GERMAN FEDERAL INSTITUTE FOR RISK ASSESSMENT

Bundesinstitut für Risikobewertung

FoodChain-Lab: an innovative tool to increase food safety through supply chain analyses

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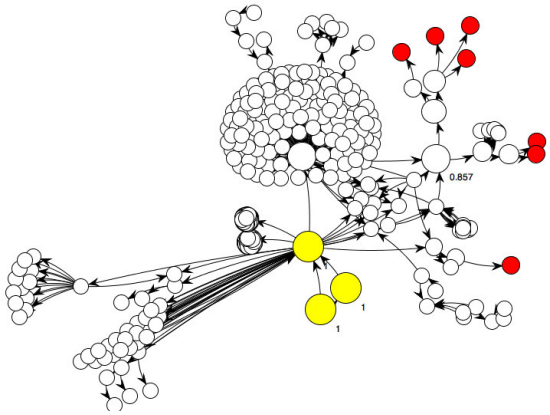


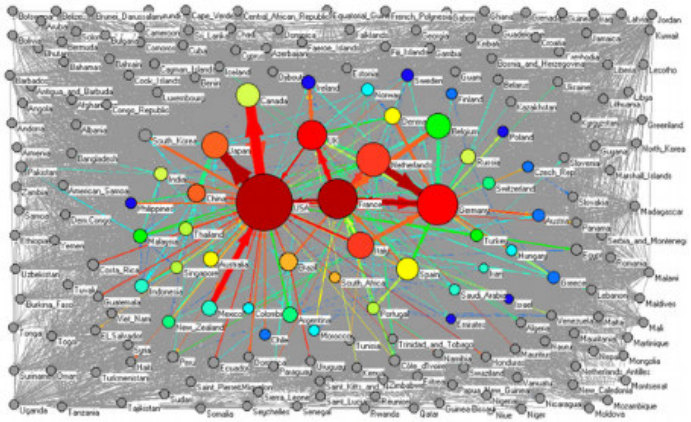
Food Chain Lab
Powered by BfR

FCL was supported by EFSA-BfR Framework Partnership Agreements (FPA) GP/EFSA/AMU/2016/01 and GP/EFSA/AMU/2020/02, and received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement No 773830 (OH EJP COHESIVE).

Why do we need FoodChain-Lab?

Globalised trade

Long and complex supply chains



Large amounts of data

Ercsey-Ravasz M et al. (2012) PLoS ONE 7(5): e37810. doi:10.1371/journal.pone.0037810

Increased complexity of risk assessment and outbreak control

Importance of powerful integrative software tools
e.g. for tracing food and feed

Traceability/Tracing

What is tracing? (Regulation (EC) No. 178/2002, Art. 18)

1) … **at all stages of production, processing and distribution**…

2) **Food and feed business operators** shall be able to **identify any food company from** whom they have been **supplied** …

3) …**to** which their products have been **delivered**.

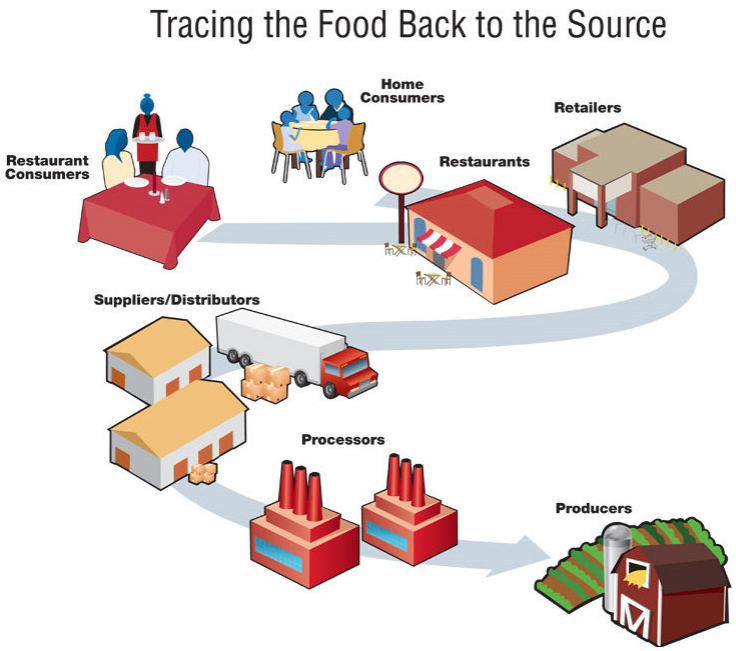
Purpose of tracing

- identify source of contamination + distribution of contaminated food

  warning of consumers
  remove contaminated food from market

- compare distribution of cases + contaminated food

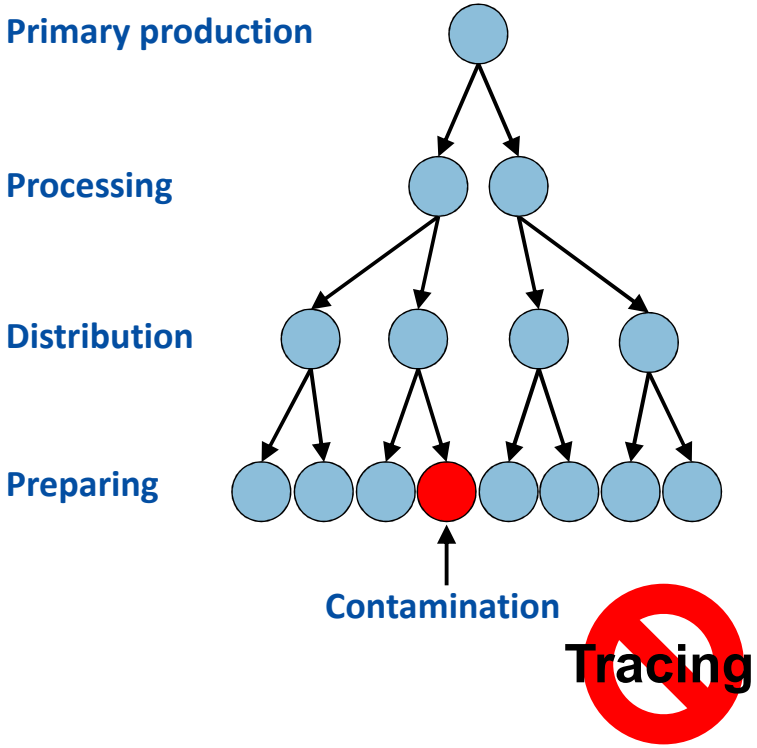
  strengthen epidemiological association



CDC: https://www.cdc.gov/outbreaknet/investigations/ figure_traceback.html

Tracing in foodborne crises

Foodborne disease outbreak affecting multiple locations/countries



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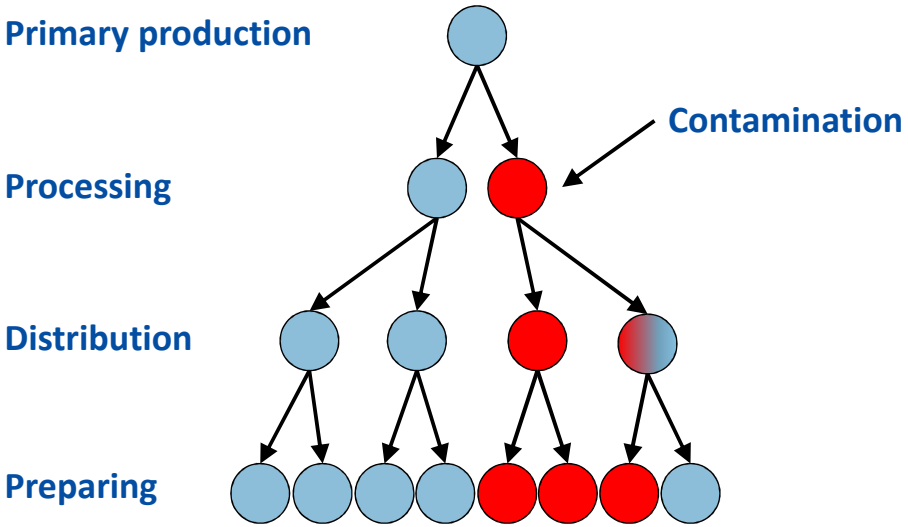

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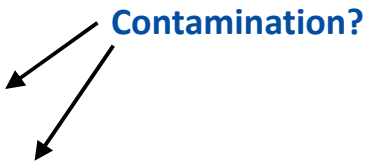
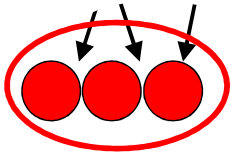
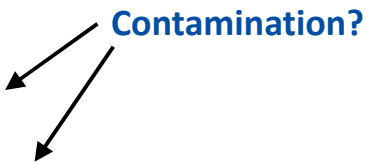


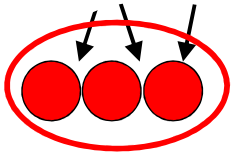


The outbreak investigation teams can only see cases

Tracing in foodborne crises

Foodborne disease outbreak affecting multiple locations/countries





The outbreak investigation teams can only see cases

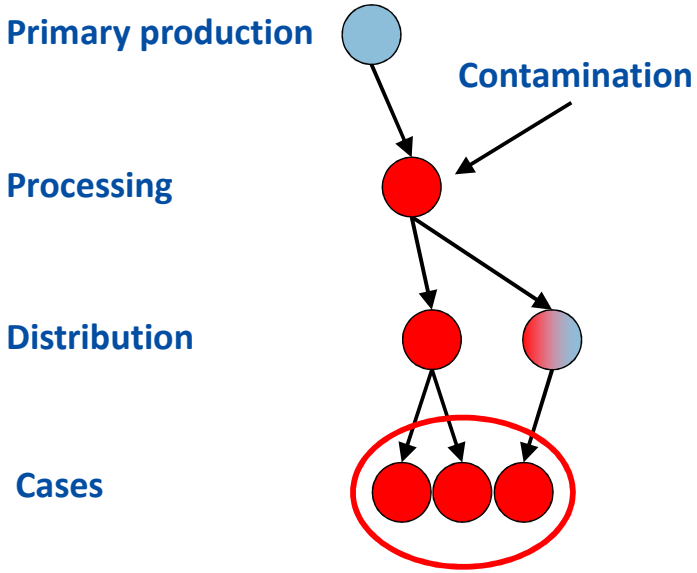
Tracing

Interview: Who ate what, when, where, how much and how?

→ Suspicious product?

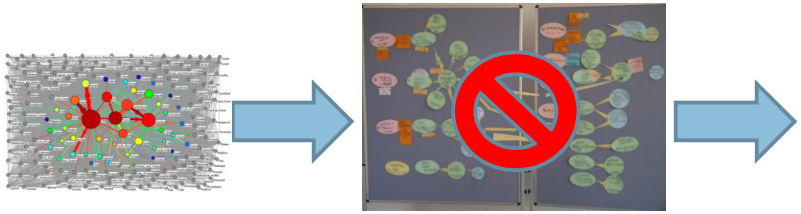
Tracing in foodborne crises

Foodborne disease outbreak affecting multiple locations/countries



Backtracing

- Step-by-step upstream the supply chain (REGULATION (EC) No 178/2002)
- Collecting delivery data for suspicious products and their ingredients
- Combine fragmented information
- Origin of contamination?



Food Chain Lab
Powered by BfR

efsa one HEALTH EJP COHESIVE

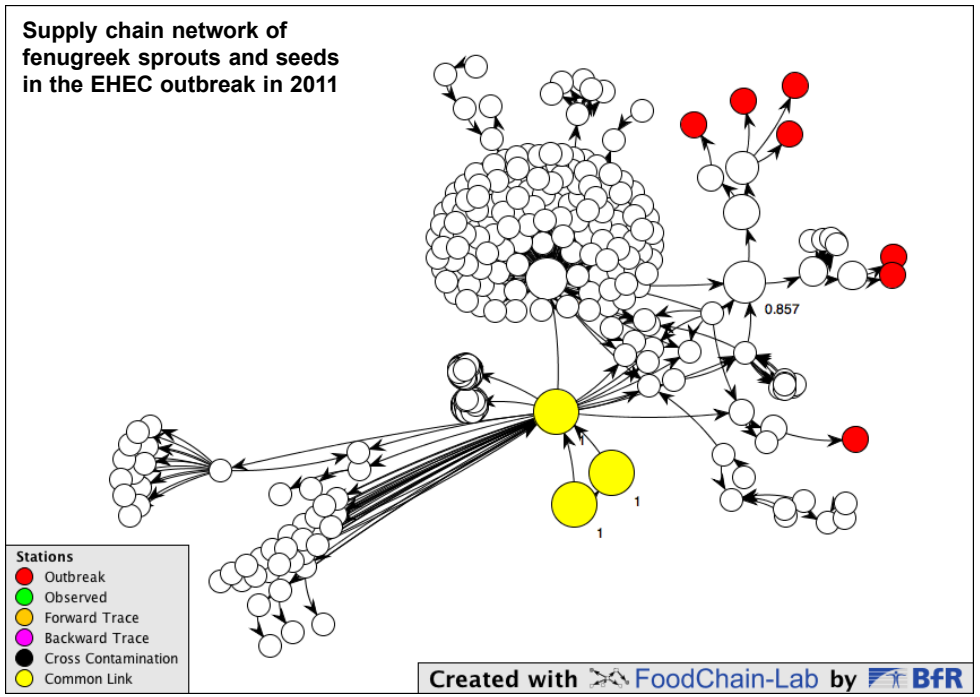
FoodChain-Lab – What is it?

- Free open source software (https://foodrisklabs.bfr.bund.de/foodchain-lab/)
- Tool to trace back and forward suspicious food items along complex supply chains to help solving foodborne crises (outbreaks, chemical contaminations)
- Available as **desktop version** and **web application**

  https://foodrisklabs.bfr.bund.de
  + data collection/ cleaning

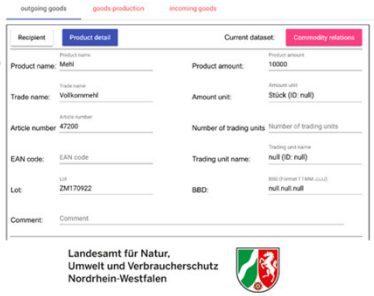
  https://fcl-portal.bfr.berlin
  data collection/cleaning coming soon

- Data collection via Exceltemplates, web-based data collection tool, interface for mass data envisioned
- Automated visualisation of food business operators and deliveries
- Automated analysis of supply chain network to identify potential common source of pathogen/contamination and disease cases
- Interactive analysis, simulation of hypotheses (e.g. cross contamination
- Helps prioritizing next investigation steps



The FoodChain-Lab web application (FCL Web)

North Rhine-Westphalia cooperation
- Tracing data collection tool

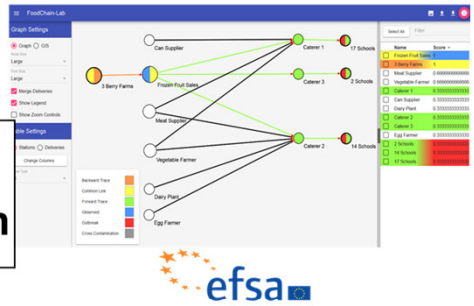


The Tracing (Web-) Portal

https://fcl-portal.bfr.berlin/

Data Collection
RASFF
Local
Bulk

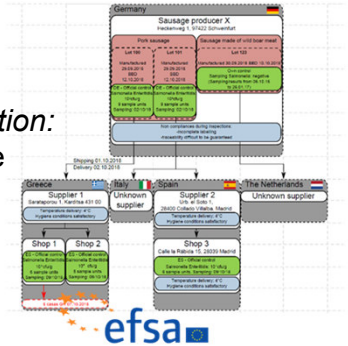
Data Analysis & Visualization



EFSA-BfR cooperation:
- Tracing web platform including desktop FoodChain-Lab for tracing needs

One HEALTH EJP COHESIVE

EFSA-BfR cooperation:
- Reporting module



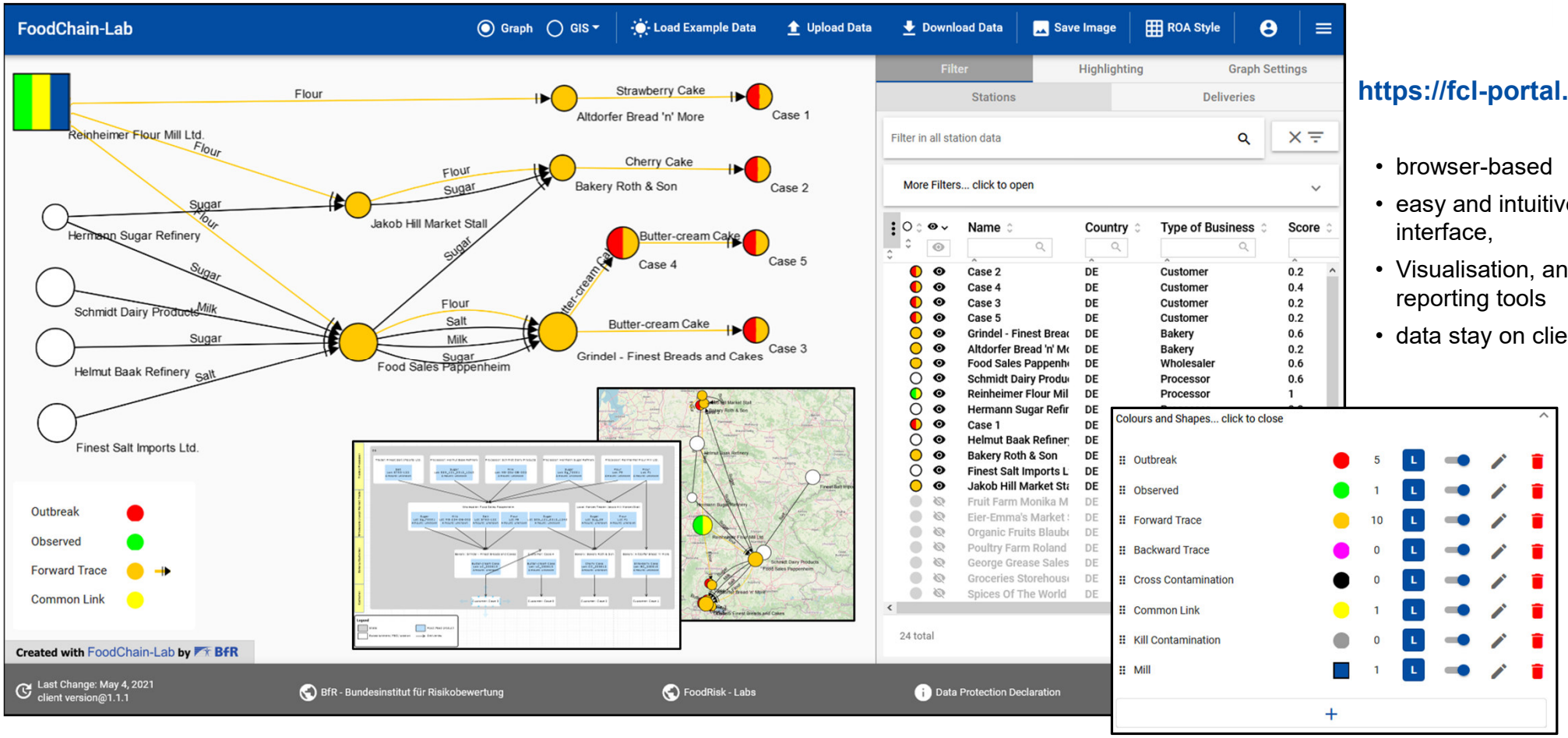
Reporting

Sync with Desktop App

KNIME

OH EJP NOVA:
- NOVA gravity model and webtool

FCL Web – network view, map view, reporting view and data



https://fcl-portal.bfr.berlin/

- browser-based
- easy and intuitive user interface,
- Visualisation, analysis and reporting tools
- data stay on client side!

*FCL Web visualising the supply chain network of a fictitious foodborne disease outbreak in the **network view**, the **map view**, the **reporting view** and in the **data table**.*

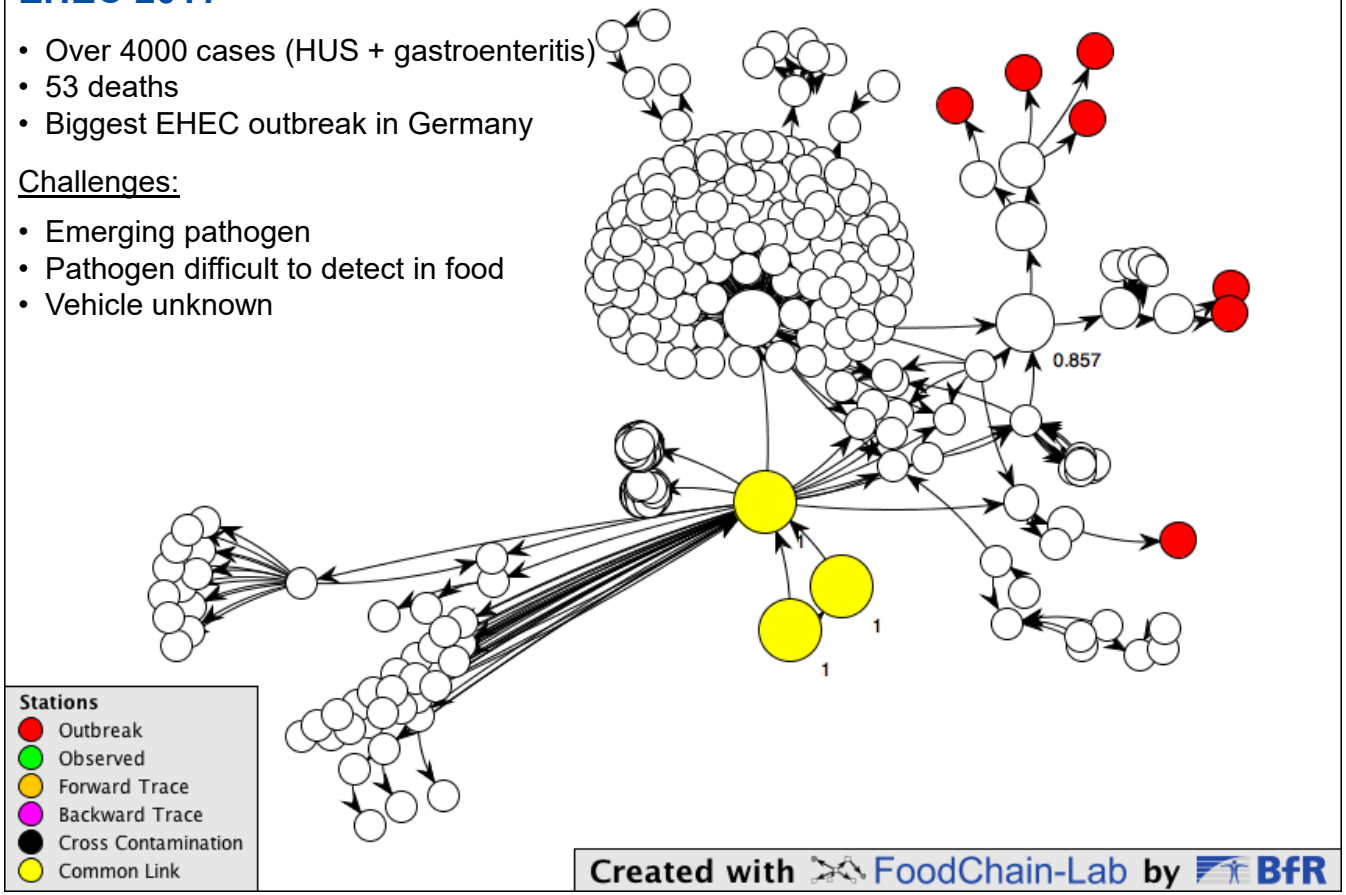
FoodChain-Lab – Successful applications and impact

EHEC 2011

- Over 4000 cases (HUS + gastroenteritis)
- 53 deaths
- Biggest EHEC outbreak in Germany

Challenges:

- Emerging pathogen
- Pathogen difficult to detect in food
- Vehicle unknown



Other applications:

DE:
Norovirus 2012, Salm M. 2015,
EHEC 2017, Fipronil 2017

EU:
HAV 2013/14, C. Bot. 2017 (Plötze),
Salm 2017 (Sesam)

Autonomous applications:
UK, AT, ES, HU, PL

Free support by FCL team efsa

Interested?
Please contact foodrisklabs@bfr.bund.de

Impact:

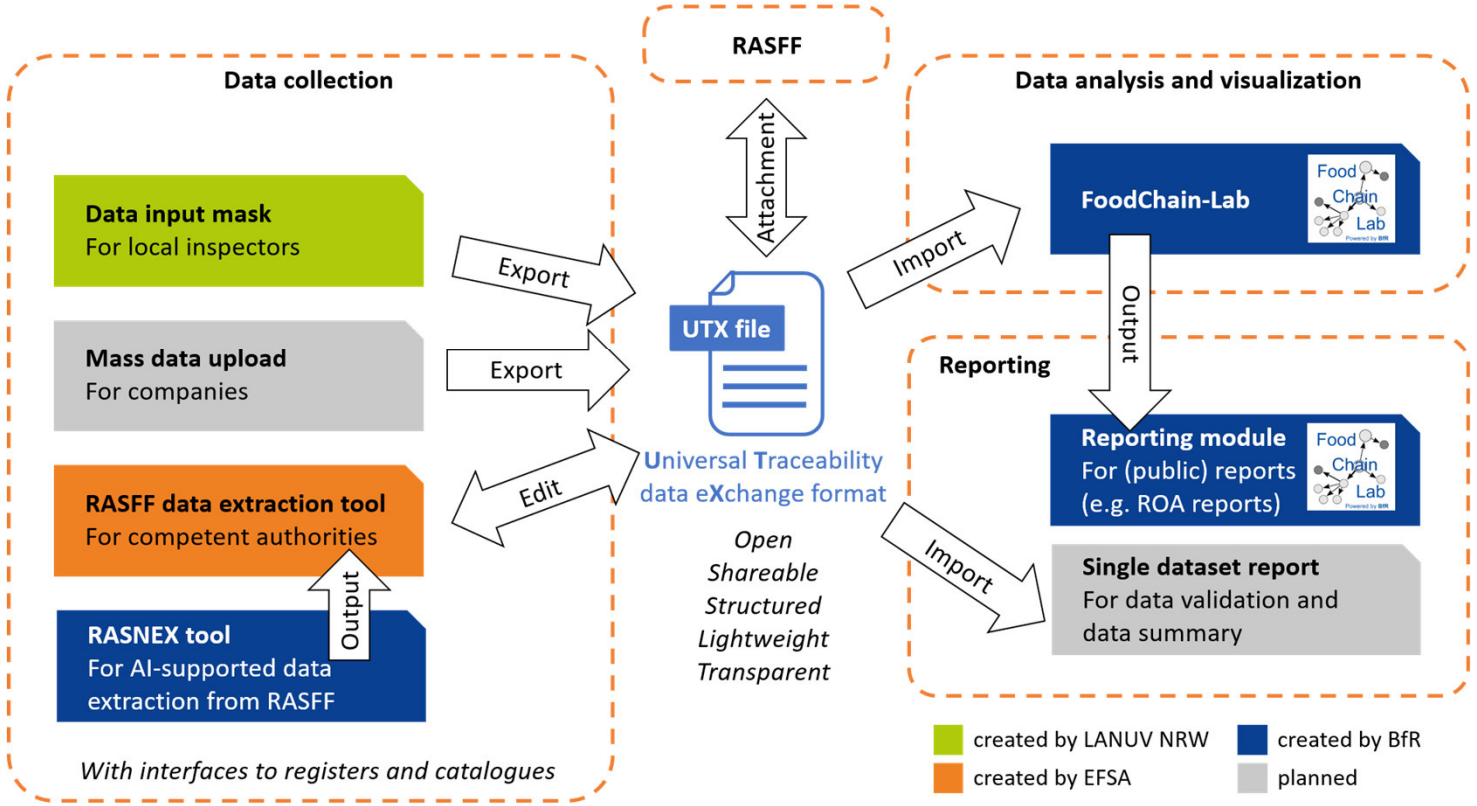
FAO/WHO/OIE: FCL part of Tripartite Tool Box (SISOT)

U.S. FDA implemented FCL and FCL Web in data analysis workflow

FCL Web – Where does the road take us?

EFSA-BfR cooperation on multiactor tracing software workflow + universal traceability data exchange format

Tracing software ecosystem for Europe



Benefits:

Facilitate data exchange

Avoid double work

Easy visualisation + analysis

Your tool?
Feedback on UTX?

Please contact
foodrisklabs@bfr.bund.de

Universal Traceability data exchange format (UTX)

Universal Traceability
data eXchange format

Open
Shareable
Structured
Lightweight
Transparent

Harmonisation of data models is key for interoperability → UTX standard

Structured:
- Core information (investigation, product, station, activities) is interoperable (standardised part of UTX)
- additional unstructured part → offers flexibility to include data which are characteristic for specific tools

Open + Shareable:
- All tools respecting the UTX standard can be used
- Can be uploaded to RASFF system

Transparent:
- Information source is noted

Lightweight:
- JSON or XML file

Benefits of using FoodChain-Lab for MS/EU authorities

- Free and open-source software
- Unifies stepwise tracing information in visualization
- All steps integrated in one modular framework
  - *Data Management, Data Cleaning, Data Analysis (automated, calculation of scores)*
- Helps during Outbreak Investigation
  - *Identify potential common source of contamination by tracing back and forward suspicious food items*
  - *Assists in brainstorming → test hypotheses and generate new ones*
  - *Helps prioritizing next steps*
  - *Identifies missing data*
- Free support and free trainings in FCL
- Harmonisation with/integration of other tools and initiatives

→ Fast and reliable investigation of foodborne incidents

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Thank you for your attention

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(Extended) FoodChain-Lab Team

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