Panel: Ontology and Agent Memory – Turning Research into Product Capabilities

Position statement

- Ontologies and structured knowledge form a **persistent semantic layer** that **connects memory, reasoning, and action**.
- An AI agent relying on a **Large Language Model lacks an explicit world model**,
  - at least a model that provides a shared understanding of the part of the world that is relevant for the tasks the agent may need to perform,
  - **along with a specification of what actions are possible and what constraints apply**
- Relying on **implicit knowledge and short-term memory**, gives rise to several **challenges:**
  - **verifying multi-hop reasoning and handling change**, which may **give rise to conflicts and invalidate previously held "beliefs"**.
  - Additional complexity: **information exchange, coordination and/or delegation**
  - **The agents need shared reference, not just context.**

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- **Around Ontologies and KGs we can:**
  - **reason consistently**
  - **trace provenance**
  - **generate new knowledge**
  - **explain results of reasoning processes that are auditable in all their steps**
  - **build axiomatic theories accounting for evolution in dynamic environments.**
- As agents are not passive entities, **their behavior should be governed by their ability specifications and overarching principles,** which determine the capacity in which they may compose actions and tasks into complex workflows (manifestation of autonomy).
- **Furthermore, agents should have a queryable internal state**
  - **and an introspective ability built on top of that.**