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Standards  
Agency  
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**FSA's future food  
surveillance system**

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## In this presentation...

- Why Surveillance is an FSA priority? Reasoning behind the approach to a new food surveillance system
- Drivers for change
- Level of ambition
- High level plan
  - Prototypes – Proof of Concept (PoC)
    - Olive oil and vibrio POCs
    - Internal & External networks
- Next steps

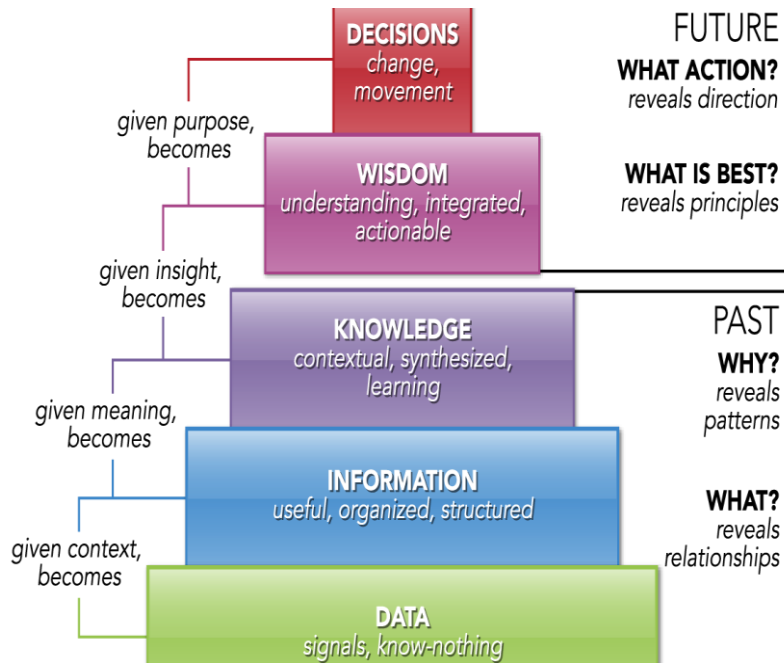
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## Definition of Surveillance

**Surveillance** can be defined as: *"the ongoing systematic collection, collation, analysis and interpretation of data, followed by the dissemination of information to all those involved so that directed actions may be taken"* (WHO).

The **FSA's Food surveillance** (in this context 'food' includes drink and animal feed) is about building a picture of the food system, its risks and vulnerabilities, so that FSA, and others, can manage consumer risks.

## Data pyramid



## Surveillance vision built on data

To protect the consumer, and ensure that food is safe and authentic, we need to analyse data to understand where issues may arise **before** they are issues

### Protecting the consumer

Food is safe to eat

Food is what it says it is

Identify emerging risks

Spot the anomalies

Take data-driven action

Assess historic incidents' data

Identify root causes of incidents

Share insights with partners

Understand impact of potential actions

Why?

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Before

Event Occur

After

Awareness

Prevention

Detection

Intervention

PREDICTIVE

PROACTIVE

REACTIVE

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**Expectations**    **Goal:** Design a flexible, evolving system to account for possible risks and challenges

## What are the drivers for change?

1. **Current program has room for improvement** – “Scraping tablecloths in Leeds” does not protect the public against evolving and often fast moving, global threats
2. **Budget pressures are high** – £2m spent on sampling could be used more intelligently
3. **Regulate the Future, not the Past** – be prepared to manage future problems, not focused only on regulating past / known issues
4. **Others may do it better** - **Industry** / academic and technology progress affords us the opportunity to use this and to support Surveillance

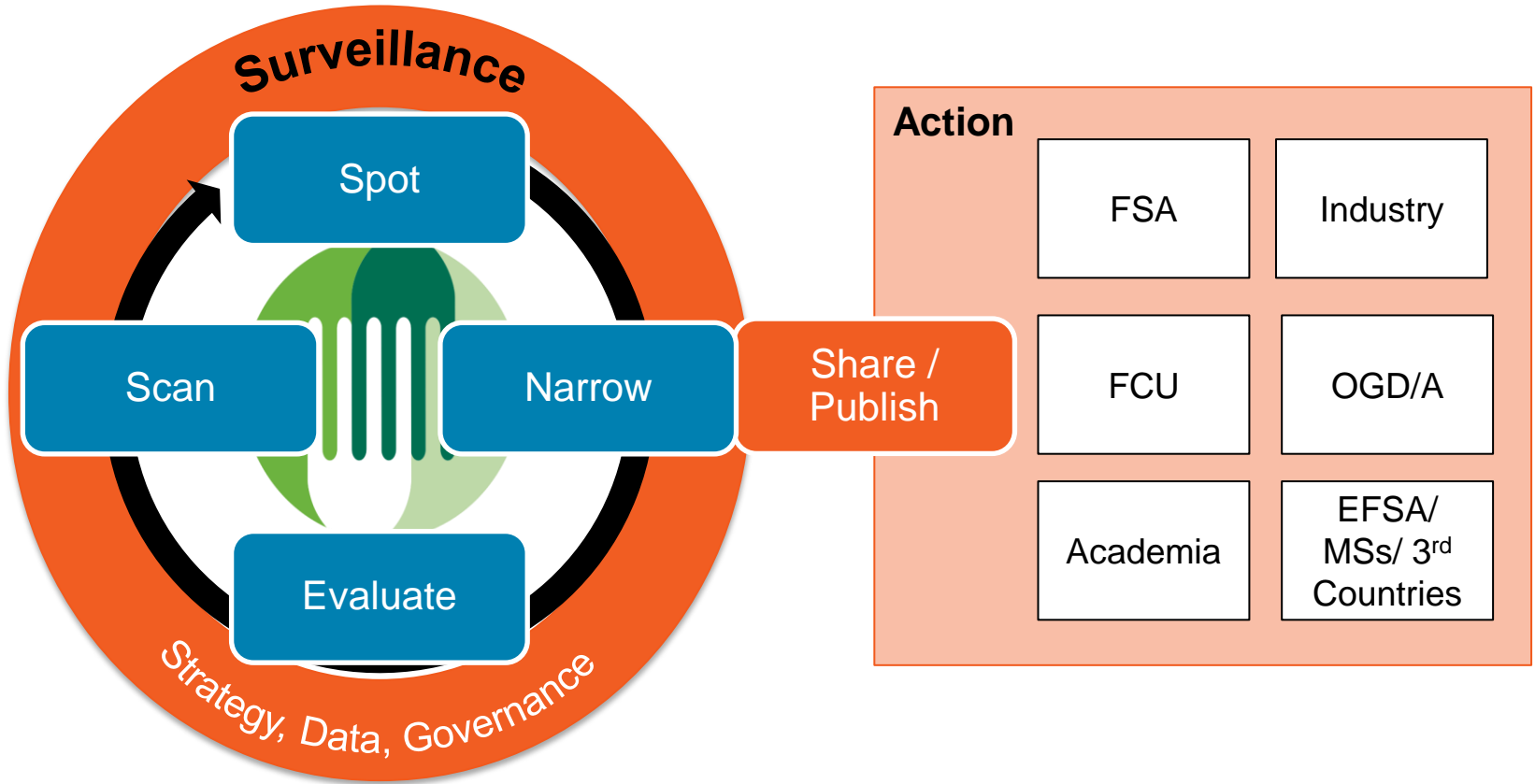
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## The Vision: where do we want to be ?

**By March 2019 have a Surveillance Capability (core service) that:**

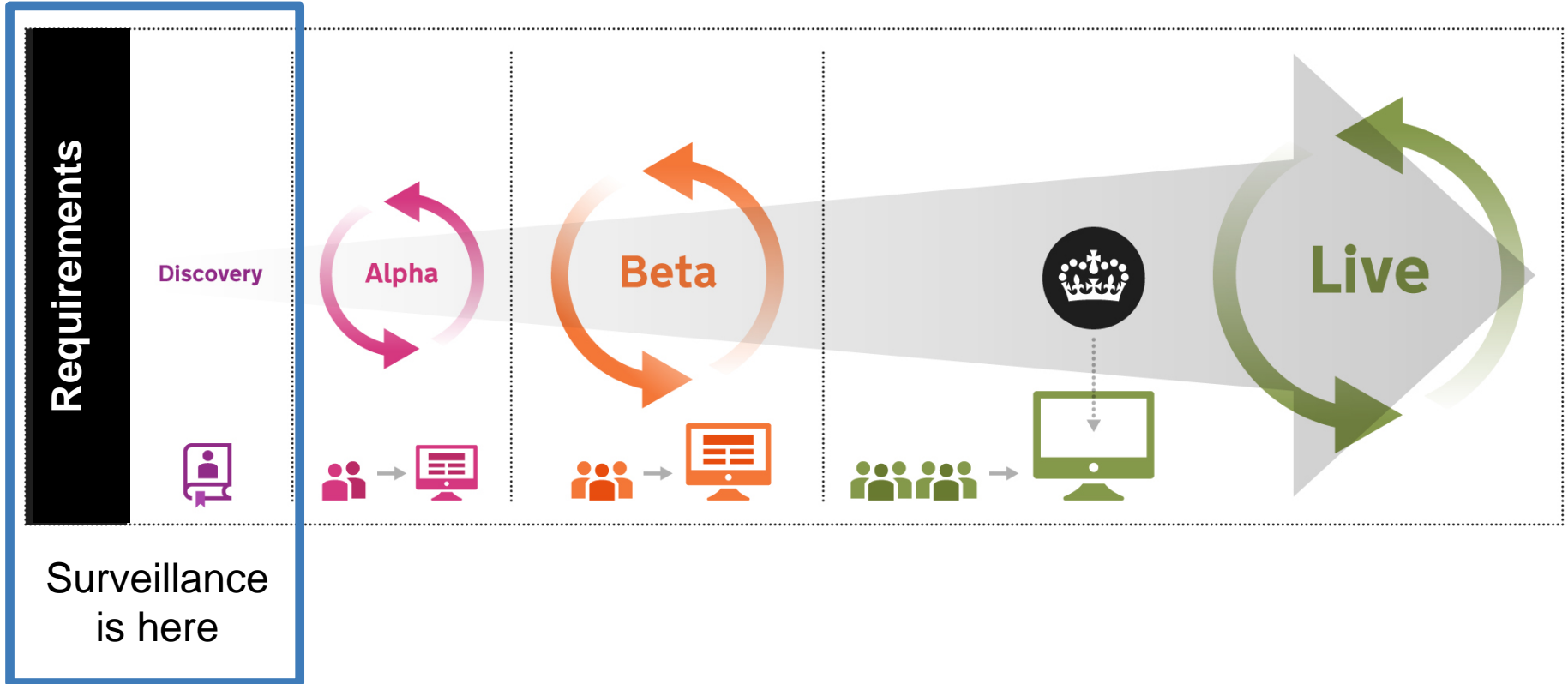
- Supports the wider ambition **that food is safe to eat and is what it says on the tin**
- **Helps us to understand risks (safety / authenticity / assurance) and identify both gaps and risks** that are changing or not being managed, followed by a plan of action
- **Drives decision making and prioritisation across all parts of the FSA and beyond**
- **Uses evidence-based analytics** to deliver the appropriate level of confidence / certainty to drive decision-making

# Proposed High Level Operating Model





# Programme Update – Prototypes



- Comotion deliverables encapsulated the Surveillance vision and Target Op Model
- Defining detailed user needs and mobilising to delivery has proven to be a challenge
- We will use the discovery phase to learn and help assess the options
- This approach also supports the Surveillance transition toward agile delivery, see Appendix 03

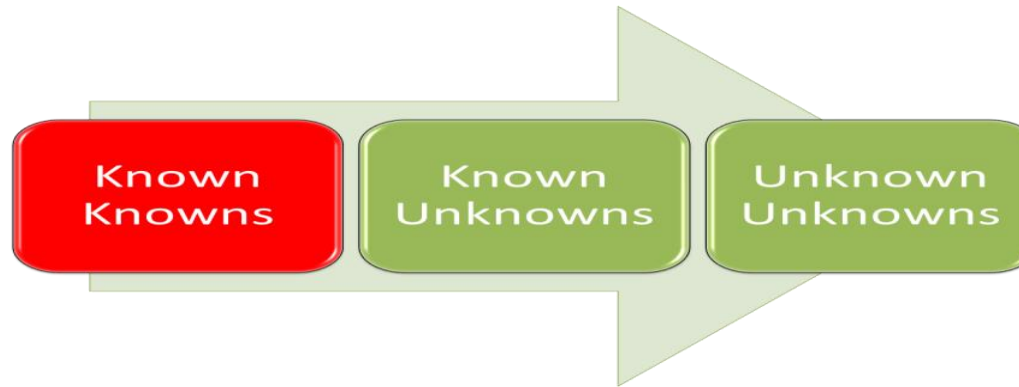
# Prototypes

## SURVEILLANCE

Think Big, Act Small, Fail Fast  
and Learn Rapidly

### Why Prototyping ?

- Prototyping approach has received wholesale agreement, spanning programme board members, surveillance delivery team, academia and external partners
- First two POCs: Olive Oil and Vibrios, both of which begin with 'Known Knowns'.



- Developing a technological solution to case studies will address a 'Known Knowns' example and could be used as a benchmark model against which futures models are assessed.
- IBM has supported the development of the first prototypes (mid-November)

## The key to quickly generating insight

- For the first time, we organised a #hackathon which brought together subject matter experts & data scientists, who used open data to create actionable insights into high-risk commodities
- For seven weeks we worked with IBM on two proofs-of-concept



### **Olive oil adulteration**

As a result of fraudulent activity, one in three bottles of olive oil in the UK are either fake or of poor quality



### **Vibriosis in shellfish**

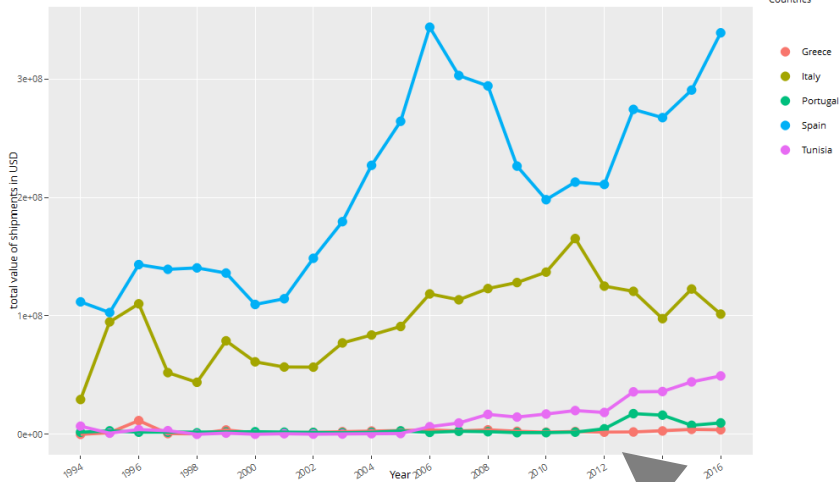
Naturally occurring bacteria in warm coastal water can cause disease in people who eat contaminated shellfish

### **Week by week plan**

1. Business understanding
2. Data gathering
3. Hackathon preparation
4. Two-day Hackathon event
5. Continued analysis
6. Road-mapping and prototyping
7. Final playback

# We created a trade dashboard...

Global trade of olive oil using UN Comtrade data  
Imports into France from Greece, Tunisia, Portugal, Italy, Spain



Click the 'Plot' button to update the plot.

**Country of interest:**  
France

**Trade partners:**  
Greece Tunisia Portugal Italy Spain

**Commodity codes:**

- 150910 - Vegetable oils; olive oil and its fractions, virgin, whether or not refined, but not chemically modified
- 150990 - Vegetable oils; olive oil and its fractions, other than virgin, whether or not refined, but not chemically modified
- 151000 - Vegetable oils; oils and their fractions n.e.s. in chapter 15, obtained solely from olives, whether or not refined, but not chemically modified, including blends of these oils or fractions with oils or fractions of heading no. 1509

**Trade Direction for Reporting Country:**

- Imports
- Exports
- Re-Imports
- Re-Exports
- All

**Plot 'value of trade' or 'weight of trade' along y-axis**

- Value in USD
- Weight in KG

The user selects a country of interest and up to 5 trade partners to plot

The user then selects commodities (olive/pomace oil by default)

The user selects trade direction (Import/Export) and plot type (Value/Weight)

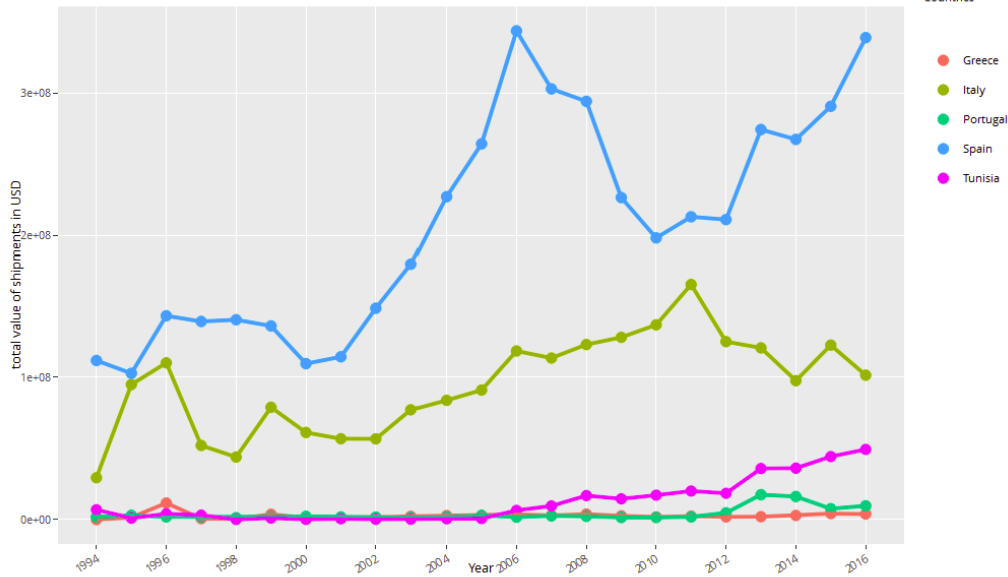
Plot of the chosen countries, with further details provided on hover

# Hackathon outputs #oliveoil

We created an interactive dashboard that uses openly available UN trade data to identify patterns and anomalies in the trade of olives and olive oil.

## Global trade of olive oil using UN Comtrade data

Imports into France from Greece, Tunisia, Portugal, Italy, Spain



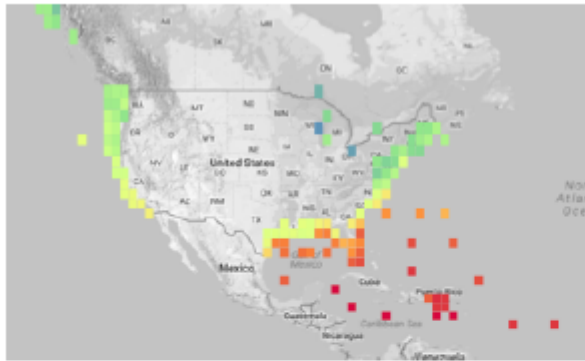
A user of the dashboard might note that...

- UK's biggest trade partner (EU member state) in olive oil production dropped by 75% in 2017
- despite this, exported amount of olive oil to the UK remained similar
- during that time, 3<sup>rd</sup> country exported olives to EU member state
- 3<sup>rd</sup> country olives were likely turned into EU-labelled olive oil

# Hackathon outputs #vibrio

We created machine learning models that use data from the CDC and NOAA to predict vibrio infection rates with the intention to apply this to the UK

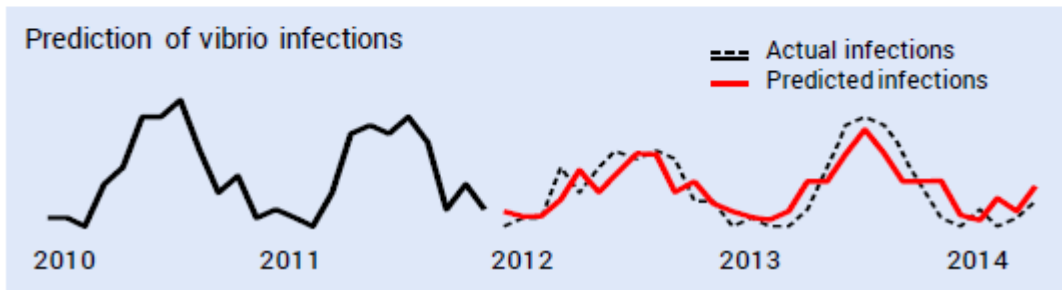
Sea surface temperatures USA



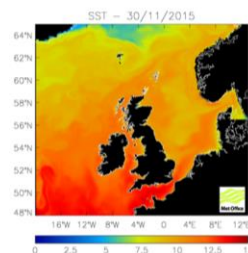
Vibrio infections over time



Prediction of vibrio infections



Maps showing UK Oyster beds



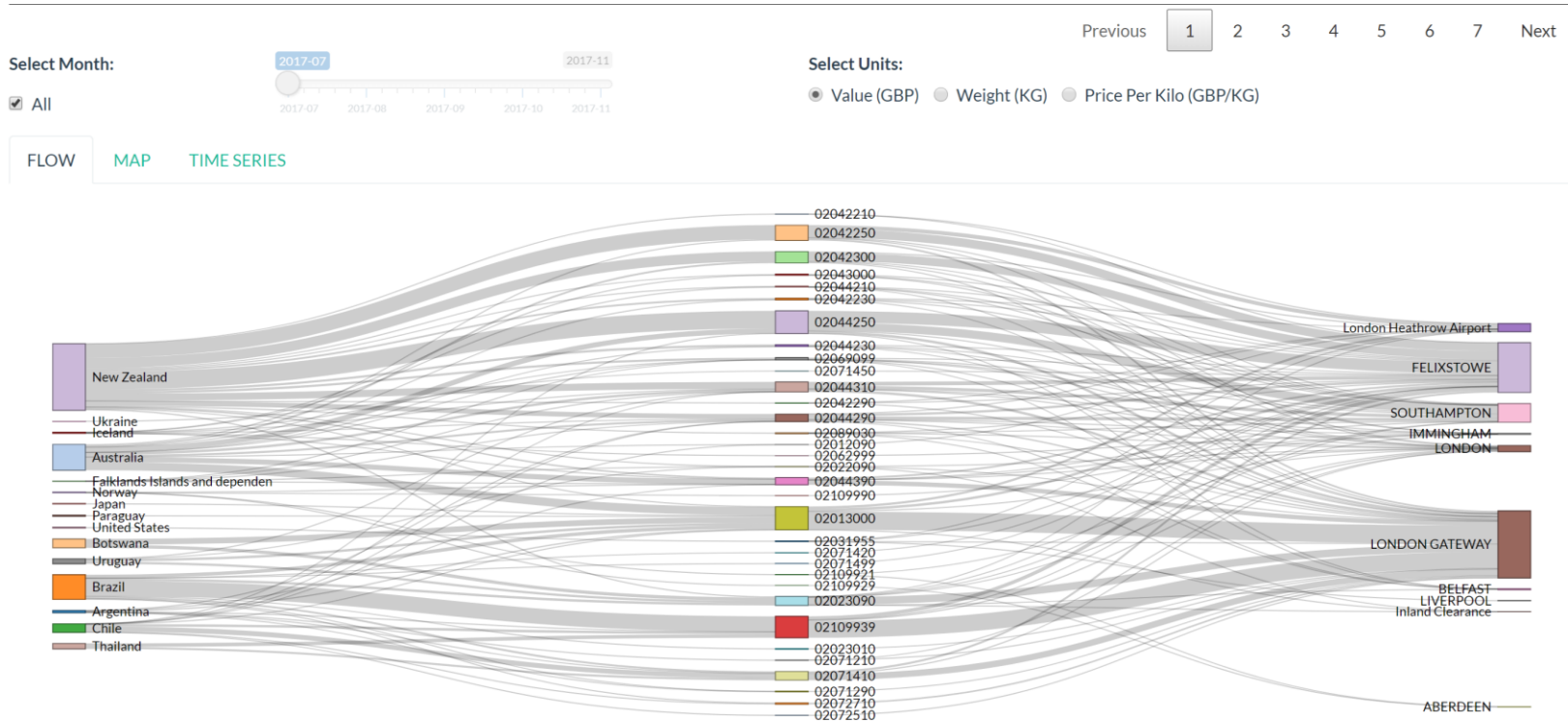
2015 UK Sea Surface Temperature (SST) (Met Office, 2015)

## We found that...

- in the US, number of vibrio infections correlates strongly with sea surface temperatures (SST)
- can use machine learning approaches to predict the local number of infections from SST
- using climate change models, this model may also be used to predict risk of infections in the UK
- we can identify vulnerable groups in the population and model survival rates for those who are infected.
- We can use the UN global trade to track imports of shellfish.

# Trade data visualisation tool

<https://foodstandards.shinyapps.io/TradeDataVis/>



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## Internal /External Networks

### Internal Network

- The second Internal Network took place on the 21st of September.
- The agenda includes an up-date on progress of the Surveillance work and a workshop to identify next prototype work
- Biggest challenge: organisational cultural change.

### External network

- The first External Network meeting took place on the 6th October.
- Open and frank discussion about challenges
- Biggest challenge: sharing data/ commercially sensitive data, etc.

**INDUSTRY BUY-IN!!!**





## Next Steps

- Continue with new POCs to keep running the high level operating model
  - Increase complexity – progress from ‘Known Knowns’ to ‘Know Unknowns’ / ‘Unknown Unknowns’
  - Involve other companies/ academia...
  - Present results across the FSA and externally - support cultural change
    - **IMPORT AND EXPORTS**
    - **MEAT OPERATIONS**
- Start generating ideas to tackle challenges from internal & external networks
- Start thinking what a new ‘platform’ will look like, how & who will run it, etc.



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**QUESTIONS?**

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