The Challenge of Deploying Semantic Technologies at EDF

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All electricity-related activities

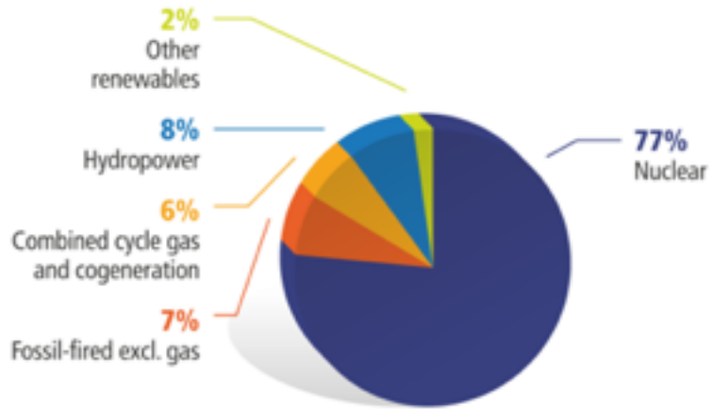
- Generation
- Transmission & Distribution
- Trading and Sales & Marketing
- Energy services

Key figures (2015)

- €72.9 billion in sales
- 38.5 million customers
- 158,161 employees worldwide
- 84.7% of generation does not emit CO2

ELECTRICITY GENERATION

623.5 TWH (2015)



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Plan

Why proposing semantic technologies could be complicated

Successes and on-going proofs of concepts

How to increase the spread of semantic technologies

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Proposing Semantic Technologies

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We all know that semantic technologies are worth to be used …

Elegant way for modelling domains

Formal framework with ontologies

Reasoning abilities

But the use of these technologies is not widely spread in our companies … why ?

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Barriers to Knock Down

Scalability

Integration with other technologies

Miscellaneous

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Scalability

10M companies in a base

-> easy for DBMS on a laptop

-> 1G triples -> 50 GB RAM needed !

35M customers

-> 200 GB RAM !

Especially in this stage of integration one has not to be so demanding !

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Integration with other technologies

Integration with DBMS could be achieved with wrappers

What about Hadoop ?

We lose the deductive aspect !

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Miscellaneous

Dedicated tools (ETL, debuggers, …)

It is a new technique amongst others

Available skill in semantic technologies needed

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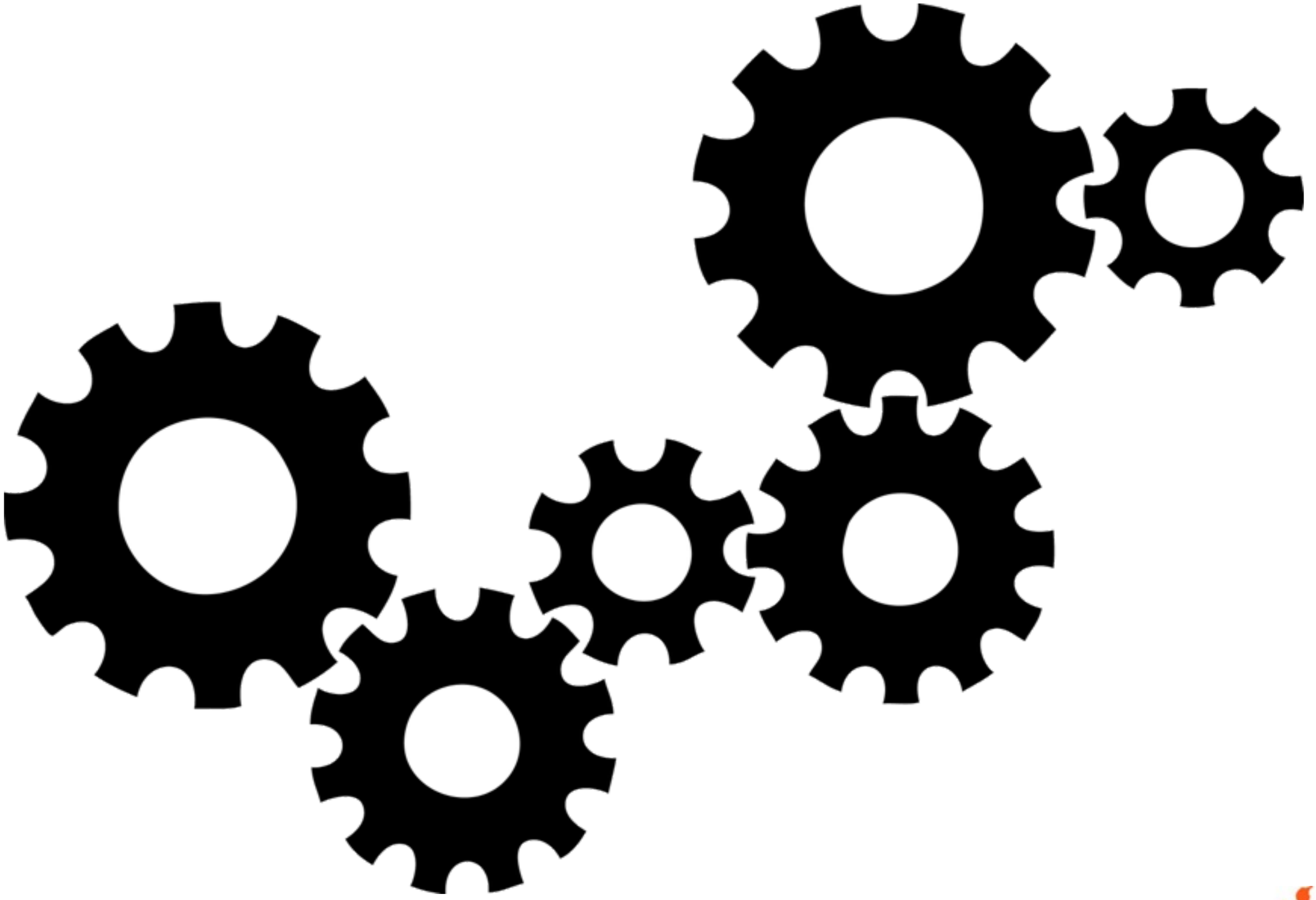
Successes and on-going POCs



Customer Relationship Management

Finance Processes

Electricity Networks

Technical Repositories

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The Energy Management Advisor

Providing the customer with a smart electricity consumption analysis

UNIVERSITY OF OXFORD
DEPARTMENT OF COMPUTER SCIENCE

Semantic Web and Data Integration: new technologies and applications to industry - 26th-27th May 2016

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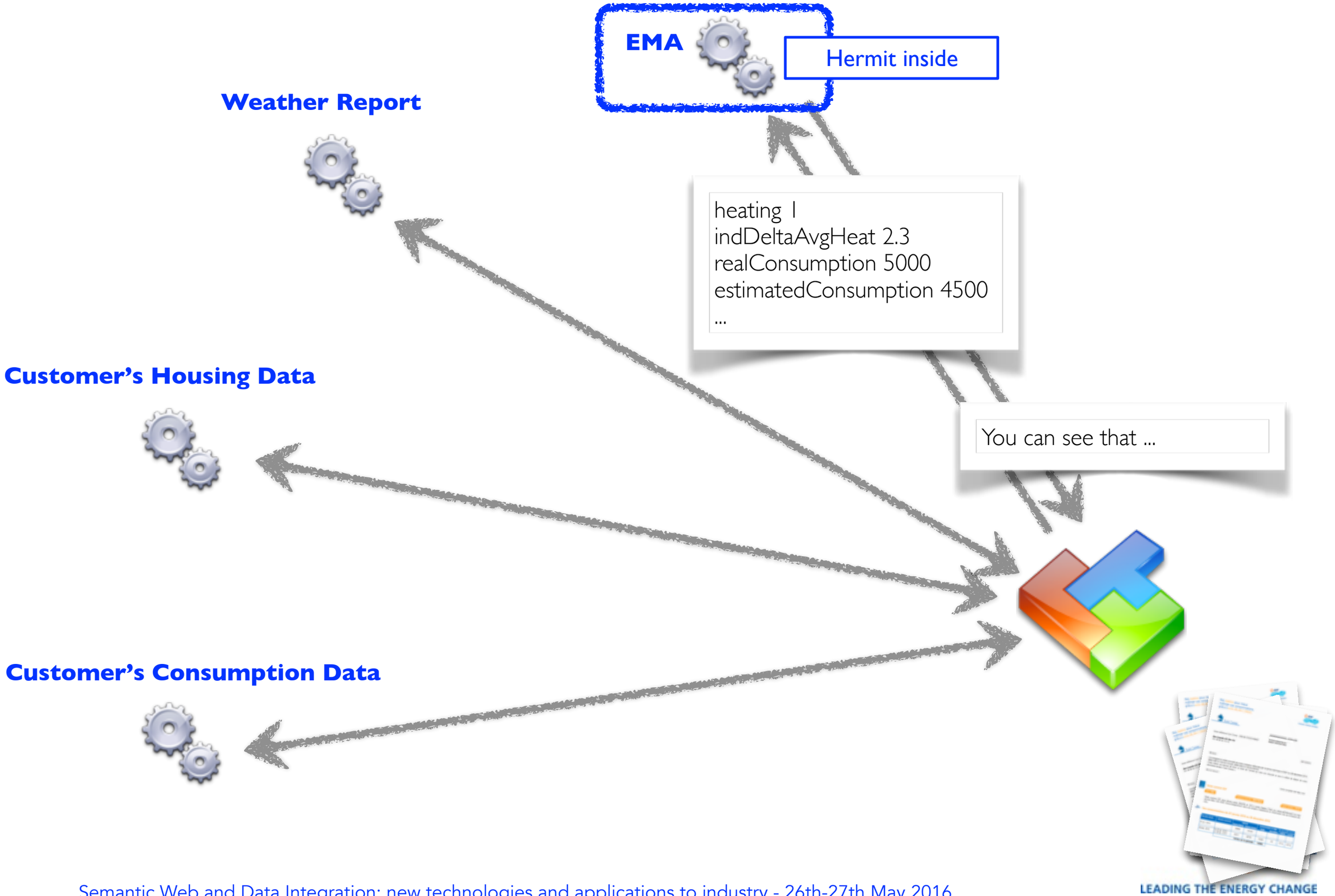
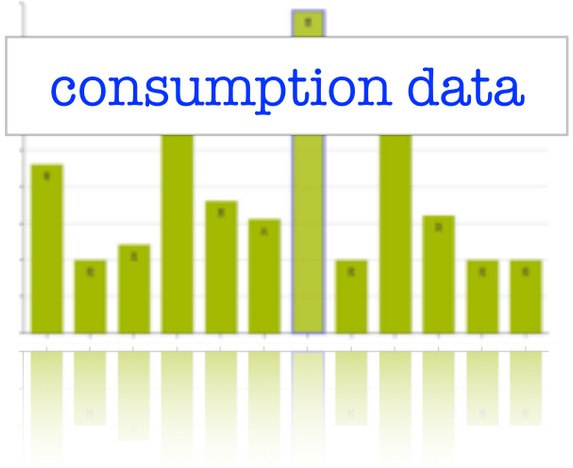
Industrial version - 300 000 users during 5 years



New Proposition for the EMA

consumption data



customer's data

RDF store

local wheather

consumption analysis

customer's interaction

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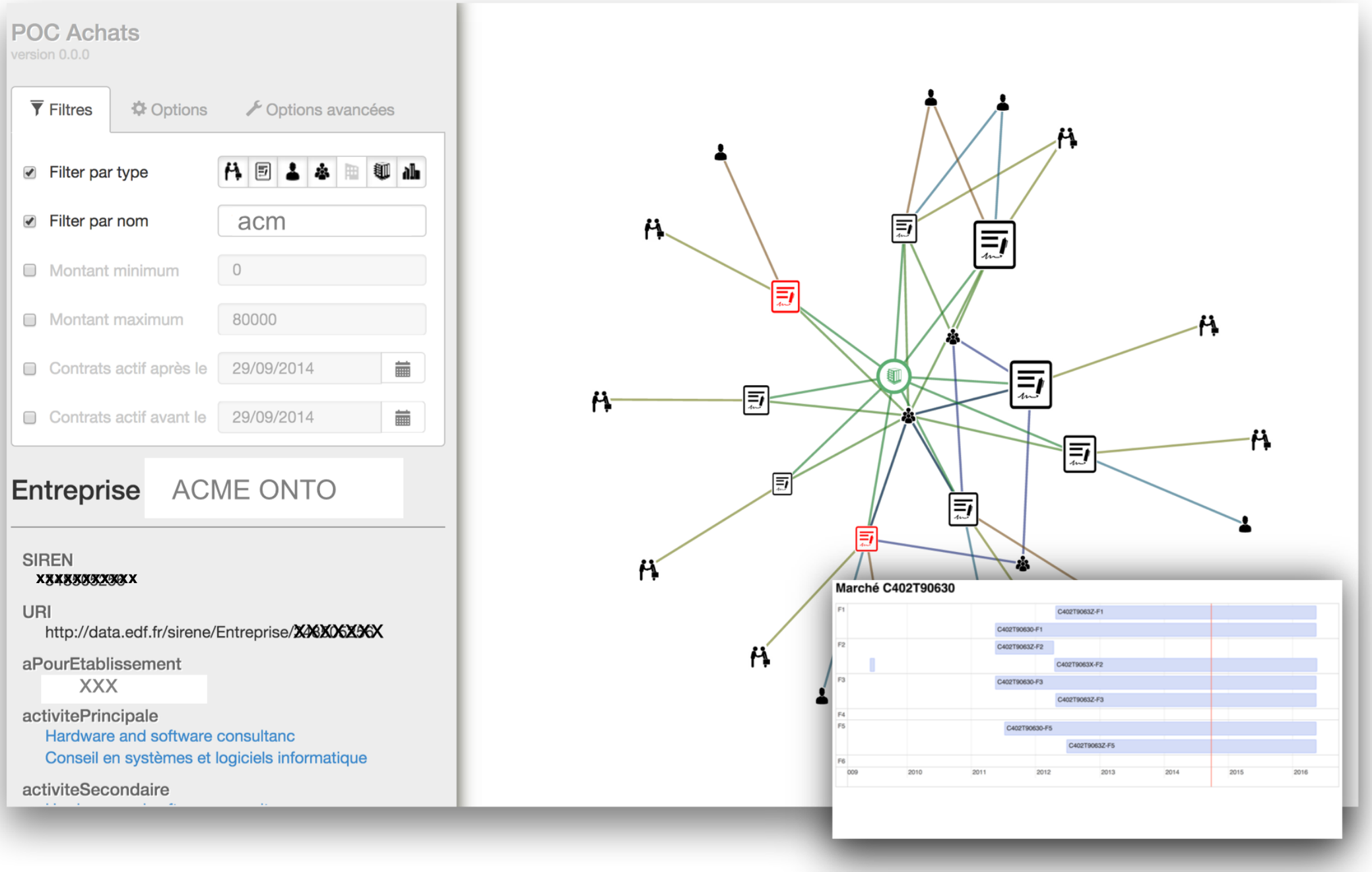
Once again scalabity problems could arise

We started our experiments with **RDFox**

We improved our experience with real time with ontology driven user's interactions

Finance processes



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Base-line data

employee
customer
account
company
....

areBasedOn

areBasedOn

paiement
invoicing
....

Operational processes

generates

Accounting events

encashment
fixed assets
....

aggregates

generates

proves

justify

pay slip
invoice
....

Supporting documents

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Ontologies are needed for modelling interactions between different worlds

Reasoning is needed for synchronizing events in these different worlds and provide the users with consistent views

Reasoning is needed for issuing suspicious event alerts

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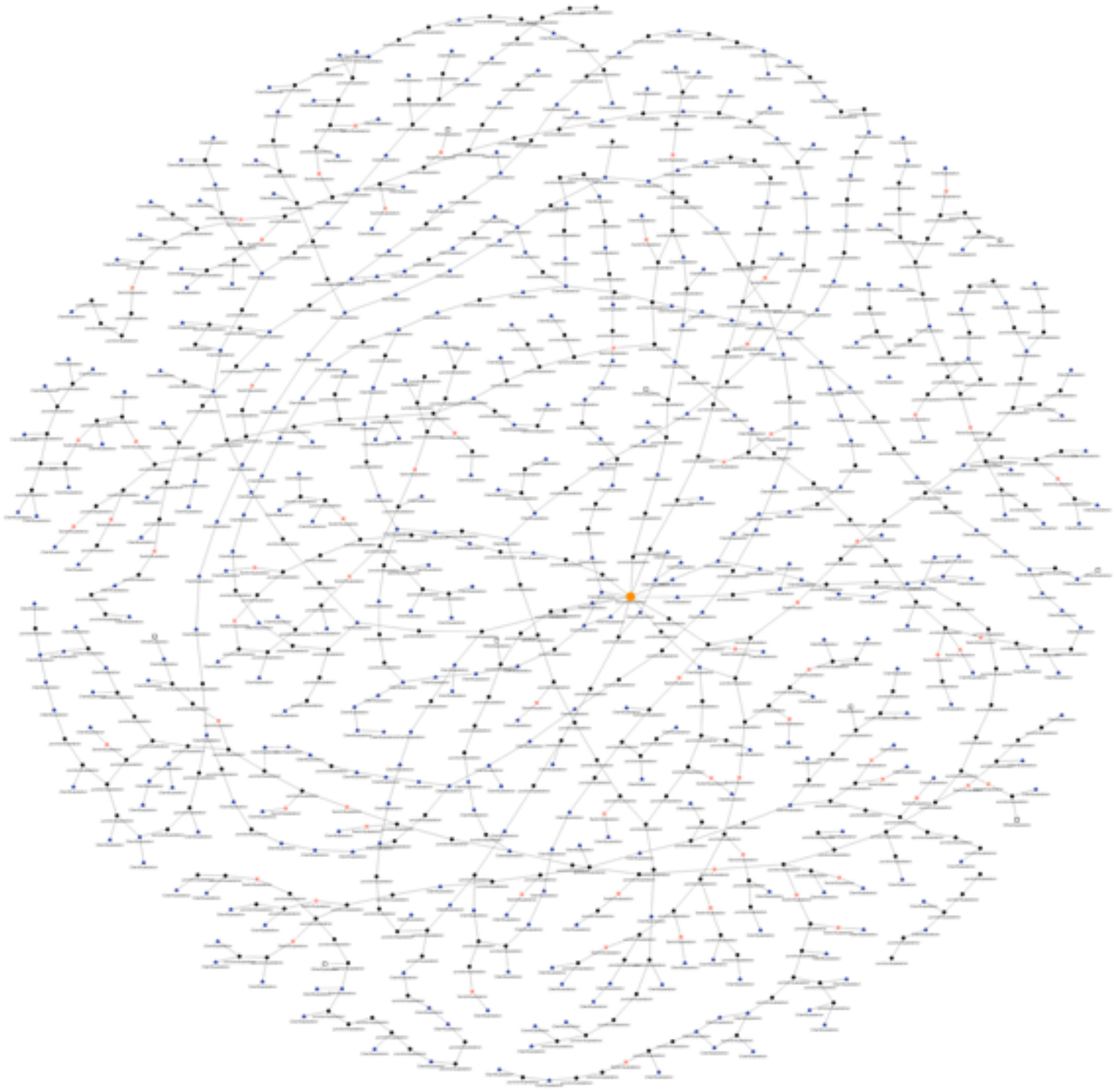
Amongst several POCs one was dedicated to the purchase process analysis

We started to model some parts of the whole with ontologies describing companies, employees, contracts …

We developed then a generic graph UI generator on top of RDFox : SemVue

Once again scalability is needed

Electricty Networks



Electricity networks represented with **RDF triples** (standardized Common Information Model)

A fine grained description of all the components in an electricity network

Several technical options were intended (Neo4j + PostgreSQL + Jena)

Why not **RDFox** alone ?

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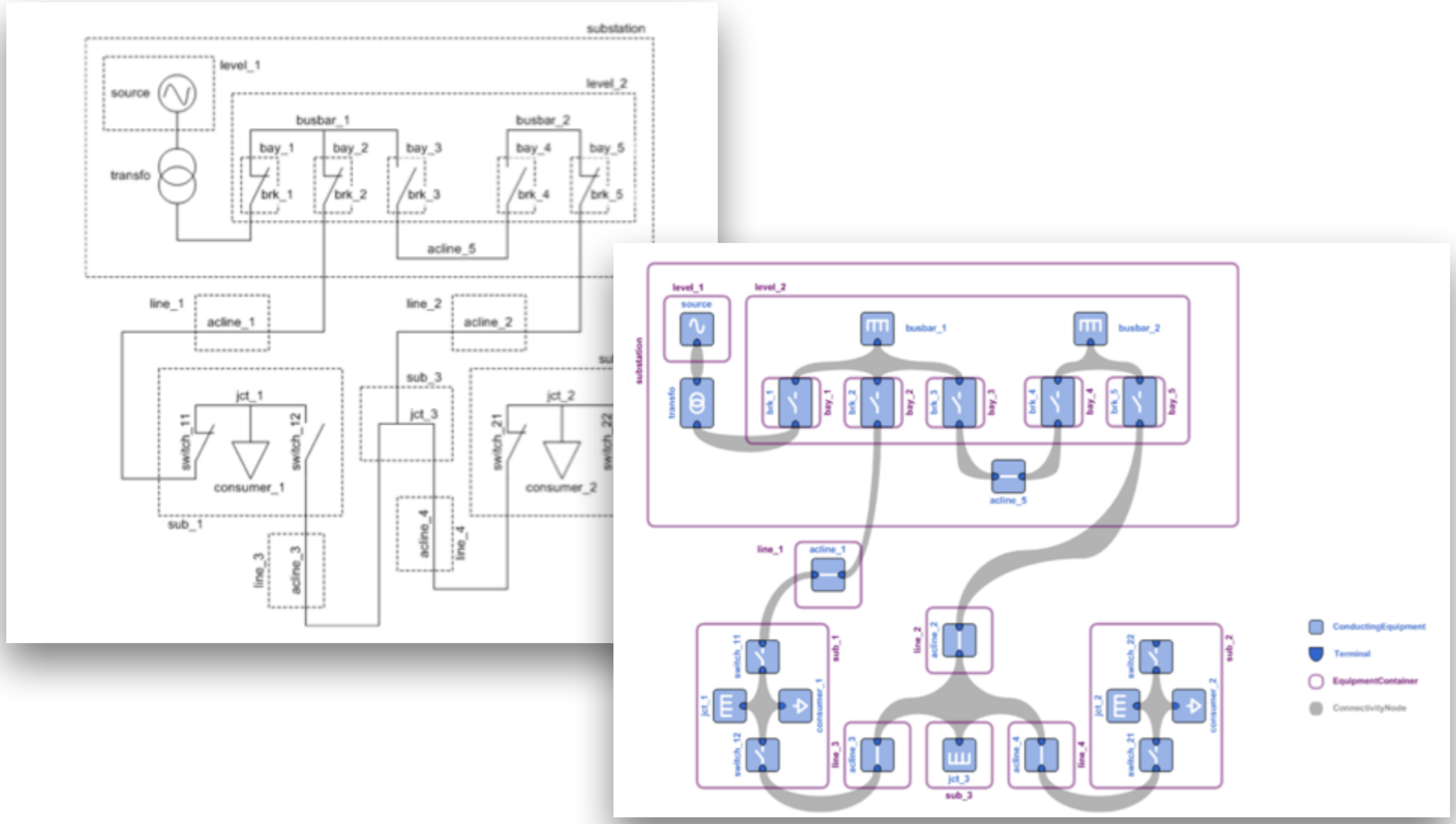

CIM RDF Modelling

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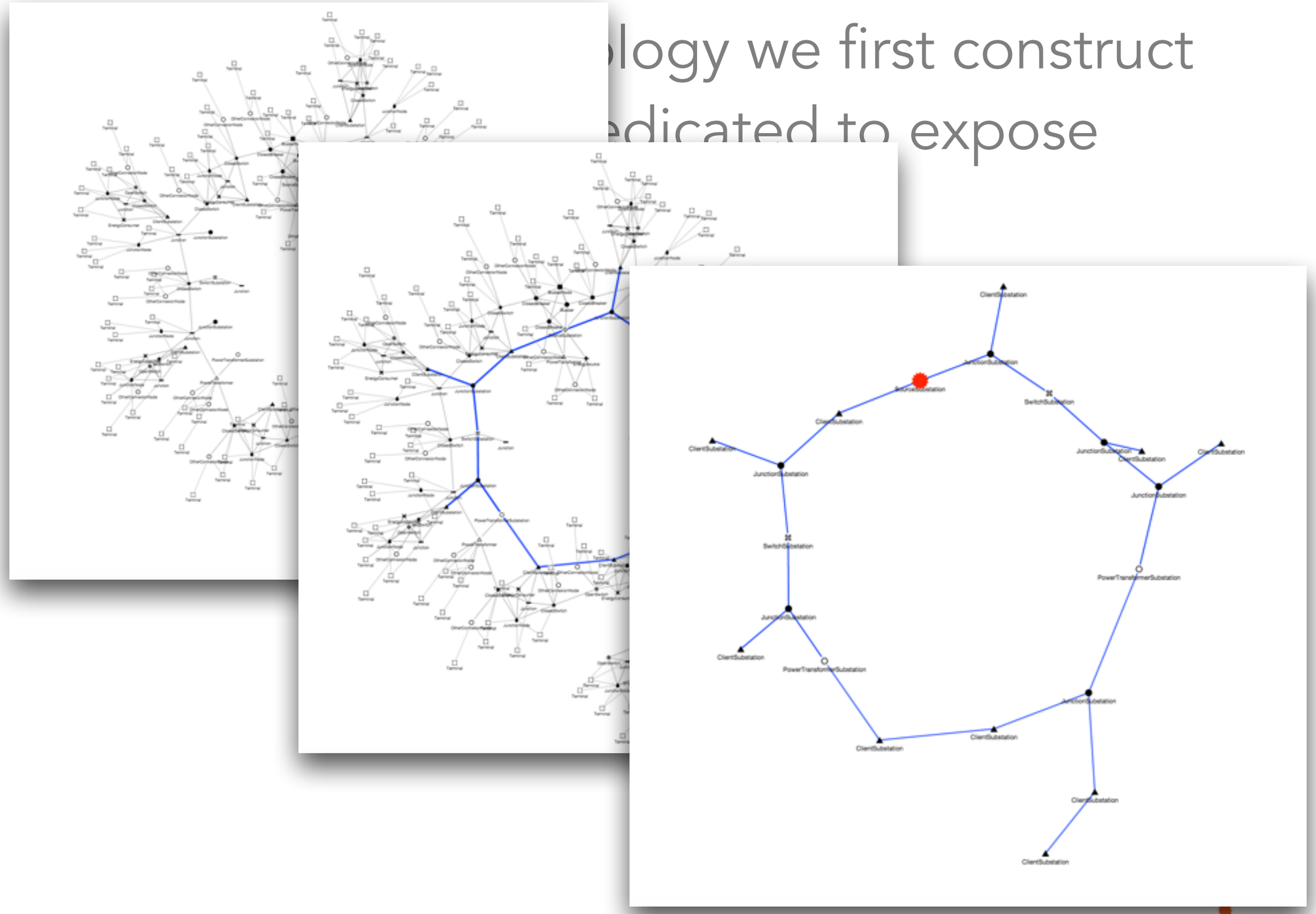
logy we first construct
edicated to expose



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Looking for backups in case of incident with topological analysis of networks

The identification of possible contacts between independant networks allows us to offer an alternate connection to customers in case of incident

Power flow analysis

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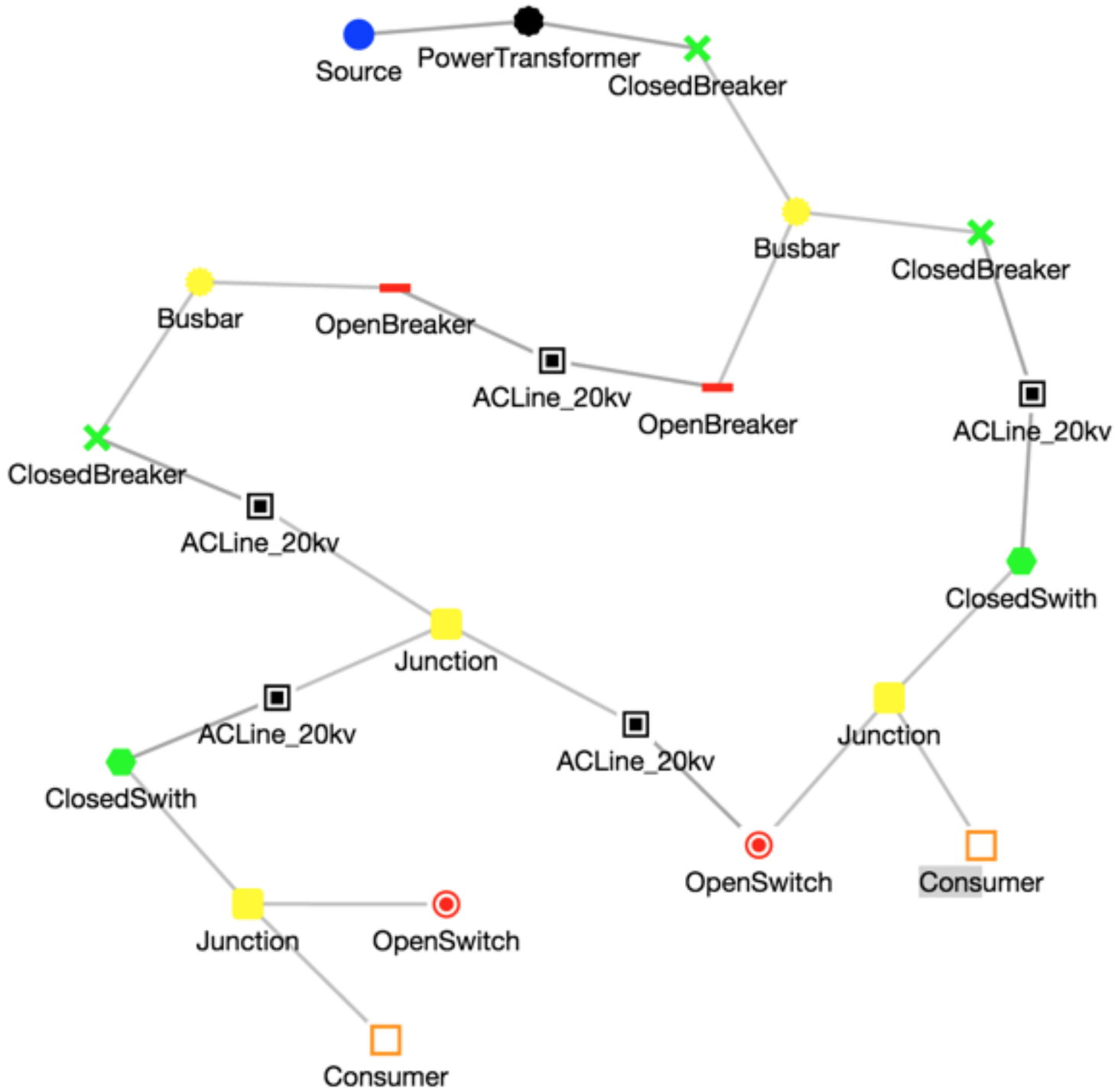

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RDF stores like RDFox are able to handle industrial use-cases

The same logical framework is used for the data representation as well as for business rules

CWA,NAF,aggregation needed

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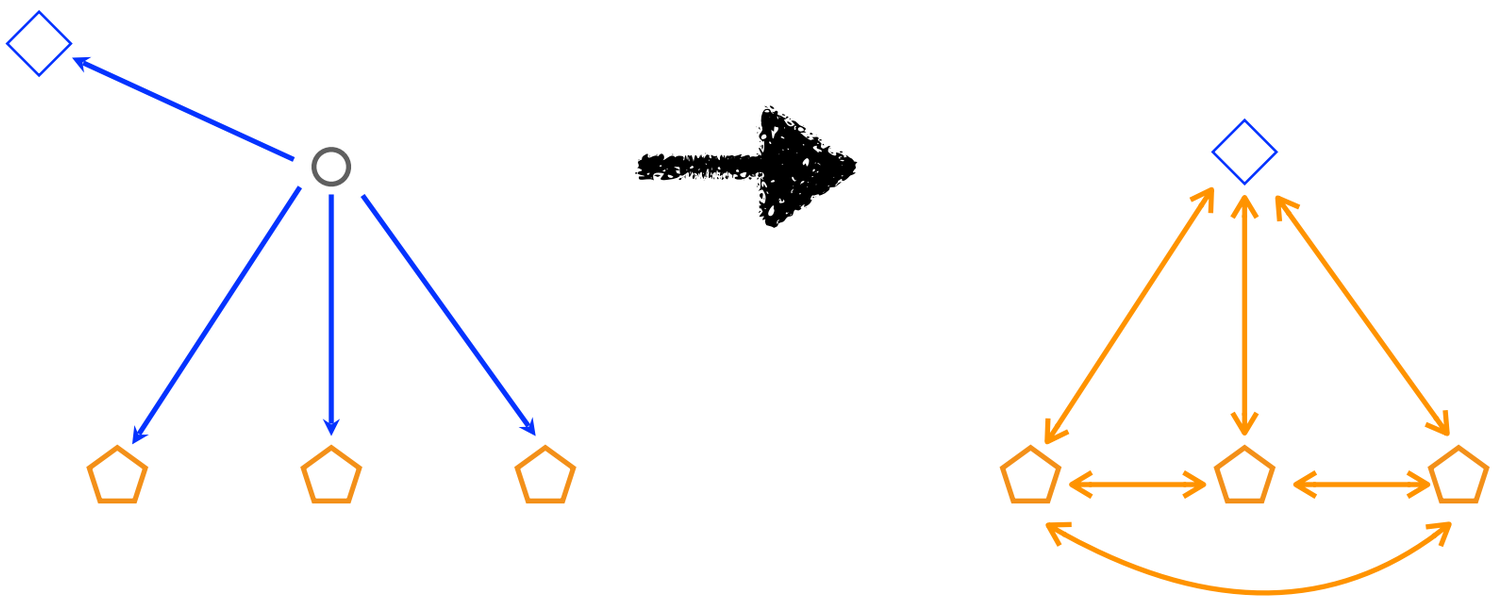
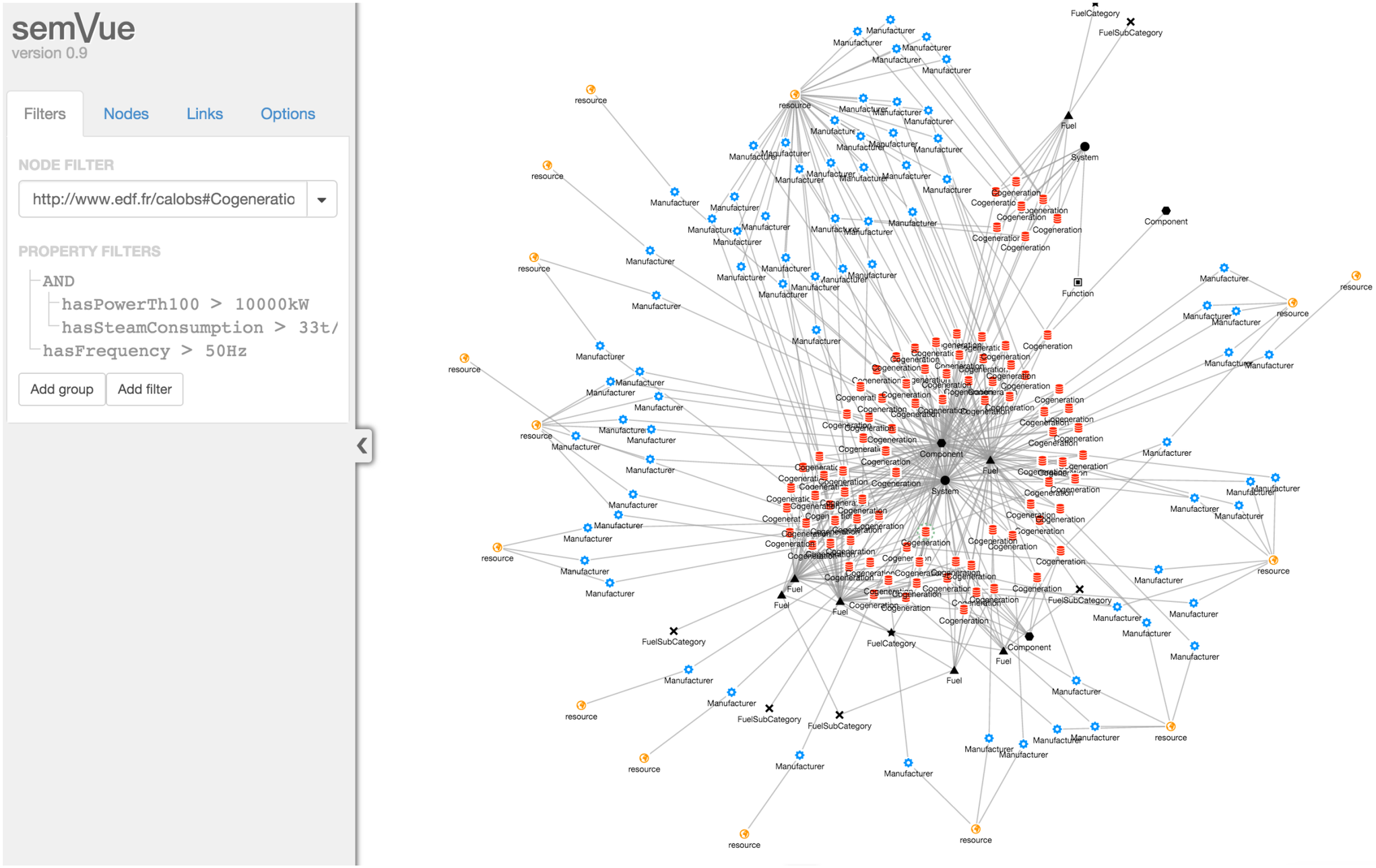


Technical Repositories



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Q : What kind of heating system can I suggest for this collectivity to use ?

Knowing that the place is close to a biomass source and that the average temperature in winter is not so low and that the surface to be heated is around …

A : Here’s the list of the suitable models …

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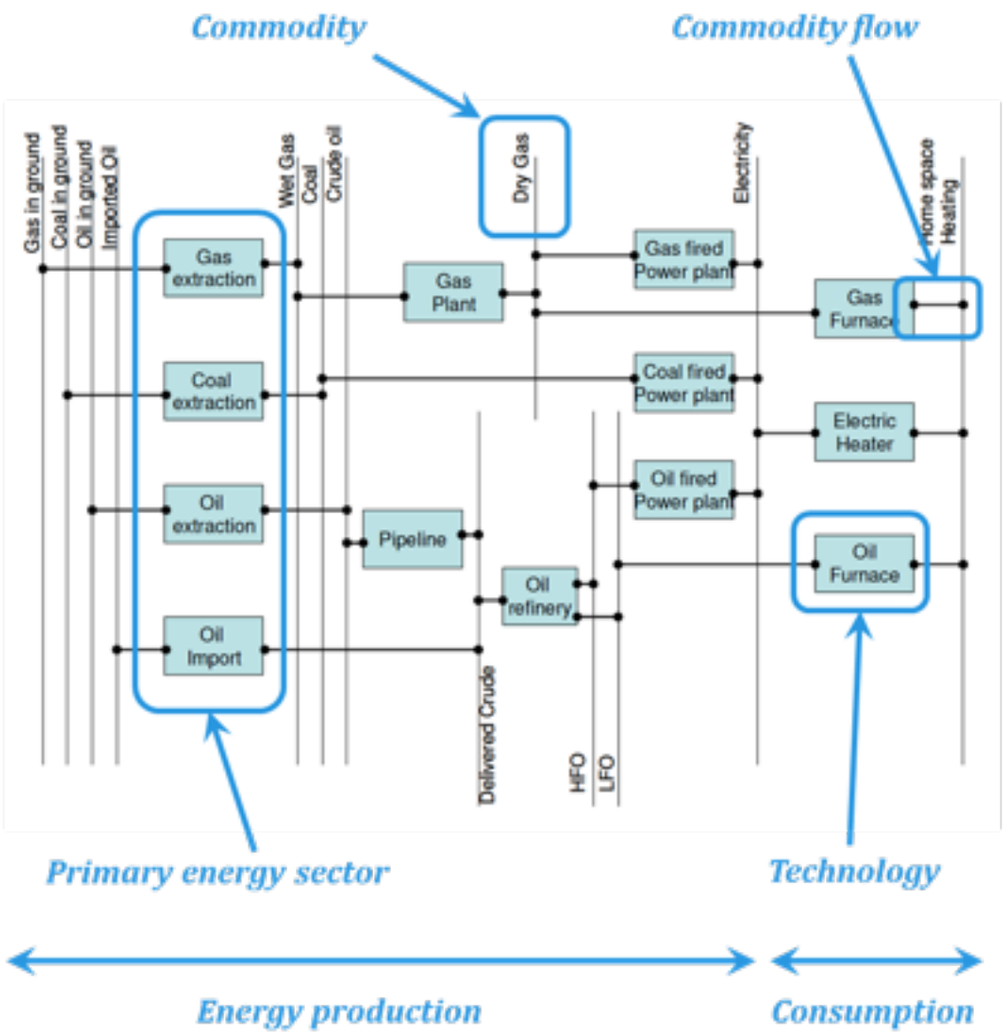
Energy System modelling



Source : adaptation from Richard Loulou & al. Documentation for the TIMES Model (Part I), 2005,
Energy Technology Systems Analysis Program.

Simulation tools

RDF

Consistency
Linked data
Faceted search
Business intelligence

- **Technical specifications**
- **Regulation watch**
- **Market watch**
- **DB: Plants, production, customers, providers, prices, etc.**

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Semantic facet search (SemFacet) for smart navigation through the data

Reasoning for discovering new links between data

Smart interface for dealing with complex data such as described in time or QUDT ontologies

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How to increase the spread of semantic technologies

Scalability

RDF stores must reduce their memory footprint for beeing eligible to standard computers

OBDA should keep the deductive ability …

How ?

Distributed reasoning should be addressed

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Reasoning Features

(Open | Closed) World Assumption

Negation As Failure

Aggregation : mandatory for data analytics !

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Questions ?