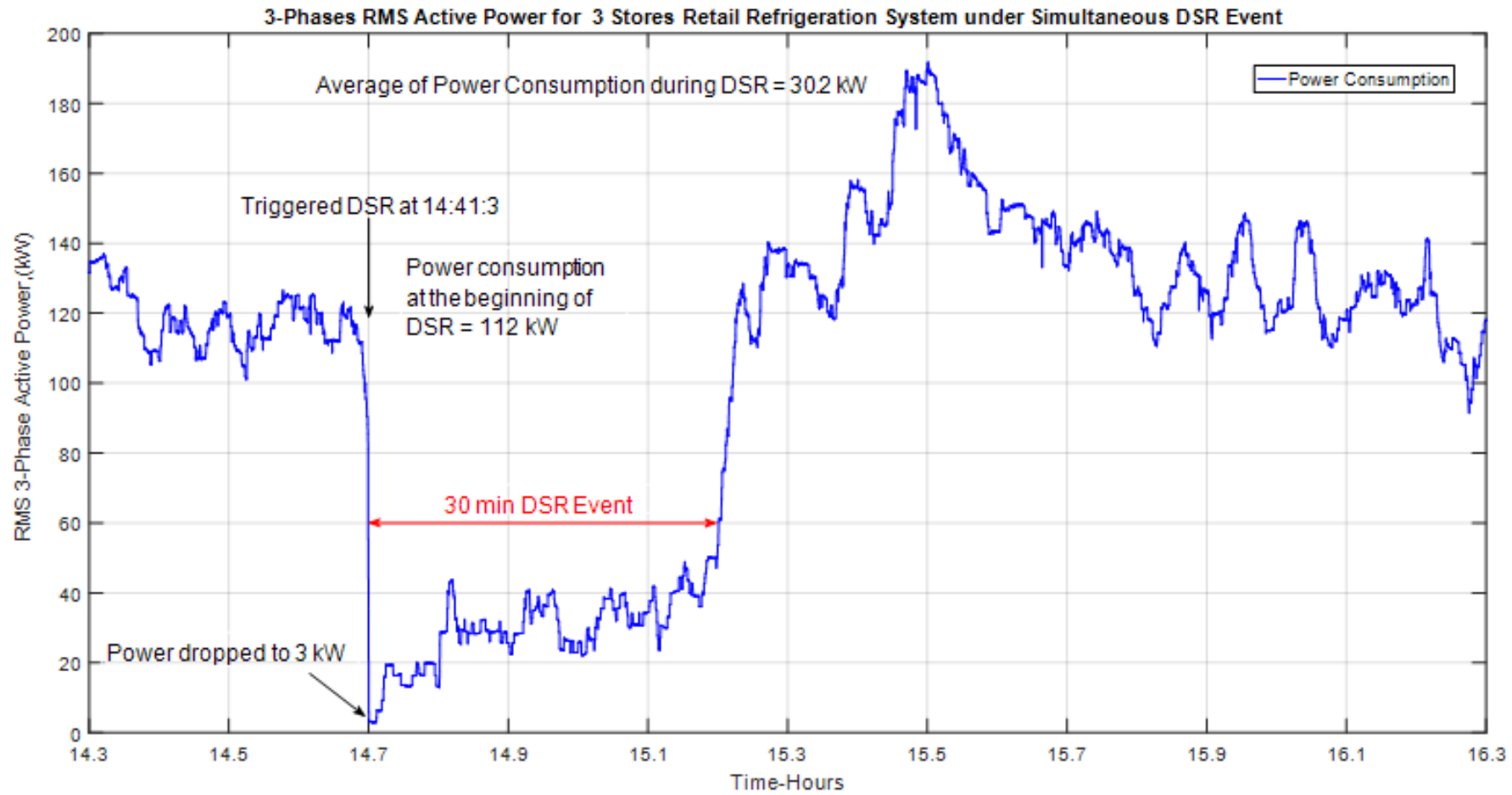
Ensure food safety and quality, alongside critical asset reliability



DSR – Demand Side Response



Machine Learning and AI capabilities drive continuous algorithm evolution enabling more reliable and robust future forecasting



SUMMARY

- System is Proven in 18 Tesco Retail Store
- Demonstrated unprecedented networked control in real time
- New Distributed AI used to calibrate each case
- Can be Applied across small or large refrigeration assets
- Potential to help stabilize the National Grid as more renewables come on stream



THANK-YOU