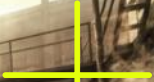
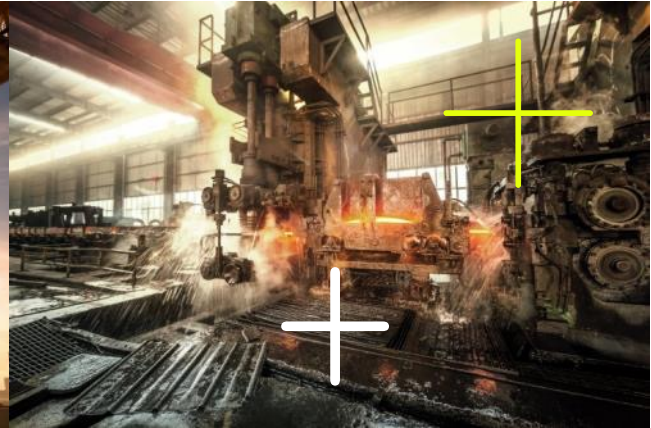




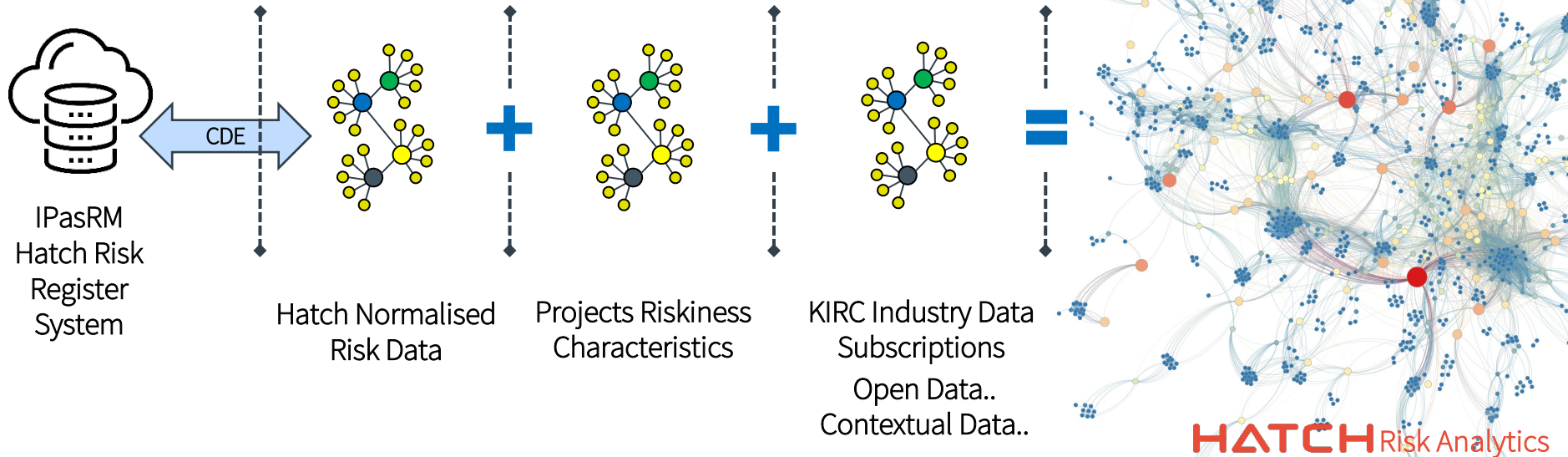
Hatch Risk Knowledge Graph



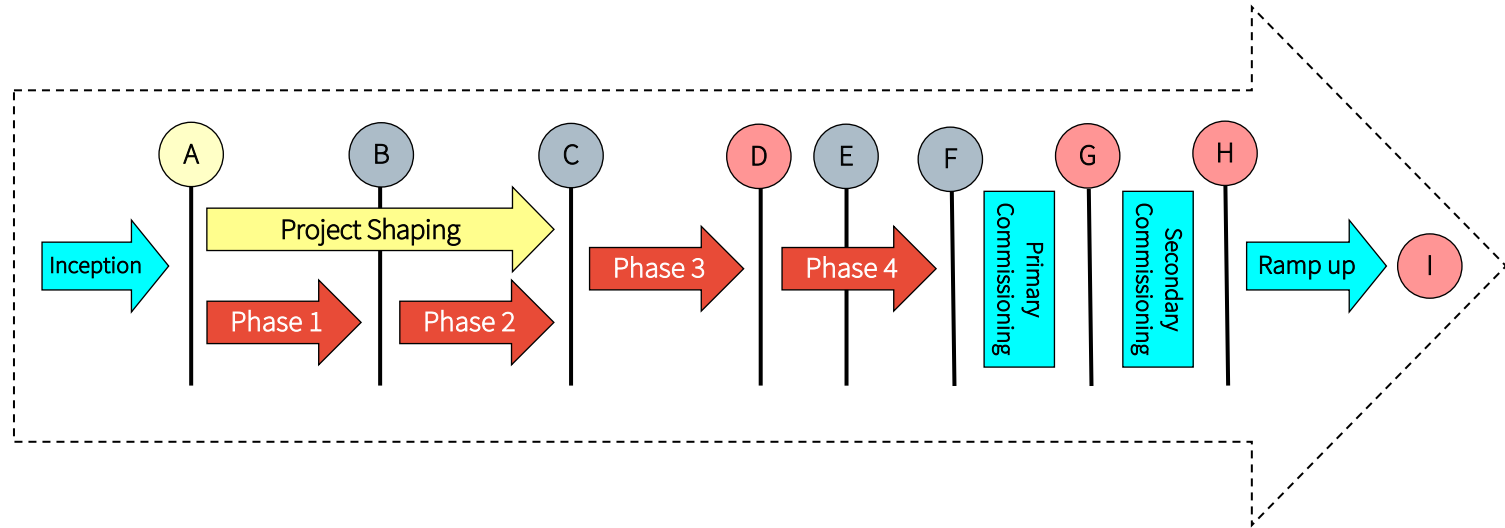
NKOS 2021

VRM Virtual Risk Memory

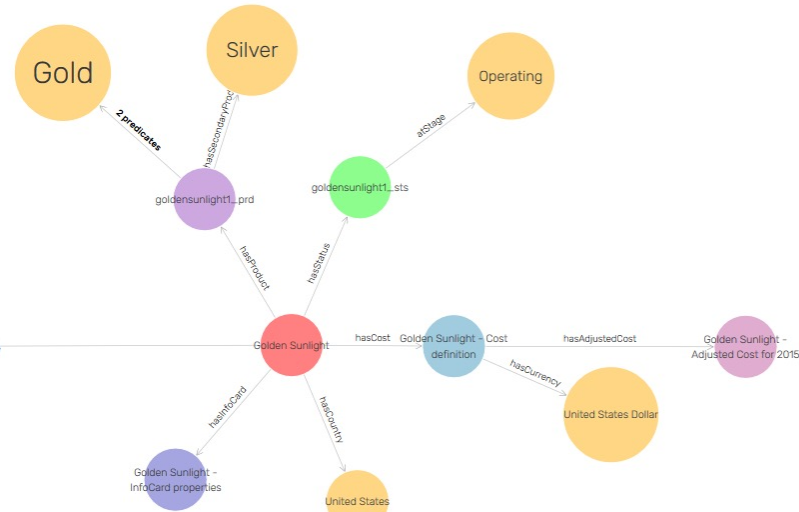
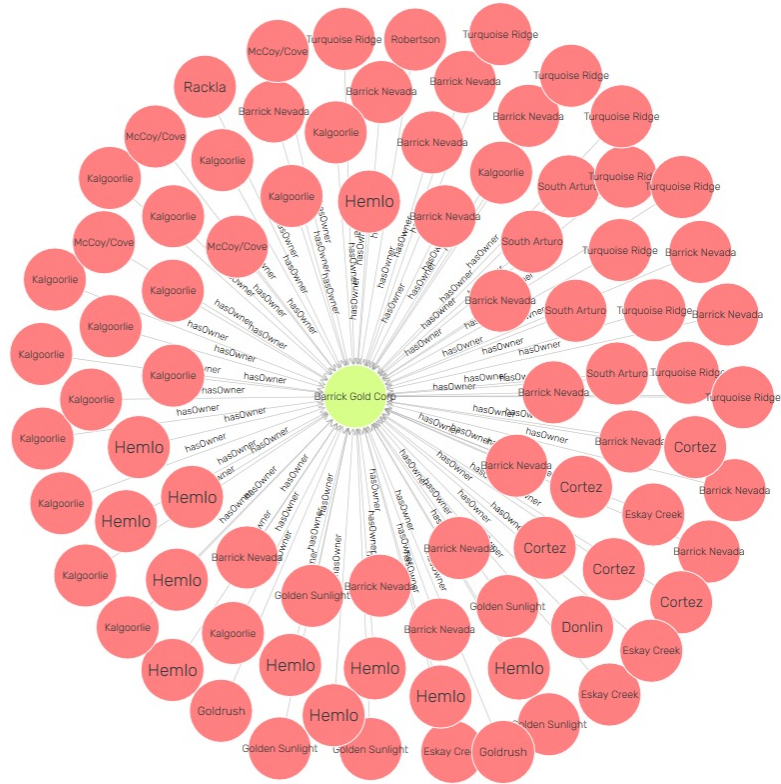
- ✓ Risk Knowledge Graphs & Context Aware Risk Identification
- ✓ Risk Pattern Recognition Against Project Tendencies & Characteristics
- ✓ Supply Chain Risk Analysis of Redundancies and Resilience



Unit of Analysis: Project



Linked Data, Semantic Web, and Ontology Engineering



Through use of Ontologies

- Class hierarchy
- Domain and range restrictions
- Deduction and inference reasoning
- Activities and processes

Through use of Linked Data

- Interoperability
- Reusability
- Discoverability
- Process-ability

Ontology Competencies

- **Lifecycle Data Analytics**

Capture historical project data and allow for logical deductions and aggregation across different data levels (overall and lifecycle) for risk analytics.

- **Cost Normalization**

Define and track cost estimates and corresponding scopes during the lifecycle of the project and allow for cost normalization processes.

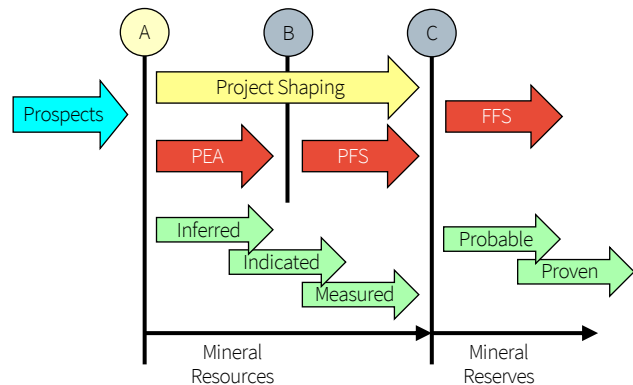
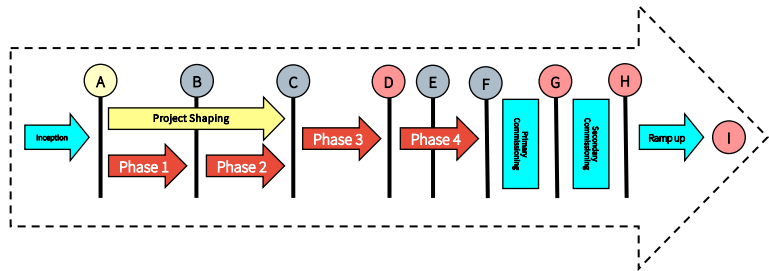
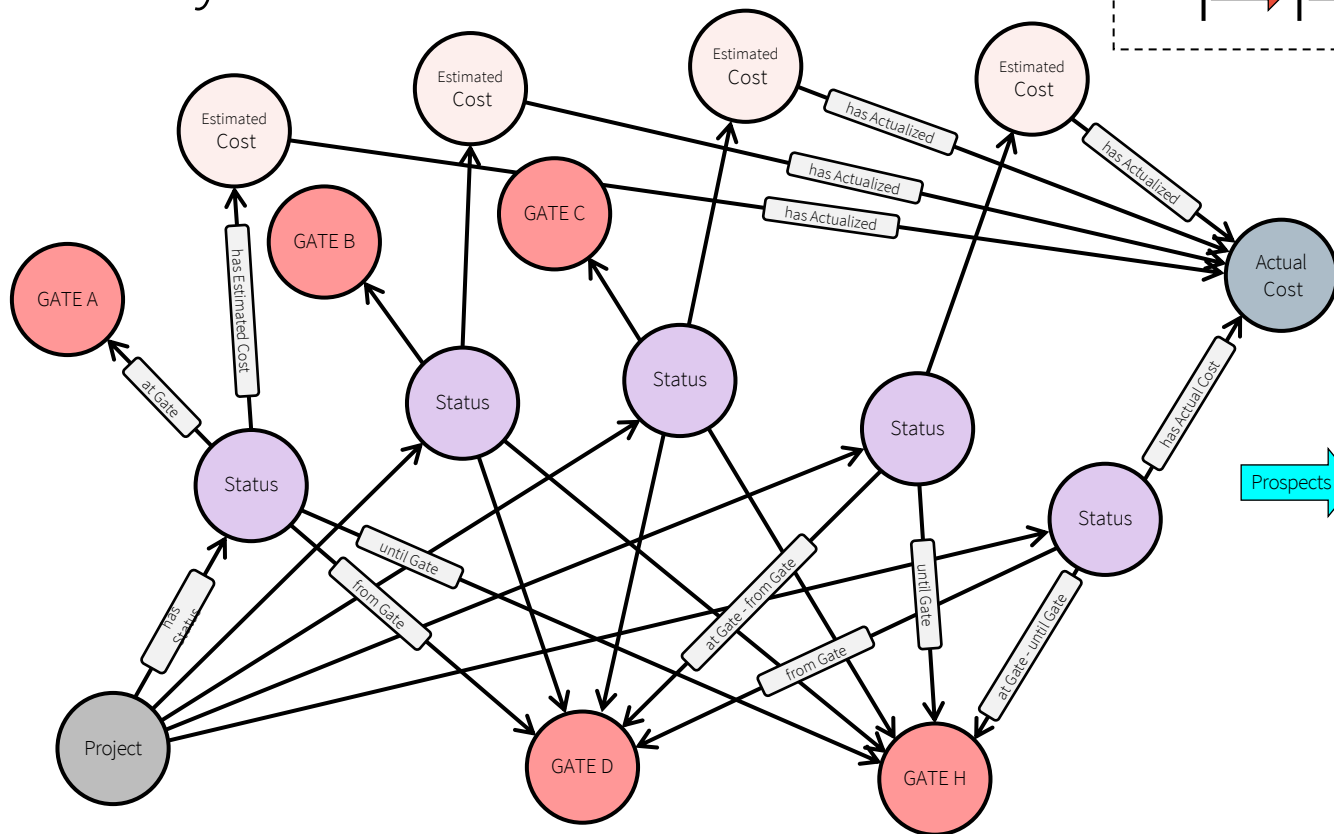
- **Network Analysis**

Allow network analysis of collaborations, projects, organizations, and products.

- **Universal Semantics**

Define universal semantics for projects data, risk factors and characteristics.

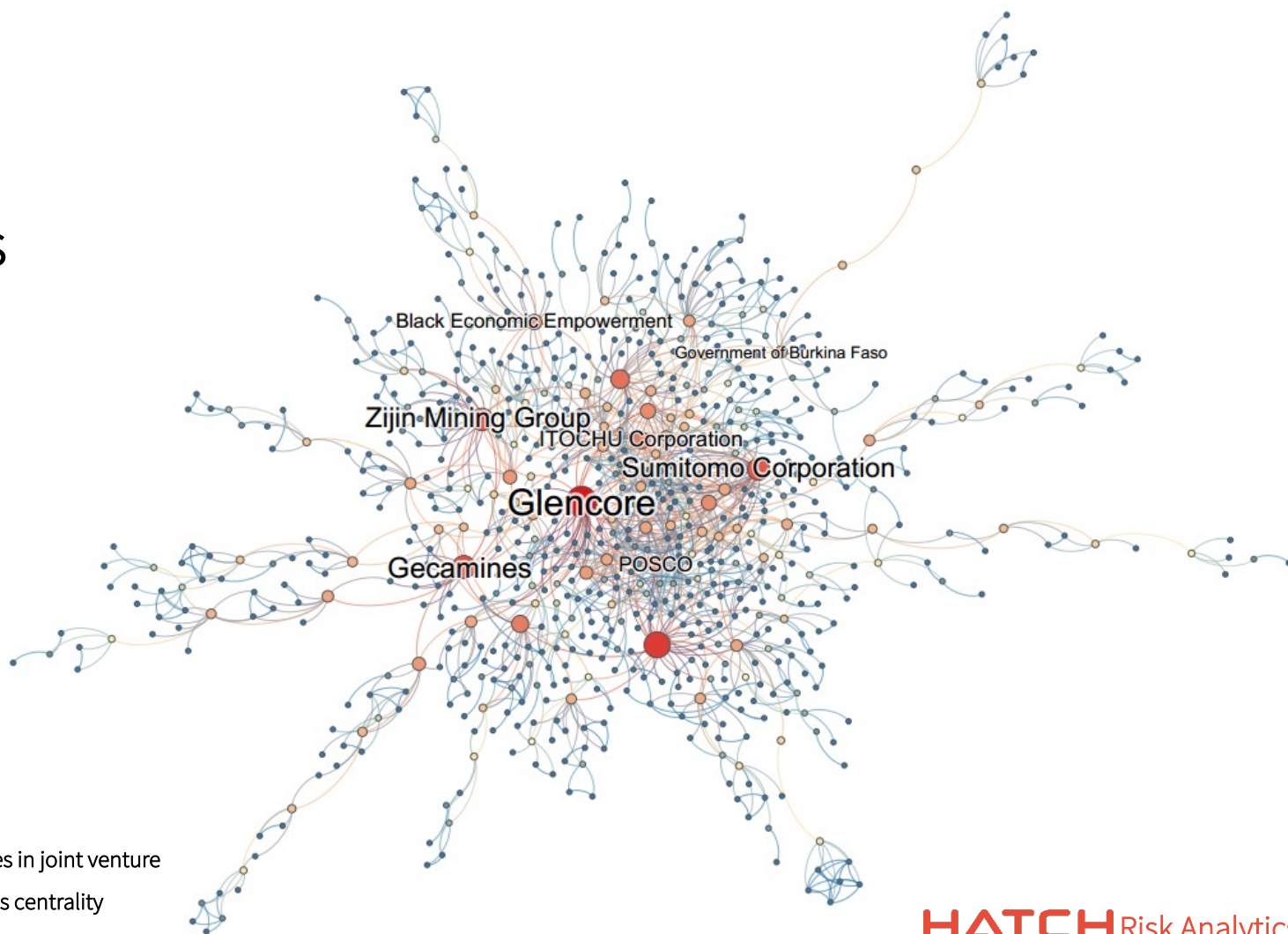
Representing Lifecycle Data



CIM Definitions for Mining Projects

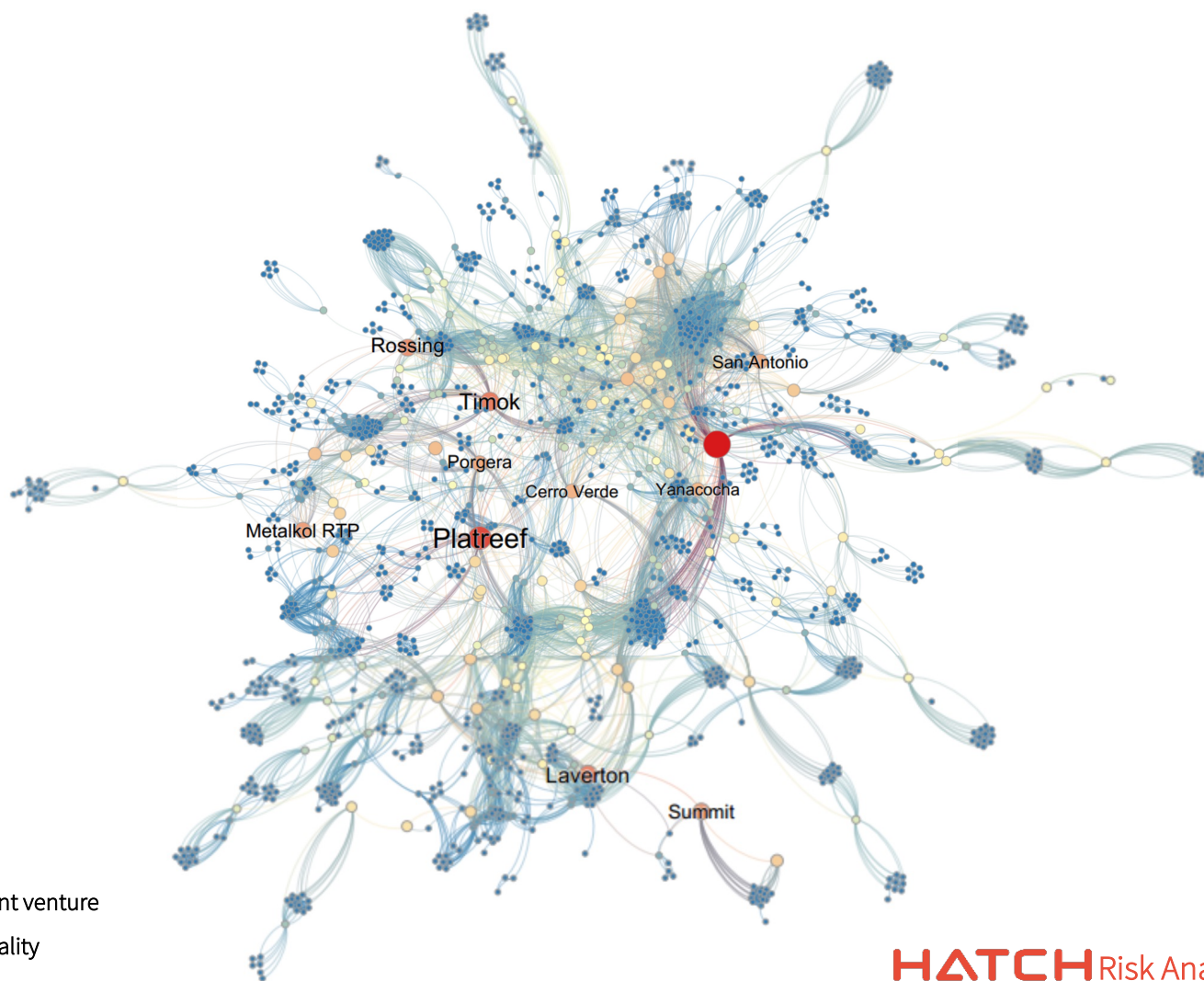
HATCH Risk Analytics

Network of Company Partnerships



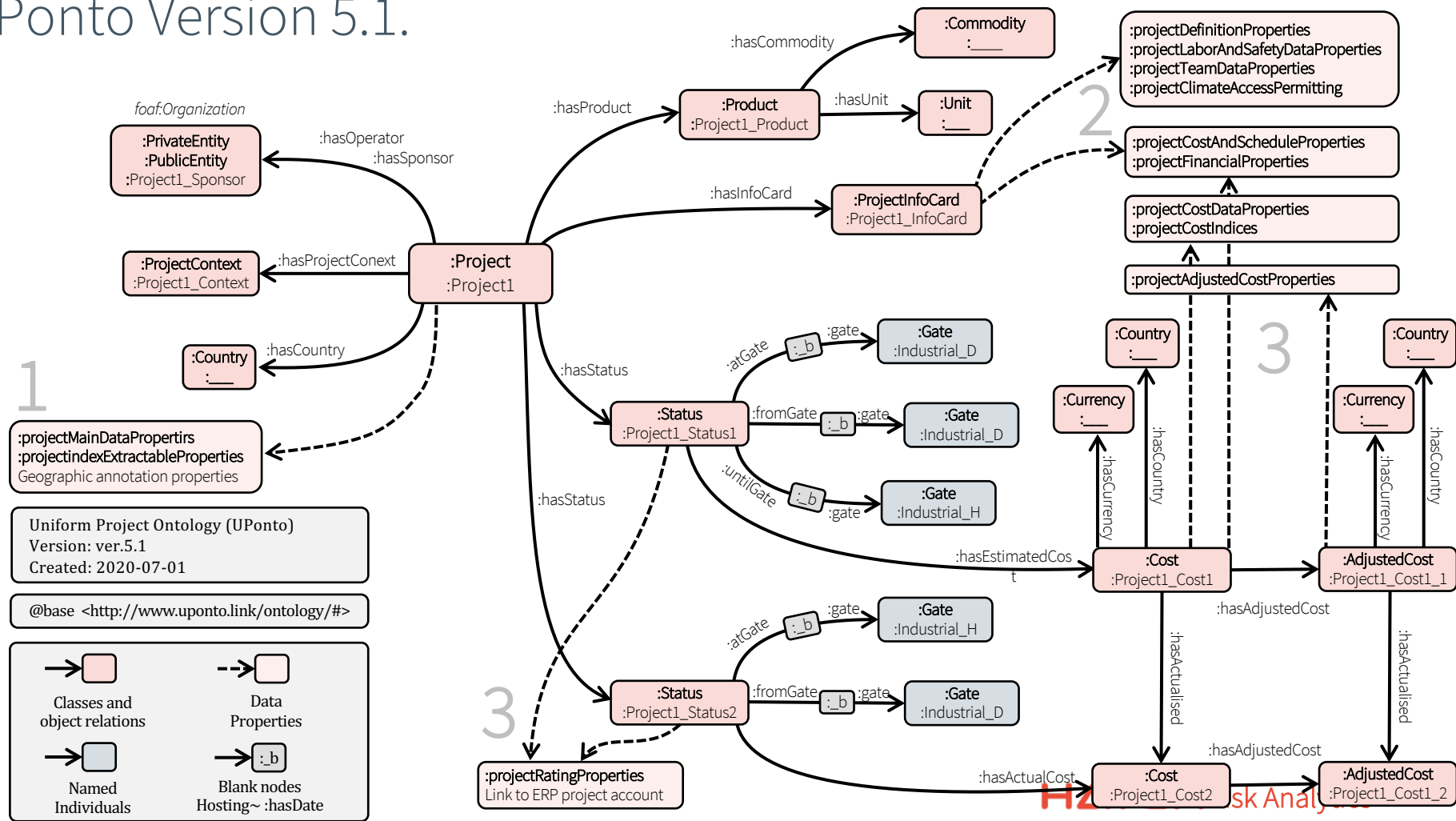
- 1-partite mapping of companies in joint venture
- Node's size reflect betweenness centrality

Network of Project Partnerships

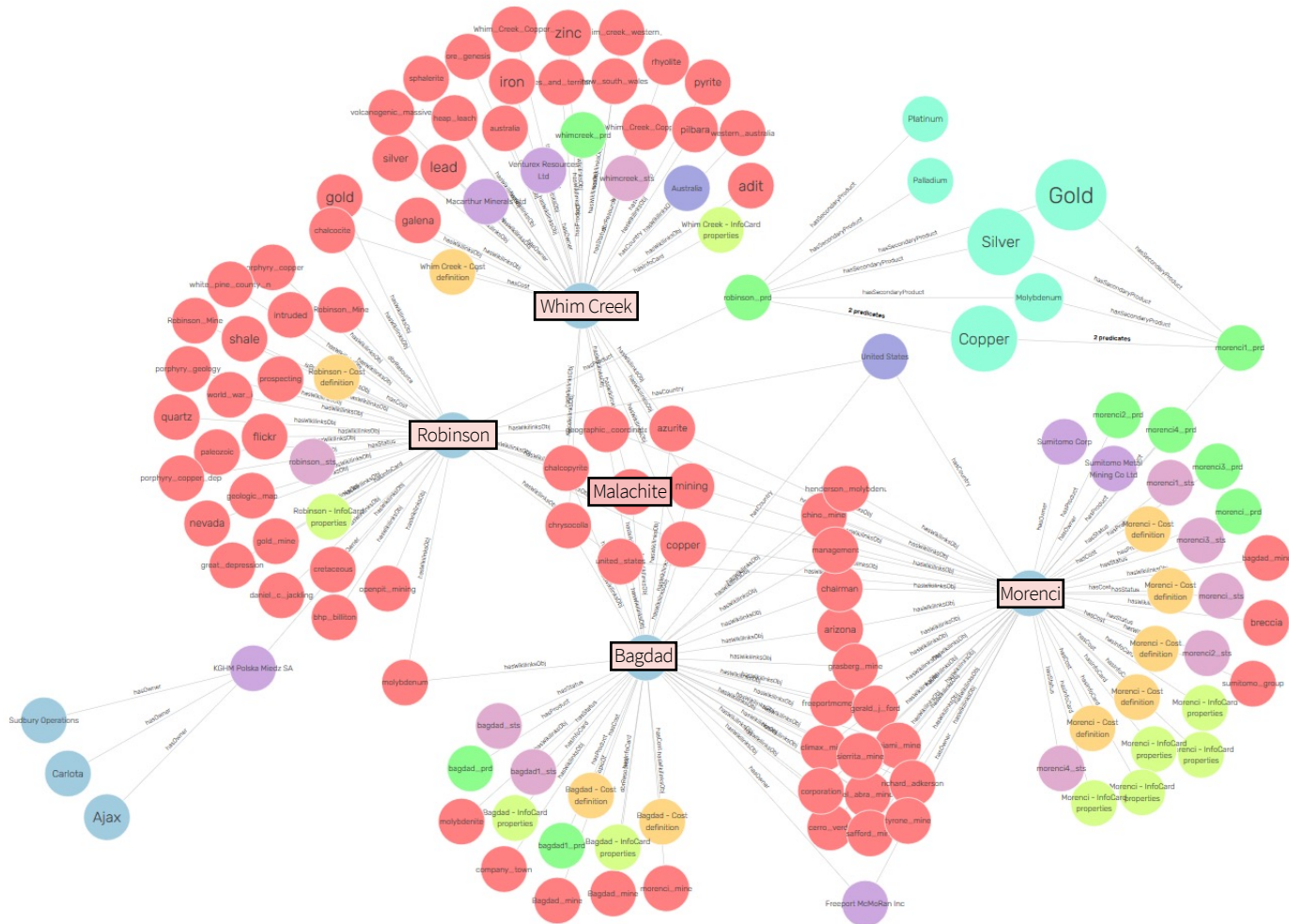


- 1-partite mapping of companies in joint venture
- Node's size reflect betweenness centrality

UPonto Version 5.1.



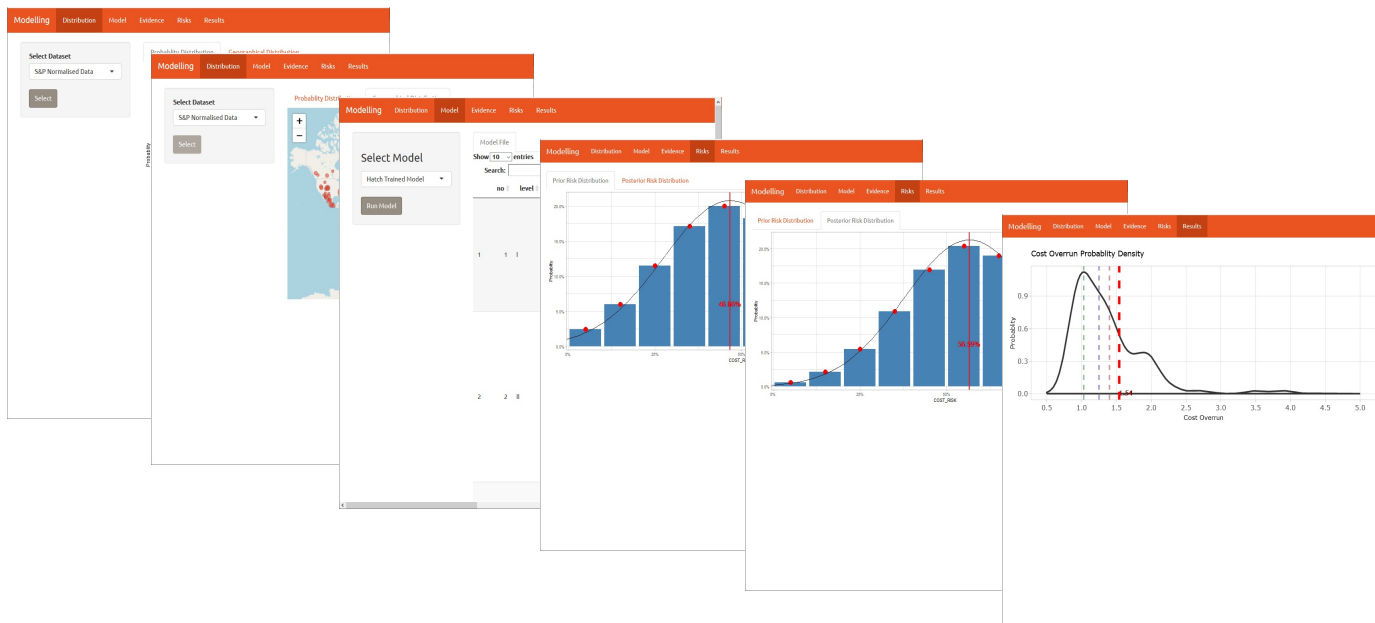




Implementation of STRM & GBNRM

Using R-Shiny

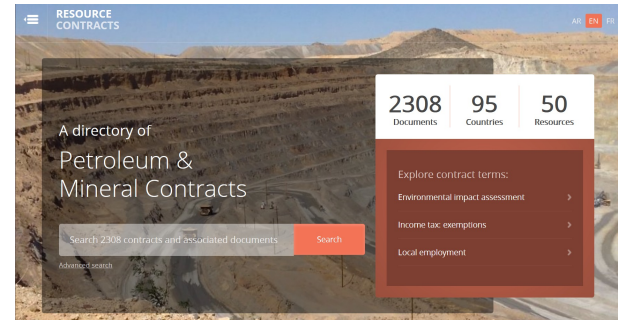
- ✓ Inference module
- ✓ Next step: GeoSPARQL



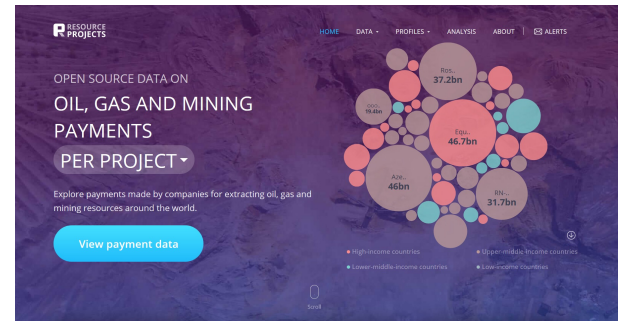
Mining Disclosures

- The project was carried out as a visiting scholar semester in Columbia Law school.
- Extractive Industries Transparency Initiative (EITI) is a global standard for the good governance of oil, gas and mineral resources.
- Proposed in 2002 by the UK government at the World Summit on Sustainable Development in Johannesburg.
- Voluntarily adopted by 52 countries.
- Is developed and overseen by an international multi-stakeholder board, consisting of representatives from:
 - Governments,
 - Extractives companies,
 - Civil society organisations, *such as Natural Resource Governance Institute (NRGI)*
 - Financial institutions, and,
 - International organisations.

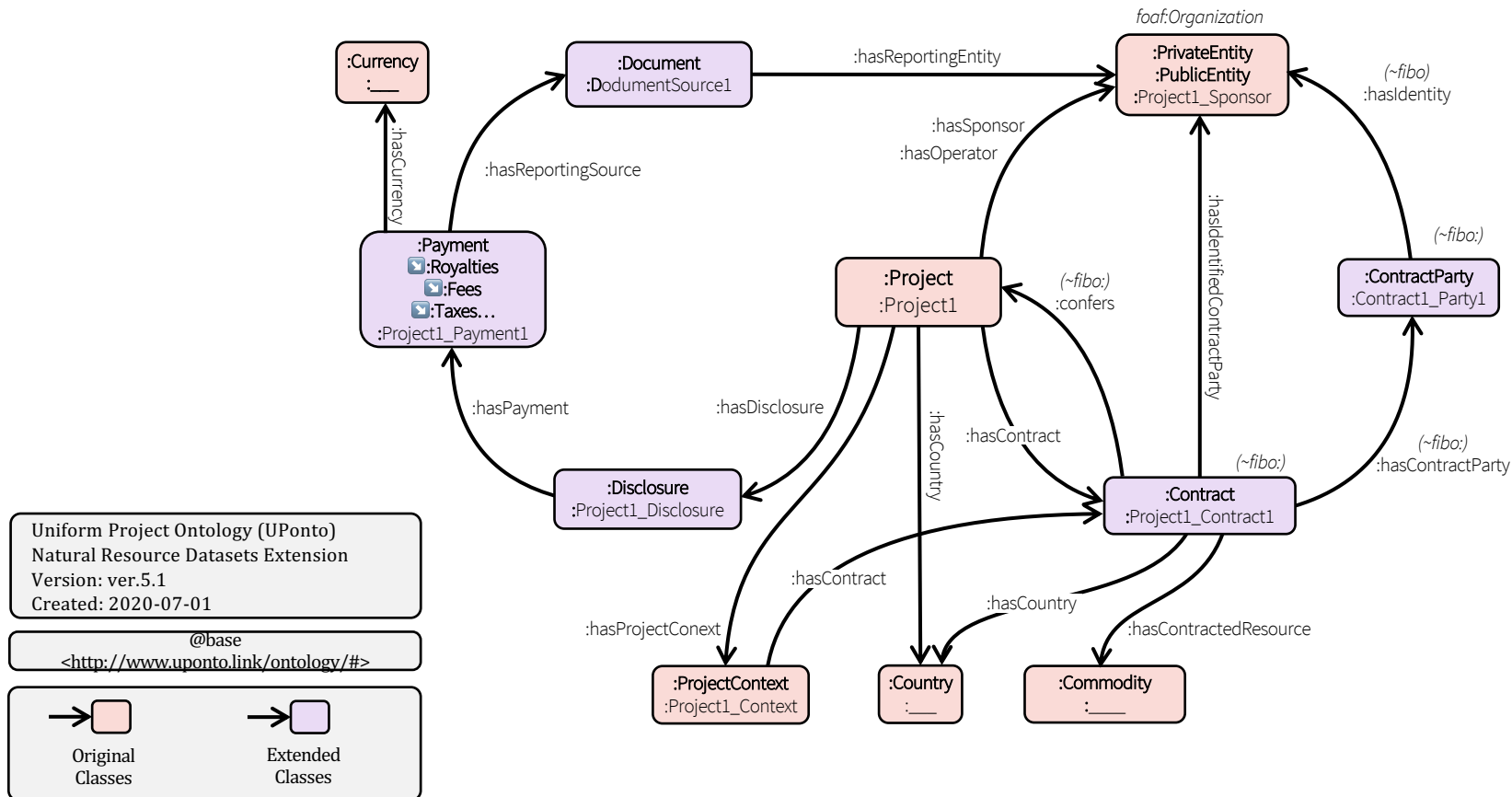
Resource Contracts



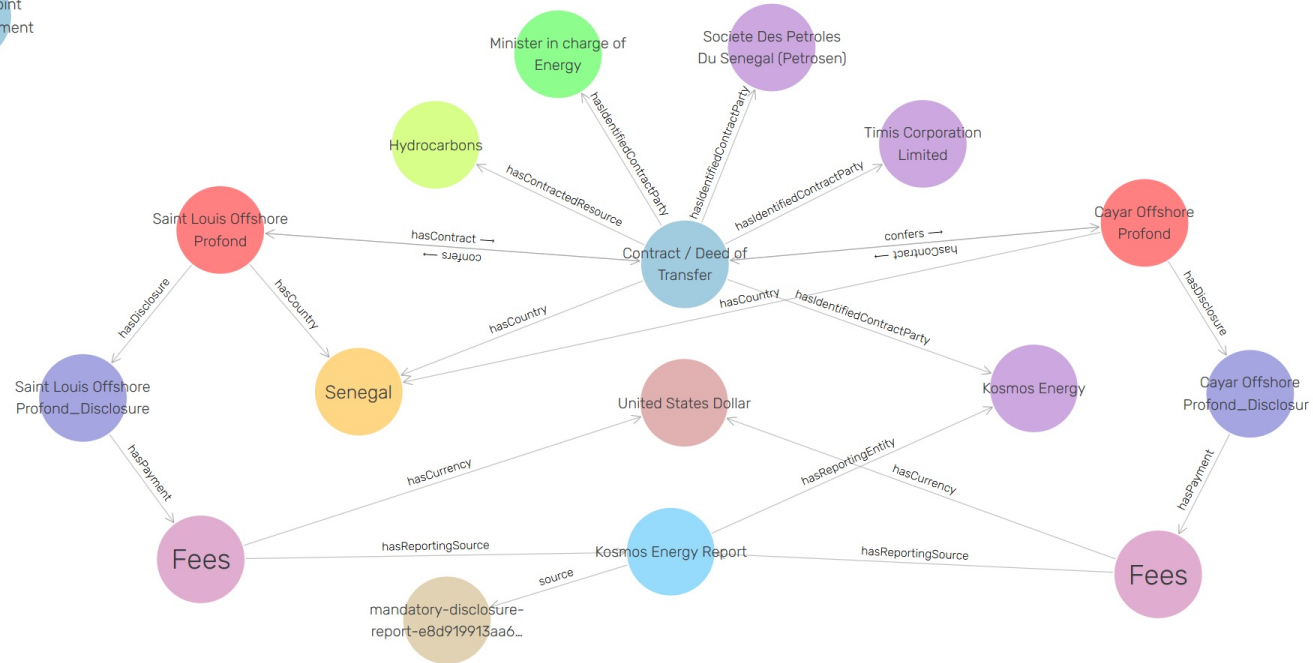
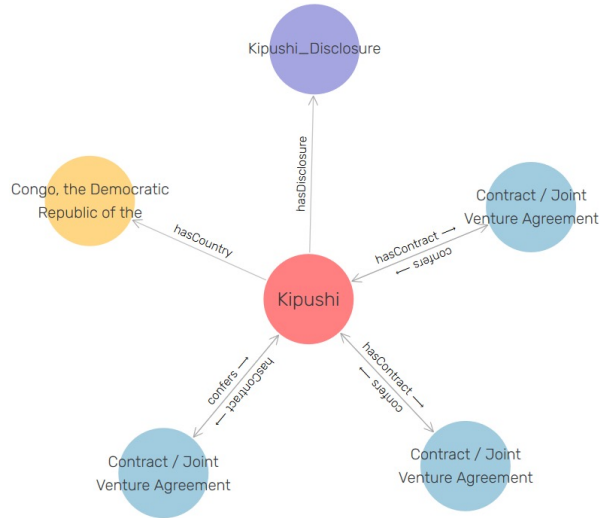
Resource Projects



Natural Resource Datasets Extension



Example: Kipushi, Saint Louis Offshore Profond



Knowledge Graphs

Open Linked Data

- Opportunity to collaborate with Dbpedia.
- Currently working on mapping entities with Dbpedia and federated queries to justify an open endpoint.
- Decoding beneficial ownership issues.

```
SELECT ?Country ?Population (sum(?e) AS ?Total)
(sum(?e)/?Population AS ?PerCapita)
WHERE {
  ?y a :HeavyIndustrial. ?y :hasDisclosure ?q.
  ?q :hasPayment ?w. ?w a :Royalties.
  ?w :hasPaymentValue ?e.
  ?y :hasCountry ?x. ?x rdfs:label ?Country.

  ?x a dbo:Country.
```

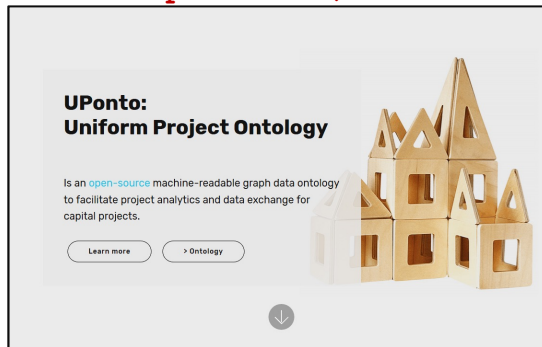
Federating

Mapping

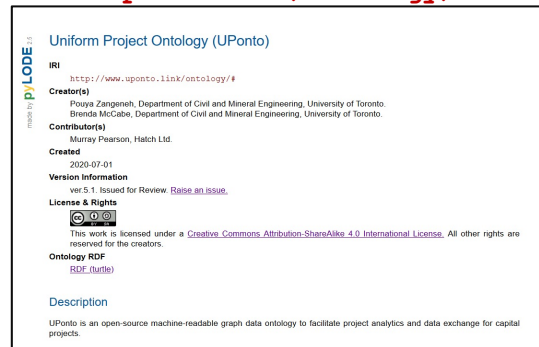
```
SERVICE <http://dbpedia.org/sparql> {
  ?x dbp:populationCensus ?Population.
}
GROUP BY ?Country ?Population
```

Website and Documentation

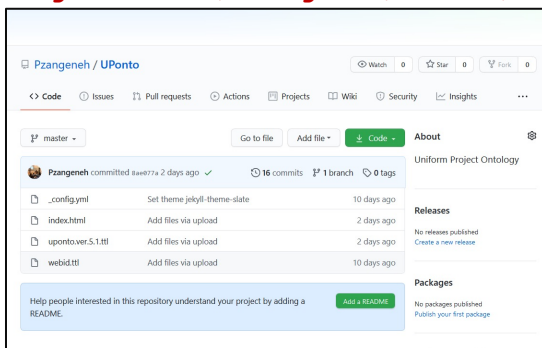
uponto.link/



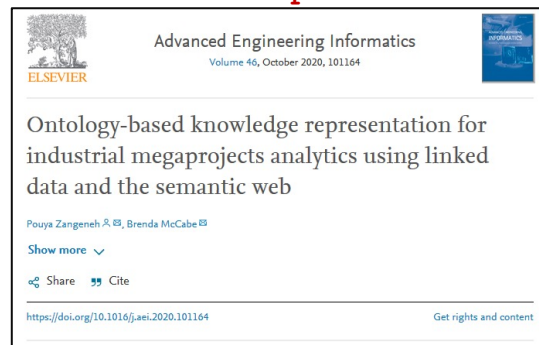
uponto.link/ontology/



github.com/Pzangeneh/UPonto/



[Paper](#)



A large flock of birds, possibly starlings, is captured in flight against a sunset sky. The birds are silhouetted against the warm, orange and yellow light of the setting sun, which is visible on the horizon. The flock is arranged in a large, sweeping V-shape that fills much of the upper half of the frame. The sky transitions from a deep blue at the top to a bright orange near the horizon. The overall mood is serene and majestic.

Thank you

For Questions, Comments and Further
discussion, please reach out to
Pouya.zangeneh@hatch.com

HATCH