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Funded by the European Union

# Project update : focus on WP1 and WP7

EFSA Stakholders Discussion Group on Emerging Risks

November 2025

All fake-looking images are made with AI

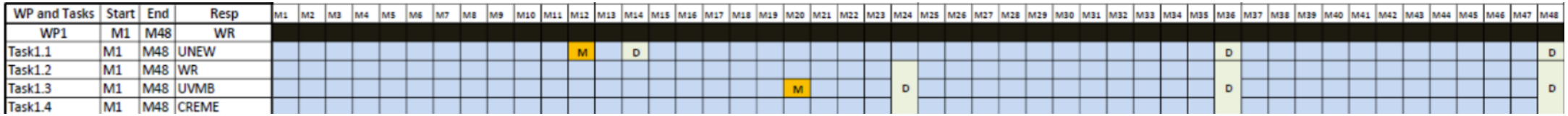
# Updates of WP1 activities from 2025

## WP1 :

## AI for Predictive models on Emerging Risks

## From text analysis and Holistic combinations

# Status of WP1



| WP and Tasks | Start | End | Resp | M1 | M2 | M3 | M4 | M5 | M6 | M7 | M8 | M9 | M10 | M11 | M12 | M13 | M14 | M15 | M16 | M17 | M18 | M19 | M20 | M21 | M22 | M23 | M24 | M25 | M26 | M27 | M28 | M29 | M30 | M31 | M32 | M33 | M34 | M35 | M36 | M37 | M38 | M39 | M40 | M41 | M42 | M43 | M44 | M45 | M46 | M47 | M48 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| WP1 | M1 | M48 | WR | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Task1.1 | M1 | M48 | UNEW | | | | | | | | | | | | M | | D | | | | | | | | | | | | | | | | | | | | | | | D | | | | | | | | | | | | D |
| Task1.2 | M1 | M48 | WR | | | | | | | | | | | | | | | | | | | | | | | | D | | | | | | | | | | | | | | | | | | | | | | | | |
| Task1.3 | M1 | M48 | UVMB | | | | | | | | | | | | | | | | | | | | M | | | | | | | | | | | | | | | | | D | | | | | | | | | | | | D |
| Task1.4 | M1 | M48 | CREME | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

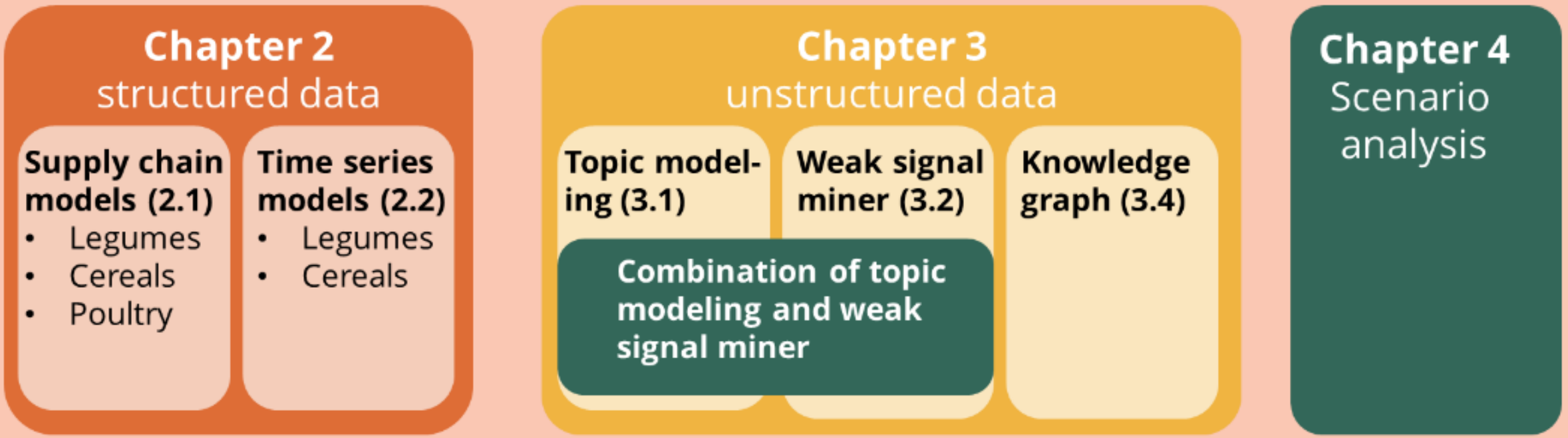
| | Deliverable / milestone | Due month | Status |
|---|---|---|---|
| D1.1 | Stakeholders' requirements, impact assessment & data sources (I) | 14 | Done |
| D1.2 | ERI models and crisis coordination (I) | 24 | Done |
| D1.3 | Stakeholders' requirements, impact assessment & data sources (II) | 36 | Done |
| D1.4 | ERI models and crisis coordination (II) | 36 | Done |
| D1.5 | Stakeholders' requirements, impact assessment & data sources (III) | 48 | |
| D1.6 | ERI models and crisis coordination (III) | 48 | |
| M1 | Stakeholders’ requirements determined | 12 | Done |
| M2 | ERI methods tested for supply chains | 20 | Done |

# T1.1: Living lab

- 3 hour living lab
- Multiple break-out rooms focused on discussions with the developers

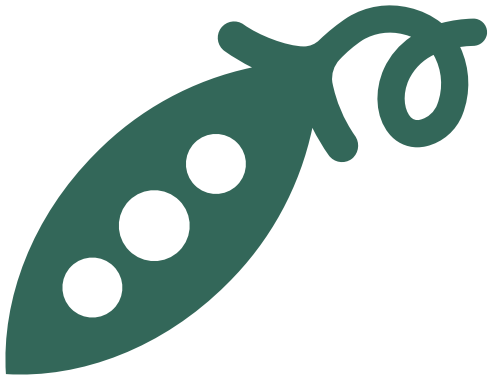

# Structure of D1.4

ERI models and crisis coordination (II)



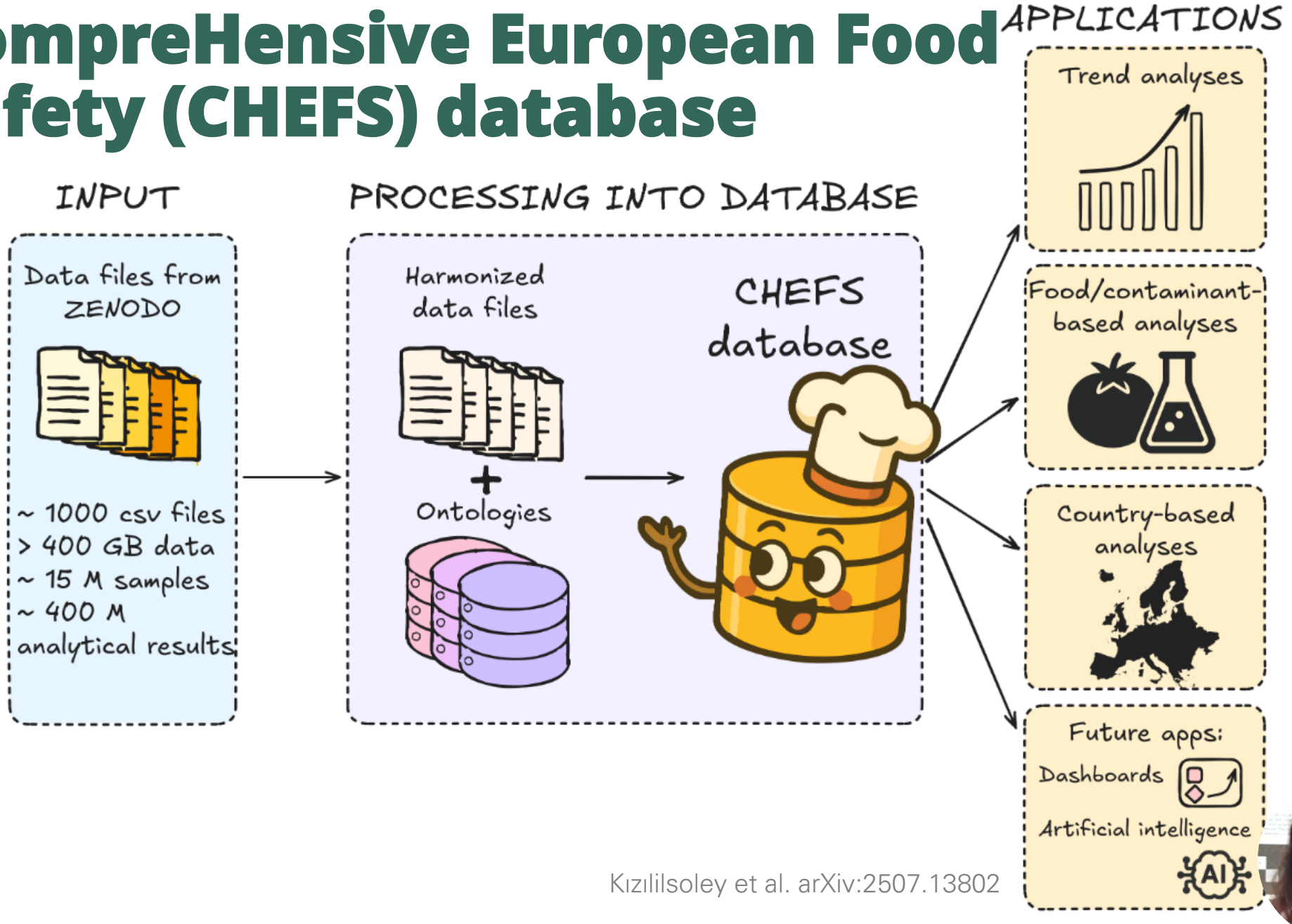
# T1.2: Predictive / forecasting AI

2024



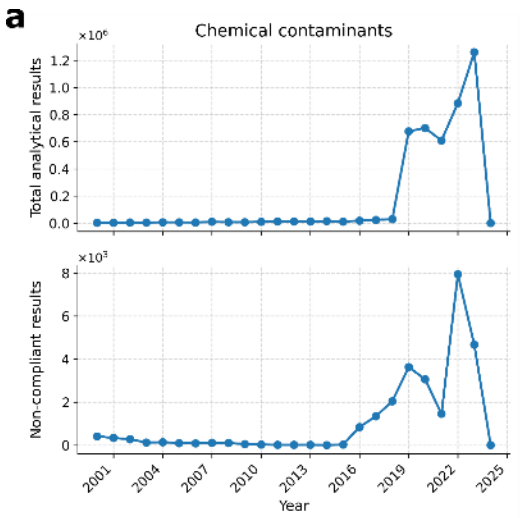
2025

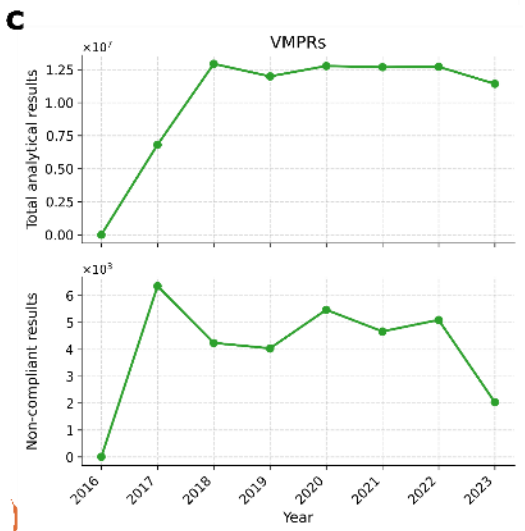
# CompreHensive European Food Safety (CHEFS) database

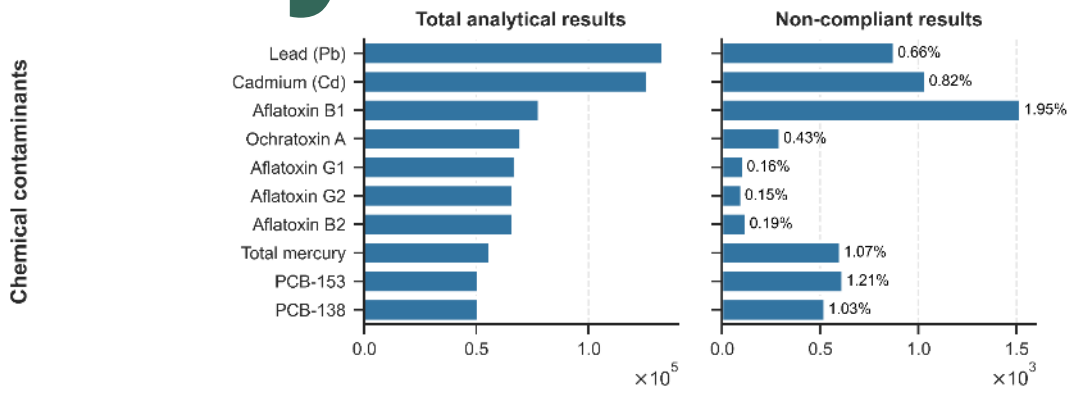


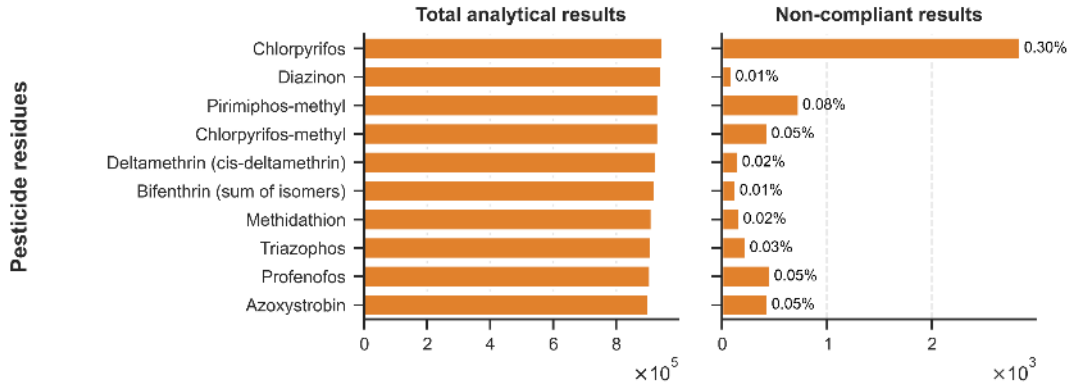

Kızılılsoley et al. arXiv:2507.13802

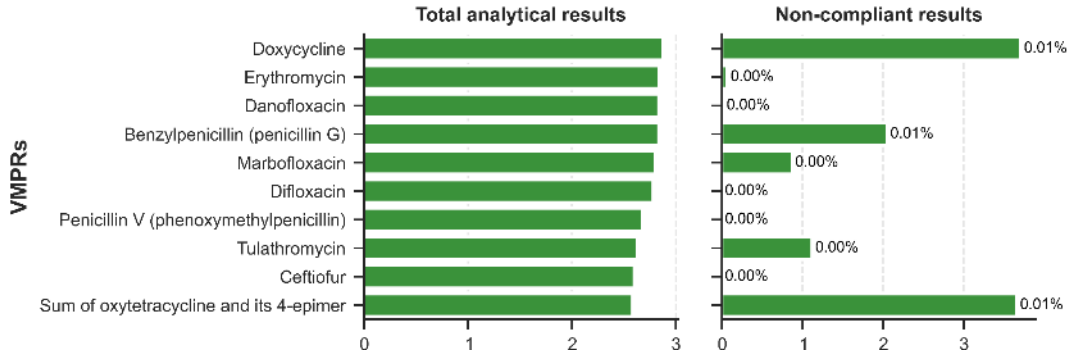
# CHEFS analyses



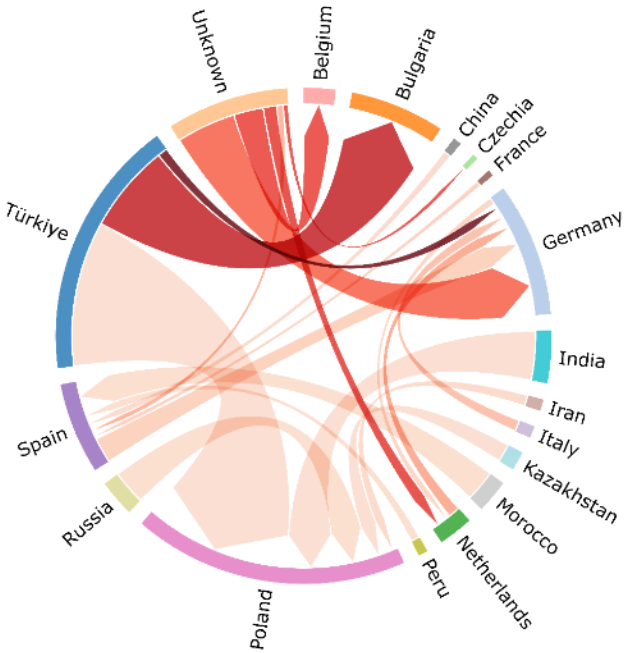



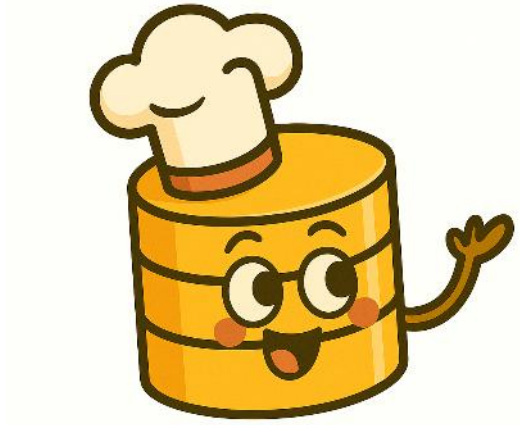




## 2020 - 2024

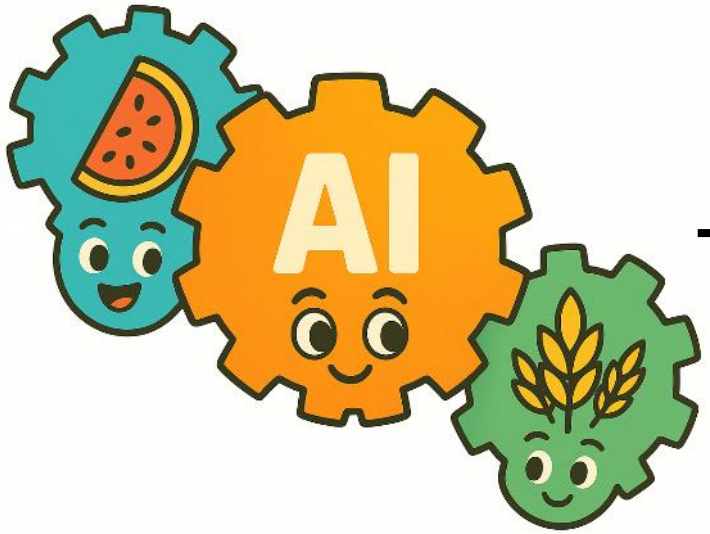


# Prediction models



+

WP5

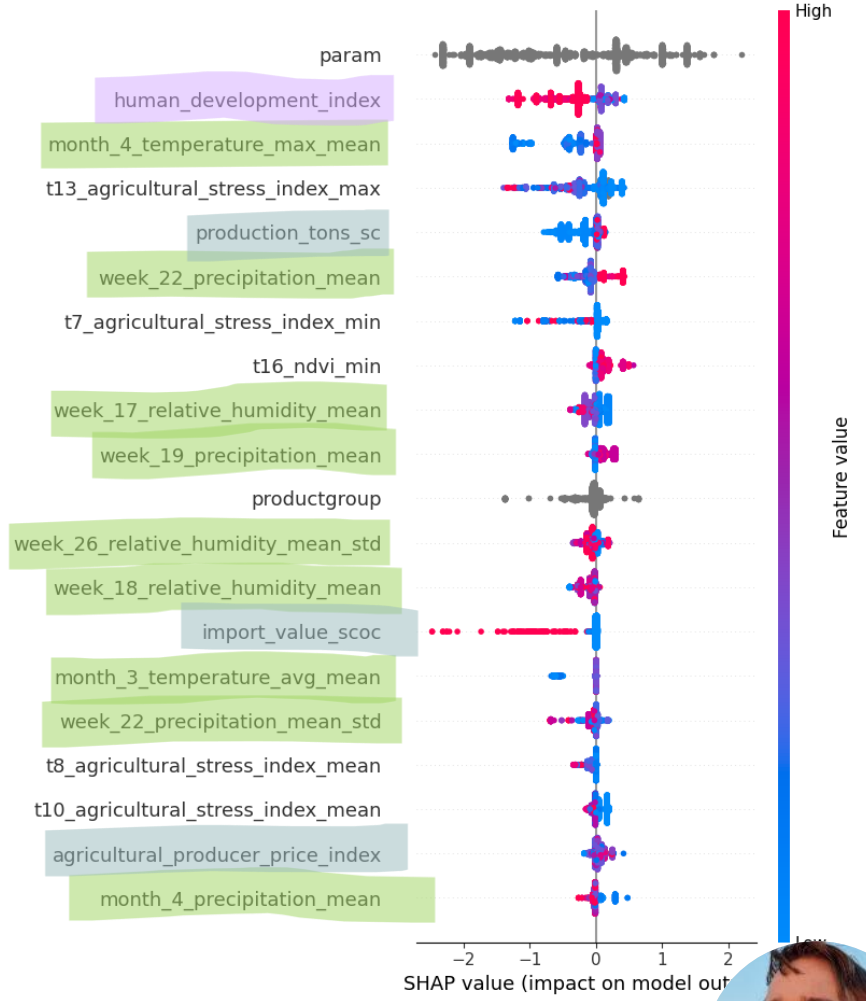

# Mycotoxins in grains

- Multiple cereal grains
- Multiple mycotoxins
- Multiple AI methods

**AI performance 73 %** (AUC)

XGBoost+SHAP

# Explainable AI




Korporaal et al. in preparation

# Time series forecasting models

Parameters

- Historical incident data: market recalls, border rejections, and laboratory test results (above and below limit).
- Derived features: e.g., peak detection, yearly maxima of contamination incidents.
- Weather variables (per country of origin): temperature, humidity, precipitation, wind, and pressure.

Data: RASFF (Europe), FDA and FSIS (USA), CFIA (Canada), national monitoring programs, and proprietary weather datasets

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# Mycotoxin prediction model

How does it work?

- It uses weather data and historical lab test data where an ingredient was above or below the allowable level.
- The model can predict the next 3 months.

What can it offer?

1.Maps

2.Model performance

3.Explainability

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# Results (accuracy)

Maize

- Mycotoxins: ~49%
- Aflatoxin: ~46%
- Fumonisin: ~47%

Cereals

- Mycotoxins: 64%

Lentils

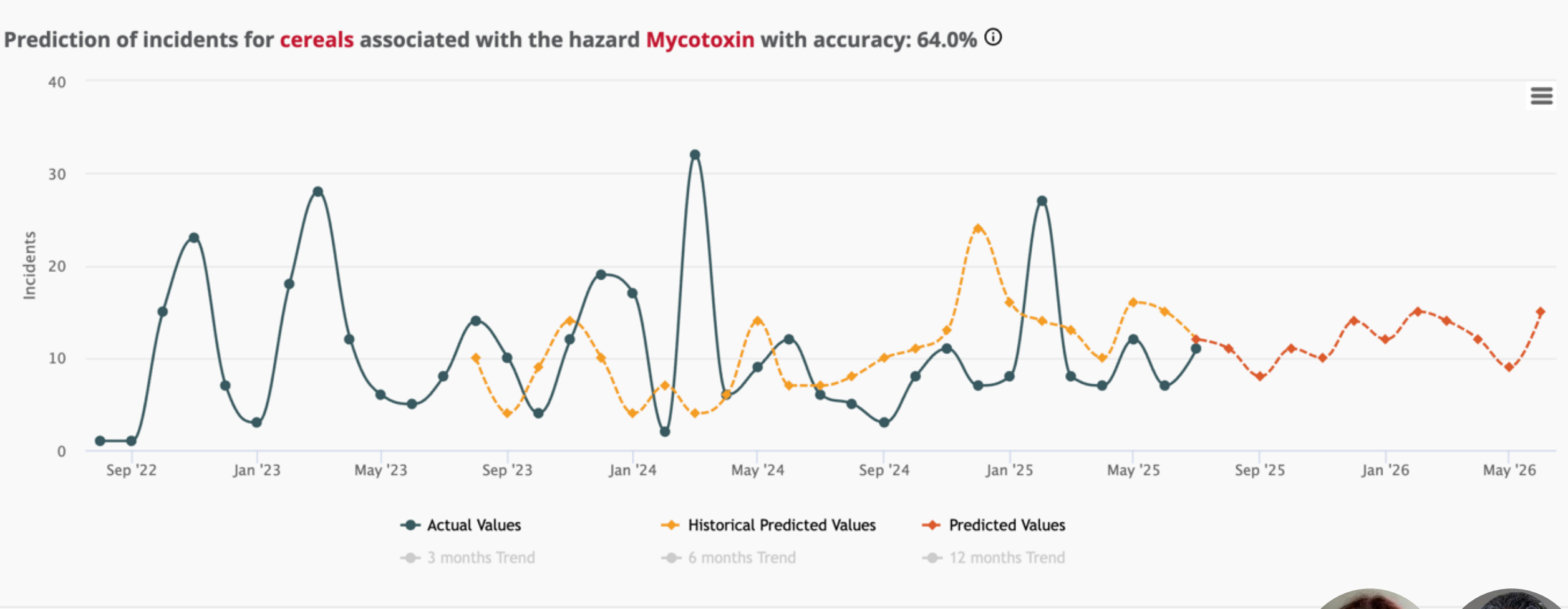
- Mycotoxins: insufficient data
- Chemical hazards: 39%

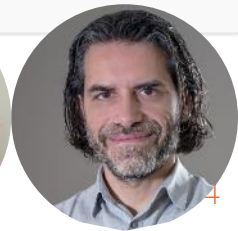
Legumes

- Chemical hazards: 56%

Ongoing: Integration of the model in the HOLiFOOD platform

# Time series forecasting models




100
50
0
Actual Non-compliant samples
Ireland
Ukraine
United States of America
Cyprus
Egypt
China
India
Nicaragua
Senegal
Nigeria
Cameroon
Brazil
Paraguay
Argentina
+
-


4
3
2
1
0
Predicted Non-compliant samples
United Kingdom
France
Ukraine
United States of America
Spain
Italy
Turkey
Israel
China
Japan
India
Egypt
Sudan
Thailand
Senegal
Nigeria
Cameroon
Nicaragua
Indonesia
Brazil
Zambia
Paraguay
Australia
Argentina
South Africa
+
-

# T1.3: Emerging risks from text

Weak signal miner

Topic modelling

Knowledge graph

# Topic modelling

Media sources (weekly scraping) → **Topic modelling** → Food safety related articles arranged into topics based on semantics

**Large text corpora pre-digested**

# Weak signal miner

Scientific abstracts → **Weak signal miner** → Terms representing potential emerging risks

**Specific potential emerging risks**

# Let's make use of different outputs together...

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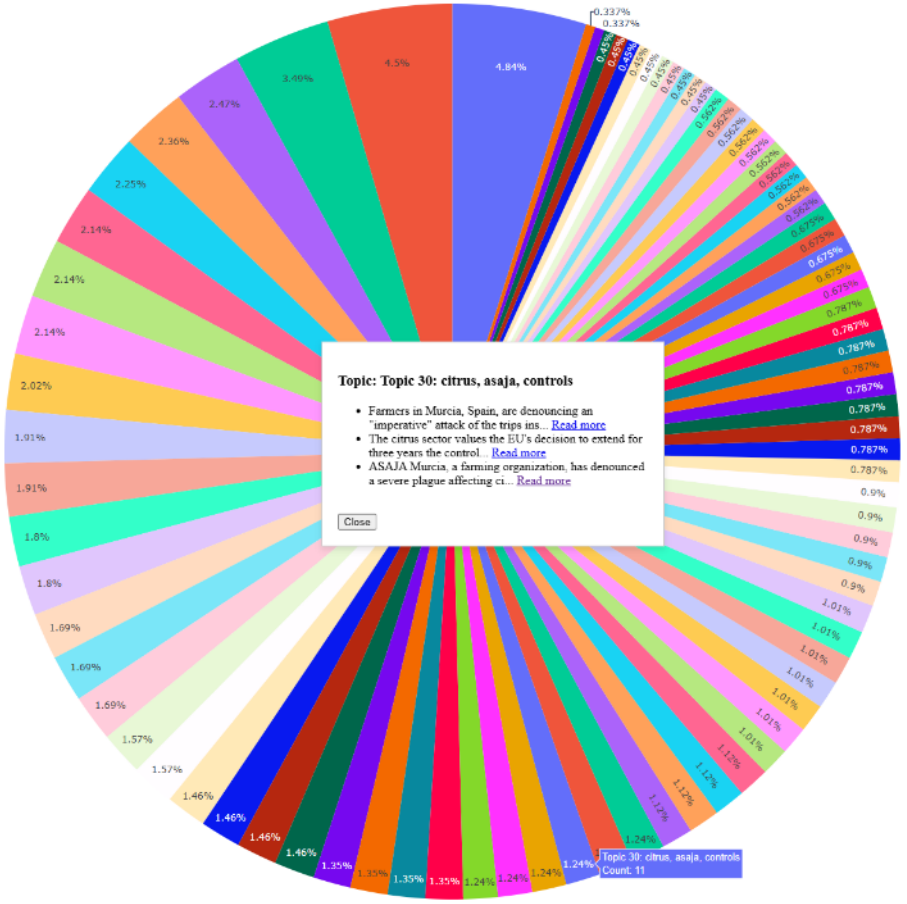
# Topic modeling




- Topic 0: acne, fda, cancer
- Topic 1: flu, bird, bird flu
- Topic 2: market, driven, billion
- Topic 3: digital twins, twins, article
- Topic 4: pollution, report, air
- Topic 5: reddy, dr reddy, sun pharma
- Topic 6: text, ban, pfas
- Topic 7: coffee, creamer, coffee creamer
- Topic 8: gmos, genetically, genetically modified
- Topic 9: million, net, loss
- Topic 10: fruits, citrus, citrus fruits
- Topic 11: coop, march, symptoms
- Topic 12: shah, students, minister
- Topic 13: film, saying, new
- Topic 14: ikea, led, lamps
- Topic 15: listeria, symptoms, carrefour
- Topic 16: cpsc, injury, toddler
- Topic 17: product, attack, body
- Topic 18: pandemic, spanish, government
- Topic 19: women, shah, sentences sentences
- Topic 20: group, italy, spain
- Topic 21: vehicles, vehicle, battery
- Topic 22: agricultural, agriculture, sector
- Topic 23: tariffs, trump, trade
- Topic 24: ikea, led, plug
- Topic 25: bottles, trader joe, trader
- Topic 26: oysters, norovirus, march
- Topic 27: ministry, ministry health, salami
- Topic 28: smith, surgery, meeting
- Topic 29: bookmark, share comments, bookm
- Topic 30: citrus, asaja, controls
- Topic 31: mustard, gherkins, allergy
- Topic 32: zalando, cadmium, black
- Topic 33: sentences sentences, sentences, sa
- Topic 34: technology, manufacturing, revenue
- Topic 35: score, italian, coldiretti
- Topic 36: irrigation, project, insects
- Topic 37: industry, 43, stroller
- Topic 38: tomato, spain, italy
- Topic 39: lidl, obstriegel, minimum
- Topic 40: caffeine, coffee, efsa
- Topic 41: boots, tablets, customers
- Topic 42: gel, 2028, microbiological
- Topic 43: directors, board, ceo
- Topic 44: million, 2024, ended
- Topic 45: foods market, foods, bites macaroni
- Topic 46: study, dietary, diet
- Topic 47: romania, romanian, ukrainian
- Topic 48: convertible, notes, common
- Topic 49: bleeding, internal bleeding, internal
- Topic 50: recalls, cheese, contamination
- Topic 51: tesco, garlic powder, garlic
- Topic 52: chipolatas, salmonella, 330g
- Topic 53: kulturheidelbeeren, phosmet, penny
- Topic 54: oyster, kits, recall
- Topic 55: substances, withdrawn, alternatives
- Topic 56: translation, supply chain, chain
- Topic 57: sushi, loves, ginger
- Topic 58: memories, sleep, apples
- Topic 59: wheat, allergen, undeclared

# Weak signal miner

## Done

- Development of pipeline from unstructured docs to ranked weak signals

## ToDo

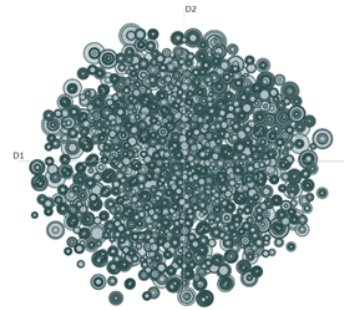
- Parameter fine tuning
- Aligment with UVMB topic modelling approach
- Handover to platform

**1. Define search space**
Create corpus from news, research, social media

**2. Preprocessing**
Harmonization

```
# Function to group by a specific time unit (Year, Month, Day)
def group_by_time_unit(df, time_unit):
    if time_unit == 'year':
        return df['Date'].dt.year
    elif time_unit == 'month':
        return df['Date'].dt.to_period('M')  # Month as YYYY-MM
    elif time_unit == 'day':
        return df['Date'].dt.date  # Exact day as YYYY-MM-DD
```

**3. Micro Topic Modelling**
Embedding & clustering



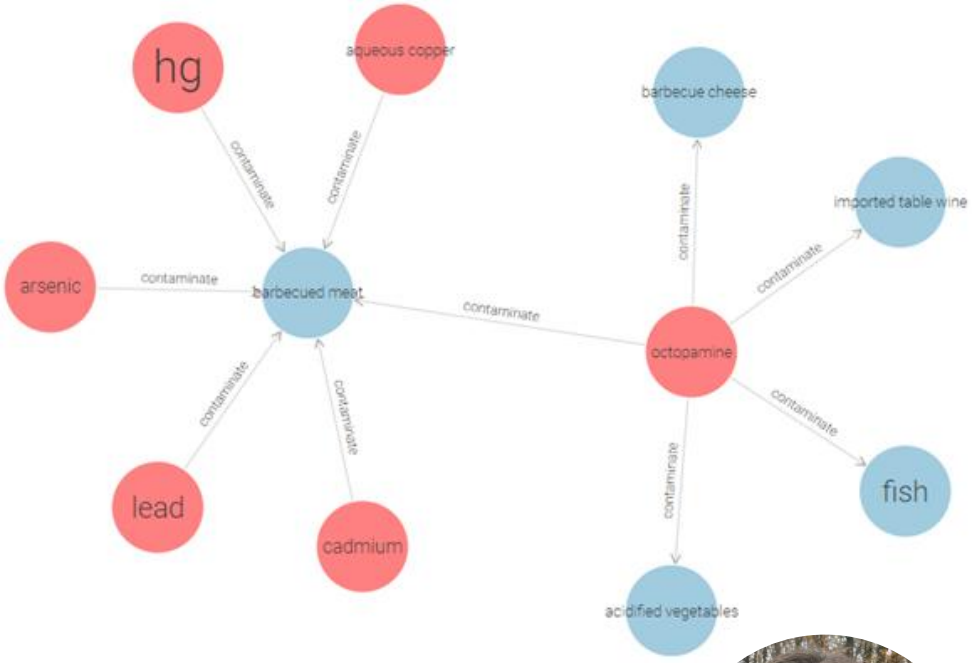

**4. Selection of Weak Signal**
Topic novelty & magnitude VS frequency

**5. Interpretation**
Human interpretation and evaluation of ranked weak signals

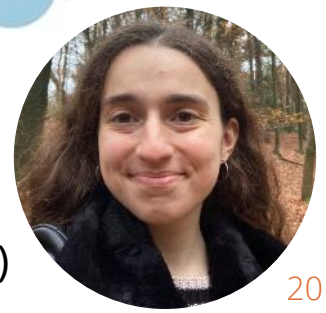
| |
|---|
| ['thiosulfate', 'chelating', 'hg', 'ligands', 'tf', 'phytoextraction', 'se', 'iodide', 'ammonium', 'metallomics'] |
| ['donax', 'viride', 'bioinoculants', 'mycorrhizal', 'amf', 'nutrient', 'arundo', 'waste', 'biomass', 'te'] |
| ['seiv', 'stabilized', 'se', 'nanoparticles', 'leachability', 'femn', 'biosenps', 'seleniumcontaining', 'nanoparticle', 'insitu'] |
| ['tps', 'extracts', 'phlorotannins', 'stressinducible', 'phenolics', 'antibacterial', 'purified', 'spiralis', 'cystoseira', 'seaweeds'] |

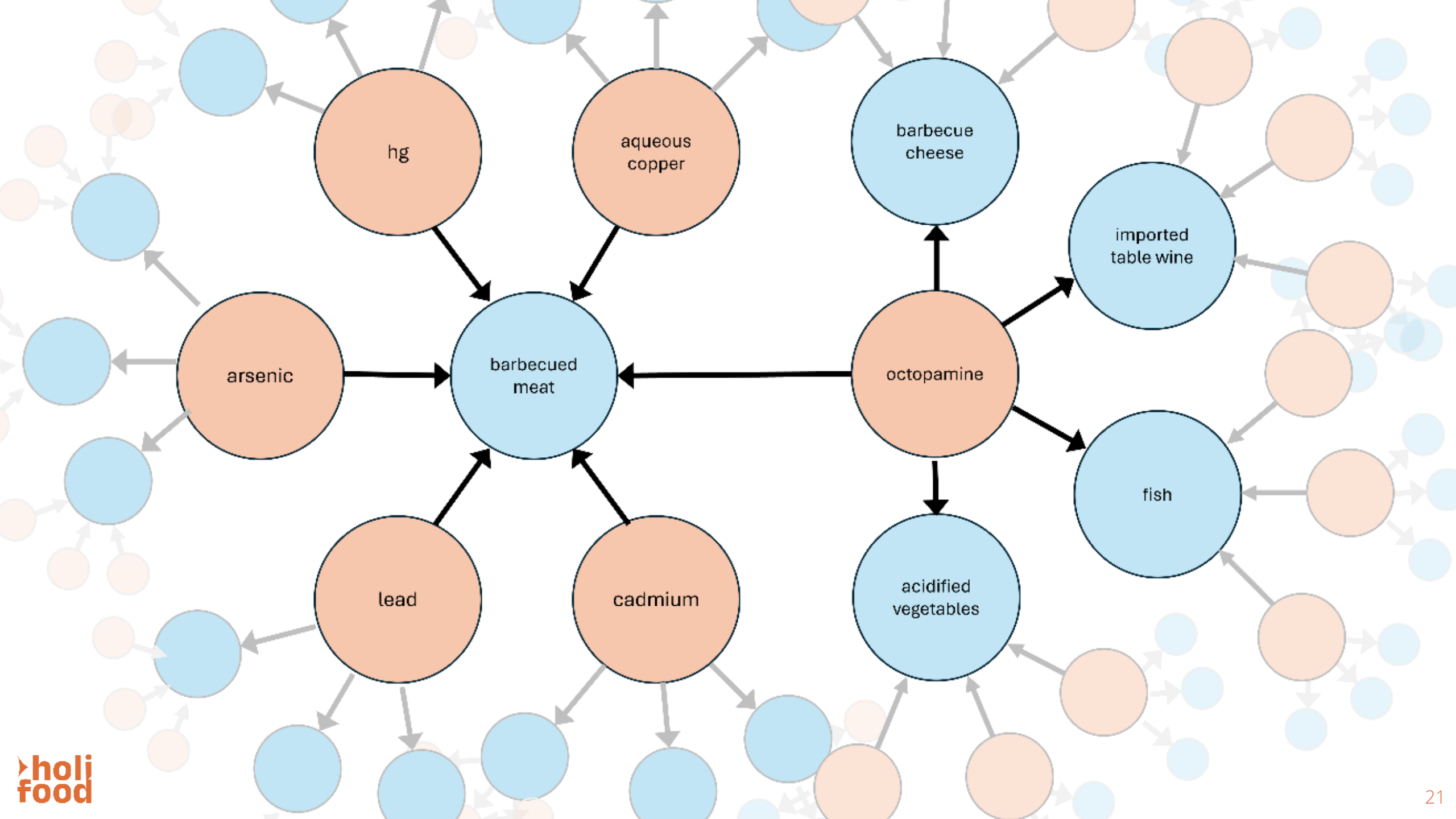
# Knowledge graph

Nous-Hermes-13B-GPTQ
(based on Llama-13B)

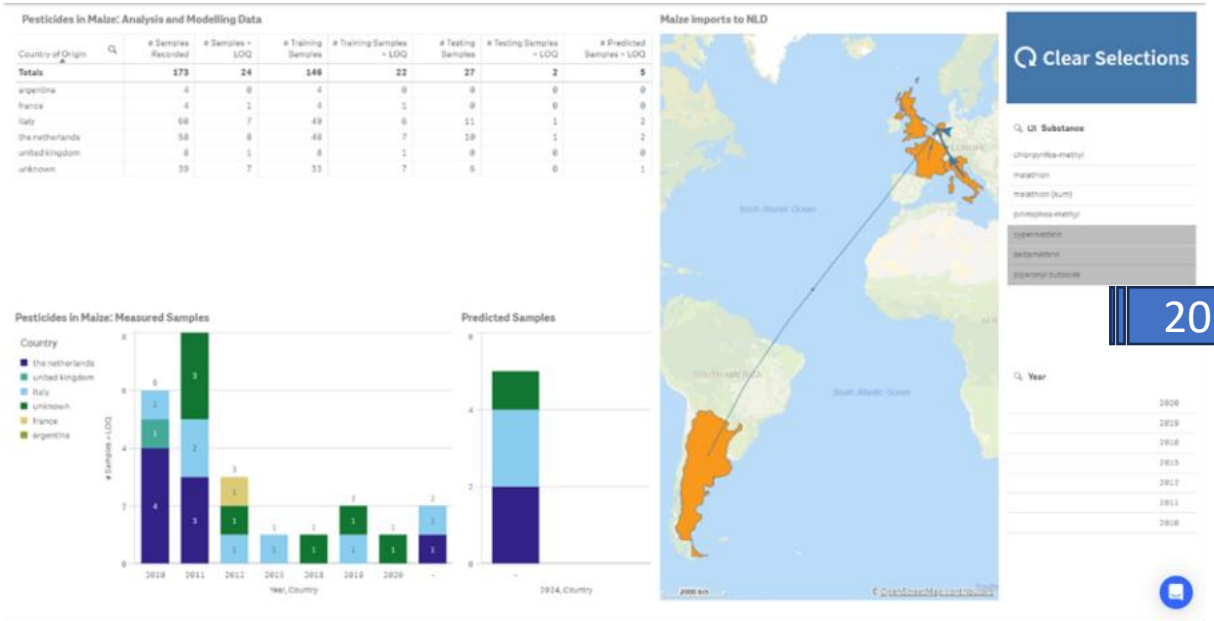



Özen et al, Appl. Food Res. 100679 (2025)

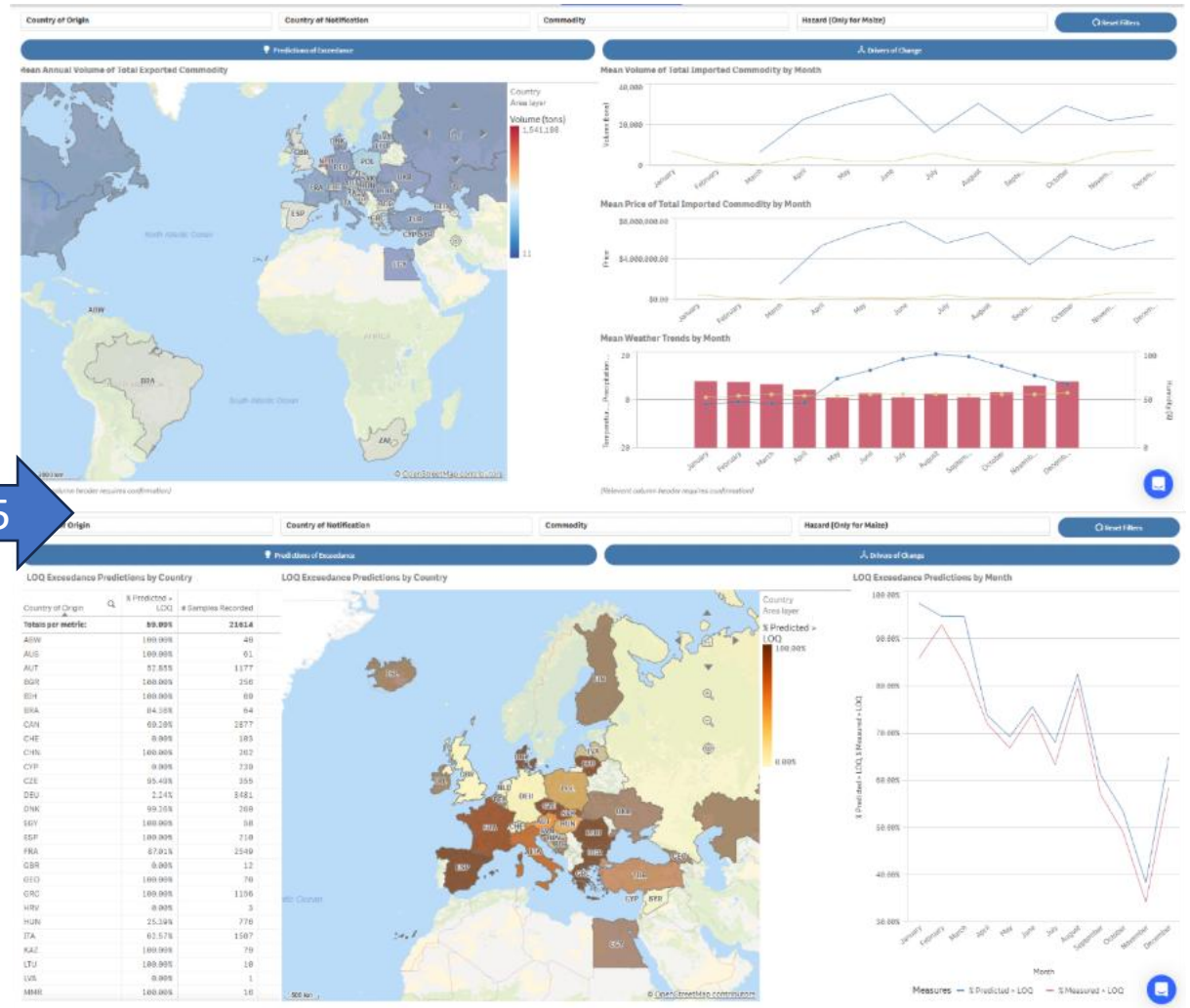



hg
aqueous copper
barbecue cheese
imported table wine
arsenic
barbecued meat
octopamine
fish
lead
cadmium
acidified vegetables

# T1.4: Turning Models into Tools

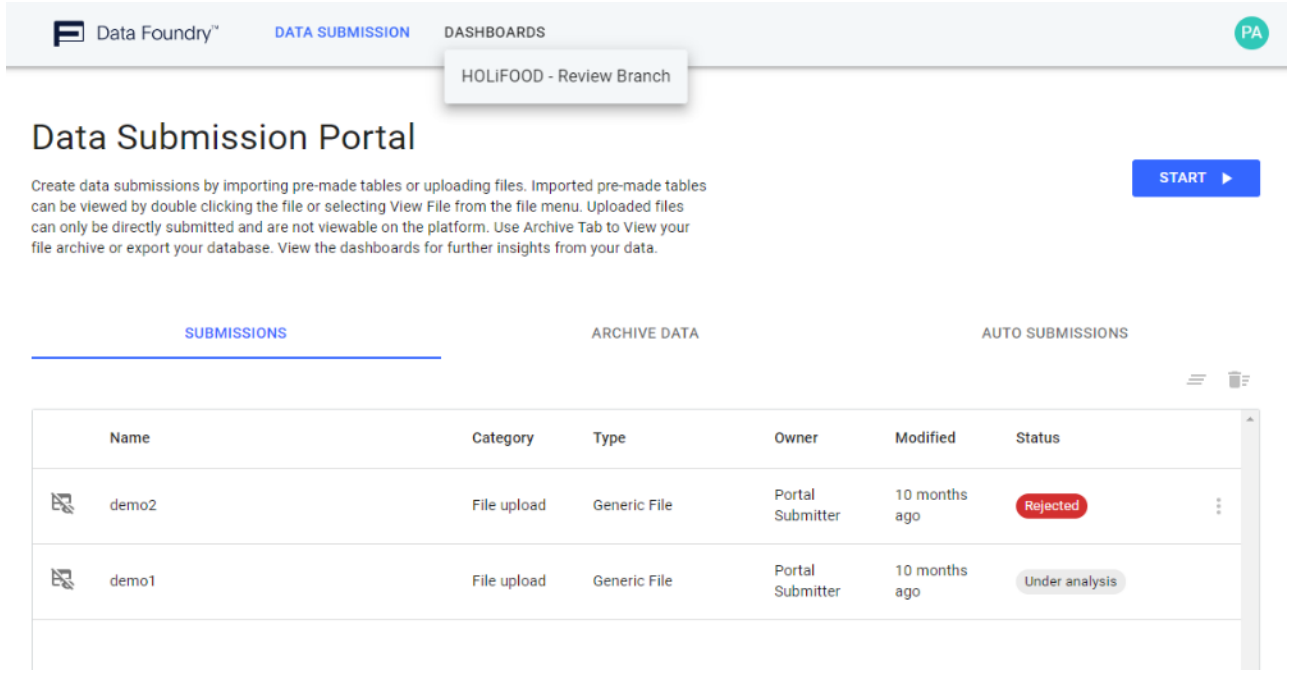



2025



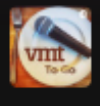
# T1.4: Turning Models into Tools

- Recent data and user **feedback** have driven evolutions in the data visualisation tools made available through the **HOLiFOOD Platform**.



# Output / impact

| Papers | When | Partner | Type | Status |
|---|---|---|---|---|
| Food safety trends across Europe: insights from the 392-million-entry CompreHensive European Food Safety (CHEFS) database | Jul 2025 | WR + UVMB | Paper | Submitted + preprint |
| Explainable AI for holistic prediction of mycotoxin contamination in cereals | TBD | WR | Paper | In preparation |
| Emerging risk identification in the food chain. Recent emerging risks and advances in topic detection methods | October 2025 | UVMB | Paper | To be submitted |
| Presentations | | | | |
| Keynote presentation | 6 x | WR | keynote | Delivered |
| Oral presentation (submitted original work) | 4 x | WR | oral | Delivered |
| | | | | |
| Podcasts | | | | |

| | | | | | |
|---|---|---|---|---|---|
| 1 |  | Episode 49: Applications of AI Part Two with B... | Food to Go | mrt 2024 | 20 seconden geled... | 30:19 |
| 2 |  | AI en Voedselveiligheid: 'opkomende risico's b... | VMT To Go – Podcasts uit de voedingsind... | mrt 2024 | 13 seconden geleden | 31:20 |

# Foreseen output KPIs for 2026

- Minimum **5 peer reviewed journal publications**
- Multiple (at least 15) presentations: keynotes and original work
- Connected to **multiple networks (incl. FoodSafer)**
- Multiple **press releases** (business magazines)
- Dissemination via non-traditional platforms (videos, podcasts, practice abstracts)

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# WP7 : Awareness Campaign for 2026

WP7 – Dissemination and Communication

October 2025

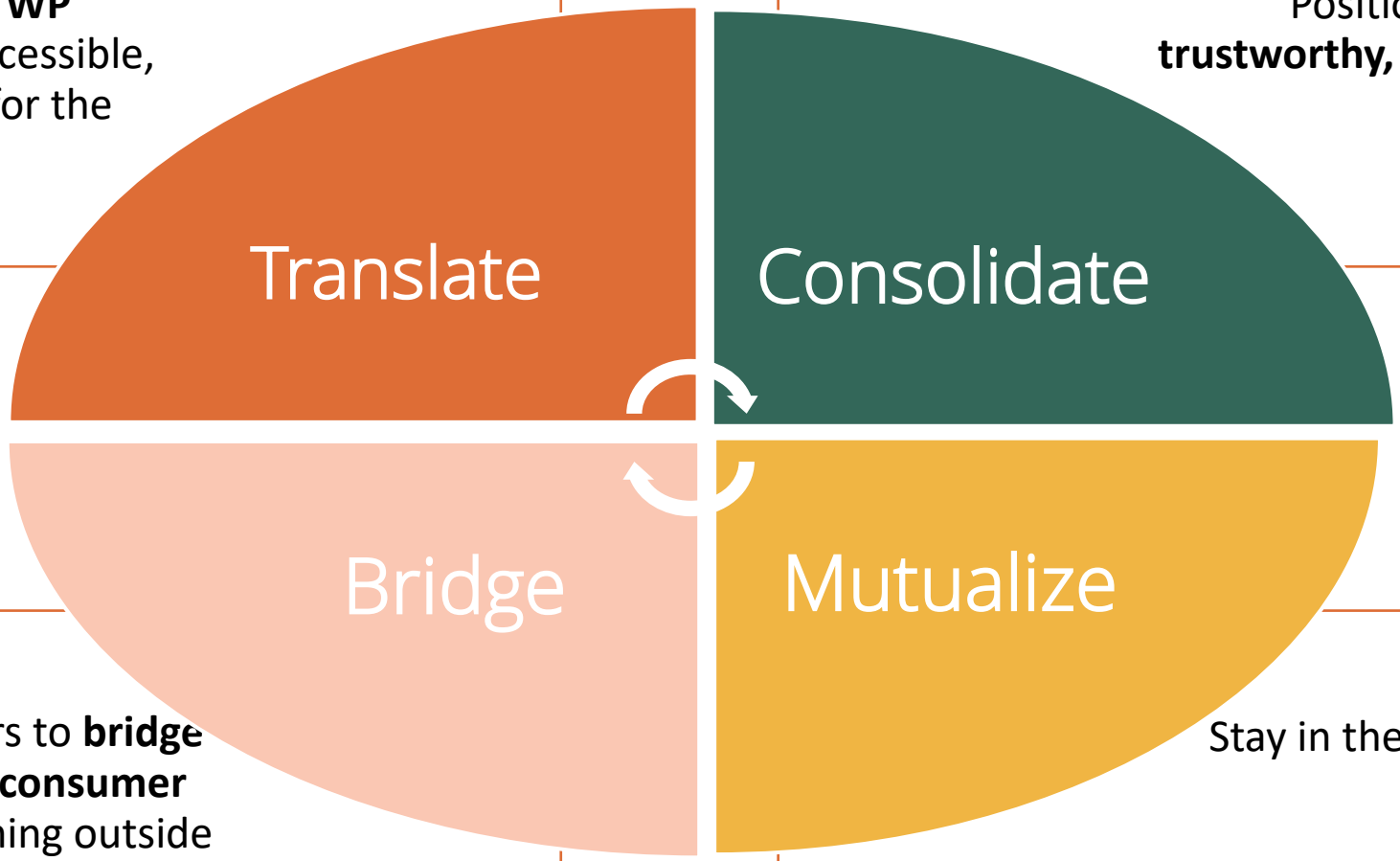
Annual Project Meeting – Bari, Italia

# Objectives and strategy of the communication campaign

# Collective objectives for 2026

**Translate technical WP outcomes** into accessible, engaging stories for the general public

Position HOLiFOOD as **trustworthy, innovative, and collaborative.**




Leverage influencers to **bridge expert work and consumer perception**, reaching outside the “science bubble.”

Stay in the **budget**: €5,000

# Strategic choices

| Centralize content | Engage influencers and stakeholders | Represent multiple WPs | Optimize resources |
|---|---|---|---|
| Develop **modular visual content** (videos, infographics) reusable across multiple platforms and audiences. | Partner with **recognized experts, industry associations, and EU-level stakeholders** to amplify credibility and reach. | Ensure each WP receives visibility through **thematic social media campaign, co-created visuals, and joint dissemination at events**. | Focus on **owned channels (social media, website), including partners'** as well as **shared events** instead of paid media or large physical campaigns. |

# Key audiences and targets

# Consumers – EU citizens

- Reach them via **accessible, educational, useful content,** highlighting:
  - **EU-led innovation** (science, tech) for public health,
  - **Co-creation process**, involving all stakeholders
  - **Food safety impact**, anticipating, mediating risks
- Include **vulnerable groups**:
  - Health sensitive populations
  - Economic vulnerable producers / farmers
  - Communities in need of methodological support for co-creation

# Scientific / Risk assessment community

- Target **multiple stakeholders** with the same technical contents from WP1-2-3-6:
  - Academia researchers, partners
  - EFSA and national food safety agencies,
  - Industry R&D

- Reach them where they get their info:
  - Professional Social Media: **Linkedin**
  - Owned Social Media platforms, through relevant **influencer posts**

# Policy makers / Regulatory enforcers

- Address institutional stakeholders with insightful, innovative learnings from WP3-4:
  - DG Sante, national FSAs/EFSA, Crisis coordinators
  - National/EU Parliaments, Agricultural / Food / Health Commitees

- Target specific Commitees and individuals:
  - Gather contact information
  - Involve/engage them through events, tag them on Linkedin posts, etc.

# AgriFood industries and producers

- Keep them aware of the **latest science developments** for the value chains with fresh contents from WP2-4
  - Lentil, poultry, maize value chains
  - Food industries / transformers, sector associations

- Bring Food Safety back in **top priorities**:
  - Through sharing **economic risk assessments**
  - Through educating on **emerging risk-managing outcomes**
  - Through disseminating EU-funded developments

# Key messages

# 4 distinct categories of messages

- Emerging food safety issues: what they are in 2025, how can we know when and where they emerge, how to prevent them ?
- EU Collaboration enables early detection and mitigation of emerging food risks.
  - Including open data & knowledge sharing driving transparency and trust in food systems, as well as the creation of new detection methods.
- Living Labs and co-creation strengthen science-policy-practice links.
- Innovative frameworks and tools (WP3 risk assessment, WP2 hazard detection) improve food chain safety and sustainability.

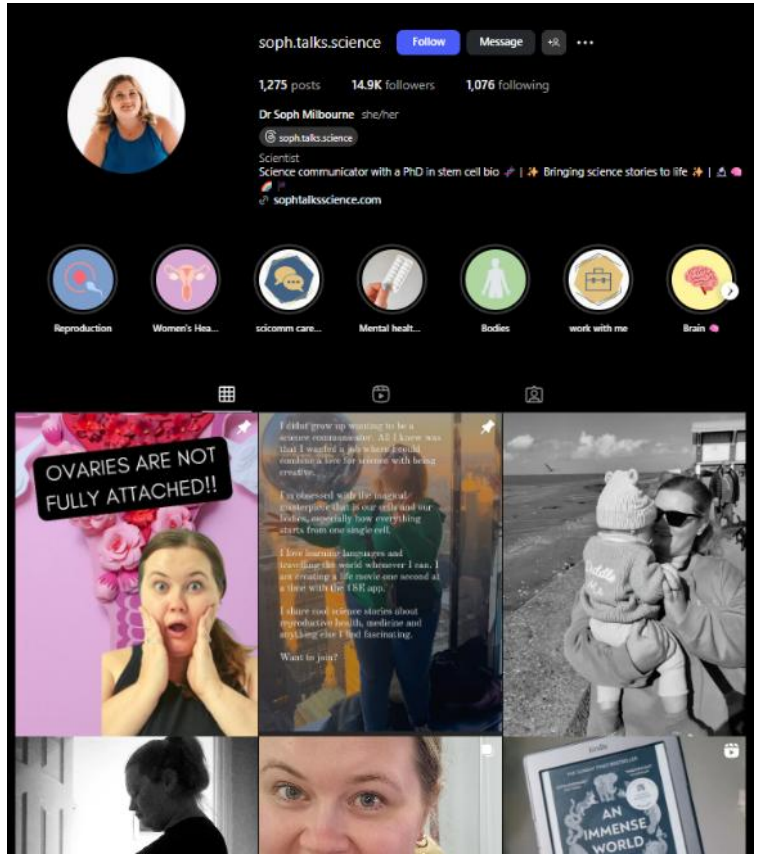
# Partnering up with influencers

# Influencer selection criteria

- **Based in EU** (multi-country reach if possible).
- **Transparent** about partnerships (trust factor).
- **Engagement rate >3%** (to ensure authenticity).
- **Mix of follower sizes** (avoid only large macro-influencers)

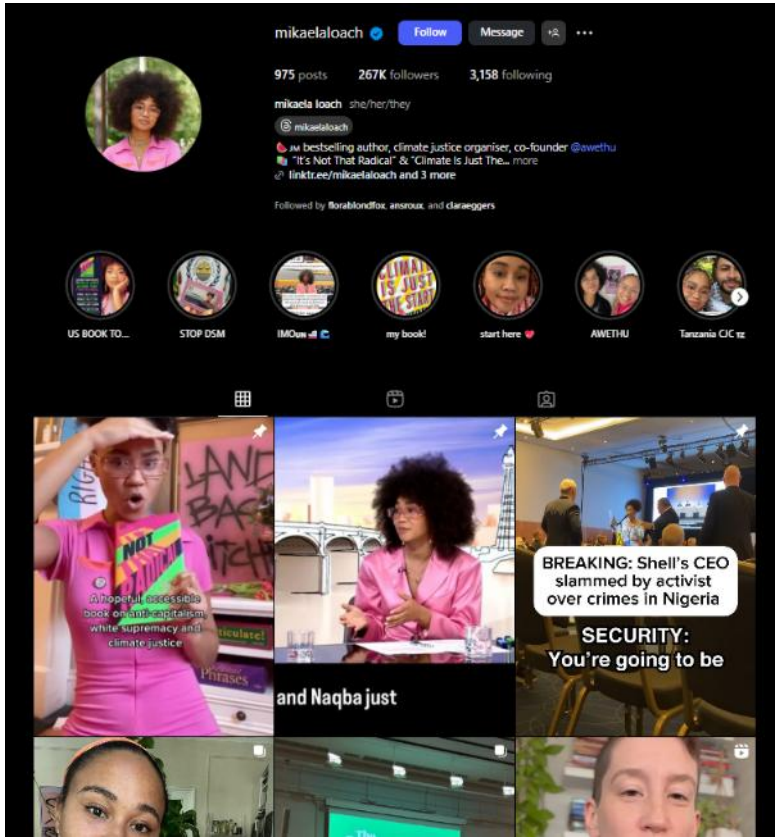
# Food safety & science Edutainers

- **Why:** They can break down WP1, WP2, WP3 outputs (hazard detection, risk assessment) into simple narratives.
- **Example profiles:** science YouTubers, EU-based science communicators active on Instagram.
- **Benefits:** Give credibility while making content engaging (animated explainers, myth-busting posts).



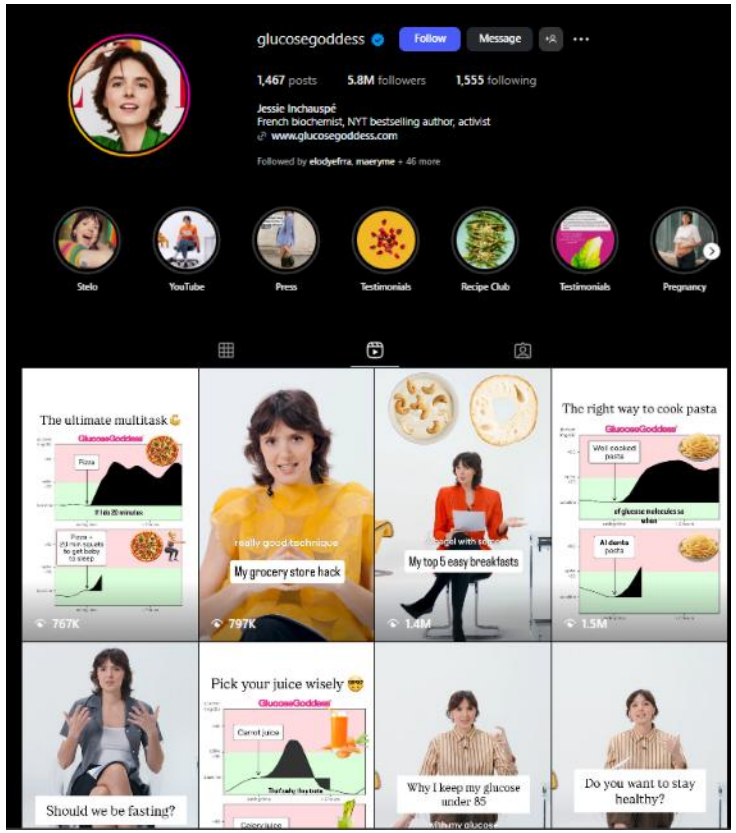
# Optional: Eco-Sustainability & Climate voices

- **Why:** WP4 (Living Labs) and WP9 (coordination) emphasize co-creation, sustainability, resilience of food chains → fits climate/eco influencers.
- **Example profiles:** science YouTubers, EU-based science communicators active on Instagram.
- **Benefits:** Place HOLiFOOD into the broader EU narrative: climate change → new pathogens → need for better monitoring tools.



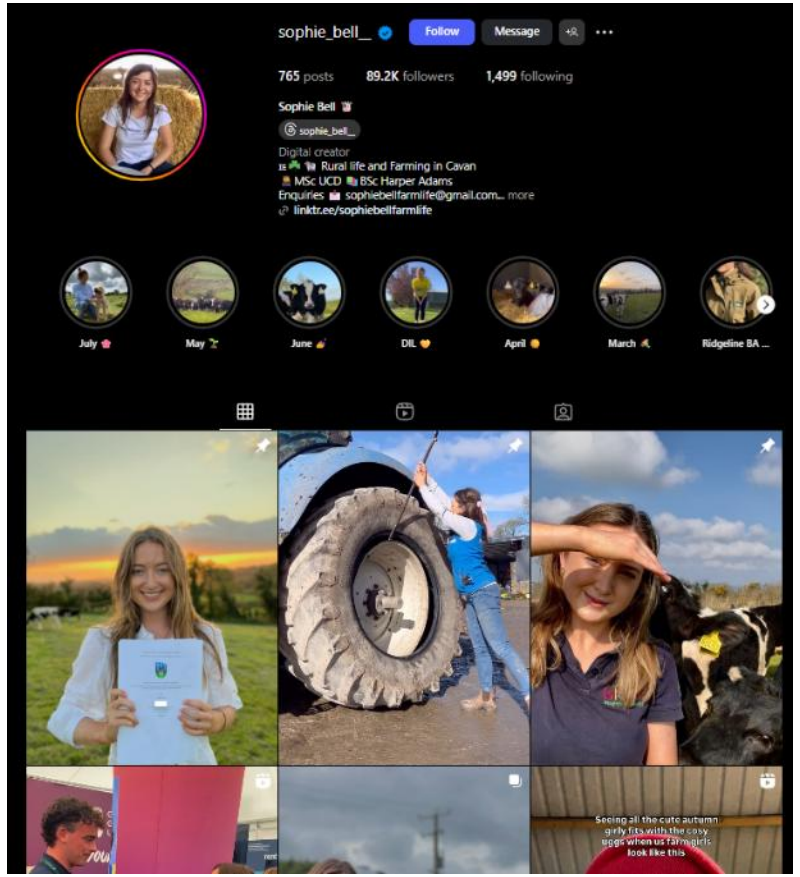
# Nutrition & healthy lifestyle Influencers

- **Why**: Connect WP2 & WP6 outputs on contaminants/mycotoxins/pesticides to everyday consumer concerns (e.g., “is my cereal safe?”, “should I worry about chicken feed?”).
- **Example profiles:** Instagram foodies
- **Benefit**: They already talk to health-conscious audiences, perfect for amplifying food safety research relevance.



# Farmers & Agri-voices

- **Why:** Especially relevant for WP2 contaminants in legumes/cereals/poultry chains.
- **Example profiles:** Agri YouTubers, EU-based science communicators active on Instagram.
- **Benefits:** Bridges vulnerable groups (farmers, producers) with consumer and policy audiences. Farmers already act as community voices, and micro-influencers (2k–10k followers) have high trust levels.



# See more at:

www.holifoodproject.eu

# Questions on WP1 ?

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SciFoodHealth

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# Thank you!

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