Enabling Efficient Food Safety Knowledge Exchange with FSK-Lab

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Overall **goal**: Strengthening of consumer health protection

- Identifying health risks
- Scientific assessment of risks
- Drawing up of recommendations on risk reduction
- Communication of these processes
Work fields

Risk Communication

Product Safety

Chemical Safety

Food Safety

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Risk Assessment = Knowledge Integration

Global Supply Chains
Feed & Food

- Natural / accidental contaminations
- Intentional contaminations
  - economically motivated (Food Fraud)
  - Criminal (Blackmail)
  - politically motivated (Food Defense)

Risk Management

Risk Assessment

Risk Communication

Hazard Identification

Exposure Assessment

Hazard Characterization

Risk Characterization

Legal framework
- International treaties (WTO, SPS, Codex)
- EU legislation
- National legislation

Population

- Human
- Animal
- Plant (Environment)

Food pattern

- Population characteristics
  - Age
  - ethnic descent
  - Immune status
  - spatial distribution

Hazard

- Microbial agents
- Toxins
- Ingredients / additives
- Chemical contaminants
- Vectors

Products

- Feed
- Food

Data / Information / Knowledge

Production & Processing

- Trade & Logistics
- Quality control

Product information / labeling

Food pattern

- Population characteristics
  - Age
  - ethnic descent
  - Immune status
  - spatial distribution

Statistical Approaches

- Modeling
- Simulation
- Pattern recognition
- Visualization
- Sample preparation
- Detection methods: FT-MIR, NIR, IRMS, NQS
- Procedures: SOP, ring trials, standardization

Analytics / Diagnostics

Methodical and technical infrastructure

IT-Systems

- Expert systems
- Software for end users
- UMD: Data management
- Hardware
Implications

Risk assessors need to use “models”
Food Safety Models
Specific Challenges for Risk Assessment Models

Science based
Reproducible
Transparent
Fully annotated
Vision

Community-driven, curated repositories for food safety models / model modules

Newly generated models / re-implemented models / legacy models

Repository GUI with search, info and model download

Model deployment
Long Term Strategy

A strategy to establish Food Safety Model Repositories


Available online at www.sciencedirect.com

International Journal of Food Microbiology

http://www.researchgate.net/publication/273791203_A_strategy_to-establish_Food_Safety_Model_Repositories

Matthias Filter, KNIME Summit 2019, Berlin, 21.03.2019
FSK-ML – a community standard for knowledge exchange

Food Safety Knowledge Markup Language (FSK-ML)

Software Developer Guide
Version 2.0 (under review)

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Matthias Filter, KNIME Summit 2019, Berlin, 21.03.2019
FSKX – A file format for the exchange of models (and data)
Food Safety Knowledge Lab (FSK-Lab)

- KNIME-extension for harmonized annotation, execution and integration of script-based models
- the FSK-ML reference implementation
FSK-Lab – facilitating harmonized annotation of models
FSK-Lab – supporting knowledge integration
FSK-Joiner – combining models graphically (JS)
FSK-Lab – facilitating user-defined simulations
Deployment

The food safety community is generating a variety of scientific knowledge (e.g., scientific publications, experimental data and mathematical models) and resources (databases and software tools for model generation and application). However, the access to this knowledge and the exchange of information between databases and software tools are currently difficult and time consuming. Therefore, three European institutions specialized in food safety risk assessment (ANSES, BfR and DTU food) initiated a joint project to establish new community resources facilitating the efficient knowledge integration and exchange into and between IT-based applications and resources. The envisaged “Risk Assessment Modelling and Knowledge Integration Platforms” (RAKIP) will be based on harmonized data formats and consistent rules for knowledge annotation. The feasibility of this concept will be exemplified through an RAKIP Web Portal allowing users to access and download risk assessment models, modules thereof and related data in a harmonized file format. These files can then be imported and executed by software tools supporting the proposed harmonized file format. The RAKIP Web Portal therefore also contains supporting resources needed for the harmonized
### RAKIP Model Repository

#### Search for the available models

#### Look into model metadata

#### Select models

#### Run the models
Deployment: FSK-Lab in Virtual Research Environments (VRE)
Deployment: Running KNIME WF in VREs
Bonus – Easy Publishing
Benefits

Modellers:
• Sharing and deploying models / model scripts / code becomes much easier, e.g. via RAKIP model repository or as supplement to your publications

Software developers:
• An open information exchange format is available and can be jointly improved
• Implementation of Machine-to-Machine communication features becomes possible

Risk assessors and researchers:
• Domain knowledge becomes more easily available and “applicable” in future risk assessments and research
Other BfR KNIME extensions

http://foodrisklabs.bfr.bund.de/

PMM-Lab

Predictive Microbiology

Outbreak Analysis and Visualization

Food Process Simulations

Knowledge Exchange

Food Chain Lab

Created by BfR

Food Process Lab

Powered by BfR
Outreach
The Team
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The content of this talk does not reflect the official opinion of the European Union, EFSA, BMEL or BLE. Responsibility for the information and views expressed in this talk lies entirely with the presenter.
Thank you for your attention
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