GERMAN FEDERAL INSTITUTE
FOR RISK ASSESSMENT

RAKIP
risk assessment modelling & knowledge integration platform

anses
French agency for food, environmental and occupational health safety

BfR
Bundesinstitut für Risikobewertung

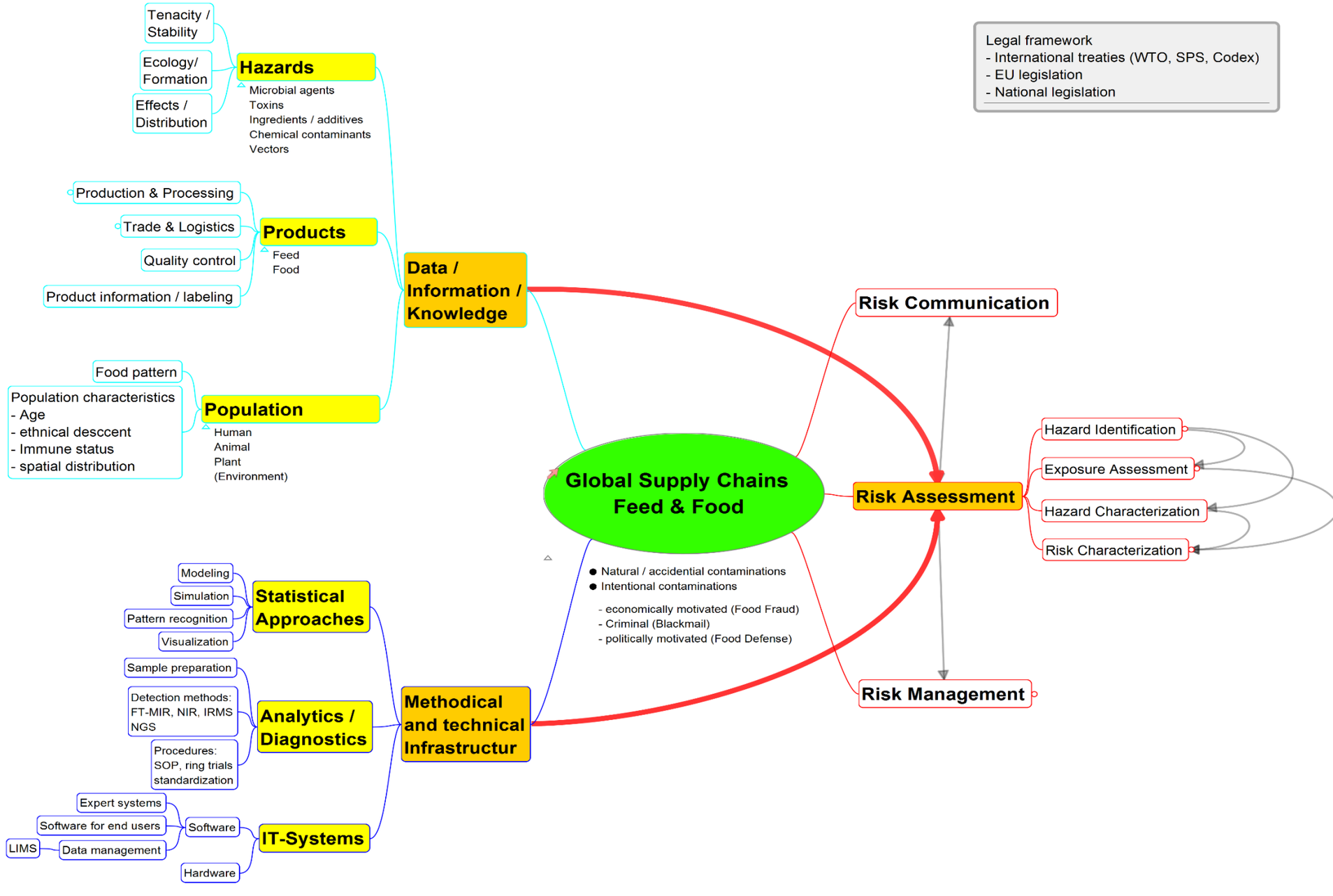
DTU Food
National Food
Institute

DTU

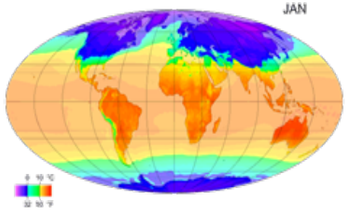
RAKIP:
Resources for harmonized annotation and efficient exchange of risk assessment models

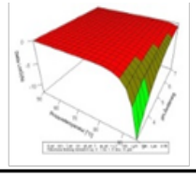
Matthias Filter

The Risk Assessment Challenge

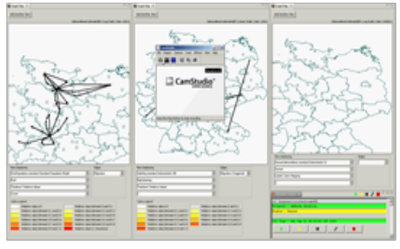


Risk Assessors Need DATA, MODELS and TOOLS !





Predictive Microbial Models



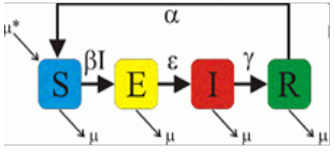
Agricultural Production

Processing

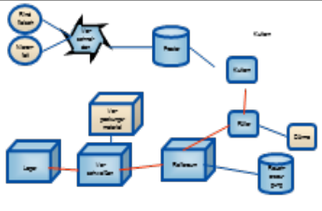
Distribution

Human Consumption

Animal Disease Models

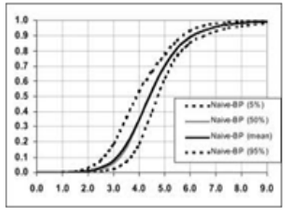


Processing Models

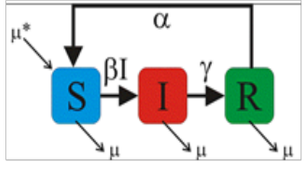


Supply Chain Models

Dose Response Models



Human Disease Models

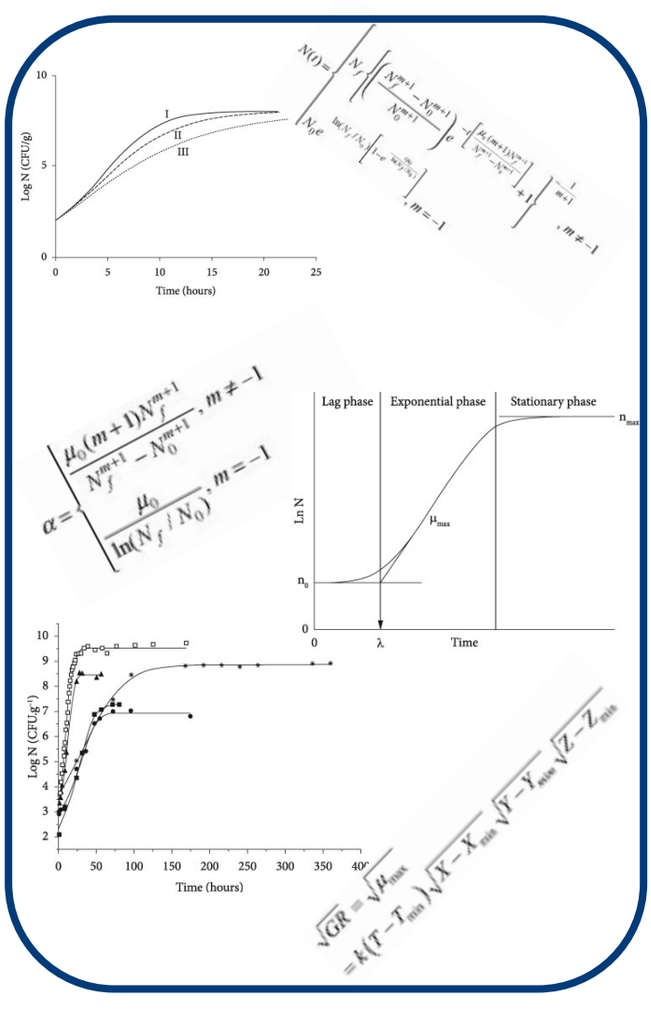


Current Situation in Microbial Risk Assessment

1. Plenty of data and models published

2. Several software tools available

3. However…



- **No agreed information exchange format supporting knowledge exchange**
- **If tools are available, only few of them are open source**

=> Hampered re-use of EXISTING knowledge

=> Limited transparency / reproducibility / quality control

=> No BRIDGE between research and application

RAKIP Project

- September 2015 … a discussion at the ICPMF9 conference
- October 2016 … a proposal for a tri-lateral funded collaboration project between ANSES, DTU, BfR
- January 2017: start of RAKIP !

RAKIP

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DTU Food National Food Institute

DTU

RAKIP - Process Analysis

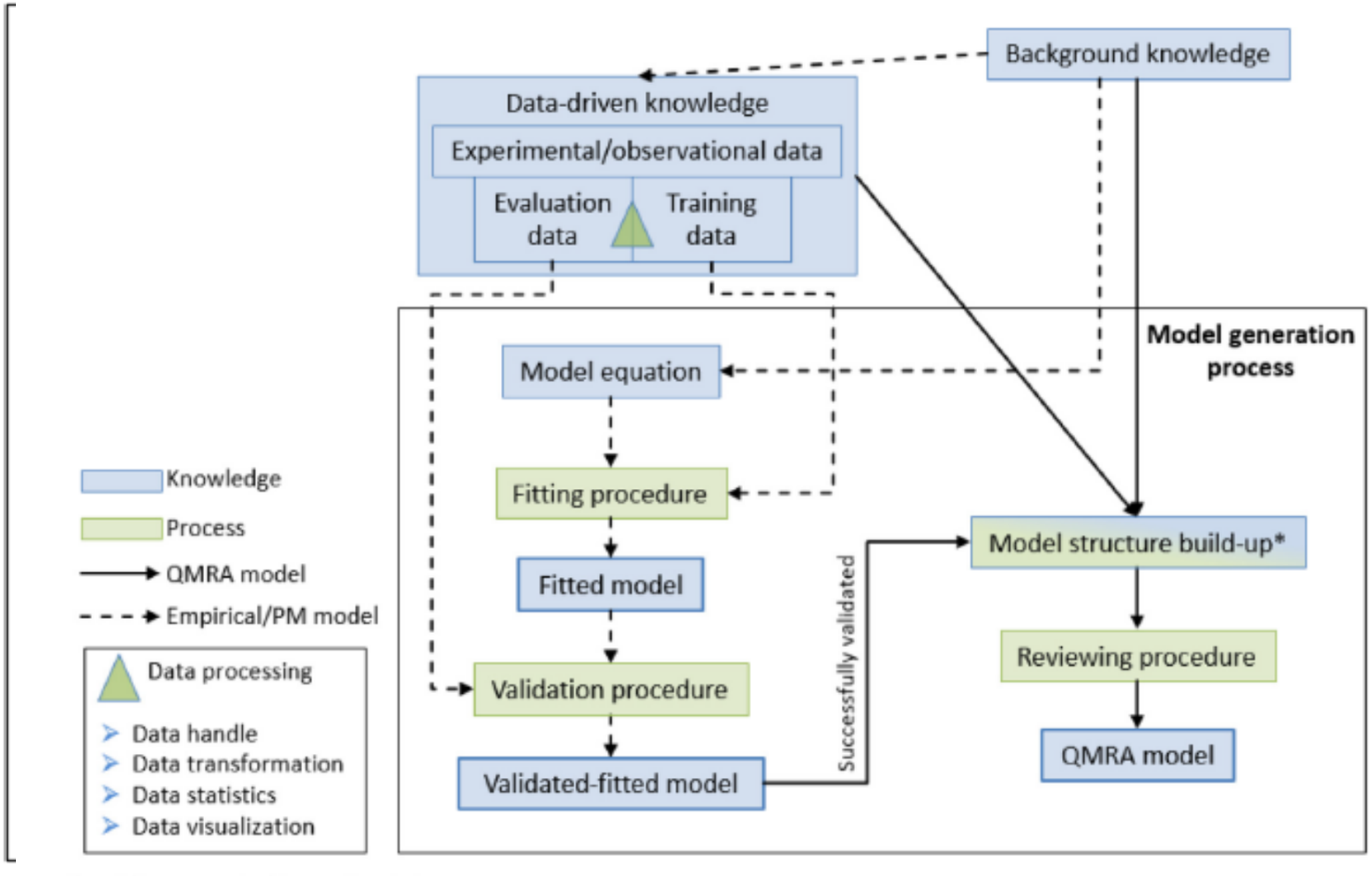


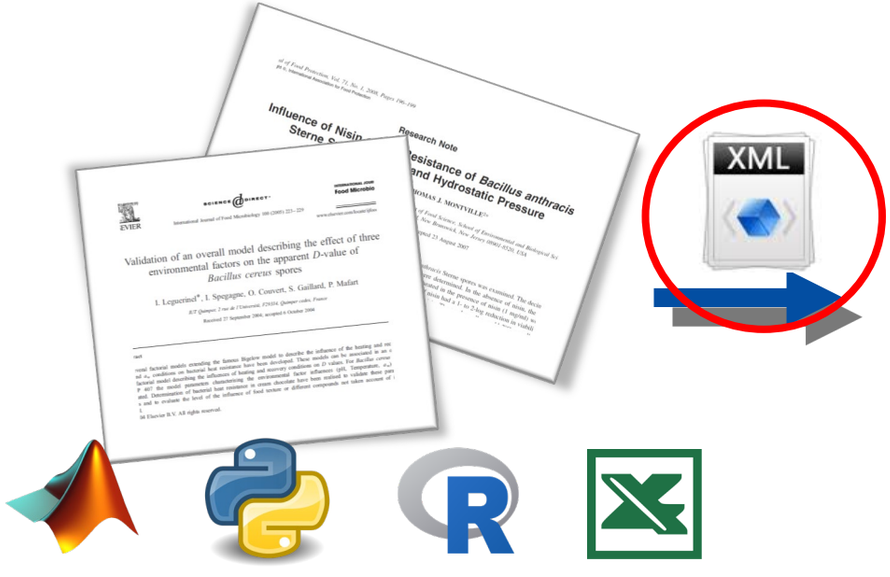
Fig. 1.

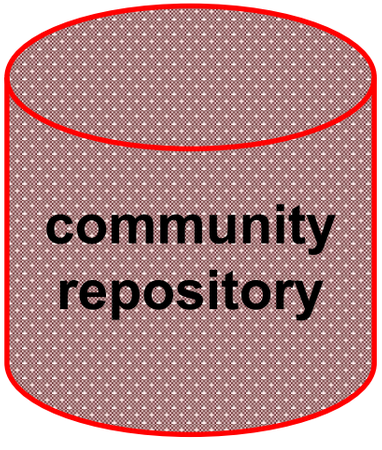
Fig. 2. The model generation process for QMRA, Empirical model and PM model.

Ungaretti Haberbeck, L., Microbial Risk Analysis (2018), https://doi.org/10.1016/j.mran.2018.06.001

RAKIP - VISION

Community-driven, curated repository of food safety models / model modules (Food Safety Knowledge Base)



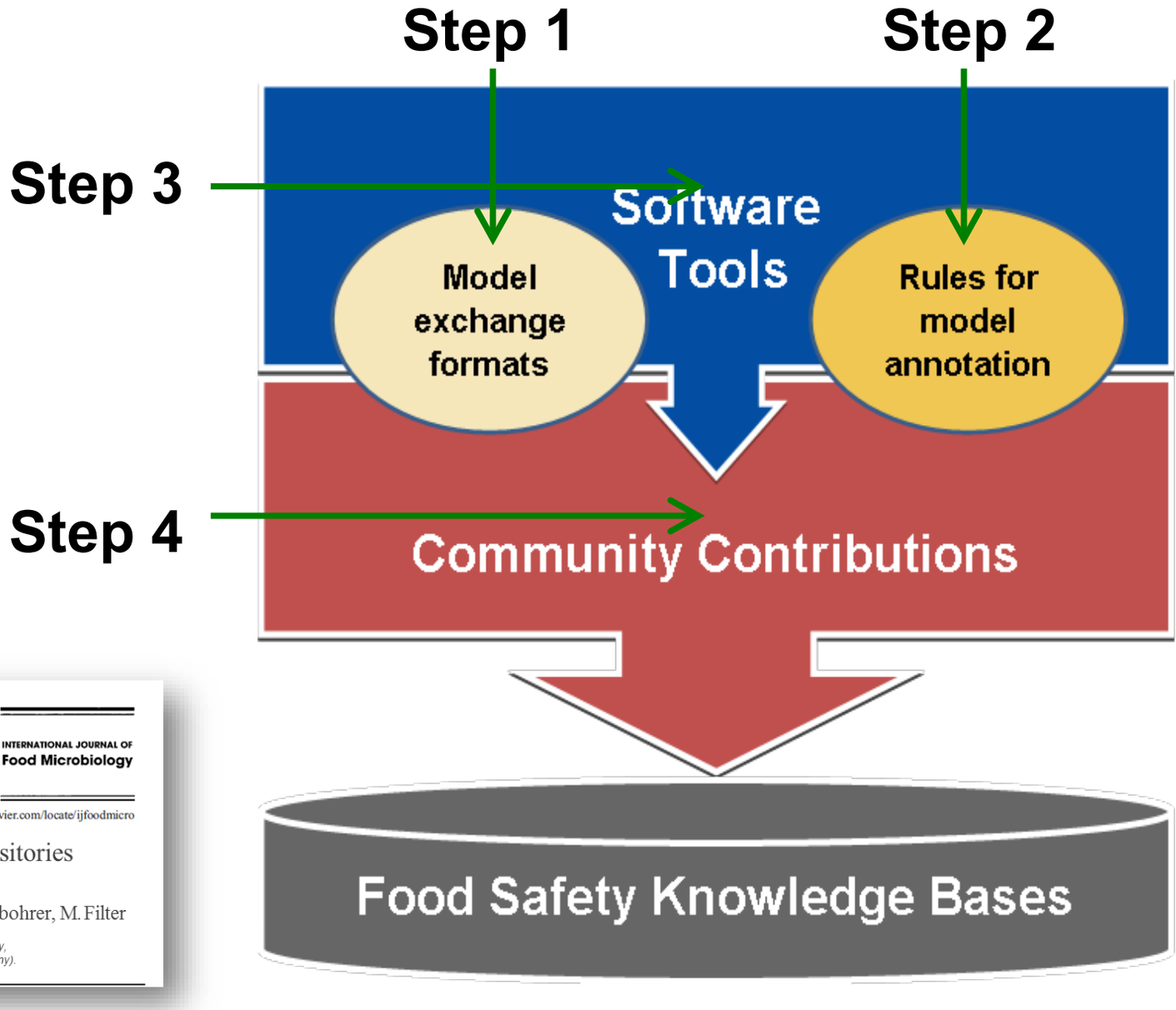


Newly generated models / re-implemented models / legacy models

Repository with search, info and model download

Model-based predictions & new risk assessments

RAKIP - Strategy



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A strategy to establish Food Safety Model Repositories

C. Plaza-Rodriguez, C. Thoens, A. Falenski, A. Weiser, B. Appel, A. Kaesbohrer, M. Filter

Federal Institute for Risk Assessment. Department Biological Safety. Unit Epidemiology, Zoonoses and Antimicrobial Resistance. Max-Dohrn-Straße 8-10. 10589 Berlin. (Germany).

http://www.researchgate.net/publication/273791203_A_strategy_to_establish_Food_Safety_Model_Repositories

FSK-ML – An Open Information Exchange Format

Food Safety Knowledge Markup Language (FSK-ML)

Software Developer Guide

Version 2.0 (under review)

Matthias Filter (Chair) — Federal Institute for Risk Assessment, Germany
Sascha Bulik — Federal Institute for Risk Assessment, Germany
Carolina Plaza-Rodriguez — Federal Institute for Risk Assessment, Germany
Miguel de Alba Aparicio — Federal Institute for Risk Assessment, Germany

Alumni contributors:

Guido Correia Carreia — Federal Institute for Risk Assessment, Germany
Alexander Falenski — Federal Institute for Risk Assessment, Germany

General Information	**1**	**Study / Data / Model Name**	**1**		
		Source	**0:1**		
		Identifier	**1**		
		Creator(s)	**1:N**	*vCard 4.0 standard*	*1*
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				Last modified date	*0:N*
		Rights	**1**	*Rights*	*1*
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		URL	**0:1**		
		Format	**0:1**		
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				PubMed ID	*0:1*
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				Publication Title	*1*
				Publication Abstract	*0:1*
				Publication Journal / Vol / Issue, etc.	*0:1*
				Publication Status	*0:1*
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				Comment	*0:1*
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		Software	**0:1**		
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		Status	**0:1**		
		Objective	**0:1**		
		Description	**0:1**		
Scope	**1**	**Product / matrix**	**0:1**	*Product/matrix name*	*1*
				Product/matrix description	*0:1*
				Product/matrix unit	*1*
				Method of production	*0:N*
				Packaging	*0:N*
				Product treatment	*0:N*
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				Fisheries area	*0:1*
				Date of production	*0:1*
				date of expiry	*0:1*
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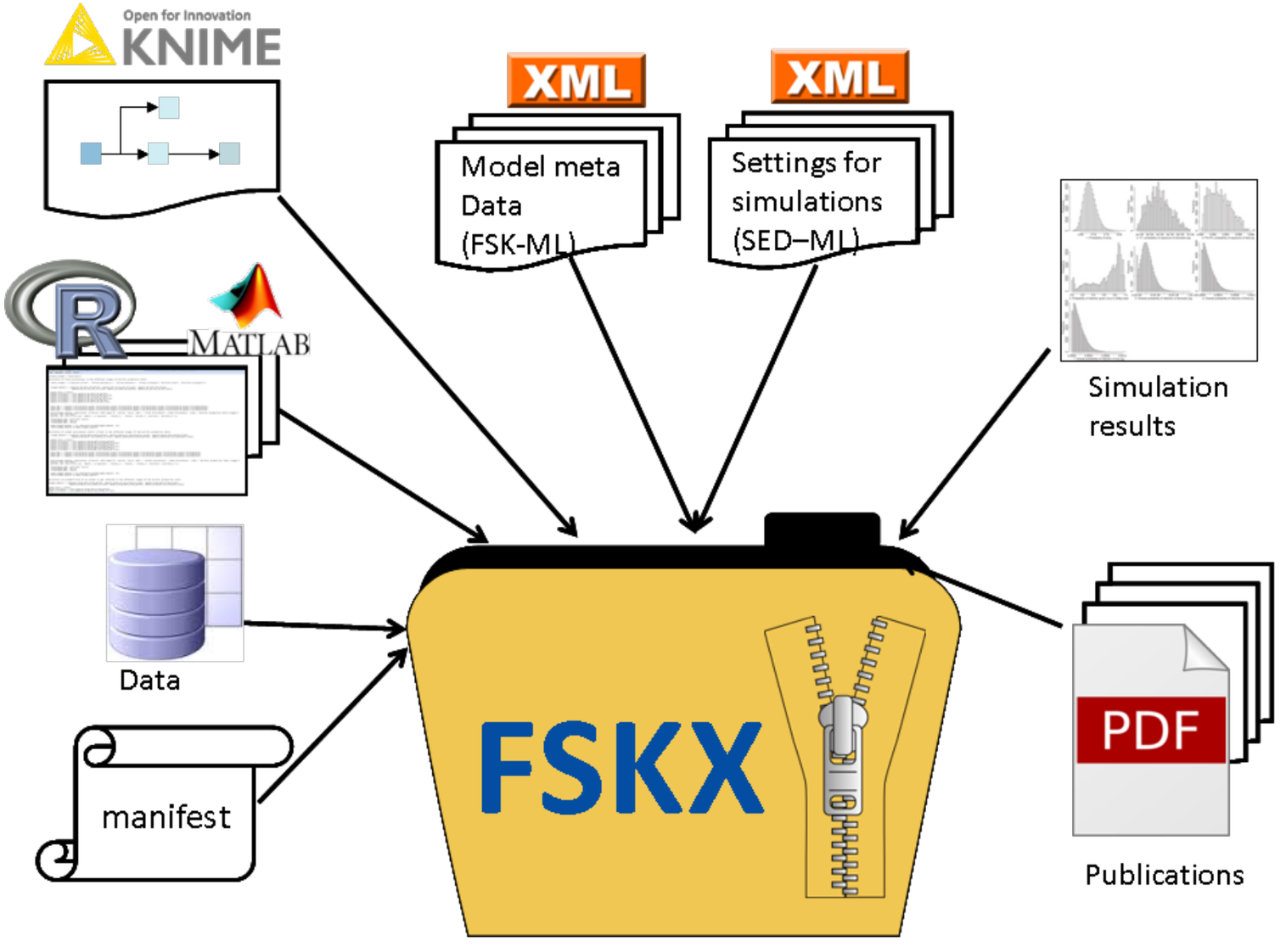
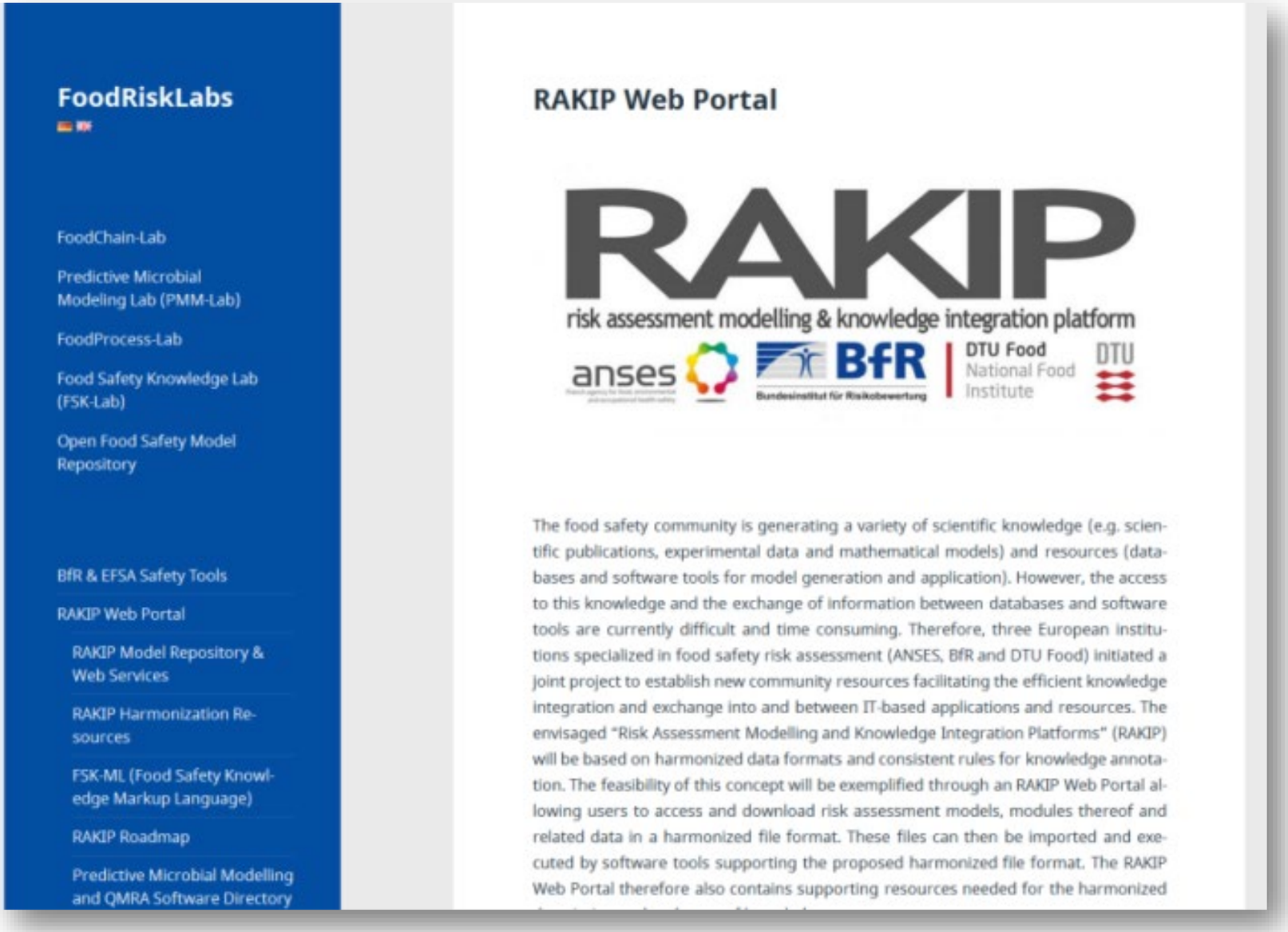
				Hazard unit	*1*
				Adverse effect	*0:1*
				Source of contamination	*0:1*
				Benchmark Dose (BMD)	*0:1*
				Maximum Residue Limit (MRL)	*0:1*
				No Observed Adverse Effect Level (NOAEL)	*0:1*
				Lowest Observed Adverse Effect Level (LOAEL)	*0:1*
				Acceptable Operator Exposure Level (AOEL)	*0:1*
				Acute Reference Dose (ARfD)	*0:1*
				Acceptable Daily Intake (ADI)	*0:1*
				Hazard ind/sum	*0:1*
				Population name	*1*
				Target population	*0:1*
				Population Span (years)	*0:N*
				Population description	*0:N*
				Population age	*0:N*

https://foodrisklabs.bfr.bund.de/rakip-harmonization-resources/

FSKX – A file format for the exchange of models (and data)



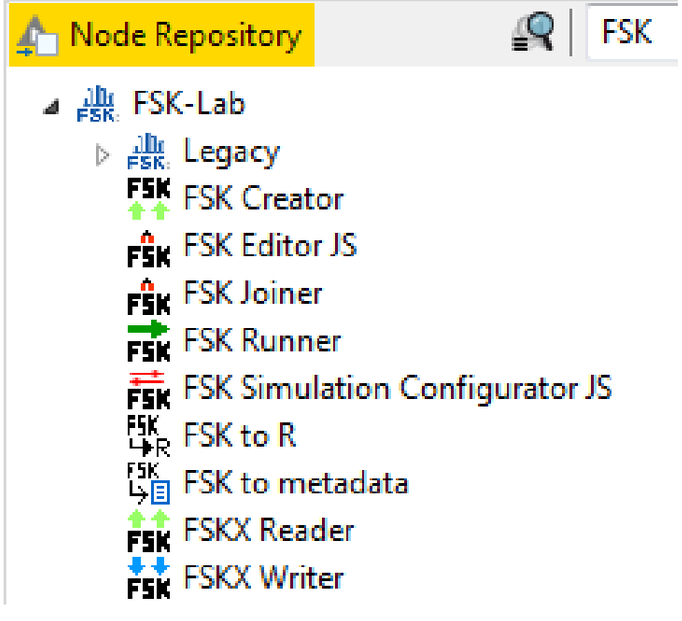
RAKIP - Portal

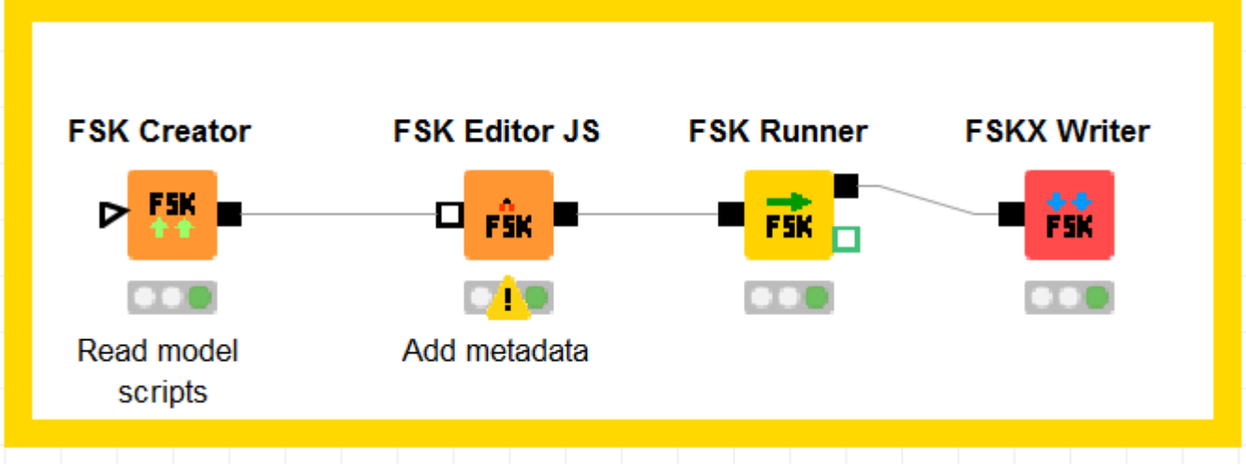


RAKIP – Software Tools

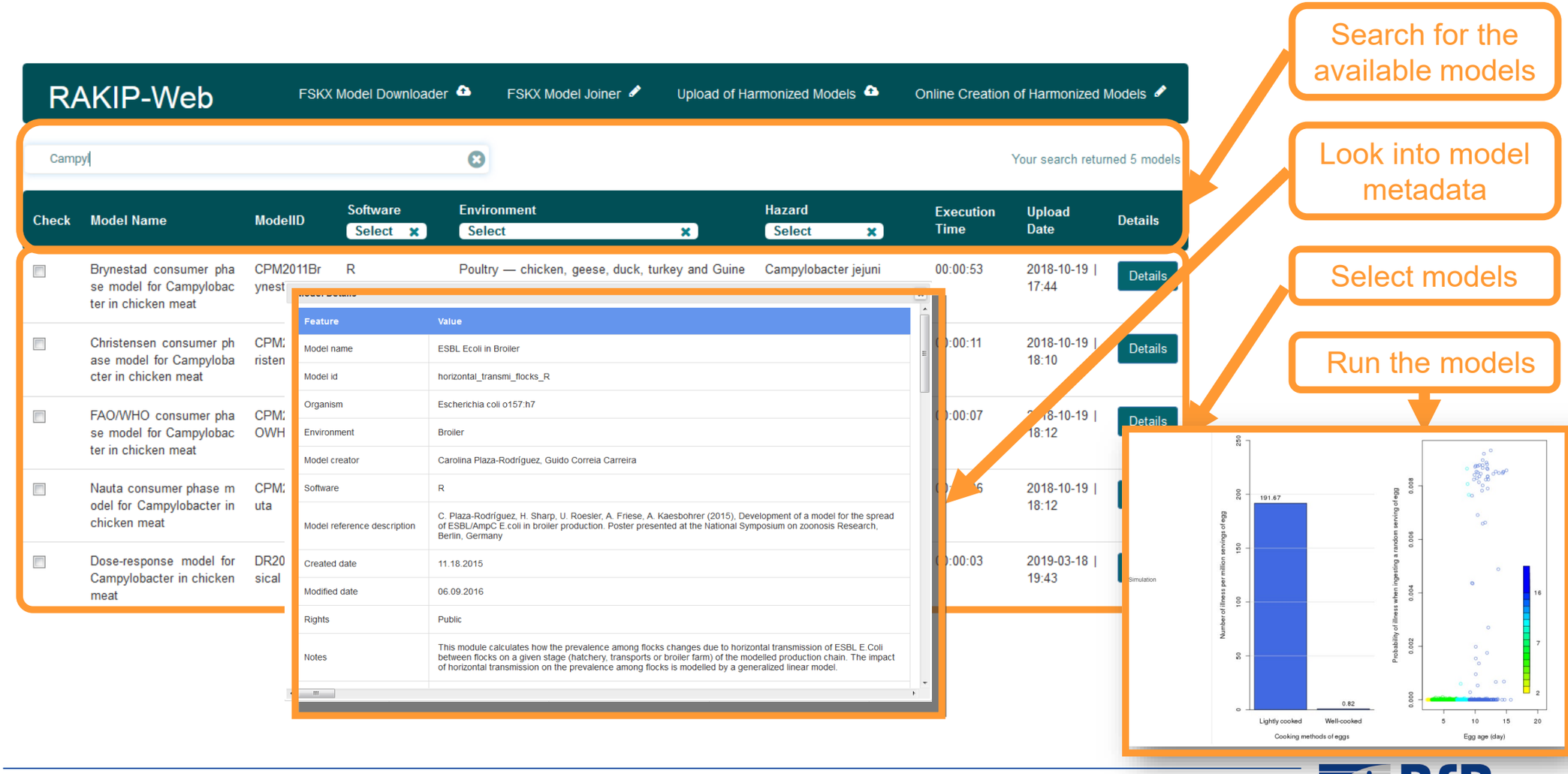
Food Safety Knowledge Lab (FSK-Lab)

- Open source software supporting FSK-ML
- Extends the open source KNIME Analytics Platform
- Allows to document and archive all data processing steps incl. intermediate results
- Graphical programming tool

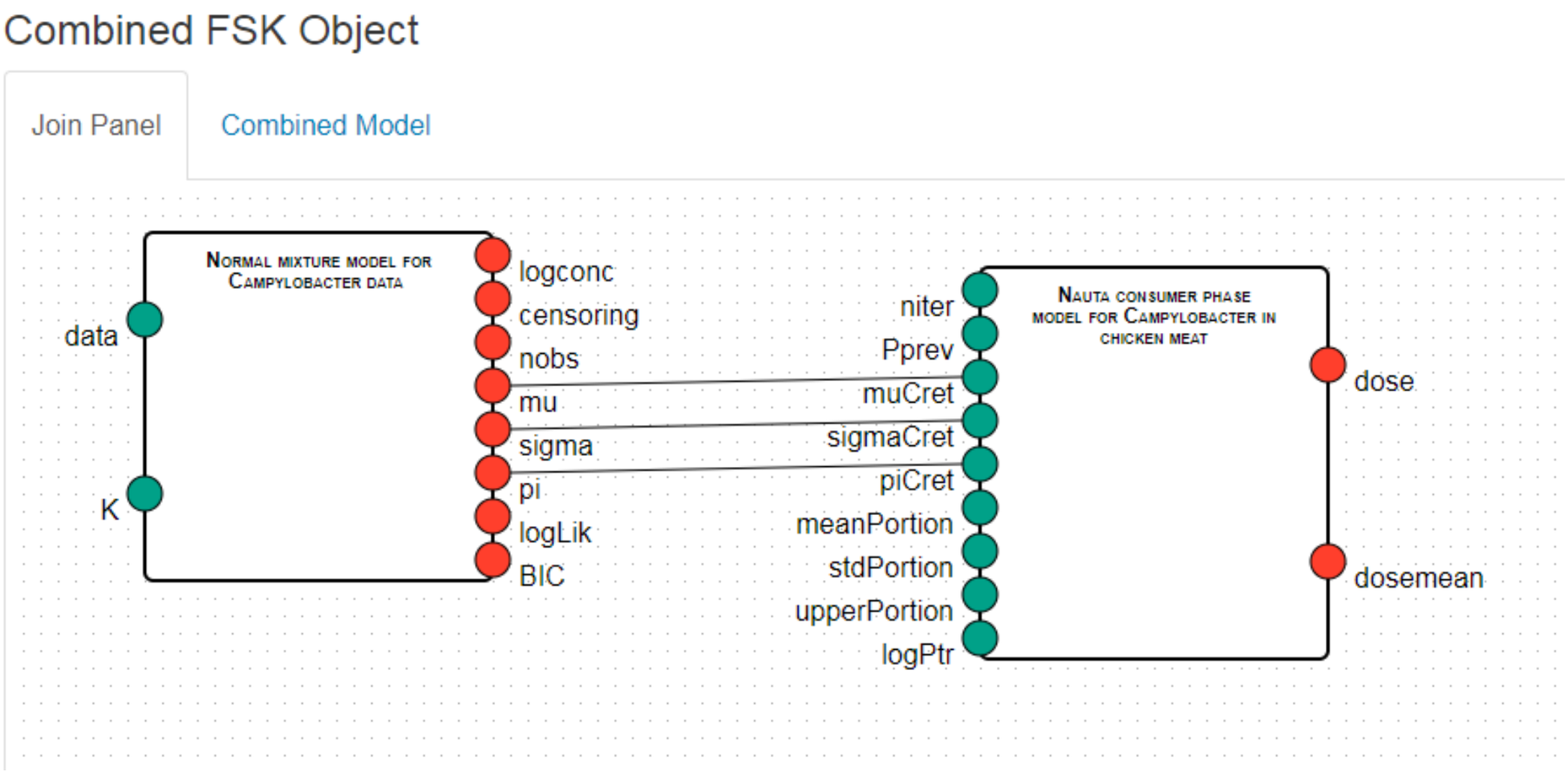




RAKIP Model Repository



RAKIP Web Services



Community 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

RAKIP Outlook

- **RAKIP Initiative** will be established facilitating broader collaboration
- RAKIP model repository will go into “**production mode**”
- **New tooling** support for the harmonized information exchange format “FSK-ML” becomes available, e.g. in “R”
- Minimum Information guidelines (**MIRARAM**) will be published
- **Content** in the RAKIP model repository will grow
- Other model classes will be addressed, e.g. source attribution, AMR, RBA, CRA, **WGS models**

Acknowledgement

RAKIP Co-Initiators:

Paw Dalgaard (DTU)
Laurent Guillier (ANSES)
Maarten Nauta (DTU)
Moez Sanaa (ANSES)

RAKIP team and co-workers:

Carolina Plaza Rodríguez (BfR)
Leticia Ungaretti Haberbeck (DTU)
Virginie Desvignes (ANSES)
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Ahmad Swaid (BfR)
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Tasja Buschhardt (BfR)
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Funding bodies and projects:

ANSES
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BfR
EFSA
AGINFRA+ project
FoodAuthent project

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Bundesministerium für Ernährung und Landwirtschaft

aufgrund eines Beschlusses des Deutschen Bundestages

ptble
Projektträger Bundesanstalt für Landwirtschaft und Ernährung

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Thank you for your attention

Matthias Filter

German Federal Institute for Risk Assessment
Max-Dohrn-Str. 8-10 ● 10589 Berlin, GERMANY
Phone +49 30 - 184 12 - 0 ● Fax +49 30 - 184 12 - 47 41
matthias.filter@bfr.bund.de ● www.bfr.bund.de/en