

The concept of Food Integrity: what does it mean and what are the scientific challenges that it poses?”

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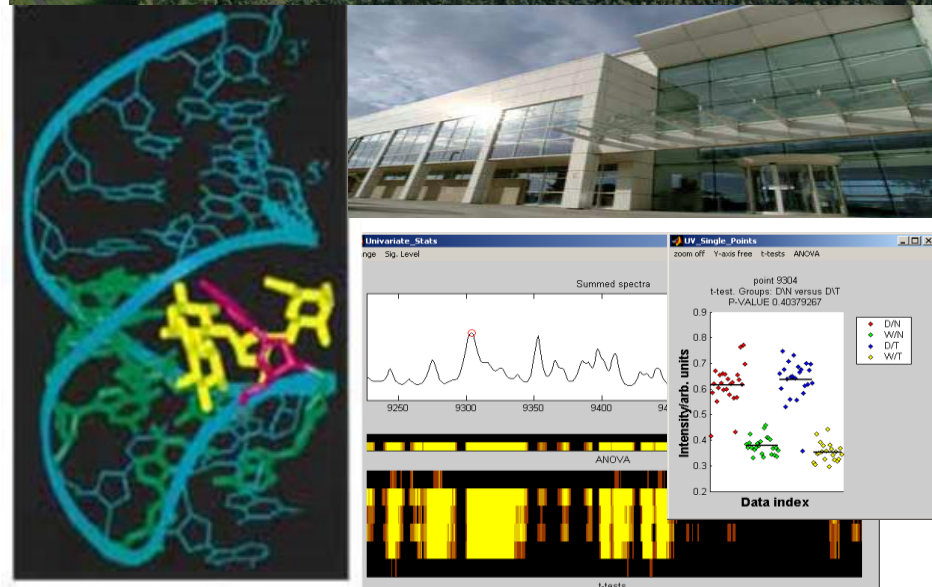
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# Fera



The Food and Environment  
Research Agency

- Government Research Agency ~500 staff
- Translational science solutions to Industry, Gov, NGO's
- Food science, Plant protection, Environmental science
- (Bio) analytical chemistry, modelling, risk analysis, omics, informatics



# To be discussed

- What is food integrity?
- What is going to change?
- Analytical challenges
- FoodIntegrity a European research initiative in the fight against food fraud

# Consumer expectations

- Expect safety quality and authenticity (integrity) to be assured
- Accurate labelling “It does what it says on the can”
- The Food Information for Consumers Regulation –embraces this sentiment

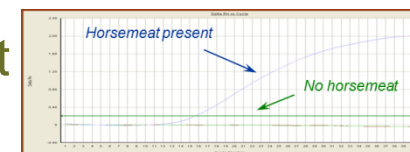
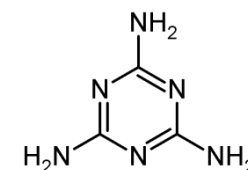


# Why does food fraud occur?

- Price differential
- Motivation
- Likelihood of detection
- Reward/penalty

# Recent food fraud incidents

- 2008 Melamine in Chinese milk products
  - 54,000 babies hospitalised, 6 deaths
  - High volume low price
  - Long term fraud due to deficient analytical methods
- 2012 Czech Republic methanol in spirits
  - 42 deaths in Eastern Europe
  - Short term “crude” fraud- easy to detect but high profits
- 2013 Horsemeat in Europe
  - No food safety issues, relatively easy to detect
  - High volume low price,
  - Long term fraud(?) due to lack of intelligence/surveillance?



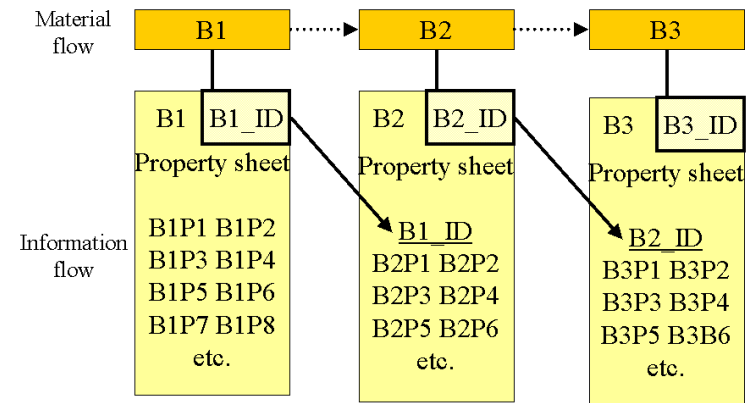
# Post horsemeat issues

- Lack of information on food authenticity
  - Expertise
  - Methodologies
  - Common language-ontology
  - Lack of access to knowledge, databases, intelligence
  - Information not being shared
- Lack of verification procedures
  - Over reliance on “food” traceability systems
  - Lack of harmonisation of methodologies and practices
  - Unclear/lack of specifications for compliance assessment



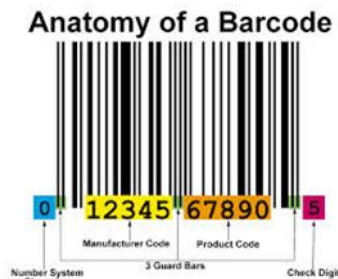
# “Food” Traceability systems

- Food traceability as the: ‘...ability to follow the movement of a feed or food through specified stage(s) of production, processing and distribution’ (ISO-22005:2007, 2007).
- EU and industry standards
- Sophisticated traceability used by retailers and large industry.
- One up one down and in some cases chain traceability
- Less advanced for some SME’s



Property sheets (manual or electronic) are keyed to globally unique batch (trade unit) ID which in turn reference previous property sheets through their unique ID. The reference link can be passive (only used in exceptional circumstances, i.e. recall) or it can be active and involve a request-response scheme where B2 can ask B1 for more information about a certain B1\_ID, and get a (standardized, electronic) reply.

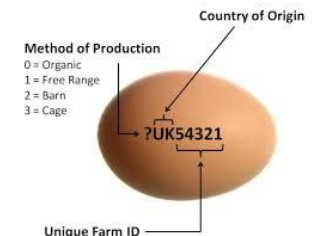
Courtesy of Petter Olsen Nofima (No)





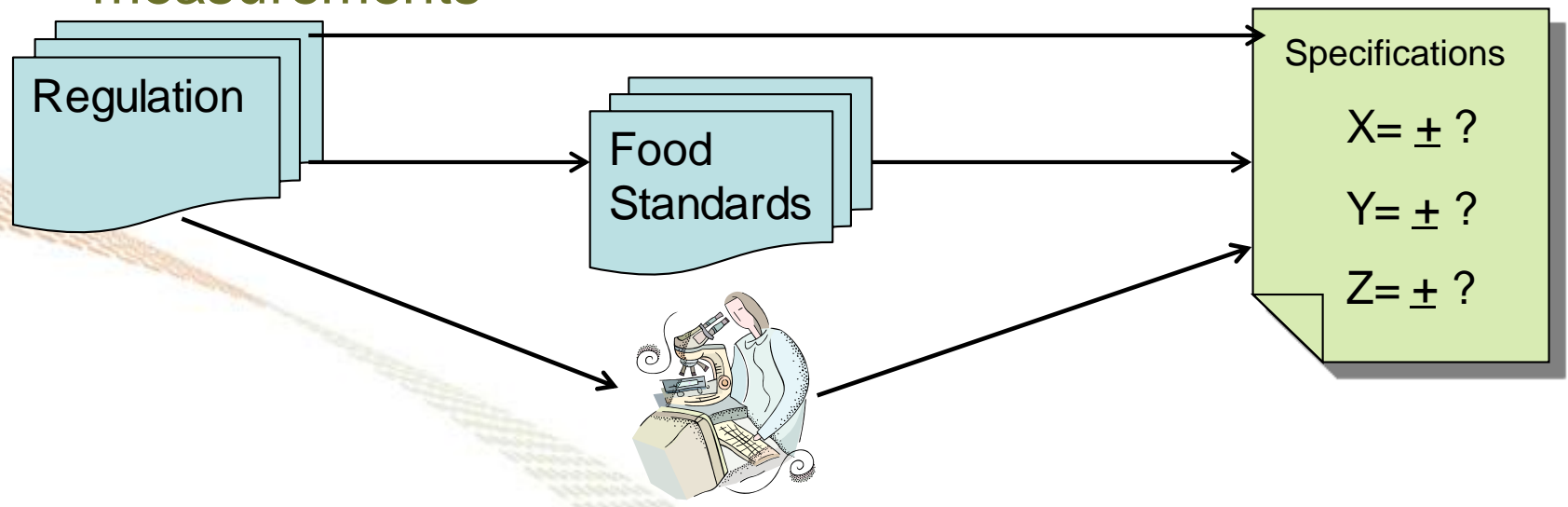
# Tracking and tracing packaging

- Most systems track and trace units of food packaging (packaging, pallets, cargoes)
- A few do track and trace the item itself
  - eg whole eggs, livestock
  - Problems can arise at processing/post slaughter stages
- Need verification match between contents and identifier- how to do?



# Verification and specifications

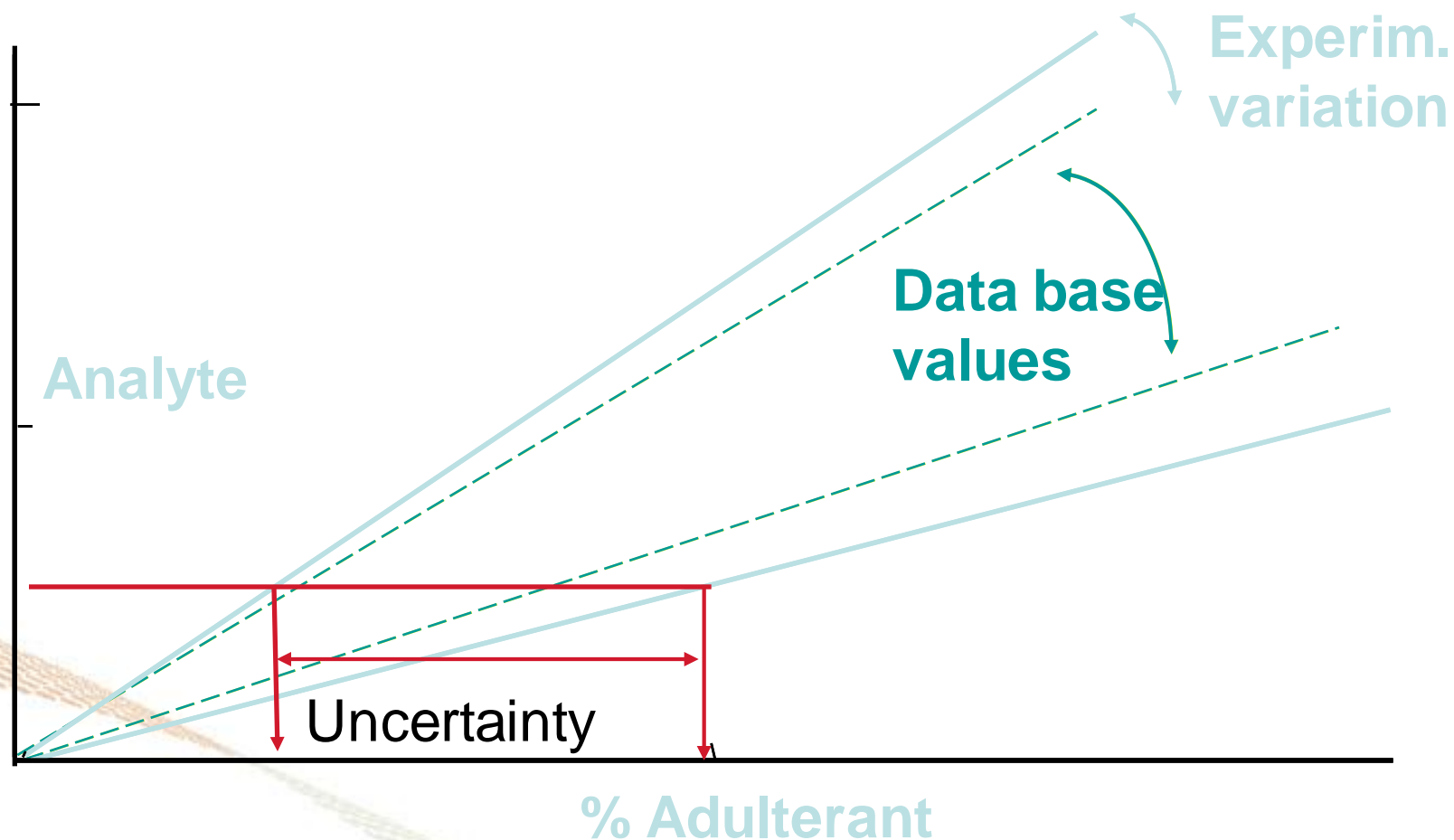
- In order to verify using analytical methodology we need a specification or to interpret regulation/std into a specification e.g.
  - Legislation relevant to Horsemeat mislabelling converted into analytical specifications i.e. PCR measurements



# Regulatory specifications

- Most regulated areas tend to have transparent specifications for compliance:
  - Food contaminants (safety) e.g. mycotoxins
  - Alcoholic drinks (tax revenue) e.g. alcohol content
  - Food commodities (trade) e.g. Sugar
- Food authenticity
  - Geographical origin, species/variety, free range ?

# Uncertainty, degree of confidence



# Assuring Food Integrity



The Food and Environment  
Research Agency



Primary  
Production

Storage

Processing

Packaging

Distribution

Retail

Product  
Consumption

Food Integrity

Verification procedures

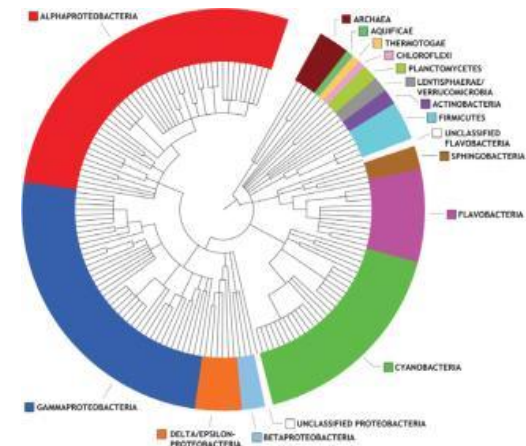
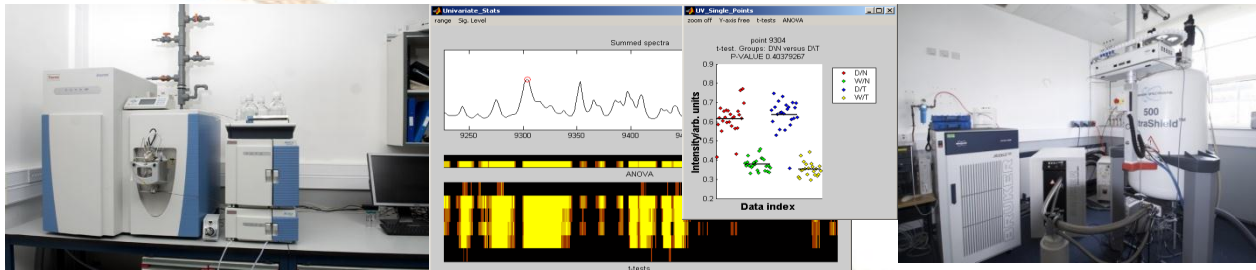
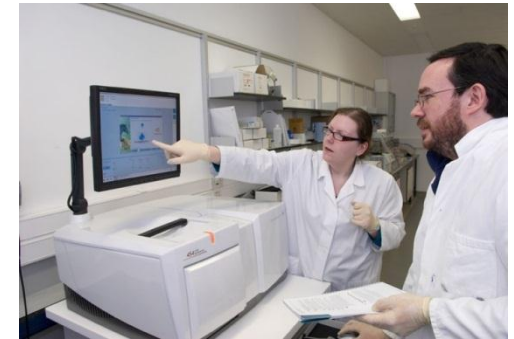
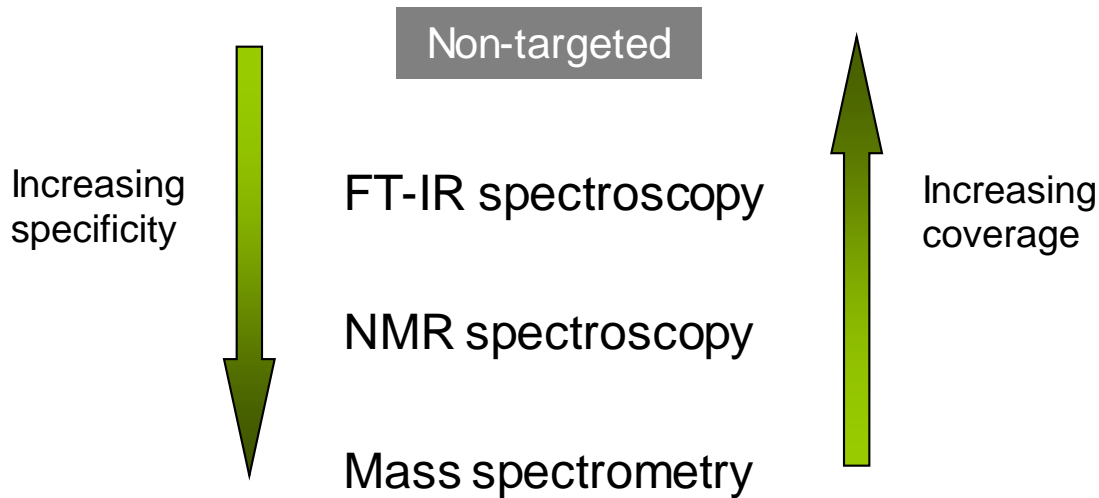
Supply Chain Management, Risk management procedures

# Enforcement requirements

- Reliable methods
  - Validated robust
  - Accepted
  - Databases
  - Reference materials
  - Cost effective
- Risk based approaches
  - Risk based sampling
  - Horizon scanning
- Smart surveillance
  - Robust untargeted methods



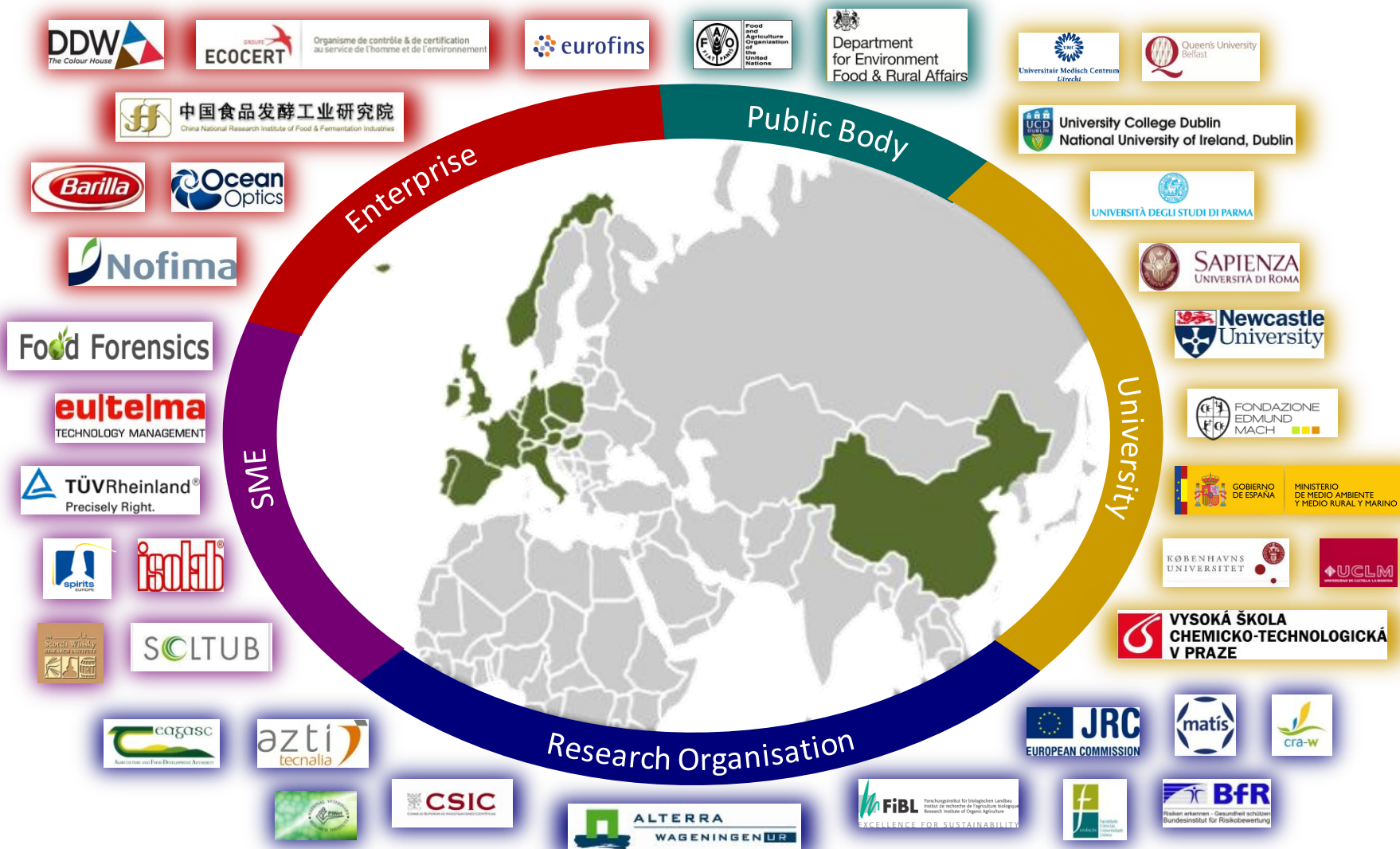
# “Measuring” change - techniques





# FoodIntegrity Project: 2014-2018

**€12M (€9M EC contribution) FP7 project with 38 partners**

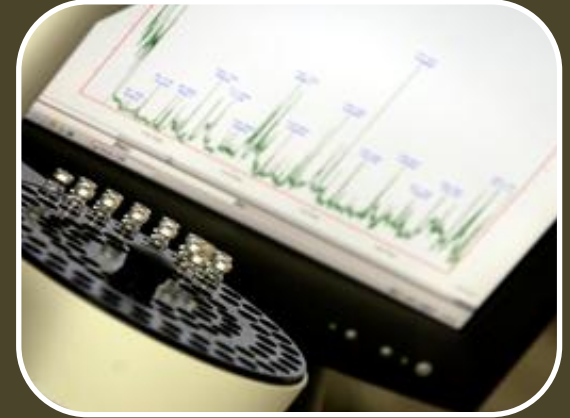




To provide Europe with a state of the art and **integrated** capability for detecting fraud and **assuring** the integrity of the food chain



To provide a **sustainable** body of expertise that can inform high level stakeholder platforms on food fraud / authenticity issues and priorities



To **bridge** previous research activities, assess capability gaps, commission research and inform EU future research needs

**ADDING VALUE TO THE EUROPEAN AGRI-FOOD ECONOMY BY PROVIDING FOOD SAFETY, AUTHENTICITY AND QUALITY ASSURANCE**

# Key Activities

- Global independent **network** of experts
- **Scientific opinions** to support regulations and enforcement
- **Stakeholder** secure forum

- Food integrity **database hub**
- **Harmonisation** of existing methods / approaches
- Identifying **research gaps**

Expertise

Evidence

R&D

Innovation

Impact

- Anticipating food fraud: early **warning system**
- Development of new **analytical and screening methods** for olive oil, fish, spirit drinks
- **Commissioning** €3M of new research

- **Industry integration**
- **Global perspective** (consumer behaviour at export)
- Knowledge/technology transfer and **dissemination**

# FoodIntegrity Network (WP1)



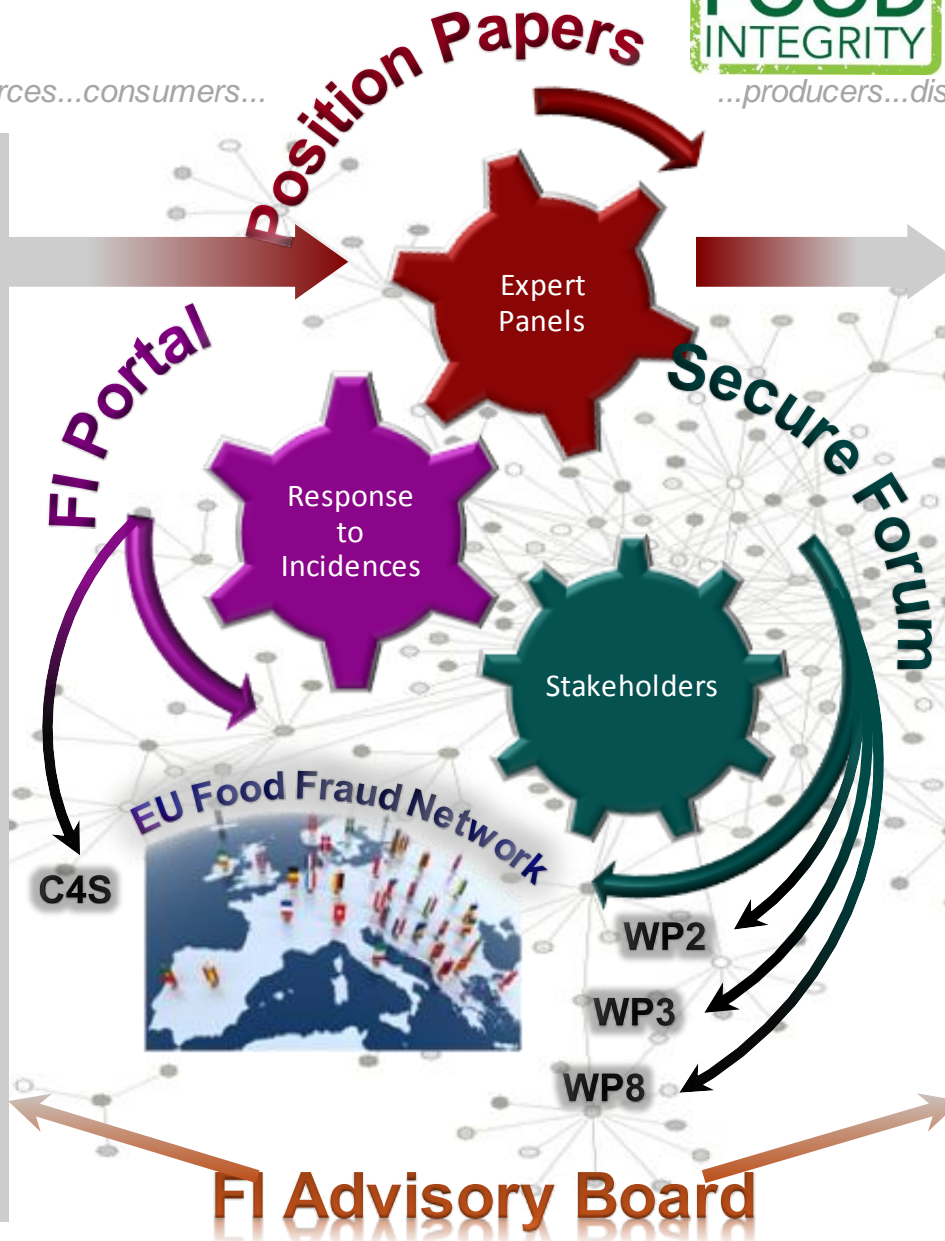
...researchers...regulators...enforces...consumers...

...producers...distributers...processors...retailers...

## Partners



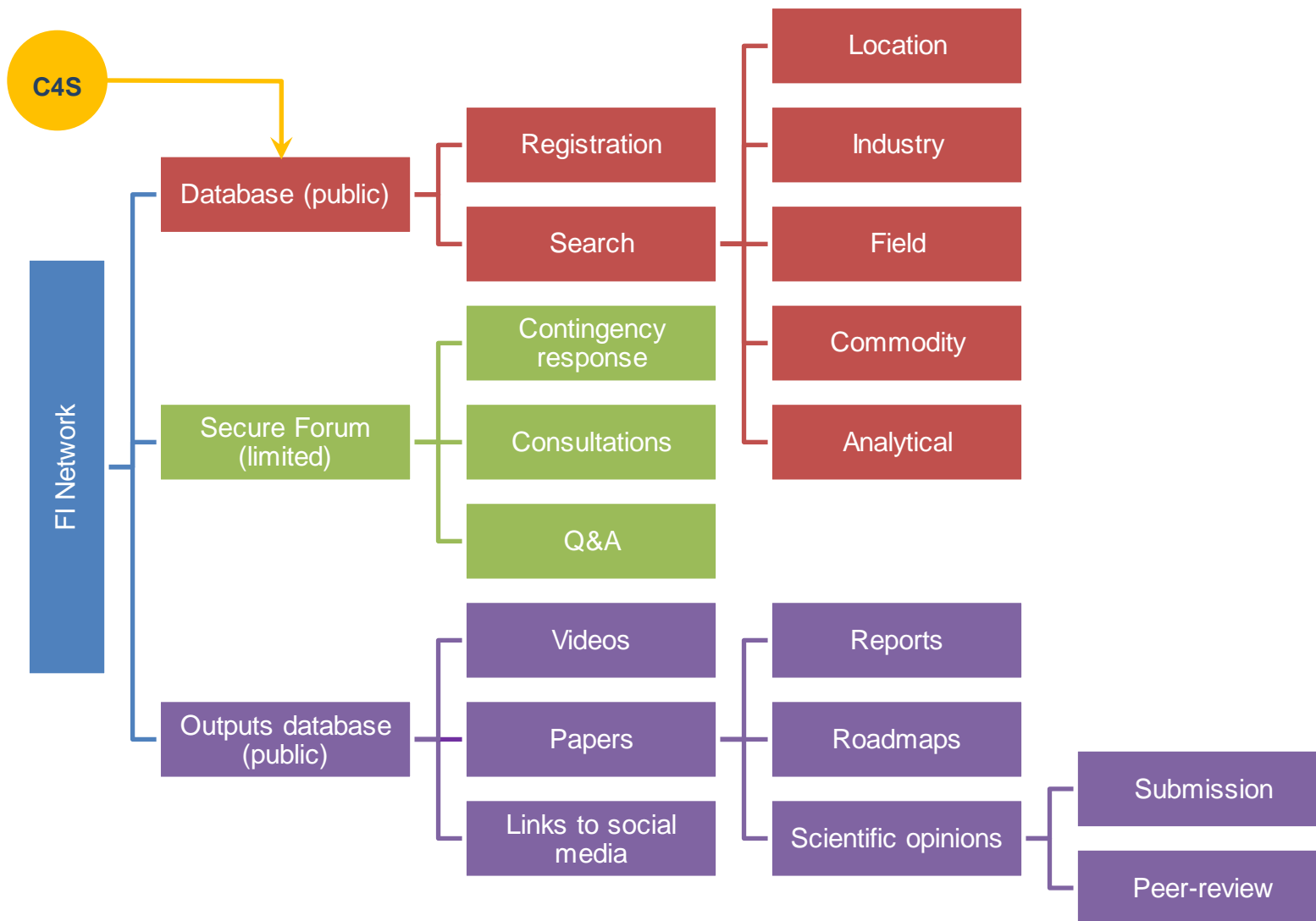
Certification body for sustainable development



## Possible Topics

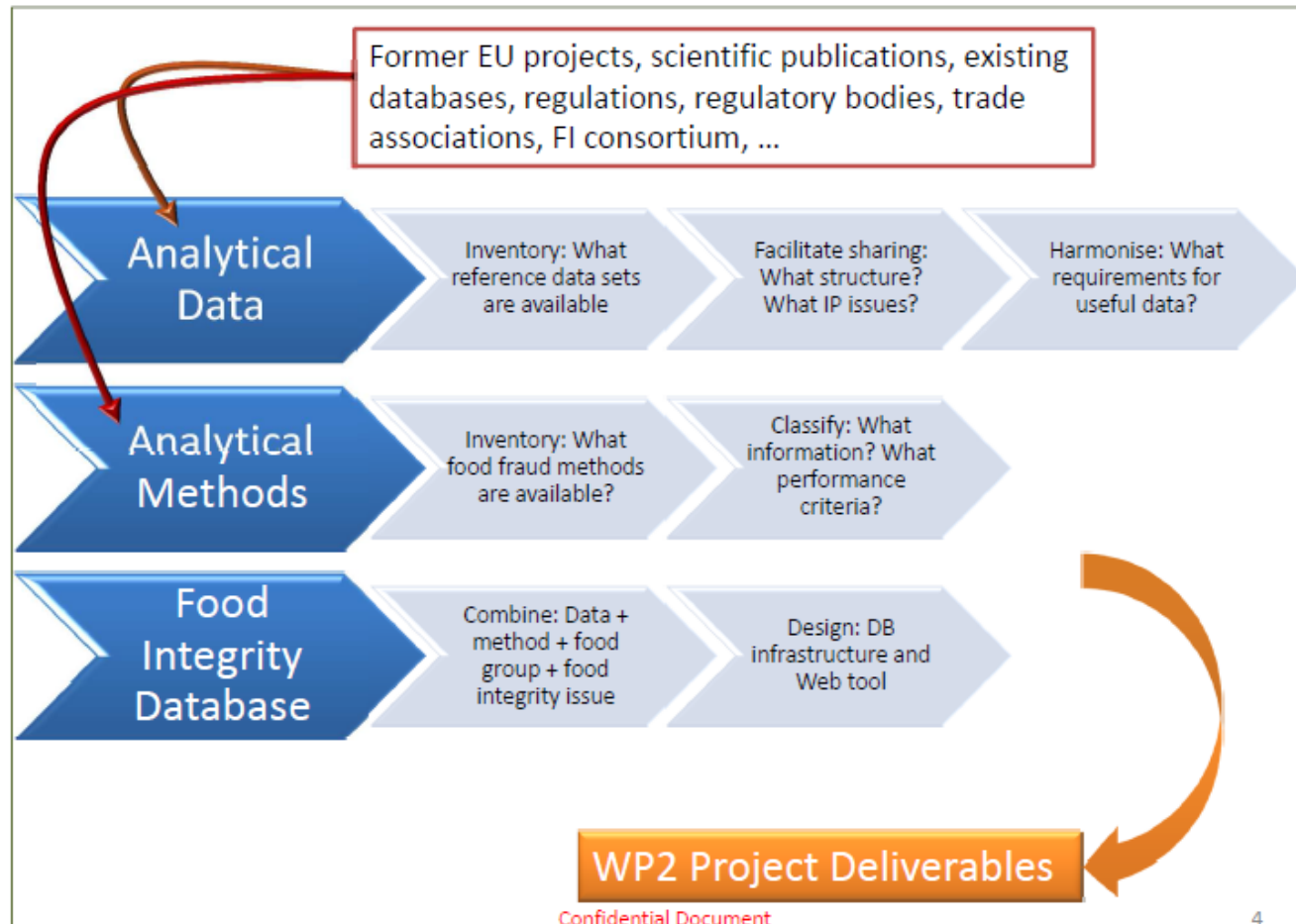
- Commodities:
  - meat, vegetables, cheese, ham, seafood products, olive oil, palm oil, balsamic vinegar, coffee, milk, eggs, fruit juice, wine, whisky, vodka
- Issues:
  - certification, fair trade, sustainable sourcing, carbon footprints, PDO/PGI/regionality protection, labelling, anticounterfeiting measures, validation, international collaboration with developing countries, verifying the sustainability of food chains
- Methods:
  - IRMS, spectroscopic methods, geochemical methods, official methods, GMO detection, microbiological methods



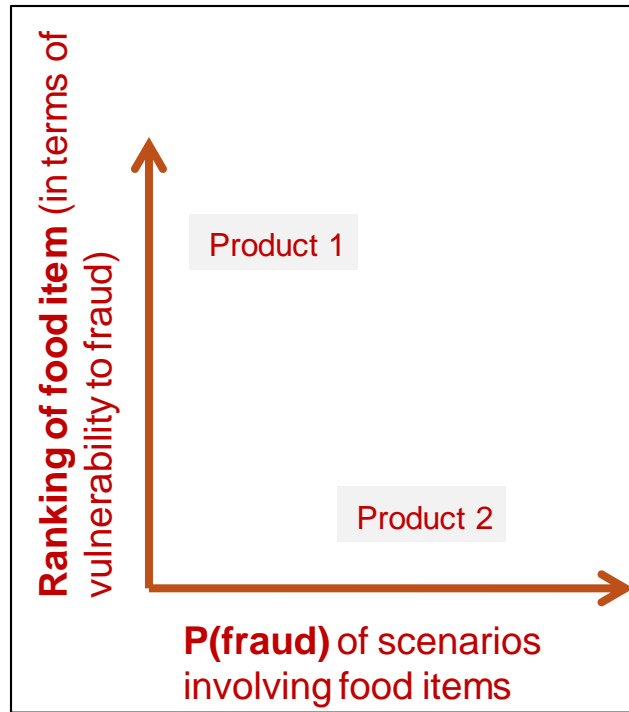


# Knowledge Base WP2

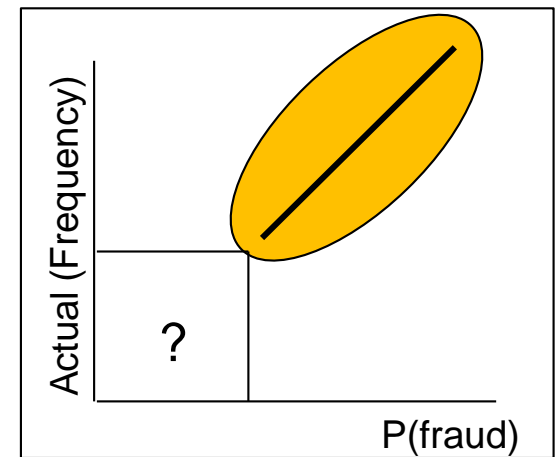
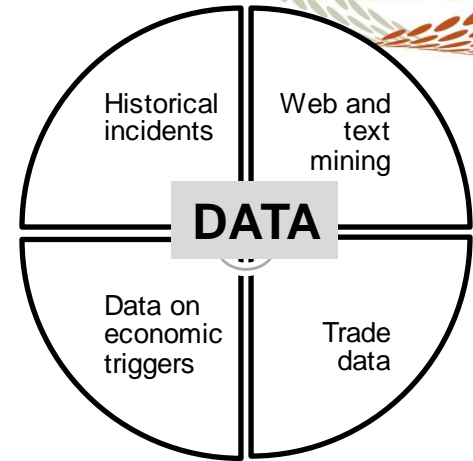
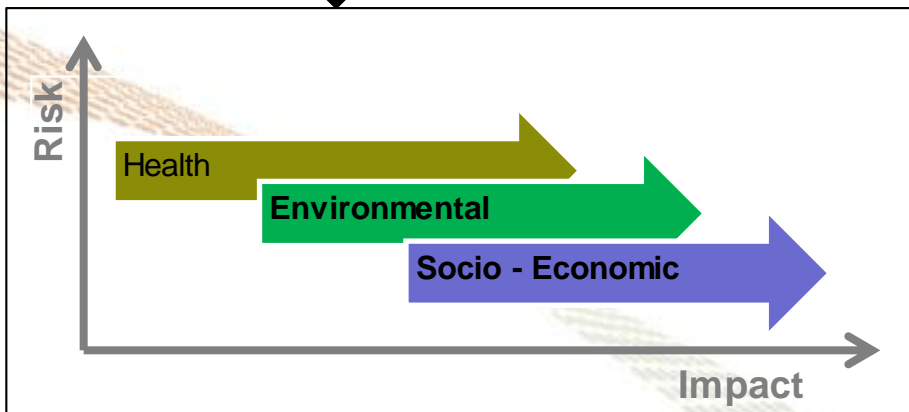
## WP2 – KNOWLEDGE BASE



# Early warning system



Act or not?





# FoodIntegrity WP6 – Seafood

- Seafood is one of the most misdescribed foodstuffs
- Many parameters cannot be verified analytically

## WP6 objectives:

- To document degree and scope of seafood misdescription
- To do spot checks for species misdescription, and send to laboratory for verification (DNA)
- To develop methods for verifying product properties in general, through mass balance and input-output analysis

### Oceana Study Reveals Seafood Fraud Nationwide

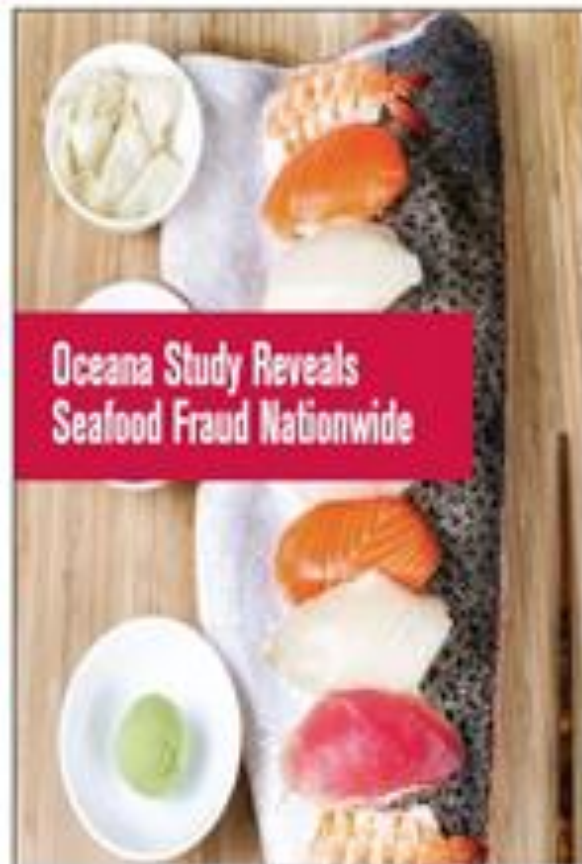
February 21, 2013

From 2010 to 2012, Oceana conducted one of the largest seafood fraud investigations in the world to date, collecting more than 1,200 seafood samples from 674 retail outlets in 21 states to determine if they were honestly labeled.

DNA testing found that one-third (33 percent) of the samples analyzed were mislabeled, in violation of the Food and Drug Administration (FDA) guidelines.

Of the most commonly collected fish types, samples sold as salmon and tuna had the highest mislabeling rates at 59 percent, respectively, with the majority of the samples identified as snapper. In fact, only 11 percent of the samples purchased nationwide were actually red snapper. The other 111 samples were another fish.

Our findings demonstrate that a comprehensive and transparent traceability system – one that tracks fish from boat to



**33% total**

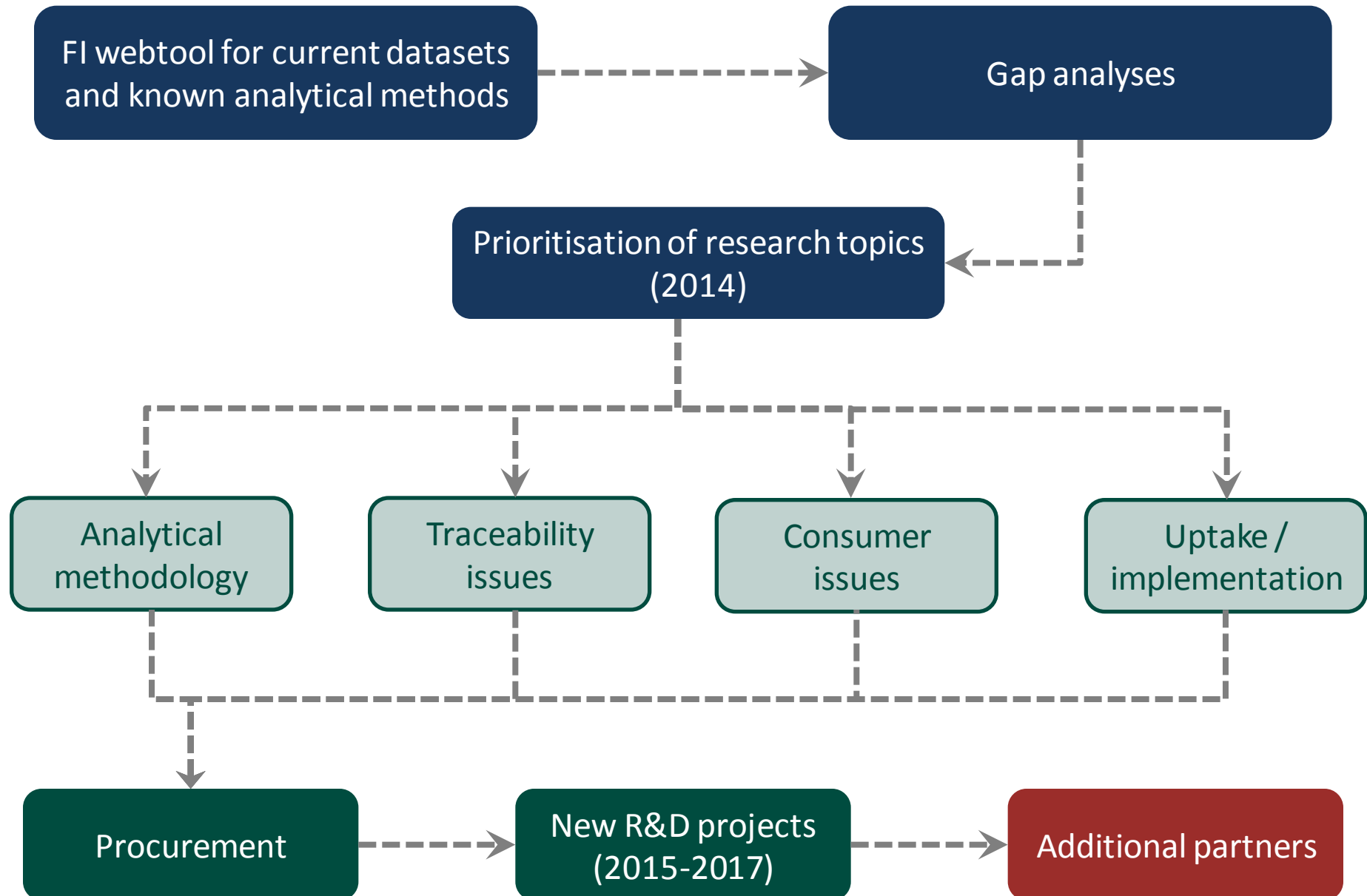
**87%**

**snapper**

**59% tuna**

**Oceana Study Reveals  
Seafood Fraud Nationwide**

# Commissioning R&D Projects



# How to Get Involved



[www.foodintegrity.eu](http://www.foodintegrity.eu)



[foodintegrity@fera.gsi.gov.uk](mailto:foodintegrity@fera.gsi.gov.uk)



# Conclusions

- The Horsemeat revealed a number of deficiencies in our ability to detect and anticipate food fraud
- A lasting legacy is the requirement to have a greater level of verification in the food chain
- FoodIntegrity is addressing many of these issues



# Assuring the integrity of the food chain: food authenticity research priorities and funding opportunities



26<sup>th</sup> – 27<sup>th</sup> March 2015. Bilbao (SPAIN)

## SAVE THE DATE



Organized by:



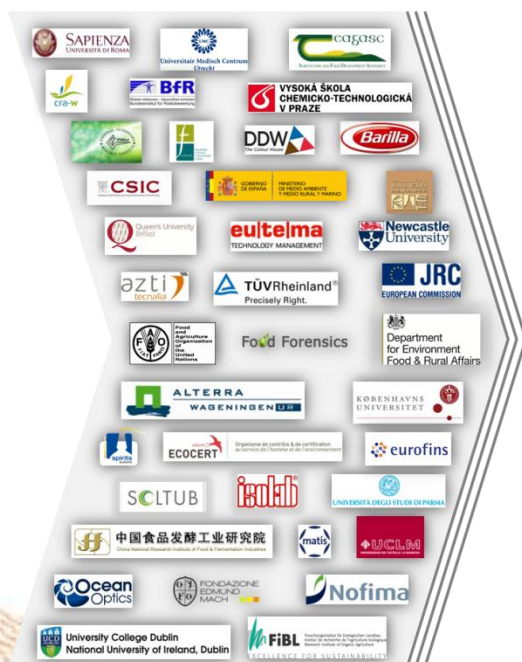
This project has received funding from the European Union's Seventh Programme for research, technological development and demonstration.



A dedicated 1 ½ day conference that will:

- Present the latest research outputs from the FoodIntegrity project:
  - A European expert network on food authenticity
  - A European knowledgebase on analytical methodology and databases for food authenticity
  - Chinese consumer attitudes to European products
  - The development of an Early warning system for predicting food fraud
  - Identifying gaps in present research
- Establish how researchers can apply to access the 2015 FoodIntegrity research calls
- Bring together national funding bodies to establish priorities for transnational funding
- Present Horizon 2020 strategic requirements in the food sector

# Acknowledgements



This project has received funding from the European Union's Seventh Framework Programme for research, technological development and demonstration

# THANK YOU

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