Conversational AI - Innovation, Challenges, Perspectives



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Onlim GmbH

Onlim at a glance

- Academic spin-off of the University of Innsbruck (Institute for Semantic Technology).
- 30 international experts in the field of Conversational AI & SaaS
- 100+ Enterprise clients
- Neuro-Symbolic Conversational AI Platform Knowledge Graph, LLM, NLU, SaaS
- 30M Interactions / Month
- Gartner Cool Vendor in “Conversational and Natural Language Technology”











































Onlim's Solution

- **A central platform**
  Create, manage, and distribute content for conversational interfaces
- **Simply onboarding and running**
  AI-as-a-Service
- **Conversational AI**
  NLG, NLU, LLMs, Conversational Modules
- **Standard interfaces**
  Data-agnostic (API), multi-channel capable
- **Input / Output**
  Text & speech, multilingual
- **Knowledge modeling**
  Merging of different data types, enabling answers to complex questions, knowledge graphs



Onlim's Solution: Platform for Natural-Language-Enabled Enterprise

Knowledge graph – Data platform

Conversational & LLM platform

Multi-channel platform

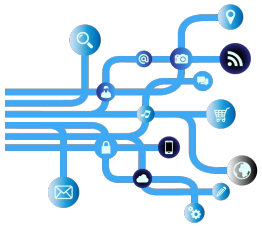


Integrates enterprise data and services, interlinks them and applies semantics for machine understanding of these data.

Integrates conversational assistants with data, delivers insights, and optimizes conversations & the knowledge graph.

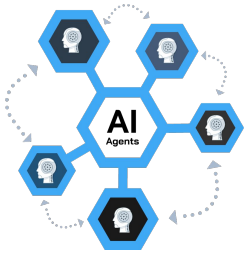
Connects conversational assistants to websites, voice assistants, messengers, phone systems, Whatsapp and external APIs.

Onlim's Solution: Tech Stack



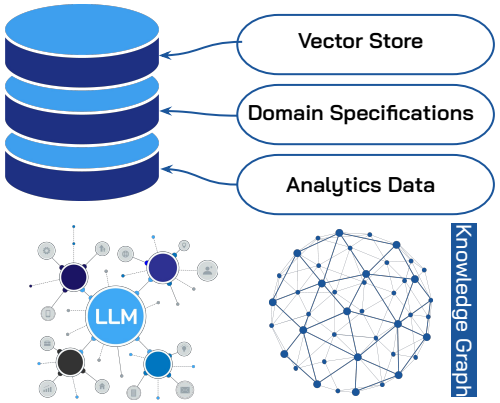
Channels & Applications

Access data in natural languages via dedicated **Channels** (Chatbot, Search, Voice, Social, Email, etc.). **Native Applications** (Chat Widgets, Search Widgets, Maps, etc.) and any **Third Party Integrations** (ServiceNow, Voxtron, ITSM Tools, etc)



AI Agents

Lo/No Code **Workflow Tool** (ITS) for creating **AI Agents** representing any type of standardised and customized **AI Products**: Email Classification & Automation, RAG. Graph RAG, Ticketing Dispatching, Orchestration, Agent Builder, etc. Agents are built on top of the Central Knowledge Base.



Knowledge Hosting (Unified Data with AI)

Central Unified Knowledge Base (Symbolic-AI and GenAI) providing a set of Databases (Knowledge Graphs, Vectorstore, Analytics), Specifications (Domain Specifications, Vocabularies), tools and functionalities: APIs, Services, Mappings, Query Languages, Monitoring, Data Verification, Assessment, Enrichment, Access to LLMs (Agnostic), Access Management, Webcrawling, File uploads, import Pipelines, etc.

Research & Innovation

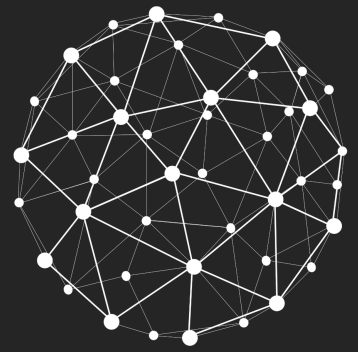
Participation in international research projects, cooperation with universities. Main research and innovation topics: **Agentic AI, Information Retrieval, Knowledge Graphs, GraphRAG**

Cloud, GDPR, Security, High Scalability

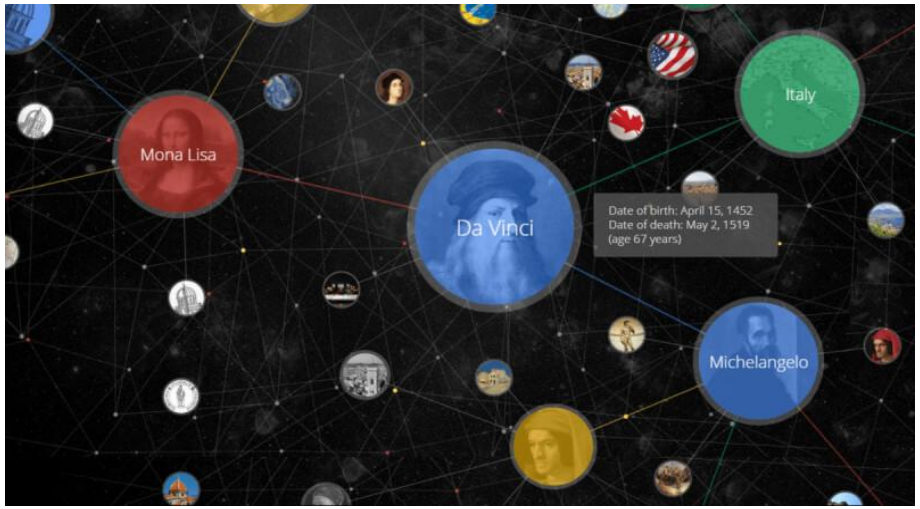
Platform follows the principles of of a **Cloud Native** App and is provided as public or private cloud with different types of SLAs. The platform is GDPR compliant and fulfills enterprise security and data privacy standards. Platform is highly scalable and designed to operate in cluster mode.

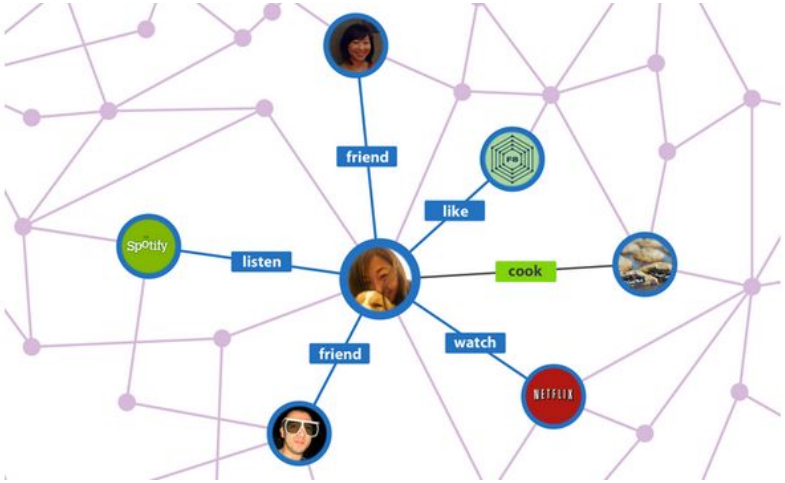


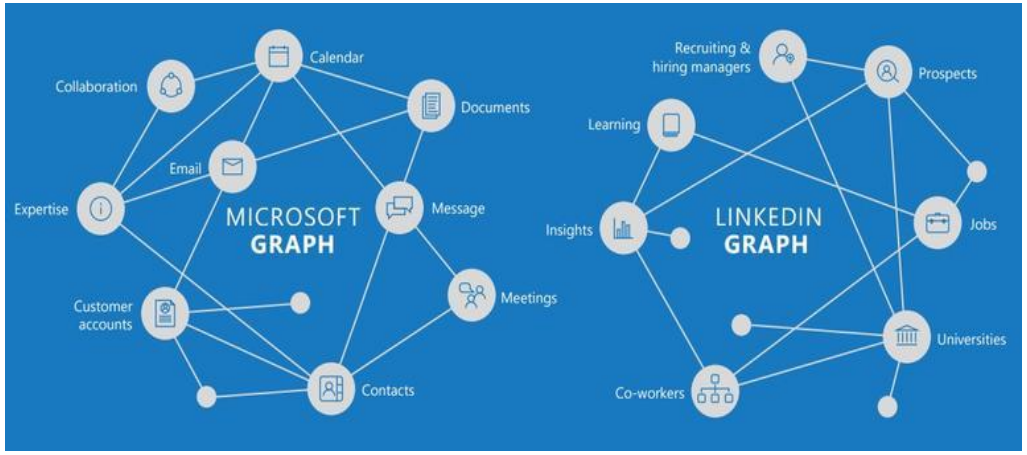
Knowledge Graphs



The rise of Knowledge Graphs



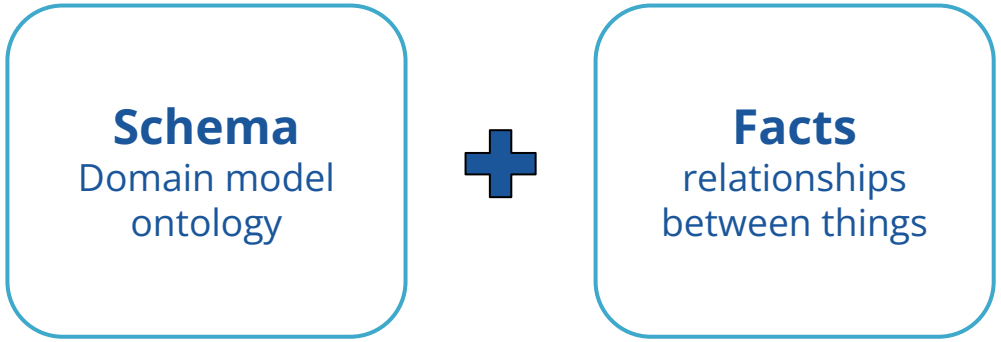




WIKIDATA

Knowledge Graphs

- Models **relationships between things** in a **graph format**
- **nodes** represent **entities or data**
- **edges** represent **relationships between entities**
- store a **domain model** in form of a **schema** or **ontology**
  - type hierarchies
  - domain and ranges of relations/edges

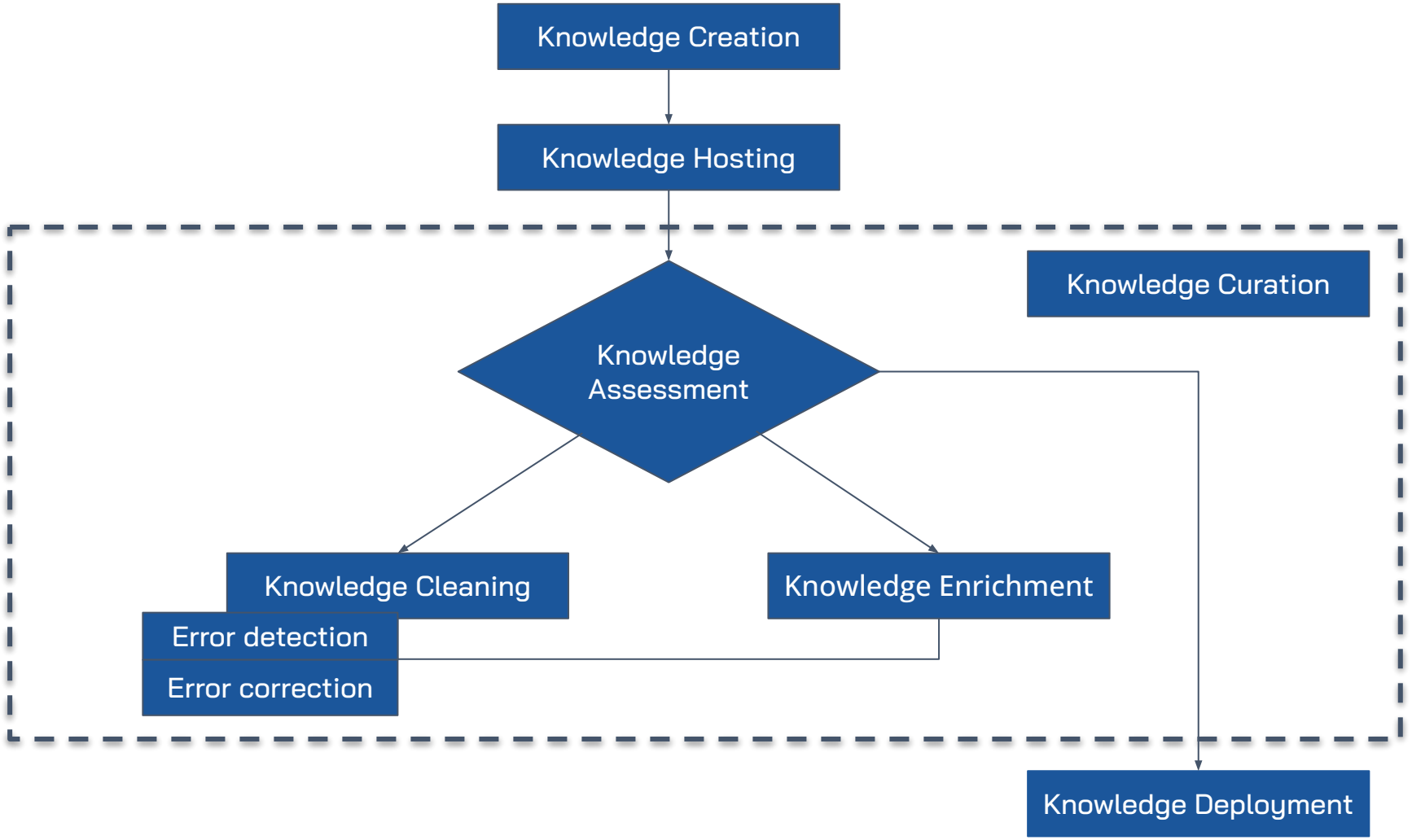


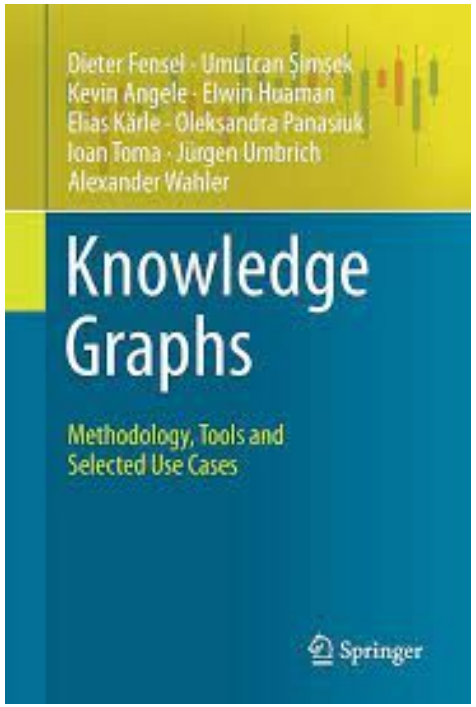
Knowledge Graphs Technologie & Standards

Standards help with the scalable development of knowledge graphs and ensure long-term use by manufacturer-independent solutions

- **World Wide Web Consortium (W3C)**:
  - **RDF(S)** as data model for facts and schema
  - **SPARQL** as query language
  - **R2ML** as mapping language
- **Internet Engineering Task Force (IETF)**:
  - e.g. **URI** - Uniform Resource Identifier
- **Schema.org** vocabulary
  - de-facto standard by Google, Bing, Yahoo, Yandex
- **RDF-Graph Databases**

Knowledge Graph LifeCycle Process





Conversational AI



Conversational AI

- Conversational AI is AI technology designed to engage in natural language conversations with humans.
- Uses natural language processing (NLP) to understand and interpret human language input.
- Generates human-like responses using natural language generation (NLG).
- Powers virtual assistants, chatbots, and other interactive systems for real-time, back-and-forth interactions.
- Contextual awareness allows conversational AI to maintain coherence and personalize interactions.

Knowledge Graphs enabling better Conversational AI

I need a hotel in Cluj from November. 4th to 6th

Natural Language Understanding

Intent: Find Accommodation

Parameters: *DatePeriod:* 4-6.11.2025 *Type*: Hotel

Dialog System

Action: Show Hotels

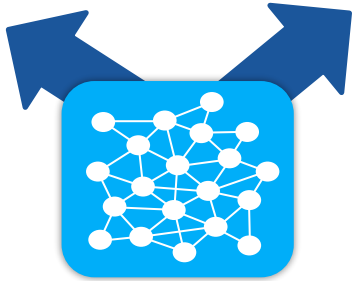
Natural Language Generation

Here is a list of hotels in Cluj that are available during the requested date period: …

From Natural Language to Intents and Parameters

Fetching results from data, content and services

Formulate the answer



Chatbots setup and trained out of Knowledge Graphs

I'm looking for a restaurant serving traditional romanian food in Cluj.

Here are some restaurants that match your

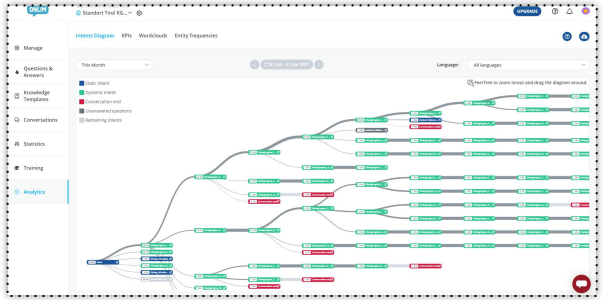


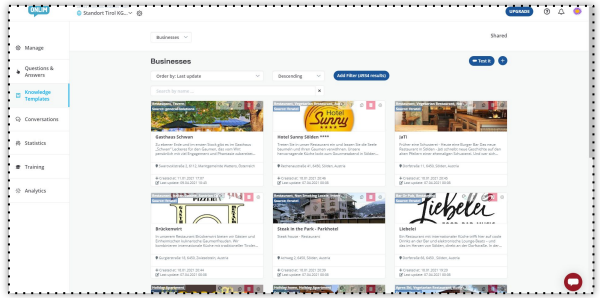
Restaurant Roata
Currently open



Casa Maramuresean
Currently open

Learning intents and data semantics out of the knowledge graph.





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Query generation

Natural language generation

We understand the question (data, context, semantics), query the knowledge graph and provide the right answer in natural language.

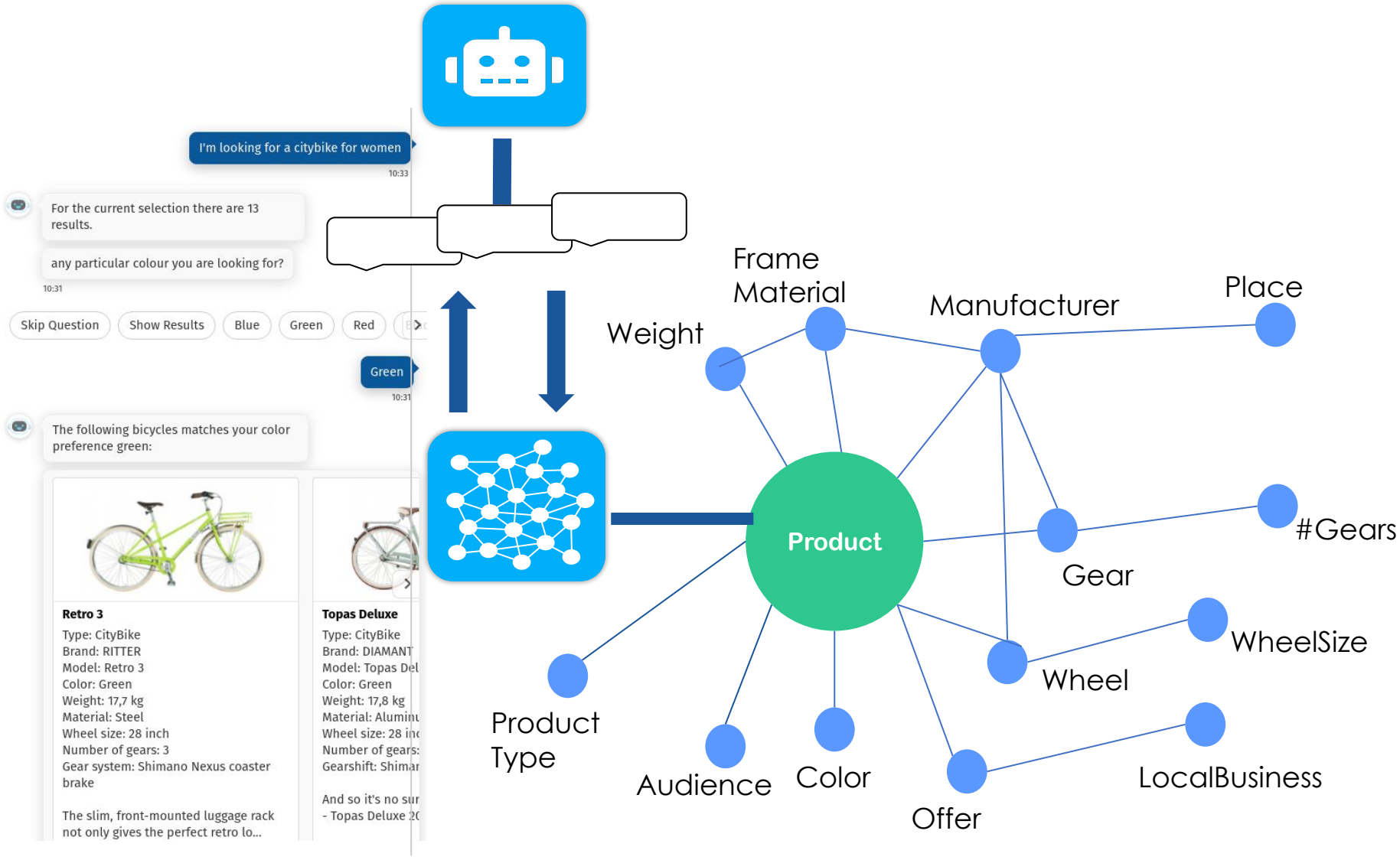
Knowledge Graphs enabling better Conversational AI

- Use the structure of the knowledge graph (i.e. entities, relations between entities) to support the Natural Language Understanding
  - **Entities** from the Knowledge Graphs become **Entities/Slots** in the NLU Agent
  - **Relations** from the Knowledge Graphs become **Intents** in the NLU Agent
  - When new knowledge get in the Knowledge Graph (new Entities, new Relations) the NLU Agent is extended with new **Entities/Slots** and **Intents**

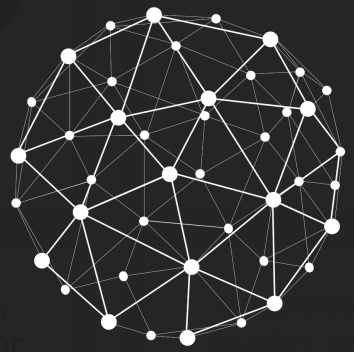
- Use the knowledge graph to support the Natural Language Generation
  - Automatically generate questions, answers from the knowledge graph

Knowledge Driven Dialog

- **Building dynamically an unlimited number of dialogues** based on the knowledge
- **Run human like conversations:** chatbot solves & clarifies issues and topics based on the knowledge

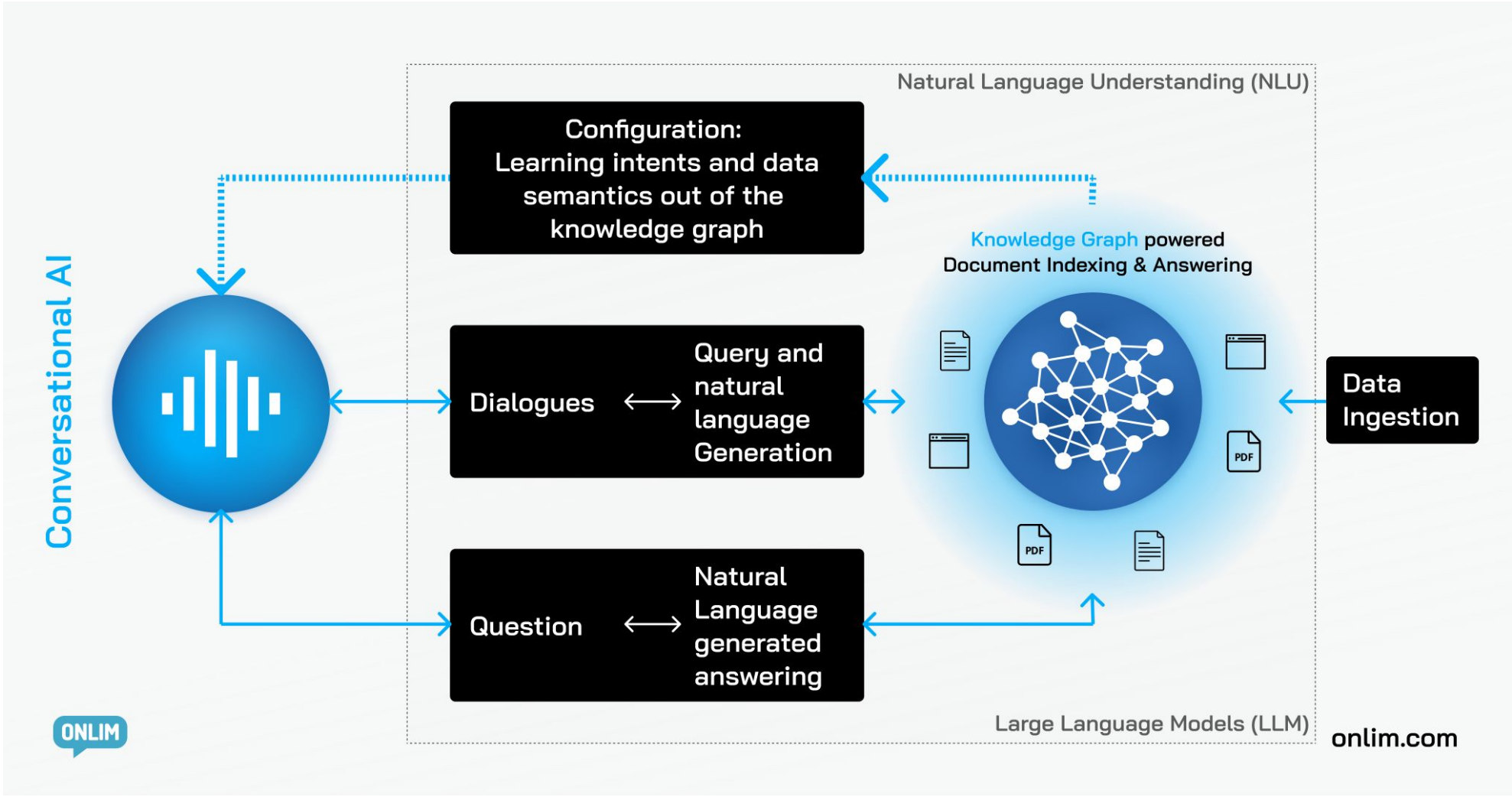


Retrieval Augmented Generation (RAG) and RAG KG





Onlim Platform Knowledge Graphs + LLM Integration



Retrieval Augmented Generation

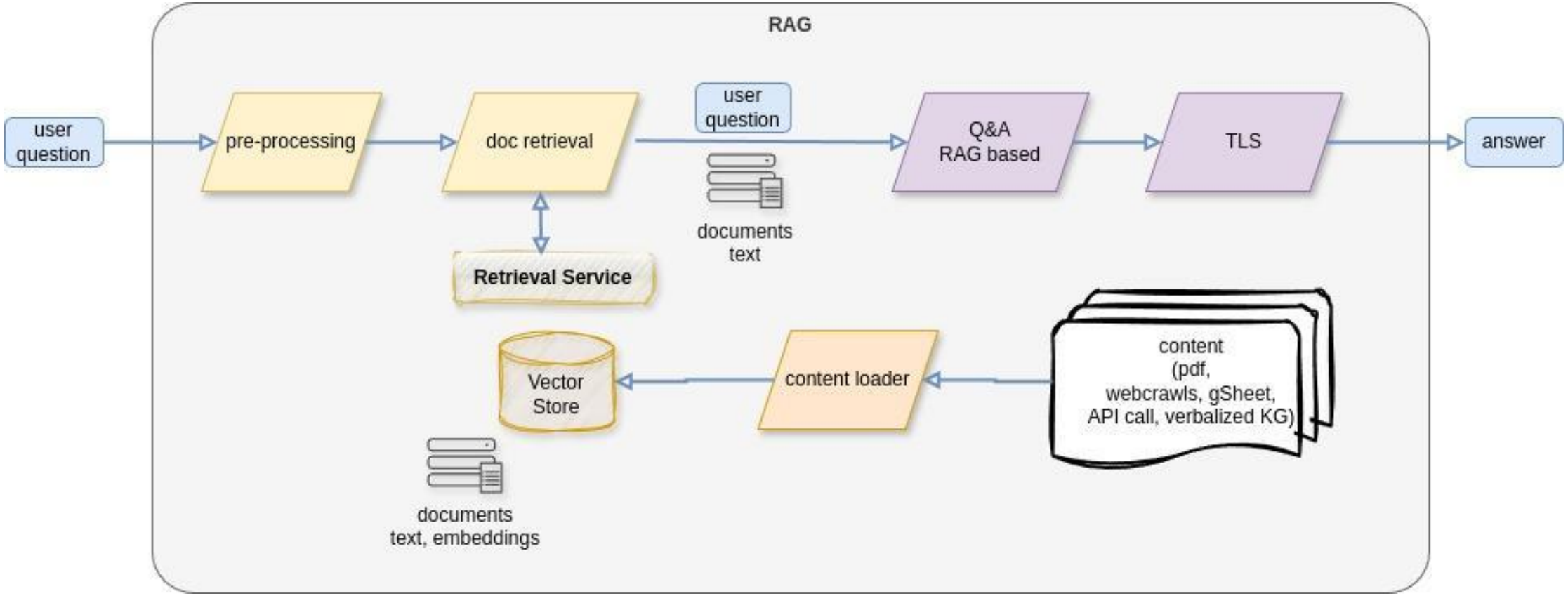
- **Retrieve** relevant contextual information from data sources
- Contextual information + user prompt are sent to an LLM
- The LLM knowledge is **augmenting** with contextual information
- Used to improve the model output i.e. **generation**

- Enhances LLMs by integrating retrieval mechanisms
- Connects LLMs with information sources (documents)
- Ensures that LLM produced content is contextual relevant



LangChain

Retrieval Augmented Generation



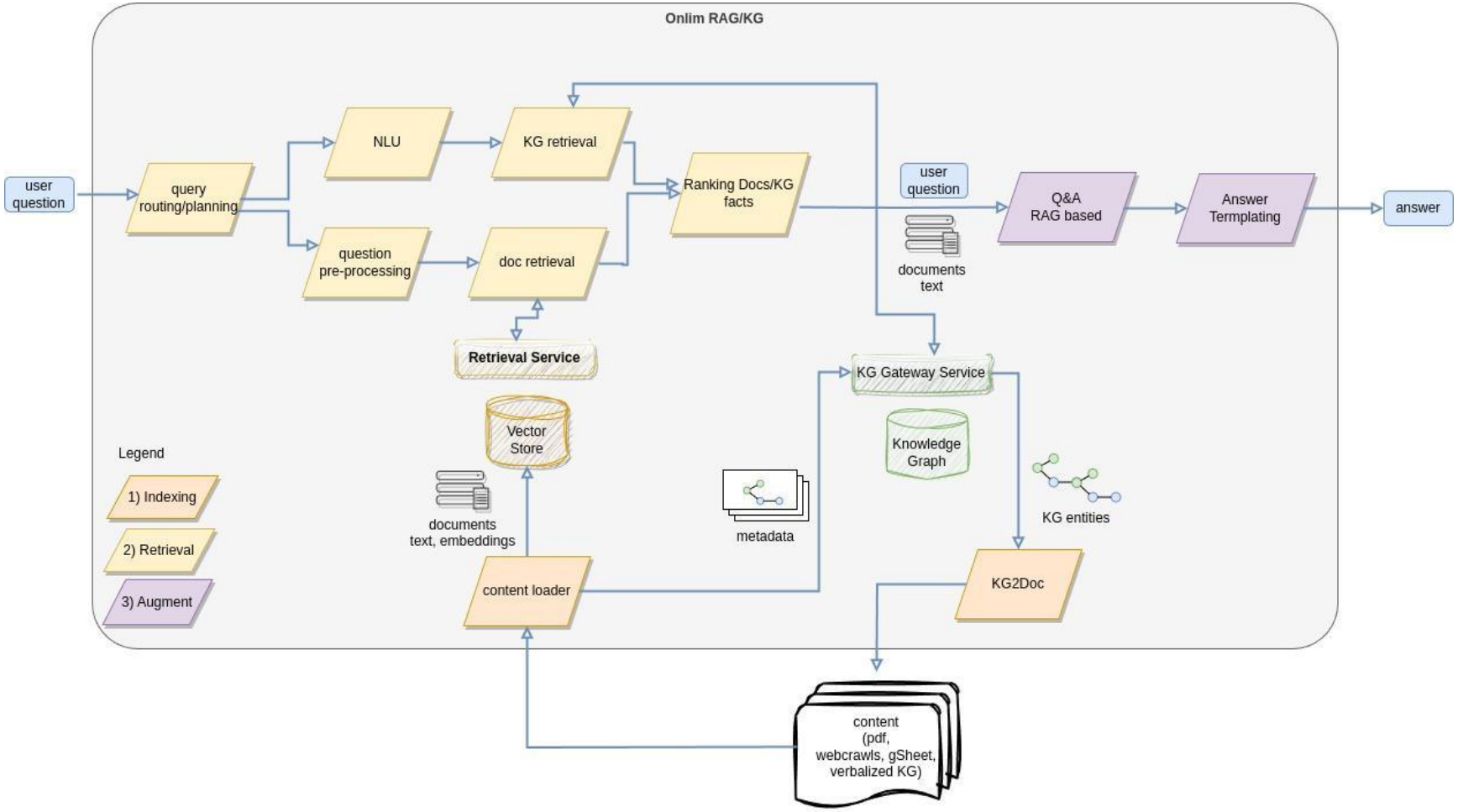
RAG support in Onlim



Unstructured data
(e.g PDFs, Website, Text ...)

Integrates chatbots with unstructured data, delivers insights and streamlines conversations

Onlim Platform: Hybrid - Retrieval Augmented Generation (RAG) - Knowledge Graphs



Conceptual Architecture of our Hybrid RAG - KG system using the advantages of both technologies to minimize hallucinations and optimise the conversational experience

Everything necessary is integrated on one platform

Agentic AI



Knowledge graph – Data platform

Integrates enterprise data and services, interlinks them and applies semantics for machine understanding of these data.

Multi-channel platform

Connects the chatbot to website chat, voice assistants, messengers, phone systems and external APIs.

Agentic AI

- **Autonomous Decision-Making & Action**: Advanced AI that independently makes decisions and takes actions.
- **Continuous Learning & Improvement:** Learns and improves over time through ongoing interaction and experience.
- **Powered by Advanced Models:** Built upon powerful models like Large Language Models (LLMs) for reasoning and adaptation.
- **Executes Complex Tasks:** Capable of understanding and carrying out multi-step, intricate tasks.
- **Multimodal Data Processing:** Processes and understands various forms of data, including text, images, and audio.
- **Interacts & Collaborates with Environment:** Engages with its surroundings, other systems, and utilizes tools to achieve goals.
- **Maintains Context & Enhances Capabilities:** Uses memory and past experiences to maintain conversational context and improve performance.

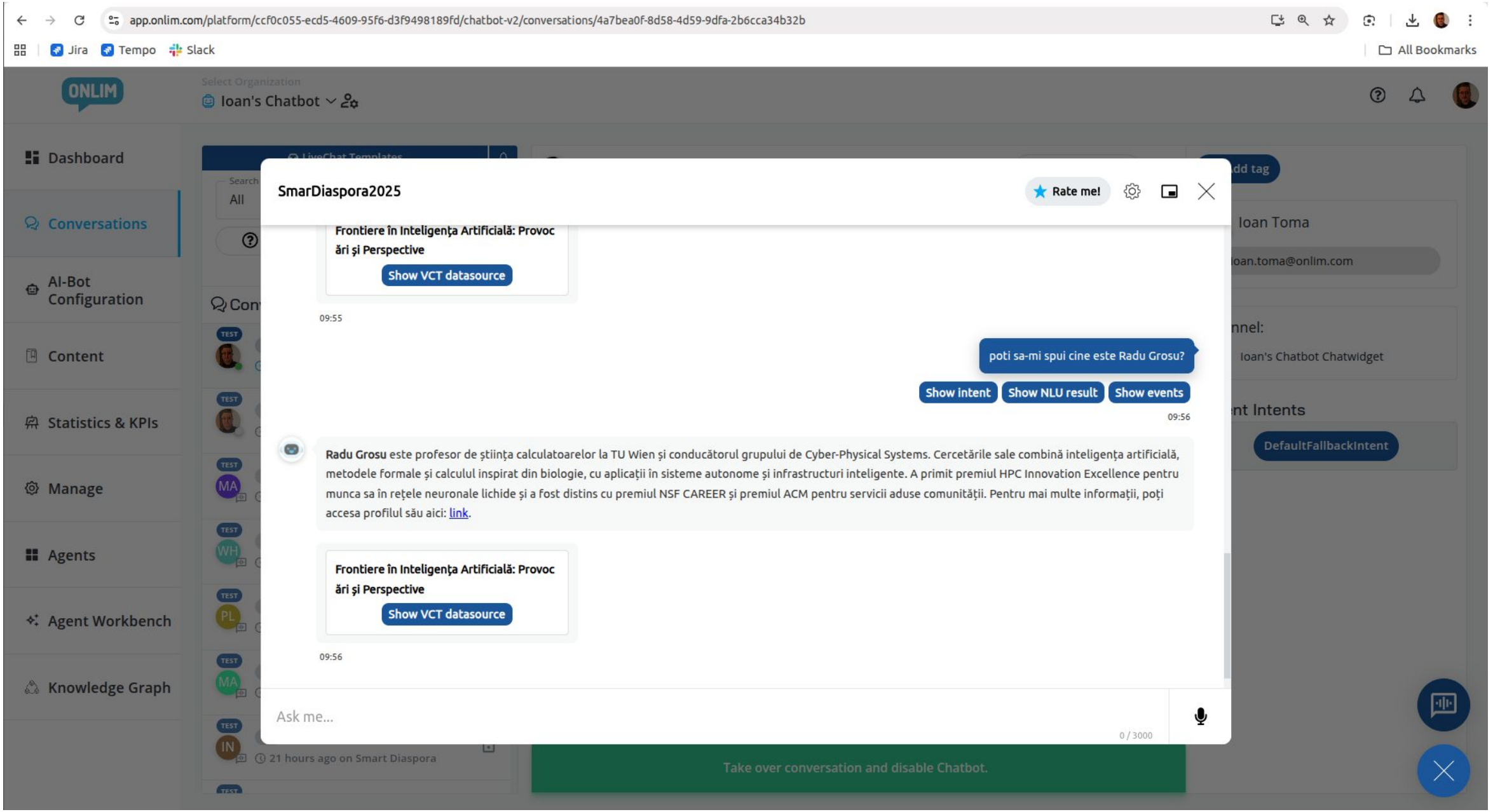
Agentic AI Frameworks

- Agentic frameworks provide structured development tools.
- These frameworks facilitate creating autonomous agent systems.
- Many frameworks support different agent architectures.
- Frameworks often include libraries for agent interaction.

Agentic AI Frameworks

Framework	No-code	Tools	Agents Orchestration
OpenAI Agents API	❌	Predefined (web, file/code)	Threads
Google Vertex AI	❌	Predefined (search, vision, etc.)	Flow-based, native A2A
Anthropic Agents API	❌	Predefined (web, file/code)	Tool-calling only
Microsoft AutoGen	❌	Predefined (REPL, code)	Programmatic chaining
Autogen Studio	✅	Predefined	Visual agent chaining
LangGraph	❌	LangChain Functions	Graph (DAG)-based flow
CrewAI	❌	Predefined, 40+ integrations	Flow- and role-based
n8n	✅	Predefined, 100+ integrations	Workflows, sub-workflows
Make	✅	Predefined, 100+ integrations	Scenarios, sub-scenarios

Demo


app.onlim.com/platform/ccf0c055-ecd5-4609-95f6-d3f9498189fd/chatbot-v2/conversations/4a7bea0f-8d58-4d59-9dfa-2b6cca34b32b
Jira
Tempo
Slack
All Bookmarks
ONLIM
Select Organization
Ioan's Chatbot
Dashboard
Conversations
AI-Bot Configuration
Content
Statistics & KPIs
Manage
Agents
Agent Workbench
Knowledge Graph
SmarDiaspora2025
Rate me!
Frontiere în Inteligența Artificială: Provocări și Perspective
Show VCT datasource
09:55
poti sa-mi spui cine este Radu Grosu?
Show intent
Show NLU result
Show events
09:56
Radu Grosu este profesor de știința calculatoarelor la TU Wien și conducătorul grupului de Cyber-Physical Systems. Cercetările sale combină inteligența artificială, metodele formale și calculul inspirat din biologie, cu aplicații în sisteme autonome și infrastructuri inteligente. A primit premiul HPC Innovation Excellence pentru munca sa în rețele neuronale lichide și a fost distins cu premiul NSF CAREER și premiul ACM pentru servicii aduse comunității. Pentru mai multe informații, poți accesa profilul său aici: link.
Frontiere în Inteligența Artificială: Provocări și Perspective
Show VCT datasource
09:56
Ask me...
0 / 3000
Ioan Toma
ioan.toma@onlim.com
DefaultFallbackIntent
21 hours ago on Smart Diaspora
Take over conversation and disable Chatbot.

app.onlim.com/platform/80310490-3c5a-4f5a-abfa-3726a4fb6fb6/knowledge-manager/explore/graph?entityId=https:%2F%2Fperks-project.eu%2Floto%2F8c992832-b2e0-4019-86d2-e3d223bfc5fc&graphUri=%2F803104...

Jira | Tempo | Slack | All Bookmarks

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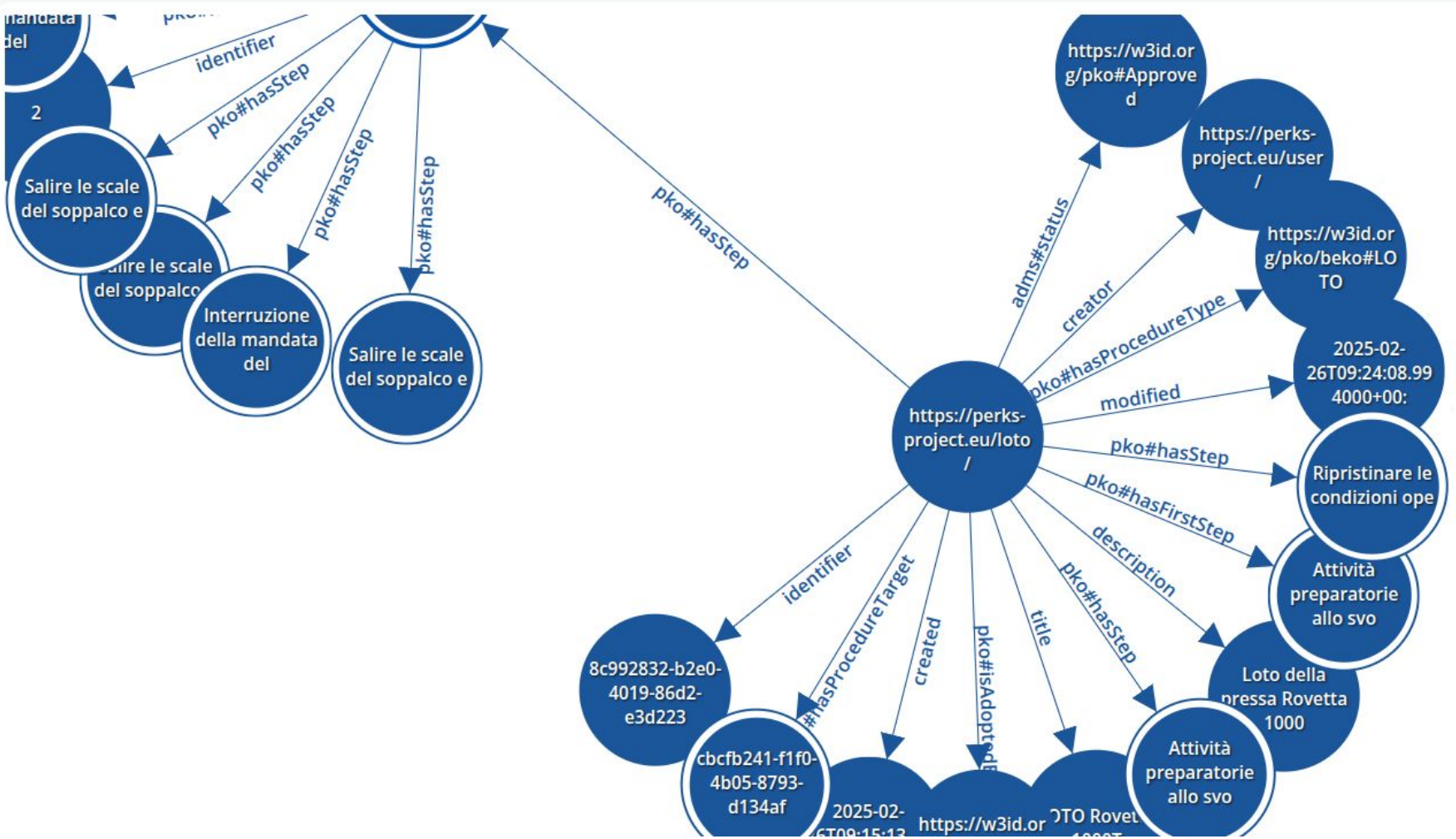
Select Organization
PERKS - Beko

- Dashboard
- Conversations
- AI-Bot Configuration
- Content
- Statistics & KPIs
- Manage
- Agents
- Agent Workbench
- Knowledge Graph

Graph: All graphs in PERKS - Beko

Select Entity: ID: https://perks-project.eu/loto/8c992832-b2e0-4019-86d2-e3d223bfc5fc

Click here to see information about the search syntax



Challenges

- Managing complexity in Knowledge Graph creation.
- Ensuring accuracy and relevance in Conversational AI.
- Overcoming limitations in RAG's information retrieval.
- Addressing ethical concerns with Agentic AI.

Summary

- LLMs are transforming human-machine interaction through natural language.
- Knowledge Graphs are vital to address LLM factual inaccuracies.
- Agentic AI is re-emerging, leveraging LLMs for autonomy.
- Agentic AI offers automation but faces security and bias challenges.
- Evolving LLMs, KGs, and Agentic AI present numerous opportunities for advancing the field of AI

Thank you!



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