Knowledge Democratization

A Business User Tutorial To Knowledge Graph Modeling

metaphacts

Company Snapshot

- metaphacts GmbH
- Founded in 2014
- Headquartered in Walldorf, Germany
- International team across multiple locations
- Independent software vendor
- **metaphactory** – Knowledge Democratization Platform

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Agenda

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- Introduction and use case
- metaphactory - Knowledge Democratization Platform
- A proposed solution to our use case using metaphactory:
  - Ontology modeling
  - Vocabulary modeling
  - Data catalog
  - Hands-on
- Another use case
  - Building a solution from scratch

Introduction

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- Let's start with a story

- Overtime, a company has worked on many projects with specific needs. The company notices that this represents valuable data that can be used to create awareness within the company, and to make informed decisions about current and new projects.

- Issues:
  - Finding and accessing data is a time-consuming task, as data might come from different sources
  - There is no common understanding of the data
    - No common data model
    - No common vocabularies
  - Difficult to reuse
  - Difficult to assess quality and trustworthiness

Introduction

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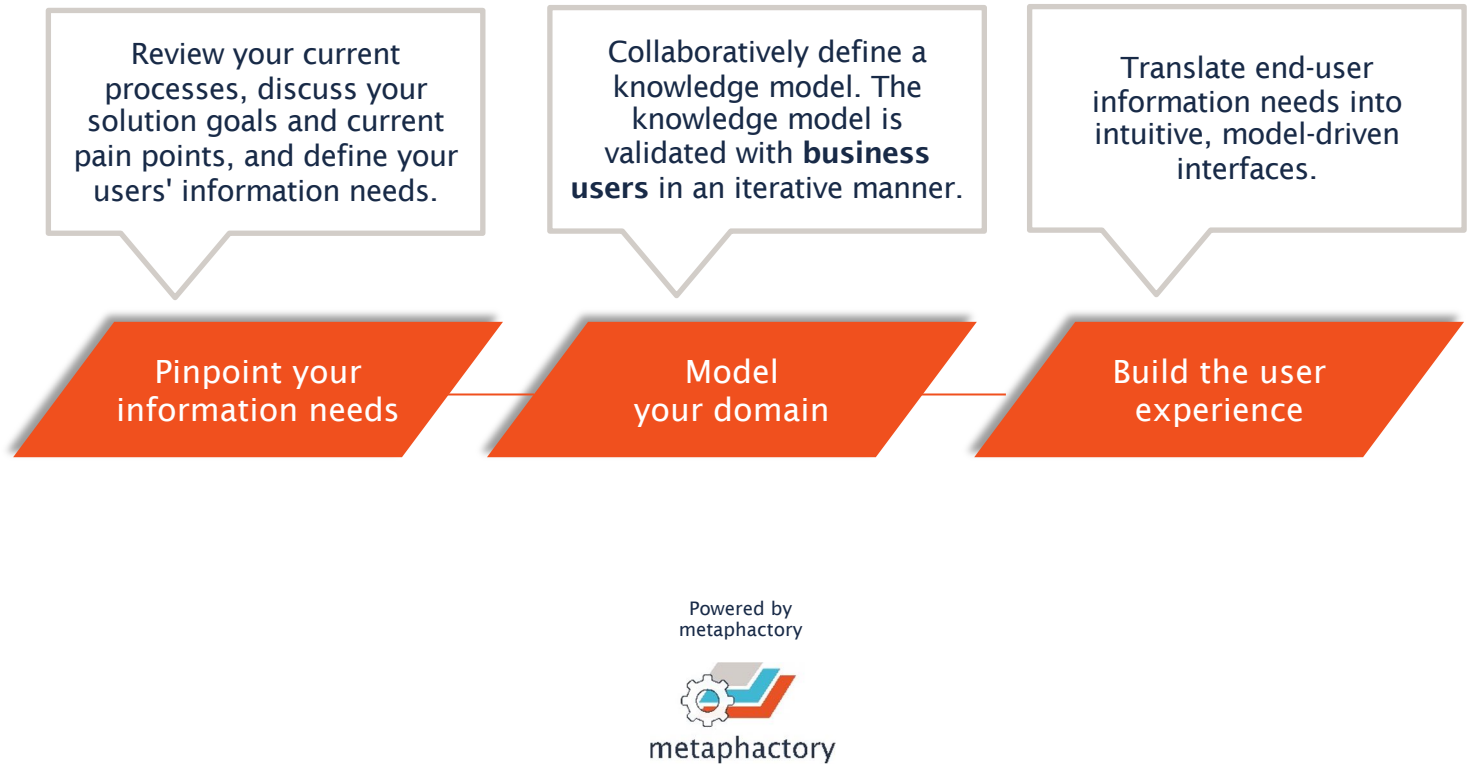
- The proposed solution is a **knowledge graph**



metaphactory - Knowledge Democratization Platform

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KNOWLEDGE GRAPH MANAGEMENT

Visual authoring, visualization, versioning & cataloging of ontologies, vocabularies, datasets & queries

Data validation, provenance & lineage

END-USER ORIENTED INTERACTION

Abstracted view

One-stop knowledge hub

Intuitive UI for knowledge discovery, exploration, analytics, editing

KNOWLEDGE GRAPH APPLICATION BUILDING

Low-code platform

Powerful template engine

Large library of Web components

Easy customization

DATA INTEGRATION & FEDERATION

Unified view on distributed and heterogenous data sources: graph databases, relational databases, REST APIs, machine learning algorithms

Transparent SPARQL federation

MIDDLEWARE SERVICES

Dynamic data-driven REST APIs based on queries

Role-based access control

Lookup & Reconciliation

Tableau – Web Data Connector Endpoint

W3C®

Run anywhere

git

FAIR

Findable Accessible Interoperable Reusable

Use case

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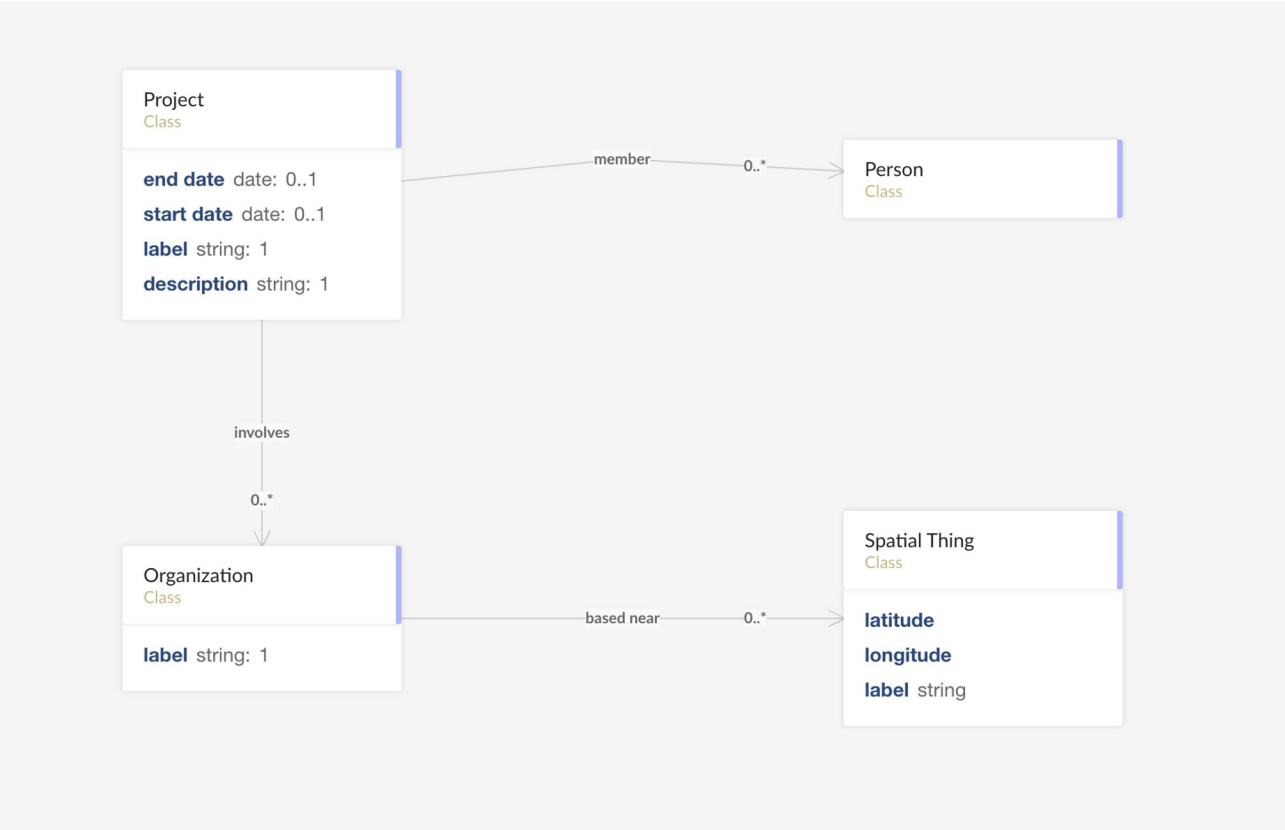
- We have access to the data, so we can define some requirements

- Requirements
  - Projects have themes
  - Projects require skills
  - Projects have members
  - Projects involve organizations
  - Organizations are based in some location

Proposed solution: the ontology

- For the current use case it was decided to reuse and extend the FOAF (Friend of a Friend) ontology (http://xmlns.com/foaf/spec/)



Proposed solution: vocabularies

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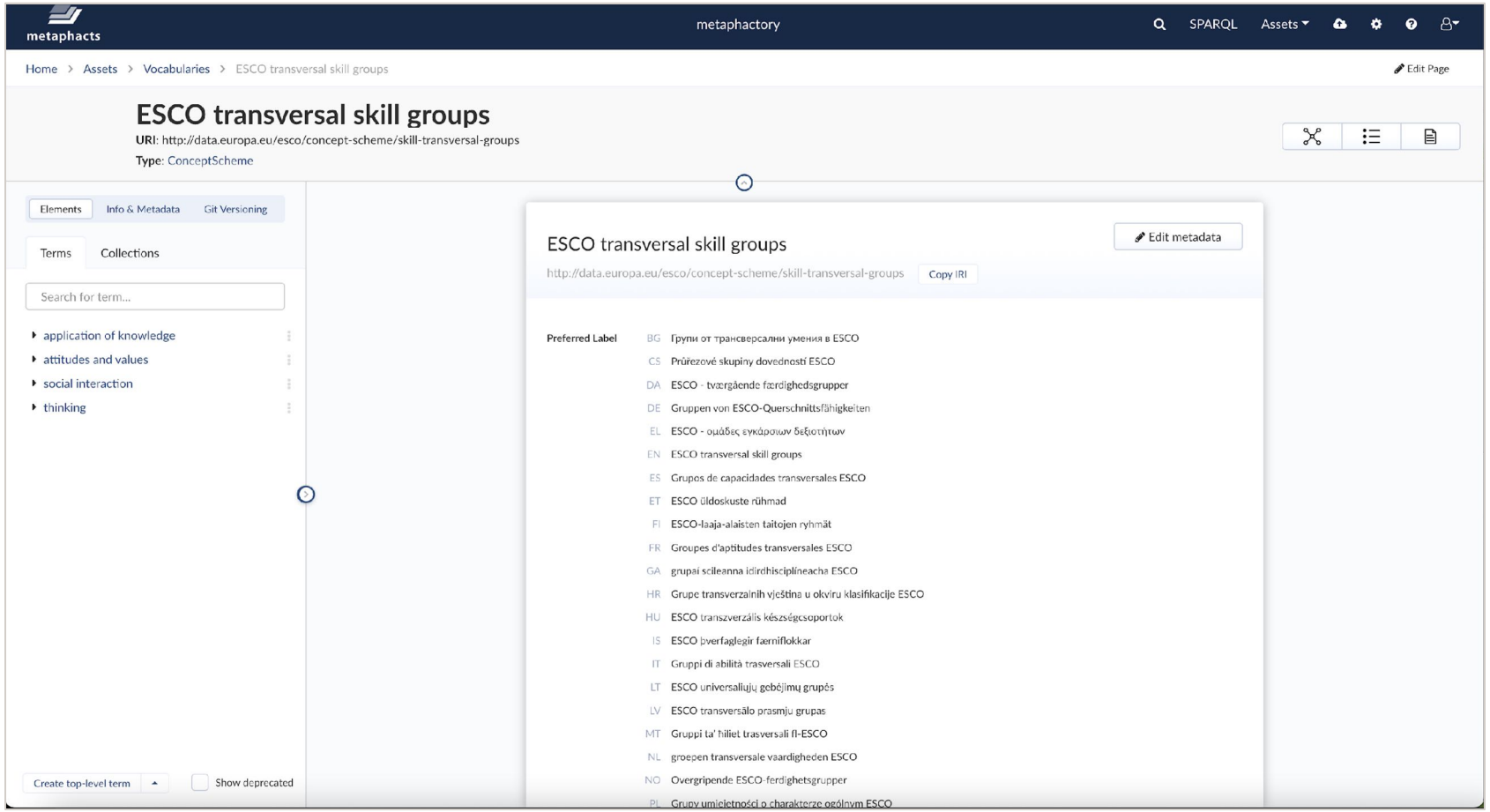
- Controlled vocabularies allow us to:
  - Organize information
  - Capture rich descriptions
  - Provide consistent terminology that captures business-relevant terms

- For our use case we have two existing vocabularies available:
  - Data theme:
    - “The Data theme authority table is a controlled vocabulary that lists concepts associated with themes used for dataset classification.”
    - Available at https://data.europa.eu/data/datasets/data-theme
  - ESCO Skills:
    - “ESCO is the multilingual classification of European Skills, Competences, Qualifications and Occupations.“
    - Available at https://data.europa.eu/data/datasets/european-skills-competences-qualifications-and-occupations

Proposed solution: vocabularies

- ESCO Skills vocabulary



Proposed solution: linking ontologies and vocabularies

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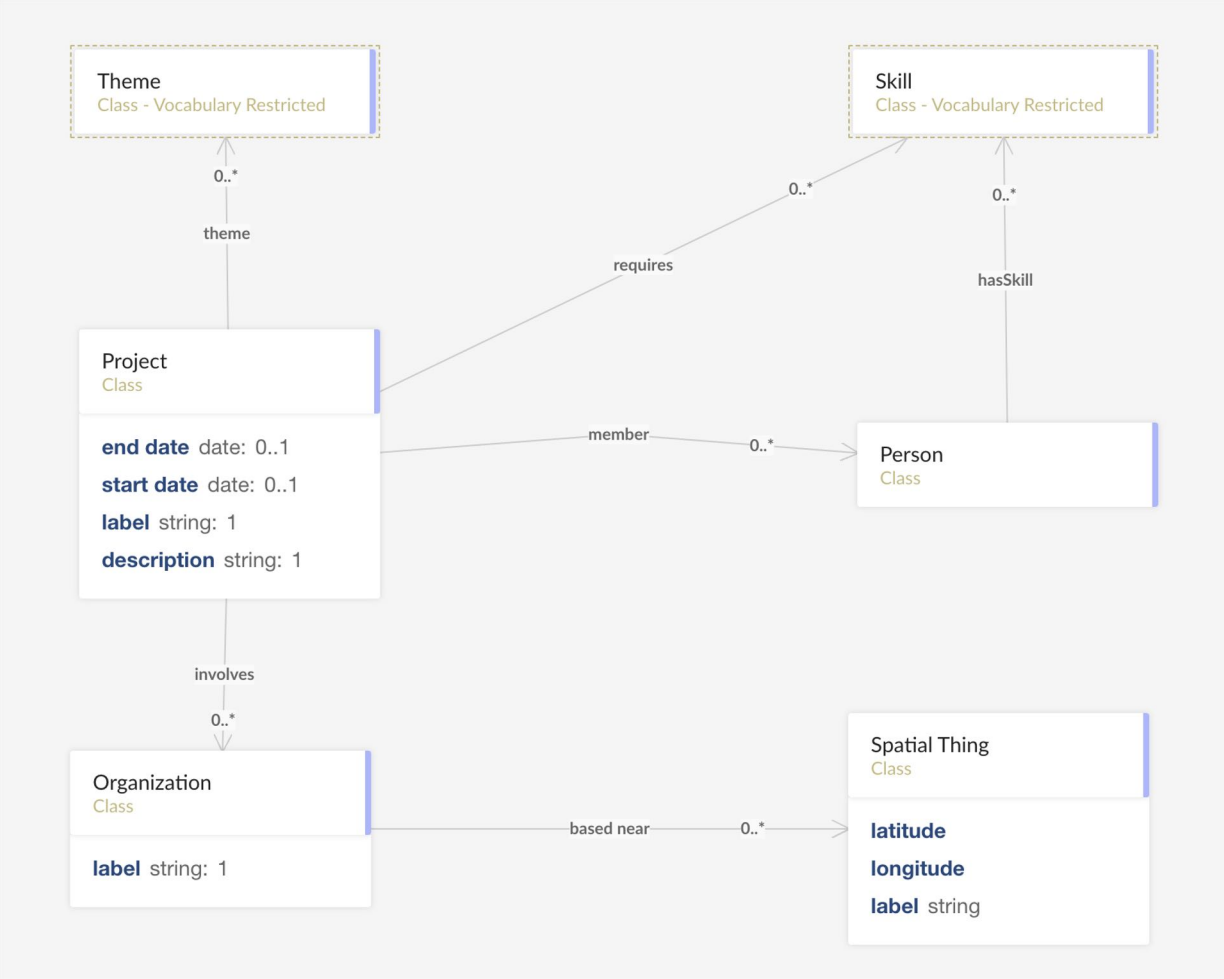
- Extended ontology to make use of controlled vocabularies



Proposed solution: data catalog

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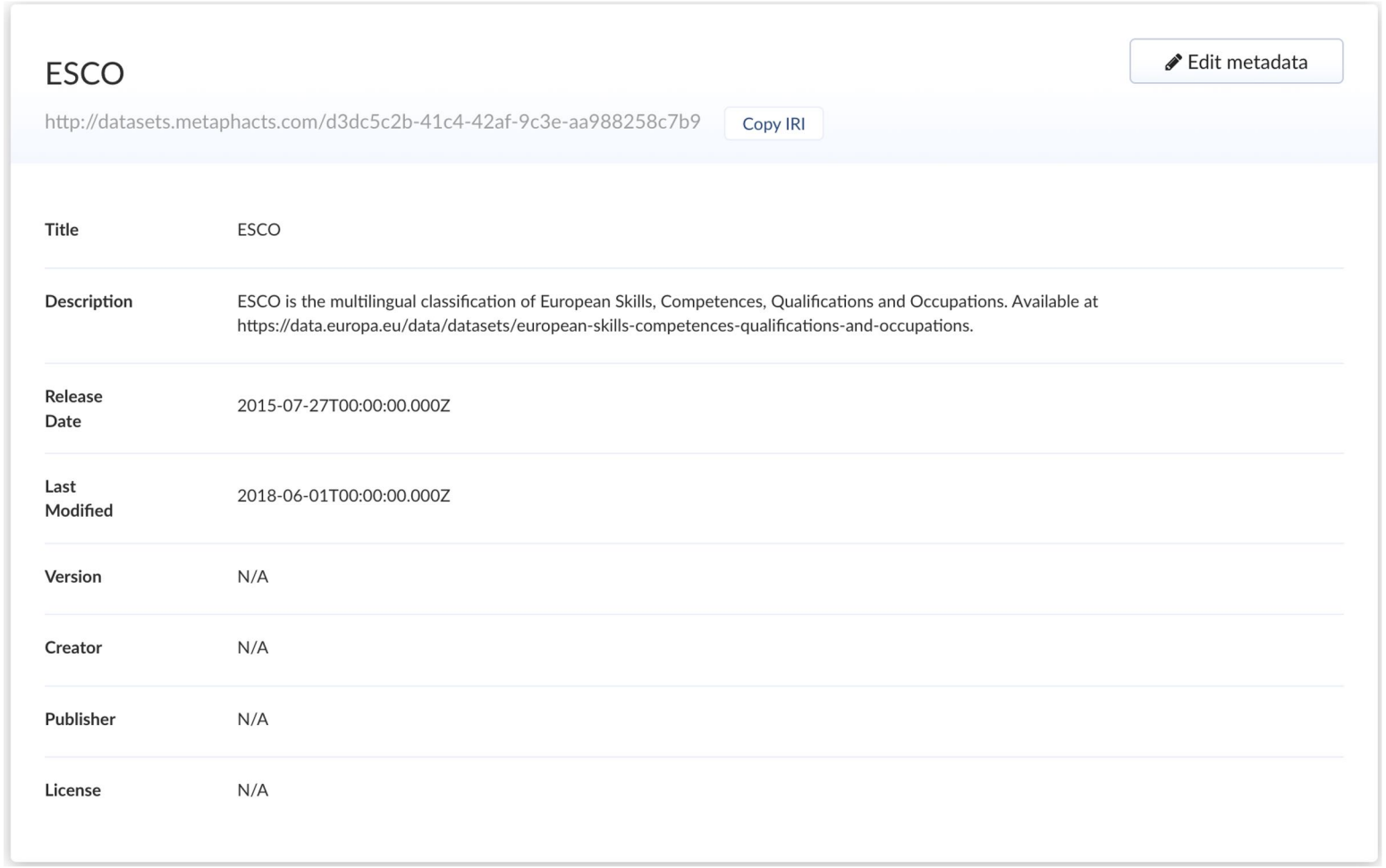
- As we start integrating data into our knowledge graph, we also would like to capture metadata about our data assets
- For this we use a data catalog
  - Gartner definition: “A data catalog **maintains an inventory of data assets through the discovery, description, and organization of datasets**”

- The first data assets that we want to provide metadata information about are the controlled vocabularies, since these came from open data sources we can provide such descriptions.

Proposed solution: data catalog

- The dataset description for the ESCO vocabulary looks like this:



Behind the scenes: OWL+SHACL & SKOS & DCAT

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- **Web Ontology Language (OWL)** provides constructs for describing classes and properties, including:
  - Definition of OWL classes
  - Definition of OWL ObjectProperties (resources as values) and OWL DatatypeProperties (literals as values).

Complexity **hidden** behind visual editing in metaphactory!

- **SHACL** is a language to describe and validate RDF graphs against a set of conditions through shapes:
  - **Node shapes**: constraints about a given focus (target) node.
  - **Property shapes**: constraints about a given property and its values for the focus node.

Reference : **https://www.w3.org/TR/owl2-overview/**
https://www.w3.org/TR/shacl/

Behind the scenes: OWL+SHACL & SKOS & DCAT

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- **Simple Knowledge Organization System (SKOS)** allows for vocabulary definitions:
  - Concept schemes, informal hierarchies and association networks, e.g.:

```
example:Science a skos:Concept .
example:ComputerScience a skos:Concept .
```

- **Data Catalog Vocabulary (DCAT)** provides a vocabulary for describing data catalogs and datasets:

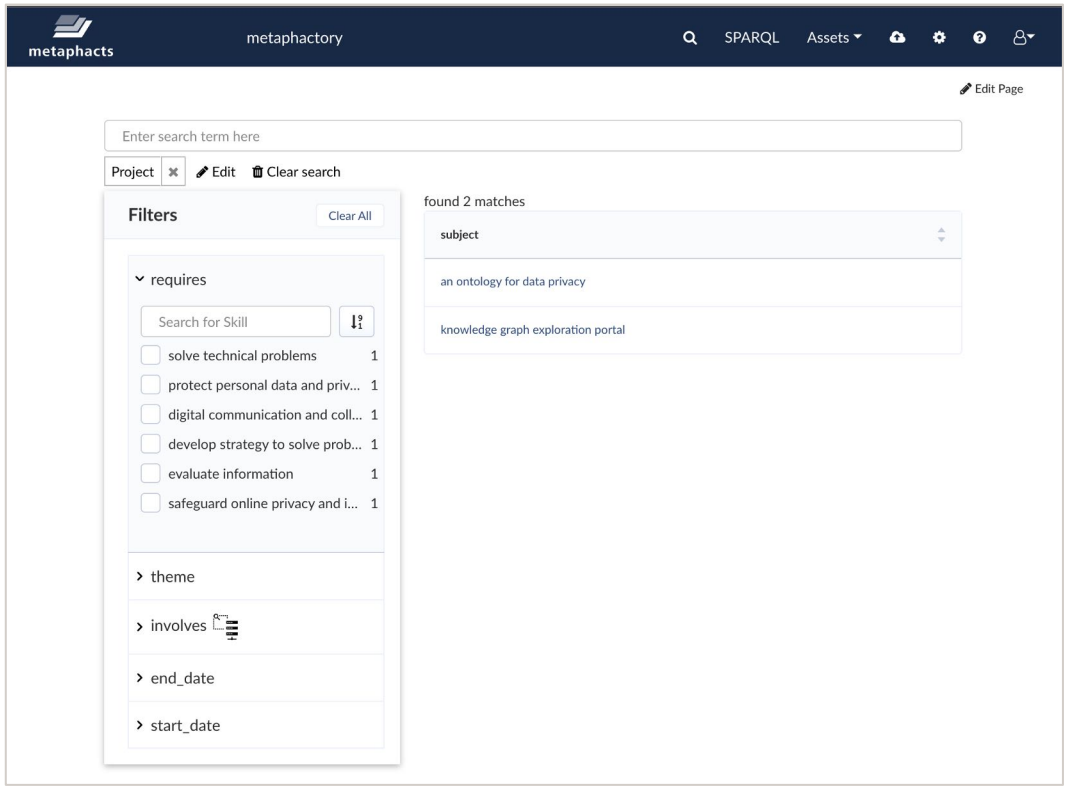
```
example:MyDataset a dcat:Dataset;
dcterms:title “My dataset” ;
dcterms:modified “2020-01-01”^^xsd:date .
```

Complexity **hidden** behind visual editing in metaphactory!

Reference: **http://www.w3.org/TR/skos-reference/**
https://www.w3.org/TR/vocab-dcat-2/

Other use cases - demo

- Model-driven forms for data authoring
- Exploration and discovery



Hands-on

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- Ontology editor:
  - Explore the the existing ontology
  - Modify the class Person and add the attribute label, and create a relation to Spatial Thing
- Vocabulary editor:
  - Explore the existing vocabularies
  - Add a new term to the Data theme vocabulary, e.g., Privacy
- Data catalog
  - Explore the existing datasets
  - Let’s say we are releasing a new version of the vocabulary, so we update the last modified date of the Data theme vocabulary

Another use case: building a solution from scratch

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- Let's say that we need to store more information about our organizations in the system
- We decided for creating a new ontology called Company ontology
  - The main definitions are:
    - Department belongsTo an Organization
    - Department has Employees, which are subClassOf Person
    - Department has a label
    - Employee has Occupation
- At this point, we decide to create a controlled vocabulary for occupations as it allows for rich descriptions and consistent terminology
  - The main concepts in our vocabulary are Manager and Engineer
  - As an example, we define more specific concepts of Engineer (i.e., narrower terms)
    - Software Engineer
      - And we add some synonyms: Application Developer and Software Developer
    - Data Engineer
    - Etc.
  - Now that we have a vocabulary, we can make use of it in the ontology

Another use case: building a solution from scratch

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- Data authoring
  - Start by creating a model-driven form for the classes in your ontology, e.g., Employee and Department
  - Use the forms to create some instance data
- Data exploration and discovery
  - For data discovery and exploration, let’s create a keyword-type search

Why metaphacts?

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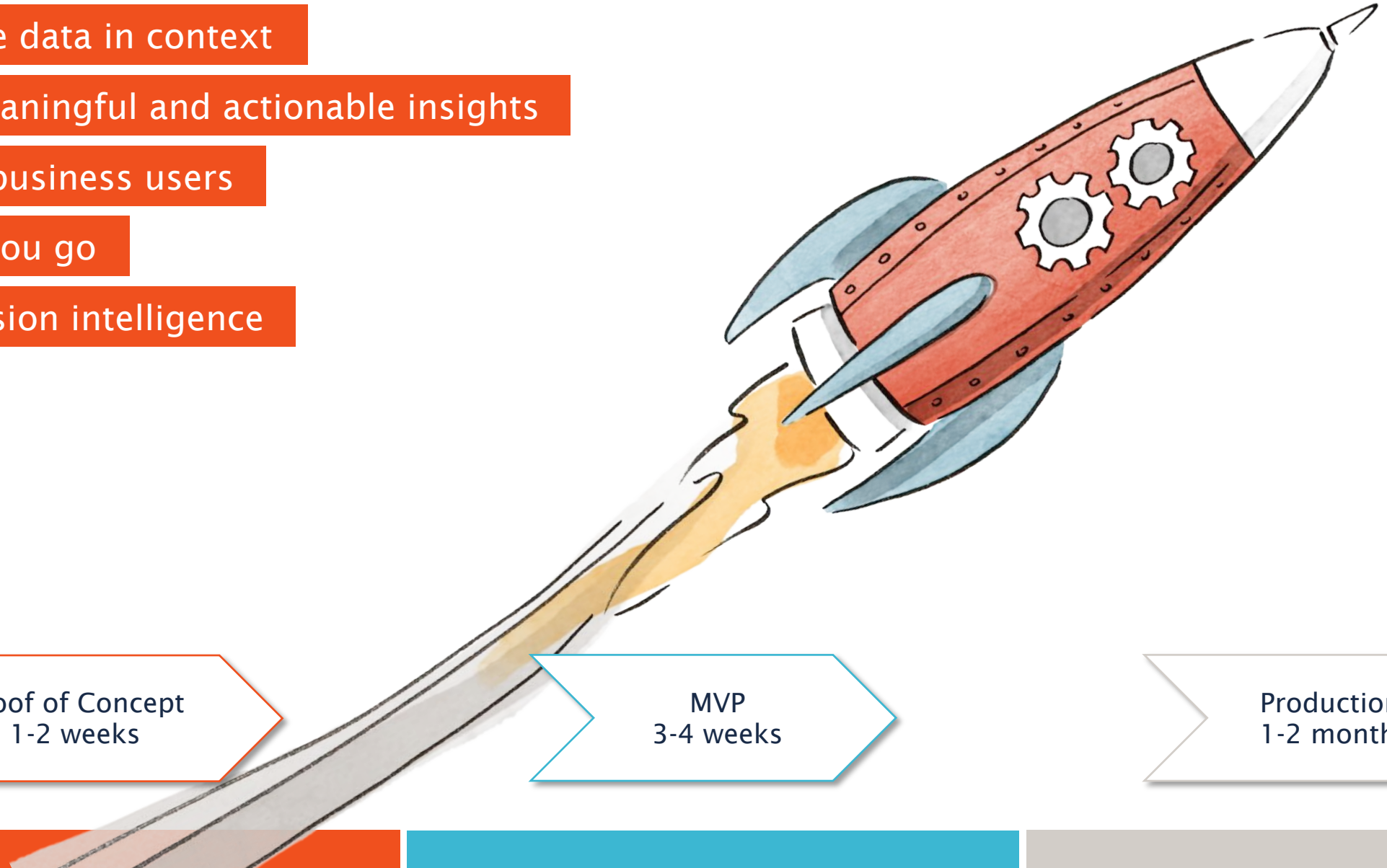
- Experience data in context
- Deliver meaningful and actionable insights
- Empower business users
- Adapt as you go
- Drive decision intelligence



Proof of Concept
1-2 weeks

MVP
3-4 weeks

Production
1-2 months

metaphacts Accelerator – let's jointly build your semantic app

Your Benefits

- **Guaranteed result:** Your graph-powered app ready for production in 2-4 weeks
- **Minimized risk:** Accelerate your app building process using proven approach
- **Continuous agile approach:** Validation of your use case in days
- **Knowledge democratization:** App enabling contribution & collaboration across teams
- **Team enablement:** Training & knowledge transfer

metaphacts Expertise

Joint app building & MVP delivery
- » Expertise from building 100+ MVPs using agile, top-down approach
- » Knowledge transfer during process
- » Use case identification & design
- » 2-3 agile sprints to deliver MVP
- » Final app presentation
- » On-demand consulting

metaphactory Platform

Software platform during project
- » metaphactory 3/6-month non-prod license to enable app validation & refinement
- » For your existing graph database or with an option to include a graph database

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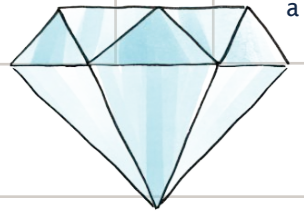

metaphacts Academy

Enablement & Training (ca. 2 days)
- » Up to 10 seats (incl. live training environment)
- » Online / Instructor-led / Hands-on
- » Three modules: Basics, Ontology, KG App Building
- » Continue at own pace & get certified

Knowledge Transfer | Enable contribution from the teams | Proof of mastering complexity

Today	KT Phase	App Building Phase	Week 4 App ready	App Usage & Demo Phase
Accelerator Kickoff	Enablement & Training	App Building	Production-ready App	(Assisted) Continous Iterations

Production Kickoff

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Thank you!

Come talk to us to learn how
you accelerate to master the data chaos!

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Free trial	›››	metaphacts.com/get-started

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Our customer base

Democratizing Knowledge (Graphs)

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50+ customers trust us

10+ Fortune 500 Companies

Pharma & Life Sciences

Engineering & Manufacturing

Finance & Insurance

100+ production-ready applications

Knowledge graph-driven applications built jointly with our customers, using our unique top-down approach

Results-driven business projects

Focus on fast result delivery

End-user enablement

Contributions to standards

Involvement in innovative research projects

metaphactory Online Demos

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Wikidata Public Demo System

Try our hosted demo system to experience metaphactory first-hand and without any installation

https://wikidata.metaphacts.com/

YouTube Channel

Subscribe to our YouTube Channel and stay up-to-date with the latest developments!

https://www.youtube.com/channel/UC9aR2H6SaU9Lvho4r6_lD4g/