

SEMANTIC INFORMATION SYSTEM - SIS

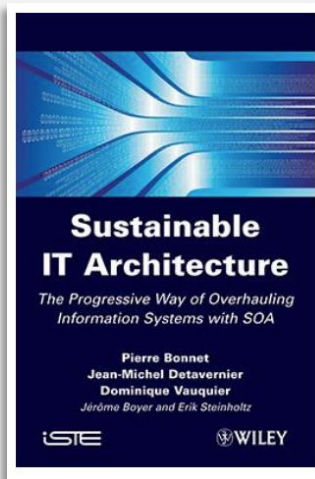
KNOWLEDGE GRAPH DATABASE & LLM

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

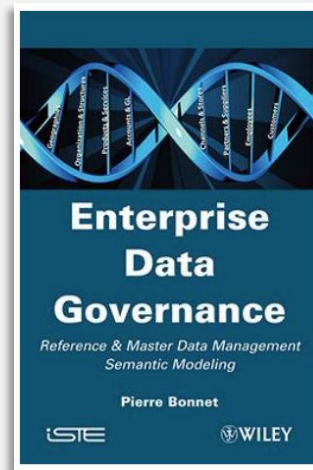
PIERRE BONNET

PIERRE.BONNET@HLFL-CONSULTING.COM



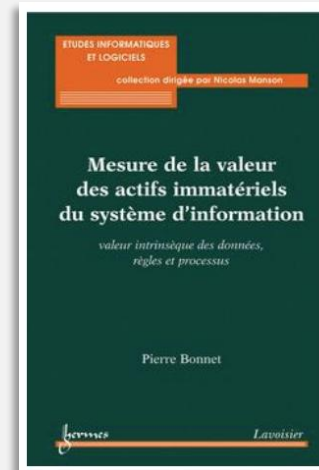
EA + SOA

HOW TO LEVEL-UP TOGAF
AND ZACHMAN



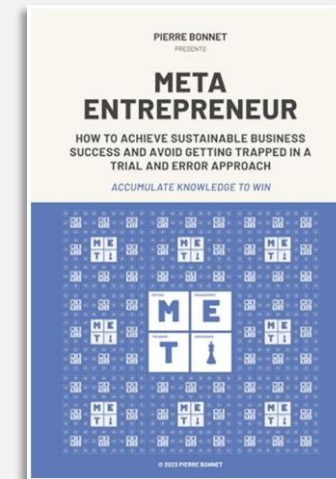
DATA

MODELING AND
GOVERNANCE AT THE
ENTERPRISE LEVEL



IS RATING

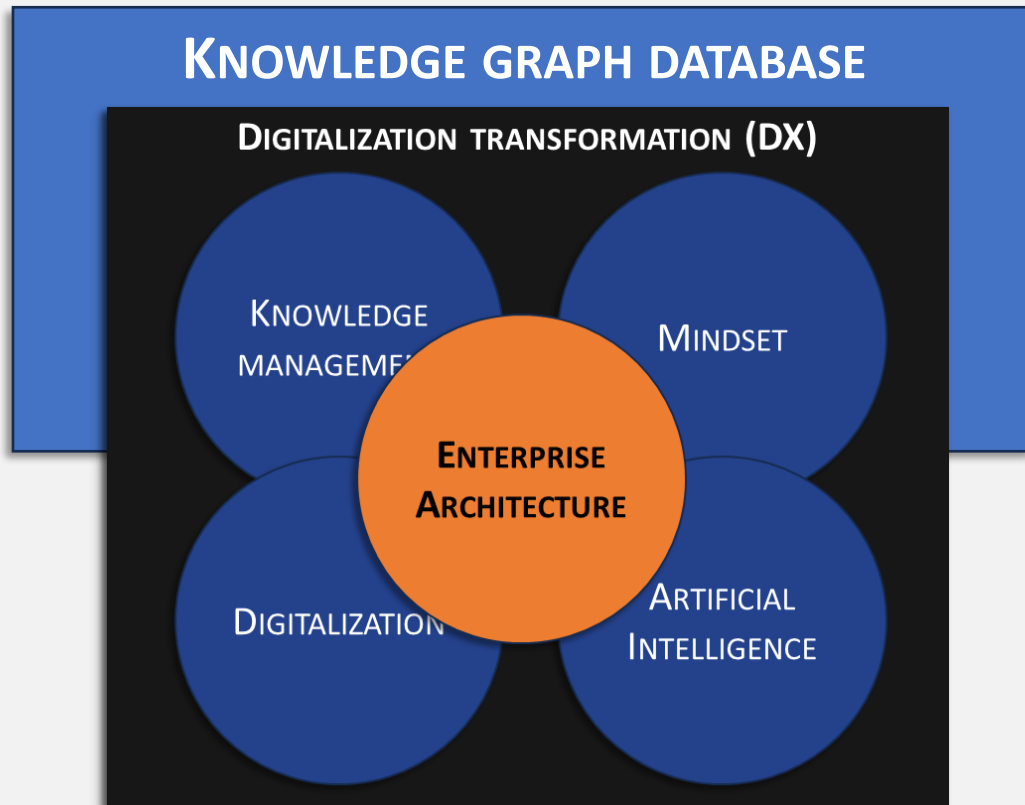
MEASURING THE INTANGIBLE
ASSETS OF THE IS: PROCESSES,
RULES AND DATA




MINDSET

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

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ENGAGE
META

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ENGAGE-META COMMUNITY

Accumulating knowledge
for sustainable win

Contact me

MOTION
M

ENGAGEMENT
E

TREASURY
T

ASSURANCE
♟

ENGAGE-META combines knowledge management and mindset practices (entrepreneurship, intra-) with data management and AI in a digital world (DX)

By utilizing a unique FRAMEWORK that formalizes key corporate and individual knowledge in a unified way

This is an approach to level-up Enterprise Architecture (EA) at the digital and AI age

A FRAMEWORK TO ACCUMULATE KNOWLEDGE AROUND FOUR ELEMENTS

MOTION (MOVE)
M

ENGAGEMENT (ACT)
E

TREASURY (FINANCE)
T


ASSURANCE (PROTECT)
A

The ENGAGE-META community offers practices to maximized your chances of success in entrepreneurship, intrapreneurship as an employee and data management with digitalization. They are inspired by my professional career of more than 30 years.

I am Pierre Bonnet, founder of ENGAGE-META, software engineer and entrepreneur. In working on best practices for the community, I have created a tool to formalize my experiences and knowledge called the E-META-FRAMEWORK (EMF). This is a common framework to organize and enrich knowledge to accelerate value creation. This framework is applied in my two areas of expertise: entrepreneurship (META-Entrepreneur) and data management with digitization (META-DX-Manager²⁾. It is adaptable to any other domain of expertise or project.

¹⁾E is the abbreviation for *Engage*.

²⁾DX is the abbreviation for *Digital Transformation*.

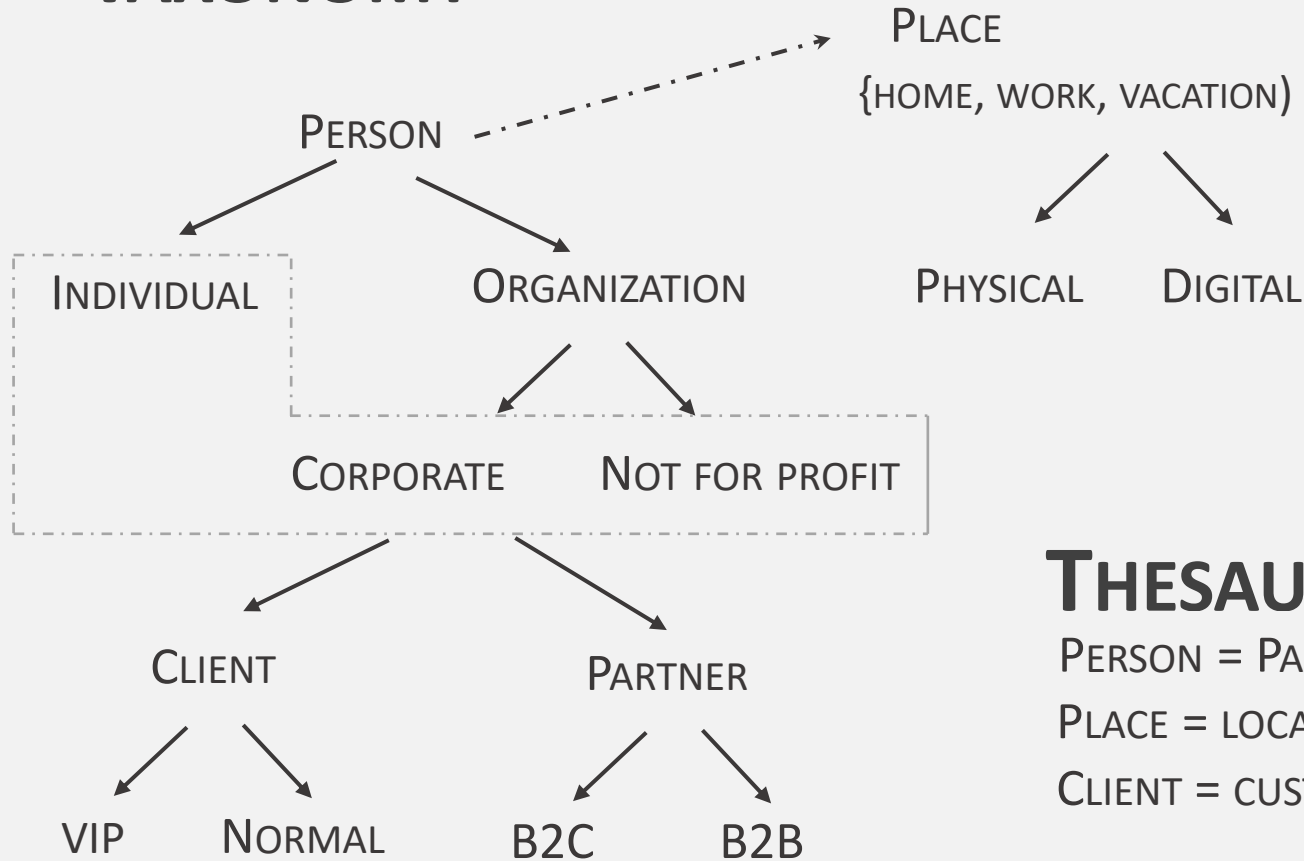


ENGAGE
META

SEMANTIC MODELING?

BUSINESS CONCEPTS DESIGN

TAXONOMY



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

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

ORGANIZATION

Lorem ipsum dolor sit amet, consectetur

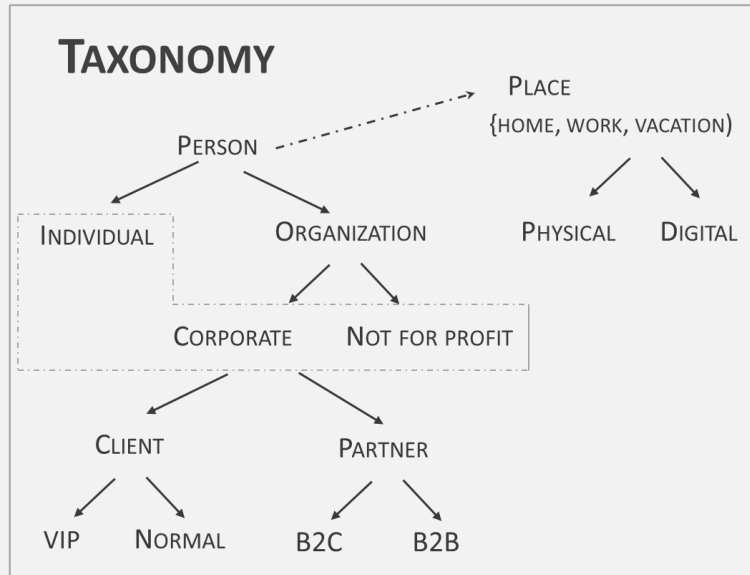
THESAURUS

PERSON = PARTY

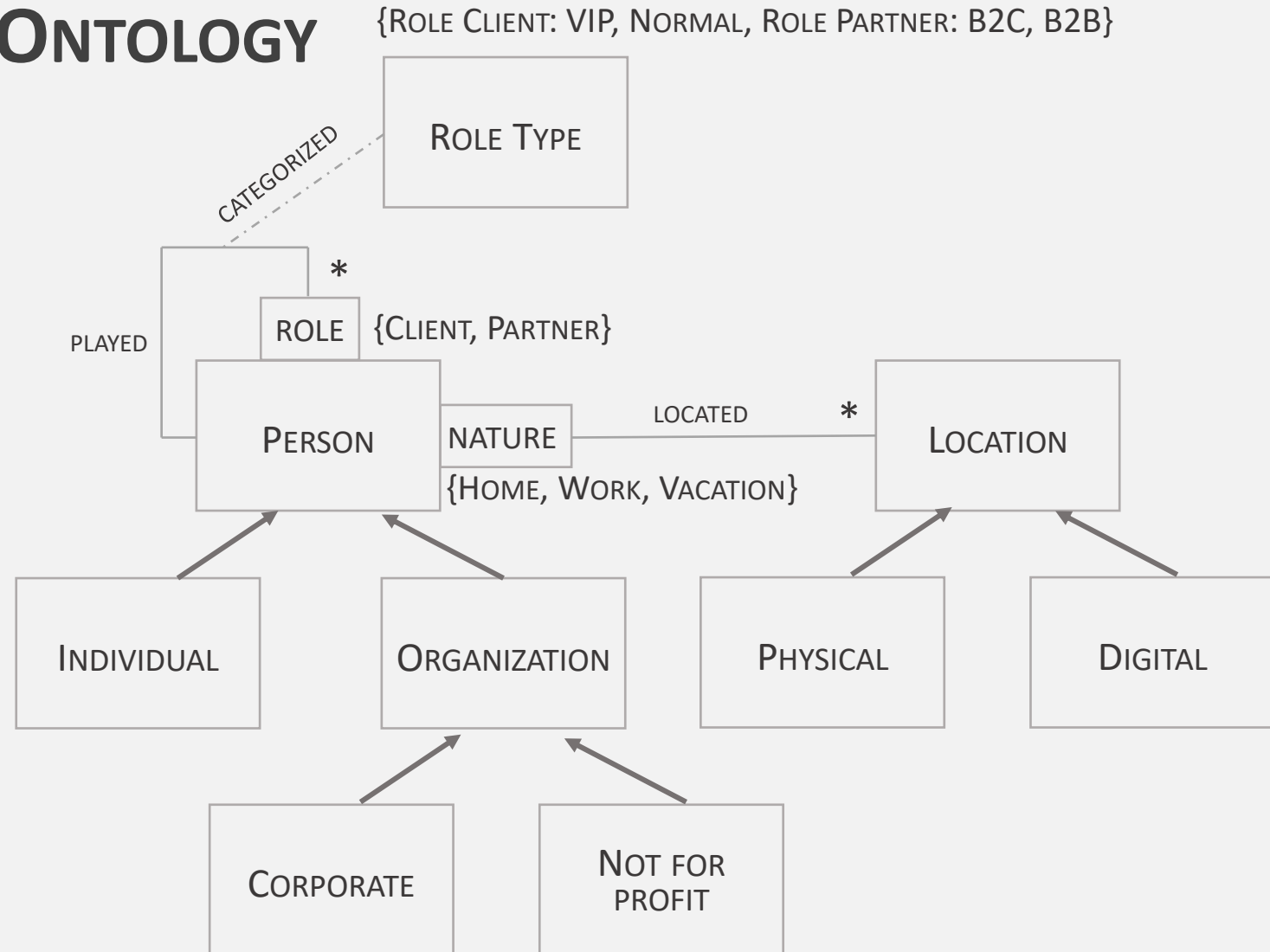
PLACE = LOCATION = ADDRESS

CLIENT = CUSTOMER

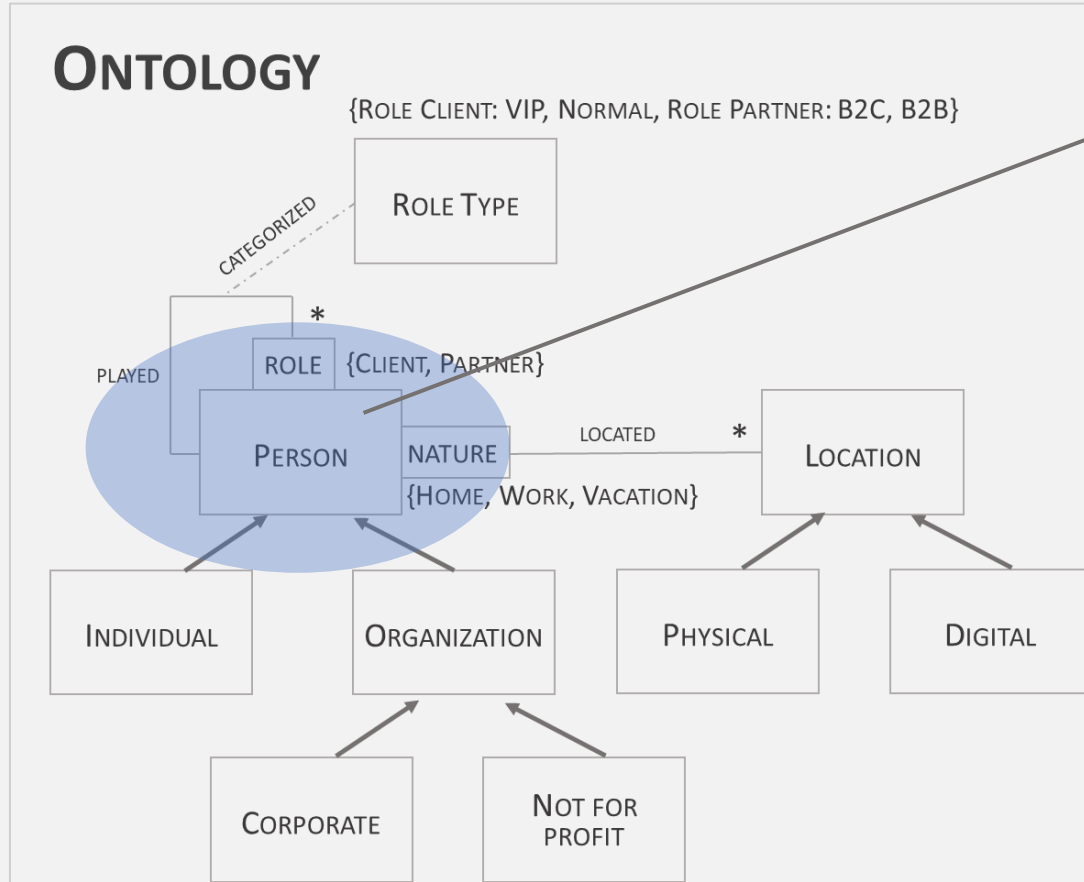
BUSINESS CONCEPTS DESIGN



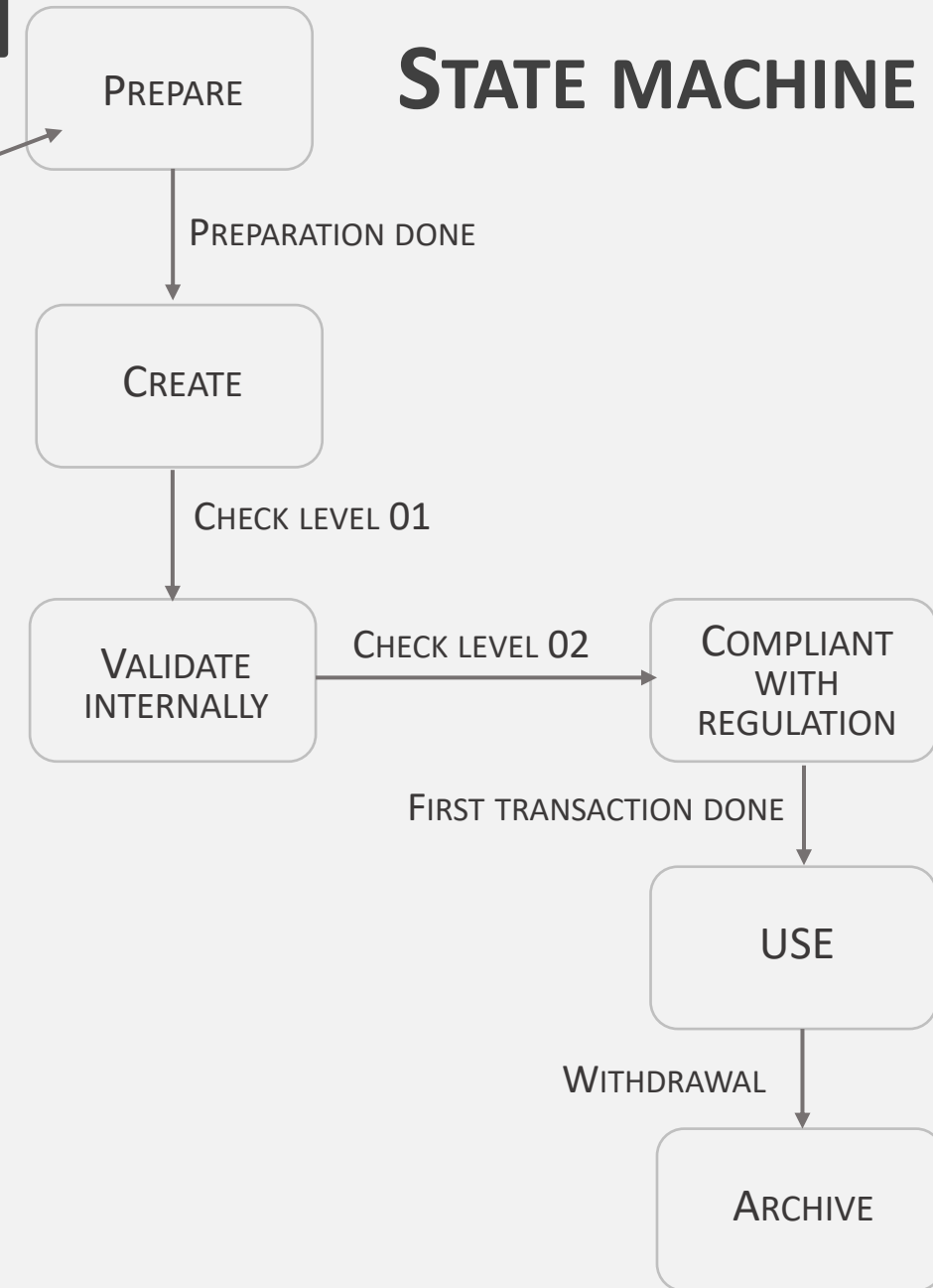
ONTOLOGY



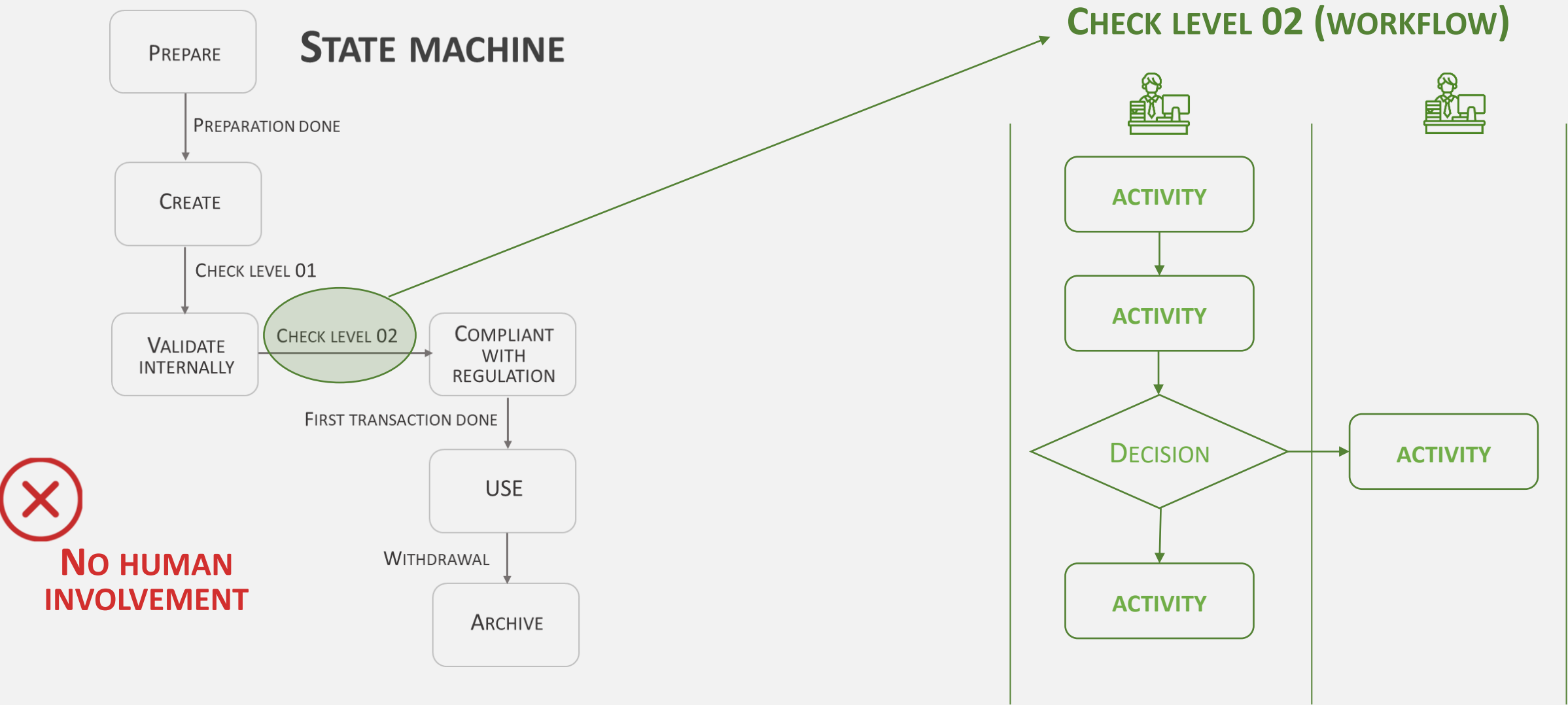
BUSINESS CONCEPTS DESIGN



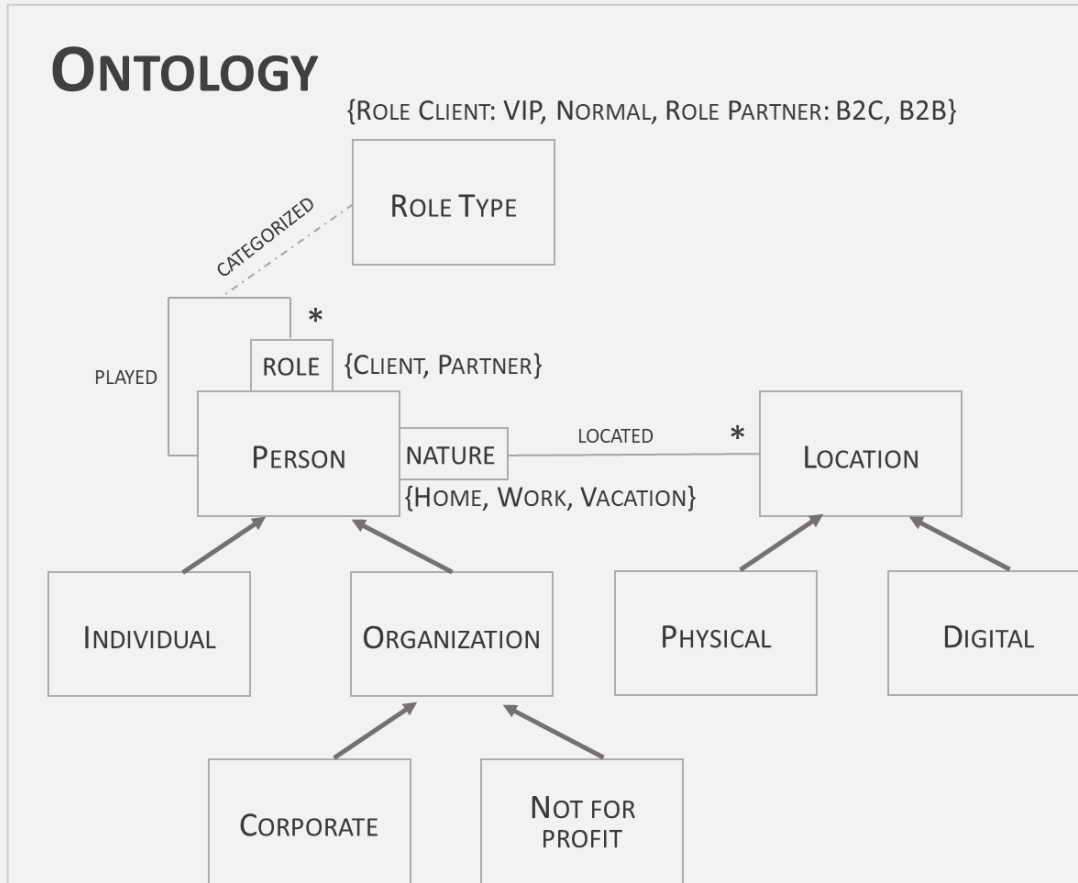
STATE MACHINE



BUSINESS CONCEPTS DESIGN



BUSINESS CONCEPTS DESIGN



BUSINESS IDENTIFIER

PERSON

XXXX+IDCategoryPerson

LOCATION

XXXX+IDCategoryLocation

ROLE

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

ROLE TYPE

XXXX

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

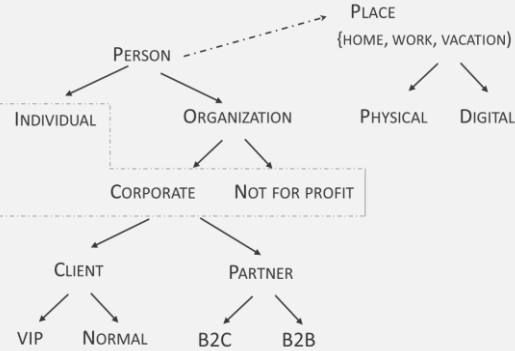
PARTNER

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



SEMANTIC MANAGEMENT STACK

GLOSSARY

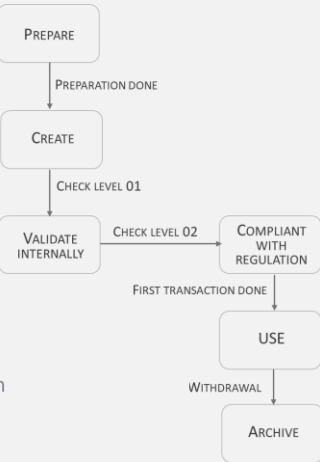
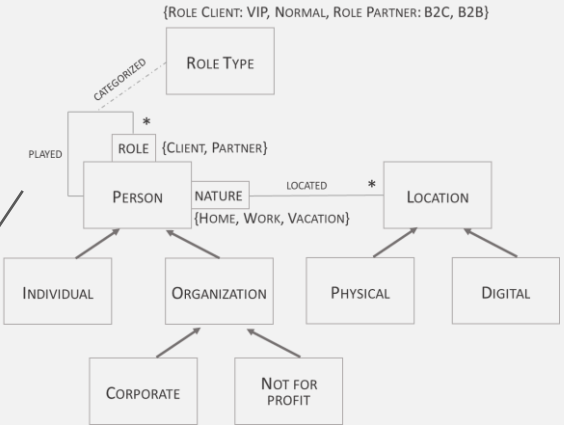
THESAURUS

TAXONOMY

ONTOLOGY

STATE MACHINE

BUSINESS IDENTIFIER



PERSON

XXXX+IDCategoryPerson

LOCATION

XXXX+IDCategoryLocation

ROLE

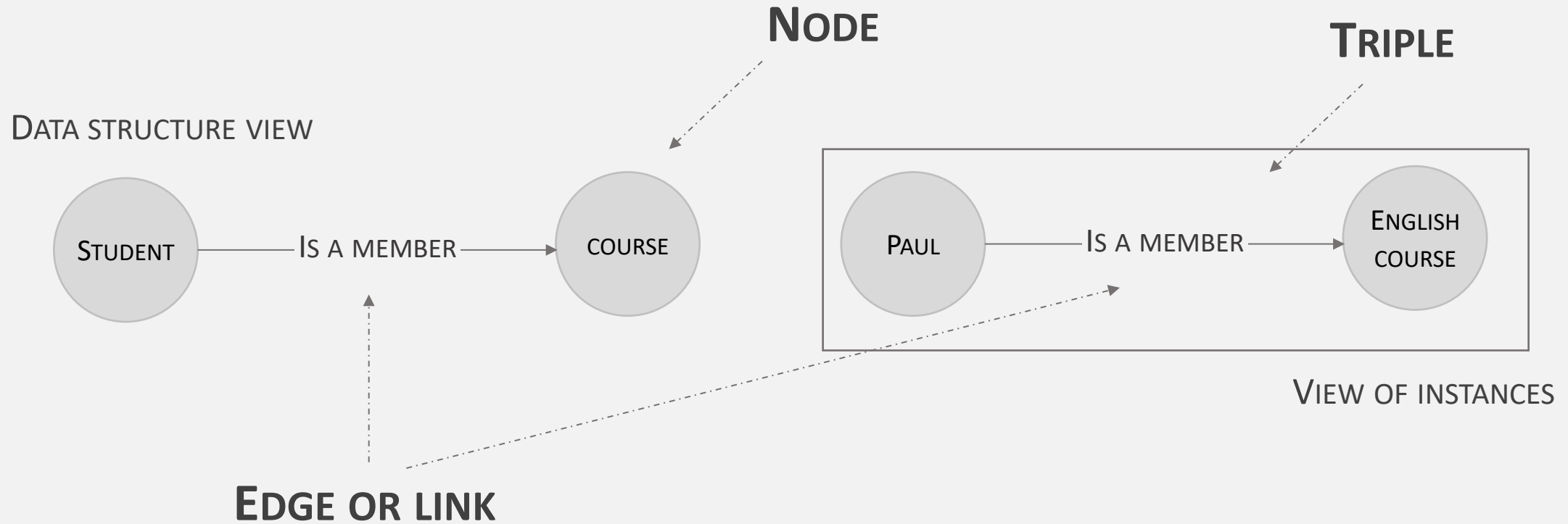
IDPerson+"TO"+IDPerson+"-"+IDTypeRole

DATABASES FOR SEMANTIC?

DATABASE TECHNOLOGIES

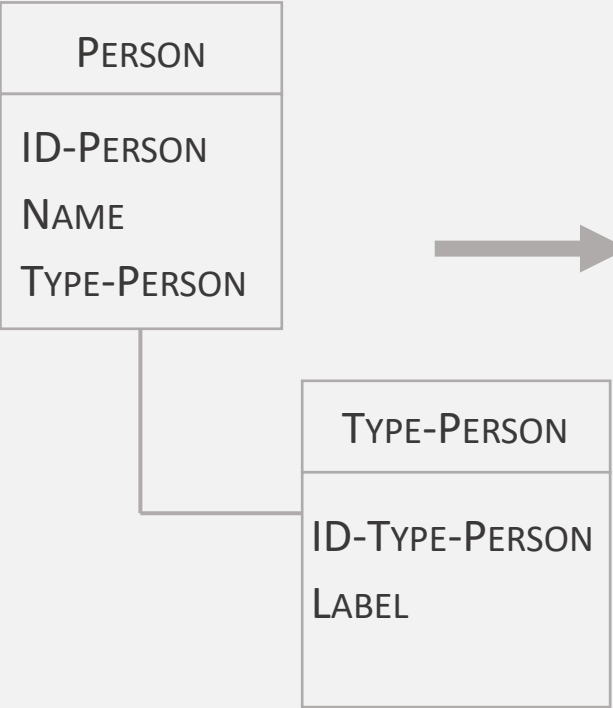
	SEMANTIC	LLM	KNOWLEDGE GRAPH	OLTP
PROBABILISTIC		✓	✗	✗
DETERMINISTIC - FORMAL		✗	✓	✓
TRANSACTIONAL - INTEGRITY		✗	✗ ✓	✓
CARDINALITY MANAGEMENT		✗	✗ ✓	✓
HUMAN LANGUAGE READABLE		✓	✗	✗
HALLUCINATION		✓	✗	✗
COGNITIVE CAPABILITY (E.G., INFERRED RELATION)		✓	✓	✗
UI ON STRUCTURED DATA & GOVERNANCE BUSINESS FEATURES		✗	✗ ✓	✓
DATA UPDATE ON LARGE VOLUME & REAL-TIME		✗	✗	✓
		TEXT GENERATION, ANALYSIS, DATA DISCOVERY, INNOVATION THINKING, CREATION	ODS ON READ-ONLY MODE, AI-GOVERNANCE, KNOWLEDGE ACCUMULATION, SEMANTIC MANAGEMENT	TRANSACTIONAL DATA, MDM, ODS ON WRITE MODE

KNOWLEDGE GRAPH DATABASE – TRIPLE

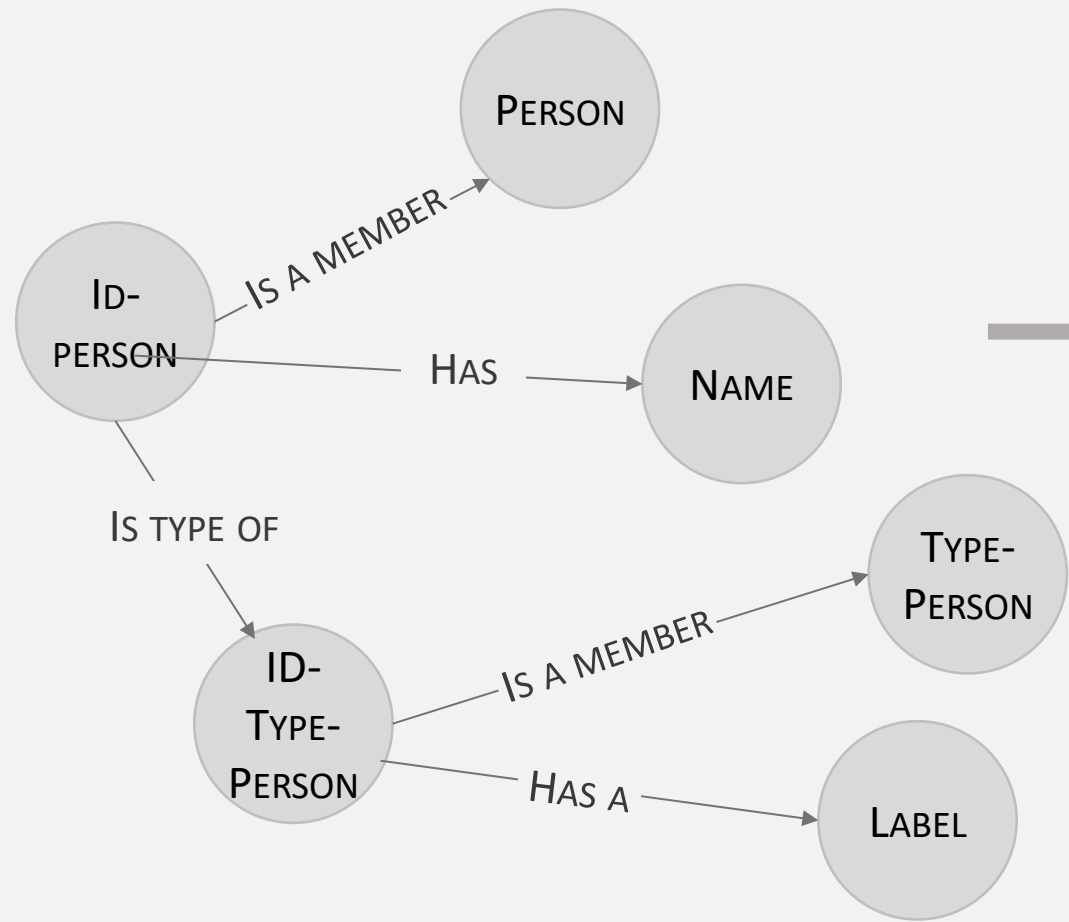


KNOWLEDGE GRAPH DATABASE – E.G. DATA MODEL VIEWS

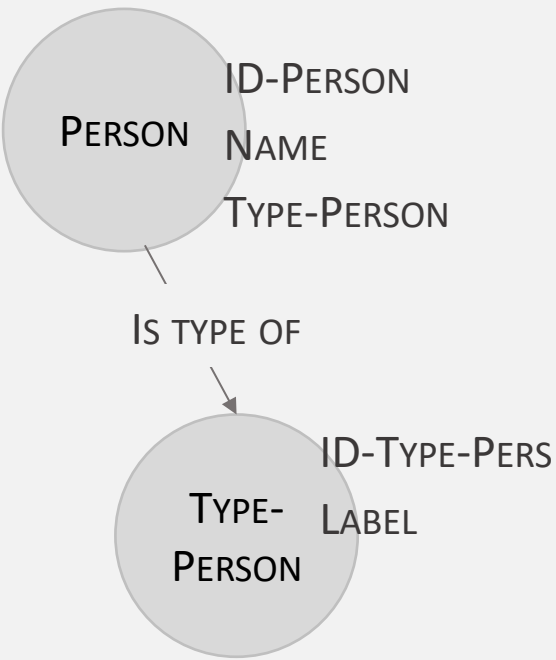
RELATIONAL TABLES



GRAPH – COMPLETELY UNFOLDED



GRAPH – COMPACTED VIEW



KNOWLEDGE GRAPH DATABASE – COMPARISON WITH TABLES

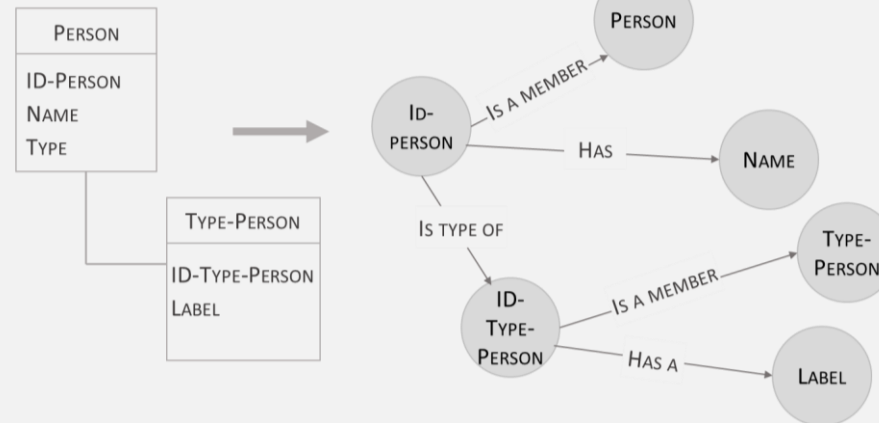
RELATIONAL TABLES



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

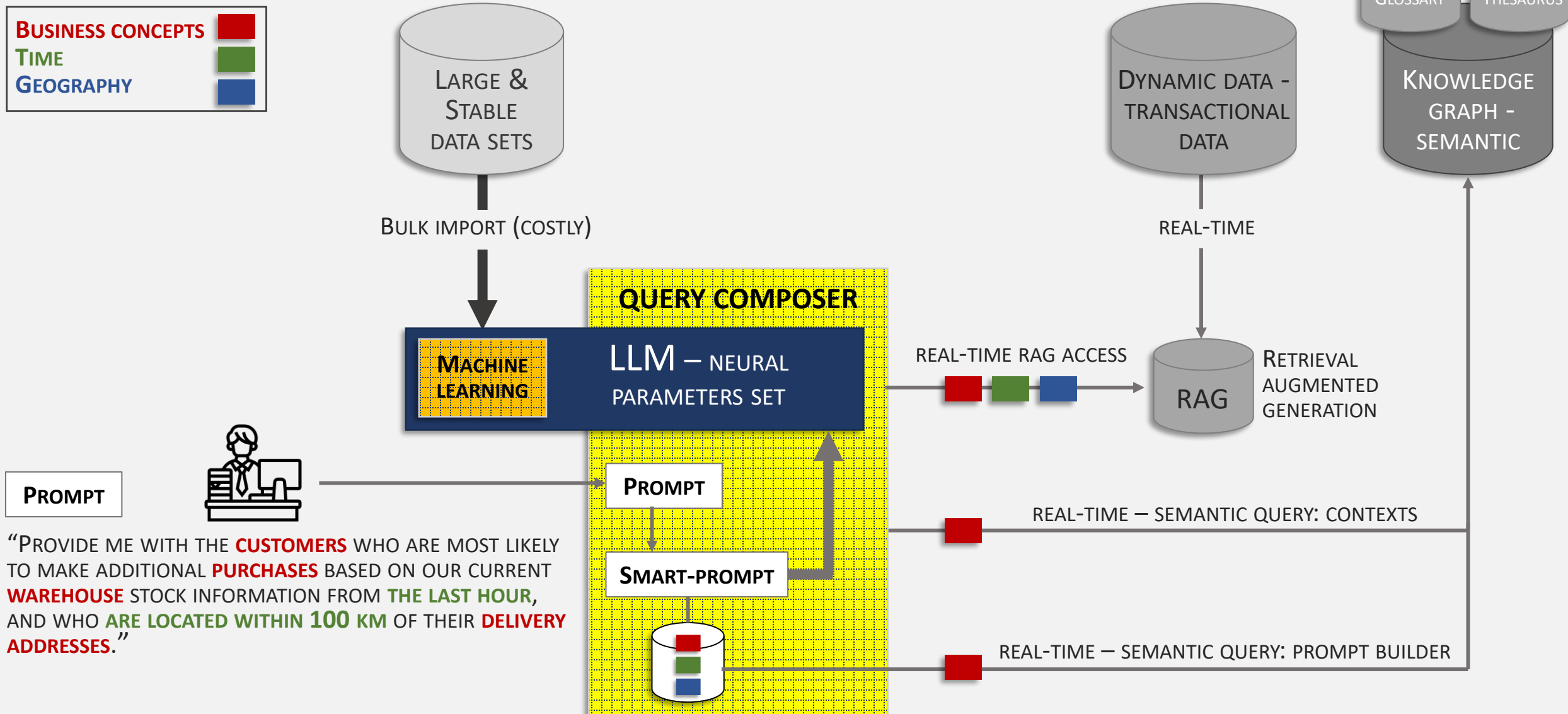
DATABASE TECHNOLOGIES

	SEMANTIC	LLM	KNOWLEDGE GRAPH	OLTP
PROBABILISTIC		✓	✗	✗
DETERMINISTIC - FORMAL		✗	✓	✓
TRANSACTIONAL - INTEGRITY		✗	✗ ✓	✓
CARDINALITY MANAGEMENT		✗	✗ ✓	✓
HUMAN LANGUAGE READABLE		✓	✗	✗
HALLUCINATION		✓	✗	✗
COGNITIVE CAPABILITY (E.G., INFERRED RELATION)		✓	✓	✗
UI ON STRUCTURED DATA & GOVERNANCE BUSINESS FEATURES		✗	✗ ✓	✓
DATA UPDATE ON LARGE VOLUME & REAL-TIME		✗	✗	✓
		TEXT GENERATION, ANALYSIS, DATA DISCOVERY, INNOVATION THINKING, CREATION	ODS ON READ-ONLY MODE, AI-GOVERNANCE, KNOWLEDGE ACCUMULATION, SEMANTIC MANAGEMENT	TRANSACTIONAL DATA, MDM, ODS ON WRITE MODE

HOLISTIC PROMPTING WITH SEMANTIC

HOLISTIC PROMPTING = LLM + KG

HOLISTIC PROMPTING WITH SEMANTIC



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**."

QUERY COMPOSER

MACHINE
LEARNING

LLM – NEURAL
PARAMETERS SET

PROMPT

SMART-PROMPT



BUSINESS CONCEPTS
TIME
GEOGRAPHY



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**

BLUE-PRINT FOR SEMANTIC INFORMATION SYSTEM (SIS)

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)

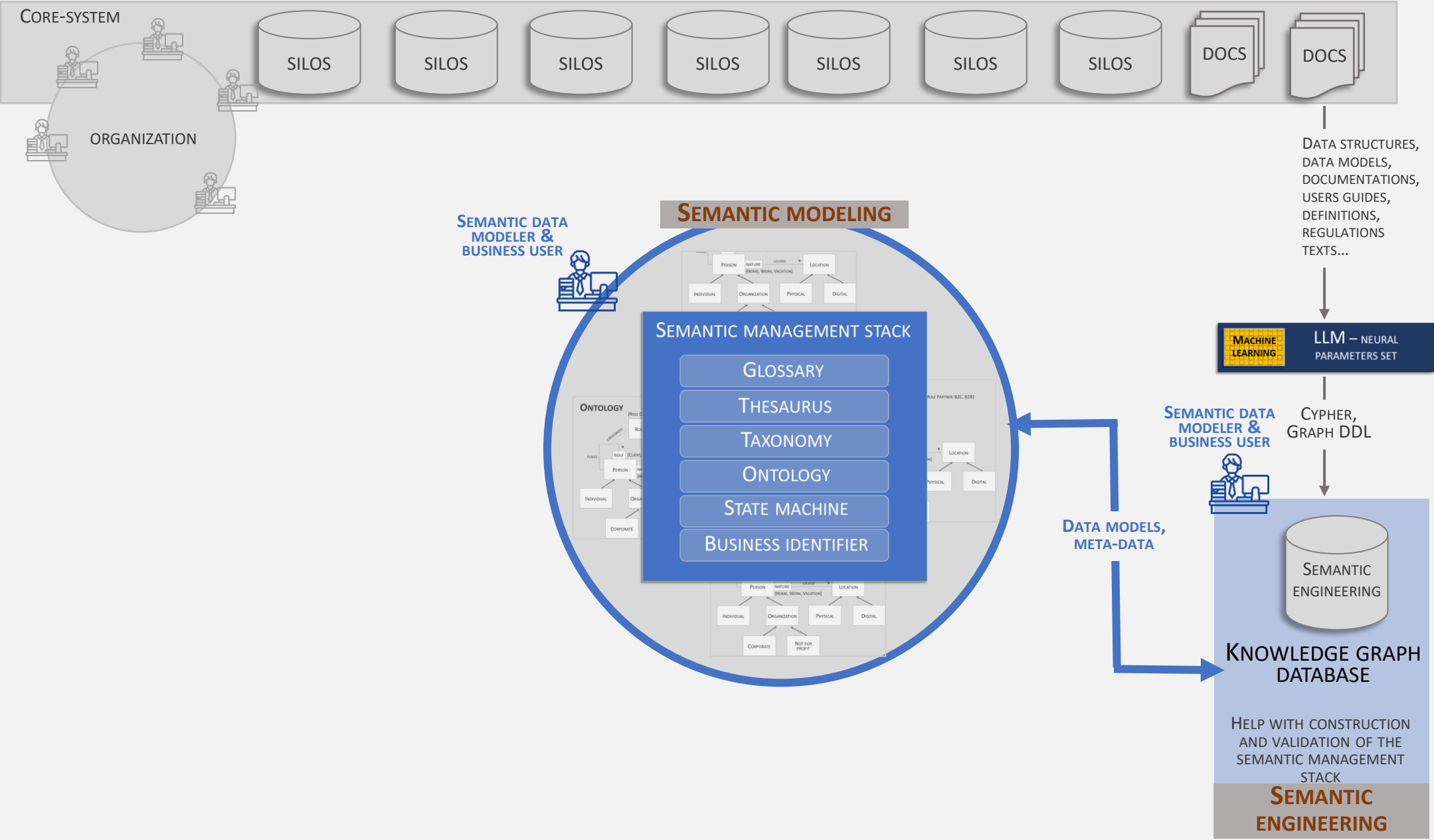


Reference and master data repository which makes it possible to unify exchanges at the ETL-EAI level and to disseminate shared data throughout the information system

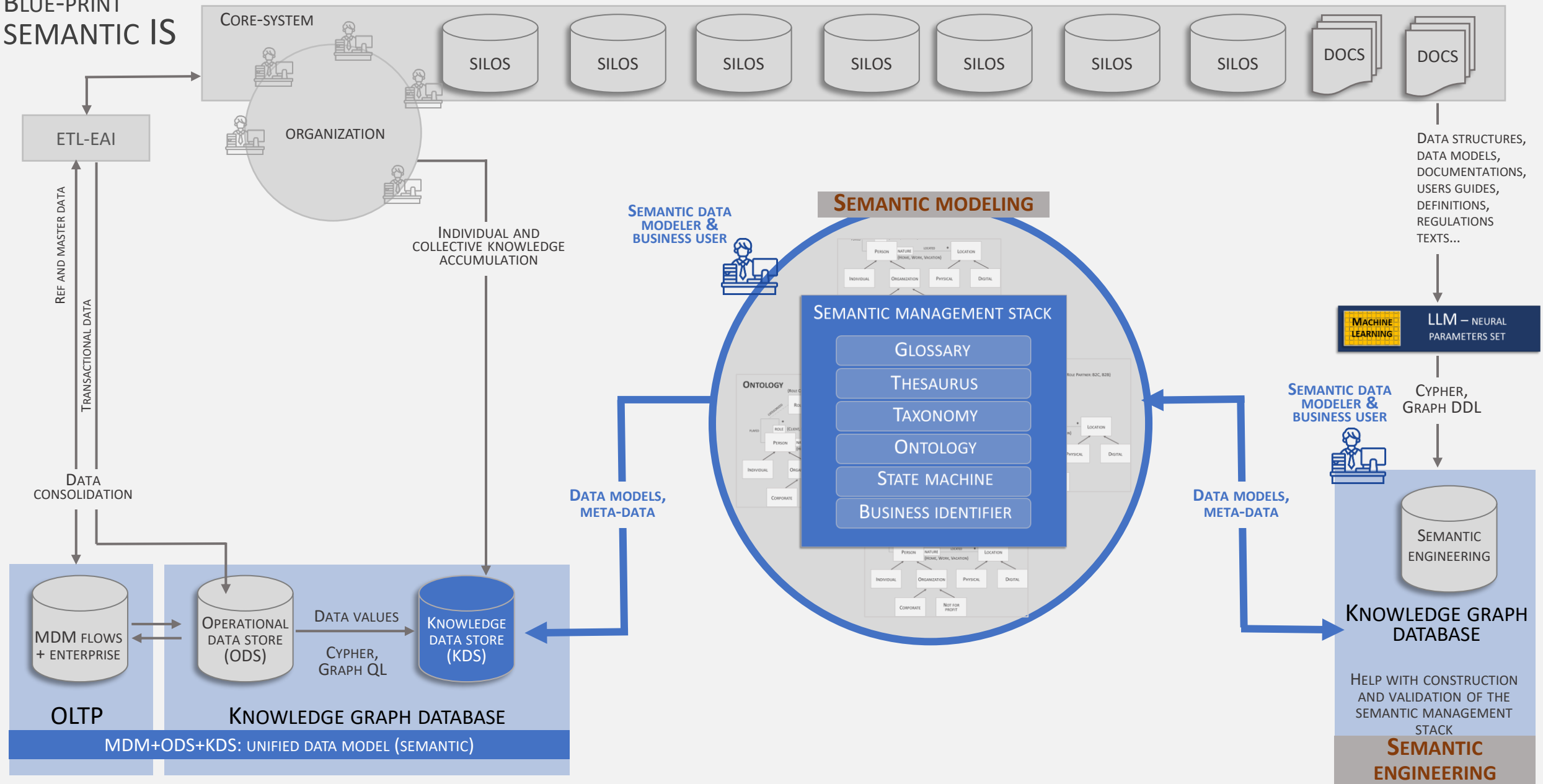


Knowledge repository which contains part or all the ODS data to have semantic management and contains the stock of unstructured information necessary for AI (contents and/or links to CMS)

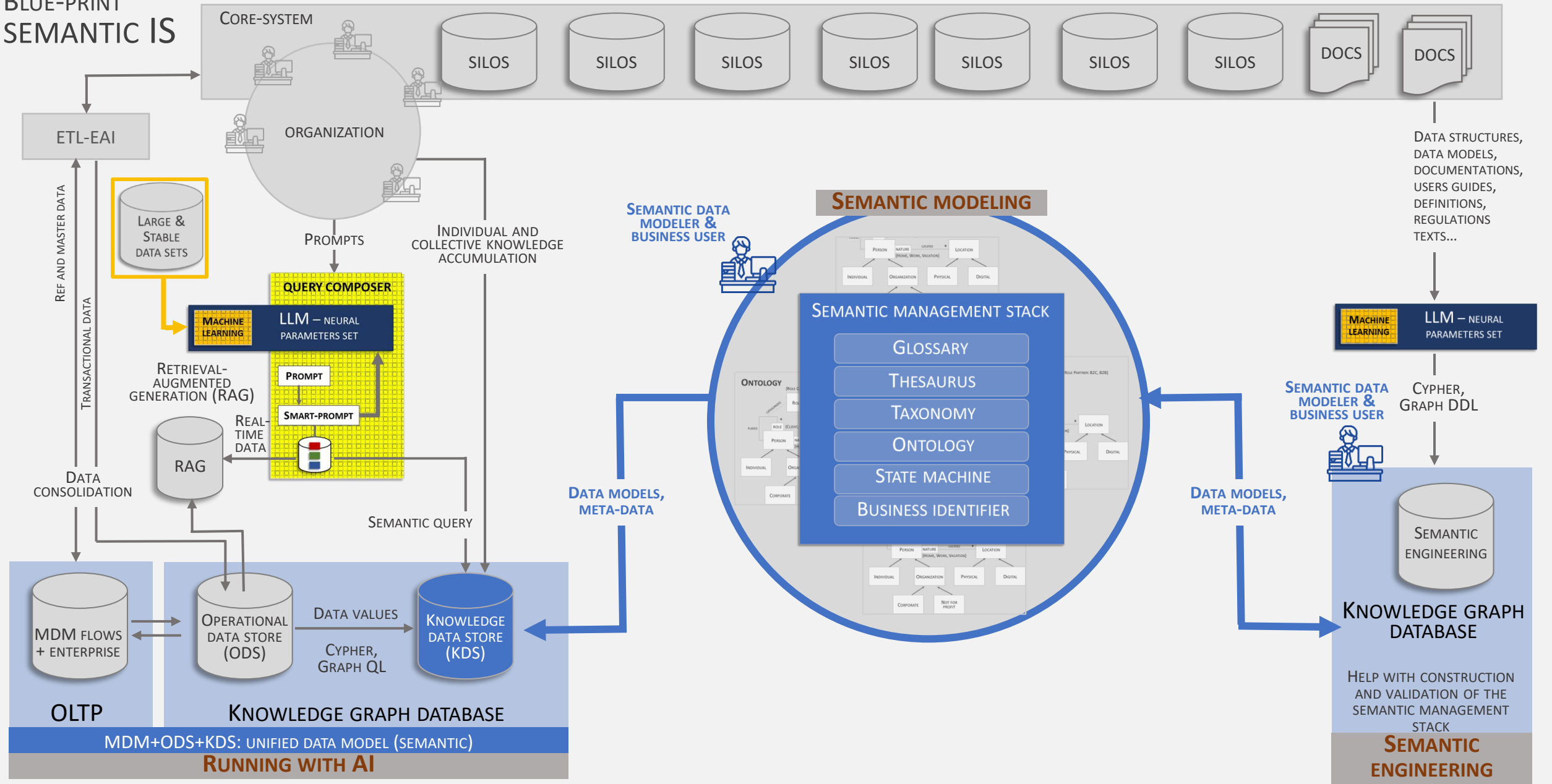
BLUE-PRINT
SEMANTIC IS



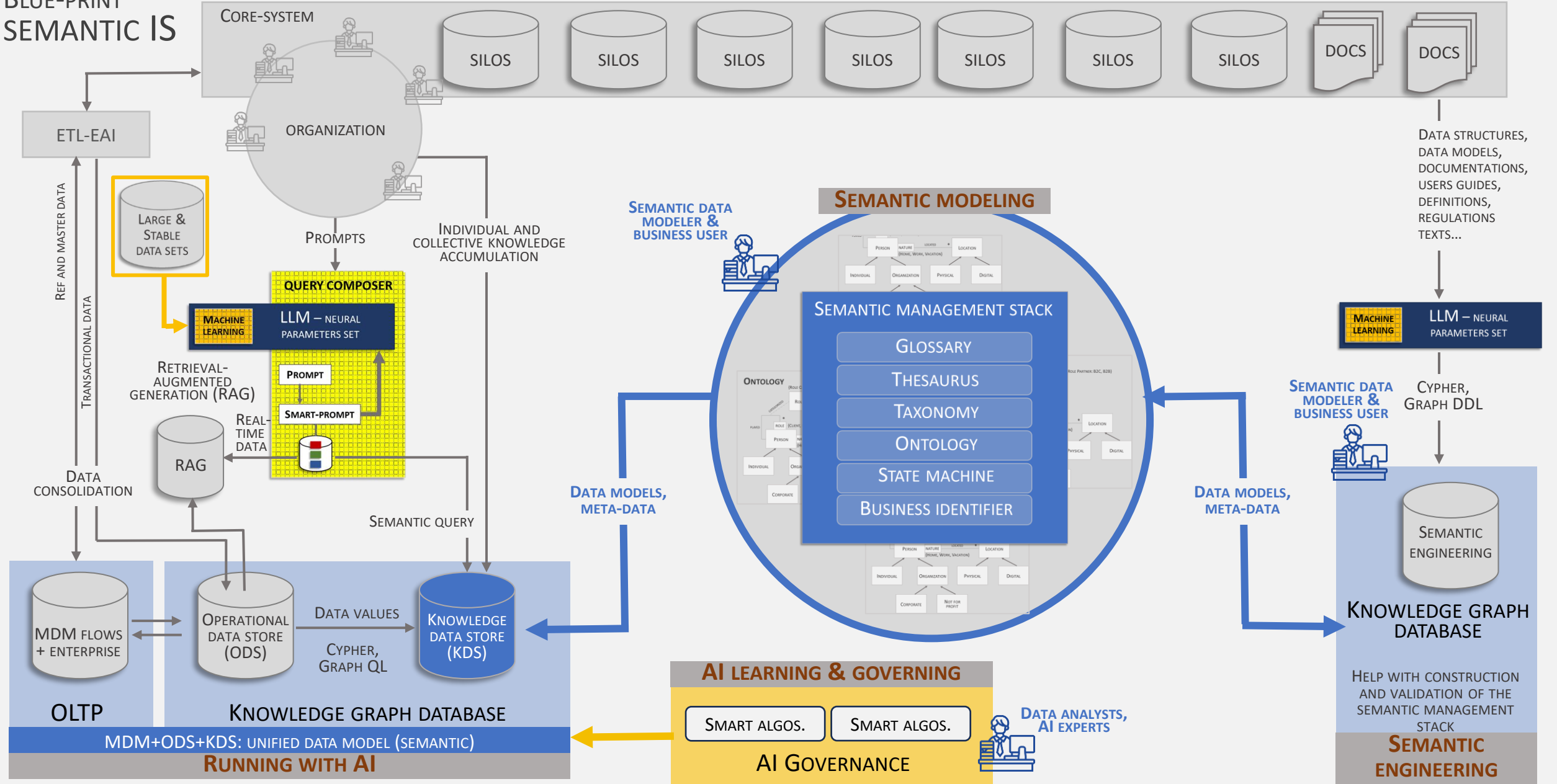
BLUE-PRINT SEMANTIC IS



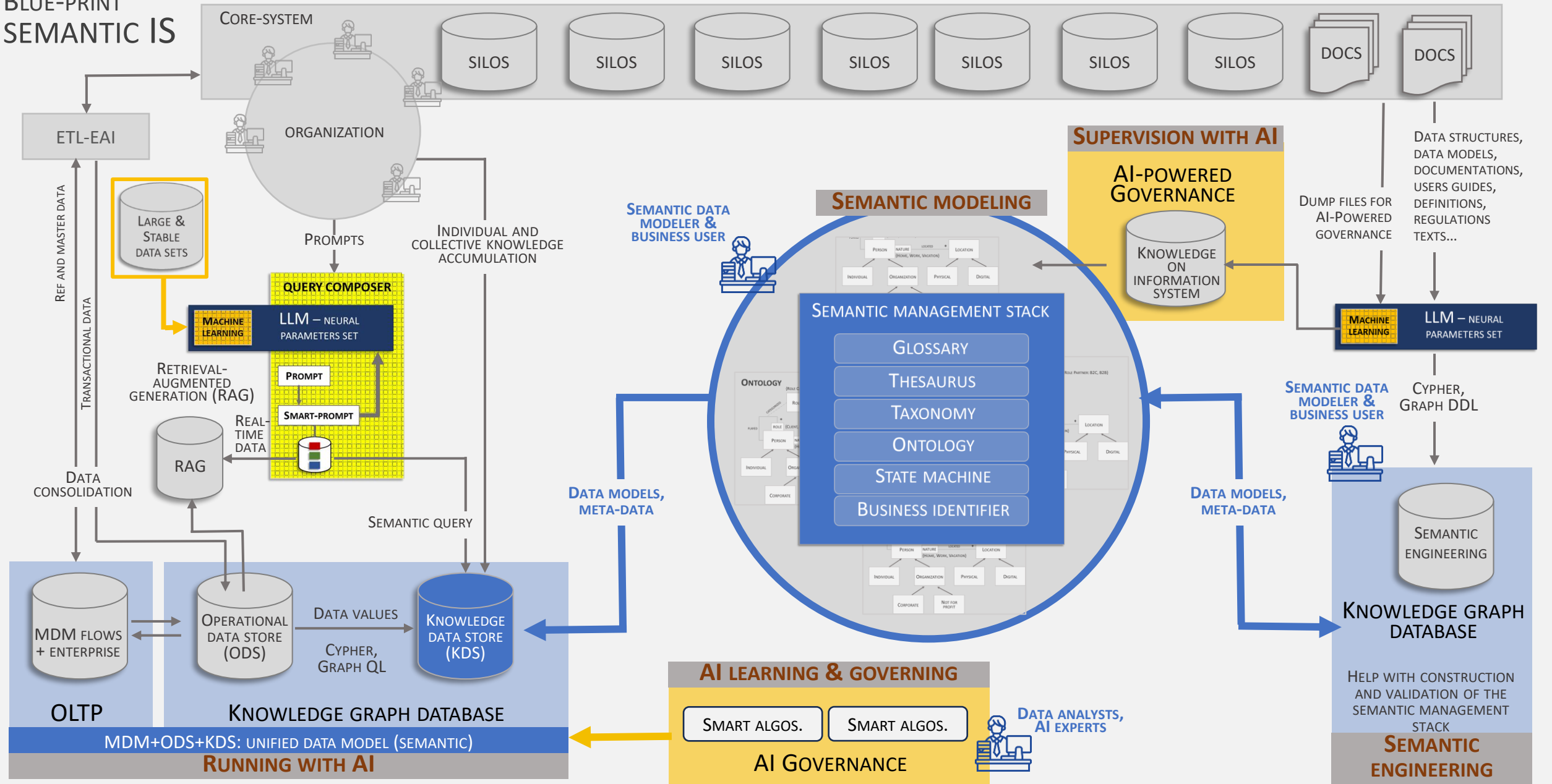
BLUE-PRINT
SEMANTIC IS

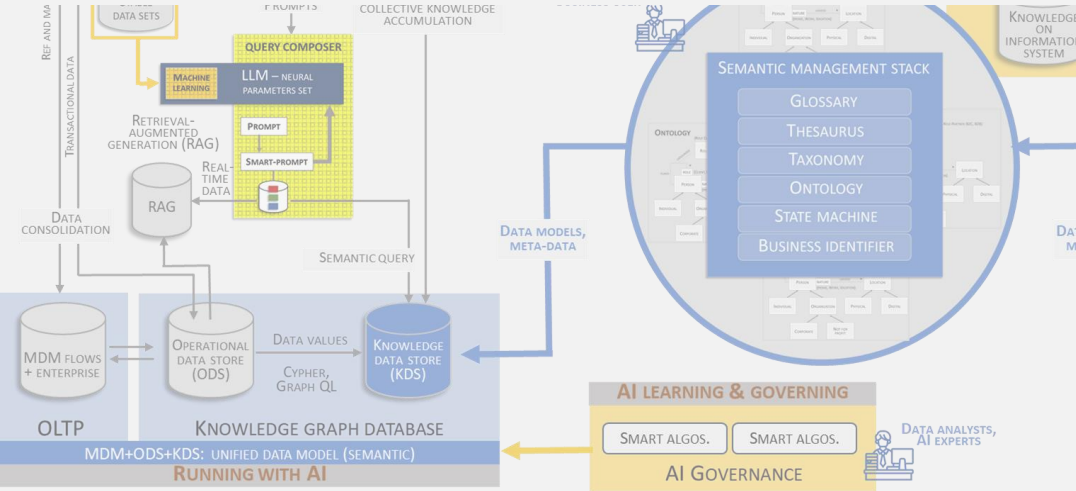


BLUE-PRINT
SEMANTIC IS



BLUE-PRINT
SEMANTIC IS





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

MORE VIDEOS

THANK YOU!

VISIT YOUR YOUTUBE CHANNEL

THIS VIDEO ABOUT ENTERPRISE ARCHITECTURE

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