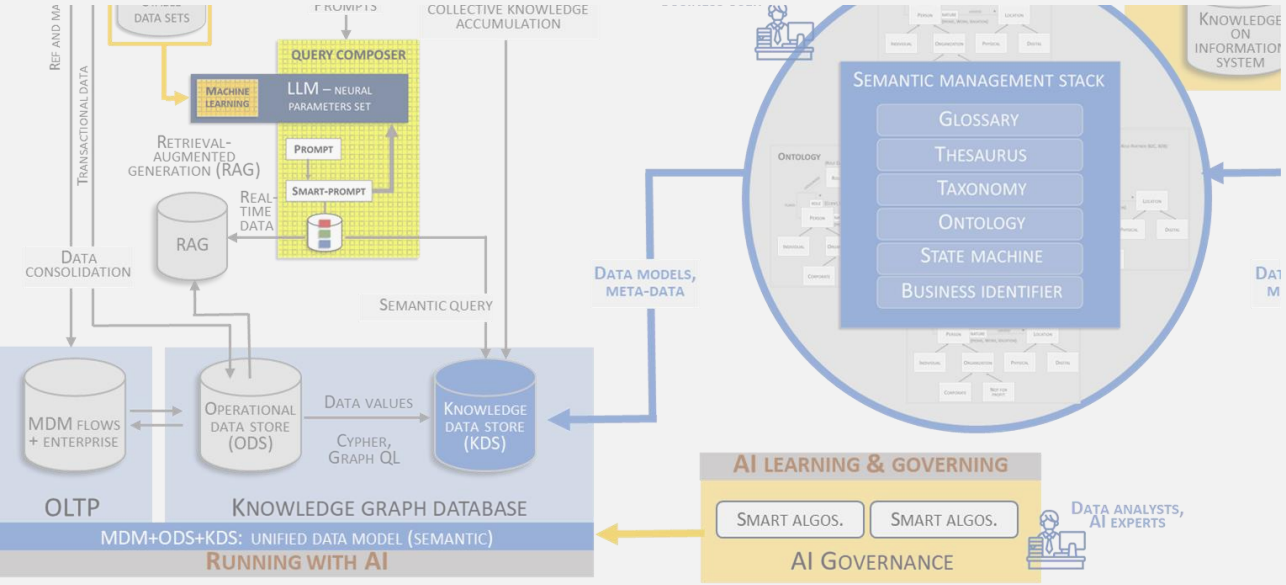

SEMANTIC INFORMATION SYSTEM - SIS

KNOWLEDGE GRAPH DATABASE & LLM

pierre.bonnet@hlfl-consulting.com – November 11, 2023

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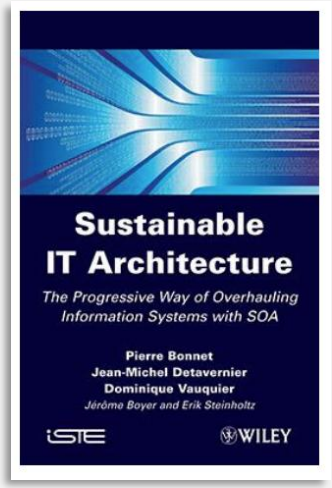
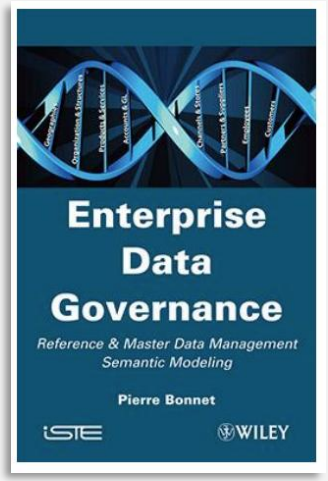
PIERRE BONNET

PIERRE.BONNET@HLFL-CONSULTING.COM



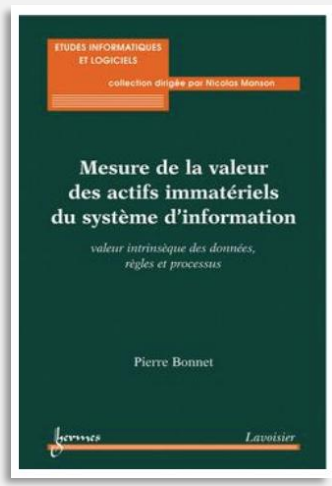
EA + SOA

HOW TO LEVEL-UP TOGAF AND ZACHMAN



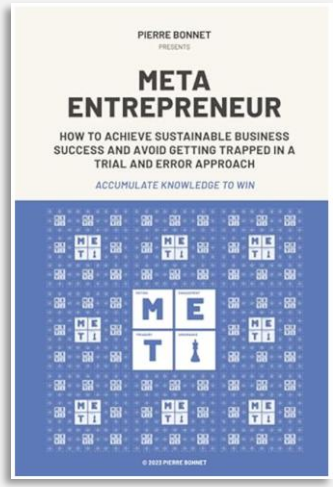
DATA

MODELING AND GOVERNANCE AT THE ENTERPRISE LEVEL



IS RATING

MEASURING THE INTANGIBLE ASSETS OF THE IS: PROCESSES, RULES AND DATA



MINDSET

ENCOURAGING A POSITIVE MINDSET TO FACE THE COMPLEXITY OF THE WORLD BASED ON KNOWLEDGE ACCUMULATION

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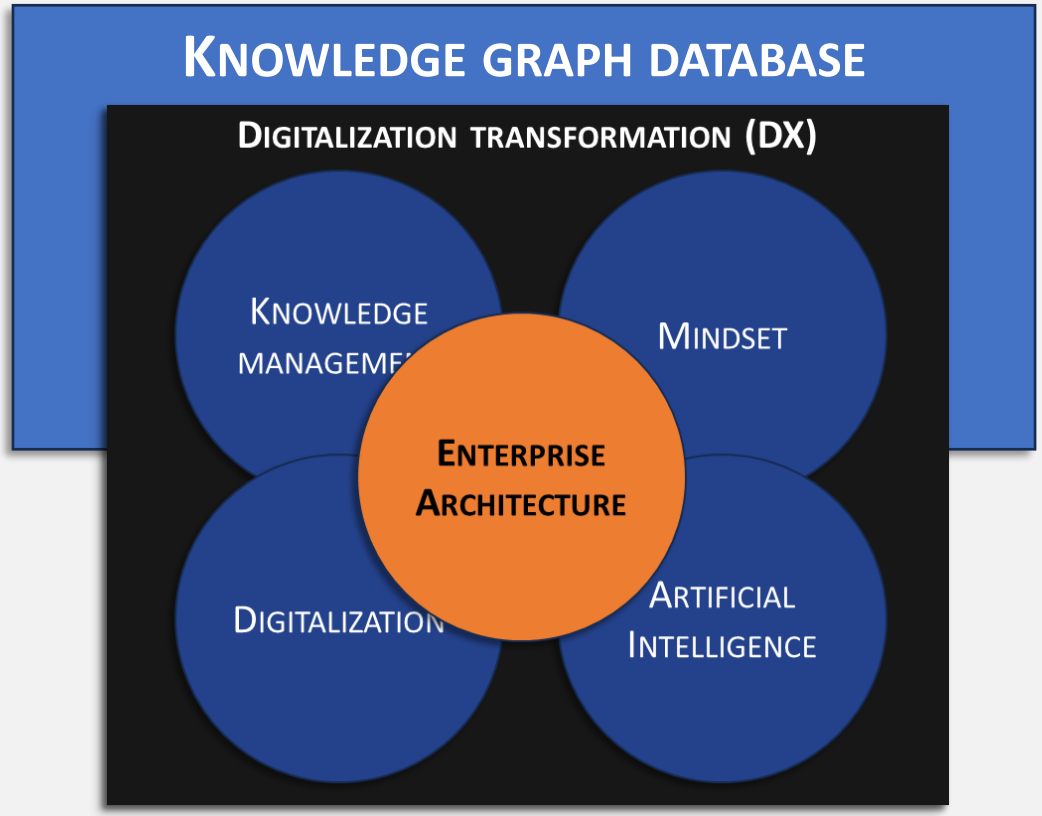

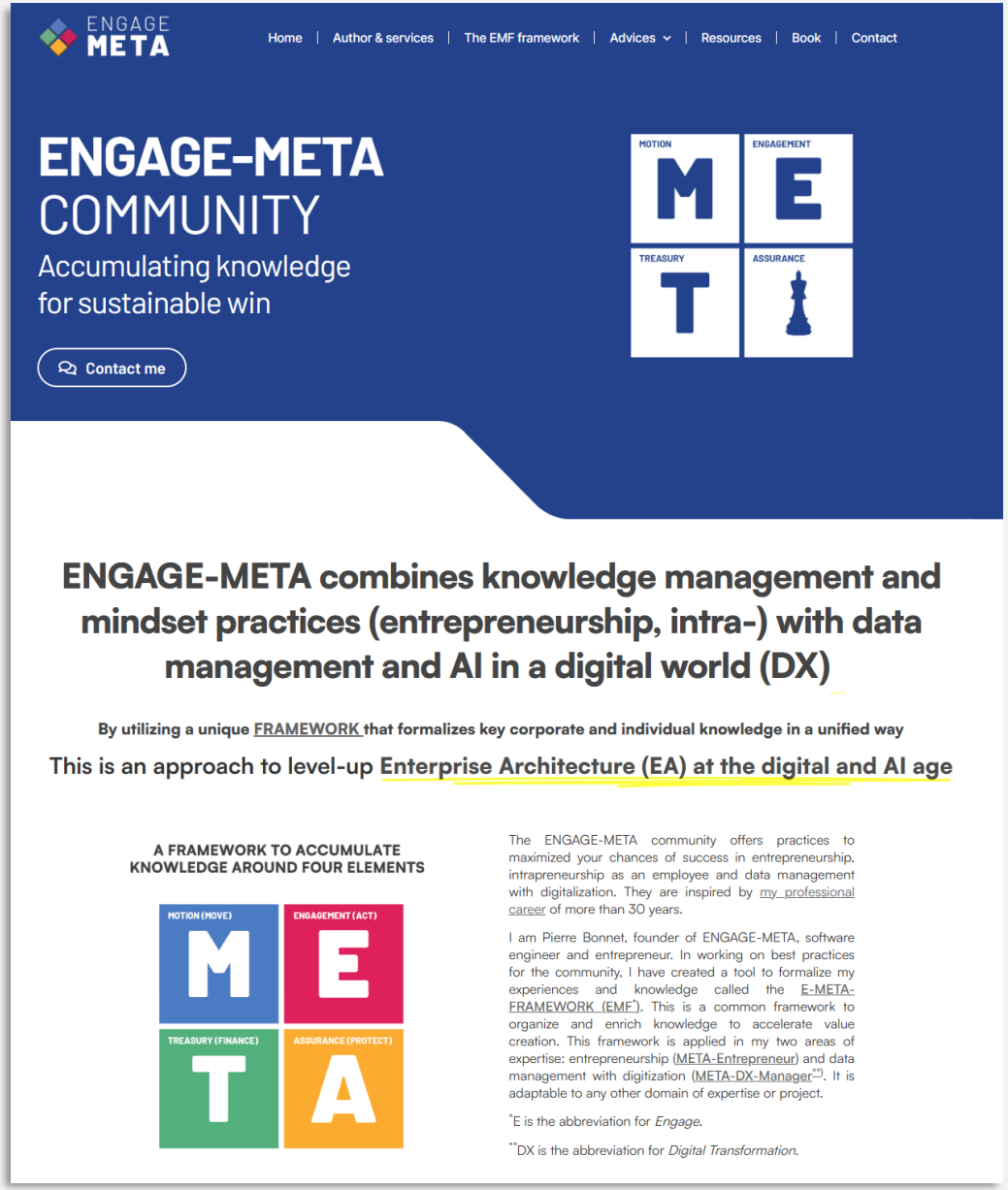

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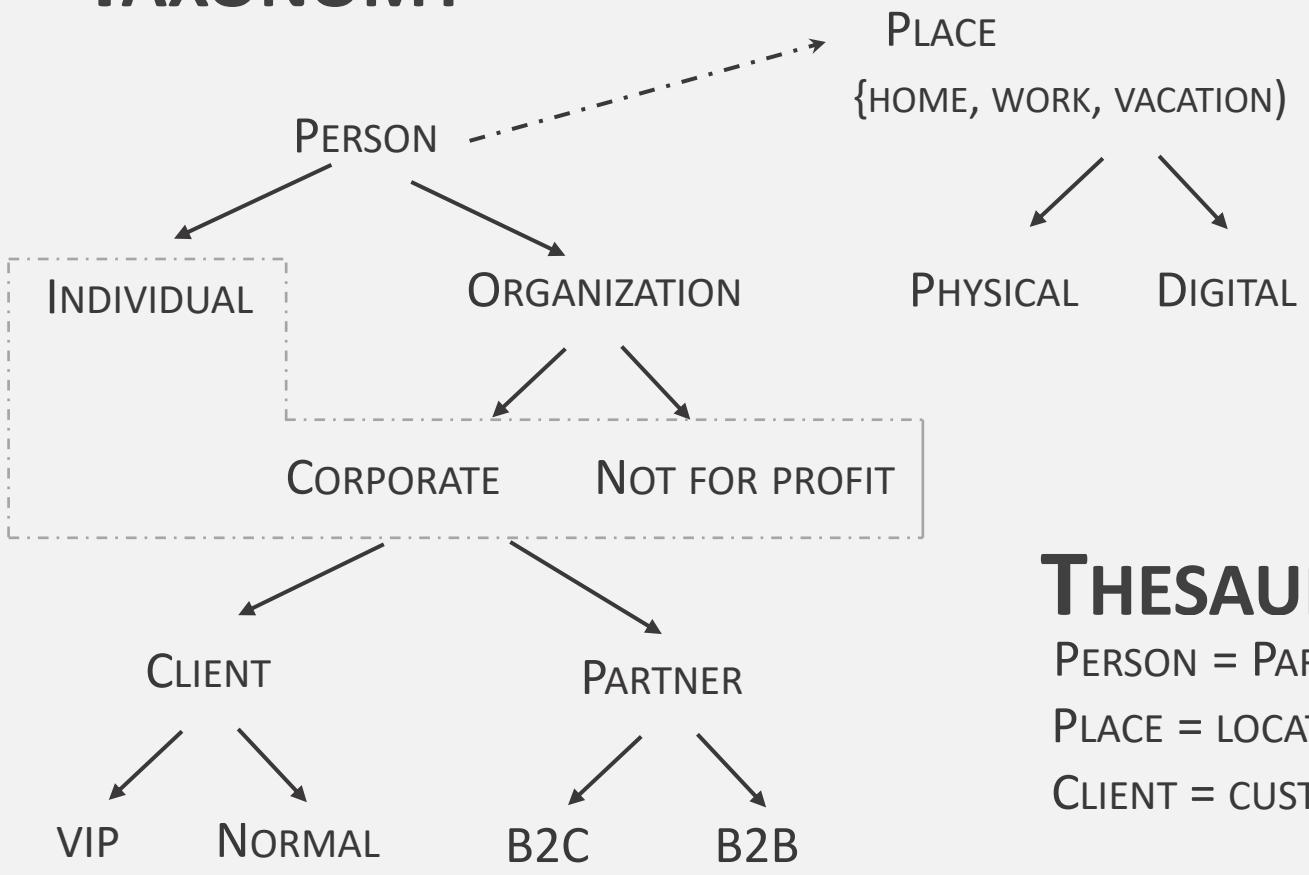
SEMANTIC MODELING?

Business concepts design

Taxonomy



Thesaurus

Person = Party

Place = location = address

Client = customer

Glossary

Person

Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do eiusmod tempor incididunt

Individual

Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do eiusmod tempor

Client

Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do eiusmod tempor incididunt

Partner

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Organization

Lorem ipsum dolor sit amet, consectetur

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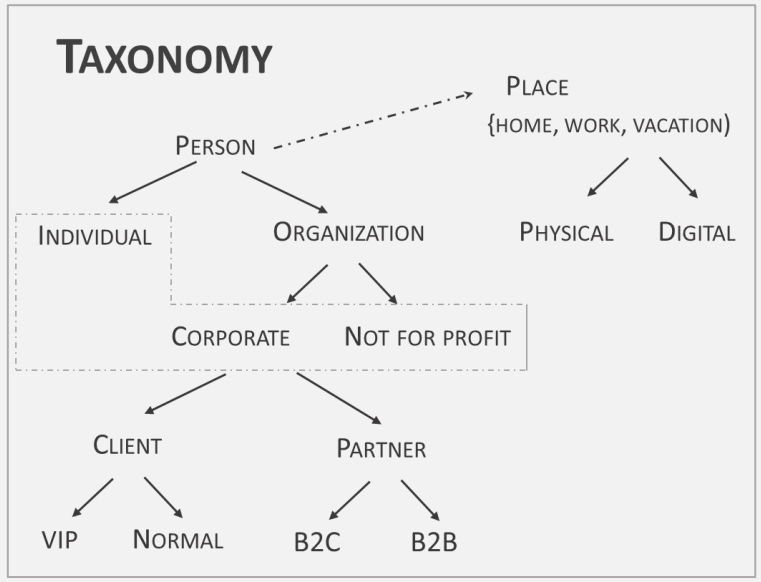
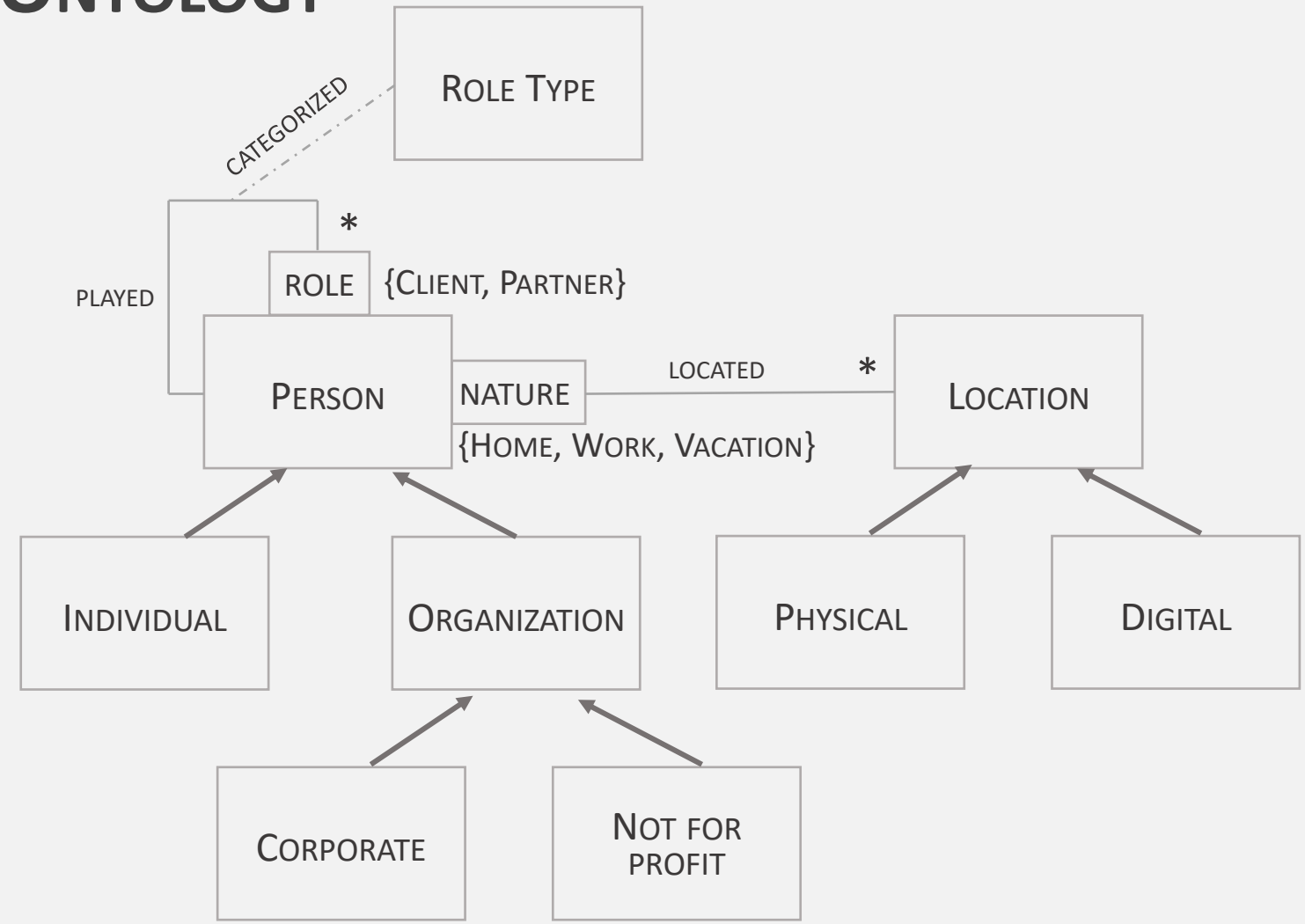
BUSINESS CONCEPTS DESIGN



ONTOLOGY

{ROLE CLIENT: VIP, NORMAL, ROLE PARTNER: B2C, B2B}



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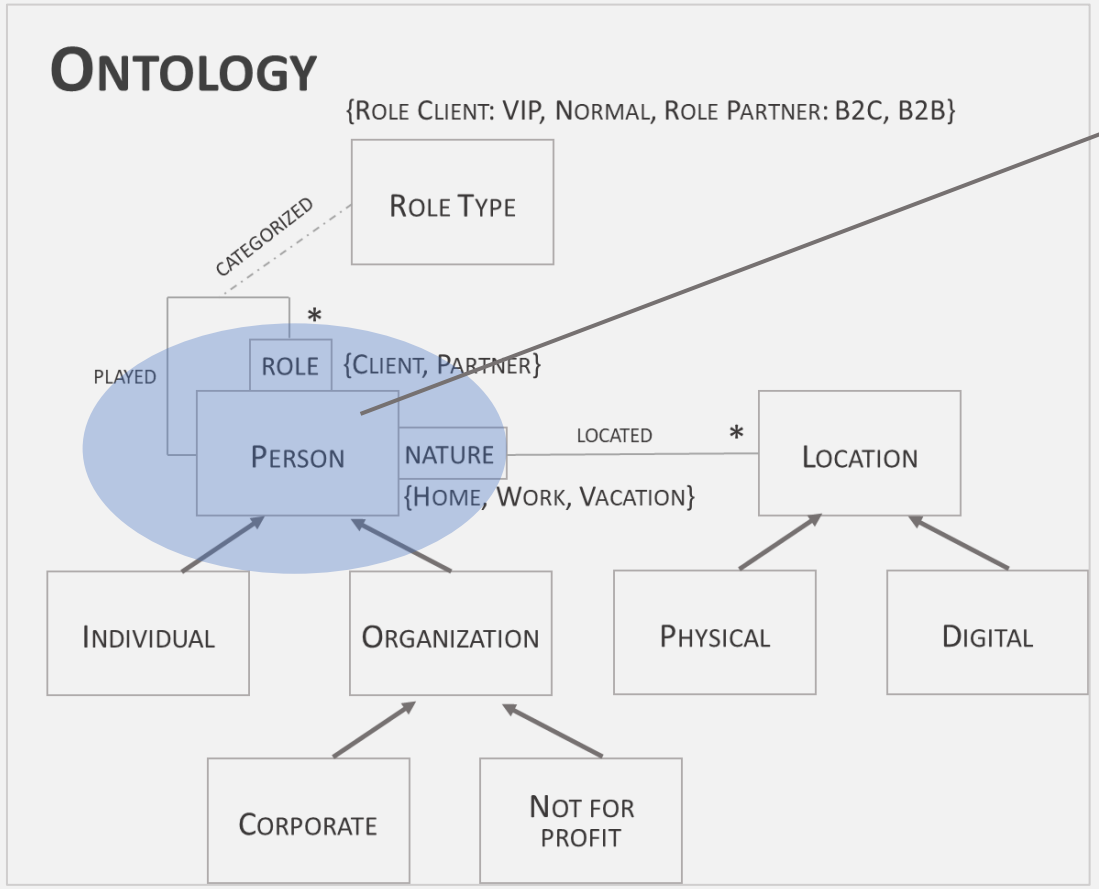
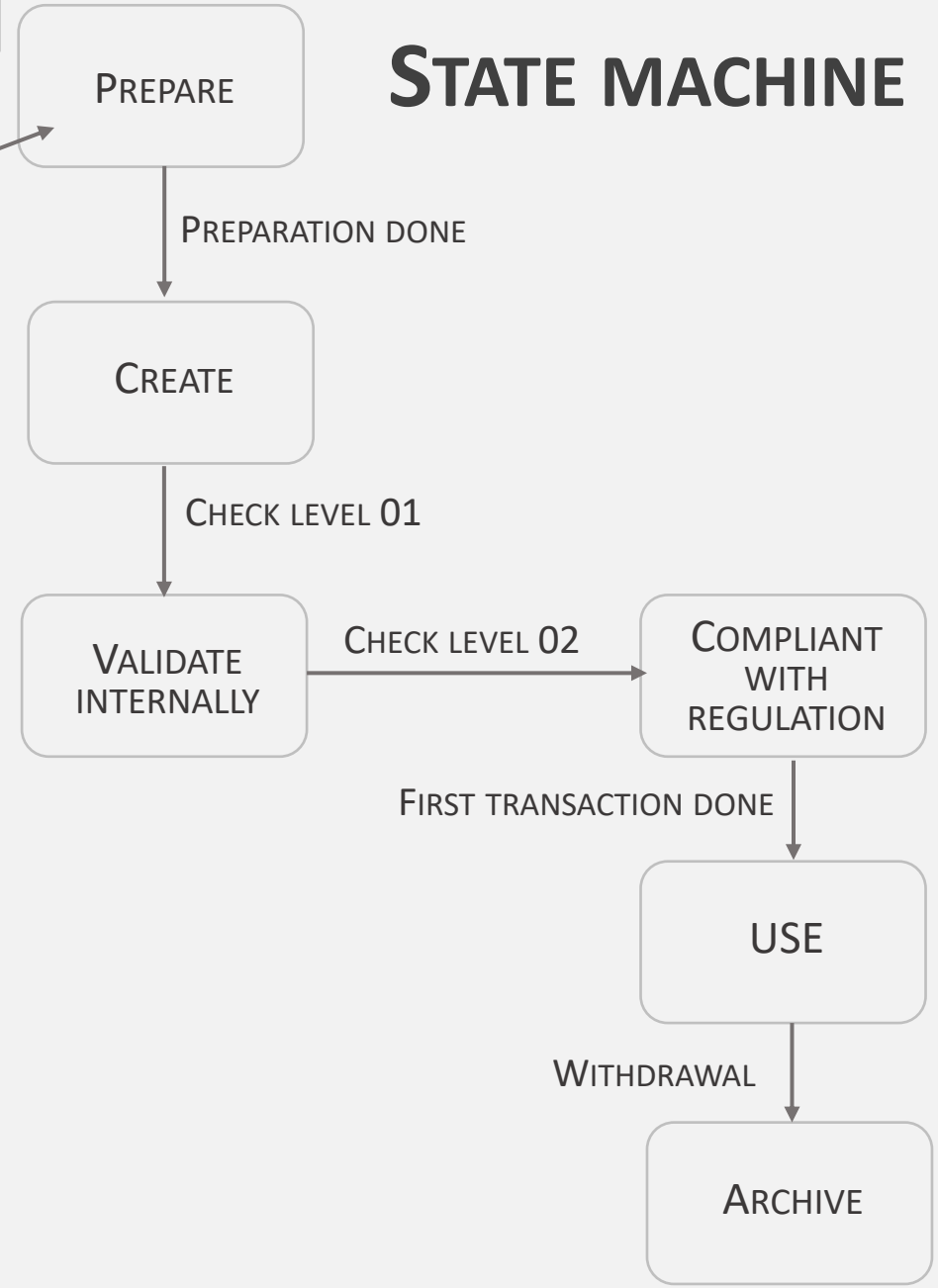
BUSINESS CONCEPTS DESIGN



STATE MACHINE



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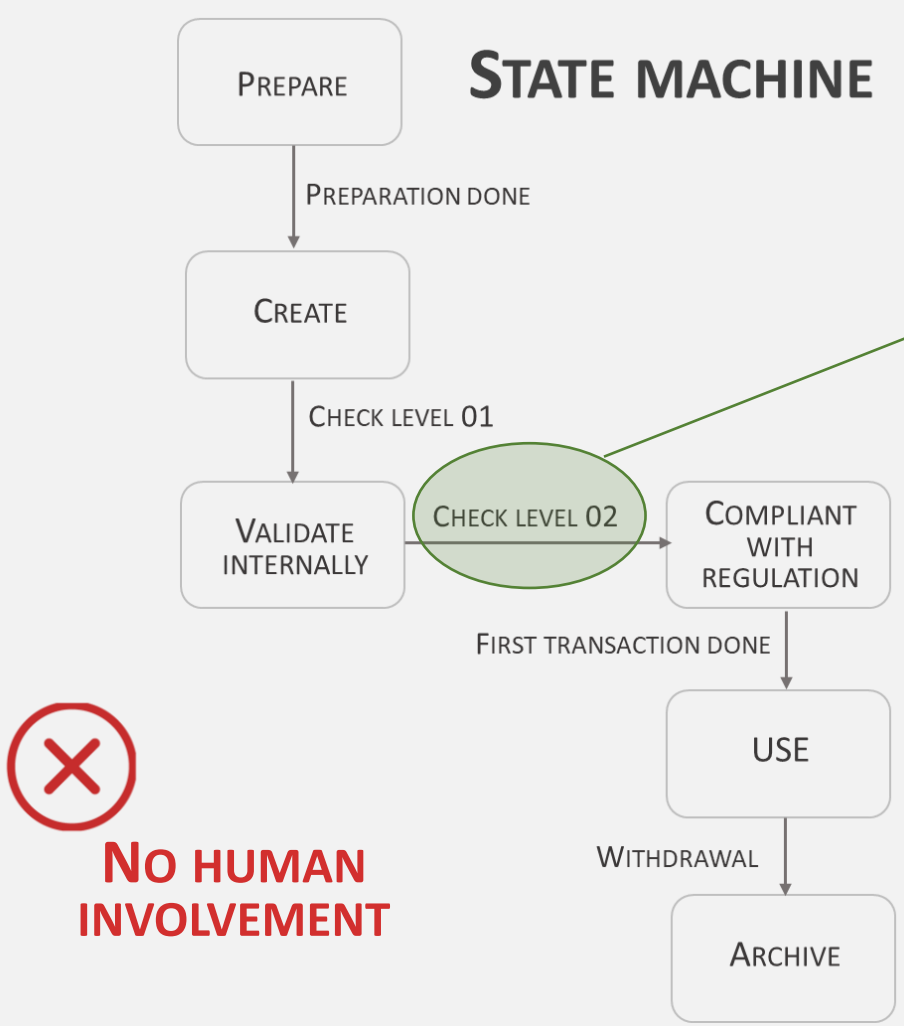
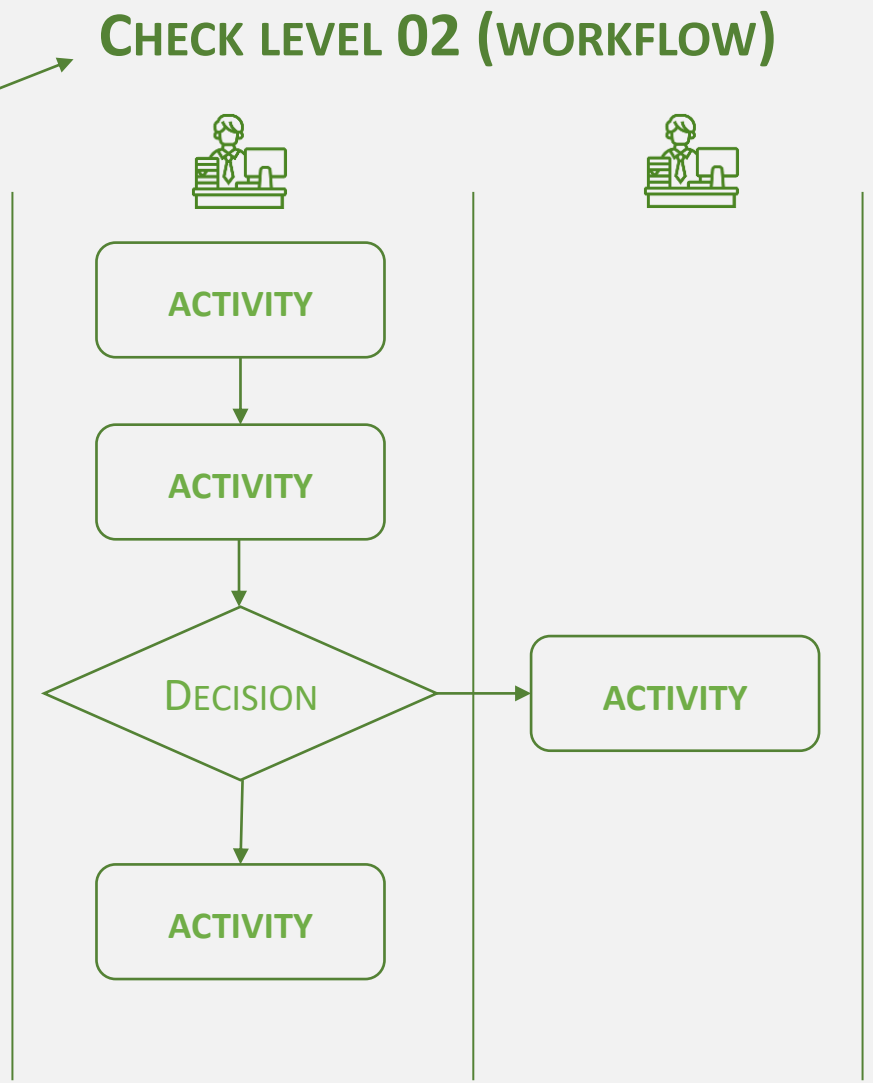
BUSINESS CONCEPTS DESIGN

HUMAN INVOLVEMENT



NO HUMAN INVOLVEMENT



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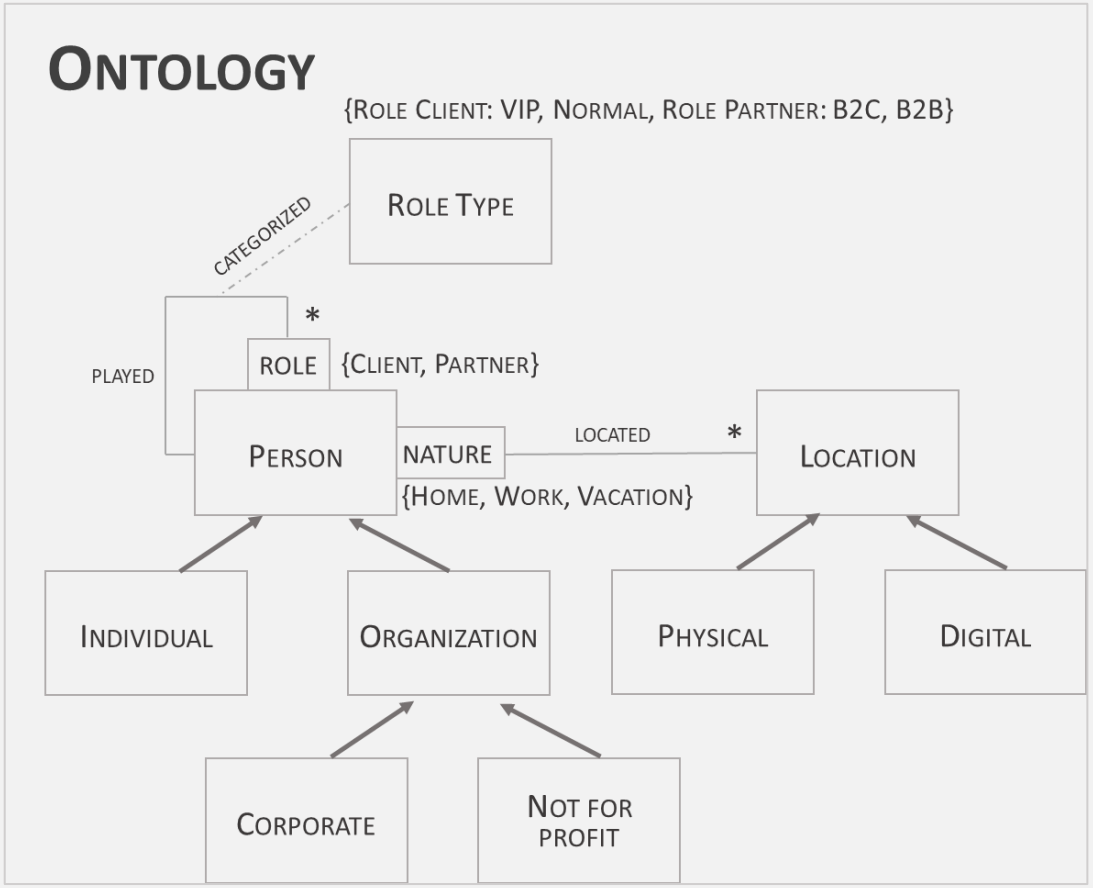
BUSINESS CONCEPTS DESIGN



BUSINESS IDENTIFIER

PERSON

XXXX+IDCategoryPerson

LOCATION

XXXX+IDCategoryLocation

ROLE

IDPerson+"TO"+IDPerson+"-"IDTypeRole

ROLE TYPE

XXXX

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Semantic management stack

- Glossary
- Thesaurus
- Taxonomy
- Ontology
- State machine
- Business identifier

Person
Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do eiusmod tempor incididunt

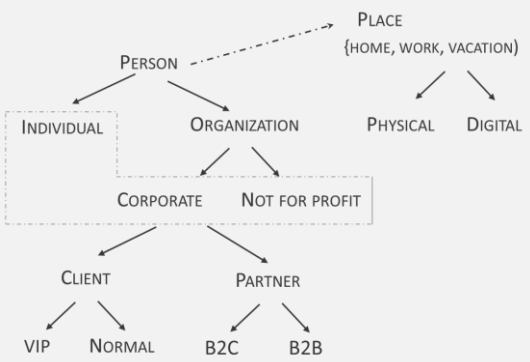
Individual
Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do eiusmod tempor

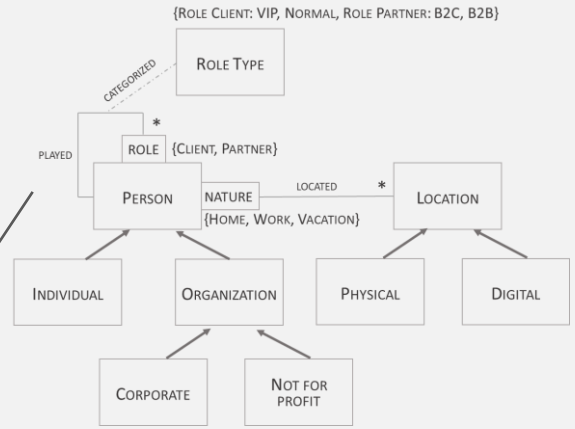
Client
Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do eiusmod tempor incididunt

Partner
Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do eiusmod tempor incididunt

Organization
Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do eiusmod tempor incididunt

Person = Party
Place = location = address
Client = customer





Person
XXXX+IDCategoryPerson

Location
XXXX+IDCategoryLocation

Role
IDPerson+"TO"+IDPerson+"-"IDTypeRole

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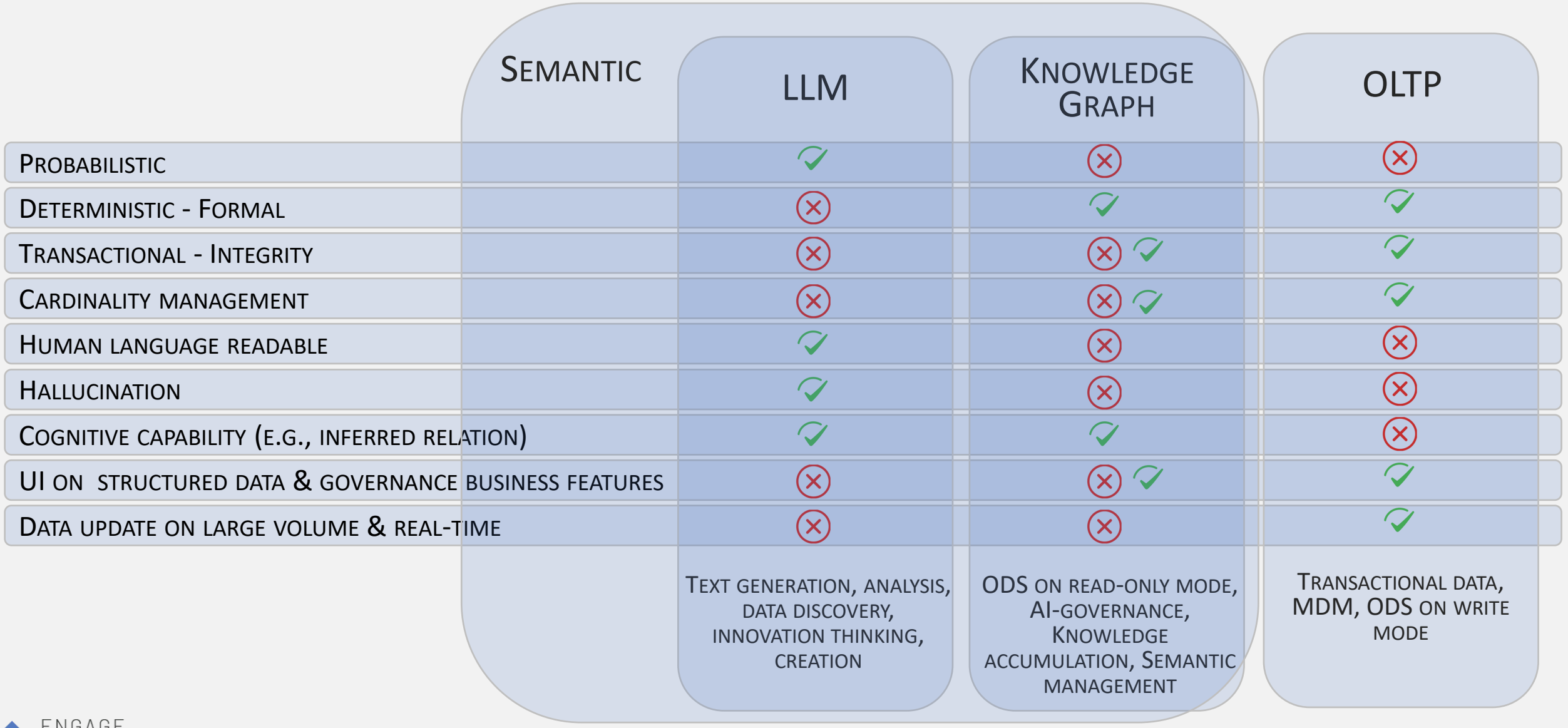
DATABASES FOR SEMANTIC?

Database technologies



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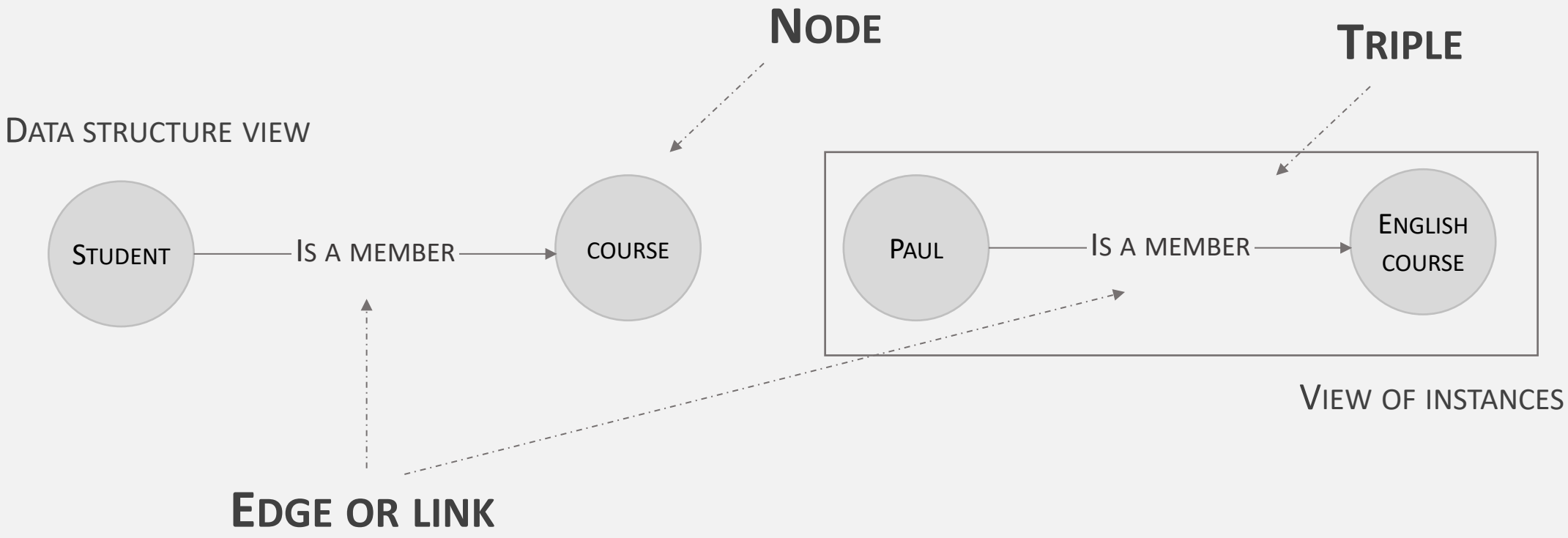
KNOWLEDGE GRAPH DATABASE – TRIPLE



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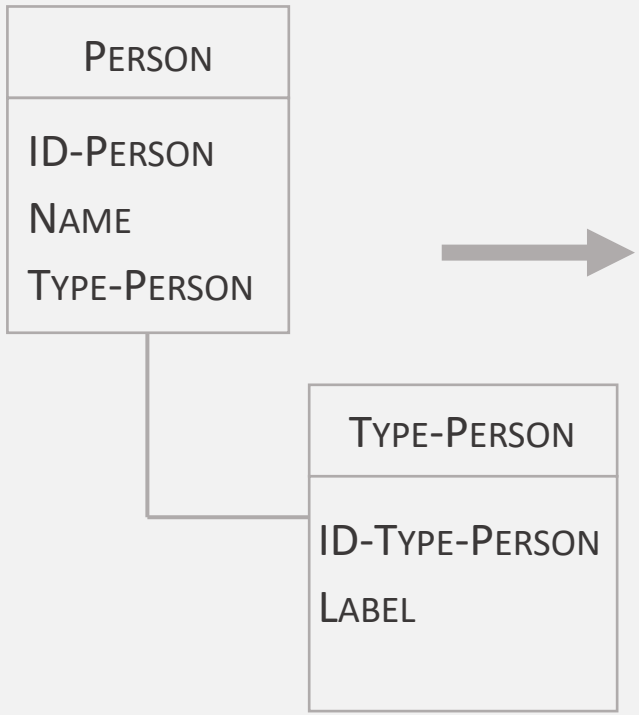
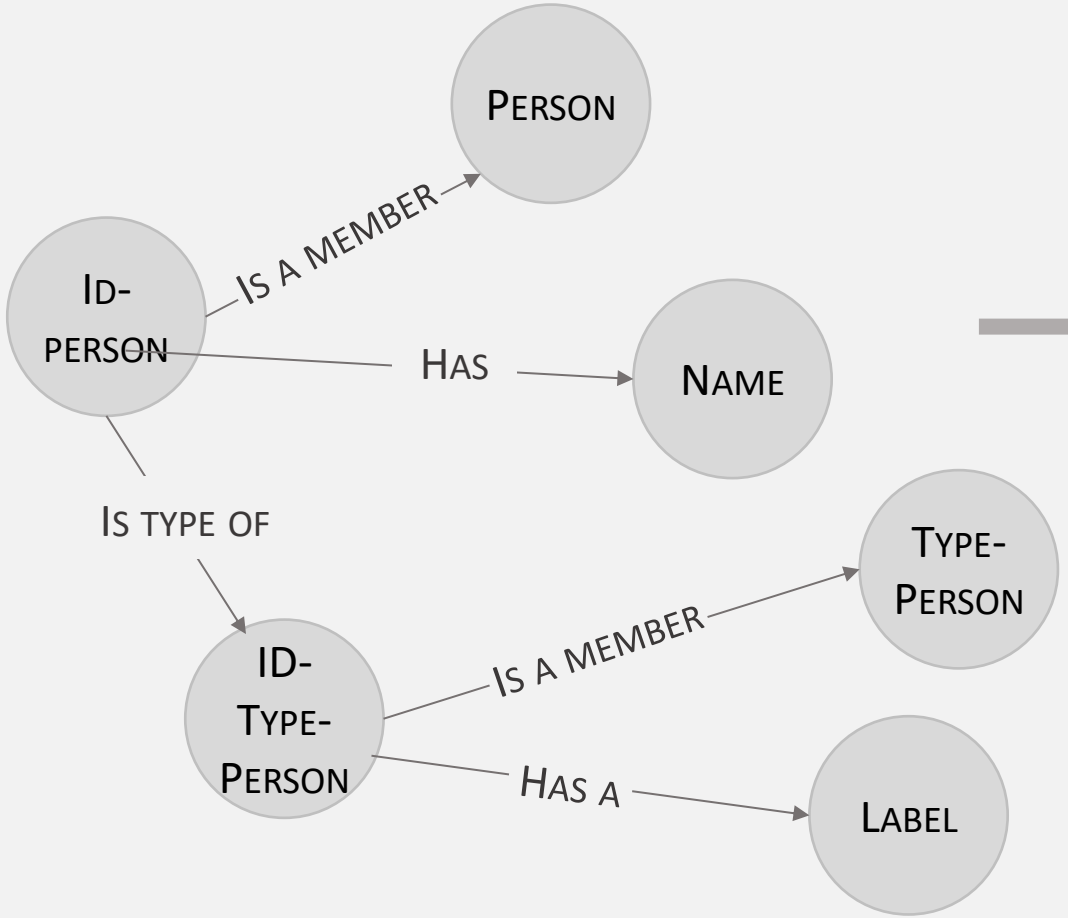
Knowledge graph database – E.g. Data model views

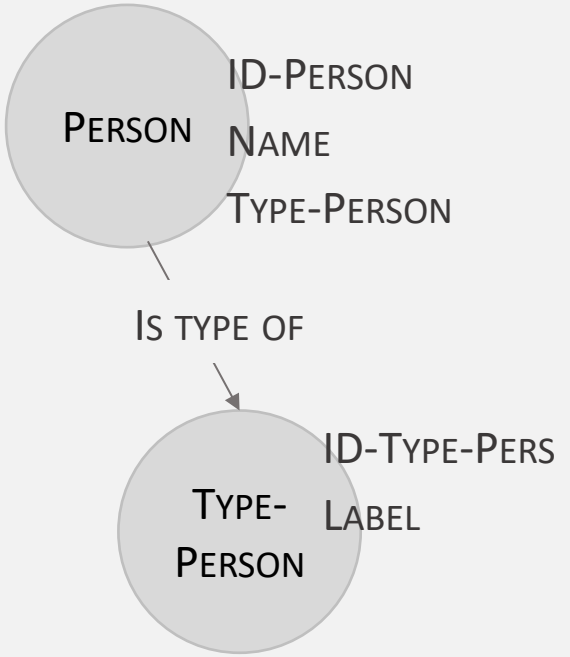
Relational tables



Graph – Completely unfolded



Graph – Compacted view



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Knowledge graph database – Comparison with tables

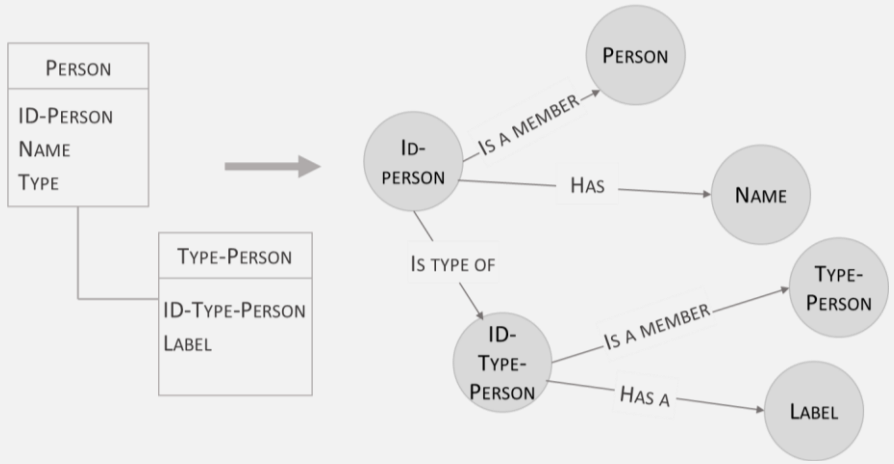
Relational tables

✓

Highly secure for data update processing by enforcing integrity rules directly at the data model level

✗

Rigid data management without a deep semantic understanding by non-IT experts. Not easy for business query processes



Graph – Completely unfolded

✓

High flexibility in relationships, including inferred links and dynamic creation, allows for an easy transition from a data model view to an instance view, making it user-friendly for business users

✗

It becomes risky during data updating processes due to the absence of integrated integrity rules, requiring specific manual coding for each case

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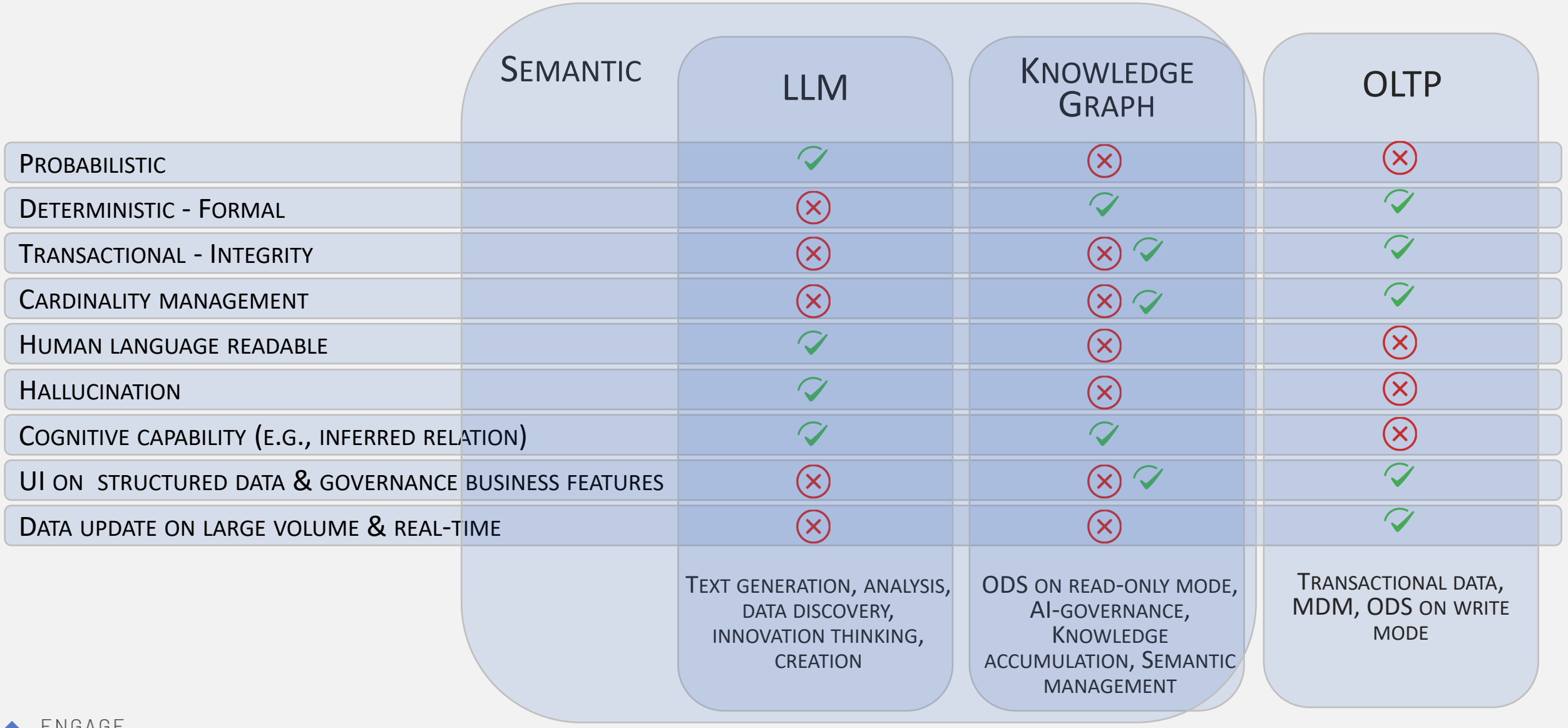
Database technologies



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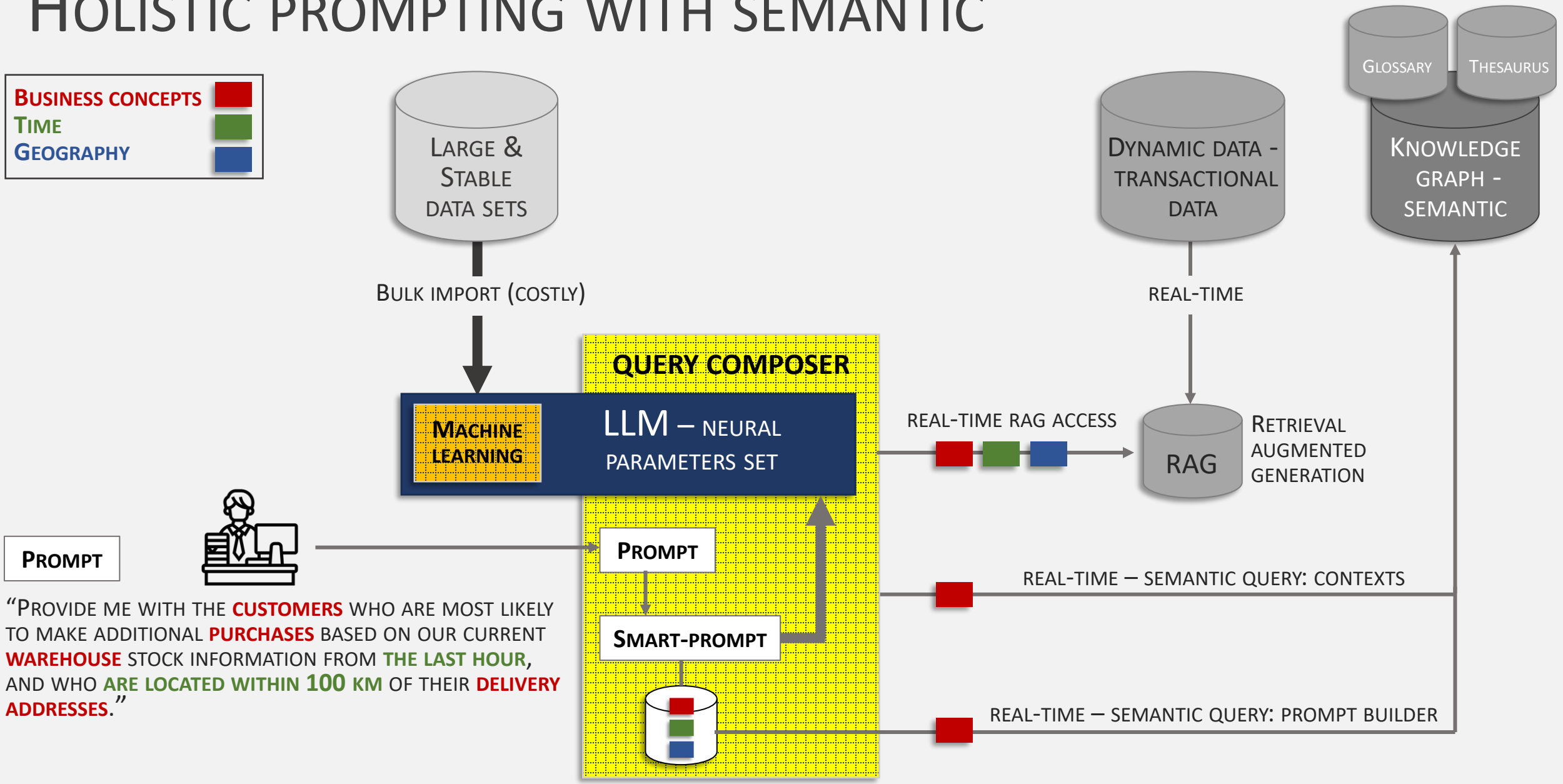
Holistic prompting with semantic

Holistic prompting = LLM + KG

HOLISTIC PROMPTING WITH SEMANTIC



"PROVIDE ME WITH THE **CUSTOMERS** WHO ARE MOST LIKELY TO MAKE ADDITIONAL **PURCHASES** BASED ON OUR CURRENT **WAREHOUSE** STOCK INFORMATION FROM **THE LAST HOUR**, AND WHO **ARE LOCATED WITHIN 100 KM** OF THEIR **DELIVERY ADDRESSES**."

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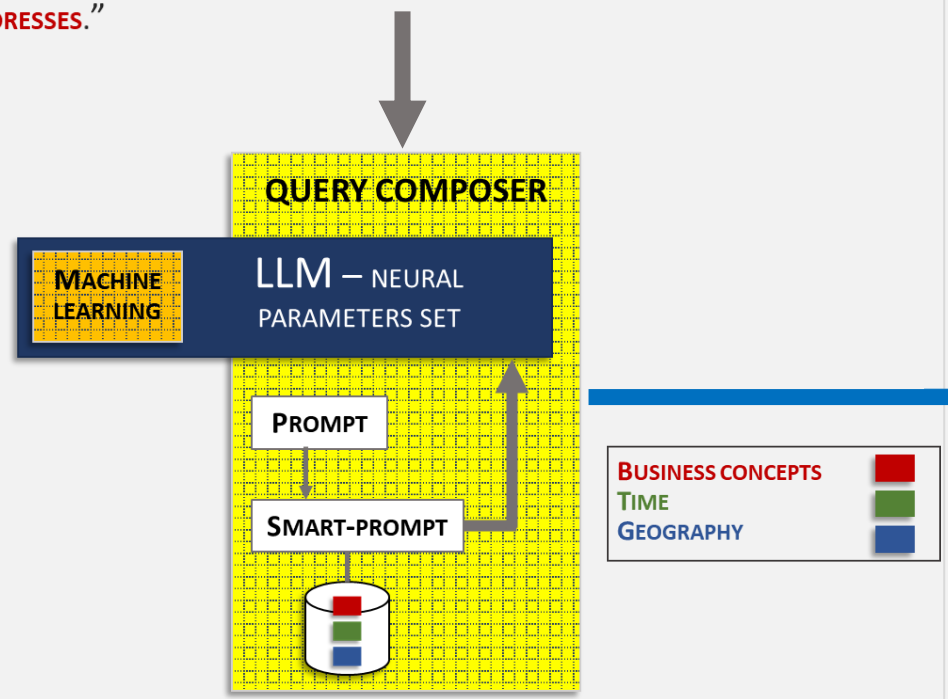
Hallucinations Checking

Holistic prompting = LLM + KG

"Provide me with the **customers** who are most likely to make additional **purchases** based on our current **warehouse** stock information from **the last hour**, and who **are located within 100 km** of their **delivery addresses**."



Based on our current dataset, we've identified three distinct **customer** segments that are most likely to make additional **purchases**, considering the **warehouse** stock information from the **last hour** and their proximity to **delivery addresses**:

Segment 1: Electronics Enthusiasts
John Smith
Emma Davis
Robert White
These customers have a history of purchasing electronics and gadgets. **They are located within 20 kilometers** of **Warehouse A,** where we have a substantial stock of electronic products.

Segment 2: Fashion Aficionados
Sarah Johnson
Lisa Wilson
David Lee
This group has a preference for fashion items and accessories. They **reside within 15 kilometers of Warehouse B**, which has a significant inventory of clothing and fashion products.

Segment 3: Home Improvement Shoppers
Michael Brown
Jennifer Hall
William Turner
Customers in this segment frequently purchase home appliances and renovation materials. They are situated **within 30 kilometers** of **Warehouse C**, which specializes in home improvement products.

By targeting these **customer** segments with tailored promotions or recommendations, we can maximize the utilization of our **warehouse** stocks, provide customers with relevant offerings, and potentially boost additional **sales**

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Blue-print for Semantic Information System (SIS)

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SOME DEFINITIONS TO UNDERSTAND THE BLUE-PRINT

SEMANTIC MODELING	Modeling business concepts with glossary, thesaurus, taxonomy and ontology
SEMANTIC ENGINEERING	Using a knowledge graph database to implement the semantic models for validation and test with business users
RUNNING WITH AI	Operating the information system with quality data and AI
AI LEARNING & GOVERNING	Managing AI learning, creating intelligent algorithms and governing AI
SUPERVISION WITH AI	Intelligently monitoring information system execution using AI to detect errors and opportunities

Operational data repository that unifies all data across silos using a semantic model. Implementation can occur in either write-mode (OLTP) or read-only mode (Knowledge graph)

Reference and master data repository which makes it possible to unify exchanges at the ETL-EAI level and to disseminate shared data throughout the information system

Knowledge repository which contains part or all the ODS data to have semantic management and contains the stock of unstructured information necessary for AI (contents and/or links to CMS)

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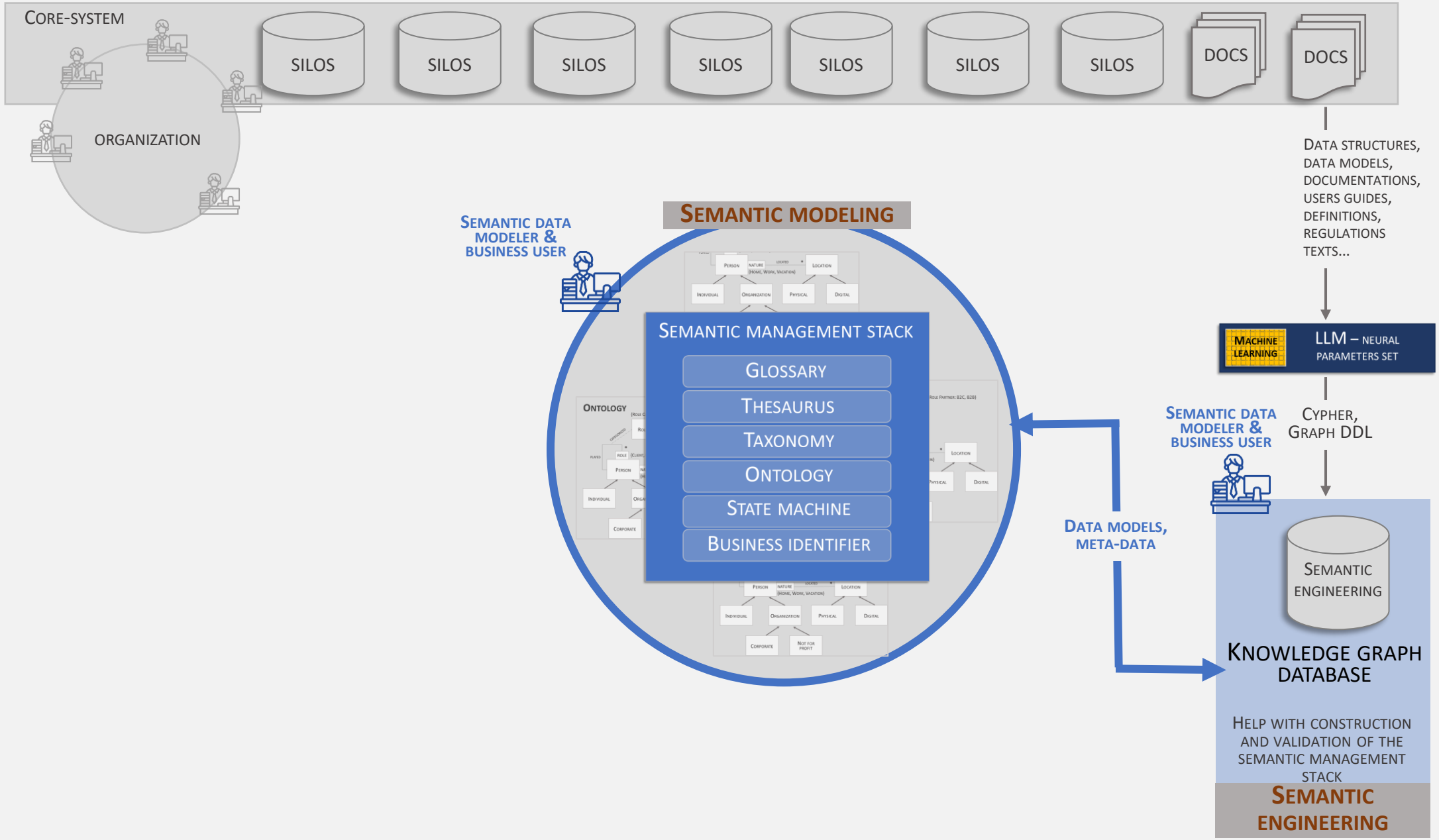
BLUE-PRINT SEMANTIC IS



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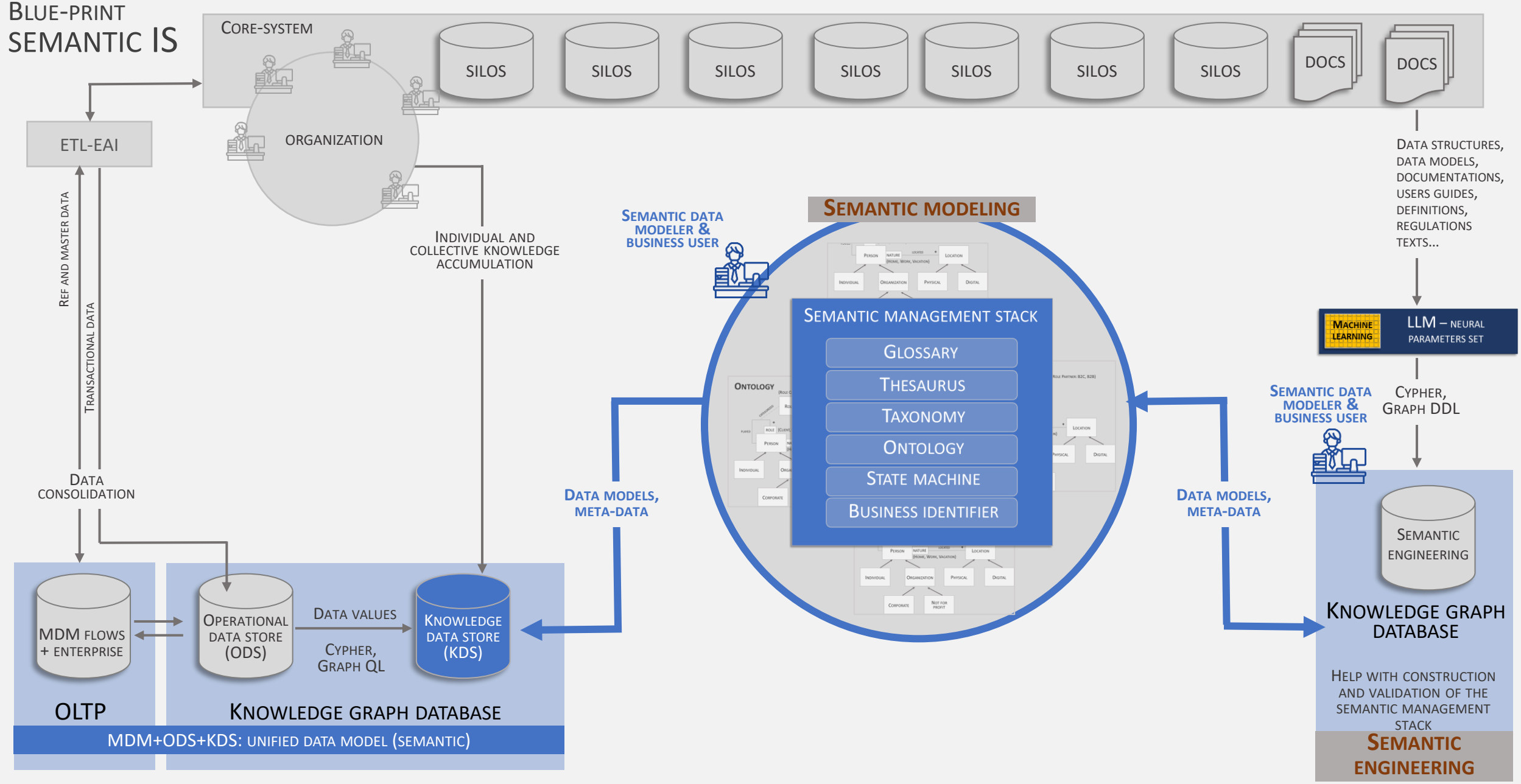

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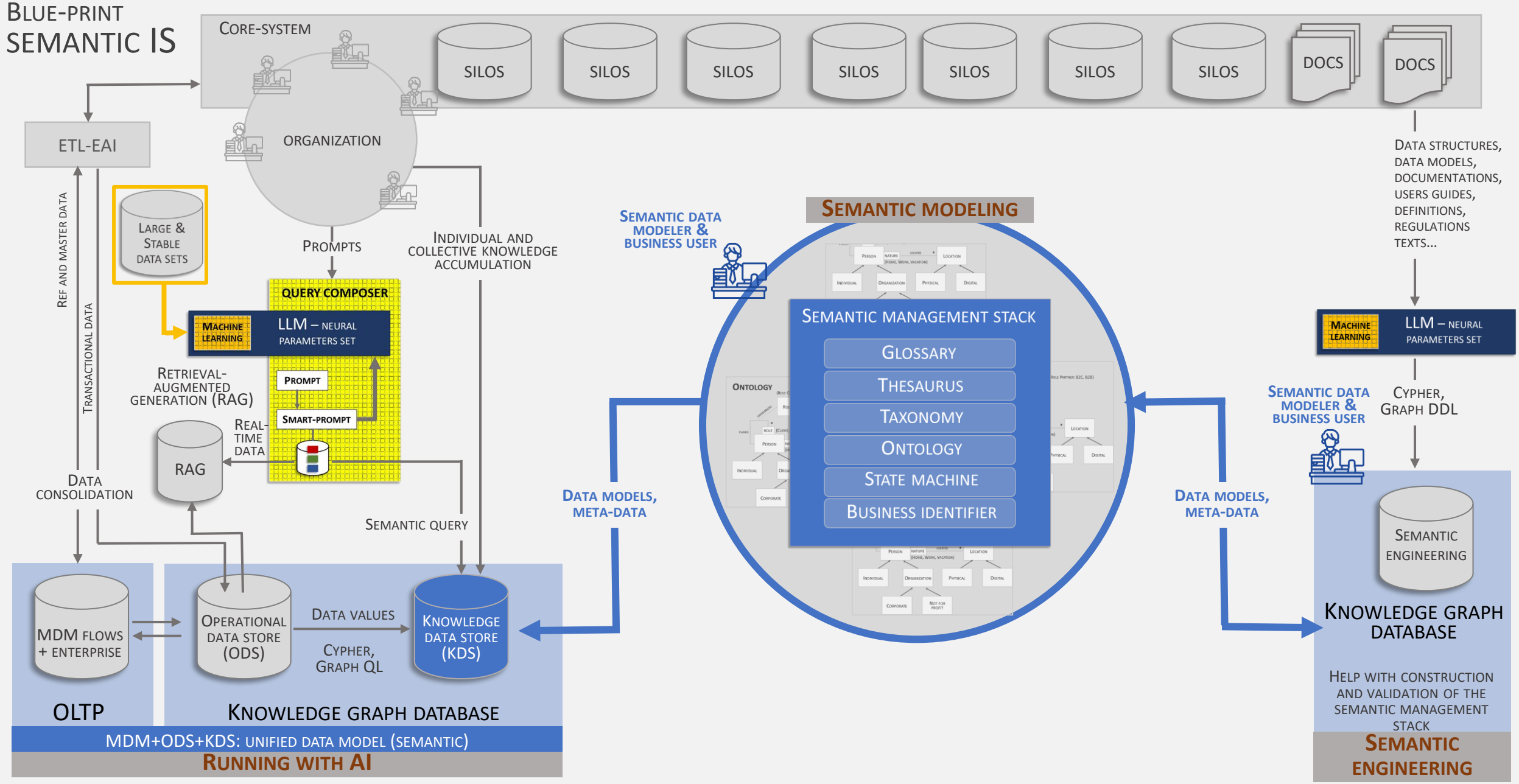

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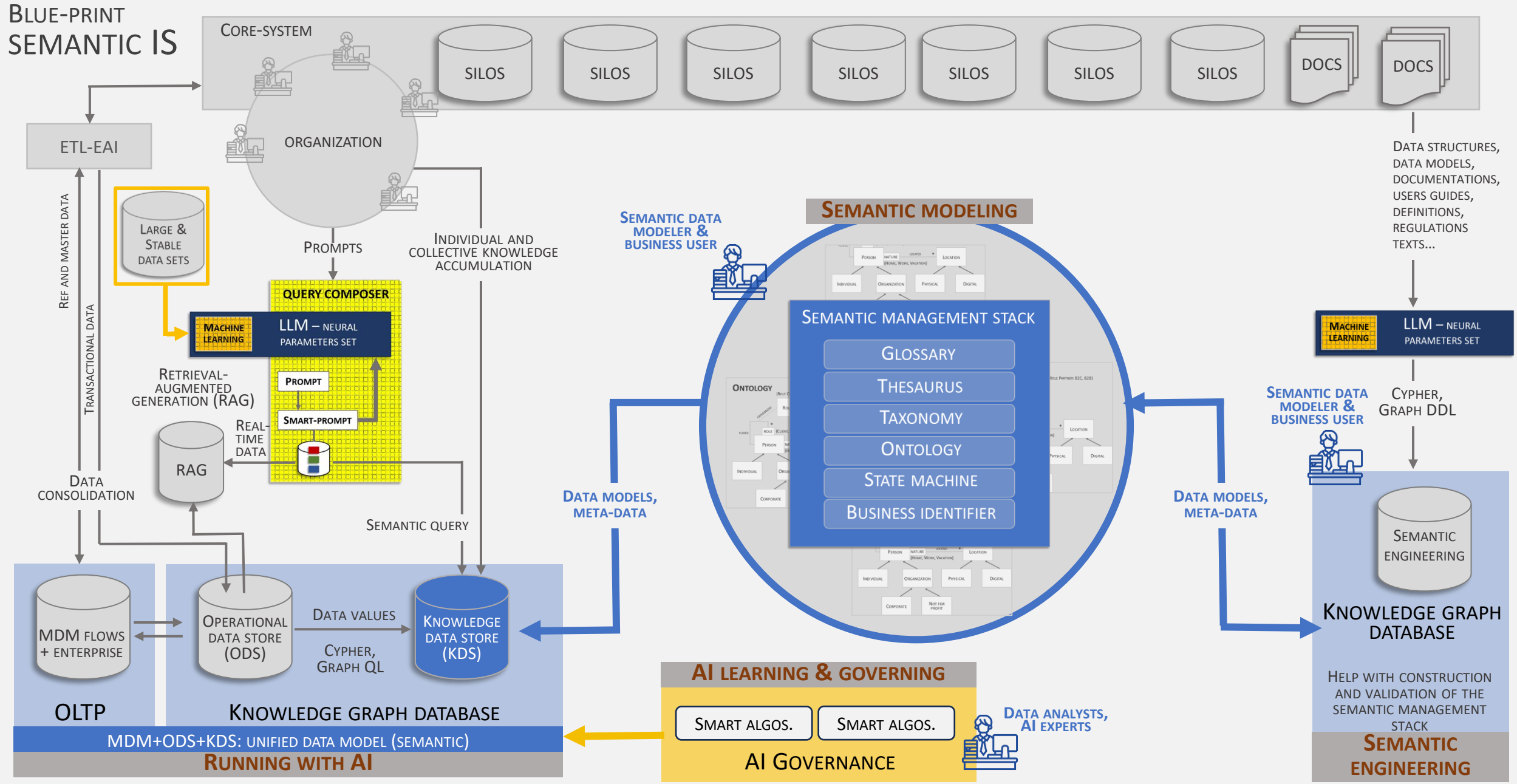

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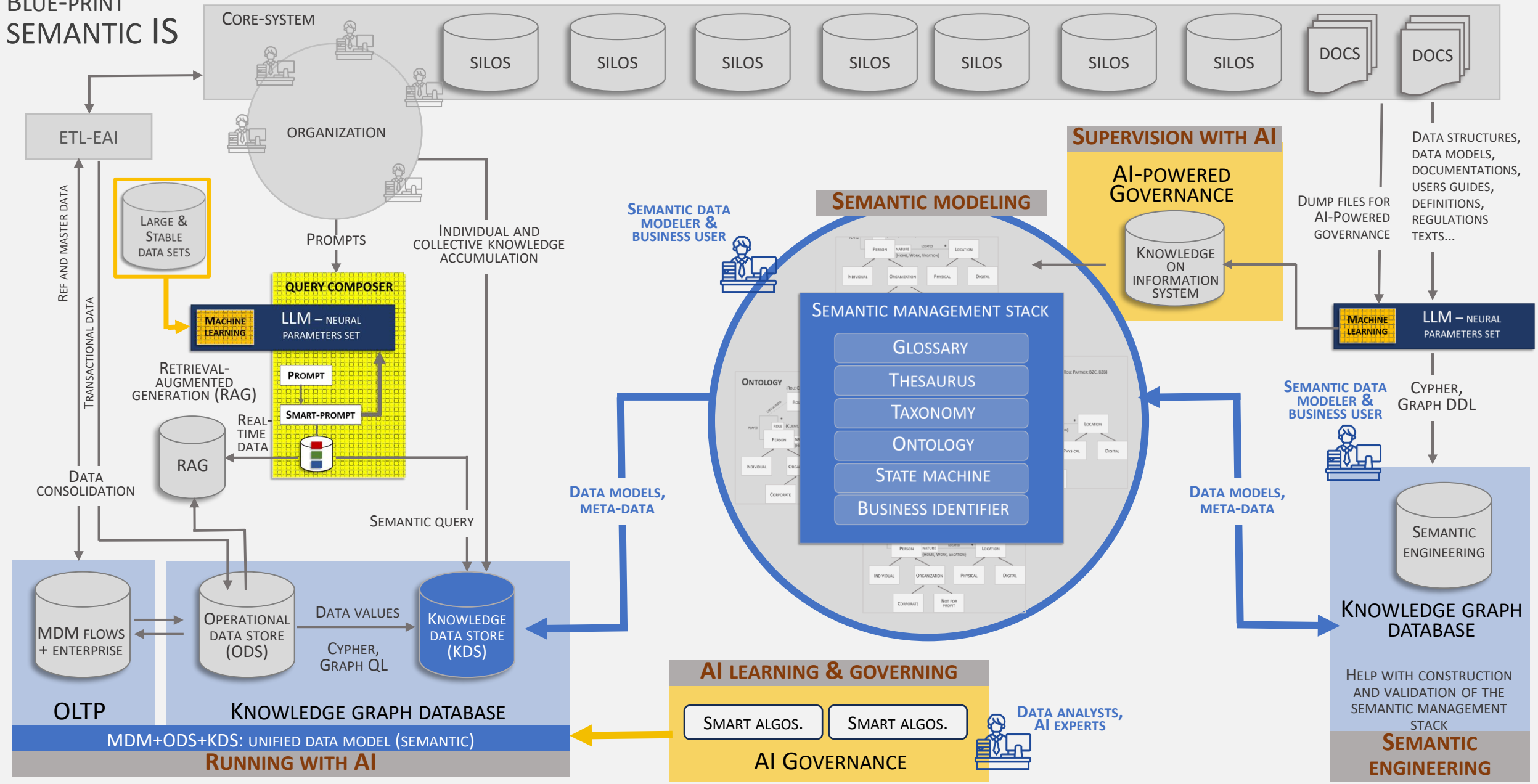

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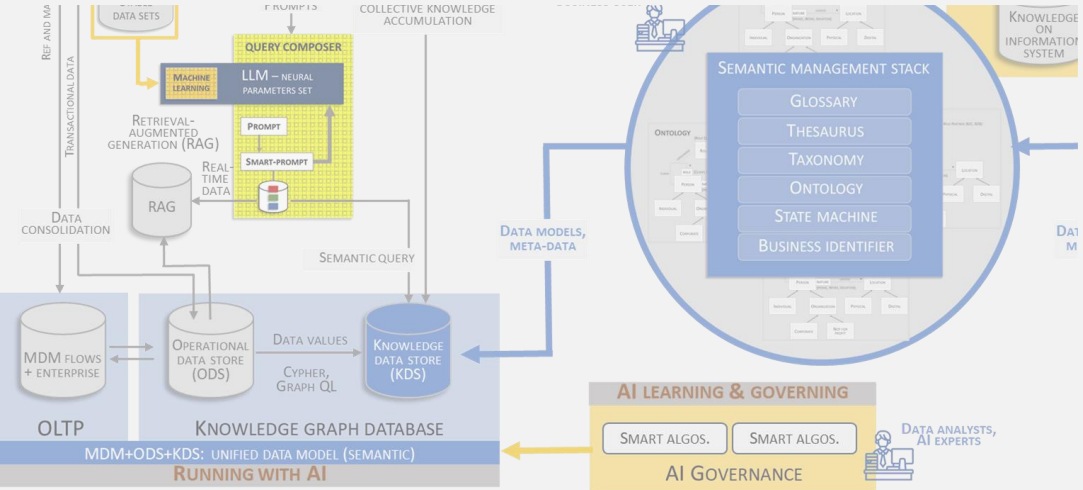

KEY TAKEAWAYS

WITHOUT A ROBUST SEMANTIC MODELING STRATEGY, INTEGRATING AI AT A LARGE SCALE INTO YOUR INFORMATION SYSTEM BECOMES A CHALLENGING ENDEAVOR

IT'S ESSENTIAL TO PROVIDE USERS WITH A SOLUTION FOR ACCUMULATING BOTH INDIVIDUAL AND COLLECTIVE KNOWLEDGE

AI GOVERNANCE SHOULD BE APPLIED AT THE SEMANTIC LAYER OF YOUR INFORMATION SYSTEM

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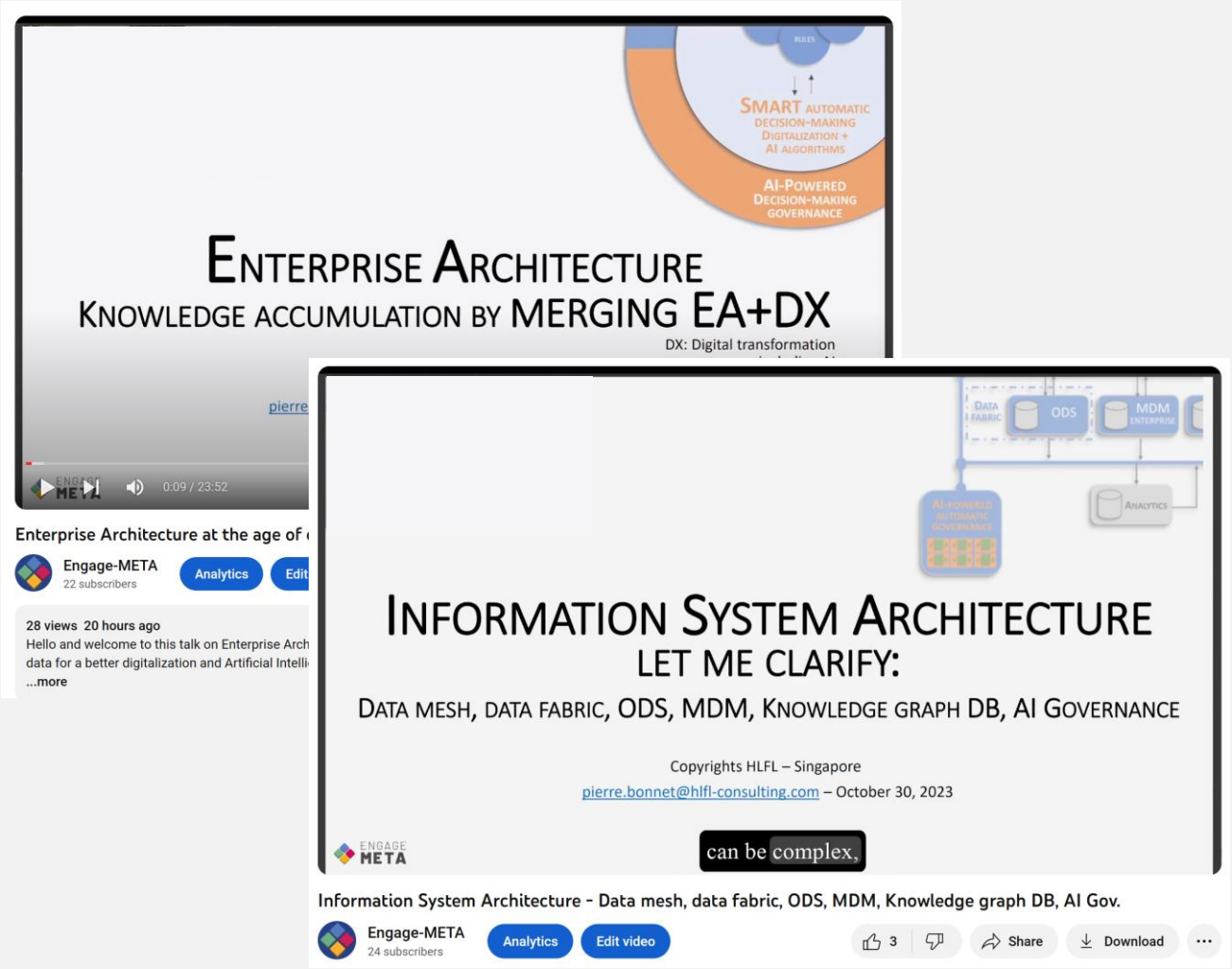

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