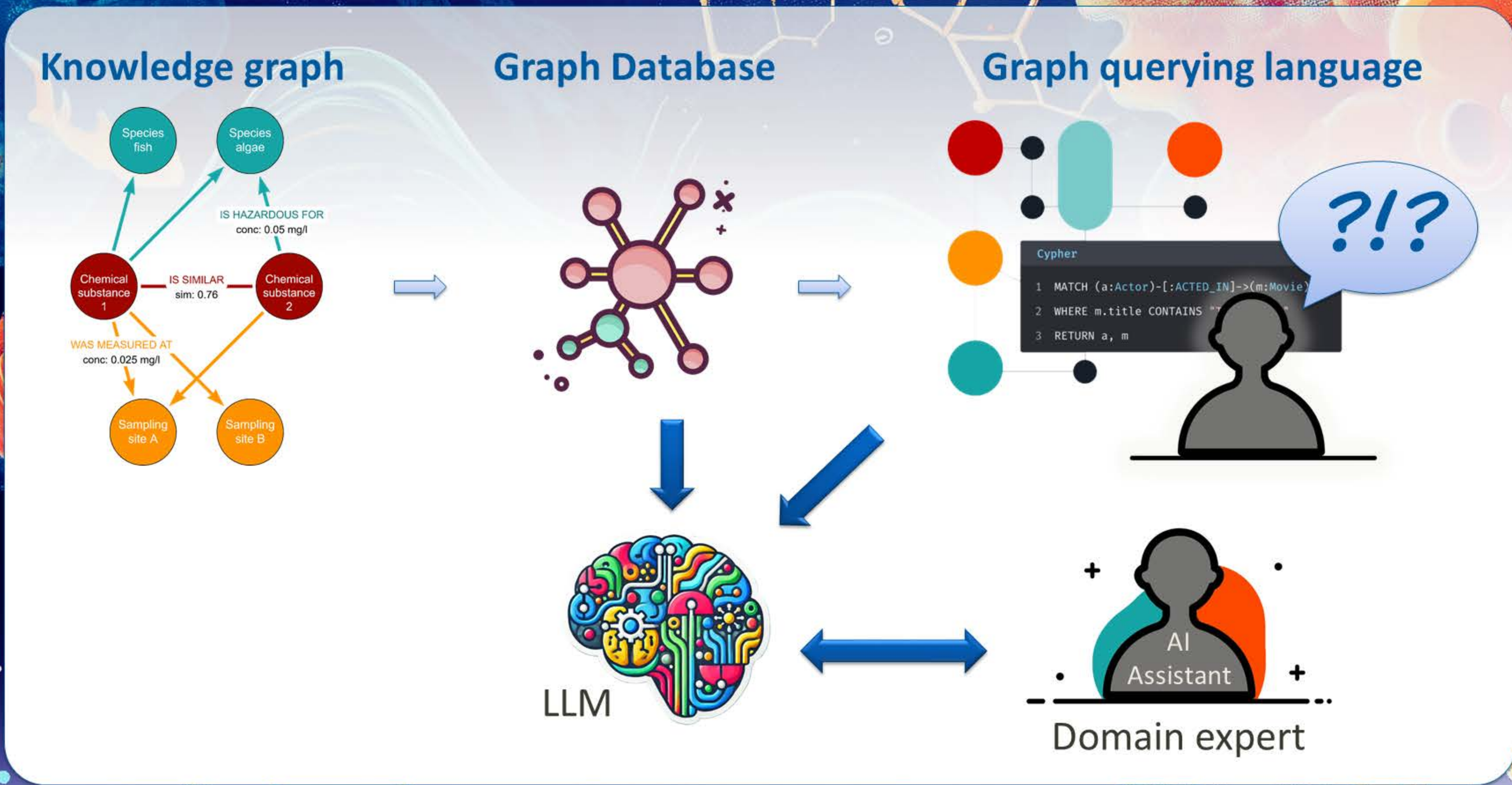


AI-Driven Science Communication: The EcoToxFred Prototype

Leveraging Large Language Models and Knowledge Graphs for Seamless Knowledge Exchange.

Patrick Scheibe, Hannes Bohring, Jana Schor



Technology

Graph Database

- Efficient querying & retrieval of interconnected data

Retrieval-Augmented Generation (RAG):

- Precise, real-time, context-aware responses

Transferability:

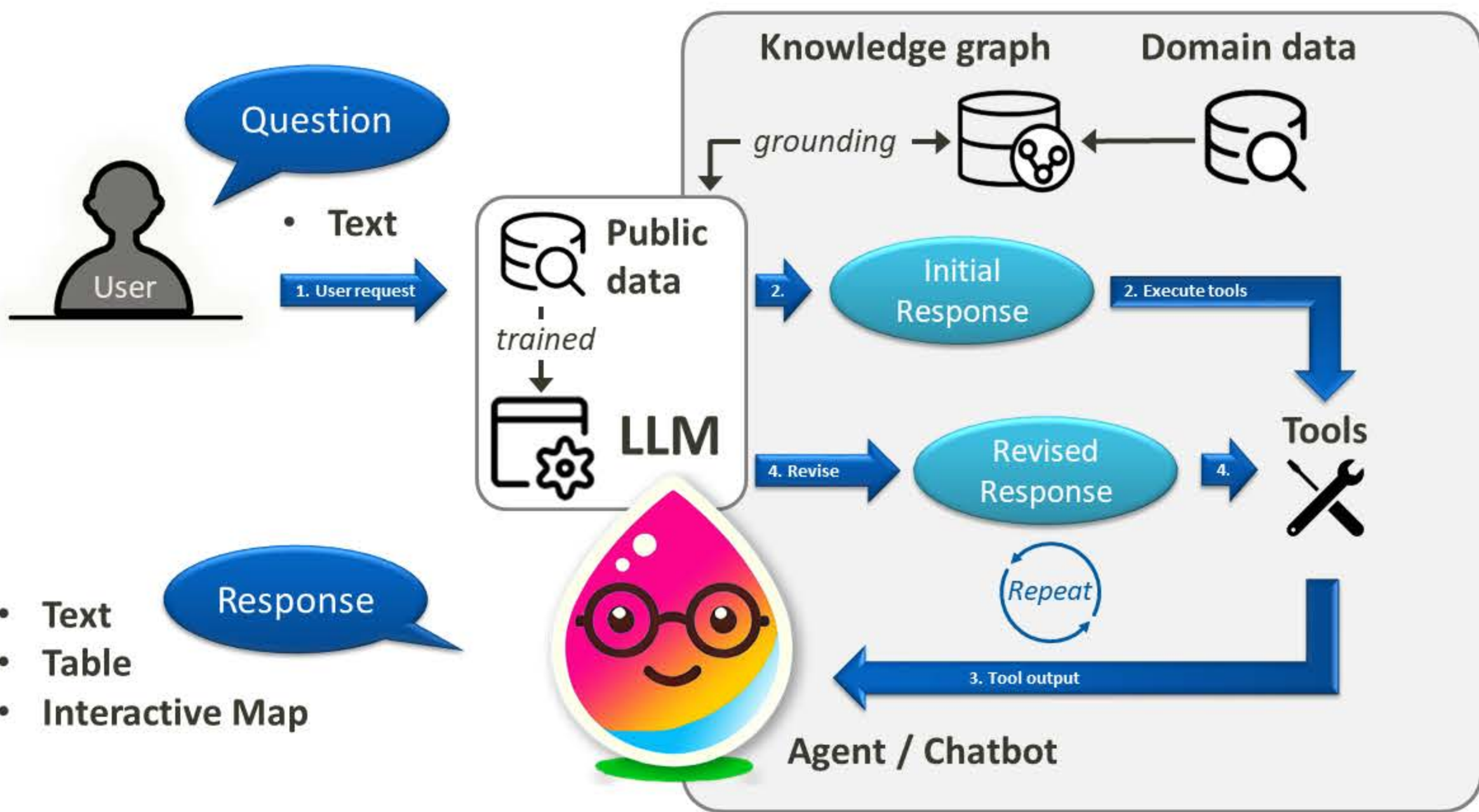
- Adaptable to any fields with structured data.

LLMs

→ may hallucinate, produce biased outputs, devoid contexts, and lack logical coherence



EcoToxFred



Hi, I'm EcoToxFred! How can I help you?

Show the ratioTU distribution for algae along the Danube (2010–2015).

Using Tool GeographicMap

The map displays the ratio of toxic units (ratioTU) for algae along the Danube River between 2010 and 2015. The ratioTU values range from 0 to 1, with an average of 0.41 and a standard deviation of 0.36. The measurements were taken at 94 unique sites, with the most frequent site being "dunaj hainburg" (20 measurements). The majority of the measurements were taken in the Danube River Basin (430 measurements). The measurements were taken across all quarters of the years, with the most measurements taken in the third quarter.

What is Diuron and where has it been measured?

Using Tool WikipediaSearch

Diuron (3-(3,4-dichlorophenyl)-1,1-dimethylurea) is an algicide and herbicide of the aryl urea class that inhibits photosynthesis. ... [→ Wikipedia]

Using Tool CypherSearch

Substance	Site	Country	WaterBody	RiverBasin	Time
Diuron	drava rkm 14	Croatia	Danube	Danube	2013-07-01
Diuron	12rw1201	Netherlands	NA	Rhine	2016-10-01
Diuron



<https://ecotoxfred.web.app.ufz.de/>
<https://github.com/yigbt/EcoToxFred>

Limitations

- User Education and Interpretation
- Technical and Maintenance considerations
- Data Privacy and Security
- OpenAI dependency

Bad data in, bad data out

When prompting the LLM to respond based on the context provided, the answer will always be as good as the provided context.

If your prompt suggests pineapple as a pizza topping, don't be surprised if it suggests that you order a Hawaiian Pizza.



[neo4j graph academy, grounding LLMs with RAG]

LLM + Graph databases → innovative and powerful to make domain knowledge accessible and usable for non-computer scientists, researchers from other domains, and stakeholders.

