U.S. FOOD & DRUG ADMINISTRATION

DIGITAL TRANSFORMATION SYMPOSIUM 2023

Hosted by FDA's Office of Digital Transformation

Warp Intelligent Learning Engine (WILEE)

Unleashing the Power of Big Data for Food Safety

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Motivation

- As regulatory scientists our ability to identify associations between different ideas in a variety of contexts enables us to derive insights that advance our work. From identifying public health risks to predicting trends and addressing stakeholder concerns, this work requires us to constantly generate a corpus of relevant data. Dealing with the volume of these data can be onerous and synthesizing information from such sources can be daunting and time consuming. The WILEE project leverages some of our previous work using machine learning techniques to address some of these challenges and promises to deliver more efficiencies in our work.

WILEE as a Data Product

- WILEE (pronounced Wiley) is an advanced, data driven, risked based decision-making tool, that leverages AI technologies to integrate, process and analyze a large variety of data sources to provide horizon-scanning capabilities that will enable OFAS to maintain a proactive posture and the capacity to “forecast” industry trends so that the Office can stay ahead of the development cycle and prepare for how to handle a large influx of submissions (operational risk - e.g., change in USDA rules regarding antimicrobial residue levels in poultry processing), prioritize actions based on risk or stakeholder perceived risk regarding substances under the CFSANs’ purview. WILEE has multiple modules that enable postmarket surveillance, signal detection, and knowledge discovery.

WILEE Goals

- **Phase I:** Create a centralized data resource for CFSAN/OFAS with an architecture that enables advanced analytics and on-demand data analysis.

- **Phase II:** Build an intelligent knowledge discovery and analytic agent that enables advanced knowledge discovery, on-demand data analysis and signal detection.

WILEE

Warp Intelligent Learning Engine

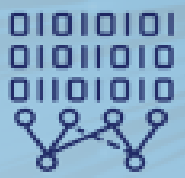
FDA

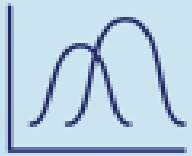
DATA INTEGRATION

- ADI
- Biotech monitoring
- CERES
- Cheminformatics
- Exposures
- FARM
- FSTA
- NIH funding
- Products
- Pubmed
- Total Diet Study
- TRAM
- Unit Cancer Risk
- Web Articles

Substances

- Chemical risks
- Microbial risks
- Packaging
- Sales



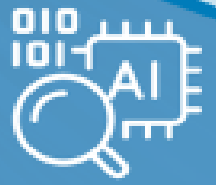


ANALYTICS

- Association Analysis --> Network Analysis
- Risk Prediction & Ranking
- Text Analytics
- Knowledge Discovery
- Signal Detection
- Trend Analysis

APPLICATIONS

- Search & AI training
- Knowledge tree
- Data mining
- Data entry
- On-Demand analytics
- Signal detection

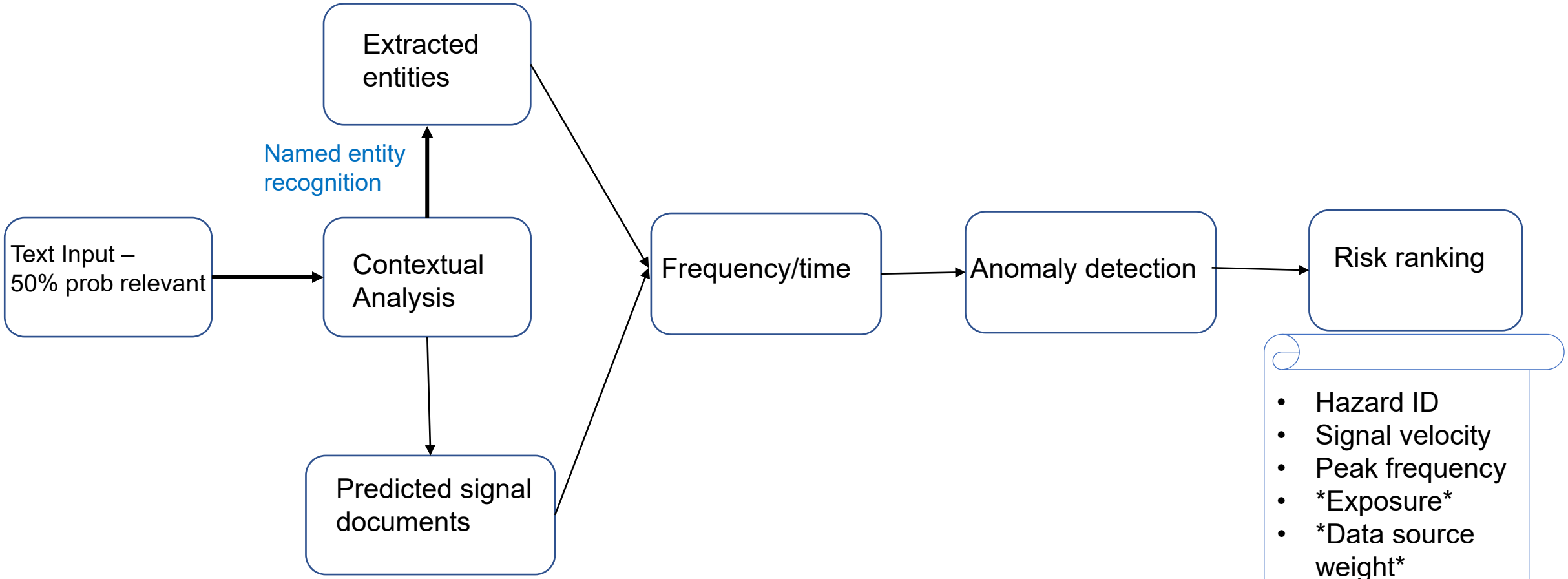


Phase II – Modules

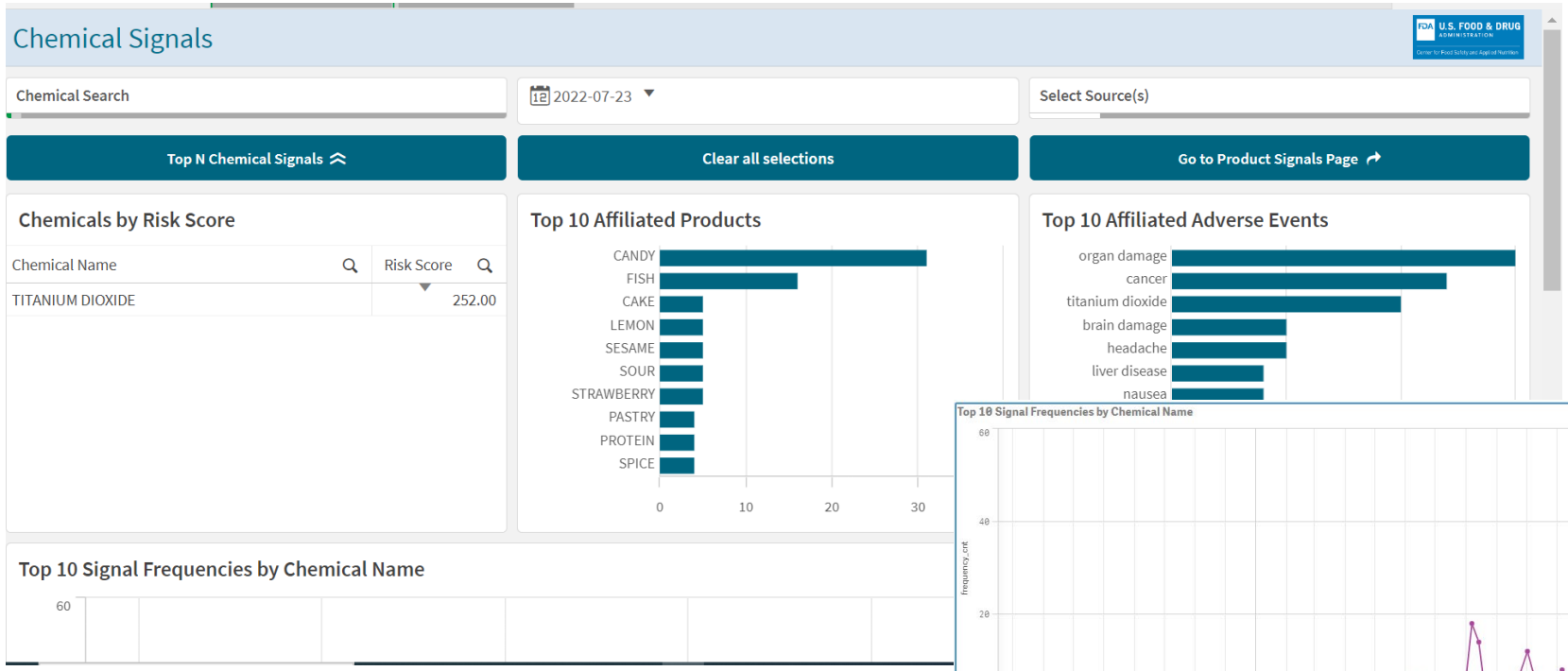
- Signal detection module and visualization
- Food label ingredient monitoring
- Knowledge discovery
- Knowledge graph - conversations

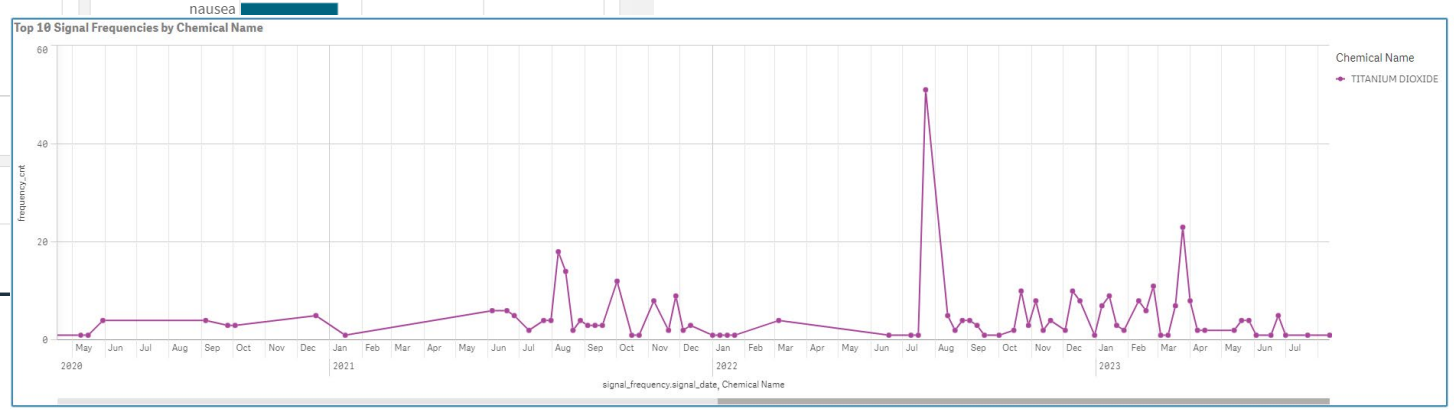
Signal Detection Module

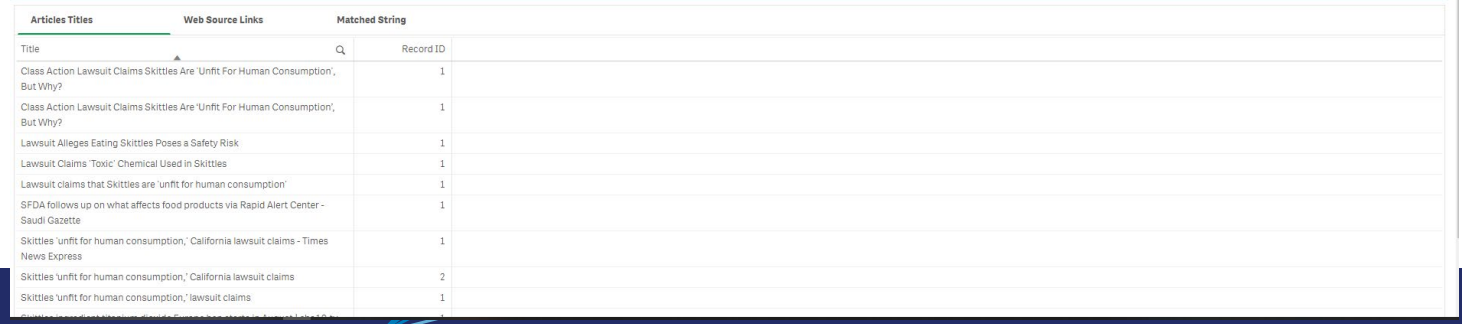
- Solutions Schematic



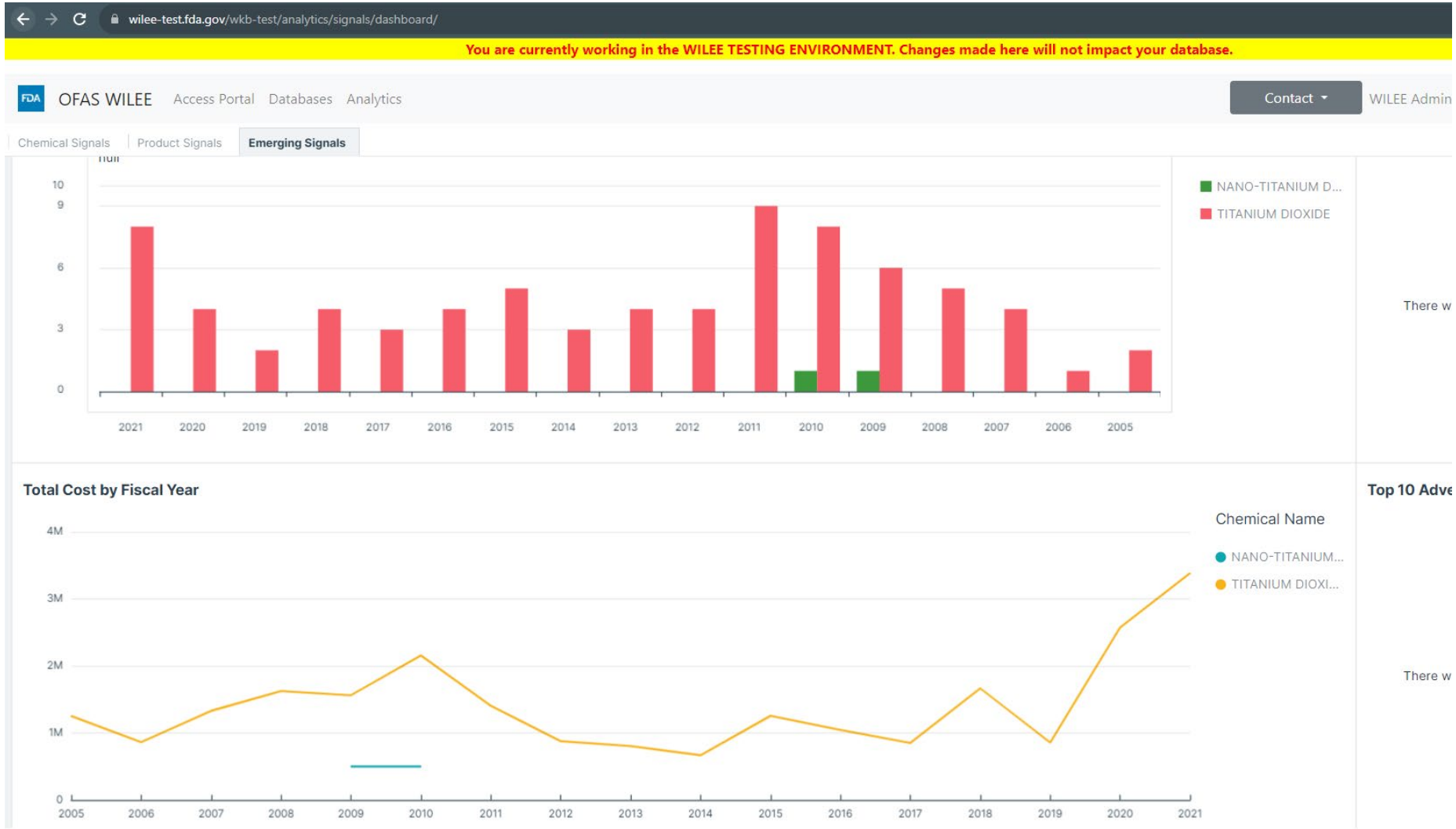
Signal Detection





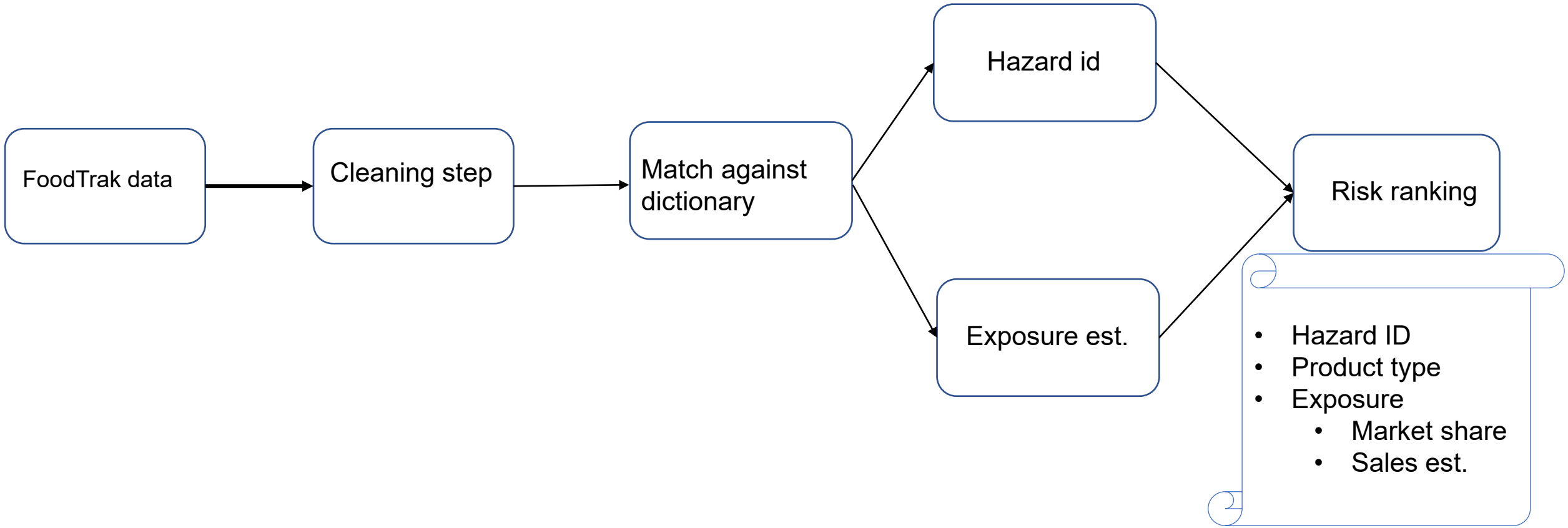


Signal Detection – Emerging Signals

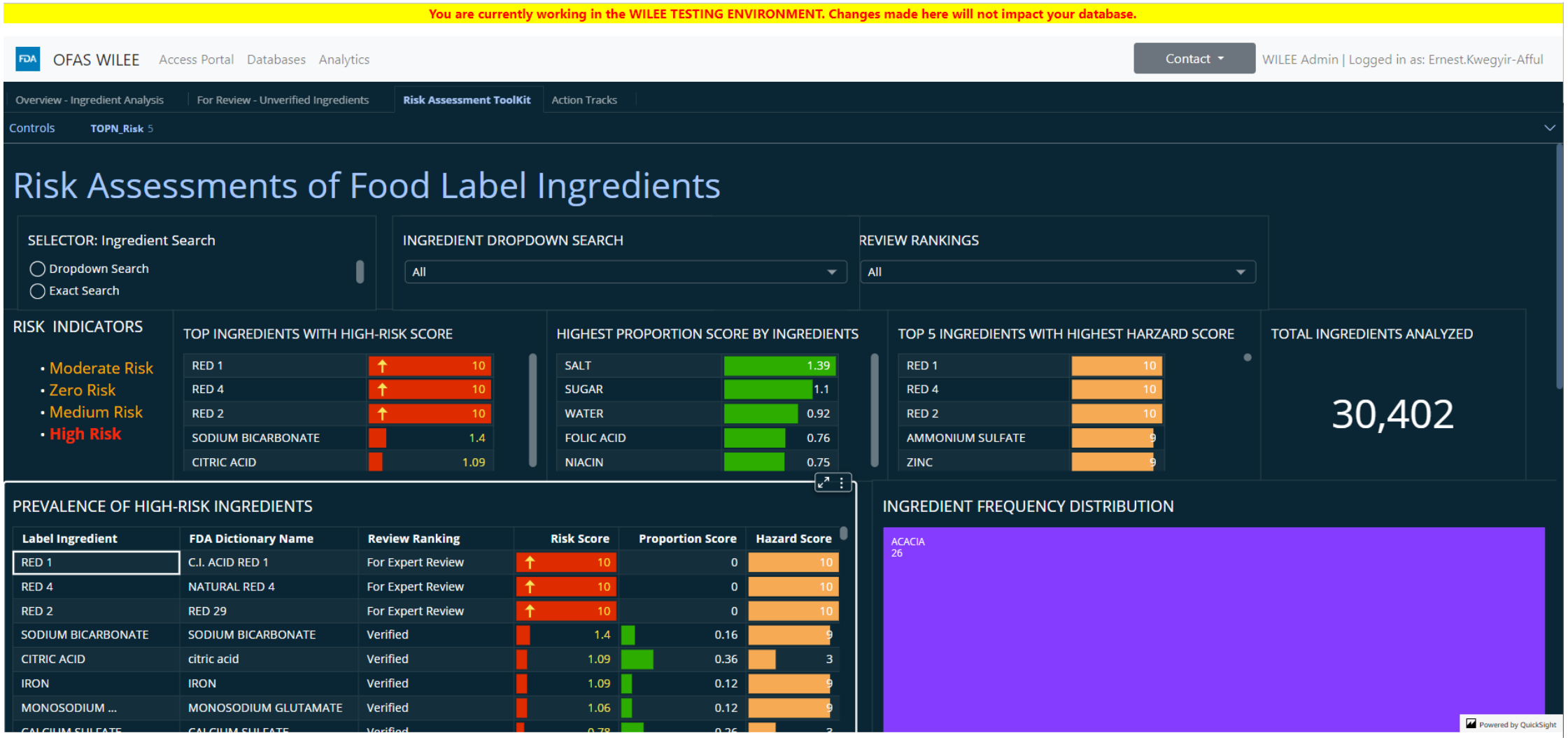


Food Ingredient Monitoring Module

- Solutions Schematic

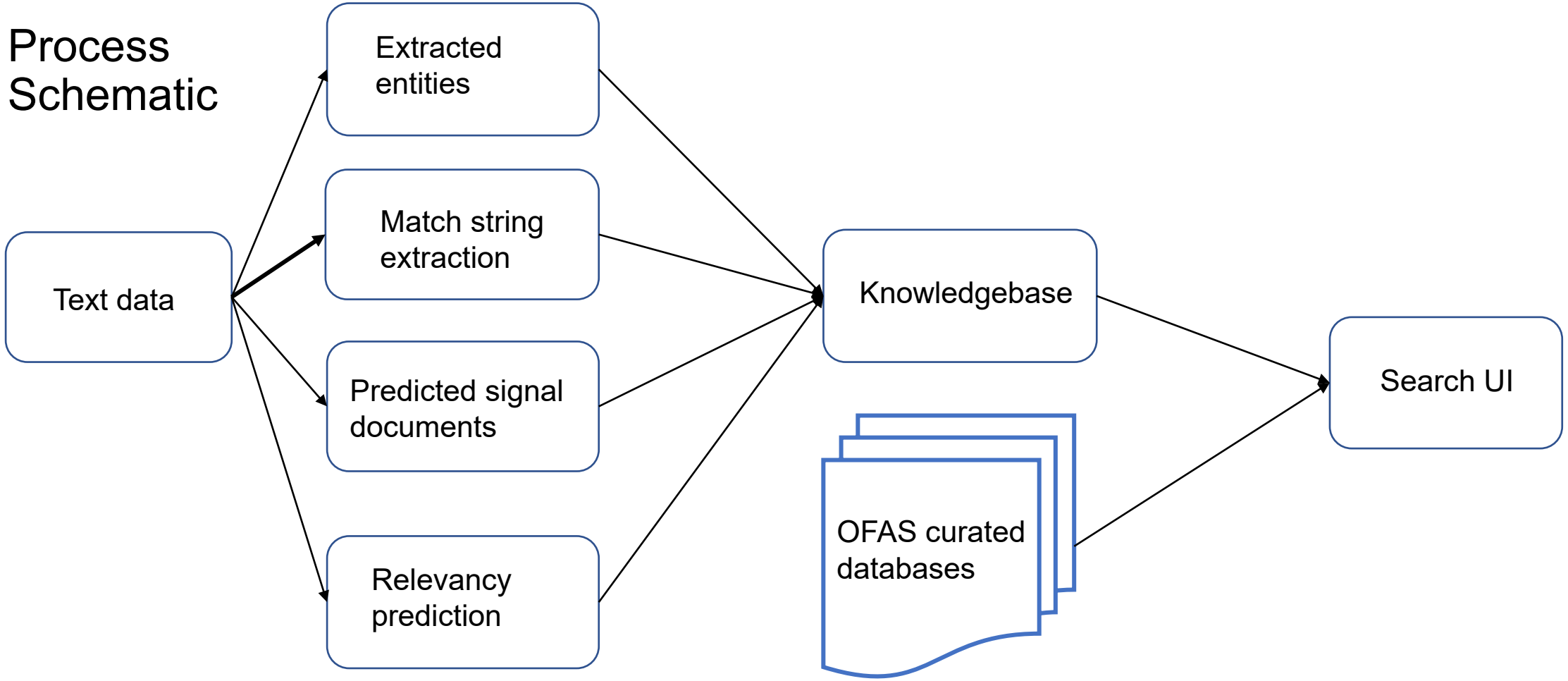


Label Ingredient Monitoring Analysis

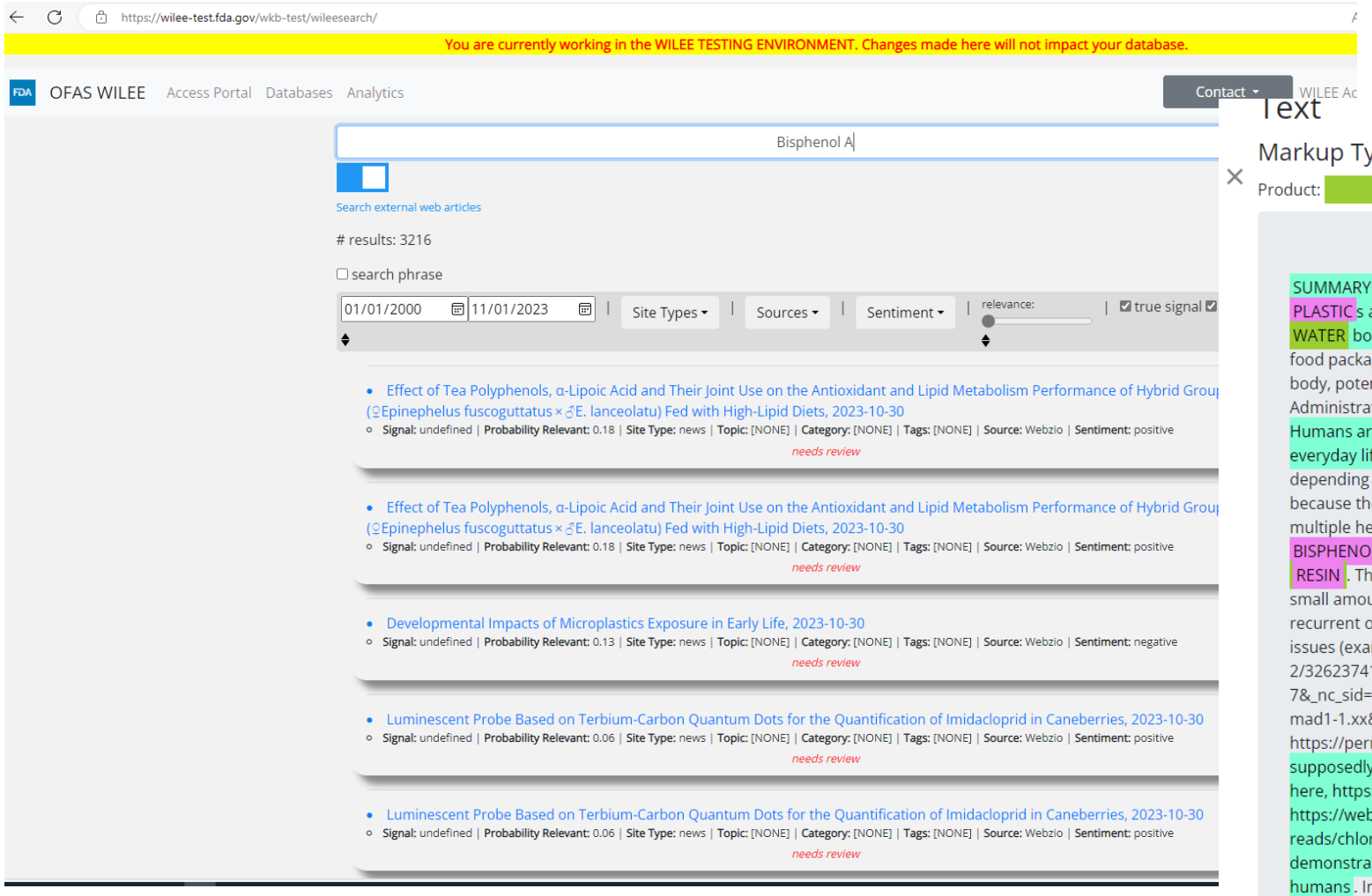


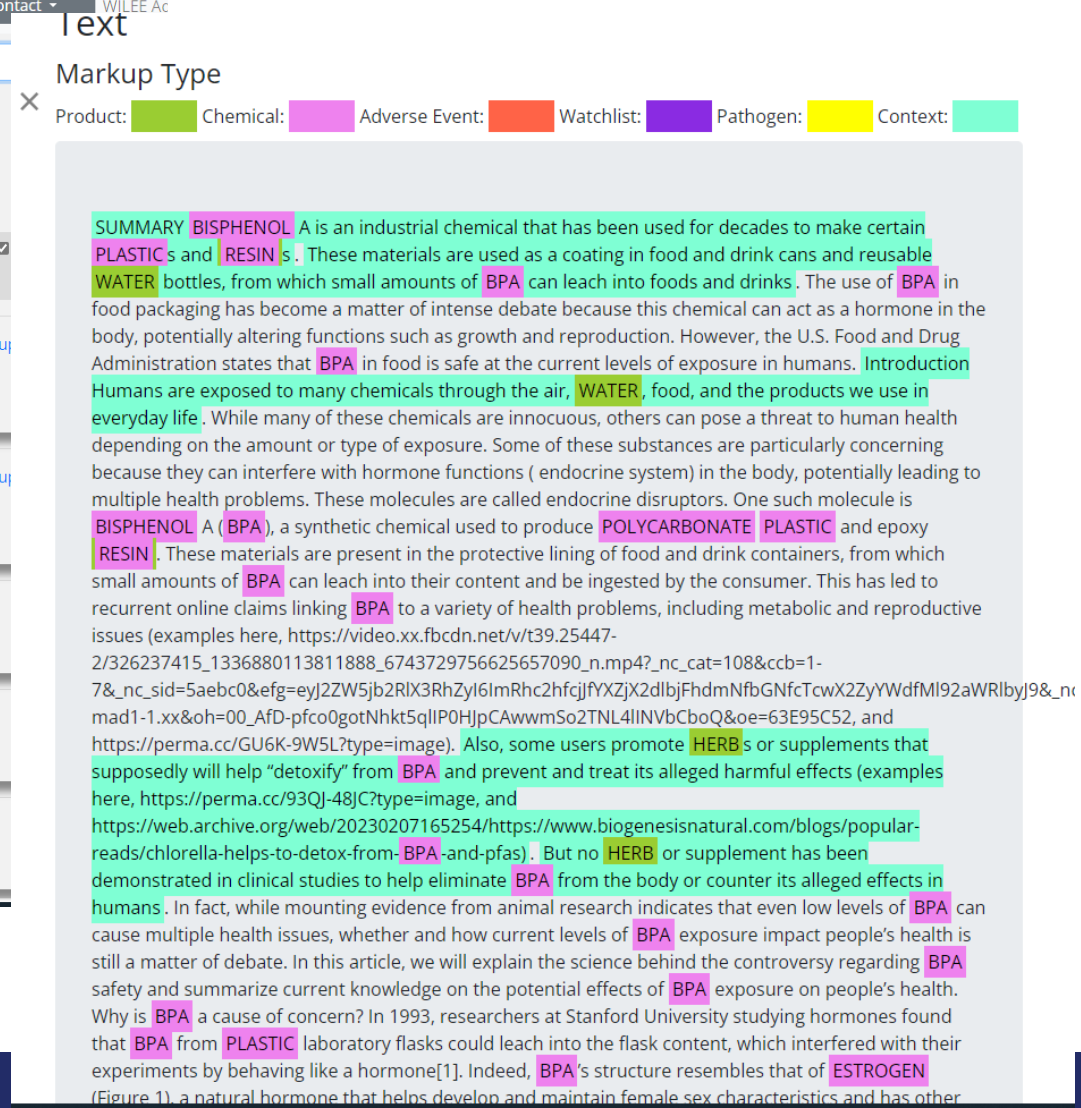
Knowledge Discovery Module

- Process Schematic

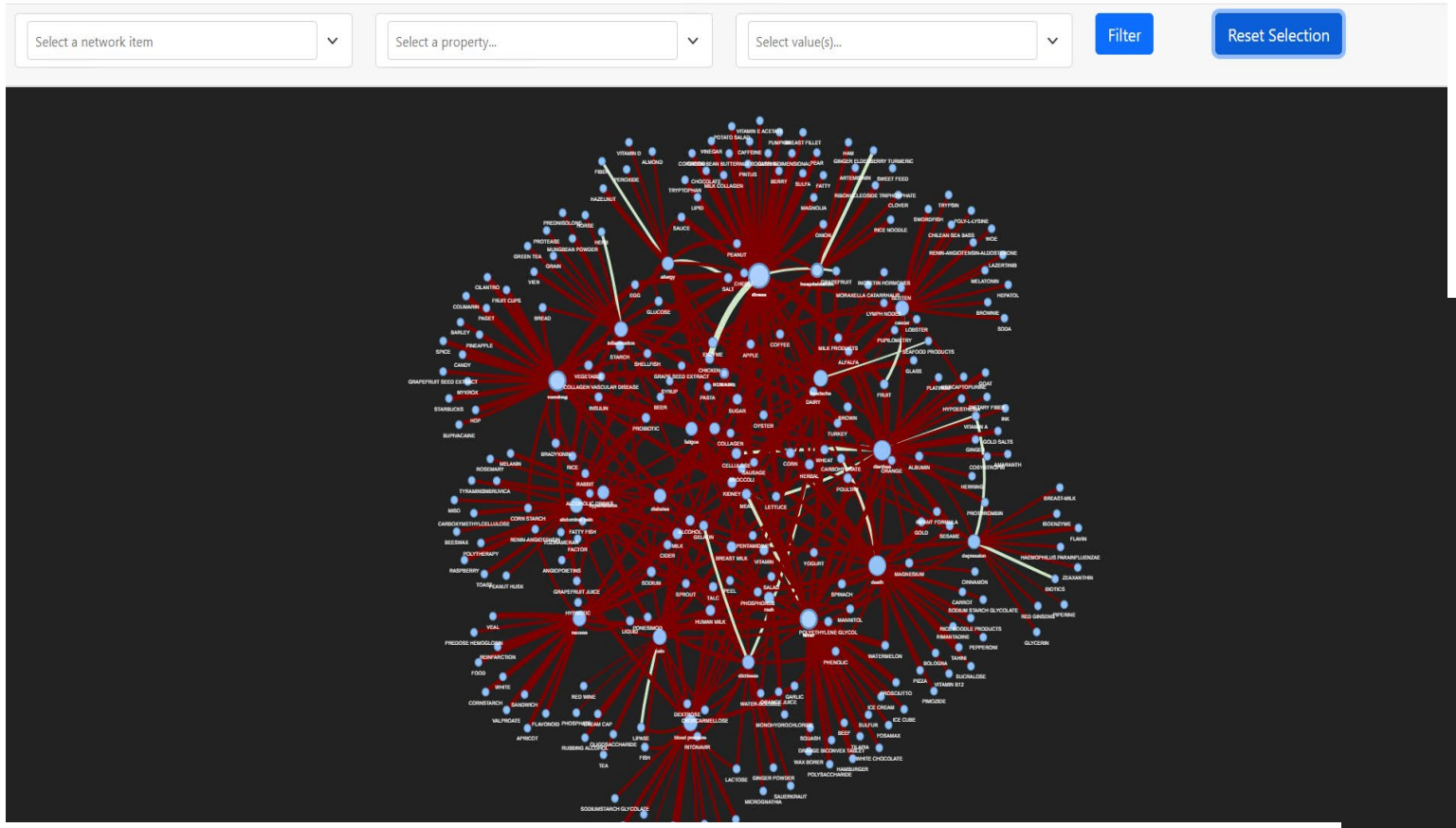


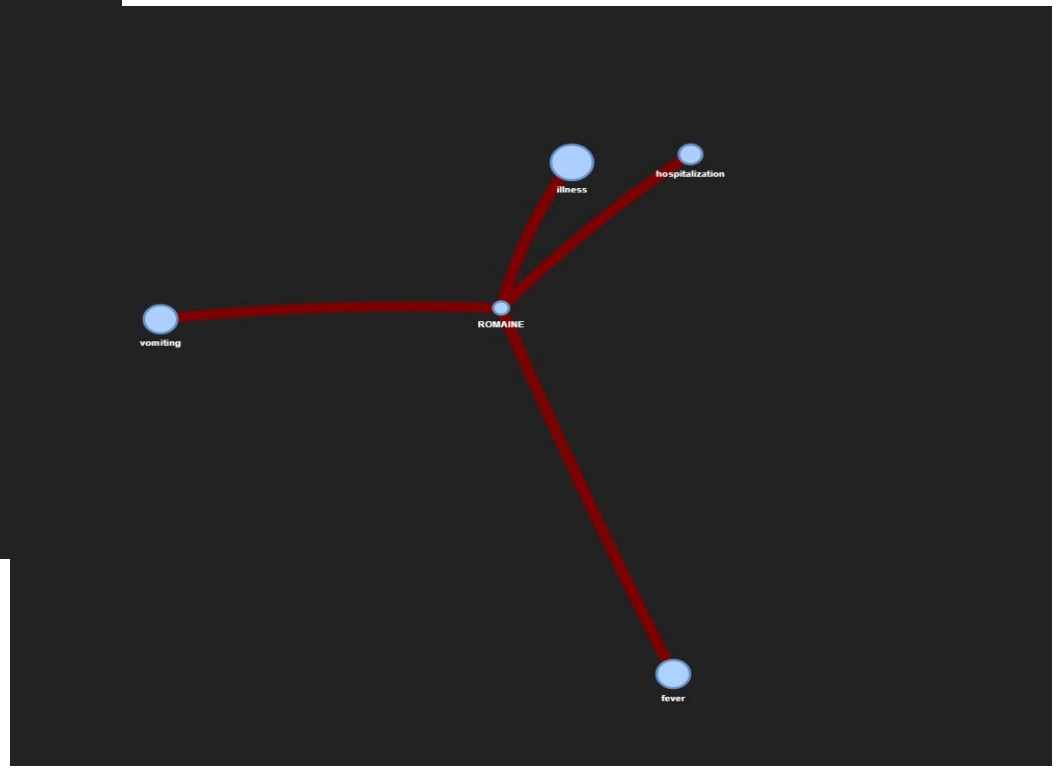
Knowledge Discovery – Results





Conversations – Knowledge Tree





Questions