



KIDA KON 2026

29–30 September 2026



Preface

Dear readers,

There is no denying that artificial intelligence (AI) is far more than a passing trend. It is a fundamental asset that is here to stay. I firmly believe that AI can be key in simultaneously strengthening and streamlining day-to-day processes, methods and practices, both in research and in administration. The capacity and efficiency of AI technologies are evolving with unprecedented speed. AI has enormous potential to make our agricultural and food systems more productive, efficient and future-proof, thereby increasing their resilience and competitiveness.

However, current public debate focuses not only on the ground-breaking benefits of AI. It also highlights the risks that this technological leap may entail – and for good reason. We are increasingly faced with the question of how we can use AI responsibly and in an ethically correct manner. How can we make sure that AI genuinely assists us rather than replacing us? And what practical, lasting value can we unlock for our agriculture and food systems by using AI technologies?

In order to resolve these questions, we need organisational structures that reconcile stability and flexibility. We need practice-oriented expert and competence networks that serve as catalysts. They can equip our organisations with the necessary digital skills and develop and spread hands-on solutions that really work – for targeted assistance in the fields.

KIDA serves as a blueprint for this kind of pragmatic and collaborative approach. The innovative AI and data accelerator brings together the Federal Ministry of Agriculture, Food and Regional Identity (BMLEH) and the institutes and authorities within our ministry's remit. It shows that success rests on good teamwork. Since 2022, the secure KIDA framework has provided the basis for seven institutions within the BMLEH's portfolio to work together in a constructive spirit of partnership.

This year's KIDA KON shows, once again, how fruitful this partnership is. The compendium you are holding in your hands will give you an insight into KIDA's latest achievements, including practical examples and new methodological approaches. With two external keynotes, KIDA KON has become a comprehensive platform for knowledge exchange on enhanced data and AI usage in the agricultural and food sector.

Under Germany's High-Tech Agenda, we recently formalised KIDA as a long-term AI and data alliance. This means that, in the future, more and more research processes and results will be "powered by KIDA". This will allow us to fully exploit the vast potential of the data we have at hand. In particular, KIDA can help cut excessive red tape that is often a considerable burden for researchers and practitioners in our field.

With their passion and commitment, the KIDA team have successfully ensured KIDA's smooth transition from the initial project stage to a consolidated and permanent network. This is a great contribution to actively promoting Germany's reputation as a renowned and competitive research location.

I wish you an insightful read and enlightening exchanges during the conference. Keep up your good work to further strengthen our agricultural and food systems as well as our rural regions across Germany!

Yours sincerely,

Alois Rainer

Federal Minister of Agriculture, Food and Regional Identity

Ladies and gentlemen, dear colleagues,

It is my great pleasure to welcome you to KIDA KON, here at the German Federal Institute for Risk Assessment (BfR).

Artificial intelligence (AI) is permeating more and more areas of our daily lives. The rapidly evolving AI tools are changing radically how we work and live. This also affects us here at the BfR.

As an institute within the remit of the Federal Ministry of Agriculture, Food and Regional Identity (BMLEH), the BfR combines scientific excellence and administrative rigor with a clear societal and political mandate. This combination is both a strength and a responsibility. In order to fulfil our mandate, it is important that we keep ourselves efficient and competitive and to unlock new potentials.

For instance, we are competing with other federal agencies for the best talents and brightest minds. We are also competing with universities and research institutes in funding calls. If we ignore the opportunities that AI offers, we fall behind.

AI methods unlock new ways of doing research. It supports the rapid and efficient analysis of data, as well as the identification of complex relationships and patterns. This enables faster and more precise scientific assessments, while also allowing routine tasks to be automated, accelerated and performed to a higher standard of quality. However, a successful digital transformation doesn't mean replicating analogue processes into a digital format. Processes need to be fundamentally reconsidered, simplified and consolidated wherever this is advisable. This will create the necessary capacities for those tasks in which human expertise and responsibility remain indispensable.

This gives the BfR a clear mandate to embrace the responsible, forward-looking and compliant use of AI. We published our commitment to use AI in such manner in April 2025.

Succeeding with AI requires a joint effort and cannot be addressed by a single institution. It is an unwise decision to establish an AI infrastructure in isolation, as it is both costly and inefficient. Succeeding with AI calls for combining expertise, sharing knowledge and experience, and working together as one to develop sustainable solutions. In this regard, the KIDA collaborative was established as a continuation of the "AI and Data Accelerator" (KIDA) project as part of the German government's AI strategy for expanding and strengthening AI and data competencies in the research and advisory institutions of the BMLEH.

The KIDA collaborative provides a platform for establishing long-term and sustainable cooperation in the field of AI. Its members are the BfR, BVL, DBFZ, FLI, JKI, MRI and Thünen, all within the remit of the BMLEH. We are proud to host this year's KIDA KON as the latest milestone in the KIDA story.

At the start of 2026, the BfR became the first institution to take over the chair of the KIDA collaborative. The institutions have joined forces in KIDA to realise the potential of data and AI methods in the fields of nutrition and agriculture, to make efficient use of shared resources and infrastructure, to promote professional exchange and to advance AI expertise in the BMLEH's area of responsibility. In this way, the KIDA collaborative strengthens AI and data competencies and provides resources for the development and application of AI solutions.

Let us address these challenges together – with a spirit of innovation, a strong sense of responsibility and the courage to explore new paths. The presentations you will hear today and tomorrow are a testimony of this spirit.

Thank you very much for your important work and your commitment.

Yours sincerely,

Dr Tewes Tralau

Vice President of the BfR

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1 Programme

Tuesday, 29 September 2026

Moderation: Dr Sören Preibusch, BfR

12:00–12:45	Registration, mounting of scientific posters
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12:45–13:00	Welcome addresses Dr Tewes Tralau, BfR, Vice President Alois Rainer, BMLEH, Federal Minister
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13:00–13:40	Keynote: AI serving weather prediction Marek Jacob, DWD
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13:40–13:55	KIDA collaborative and Hightech Agenda Germany Dr Sören Preibusch, BfR N.N., BMLEH
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13:55–14:15	How to for the DBFZ HPC Cluster Bernd Haßfurth, DBFZ
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14:15–15:00	Coffee break (at own expense) and poster session in canteen
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Session I: AI in food sciences and agriculture

Session chair: Dr Sören Preibusch, BfR

15:00–15:20	Trustworthy AI for food safety: an architecture for verifiable, accountable decision support Stefan Dehm, BfR
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15:20–15:40	Implementation of AI-based support systems in the risk assessment of microorganisms Dr Ikbel Guidara, BVL
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15:40–16:00	A sovereign, agent-based open-science layer for European food data: MRI use cases in EOSC-ARENA Bernd Hartmann, MRI and Karl Presser, Premotec GmbH
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Session II: Computer vision

Session chair: Dr Fabian Billenkamp, FLI

16:00–16:20	Automatic pig detection in three-dimensionally structured pens using computer vision Josefine Eisermann, FLI
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16:20–16:40	SoilNet app: AI-assisted expert-level annotations of soil horizons Vipin Singh, BHT Berlin
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16:40–17:20	Coffee break (at own expense) and poster session in canteen
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Session III: Digital innovations

Session chair: Dr Marco Selig, DBFZ

17:20–17:40	From publication to practice: how AI unlocks food safety models for everyone Thomas Schüler, BfR
17:40–18:00	Towards AI-assisted negotiation-based risk analysis Dr Iurii Savvateev, LMU München
18:00–18:20	Small models, large impact: decentralized AI for risk assessment in food and feed safety Dr Axel Menning, BfR
18:20–18:30	Farewell and outlook for the next day Dr Sören Preibusch, BfR
18:30–21:00	Social event (at own expense) in canteen

Wednesday, 30 September 2026

Moderation: Dr Sören Preibusch, BfR

09:00–09:40	Keynote: Data alone will not protect the environment – understanding them will Viola Rädle, UBA
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Session IV: Data quality and interoperability

Session chair: Steffen Kecke, JKI

09:40–10:00	‘Garbage in, garbage out’ – building AI-ready data foundations in the public sector Dr Vanessa Meier, BMLEH
10:00–10:20	KIDA research data hub: a semantic-web platform for FAIR data sharing supporting the One Health paradigm and risk assessment Taras Günther, BfR
10:20–10:40	On-the-fly biological knowledge graphs: pattern-guided extraction and BioLink schema-aligned relation modeling Dr Vikas Kumar, BfR
10:40–11:30	Coffee break (at own expense) and poster session in canteen

Session V: Regulatory issues and policy advice

Session chair: Tatjana Manych, BVL

11:30–11:50	AI-assisted data pipeline for automated mapping and standardized XML submission to EFSA Ruturaj Shelake, FLI
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11:50–12:10	The challenges of establishing an AI-Chatbot to support scientific policy advice Dr Christoph Pahmeyer, TI
12:10–12:30	Cost and gain of AI Dr Marco Selig, DBFZ
12:30–12:40	Wrap up and closing remarks of the conference Dr Sören Preibusch, BfR
12:40–13:40	Lunch break (at own expense) in canteen
13:40–15:40	Parallel hands-on workshops (only for registered participants) 1. Linked data - fundamentals, standards, and software solutions for research data Taras Günther, BfR Room D146 2. Integrating large language models into AI applications Tatjana Manych and Dr Ikbel Guidara, BVL Room D145

2 Abstracts – oral presentations

2.1 Keynote: AI Serving Weather Prediction

Marek Jacob^{1,2}, Tobias Göcke², Florian Prill², Michael Denhard², Felix Fundel², Hendrik Reich², Britta Seegebrecht², Sven Ulbrich², Arianna Valmassoi², Sabrina Wahl², Martin Sprengel², Stefanie Hollborn², Roland Potthast^{2,3}, Jan Keller²

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³ University of Reading, United Kingdom

Meteorological services rely on supercomputing to run numerical weather prediction (NWP) systems that provide essential forecast guidance for transportation, agriculture, industry, and society at large. These models solve complex systems of differential equations that encode our physical understanding of processes within the Earth system. In post-processing, data-driven methods have long been used to generate forecast products that cannot be represented directly by NWP models. However, such approaches have typically remained limited in scope and model complexity.

Following decades of incremental advancements in NWP, the release of machine-learning (ML) weather models in 2022 demonstrated a step change in forecast skill of selected parameters, comparable to roughly a decade of research in conventional model development. Motivated by this potential, the Deutscher Wetterdienst (DWD) initiated the development of an ML-based complement to its operational forecasting chain. After an initial prototype, this activity was embedded in a European collaboration with partner meteorological services and the European Centre for Medium-Range Weather Forecasts (ECMWF). This close collaboration has substantially accelerated DWD's AI activities and helped scale its capabilities.

In this presentation, we introduce AICON — DWD's fully operational machine-learning weather prediction (MLWP) system. We describe the underlying datasets, model architecture, software framework, European collaboration, and the operational constraints associated with deploying such a system in a German federal agency. AICON is not intended as a drop-in replacement for DWD's established ICON NWP model; rather, it represents a paradigm shift, bringing Python-, container-, and GPU-based workflows into a traditionally Fortran-centered operational environment. By delivering competitive forecasts at substantially lower computational cost and latency, AICON opens a promising pathway toward hybrid operational forecasting systems at DWD.

Acknowledgements (funding statement und disclosure):

We would like to acknowledge ECMWF and the European national meteorological services for their collaboration on joint ML and AI development within the E-AI Programme and especially the ML Pilot Project.

2.2 Trustworthy AI for Food Safety: An Architecture for Verifiable, Accountable Decision Support

Stefan Dehm¹, Alexandra Fetsch², Martin Wiedmann³, Iurii Savvateev^{1,2}, YeonJin Jung³, Caroline Renea Yates³, Monika Ehling-Schulz⁴, Sophia Johler², Matthias Filter¹

¹ German Federal Institute for Risk Assessment, Innovation Centre Food Chain Modelling and Artificial Intelligence, Berlin, Germany

² LMU Munich, Competence Centre for Food Safety, Chair of Food Microbiology, Veterinary Faculty, Germany

³ Cornell University, Department of Food Science, College of Agriculture and Life Sciences, Ithaca, USA

⁴ University of Veterinary Medicine, Center of Pathobiology, Institute of Microbiology, Vienna, Austria

In food production, operators must navigate an expanding body of regulations, guidelines, and scientific evidence that no individual can fully master. Large Language Models (LLMs) offer substantial opportunities to support decision-making here, but hallucinations, opaque reasoning, and unverifiable advice are unacceptable where food safety and public health are at stake. We present the design of a conversational decision-support system in development for the dairy sector addressing these challenges through four integrated components targeting verifiability, uncertainty transparency, multi-stakeholder balance, and regulatory accountability.

First, the system extends retrieval-augmented generation (RAG) systems with dual-source evidence grounding. Each claim is anchored either in a curated, customizable document corpus of HACCP guidelines, SOPs, regulations, and scientific literature, or in results from a live predictive model executed via the FSKX (Food Safety Knowledge Exchange) simulation framework. A control layer requires the LLM to decompose responses into individually verifiable claims, each linked to a source handle. Any claim that cannot be substantiated is automatically removed before it reaches the user.

Second, uncertainty is explicitly modeled and treated as a primary output. Confidence levels, explicit assumptions, and evidence-gap notices are communicated transparently alongside every response, indicating what additional information would improve the answer.

Third, the system addresses multi-stakeholder trade-offs by extending an AI-assisted risk negotiation framework that structures competing interests into explicit negotiation spaces. It surfaces conflicting perspectives, proposes balanced compromises, and makes its reasoning transparent, rather than obscuring value-laden choices behind a single AI-generated recommendation.

Fourth, every claim, citation, and simulation is logged as an EPCIS (Electronic Product Code Information Services) event, producing a GS1-compatible audit trail. This integrates with existing food-industry traceability systems and allows auditors and regulators to reconstruct the evidential basis of any decision.

Although instantiated in the dairy sector, the architectural pattern is transferable to other high-stakes scientific decision-support domains.

Funding statement: This work was conducted during the MicRISK2030 project (www.micrisk2030.org) funded by the SNSF (Swiss National Science Foundation, Sinergia grant number CVRSII5_209253).

Disclosure: The authors used an AI-assisted tool to improve spelling, grammar, clarity and readability. After using the tool, the authors carefully reviewed the abstract and take full responsibility for the final content.

2.3 Implementation of AI-based support systems in the risk assessment of microorganisms

Ikbel Guidara, André Friedrich, Tatjana Manych, Anke Stein

Federal Office of Consumer Protection and Food Safety, Germany

Basic research often involves the use of genetic engineering methods on microorganisms. In accordance with the German Genetic Engineering Act, the Central Committee on Biological Safety (ZKBS) conducts risk assessments of these organisms and assigns them to one of four risk groups for use as recipient or donor organisms, thus enabling the allocation of the corresponding biosafety level to the respective genetic engineering operations.

The administrative office of the ZKBS performs these risk assessments by literature search and analysis, on the basis of which a position statement is drafted and then adopted by the ZKBS. The criteria for the risk assessments are formalised and specified by the German Genetic Engineering Safety Ordinance (GenTSV). To reduce the time required for the literature analysis, an AI-based support tool (KAPRi) has been developed.

KAPRi is a low-code platform-based tool which uses a large language model (LLM) for the evaluation of scientific publications. The tool is built on the parsing and chunking of publications. Using questions derived from the classification criteria of the GenTSV, each individual chunk is processed by an LLM. The resulting report is intended to facilitate and accelerate the identification of relevant literature and facts from large quantities of literature by means of standardised recurring queries. Initial evaluations of already classified sample cases yielded comprehensible, short, concise and, most important, accurate and correctly cited answers without generating any incorrect data. Within the literature analysis of five microorganisms from different domains of life, KAPRi demonstrates a positive anticipated rate of 95.4%, as determined by a comparison between expected and actual results. The accuracy gap could be further reduced by prompt engineering and optimisation of the recurring questions. Further prompt engineering would allow the adaptation of the system to other use cases, providing clinicians, researchers and public authorities with a cost-effective review tool.

2.4 A Sovereign, Agent-Based Open-Science Layer for European Food Data: MRI Use Cases in EOSC-ARENA

Bernd Hartmann¹, Markus Seiler¹, Karl Presser²

¹ Max Rubner-Institut (MRI), Federal Research Institute of Nutrition and Food

² Premotec GmbH, Winterthur, Switzerland

European food data infrastructures face a layered challenge: generative AI (GenAI) evolves faster than the governance, provenance and interoperability frameworks needed to apply it responsibly. Existing tool-based approaches address individual problems like food classification, but remain isolated and rarely embedded in a sovereign open-science infrastructure.

EOSC-ARENA, a Horizon Europe project under the European Open Science Cloud (EOSC) initiative (HORIZON-INFRA-2025-01-EOSC-05, June 2026 to May 2029) addresses these structural gaps by developing a sovereign, transparent and EOSC-compatible multi-agent GenAI ecosystem for European research. Use cases drawn from scientific disciplines including life sciences, astronomy, oncology, material sciences and food science co-design and validate the architecture in real research settings. Within this scope, the Max Rubner-Institut (MRI), together with the Swiss company Premotec, contributes two food-science use cases that probe the architecture in the food and nutrition data domain.

Use case 1, Automated FoodEx2 Coding explores agentic workflows that propose traceable FoodEx2 codes (EFSA's standardised food classification system) for large food inventories, embedded in a federated provenance layer. It builds on MRI's long-standing FoodEx2 curation practice and the German Nutrient Database BLS 4.0 (released December 2025; 7,140 foods; 138 nutrient components, openly licensed under CC BY 4.0).

Use case 2, Synthetic Nutrient Value Imputation, extends a nutrient-imputation prototype integrated in 2019 into FoodCASE, the food composition database management system that Premotec and MRI jointly advance for BLS curation. Where analytical data are unavailable, agentic workflows will be tested to impute missing nutrient values. Each imputed value will be explicitly labelled ""synthetic"" and accompanied by provenance, prediction probabilities and uncertainty metadata, ensuring full transparency between analytically measured and synthetic data.

Both use cases will deliver FAIR-compliant, EOSC-compatible reference workflows validated against BLS 4.0 reference data.

Coordinated by Poznan Supercomputing and Networking Center, EOSC-ARENA will combine an agentic GenAI framework, an EOSC-federated agent marketplace, and community work on responsible AI. The project complements existing European initiatives by embedding food data classification and curation in a sovereign, agent-based open-science layer.

2.5 Automatic pig detection in three-dimensionally structured pens using computer vision

Josefine Eisermann, Cindy Nyanzi, Karen Kauselmann, E. Tobias Krause, Helen Schomburg

Friedrich-Loeffler-Institut, Federal Research Institute for Animal Health, Institute of Animal Welfare and Animal Husbandry, Germany

Commercial pig housing systems are often barren or only minimally enriched, meaning that pigs are unable to perform certain natural behaviours. Providing additional space and structural elements, such as elevated platforms, allows pigs to establish functional areas, e.g. separate zones for resting and defecation. The aim of the current study is to analyse the behaviour of fattening pigs in pens with elevated platforms. In this context, computer vision methods might help to analyse the space use within the pen and pig behaviour over extended periods. Seventeen fattening pigs were housed in a pen (13 m²) containing an elevated platform (4.4 m²) from about 8 until 16 weeks of life. Videos of the entire pen including the elevated platform were recorded. Frames were extracted from four randomly chosen 10-minute videos per day (total: 58 days). The first frame of each video was selected and frames containing persons excluded. Using ultralytics/YOLO (v.8.3) and based on a publicly available model pretrained on the COCO dataset (yolo11n.pt), a custom object detection model was trained, detecting pigs with bounding boxes marking each detected individual. A total of 168 frames containing 2238 pigs (75% of pigs) were used for model training, and 58 frames with 758 pigs (25% of pigs) were used during validation. During validation the model achieved a precision of 0.92, recall of 0.84, and mAP50 of 0.92, indicating that it can reliably detect individual pigs within a three-dimensionally structured pen. However, the model has so far only been validated on extracted frames from videos and its performance on complete videos remains to be tested. In the next step, the model's performance will be evaluated on videos focusing on the elevated platform. In the future, this approach might help to assess the use of elevated platforms and their impact on pig welfare and behaviour.

This work was financially supported by the German Federal Ministry of Agriculture, Food and Regional Identity (BMLEH) based on a decision of the Parliament of the Federal Republic of Germany, granted by the Federal Office for Agriculture and Food (BLE; grant number 28N-2-063-00)

2.6 SoilNet App: AI-Assisted Expert-level Annotations of Soil Horizons

Vipin Singh¹, Joey Pruessing¹, Teodor Chiaburu¹, Einar Eberhardt², Sina Hesse², Stefan Broda², Frank Haußer¹, Felix Biessmann¹

¹ Berlin University of Applied Sciences, Germany

² Federal Institute for Geosciences and Natural Resources, Germany

Accurate characterization of soil horizons is fundamental to soil survey and mapping, agricultural management, and environmental policy. Yet producing high-quality soil data with correct horizon annotations at scale remains a bottleneck. It requires trained pedological experts following complex partly hierarchical taxonomies, and cannot easily be automated without reliable ground truth data. We present the SoilNet Annotation App, a web-based tool that integrates a multimodal machine learning model into a structured expert annotation workflow for soil profile images.

The app guides domain experts through two core tasks — horizon boundary segmentation and horizon symbol assignment — with optional AI assistance from SoilNet, our multitask model for end-to-end soil horizon prediction. In AI-assisted mode, experts review and refine model-generated boundary suggestions and Top-5 label predictions, enabling iterative human-AI collaboration within a single interface.

To evaluate the tool's practical utility, we conducted a user study with about 40 experienced soil surveyors across two phases: manual annotation and AI-assisted annotation of test soil profiles. The study covered 142 soil profile images, sampled such that each image received up to three independent annotations, enabling quantification of inter-annotator agreement. Results show that AI assistance consistently improved annotator performance across all metrics — boundary delineation accuracy (IoU), horizon symbol accuracy, and hierarchical main symbol accuracy — while also increasing inter-annotator agreement. Notably, the model outperformed individual experts across all metrics, but human-AI collaboration narrowed this gap substantially.

These findings demonstrate that deploying machine learning models as interactive assistants — rather than fully autonomous classifiers — can meaningfully improve both the quality and consistency of soil survey data collected at scale. The SoilNet App is publicly accessible and built on imagery from the German Agricultural Soil Inventory (BZE-LW). Future work will address automation bias and extended taxonomy coverage to better align machine learning constraints with pedological practice.

2.7 From publication to practice: how AI unlocks food safety models for everyone

Thomas Schöler, Matthias Filter

German Federal Institute for Risk Assessment, Innovation Centre Food Chain Modelling and Artificial Intelligence, Department Information Technology, Berlin, Germany

Mathematical models are increasingly central to food safety — from predicting microbial growth to informing regulatory risk assessments. Yet a persistent problem limits their impact: models are typically published in unstructured, non-standardized formats, making parameter and metadata extraction error-prone and labour-intensive. Valuable scientific knowledge remains locked in journal articles rather than being put to practical use.

The RAKIP Initiative — a collaboration of 12 member organisations founded by ANSES, BfR, and DTU Food — has developed solutions to address this. At the core is the FAIR Scientific Knowledge Exchange (FSKX) format, which packages model code together with the metadata needed to understand its range of applicability. Models in FSKX can be easily shared and discovered through repositories that support cloud-based execution with user-defined simulation scenarios. The RAKIP Web Portal serves as a reference implementation of such a repository.

This talk presents recent advances in converting predictive models from publications into FSKX. By leveraging large language models in an agentic workflow equipped with specialized tools called skills, a web service could be established that transforms a publication into a complete, properly structured FSKX file — including model code, metadata, and documentation — in minutes rather than hours or days.

A critical element of this AI-driven process is automated quality control: the AI's model implementation is systematically tested by comparing its outputs — numerically or visually — against the results published in the original paper. This gives scientists and model providers a transparent, reproducible way to verify that the generated FSKX file faithfully represents the described model.

Together, these developments make it substantially easier for scientists, risk assessors, and regulators to share, find, and apply food safety models — regardless of their programming background. The talk illustrates the workflow with concrete examples and discusses how AI will contribute to greater transparency, reproducibility, and efficiency in food safety science.

2.8 Towards AI-assisted Negotiation-Based Risk Analysis

Iurii Savvateev^{1,2}, Alexandra Fetsch², Thomas Schüller¹, Monika Ehling-Schulz³, Sophia Johler², Matthias Filter¹

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Effective mitigation of food safety risks depends on timely and systematic risk analysis, which involves recognizing potential hazards, evaluating their probability and potential impact and identifying suitable management and communication strategies. To support this process, we introduced a risk negotiation framework centred on AI-assisted negotiation among relevant stakeholders. The methodology and first software implementation are based on a human-in-the-loop design. In this framework, each stakeholder is represented by an LLM-based autonomous agent, and the agents participate in multi-step negotiation processes. These processes provide insights into potential compromises, negotiation dynamics, and the mathematical quality of the resulting consensus.

A negotiation process begins with human stakeholder representatives providing topic- and stakeholder-relevant evidence, such as scientific publications. Using Retrieval Augmented Generation (i.e. RAG) based methods, our system extracts stakeholder positions and topic-specific information. These details are used to prompt LLM-based agents during a preliminary agent-negotiation round, in which they propose concrete issues to be debated and acceptable solution options. Agents can also use tools for web search and API-based communication with domain-relevant computational models, grounding the discussion in data-driven evidence. The proposed list of issues and solution options is then ranked by human participants using a defined scoring process to align with stakeholder preferences.

The agreed issues, options, and stakeholder preference scores are then fed into a separate negotiation simulation conducted by LLM-based agents. Agents negotiate only among predefined options while considering their own preferences and inferring opponents' agendas. The output includes the most frequent deals and their evolution over time. Thereafter, each deal is evaluated against Pareto optimality (as an efficiency criterion) and the Nash bargaining solution (as a fairness benchmark), providing a structured framework for assessing outcome quality.

In this way, AI-assisted risk negotiation can reduce the time needed to make science-based, balanced management decisions.

Funding statement: This work was conducted during the MicRISK2030 project funded by the SNSF (Swiss National Science Foundation, Sinergia grant number CVRSII5_209253) and by the German Federal Ministry of Food and Agriculture (BMEL) in the research project “KI- & Daten-Akzelerator (KIDA).

Disclosure: The authors used AI-assisted tools to improve spelling, grammar, clarity and readability. After using the tool, the authors reviewed the abstract and take full responsibility for the final content.

2.9 Small Models, Large Impact: Decentralized AI for Risk Assessment in Food and Feed Safety

Axel Menning

German Federal Institute for Risk Assessment, Berlin, Germany

In need of sovereign AI, public institutions face the challenge of integrating advanced AI while maintaining strict data localization and privacy. While Large Language Models (LLMs) offer broad capabilities, their reliance on centralized compute and generalized architecture demand extensive governance and resources across multiple dimensions. This talk explores the strategic opportunities of Small Language Models (SLMs) as a foundational cornerstone for Sovereign AI in governmental settings. Unlike general-purpose LLMs, SLMs excel as "fit-for-purpose" applications—specialized models dedicated to executing a single job exceptionally well in a decentralized architecture. We will demonstrate how this paradigm applies specifically to risk assessment for food and feed safety. By leveraging techniques like fine-tuning and few-shot learning, SLMs can be adapted to efficiently support critical workflows within the realm of risk assessment without relying on external cloud infrastructure. The presentation will map the current SLM landscape, highlighting recent technological leaps that combine SLMs with WebGPU and Edge AI. These developments allow robust, specialized models to run locally—even directly in-browser or on standard endpoint devices—drastically reducing the IT infrastructure overhead for deployment. This decentralized approach ensures that sensitive governmental data remains strictly on-premises, preserving digital sovereignty. Finally, we will examine the practicalities of implementation, detailing the necessary IT infrastructure requirements and addressing current challenges. These include navigating local hardware constraints, establishing secure deployment pipelines, and overcoming the industry evaluation biases that traditionally favor larger models. Attendees will leave with a clear understanding of how highly specialized, locally deployed SLMs offer a viable, cost-effective, and secure path forward for executing critical public sector workflows.

2.10 Keynote: Data alone will not protect the environment. Understanding them will

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Never before has our environment been observed in such detail. Satellites, sensor networks, laboratories, drones, and citizen scientists continuously generate vast amounts of environmental data. Yet data alone cannot answer the questions that matter most: Where are pollutants coming from? Which ecosystems are at risk? Which measures will have the greatest impact?

The value of environmental monitoring is no longer defined by the amount of data collected, but by our ability to transform data into actionable knowledge. This is where data science becomes indispensable. By combining statistical modelling, machine learning, data integration, and uncertainty analysis, it enables researchers to detect patterns, quantify risks, fill knowledge gaps, and support evidence-based environmental policy.

From identifying pollution sources and forecasting air quality to detecting contaminants in water or monitoring biodiversity at unprecedented scales, data science is reshaping how we understand and protect our environment. As environmental data continue to grow in volume and complexity, the greatest opportunity lies not in collecting more measurements, but in extracting more insight from the ones we already have.

2.11 'Garbage in, garbage out' – Building AI-Ready Data Foundations in the Public Sector

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Artificial Intelligence is rapidly becoming a strategic priority across the public sector, promising improved service delivery, operational efficiency, and better policy outcomes. Yet many AI initiatives in the public sector struggle to move beyond pilot stages or fail to deliver expected value. A common reason is not the AI technology itself, but the quality, accessibility, and interoperability of the underlying data. This is especially true in fields, where survey or manual input data is commonly used. This administrative data, e.g. on funding programs or agricultural land use, is often inconsistently kept, missing values, or containing errors leading to overall poor data quality.

Yet, data quality and interoperability are foundational requirements for successful AI applications in government and public administration with AI solutions depending on reliable, consistent, and well-governed data. In many organizations, however, data is fragmented across departments, stored in incompatible formats, lacking metadata, or governed by inconsistent definitions. These challenges lead to unreliable AI outputs, reduced trust, and significant barriers to scaling AI solutions within the organization.

This session will demonstrate how a modern data architecture using open-source tools can address these challenges by creating a trusted, reusable data foundation. By introducing software engineering principles into data transformation workflows, it allows organizations to document business logic, implement automated testing, enforce data standards, and establish clear lineage from source systems to AI-ready datasets.

Drawing upon data transformations from applications developed for the Ministry of Agriculture, Food and Regional Identities, this talk will show how a well-designed data architecture, consistent documentation, and robust governance practices can improve data quality and produce the high-quality, trustworthy and interoperable data modern AI applications require in the public sector.

2.12 KIDA Research Data Hub: A Semantic-Web Platform for FAIR Data Sharing Supporting the One Health Paradigm and Risk Assessment

Taras Günther, Thomas Schüler, Matthias Filter

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Effective risk assessment and One Health related research depend on timely access to interoperable and well-described data. Currently, many data sharing platforms like EFSA's Knowledge Junction only provide interoperable metadata on data files, but do not require or enable the exchange of interoperable linked data. This can lead to ambiguities in the raw data file and the metadata provided in these repositories hindering data discovery, reuse and cross-domain data integration.

Here, we introduce the KIDA Research Data Hub (KIDA-RDH), a semantic web-based platform that enables FAIR-compliant data discovery and access. KIDA-RDH provides a user-friendly web interface for browsing, querying, and reusing of data, vocabularies, and domain ontologies, thereby facilitating compliance with the FAIR data principles.

The user interface of KIDA-RDH features three core modules. 1) a public KIDA-RDH workspace for managing and querying datasets; 2), a private data space for users who want to store own linked data with controlled access, and 3) a vocabulary browser for exploring domain-specific ontologies. With these three modules users are able to interact with own and shared linked data in RDF format, e.g., those generated with the RDF4RiskAssessment Toolkit (<https://fskx-api-gateway-service.risk-ai-cloud.com/fskx-gui-service/kida-graph-database-service>) domain ontologies, or custom sources to facilitate data enrichment and interdisciplinary data analysis.

KIDA-RDH conforms to the DCAT-AP standard, storing metadata, research data, and scholarly information as RDF. The platform provides a SPARQL endpoint, and a RESTful API. The backend leverages the open-source software OpenLink Virtuoso (<https://www.openlinksw.com/>), a scalable RDF triple store, that provides high-performance SPARQL querying, bulk RDF ingestion, and role-based access control, enabling secure data access and efficient cross-project sharing.

Piloted in the KIDA project the platform will support other research initiatives like the RAKIP Initiative (<https://foodrisklabs.bfr.bund.de/rakip-initiative/>). By providing a sustainable and interoperable environment, KIDA-RDH fosters interdisciplinary collaboration and lays the groundwork for future FAIR-compliant data mesh and AI-driven data analysis initiatives.

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2.13 On-the-Fly Biological Knowledge Graphs: Pattern-Guided Extraction and BioLink Schema–Aligned Relation Modeling

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The biomedical literature now contains tens of millions of heterogeneous, rapidly growing articles, making direct human curation of domain knowledge infeasible at scale. While large language models (LLMs) offer powerful semantic capabilities, naively applying them across entire corpora such as PubMed is computationally prohibitive and difficult to control, and existing keyword or embedding-based search alone either lacks precision or systematically misses relevant evidence in very large databases. To address these limitations, we propose an agentic, on-the-fly knowledge-graph curation framework that combines declarative syntactic patterns with semantic validation to retrieve and extract precise literature-derived facts on demand. Our system operationalizes expert-crafted linguistic patterns to harvest candidate subject–predicate–object triples, and then standardizes them via a relation classification model trained under distant supervision against the BioLink schema. The resulting pipeline tightly couples pattern-based information extraction, BioLink-aligned relation classification, and agentic orchestration for iterative retrieval, extraction, and refinement, yielding knowledge graphs that are both transparent through explicit patterns and semantically interoperable through a universal biological knowledge organization schema. The contributions of this work are threefold: (i) a declarative pattern system for transparent, on-the-fly curation of biological knowledge from large-scale literature (ii) the first distant supervision dataset aligned to the BioLink relation inventory and (iii) a relation classification model that maps extracted relations to BioLink-compatible predicates. By enabling scalable, schema-aware, and auditable knowledge curation from very large text corpora, this framework supports the life sciences and risk assessment communities in constructing mechanistic hypotheses, populating adverse outcome pathway (AOP) networks, and accelerating evidence-based toxicological assessment.

2.14 AI-Assisted Data Pipeline for Automated Mapping and Standardized XML Submission to EFSA

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Data collection is a crucial task of the European Food Safety Authority (EFSA). It is a basic part of risk assessment under Articles 22 and 23 of Regulation (EC) No 178/2002. In the SIGMA project, the EFSA Standard Sample Description version 2 (SSD2) data model was extended to enable the harmonised collection of laboratory test results on animal diseases. The EFSA Data Collection Framework (DCF) allows reporting countries to submit eXtensible Markup Language (XML) data files according to EFSA guidance.

Within the OH-4 Surveillance project, we developed a modular Python and Apache-Airflow based pipeline to transform the disease data received from the federal states of Germany into a standardized XML submissions and a normalized PostgreSQL database. The workflow maps original German source fields to EFSA-compliant XML attributes, generates deterministic identifiers and applies validation rules for duplicate detection, exclusion handling and record consistency. Submitted XML records are stored separately from excluded rows, while raw source data remain linked for traceability and auditability.

To reduce manual workload and improve reproducibility, the pipeline combines rule-based transformations with ML-assisted mapping support and explicit manual override logic. The system handles disease-specific mappings, species and location resolution and also a function for update and delete behaviour for already submitted XML records. In parallel, we designed a normalized database model that stores only submitted records together with source-file metadata, original raw values and change logs.

The pipeline successfully processed and transmitted over 239,000 surveillance records from 2025 reporting cycle into EFSA data warehouse, reducing manual preparation time and eliminating systematic mapping errors that previously required repeated manual correction cycles.

These results demonstrate that an automated, ML supported data pipeline can reliably replace manual data processing, improve submission quality and provide a reproducible and auditable foundation for future data driven analysis.

2.15 The challenges of establishing an AI-Chatbot to support scientific policy advice

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A large part of policy advice from government institutions is delivered through scientific opinions. Preparing these documents often requires significant research, collaboration and coordination under tight deadlines. Furthermore, the utilisation of previous scientific opinions is hindered because most remain unpublished. Therefore, usage depends on knowledge, on maintaining shared folders, and on the effort to stay informed about all potentially relevant documents. Since this is almost impossible across large organisations such as the Thünen-Institute, we took on the challenge of systematically organising the scientific opinions and improving access through a local RAG-based chatbot. This work presents a retrieval-augmented generation (RAG) system for accessing institutional scientific opinions. The documents are segmented into semantically meaningful chunks and encoded using embedding models. Semantic search retrieves relevant content based on user queries, which is then used to construct a context for the language model. This approach improves response relevance and reduces hallucinations by grounding outputs in an external document corpus. Commercial LLMs are unsuitable due to the confidentiality of internal documents and limited in-depth knowledge. The organisation of previous scientific opinions faces various challenges, including inconsistent titles and descriptions, workforce changes, and limited access to digital and non-digital repositories. We developed workflows to automatically prepare new documents and continuously increase the RAG database. The main challenge is to evaluate the chatbot's retrieval and answer accuracy while continuously updating its functionality to the latest developments in this dynamically evolving topic to support highly specialised experts. Furthermore, we need to understand the user base's intentions to develop and further improve the chatbot. We aim to provide experts with an assistant that helps quickly identify existing knowledge, locate relevant subject matter experts, and improve coordination across departments.

2.16 Cost and gain of AI

Marco Selig

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AI adoption is increasing rapidly, also in science. While the cost of AI - be it monetary, computational, energetic, environmental - can be measured and traced, the benefits are less obvious. Often, the comparison is drawn to classical, non-AI-based algorithms or judgement is made upon the ""now enabled"". In this talk we introduce the achieved information gain as an objective measure for actual advancement of content, which can be balanced against costs. The concept of achieved information gain is illustrated on the example of reconstructing noisy images.

3 Abstracts – poster presentations

3.1 High-Resolution Orchard and Field Margin Mapping for Sustainable Pest Management

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To support sustainable orchard production systems, it is essential to precisely map orchard rows and distinguish them from surrounding trees, shrubs and other permanent crops. This spatial information is critical for two key purposes: assessing the influence of semi-natural woody vegetation on beneficial insect dynamics within and around orchard fields and the determination of field margin widths for pesticide application.

This study presents an automated, object-based remote sensing workflow that integrates airborne laser scanning (ALS) data with high-resolution digital orthophotos (RGBI) to map orchard rows and surrounding woody vegetation at 20-cm resolution. Vegetation segments were delineated via a region-growing algorithm and classified into four functional categories (trees, shrubs, orchards, residuals) using a random forest model trained on height and spectral features. The framework was applied across 41 orchard fields and their 500-m buffer zones in four major German fruit-growing regions.

We were able to map orchard rows with high precision. In Altes Land (583 ha buffer area), we mapped 291.2 ha (± 5.77 ha) of orchards, 52.1 ha (± 2.57 ha) of trees and 54.7 ha (± 5.44 ha) of shrubs, achieving F1 scores of 0.94, 0.95 and 0.76 respectively. In Rheinpfalz (645 ha buffer area), we estimated 67.9 ha (± 2.1 ha) of orchards, 36.5 ha (± 1.3 ha) of trees and 19.6 ha (± 1.8 ha) of shrubs, with F1 scores of 0.86 for orchards, 0.91 for trees and 0.58 for shrubs. Using available land use data sets on field block, field margin widths can be estimated. The resulting maps provide a spatially explicit baseline for modelling pest pressure and calibrating pesticide application zones.

3.2 A systematic mapping of methods in animal observational studies using artificial intelligence techniques

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Introduction: Observational study designs are widely used in veterinary epidemiological research; however, they are not always clearly reported. Automated text classification using artificial intelligence (AI), particularly large language models (LLMs) and large reasoning models (LRMs), offers a scalable approach to standardizing study design identification. This study evaluates the performance of different AI models in classifying epidemiological study designs and populations from scientific texts.

Methods: A SCOPUS-based search strategy yielded approximately 20,000 veterinary epidemiological records. From these, a random sample of ~400 studies was selected and manually annotated by two trained epidemiologists for study design and population classification, with discrepancies resolved by a third reviewer to establish a gold-standard dataset. Multiple approaches were benchmarked, including LLMs, LRMs, support vector machines, and rule-based regular expression methods. Different prompting strategies were evaluated for LLMs/LRMs, ranging from minimal instructions to detailed descriptions of epidemiological study designs, as well as prompts generated by LLMs based on their internal domain knowledge. Model performance was assessed against the gold standard using accuracy, sensitivity, specificity, and inter-rater agreement (kappa statistics), alongside computational efficiency. Methodological guidance on model selection and implementation was supported through collaboration with the KIDA initiative.

Results: Preliminary findings indicate substantial variability in classification performance across models and prompts. Models differed in their ability to correctly identify study designs, particularly in cases of incomplete or ambiguous reporting. Prompt structure and the inclusion of domain-specific definitions significantly influenced classification accuracy. Trade-offs between model performance and computational efficiency were also observed.

Discussion: This study demonstrates the potential of combining LLMs, LRMs, and traditional machine learning approaches for large-scale classification of epidemiological literature. It highlights the importance of prompt design, model screening, and high-quality annotated data. The findings contribute to ongoing efforts to improve data comparability, transparency, and the application of AI methods in veterinary and health research."

3.3 The needle in the haystack - Enhancing Discoverability of Monitoring Data through Search Engine Optimization and Model Context Protocol (MCP) Query Interface

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There is a large body of available zoonoses monitoring data. However, stakeholders often struggle to find and access relevant information. This hinders risk assessment and data-driven decision-making. It also leads to additional sampling to fill the perceived gap and a waste of resources and effort.

The question arises: Why are monitoring data often not discovered or cannot be queried, despite being available and important for public health and food safety? Our research aims to address this issue by using ZooNotify, web-based platform providing access to zoonoses monitoring data from Germany, as an example. We propose a two-fold approach to make existing data more findable, accessible, interoperable, and reusable (FAIR).

First, we will improve discoverability by applying established search engine optimization strategies to make ZooNotify and its datasets more findable to researchers and stakeholders. Second, we will develop a Model Context Protocol (MCP) interface for ZooNotify. MCP is an open standard that allows AI assistants to query external data sources directly, making ZooNotify accessible from any MCP-compatible AI client without custom integration — enabling natural language queries over the database. Together, these contributions advance the EU strategy for open and FAIR data and support the protection of animal and public health. Our approach has the potential to be translated to other domains, promoting the reuse of existing data and thereby improving their value and fostering a culture of data-driven decision-making.

3.4 The FAIR Scientific Knowledge eXchange (FSKX) format as a data format for standardised AI system benchmarking

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Introduction: AI system benchmarking refers to the systematic performance evaluation of AI systems on clearly defined tasks, datasets, and evaluation metrics. In scientific and regulatory contexts, AI benchmarking becomes increasingly important specifically for assessing, whether AI systems provide correct answers in various use cases. Therefore, AI system benchmarks help to inform software developers, researcher and organisations in selecting the appropriate AI system for any given application scenario.

Goals: The goal of this work is to demonstrate how the FAIR Scientific Knowledge eXchange (FSKX) format can be used to capture benchmark data and related evaluation resources in a single structured object. FSKX supports the packaging of datasets, prompts, reference outputs, evaluation scripts, dependencies, execution settings, and metadata. This allows benchmark tasks to be exchanged together with the information required to execute and interpret the evaluation procedure.

Concept using FSKX for benchmarking LLMs: In our concept, an FSKX formatted LLM benchmark supplies a task that an LLM must accomplish, evaluates model performance and assesses outputs against predefined metrics and reference results. For example, such a package may contain a set of PDF documents from which an LLM is expected to extract specific information, together with reference annotations and a script for calculating performance measures. Such standardised benchmark packaging allows benchmark workflows to be executed in a defined and repeatable way across platforms. A proof-of-concept implementation is available through the KIDA-Web model repository, where evaluation results can be displayed as an FSKX-file-specific leaderboard.

Conclusion: FSKX-based benchmarking provides a practical way to bundle benchmark datasets, expected outputs, evaluation scripts, and descriptive metadata. By transforming benchmarks into reusable FAIR digital objects, FSKX offers a promising foundation for standardised and repeatable evaluation of AI systems in the future.

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References: Filter, M., Schüler, T., Ben Romdhane, R., 2024. Food Safety Knowledge Exchange (FSKX) format: Current status and strategic development plans based on a SWOT analysis. *Microb. Risk Anal.* 27-28. <https://doi.org/10.1016/j.mran.2024.100309>, RAKIP Initiative <https://foodrisklabs.bfr.bund.de/rakip-initiative/>

3.5 Implementing AI-assisted tools to support German official food control authorities in their fight against food fraud

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The National Reference Centre for Authentic Food (NRZ-Authent) operates at the interface between the Federal Ministry of Agriculture, Food and Regional Identity (BMLEH), Federal Offices concerned with food and feed as well as the official food control authorities at state level. Supporting the specific objectives of the NRZ-Authent, we have developed and operate web-based services addressing various aspects of data management, including information acquisition, content-based aggregation, distribution and data organisation. Prominent examples include the information management system FAKT [1], a service platform for business intelligence (CUBE), as well as data hubs and reference databases for specific topics.

Next to data safety and sustainability, interactive and intuitive user interfaces, careful consideration of the integration into every-day business activities and the optimisation of interaction efficiency with the software applications are at the core of our design concepts and aim for the best possible user convenience within the given frameworks.

Many individual work items within these software applications and pipelines are supported by AI-based processes to minimise the efforts by users when completing individual tasks. Within our ecosystem, this support is enabled by a stand-alone AI module that receives requests from individual applications through an application programming interface (API) following the completes the requested tasks by calls to an interface following the OpenAI API standard [2]. As a principle, all end user-accessible applications utilise programmatically defined AI prompts, eliminating the need for in-depth prompt training of users for the particular tasks, limiting the possibility of mishandling and ensuring consistency with respect to the scope of results.

References

[1] Hofmann, A., Rietsch, J. & Haase, I. (2025) A perspective by the German NRZ-Authent on information and knowledge management in governmental authorities. npj Sci. Food 9, 123. DOI: /10.1038/s41538-025-00487-8

3.6 AI-based 3D monitoring of welfare-related behavioral changes in cows with atypical BSE

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Atypical bovine spongiform encephalopathy (BSE), or “mad cow disease,” remains a major challenge for animal health, food safety, and neurological research. In an ongoing experimental study, 20 young cows were infected intracerebrally with H- or L-type atypical BSE to investigate disease pathogenesis. Clinical symptoms are expected after an incubation period of 12–20 months, but subtle behavioral and physical changes may already occur during the preclinical phase. These include apathy, social withdrawal, repetitive behavior, locomotor impairments, loss of condition, and increased sensitivity.

The project aims to identify early deviations in behavior and species-specific locomotion before obvious neurological signs appear. A particular focus lies on animal welfare indicators such as activity, social interactions, posture, spatial behavior, and movement quality. The goal is to establish measurable behavioral and movement parameters that can serve as digital biomarkers for emerging neurological dysfunction while also enabling objective welfare assessment.

To achieve this, a computer-assisted monitoring system based on modern computer vision techniques was developed. The cows were housed in an experimental barn modeled after a conventional dairy cubicle system. Four synchronized cameras continuously recorded the animals, enabling 3D reconstruction of body points for quantitative analysis of gait, posture, activity, and social behavior. YOLO-based convolutional neural networks were trained to detect and track individual animals and extract movement-related features.

The system enabled reliable tracking under practical housing conditions and generated accurate 3D movement data. Initial anomaly detection models identified significant deviations from individual baseline behavior before clinically visible neurological symptoms emerged.

These findings demonstrate the potential of AI-supported 3D behavioral analysis for the early detection of subtle preclinical changes in atypical BSE. Continuous monitoring of movement, behavior, and welfare-related parameters may provide valuable digital biomarkers for neurological disease while supporting automated, data-driven animal welfare assessment in livestock farming.

3.7 PigViroScope: Synthesising Evidence of the Global Pig Virome with Artificial Intelligence

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Pigs (Suidae) play essential roles in agriculture and serve as important models for infectious disease research due to their physiological similarity to humans. Swine virology is thus a key domain within the One Health framework, particularly regarding emerging infectious diseases, zoonotic spillover, and pandemic risk. Yet, no comprehensive inventory of the global pig virome currently exists, limiting disease surveillance, pandemic preparedness, and food system resilience. Moreover, the virological literature is extensive, fragmented, and distributed across decades and disciplines, making conventional manual synthesis infeasible.

To address this gap, we conducted a systematic literature review supported by natural language processing to identify and catalogue all viruses reported to infect pigs. We developed Evidence Unification through Language-model Evaluation (EULE), a hybrid workflow integrating a locally hosted large language model (LLM) into established systematic review methodology. The pipeline was implemented in R, with Llama 3.3 70B deployed locally for literature screening, information extraction, and downstream visualization.

Using EULE, we screened over 56,000 literature records, of which more than half were classified as relevant to swine virology. Across these, we identified over 700 unique virus species spanning more than 30 viral families. The most frequently represented viruses were African swine fever virus (ASFV), porcine reproductive and respiratory syndrome virus (PRRSV), porcine circovirus (PCV), classical swine fever virus (CSFV), and swine influenza A virus.

Our findings highlight major viral priorities in swine research while revealing the broader diversity of less frequently reported pig-associated viruses worldwide. By applying artificial intelligence to systematically synthesize the known pig virome from scientific literature, we provide a foundational resource for cross-species pathogen monitoring at the human–animal interface and demonstrate the broader value of large language models for large-scale biological knowledge synthesis in support of pandemic preparedness.

3.8 Data Quality and Interoperability as Key Factors for AI Deployment in Environmental Monitoring

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Data quality and interoperability represent critical success factors for deploying artificial intelligence (AI) technologies within environmental protection. The relevance of this study stems from escalating global environmental crises and the urgent need to utilize AI predictive models to mitigate them. However, current algorithmic efficiency is heavily restricted by data inaccuracies and "information silos"—isolated agency databases operating on conflicting standards. This compromises the reliability of climate change forecasts and hinders real-time emissions monitoring. The aim of the study is to comprehensively analyze how environmental data quality and interoperability impact AI algorithmic accuracy, and to develop evidence-based recommendations for their standardization. To achieve this goal, the following objectives have been set: Examine the integration barriers of environmental data originating from heterogeneous sources (satellites, sensors, field surveys). Quantify the negative impact of data errors and omissions on machine learning precision. Analyze current international protocols for environmental data exchange and successful open-dataset use cases. Develop systemic architecture requirements for unified data platforms supporting "green" AI technologies. Evaluate the balance between the environmental benefits of AI deployment and its own carbon footprint generated during big data processing. The practical significance of this work lies in the fact that ensuring system interoperability will transform artificial intelligence into a reliable tool for sustainable development.

3.9 A Pipeline for Cross-Cohort Harmonization of FFQ Dietary Data Objectives

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Nutrition and multi-omics studies increasingly combine dietary intake data with microbiome, metabolome and health phenotype data. However, dietary assessment data often remain difficult to compare across cohorts, limiting the reuse of existing studies for cross-cohort analyses, machine learning approaches and the evaluation of diet-omics-health associations across populations. Food Frequency Questionnaires (FFQs) are widely used because they are scalable and capture habitual dietary intake, but cohort-specific FFQs differ in their level of detail and food item structure. This study aims to develop an open-source pipeline for harmonizing FFQ-derived dietary data across cohorts.

Methods

In this ongoing study, each question within cohort-specific FFQs is mapped to standardized food groups. To enable harmonization and comparability between different FFQs, the pipeline uses the FoodEx2 taxonomy. Food groups and FFQ questions are annotated with FoodEx2 codes. Items that cannot be directly matched are processed using semantic text embeddings and ambiguous items are assigned uncertainty flags. Feasibility is assessed by calculating the Mediterranean Diet Score using both cohort-specific and harmonized FFQ mappings.

Results

The pipeline is generating a harmonized FFQ item structure and a reproducible mapping protocol. The harmonized structure links FFQ items to FoodEx2-based food groups, enabling comparison of dietary variables across cohorts with different FFQ designs.

Conclusions

This study establishes a taxonomy-linked representation of FFQ items to improve the comparability of dietary variables across cohorts. By combining FoodEx2-based annotation and semantic matching, the pipeline provides infrastructure for cross-cohort nutrition epidemiology and supports future precision nutrition and multi-omics research.

3.10 Beyond Accuracy: Uncertainty-Aware Mapping of Machine-Learning-Derived soil organic carbon Trends Across Europe

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Machine learning is increasingly used to generate high resolution soil maps for climate and environmental monitoring. However, when machine learning predictions are used to derive secondary indicators such as temporal trends, prediction uncertainty can strongly affect interpretation. This is particularly important for soil organic carbon, a key indicator of soil health and climate resilience, where the estimated changes over time may be difficult to distinguish from uncertainty in the underlying predictions.

At KIDA-KON, we present a workflow to assess machine learning derived soil organic carbon (SOC) trends across Europe. Using harmonized spatio-temporal SOC predictions from the AI4SoilHealth project for the period 2000–2021 at 30 m spatial resolution, we estimated pixel-wise trends across European soils. In addition, we estimated corresponding trends from upper and lower prediction quantiles to evaluate how uncertainty propagates into the derived trend estimates.

We further identified where the direction of SOC change is consistent across the central, upper, and lower quantile trends. Pixels with agreement across quantiles indicate more robust trend signals, whereas disagreement highlights areas where increases or decreases in SOC should be interpreted with caution. This approach shifts the focus from producing a single trend map to identifying where machine-learning-derived trends are reliable enough to inform soil health assessment.

Preliminary results show pronounced regional differences in both SOC trends and their reliability. Declining trends are visible in several parts of eastern, western, and northwestern Europe, while some northern regions show increasing trends. However, agreement maps reveal that not all apparent trends are equally robust under prediction uncertainty.

This work demonstrates how uncertainty-aware analysis can make machine-learning-based soil monitoring more transparent and decision-relevant. By combining high-resolution trend estimation with agreement across prediction quantiles, the workflow supports trustworthy AI applications for large-scale soil health monitoring

3.11 AI meets FoPro+

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The FoPro+ database holds extensive information on research projects. To improve data quality, we investigated how AI, to be precise generative AI and also small language models, can be utilized to overcome problems such as incomplete or outdated abstracts and inconsistent keyword indexing. This poster covers our approaches to (i) generate meaningful project descriptions geared to target groups, (ii) assess alignment of projects with key research questions in terms of elaborated topics, and (iii) sustainable keyword indexing.

3.12 RDF4RiskAssessment: Guided and LLM-Assisted Linked Data generation for FAIR scientific data

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Scientific risk assessment and life-science research rely on heterogeneous tabular datasets that are difficult to harmonize, interlink, and reuse. The RDF4RiskAssessment Toolkit addresses this challenge by providing a modular, user-friendly solution for converting scientific data tables into FAIR (Findable, Accessible, Interoperable, Reusable) RDF representations suitable for knowledge graph integration.

Designed for researchers without extensive Semantic Web expertise, the toolkit provides guided interaction through a step-by-step interface with contextual hints. Starting from CSV or Excel files, it identifies candidate terms from column headers and data values and organizes them into an SSSOM (Simple Standard for Sharing Ontological Mappings)-compatible matching table. Reconciliation services enrich these terms with persistent identifiers, labels, descriptions, mapping relations, provenance information, and confidence metrics from selected knowledge sources such as ontology lookup services. Users can curate mappings semi-automatically or use a large language model (LLM)-driven agent-based reconciliation service that coordinates provider-specific searches, compares candidate entities, and provides transparency into agent activities, decision steps, and processing costs while classifying SKOS (Simple Knowledge Organization System) relations and supporting configurable review or auto-acceptance rules.

Based on the enriched matching table, the original dataset, and metadata, the RDF Generation Service creates modular outputs in standard RDF formats such as Turtle, TriG, and JSON-LD. These outputs include interlinked graphs representing the research data in compliance with FAIR standards such as DCAT-AP. This preserves the connection between original tabular values, harmonized concepts, and provenance while making the data suitable for integration into domain-specific knowledge graphs. To support transparency and validation, the RDF-to-Table Conversion Service can transform generated RDF back into a reviewable tabular form. By combining guided usability, LLM-assisted semantic enrichment, modular RDF generation, and round-trip conversion, the toolkit enables interoperable Linked Data creation for risk assessment, food safety, and broader life-science applications.

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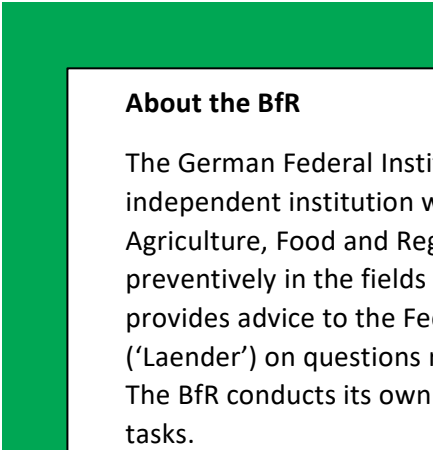
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The German Federal Institute for Risk Assessment (BfR) is a scientifically independent institution within the portfolio of the German Federal Ministry of Agriculture, Food and Regional Identity (BMLEH). It protects people's health preventively in the fields of public health and veterinary public health. The BfR provides advice to the Federal Government as well as the Federal States ('Laender') on questions related to food, feed, chemical and product safety. The BfR conducts its own research on topics closely related to its assessment tasks.

About the KIDA collaborative

The KIDA collaborative is the continuation of the "AI and Data Accelerator" (KIDA) project as part of the German government's AI strategy for expanding and strengthening AI and data competencies in the research and advisory institutions of the Federal Ministry of Agriculture, Food and Regional Identity (BMLEH). The institutions have joined forces in KIDA to realise the potential of data and artificial intelligence methods in the fields of nutrition and agriculture, to make efficient use of shared resources and infrastructure, to promote professional exchange and to advance AI expertise in the BMLEH's area of responsibility. The KIDA collaborative forms a network with a long-term perspective to consolidate cooperation on artificial intelligence in the BMLEH's area of responsibility.