



GenEpi-BioTrain

# WGS system for One Health - EFSA platform

29/05/2024

# Outline

This session consists of the following elements

1. Overall design requirements
2. Data sharing to EFSA
3. Joint ECDC-EFSA Data Analysis
4. Demo

# IMPLEMENTATION REQUIREMENTS

- EFSA and ECDC have been **mandated by EC in 2019** to establish and run two interconnected platforms in their respective domains, allowing data sharing and analysis of WGS data collected from EU Member States
- The Joint One Health WGS system is **operative since July 2022**
- **Why two interconnected platforms?**
  - Addressing sector specific governance and agency network needs
  - Streamline user identity management and user support
  - Integration with agency specific infrastructure
  - Increase control in data sharing cross-sector



**Secure Collaboration:** Sharing data while retaining ownership



**Responsible Data Use:** Prioritizing accuracy, ethics, and regulations



**EU Complexity:** Addressing organizational structures and national prioritizations



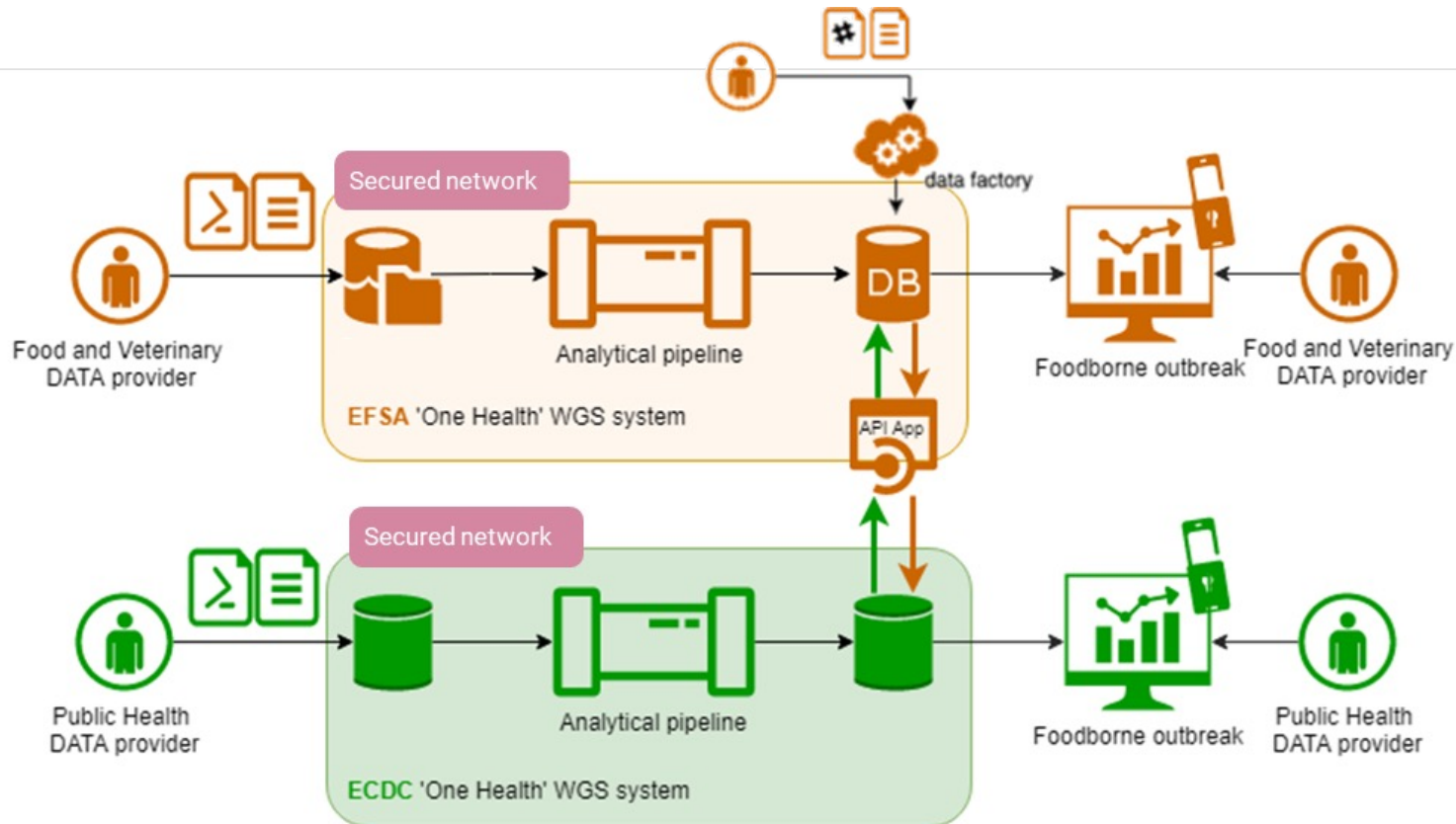
**Operational Efficiency:** Swift outbreak response and public health protection



**Constantly evolving:** Adaptation to new developments



# EU ONE HEALTH WGS DATA SHARING MODEL



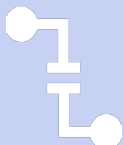

**Controlled-Centralized Data Sharing at sector level** Ensures data integrity, security, and responsible chain of custody for sector-specific information.

**Cross-Sectoral sharing of specific data** Fosters multidisciplinary insights and collaborative outbreak response.




# EFSA AND ECDC JOINT ONE HEALTH WGS SYSTEM

## TWO PLATFORMS IN EFSA AND ECDC

	<b>Interoperability</b> <b>Cross-sector matches</b> Detection of joint microbiological clusters
	<b>Machine-to-machine</b> Seamless cross-sectoral exchange of WGS-based typing data and epidemiological data upon verified correlation

## GOALS EFSA PLATFORM

	Build a database of genomic profiles that can be queried in case of foodborne outbreaks	<b>PREPAREDNESS</b>
	Support the real-time investigation of multi-country foodborne outbreaks	<b>RESPONSE</b>
	Support cross-sectorial collaboration and partnership among MS in the Food Sector	<b>ENGAGEMENT</b>



# DATA SHARING TO EFSA

## WHO CAN ACCESS THE EFSA SYSTEM

### USERS AT COUNTRY LEVEL



#### COUNTRY OFFICER

Coordinate data provider organisations  
Contact point for EFSA



#### DATA PROVIDER

Share typing data to EFSA Database  
Manage shared information

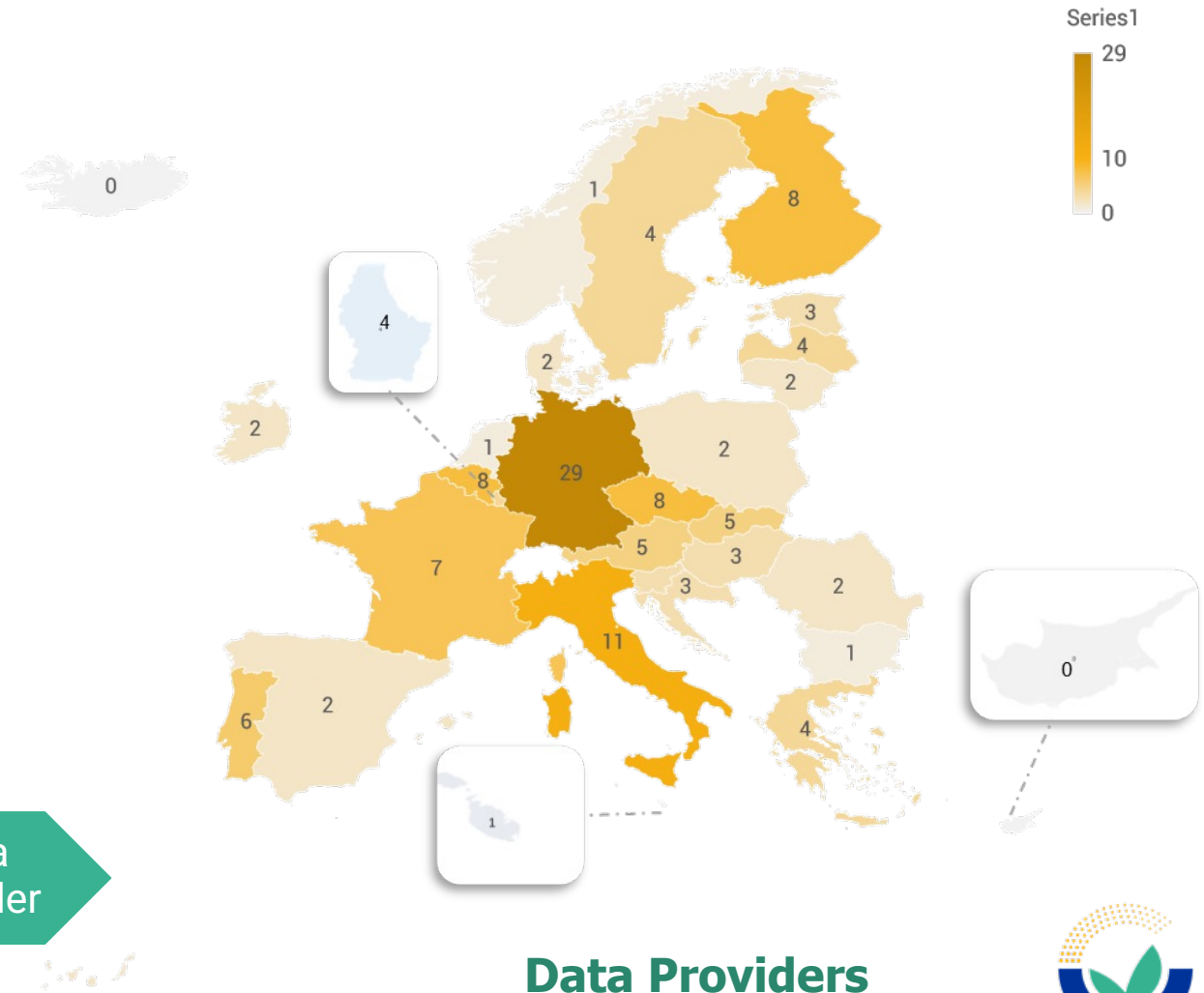
### NOMINATION PROCEDURE

PAFF

Food  
safety  
authority

Country  
officer

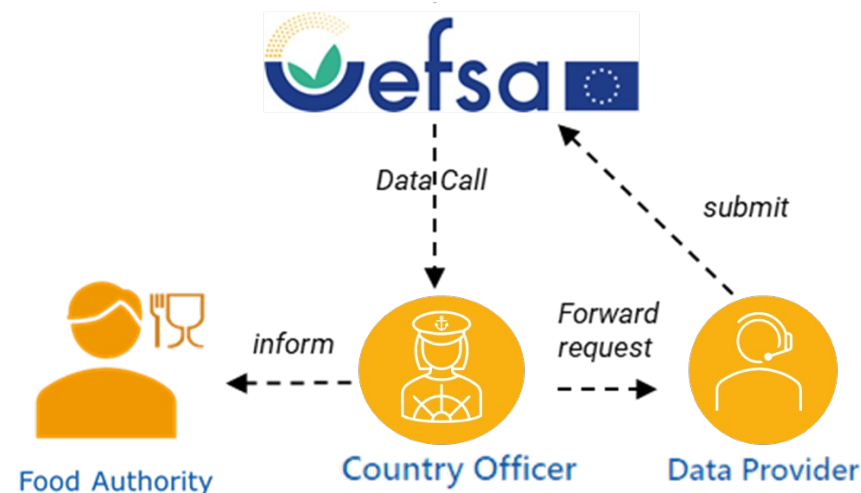
Data  
provider



# DATA SHARING TO EFSA

## WHEN DATA ARE SHARED

REACTIVELY	Data calls for all countries when an outbreak assessment has been requested
PROACTIVELY	<p>Data provider can share data at any time. Each country has own strategy on data sharing</p> <ul style="list-style-type: none"><li>• All own checks data</li><li>• Data collected for annual monitoring</li><li>• Only in response to EFSA calls</li></ul>



# DATA SHARING TO EFSA

## WHAT DATA ARE SHARED



### EXPERIMENTAL DATA

Information related to the experiment



### TYPING DATA

Genomic profile and other typing data



### EPIDEMIOLOGICAL DATA

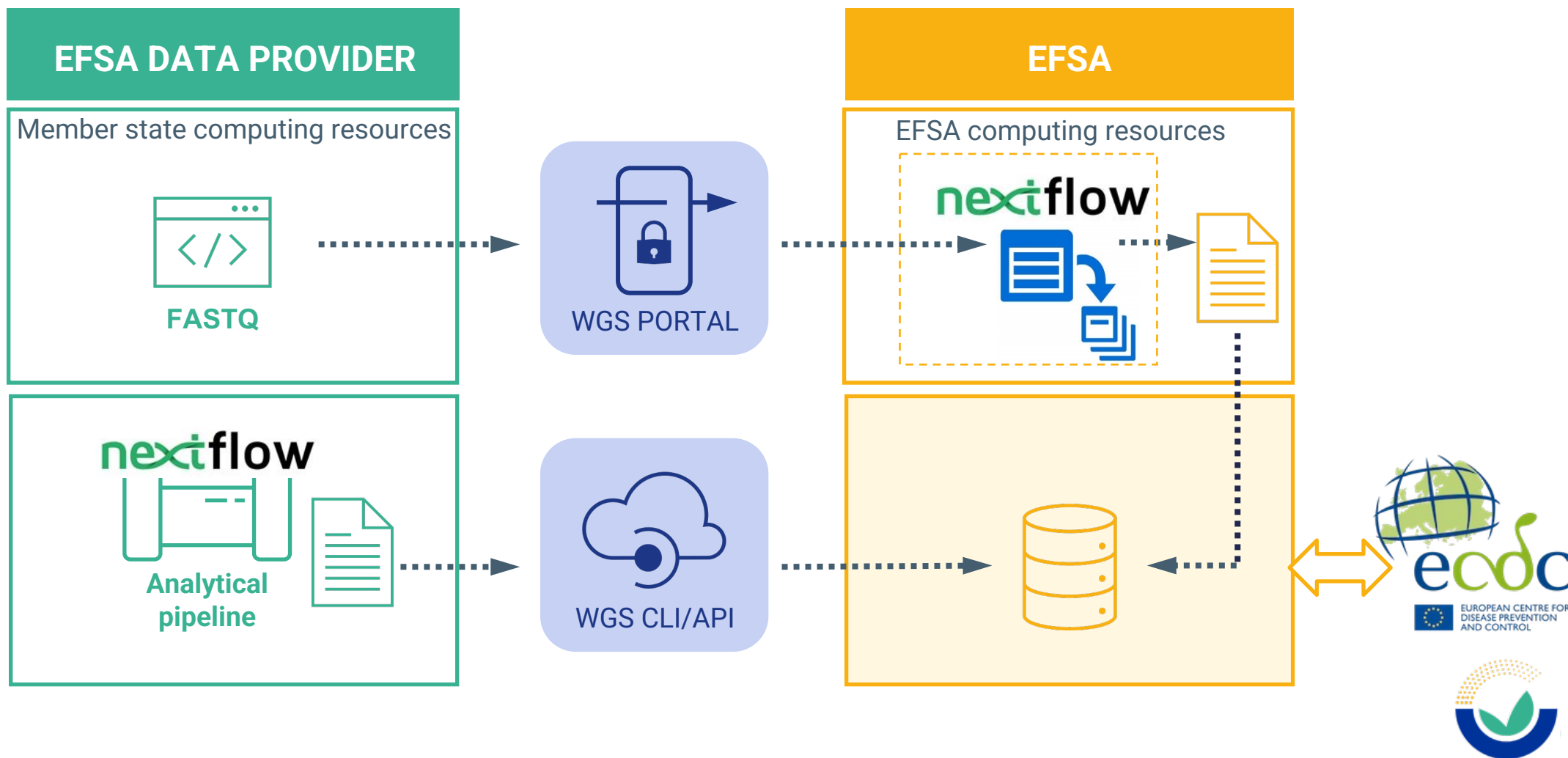
Information related to food/ feed/ animal samples from which the pathogen has been detected





# DATA SHARING TO EFSA

## HOW DATA ARE SHARED



# DATA SHARING TO EFSA

## OVERVIEW EFSA DATABASE – MAY 2024

[Monitor](#)[Data Overview](#)[Tagging](#)[Reports](#)[Queries](#)[GrapeTree](#)[ROSSI Mirko](#)

### Overview of released results

[Public](#)[All](#)[Species](#)[All](#)[Sampling Date](#)[All](#)[Isolation Date](#)[All](#)[Overview](#)[Go to page: Overview](#)

**26** 100%  
# Reporting countries

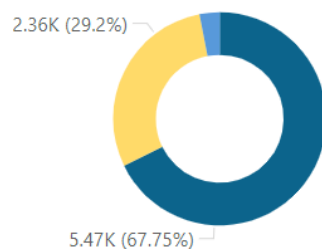
**2347** 29%  
# Released profiles with EpiData

**305** 100%  
# Sampling matrixes reported

**8068** 100%  
# Released profiles

**5164** 64%  
# Public profiles

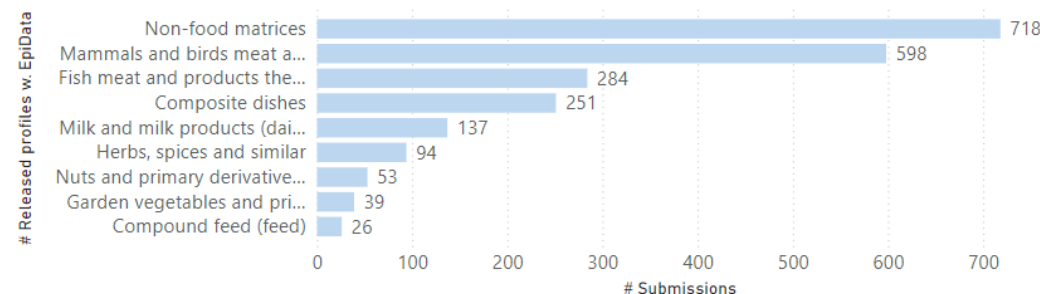
### Released profiles by species



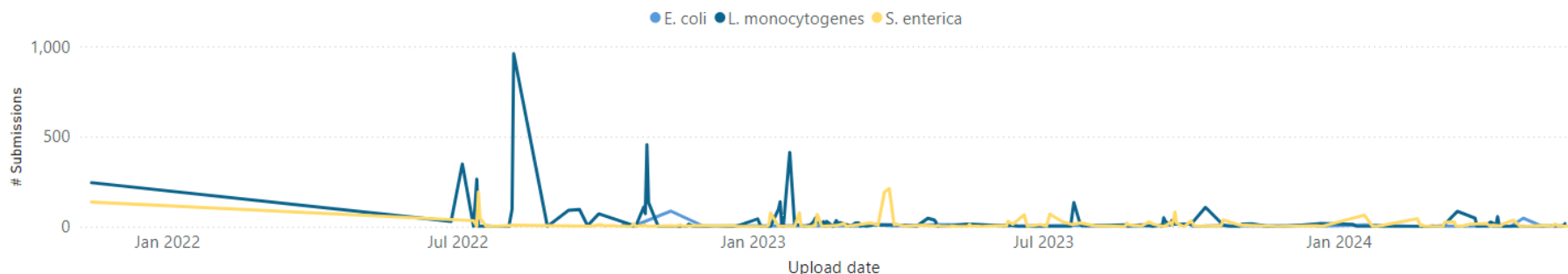
#### Species

- L. monocytogenes
- S. enterica
- E. coli

### Released profiles with EpiData by sampling matrix category



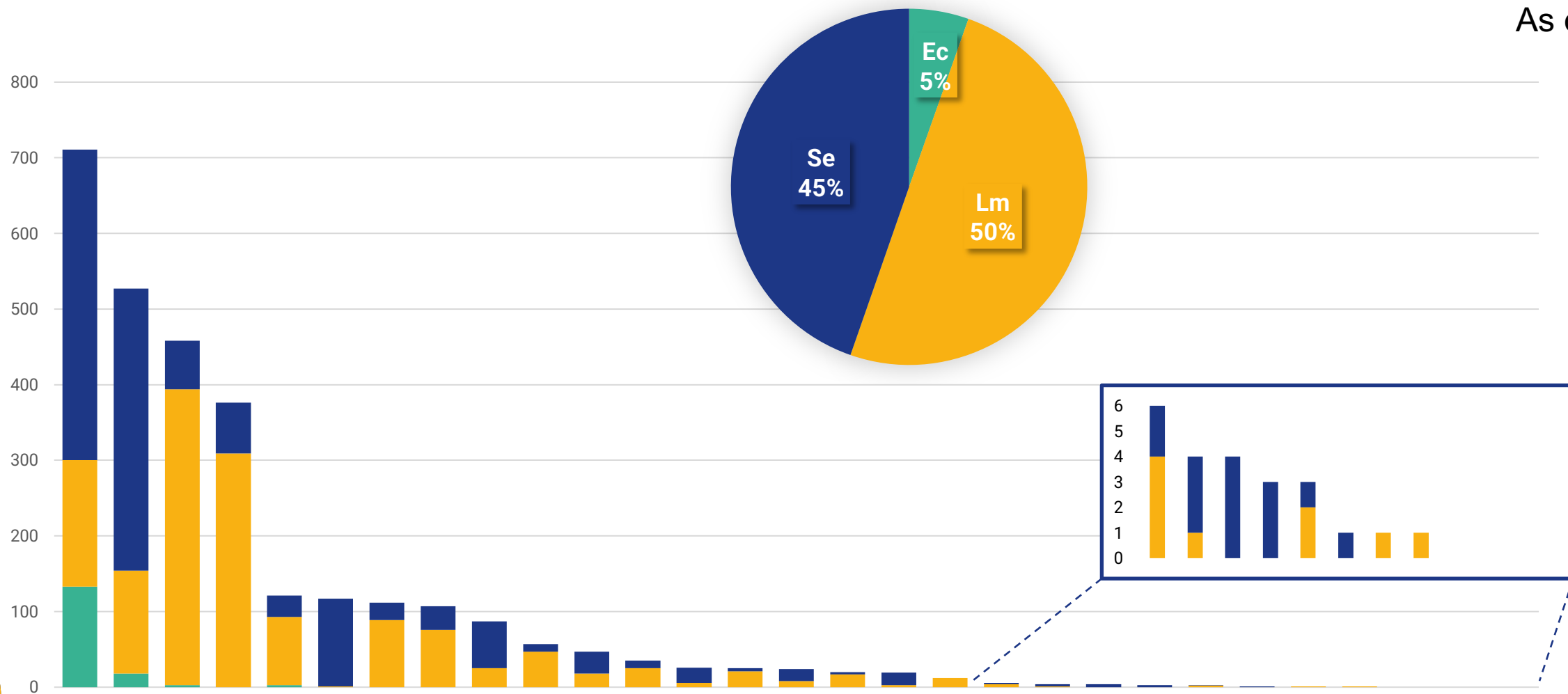
### Trend of uploading over time, per species



# DATA SHARING TO EFSA

## MEMBER STATES CONTRIBUTION

As of 29/05



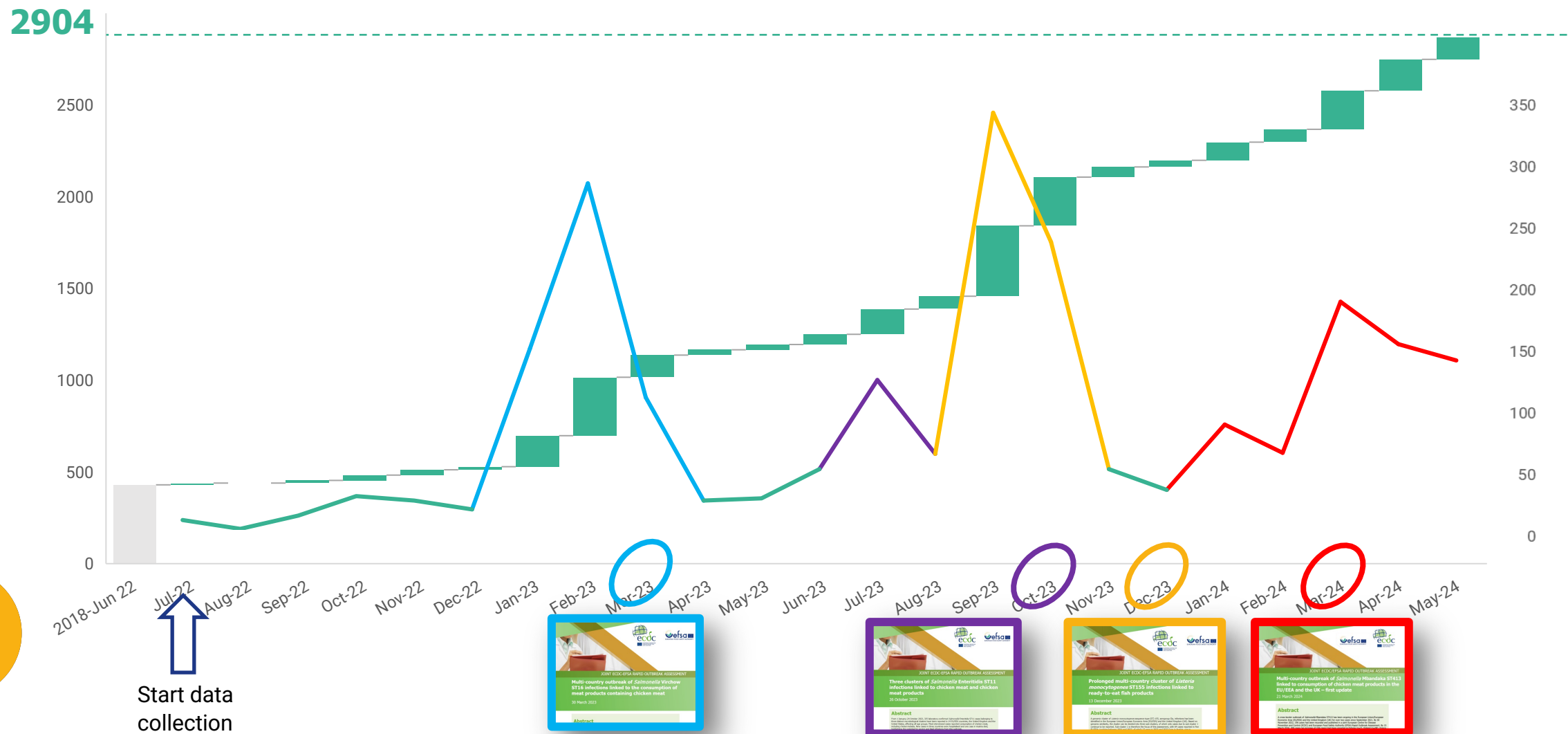
EFSA system: **2904 genome sequences** shared since July 2022 (approx. **100/month**)



# DATA SHARING TO EFSA

## MEMBER STATES CONTRIBUTION

As of 29/05



# JOINT ECDC-EFSA DATA ANALYSIS

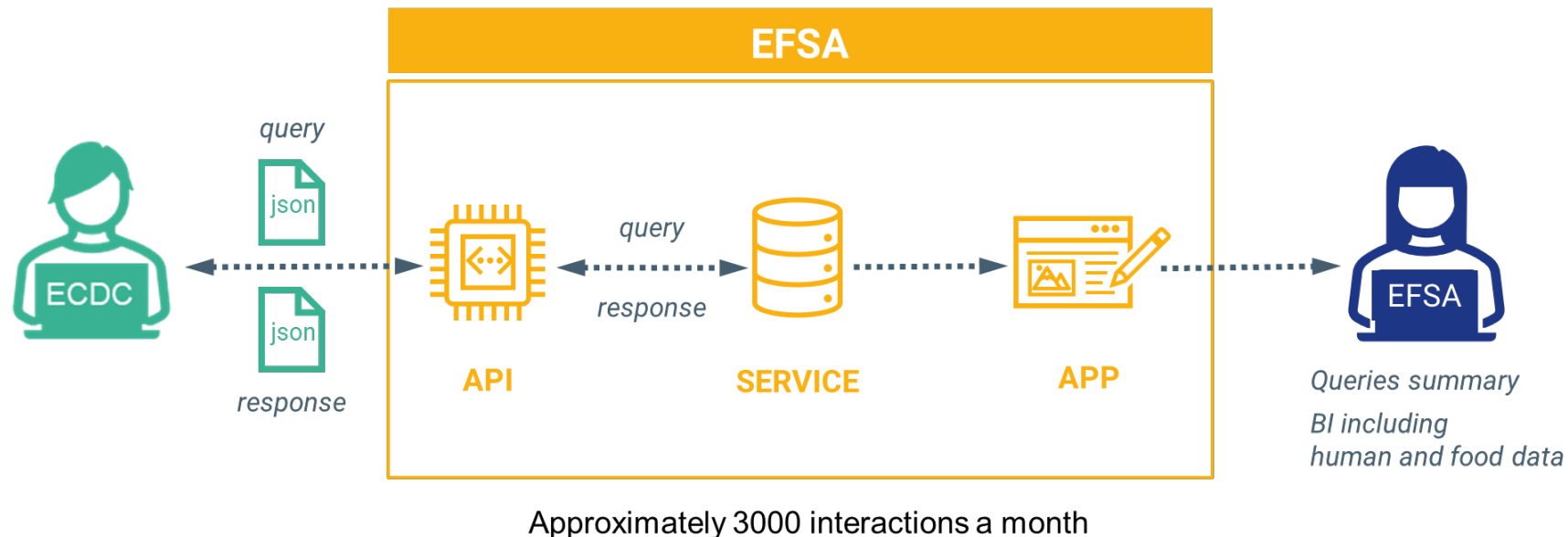
## HOW IS THE CLUSTER ANALYSIS PERFORMED

### Recurring weekly querying

- Automatic weekly querying
- Cluster definition at ECDC
- Fixed threshold of allelic distance

### Ad hoc querying

- Querying on demand
- Linked to events in EpiPulse
- Multiple thresholds of allelic distance



# JOINT ECDC-EFSA DATA ANALYSIS

## OVERVIEW OF QUERIES RECEIVED FROM ECDC – MAY 2024



Monitor

Data Overview

Tagging

Reports

Queries

GrapeTree



ROSSI Mirko

### Overview Received Queries

Summary Received Query

Go to page: Summary Received...

67K

# Queries Received

2066

# EFSA Entries Matched

1181

# Clusters

#### Last Month

isolate\_species\_code Numbers Of Clusters ECDC sent Numbers Of Clusters matching EFSA

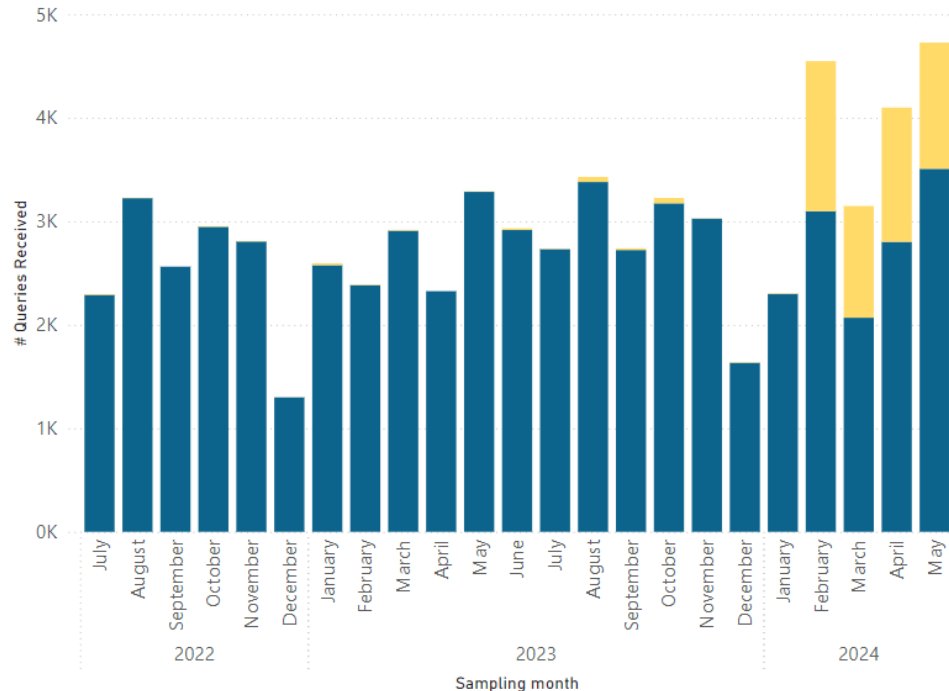
L. monocytogenes	699	146
S. enterica	403	74

#### Total

isolate\_species\_code Numbers Of Clusters ECDC sent Numbers Of Clusters matching EFSA

L. monocytogenes	743	165
S. enterica	438	93

isolate\_specie ● L. monocytogenes ● S. enterica



# JOINT ECDC-EFSA DATA ANALYSIS

## HOW DATA ARE USED

### Monitoring phase

The data are shared by the data providers and data are editable any time

Data provider can delete data any time

ECDC and EFSA perform cluster analysis

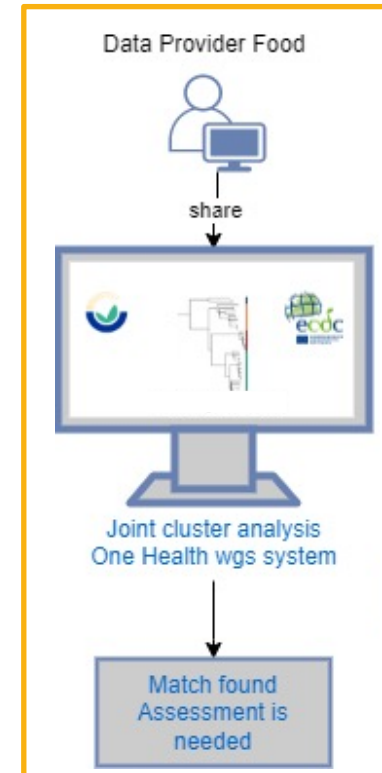
### Assessment phase (ROA)

EFSA requests the **countries** to validate data associated to specific entries

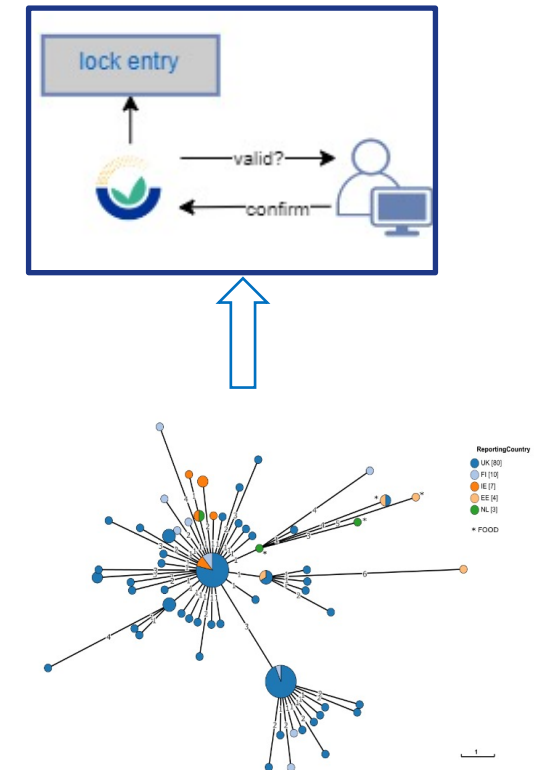
Assessment is published and data are “locked”

Locked data cannot be edited or deleted


### Monitoring phase



### Assessment phase





# DEMO – ROA ST1607

MonitorData OverviewTaggingReportsQueriesGrapeTree?🔔 ROSSI Mirko



## EFSA One Health WGS System Portal

The EFSA One Health WGS System has been developed by EFSA as response to the European Commission mandate for the collection of sequencing data of isolates from food, feed, animals, and the farm and food processing environment, for the purpose of supporting ECDC in rapid detection of multi-country foodborne outbreaks

Quick startMonitorData OverviewTagging





# ENGAGEMENT ACTIVITIES BY EFSA

- **Continue work with MS for improving data sharing at EU level**
  - Creation of [WGS subgroup](#) of EFSA Zoonoses Monitoring Data (ZMD) network
  - [Interagency networks meeting](#) of the ZMD network and ECDC's FWD Network
  - [Educational activities](#) (webinars, publications)
- **Improve data sharing at international level**
  - FDA-EFSA-MS multilateral interaction
- **Ensuring harmonization across different stakeholders**
  - Working closely with [inter-EURL WG on NGS](#) and EURLs' networks
  - Working with [international partners](#) (e.g. PH4GE, GMI, etc.)
- **Increase awareness at risk managers and policy makers**
  - "[Science meets policy](#)" conference (<https://www.efsa.europa.eu/en/events/science-meets-policy-conference-using-next-generation-sequencing-tackle-foodborne-threats>)



# In summary

Successful example of cross-sectoral collaboration at EU level

**EFSA system:** 174 users across 27 EU MS and 2 EEA countries

**EFSA system:** > 2900 profiles shared by 26 EU MS and EEA countries since July 2022 (approx. 100/month) + over 5000 profiles generated from public data

**So far, ECDC sent** ~1,100 clusters weekly for a total 60k queries

Hundreds of clusters containing human and food data detected

The One Health WGS system supported the collection and analysis of WGS data for the assessment of multiple EU multi-countries foodborne outbreaks involving several hundreds of human cases across EU



# Acknowledgements

The creation of this training material was commissioned by ECDC to Institut Pasteur with the direct involvement of Mirko Rossi