Deltares

Development and application of LLMs-based tools and agents at Deltares

DigiShape Day

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Verification plot explainer

River operation forecaster:

You want to assess the performance of your forecasts from the past months using the verification dashboard. You get a bunch of plots: rank histogram, reliability diagram, point plot…

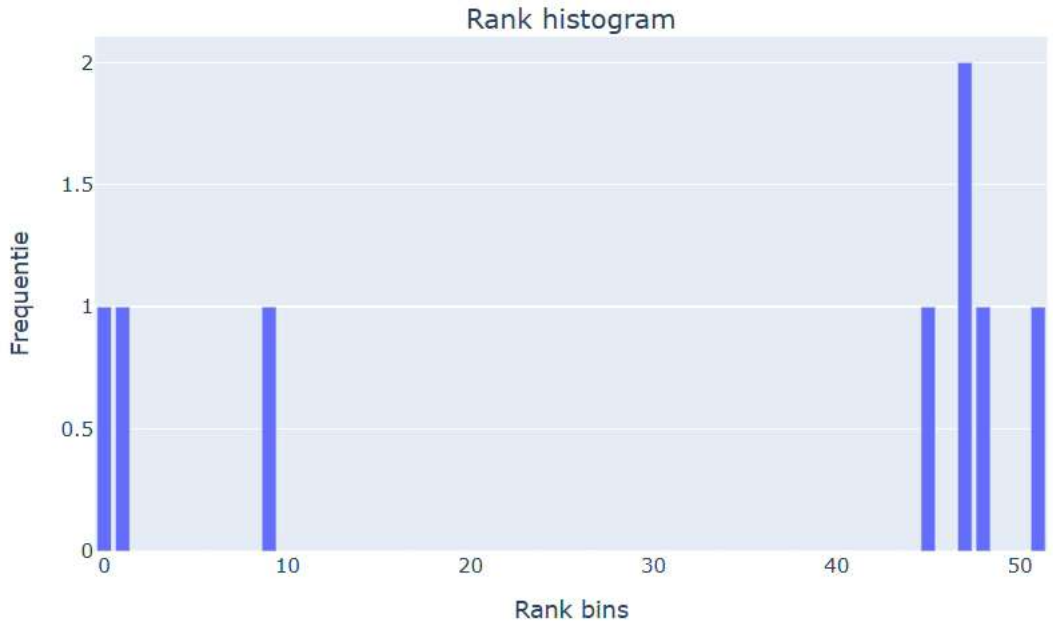
“The plots are nice, but what do they actually mean?”

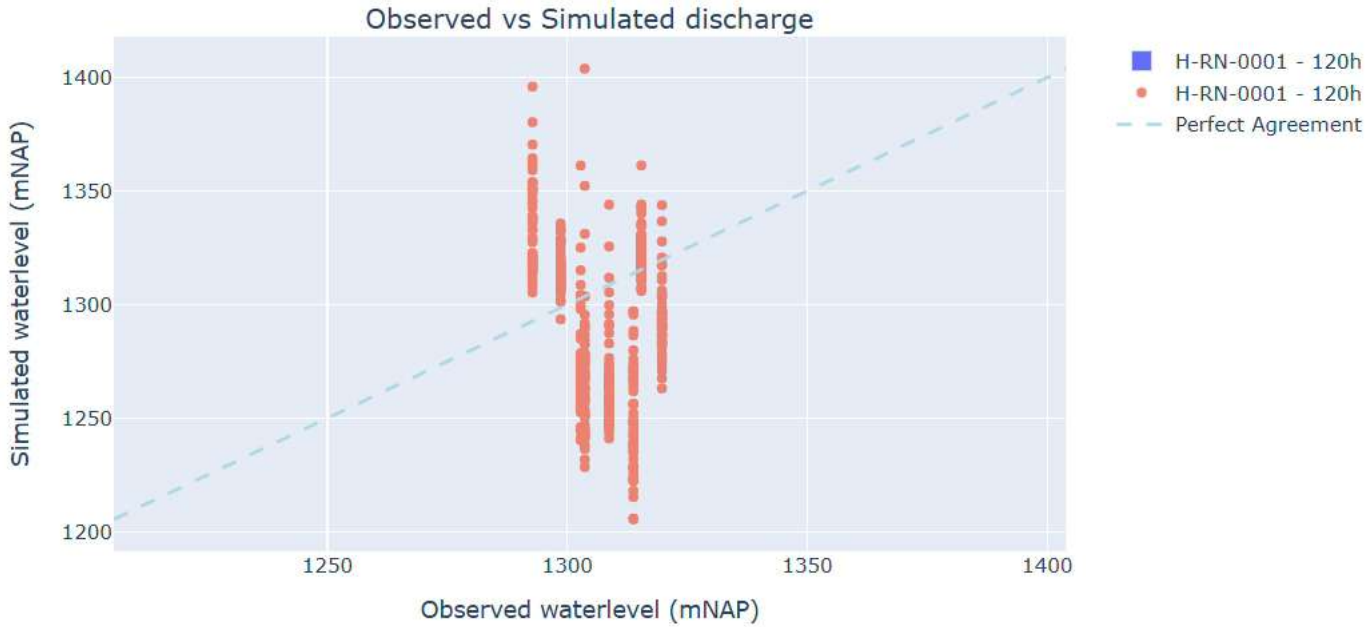
**This project is developed together with Jurian Beunk from Deltares*

CRPS per station | CRPS & Rank histogram | Observed vs Simulated

Stations: × H-RN-0001

Forecast horizon (uur): 120h





Explain these plots

Errors | Callbacks | v3.2.0 | Server

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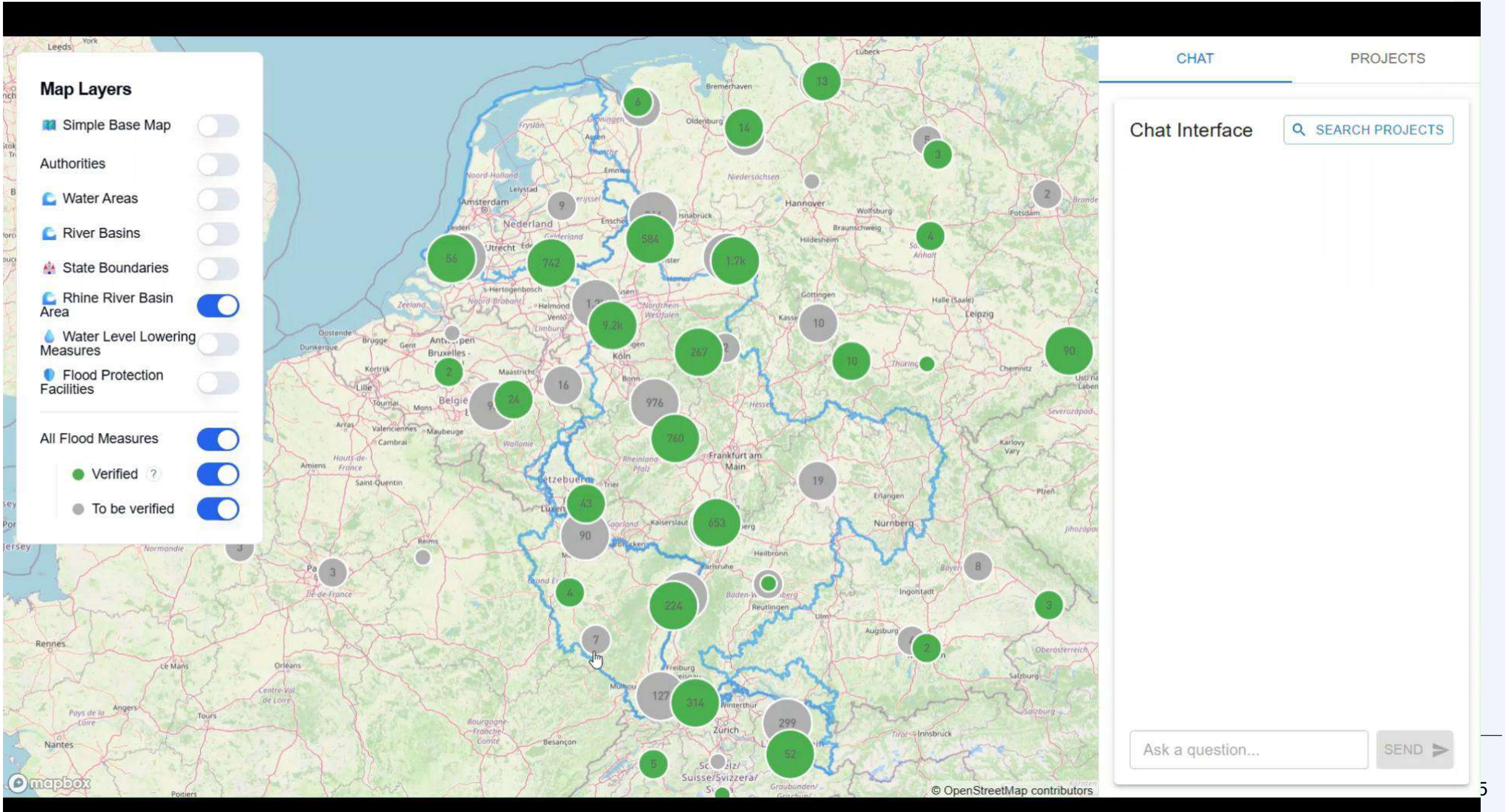
Inventory of flood measures

Policy maker/expert in flood risk management:

“What’s happening across the basin? What measures have been taken upstream? Are they doing enough?”

But the information is scattered – documents about flood measures at different regions across the basin – it takes ages to piece together the full picture.

*This project is developed together with Jude King and Kymo Slager from Deltares


Map Layers
Simple Base Map
Authorities
Water Areas
River Basins
State Boundaries
Rhine River Basin Area
Water Level Lowering Measures
Flood Protection Facilities
All Flood Measures
Verified
To be verified
CHAT
PROJECTS
Chat Interface
SEARCH PROJECTS
Ask a question...
SEND
© OpenStreetMap contributors
mapbox

Water management agent

Typical question at a water authority:

You need to know the current state in the catchment: rainfall, water levels, infrastructure status.

“I need to ask the meteorology people, ask the hydrologist, check a few dashboards… ”

It takes time and coordination just to get the full picture.

*This project is developed by Jude King from Deltares

Available Tools

- RAG Search Tools
- Analysis Tools
- Visualization Tools
- Quality Control Tools

quality_control_check - Verify content quality

• Ask for: *'Check if this report meets standards'*

compose_final_response - Final composition

• Ask for: *'Put together a final report'*

continue_after_feedback - Handle feedback

• Use when agent asks for your input

get_final_approval - User approval

• Final step before completing tasks

- Strategic Planning Tools
- Human Interaction Tools

ask_human - Get user guidance

Deploy

Water Management Agent - Live Chat

Live Water Management Chat

Clear Chat

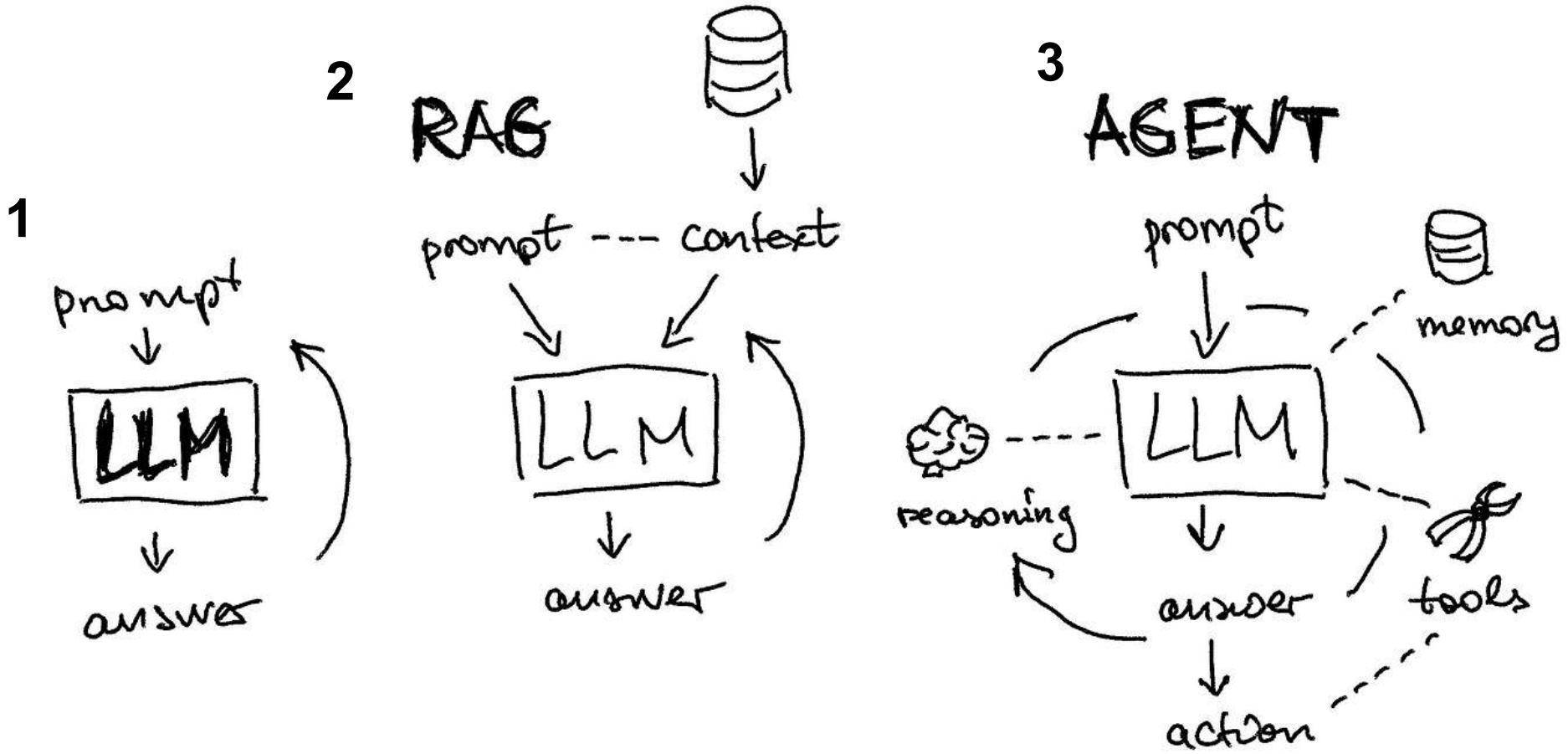
Ask about water management...

Live Status

Ready for your question

LLMs/agent – Three main types

Tool architecture: increasing complexity/functionality



Source: Intro to LLM Agents with Langchain: When RAG is Not Enough | by Alex Honchar | TDS Archive | Medium

Overview of projects (since 2023)

Sequential LLMs/ Data mining

- Groundwater salinity modelling
- Flash flood events in Italy
- Dike inspections to structured data

RAG

- Transboundary AI cooperation
- FEWS chatbot
- Voice for nature
- 3D salinity modelling in the Mediterranean
- AI tool for governance and biophysical data
- Coastal classification and geospatial reasoning

Agentic workflow/Agents

- State of the Coast
- Inventory of Flood Measures
- Subsurface modelling

Centralized development of LLMs/agents at Deltares

Multiple independent LLMs-based projects

DLLMForge

Modular, reusable components

Speed up development and ensure interoperability and quality for future projects

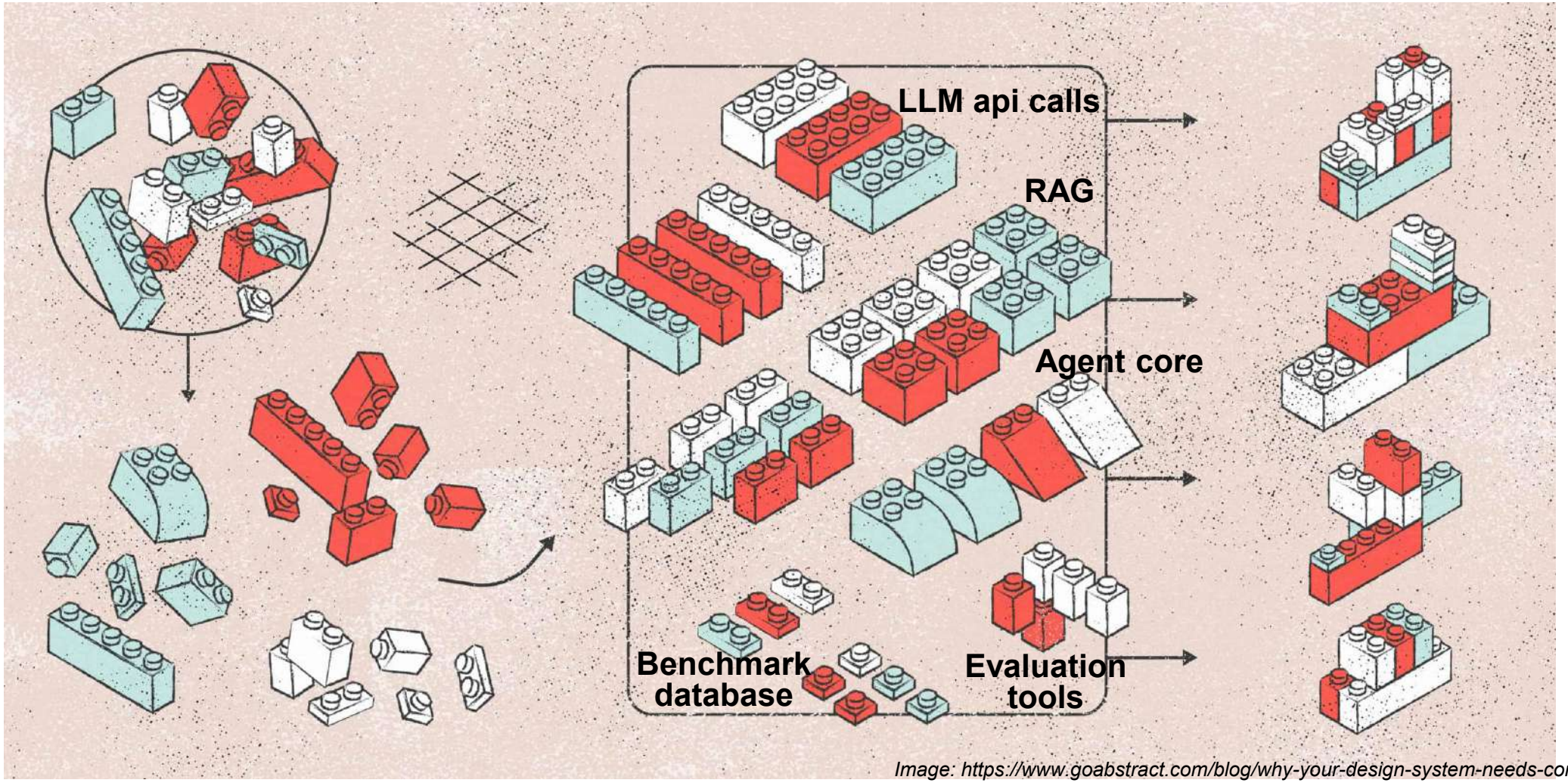
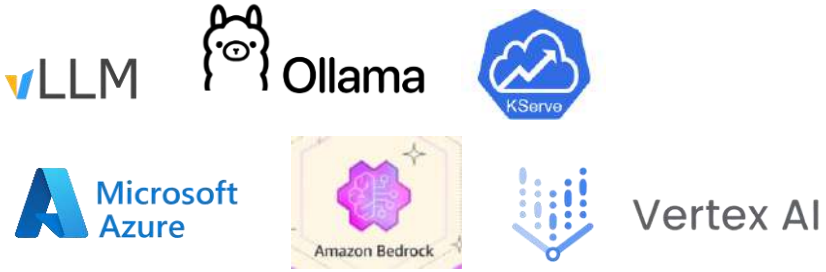


Image: https://www.goabstract.com/blog/why-your-design-system-needs-content-strategy

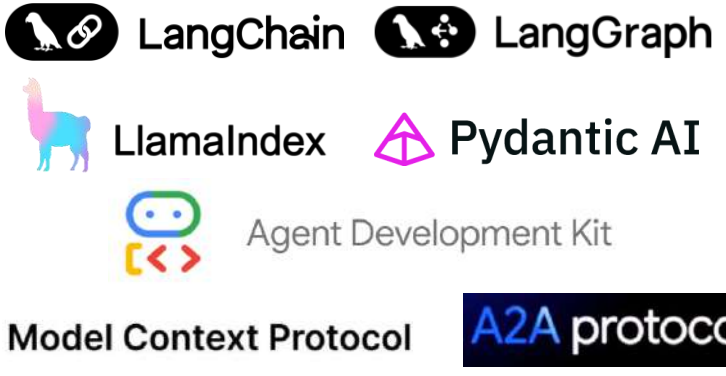
LLM Ecosystem

- Model development
  Training

- Model serving
  Inference



- Agents
  Connect models to humans, tools, apps, data and agents



Points for discussion

- How to make choices among the fast-growing options of LLMs, infrastructures and frameworks?
- How can agents developed by different organizations work together? Do the agents need to share the same model, infrastructure, or standards?
- How to evaluate and maintain the performance of agents? Do we as a community need a shared perspective of quality assessment, evaluation framework with standard methods and metrics?

Contact

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