free your time to create

Overcoming boundaries: How Linked Data and Machine Learning are Transforming Enterprise Software

Keynote LDAC 2024

elevait


By ChatGPT

Overview

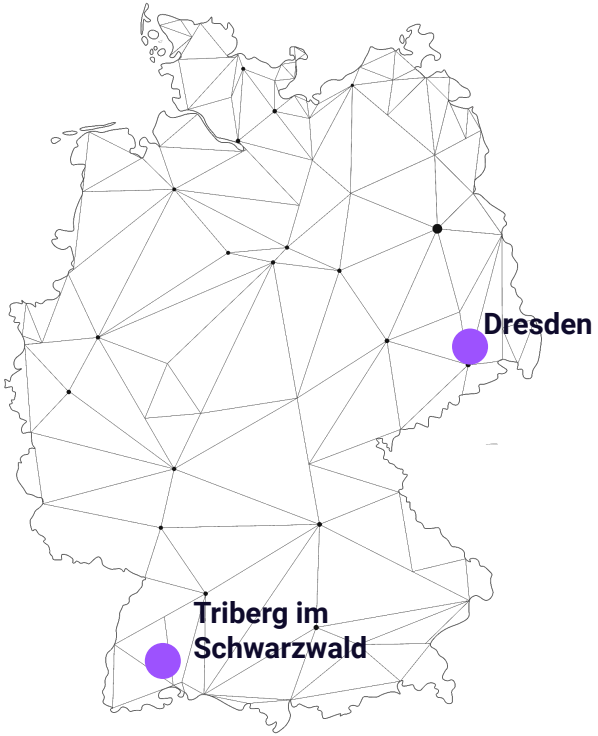
Keynote LDAC 2024

1. elevait
2. Enterprise Software - Status Quo
3. elevait suite
4. 1 Platform, many use cases

elevait GmbH & Co. KG

In a nutshell

2021	Year of foundation
85	Employees
17	Nations



Vision & Mission

Free your time to create.

Our mission is to revolutionize the flow of information in companies by putting automation, process efficiency and seamless knowledge sharing at the forefront of what we do.

Research & Transfer

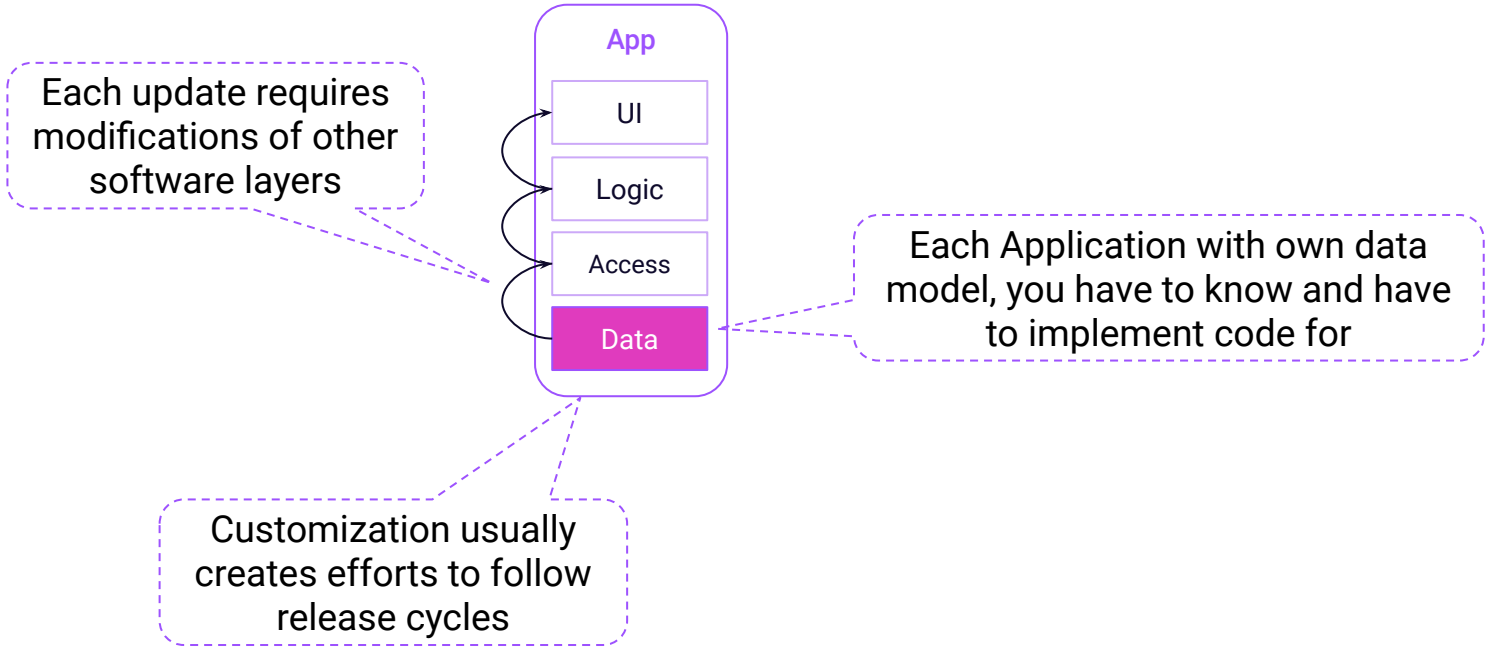
AI Innovation award (BMWi), DB mindbox

Involved in various, highly innovative national and international research projects.

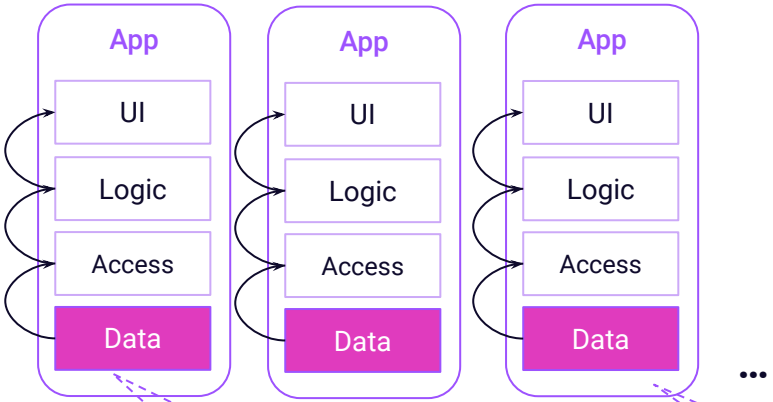
Enterprise Software Status Quo


RELEASE
DELAYS
RELEASE
DELAYS
MAINTAINABILITY
ISSUES
By ChatGPT

Challenges of Enterprise Software



Challenges of Enterprise Software



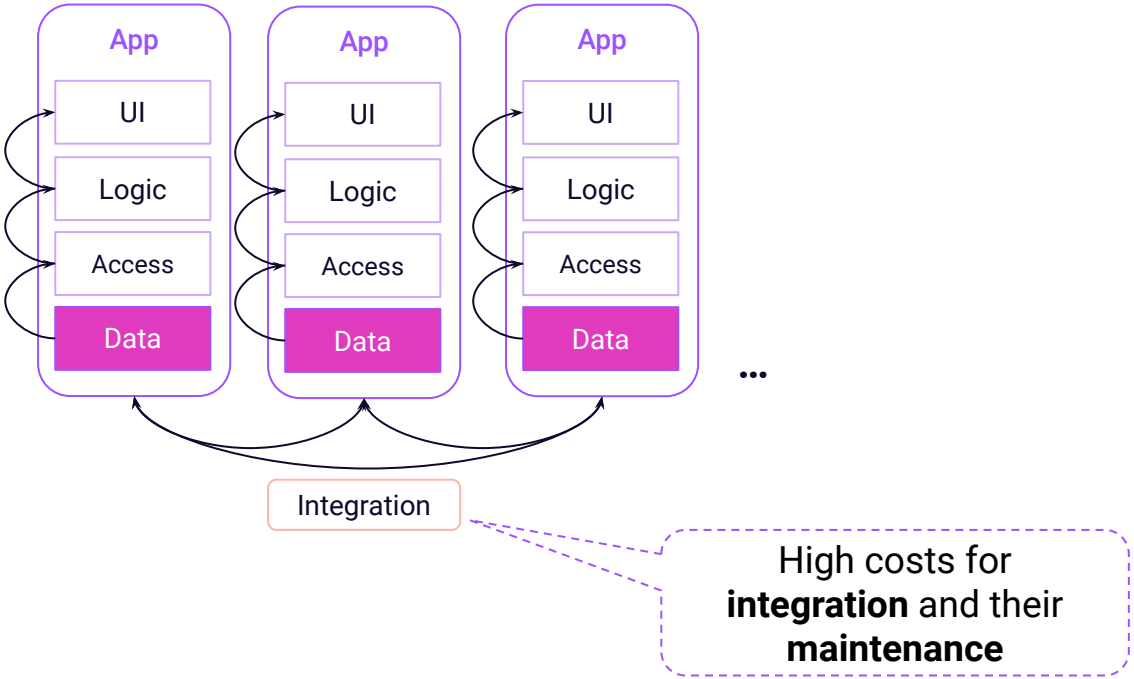
1000 Apps
x 1000 Tables
x 1000 Lines of Code
= **1.000.000.000 Lines of Code**

Dave McComb: The Data-Centric Revolution: Restoring Sanity to Enterprise, 2019

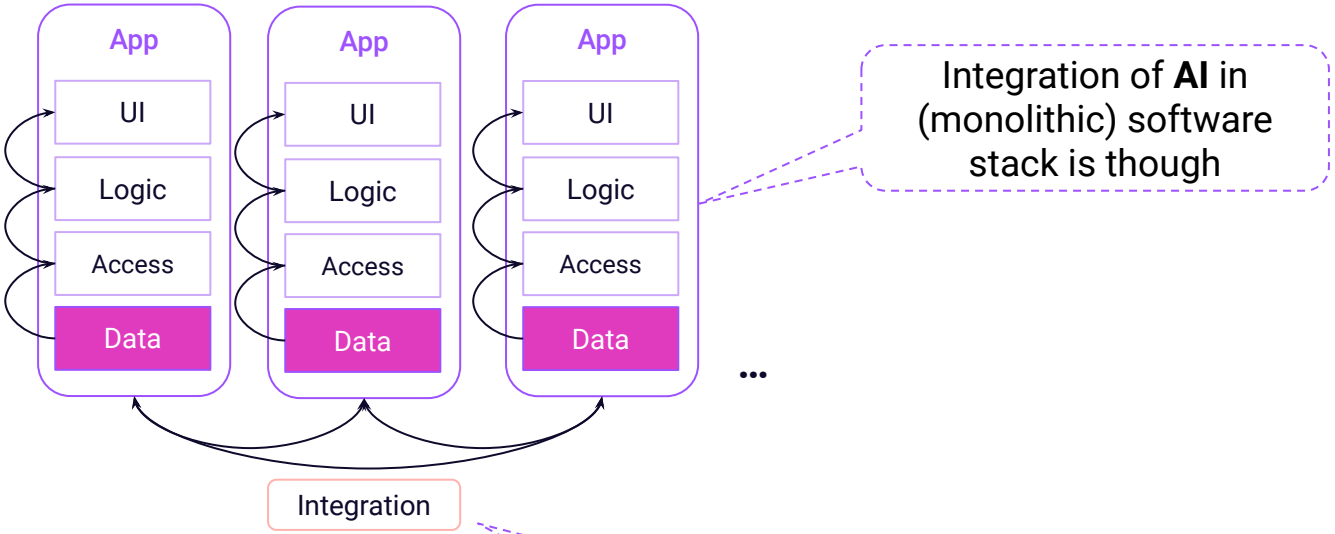
Decoupled data silos results in **redundant**, often **not up-to-date data**

Each application comes with the same issues but **multiplies** the effect

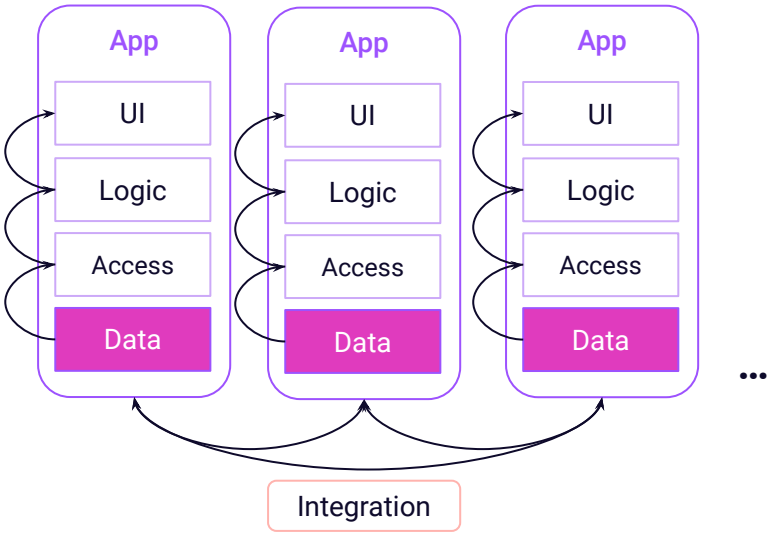
Challenges of Enterprise Software



Challenges of Enterprise Software



Challenges of Enterprise Software



...

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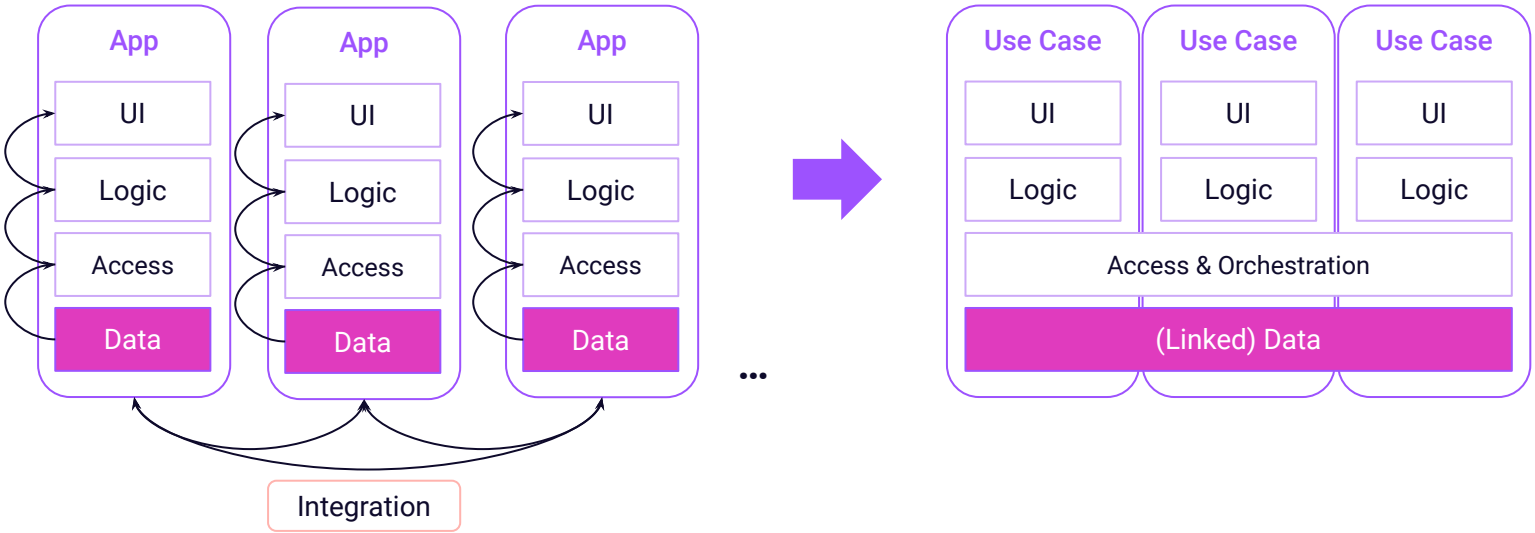
How to solve these issues?

New Paradigm: Data-Centric Enterprise



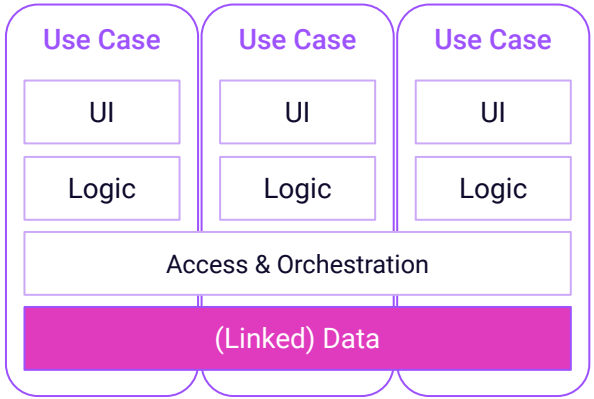
Application-centric

Data-centric

New Paradigm: Data-Centric Enterprise

Advantages

- No application boundaries
- Use case related implementation
- Common data access eases its use and allows integration of AI
- (Dynamic, continuous release cycles)
- Lower life-long costs



Data-centric

elevait suite

Insights of a Data-Centric Enterprise Software
for Knowledge-based Automation

Vision

We value time as the ultimate asset.

elevait strives to provide individuals with more time as a liberating force, enabling them to embrace purpose, creativity, and joy –

in everything they do.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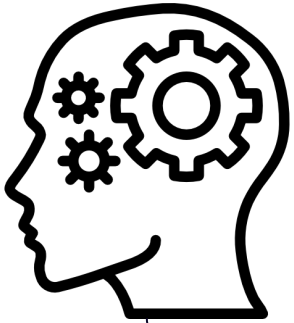
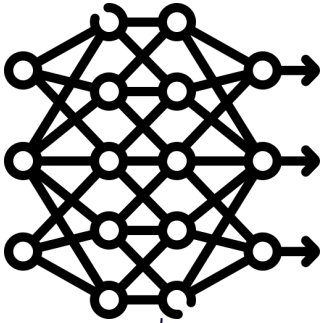
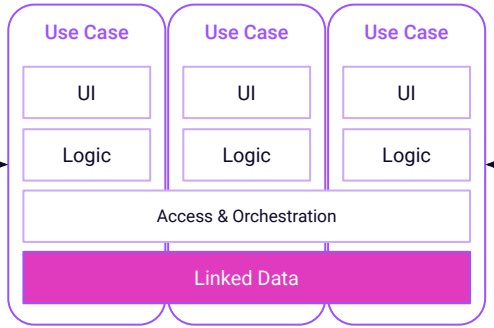
How can we reach this vision?

Symbolic Knowledge



Machine Learning

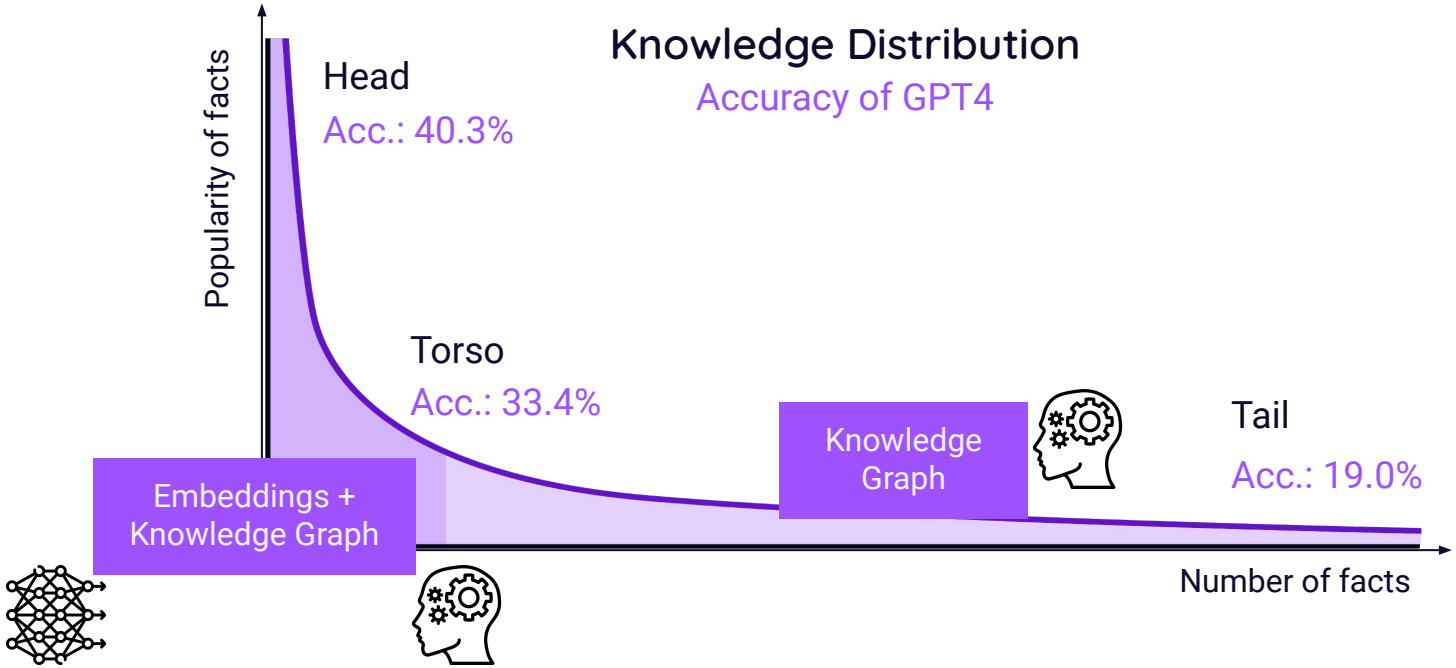




Platform

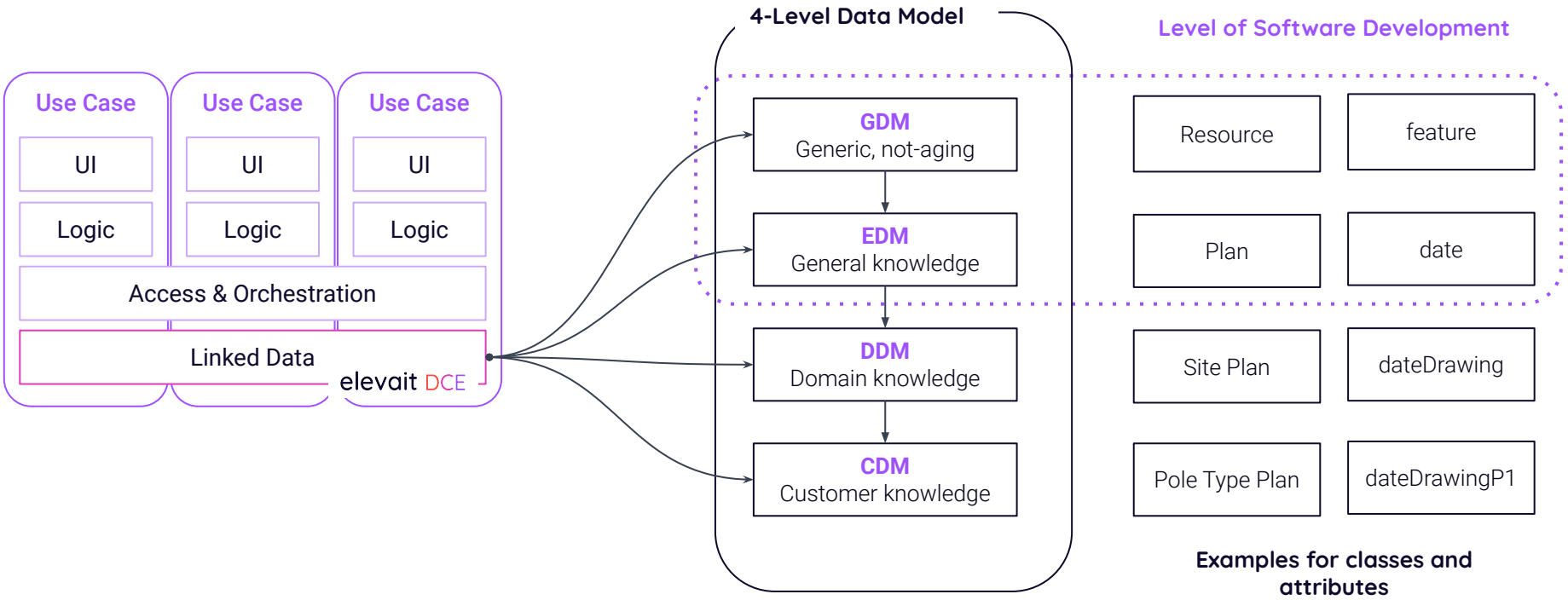
We have GenAI! Why do we need symbolic knowledge?

We have GenAI! Why do we need symbolic knowledge?

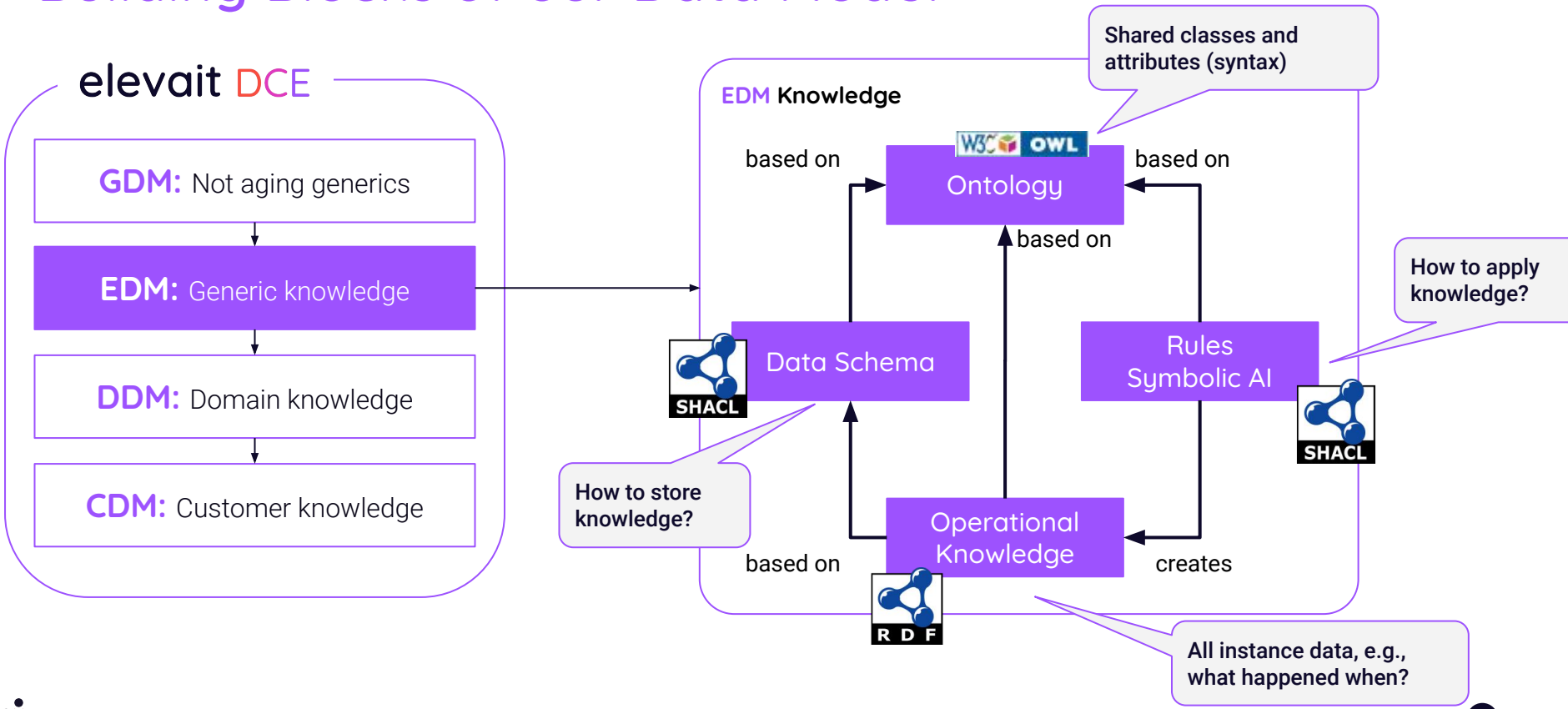


Sun et al.: Head-to-Tail: How Knowledgeable are Large Language Models (LLMs)? A.K.A. Will LLMs Replace Knowledge Graphs?, arXiv, 2023 - https://arxiv.org/abs/2308.10168

Knowledge Graphs within the Platform



Building Blocks of our Data Model



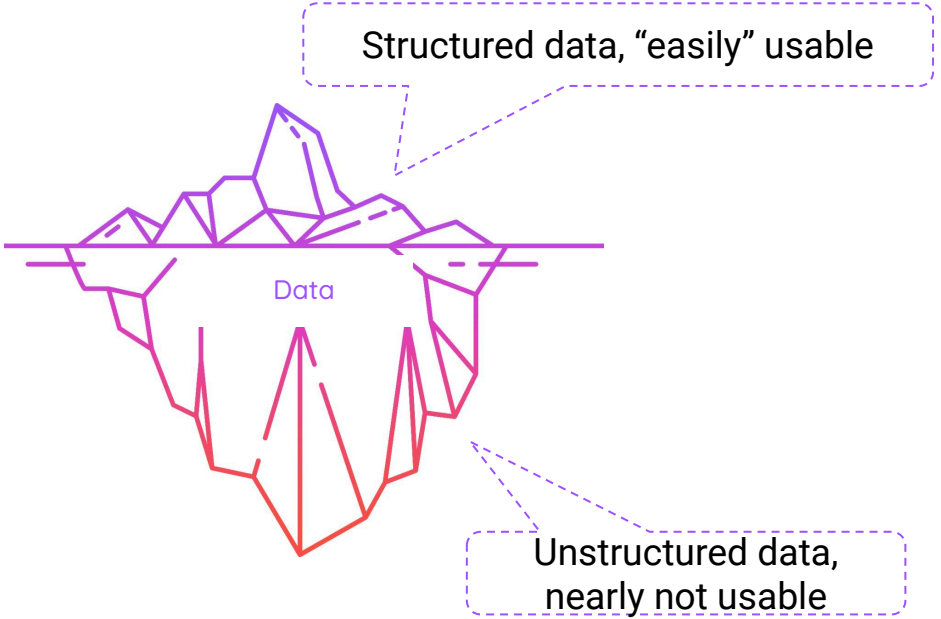
We have no Linked Data! Use Machine Learning.

Design time

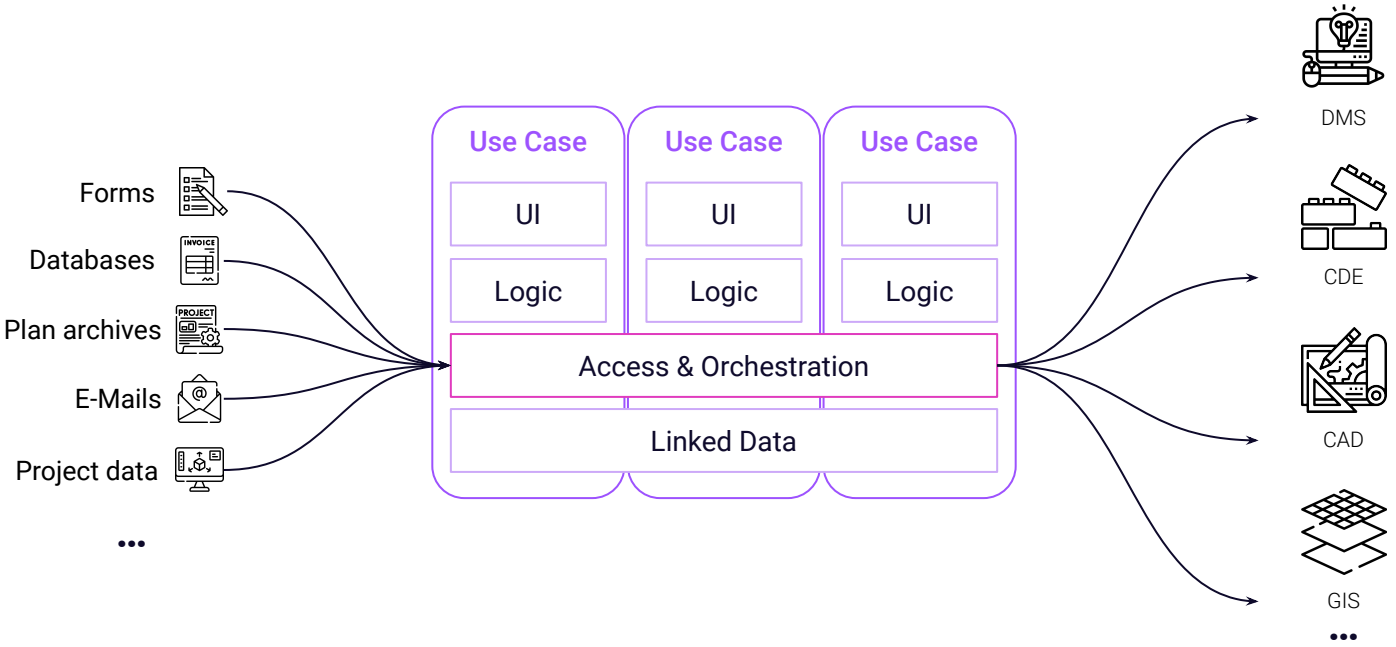
- Support data understanding
- Indirectly infer knowledge, e.g., by clustering
- Directly infer knowledge, e.g., facts, attribute ranges

Runtime

- From (un-) structured data to operational knowledge, e.g., by classification, extraction

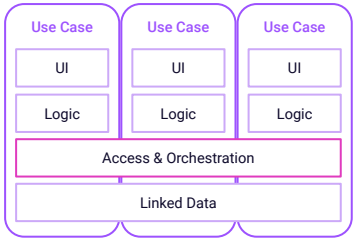


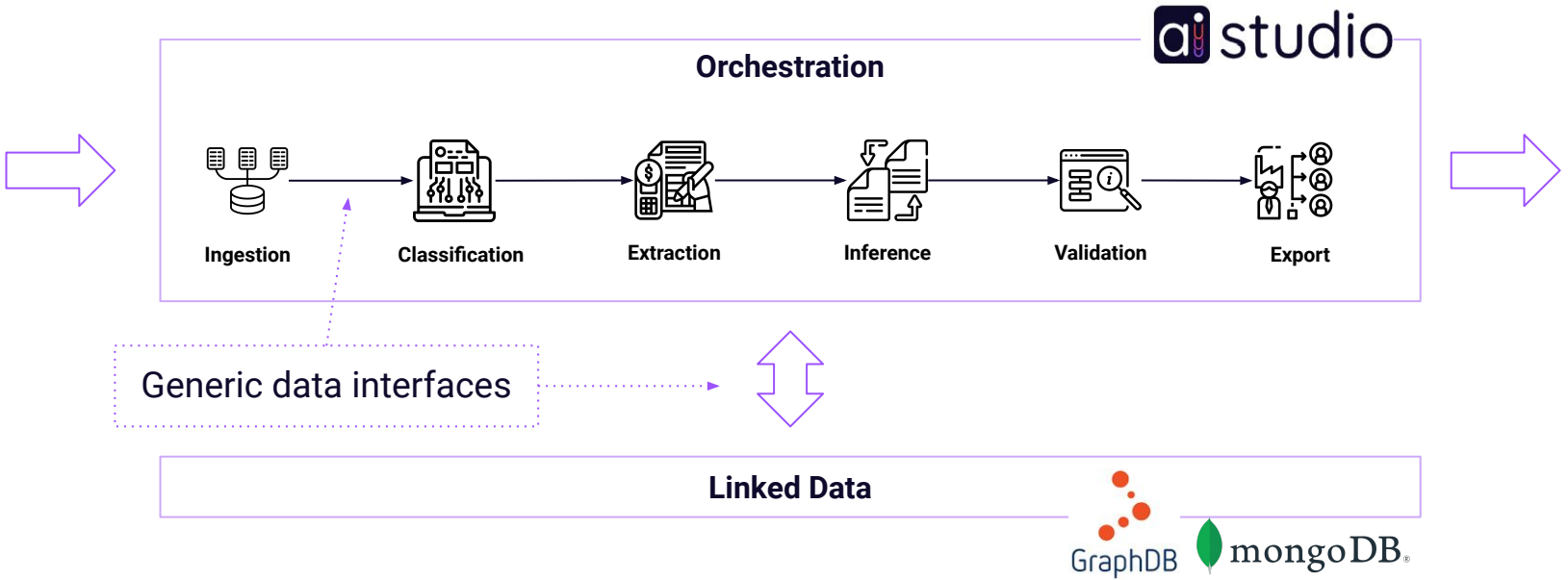
Data-driven Orchestration and Execution



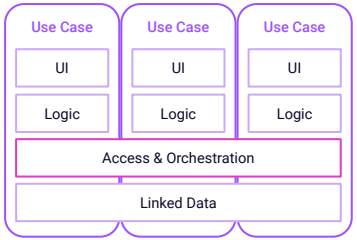
Standardized data access and execution of business logic.

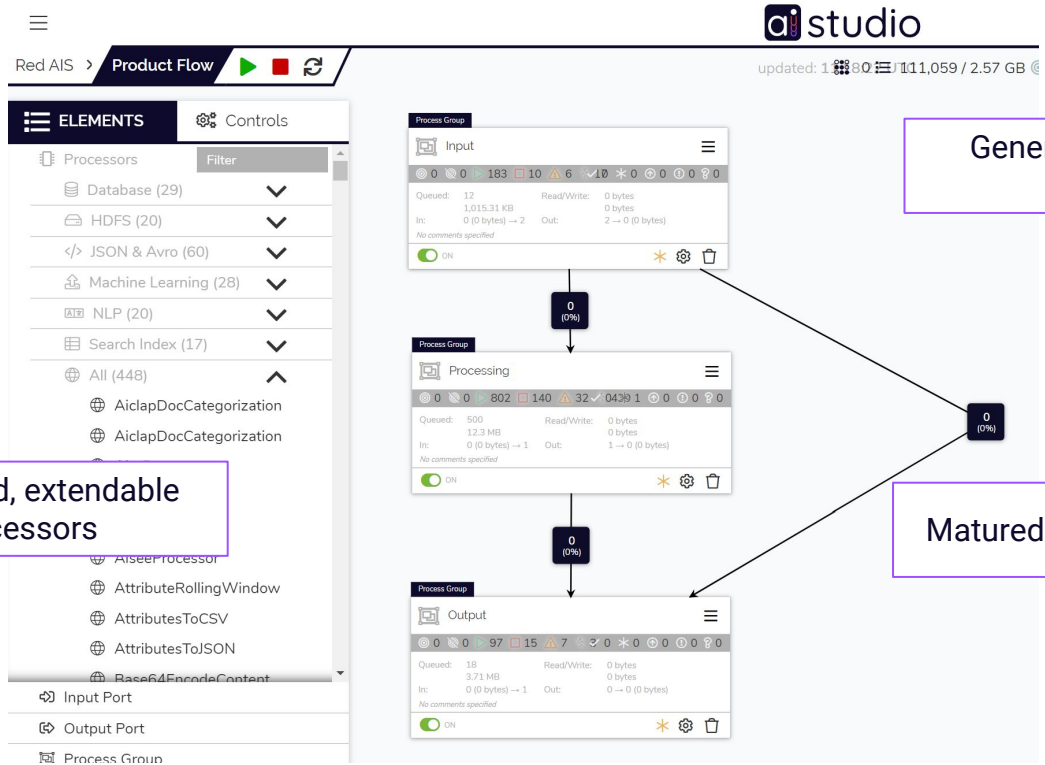
Data-driven Orchestration and Execution





Data-driven Orchestration and Execution



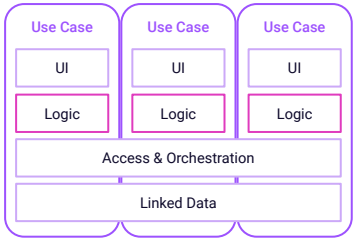


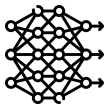
Generic, hierarchical workflow

Predefined, extendable processors

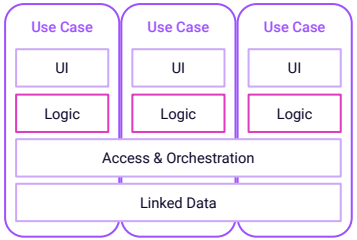
Matured queuing system

Develop Business Logic - How to?



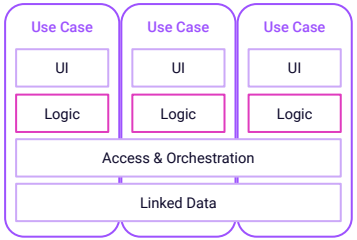
	Approach	When to use?	Pros	Cons
	**Coding**	Clear, stable rules and requirements	Full control, low dependency on data records	Low flexibility, high maintenance effort
	**Semantic Reasoning**	Knowledge representable as logical rules, deductive reasoning possible	Declarative, no code and no data required, results are transparent and comprehensible	Complex to create and maintain
	**Machine Learning**	Unclear rules, changing patterns and large amounts of data	Adaptive, recognizes complex patterns, suitable for tasks that cannot be explicitly programmed	Black-box problem, it's a statistic approach, data-intensive

Develop Business Logic

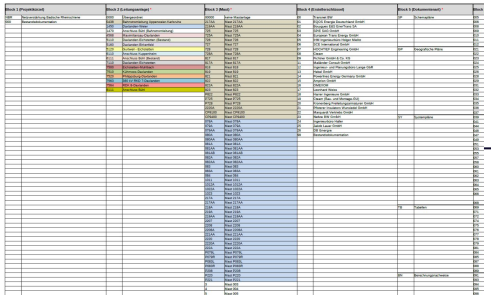


Approach	Ingestion	Classification	Extraction	Inference	Validation	Export
Code	x	-	x	x	x	x
Semantic Reasoning	-	-	-	x	x	-
Machine Learning	x	x	x	x	-	-

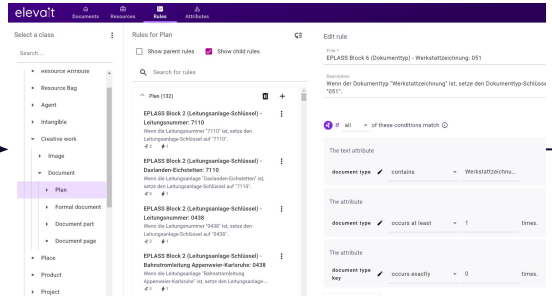
Semantic Reasoning using SHACL



Implicit or explicit business rules



No-code rule editor for domain experts



Generated SHACL rules

Foundation to standardize knowledge & processes by experts.

Select a class

Search...

- Resource Attribute
- Resource Bag
- Agent
- Intangible
- Creative work
  - Image
  - Document
    - Plan
    - Formal document
    - Document part
    - Document page
- Place
- Product
- Project

Rules for Plan

Show parent rules

Show child rules

Search for rules

Plan (132)

EPLASS Block 2 (Leitungsanlage-Schlüssel) - Leitungsnummer: 7110
Wenn die Leitungsnummer "7110" ist, setze den Leitungsanlage-Schlüssel auf "7110".
3 1

EPLASS Block 2 (Leitungsanlage-Schlüssel) - Daxlanden-Eichstetten: 7110
Wenn die Leitungsanlage "Daxlanden-Eichstetten" ist, setze den Leitungsanlage-Schlüssel auf "7110".
3 1

EPLASS Block 2 (Leitungsanlage-Schlüssel) - Leitungsnummer: 0438
Wenn die Leitungsnummer "0438" ist, setze den Leitungsanlage-Schlüssel auf "0438".
3 1

EPLASS Block 2 (Leitungsanlage-Schlüssel) - Bahnstromleitung Appenweier-Karlsruhe: 0438
Wenn die Leitungsanlage "Bahnstromleitung Appenweier-Karlsruhe" ist, setze den Leitungsanlage-...
3 1

Edit rule

Title *
EPLASS Block 6 (Dokumenttyp) - Werkstattzeichnung: 051

Description
Wenn der Dokumenttyp "Werkstattzeichnung" ist, setze den Dokumenttyp-Sc
"051".

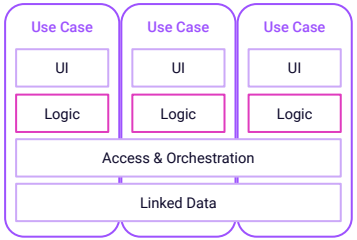
If all of these conditions match

The text attribute
document type contains Werkstattzeichnu...

The attribute
document type occurs at least 1 tim

The attribute
document type key occurs exactly 0 tim

Exemplary ML-Services



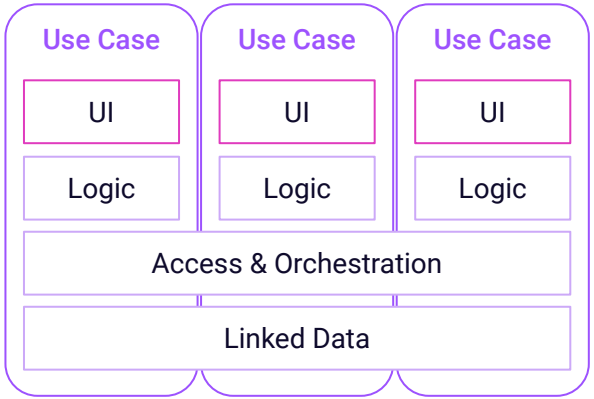
Developed by elevait

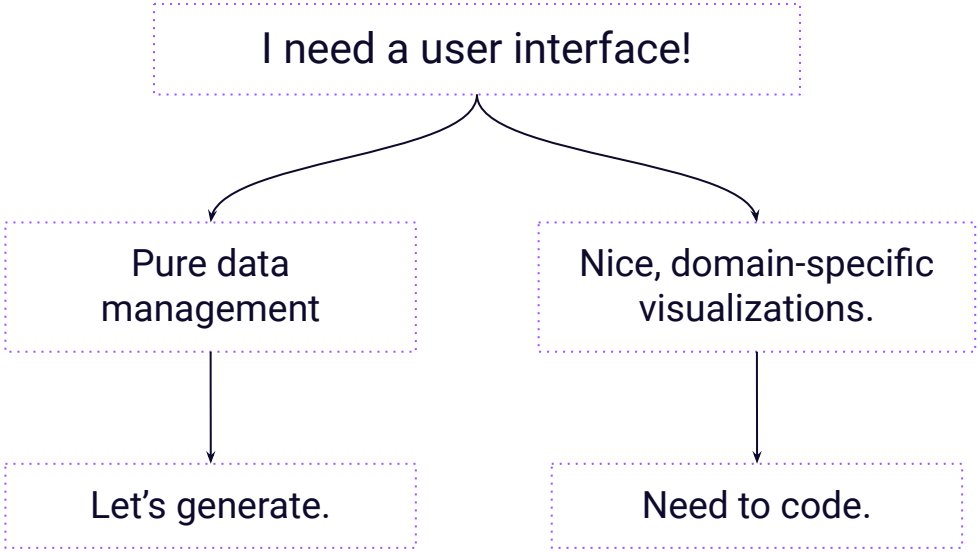
- **Ingestion**
  - OCR
  - Handwriting
  - Checkbox
  - Derotation
  - Denoising
- **Classification**
  - Texts
  - Images
  - Document Revisions
  - Plans
- **Extraction**
  - Invoices
  - CVs
  - Forms
  - Plan Metadata
  - Geo Reference
  - Plan Objects

External services

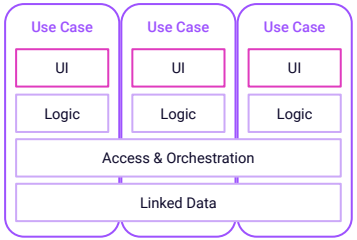
- **Azure GPT**
  - Summary
  - Extraction
  - Classification
- **...**

User Interface





User Interface Generation - Schema



Class

- Resource
  - Resource Attribute
  - Resource Bag
  - Agent
  - Intangible
  - Creative work
    - Image
    - Document
      - Plan
        - Drawing
        - Schedule
      - Formal document

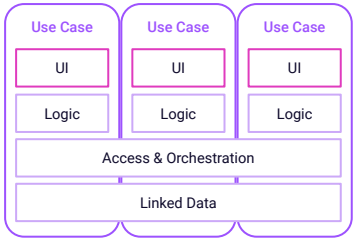
SHACL Shape

```
:PlanShape
  rdf:type edm:ResourceShape ;
  rdf:type edm:RootResourceShape ;
  rdf:type sh:NodeShape ;
  rdfs:label "Plan"@de ;
  sh:labelTemplate "{?fichtner:documentName}" ;
  sh:property [
      rdf:type sh:PropertyShape ;
      sh:path fichtner:documentName ;
      sh:datatype xsd:string ;
      sh:name "Dokumentenname"@de ;
    ] ;
  sh:property [
      rdf:type sh:PropertyShape ;
      sh:path fichtner:conventionalPlanNumber ;
      sh:datatype xsd:string ;
      sh:name "EPLASS Plannummer"@de ;
    ] ;
```

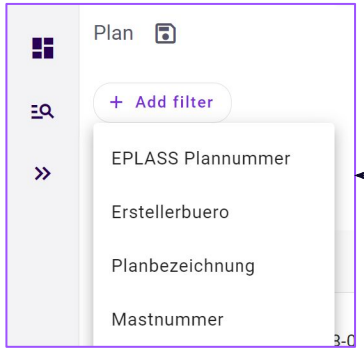
Properties

- feature
  - gdm:feature
- text attribute
  - edm:textField
- reference number
  - edm:referenceNumber
- EPLASS Plan Number
  - fichtner:conventionalPlanNumber

User Interface Generation - Generators



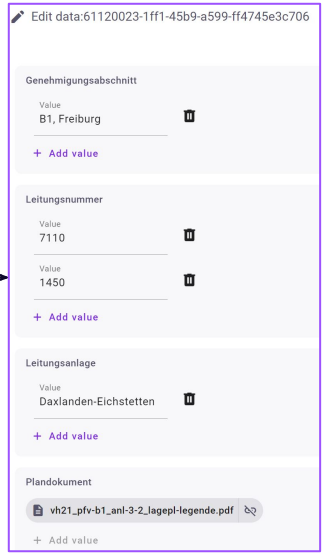
Filters



SHACL Shape

```
:PlanShape
  rdf:type edm:ResourceShape ;
  rdf:type edm:RootResourceShape ;
  rdf:type sh:NodeShape ;
  rdfs:label "Plan"@de ;
  sh:labelTemplate "{?fichtner:documentName}" ;
  sh:property [
      rdf:type sh:PropertyShape ;
      sh:path fichtner:documentName ;
      sh:datatype xsd:string ;
      sh:name "Dokumentenname"@de ;
    ] ;
  sh:property [
      rdf:type sh:PropertyShape ;
      sh:path fichtner:conventionalPlanNumber ;
      sh:datatype xsd:string ;
      sh:name "EPLASS Plannummer"@de ;
    ] ;
```

Forms

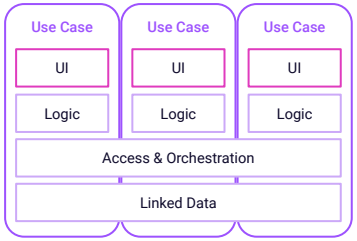


EPLASS Plannummer	Erstellerbuero	Planbezeichnung	Mastnummer
NBR-7110-00000-01-GP-028-000…	EQOS Energie	Lageplan	209A 212A and 2 more
NBR-7110-00000-01-GP-028-000…	EQOS Energie	Lageplan	1333 145A and 12 more

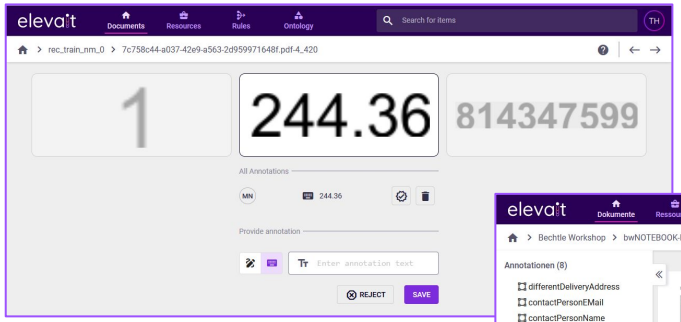
Tables

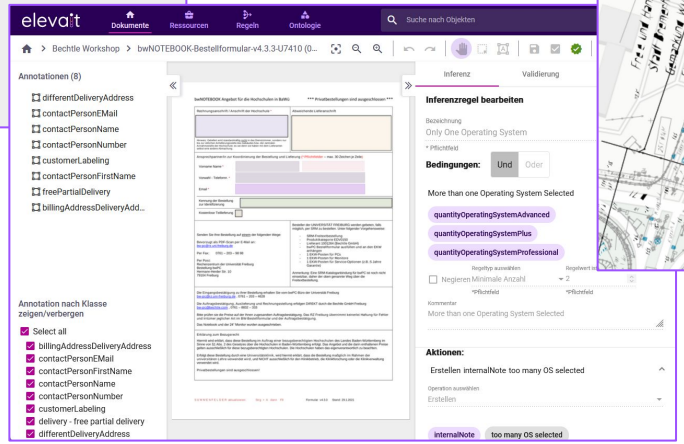
Queries

Task-specific User Interfaces



Data Annotation for ML





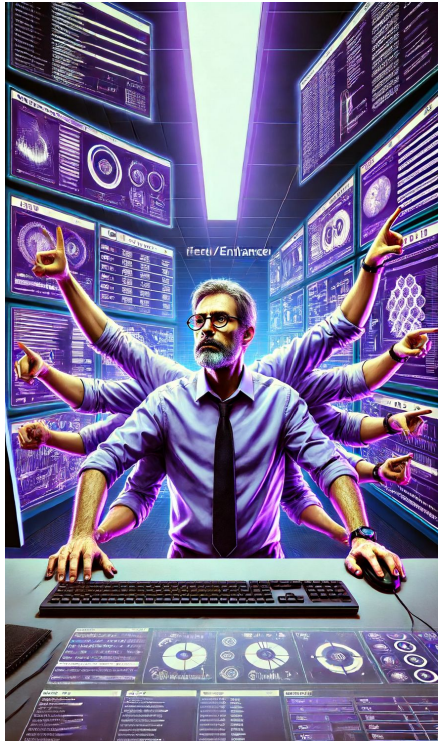
Document Viewer

GIS Viewer

That’s all a next-gen Enterprise Platform needs?

No! Further topics are…

- Data (Model) Management
- *Ops, CI/CD for software, ML models and data models
- Monitoring, for infrastructure, deployments, applications, and business processes
- Alerting
- Organizational, like project management, support
- …

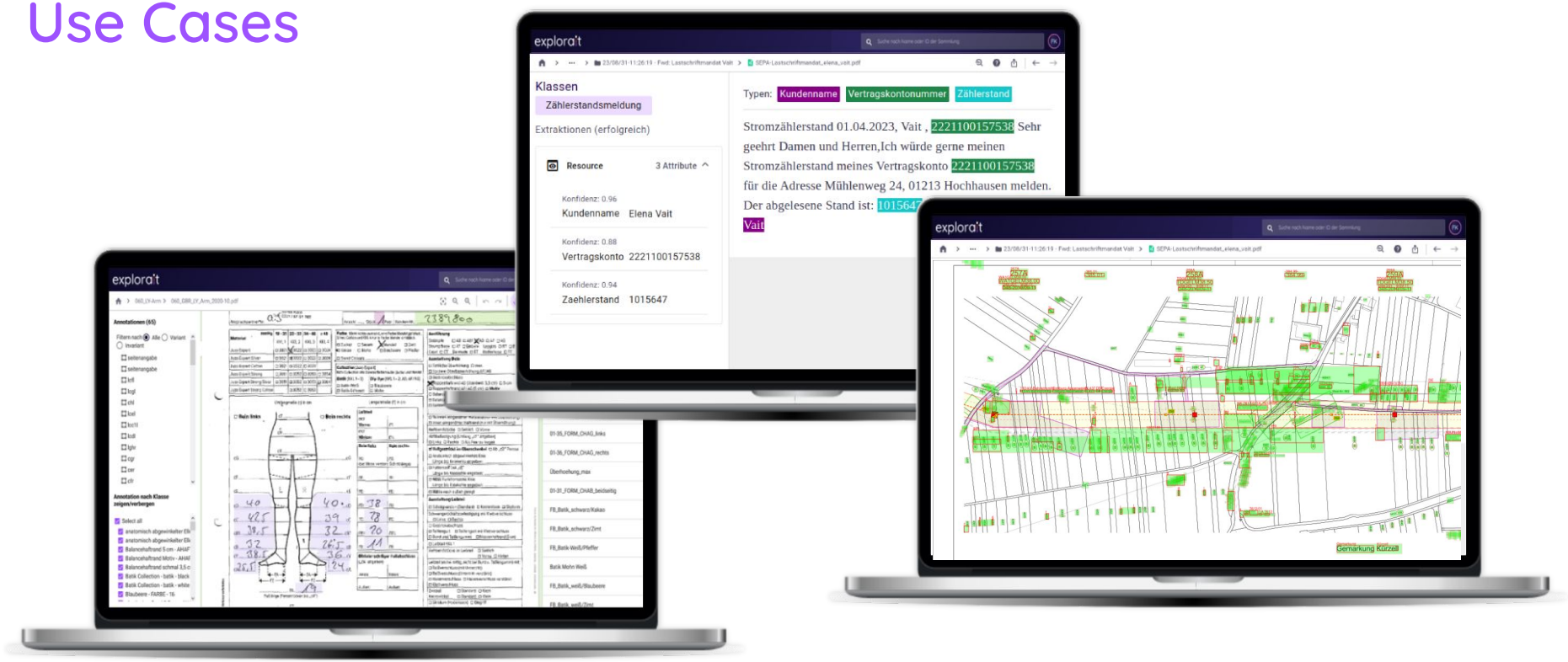


By ChatGPT

1 Platform, many Use Case

Exemplary Use Cases from the Construction Industry and Beyond

Use Cases



Interested? Come to our stand!

elevait

Contact

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Founder & CEO
martin.voigt@elevait.de

Let's connect!

LinkedIn

elevait

Here is where your AI journey begins.