GOBIERNO DE ESPAÑA MINISTERIO DE CIENCIA E INNOVACIÓN

UNIVERSIDAD DE MURCIA

Unión Europea

ASIO: a Research Management System based on Semantic technologies

Jose Emilio Labra Gayo

José Barranquero Tolosa

Guillermo Facundo Colunga

Alejandro González Hevia

Daniel Ruiz Santmaría

Emilio Rubiera Azcona

Paulino Álvarez de Ron Ondina

WESO

izertis

Background: HERCULES project

Research data semantics for Spanish universities

Goals:

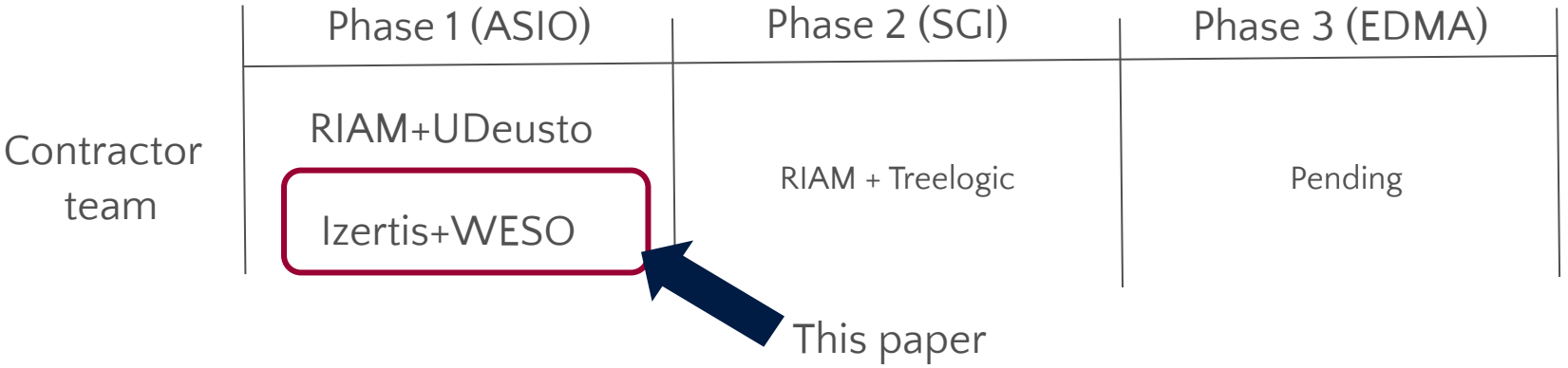
- Gather new information
- Integration of heterogeneous nodes
- Apply semantic web technologies

WESO

Background: Hercules project

3 phases:

- Semantic architecture and ontological infrastructure (ASIO)
- Research management system (SGI)
- Enrichment methods and data analysis (EDMA)

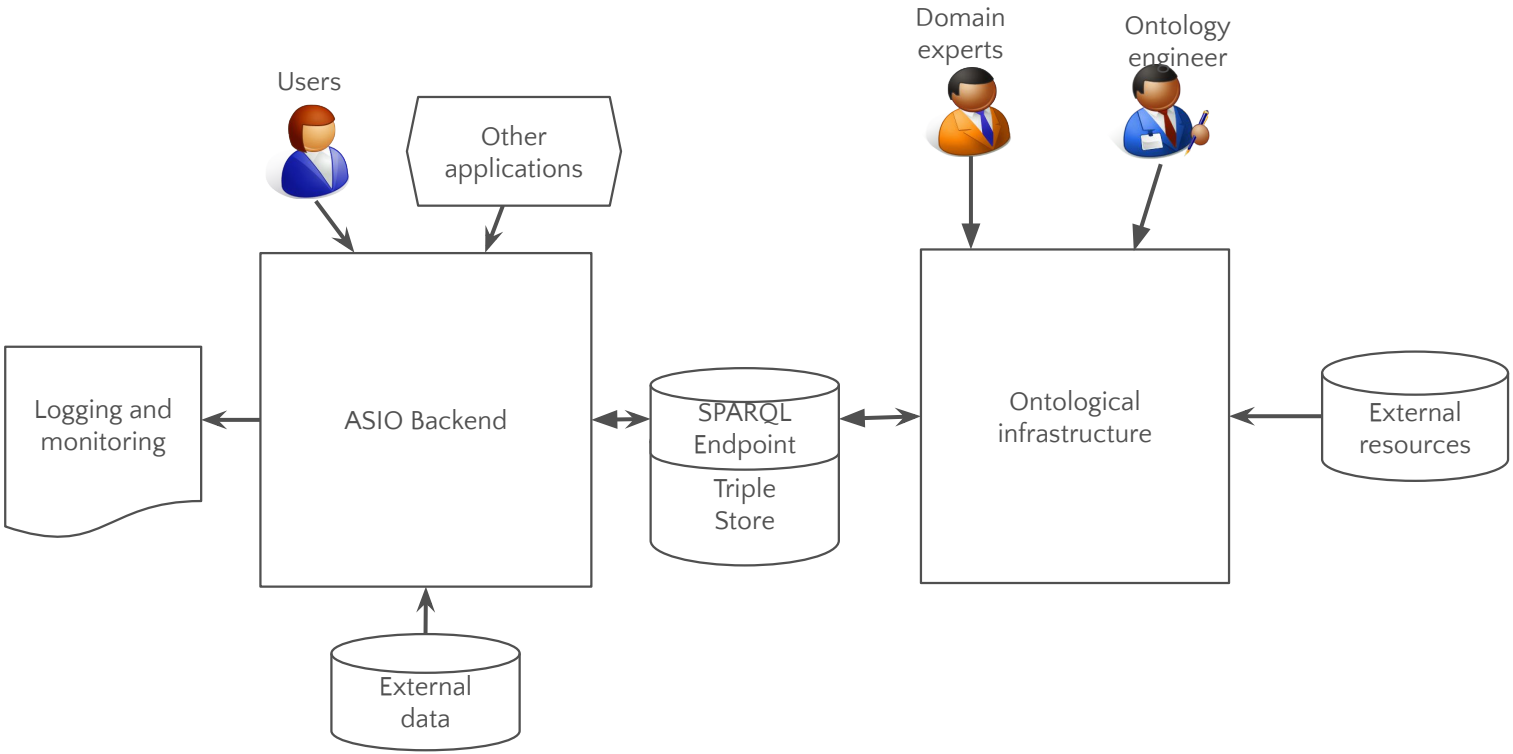


Architecture of ASIO

2 main building blocks

- Semantic architecture/Backend
- Ontological infrastructure

Building blocks



ASIO Backend

Front end

Offers a Linked Data Platform API

Web publication service

Clean architecture pattern

Domain model using POJOs

Event sourcing

Apache Kafka as the source of truth

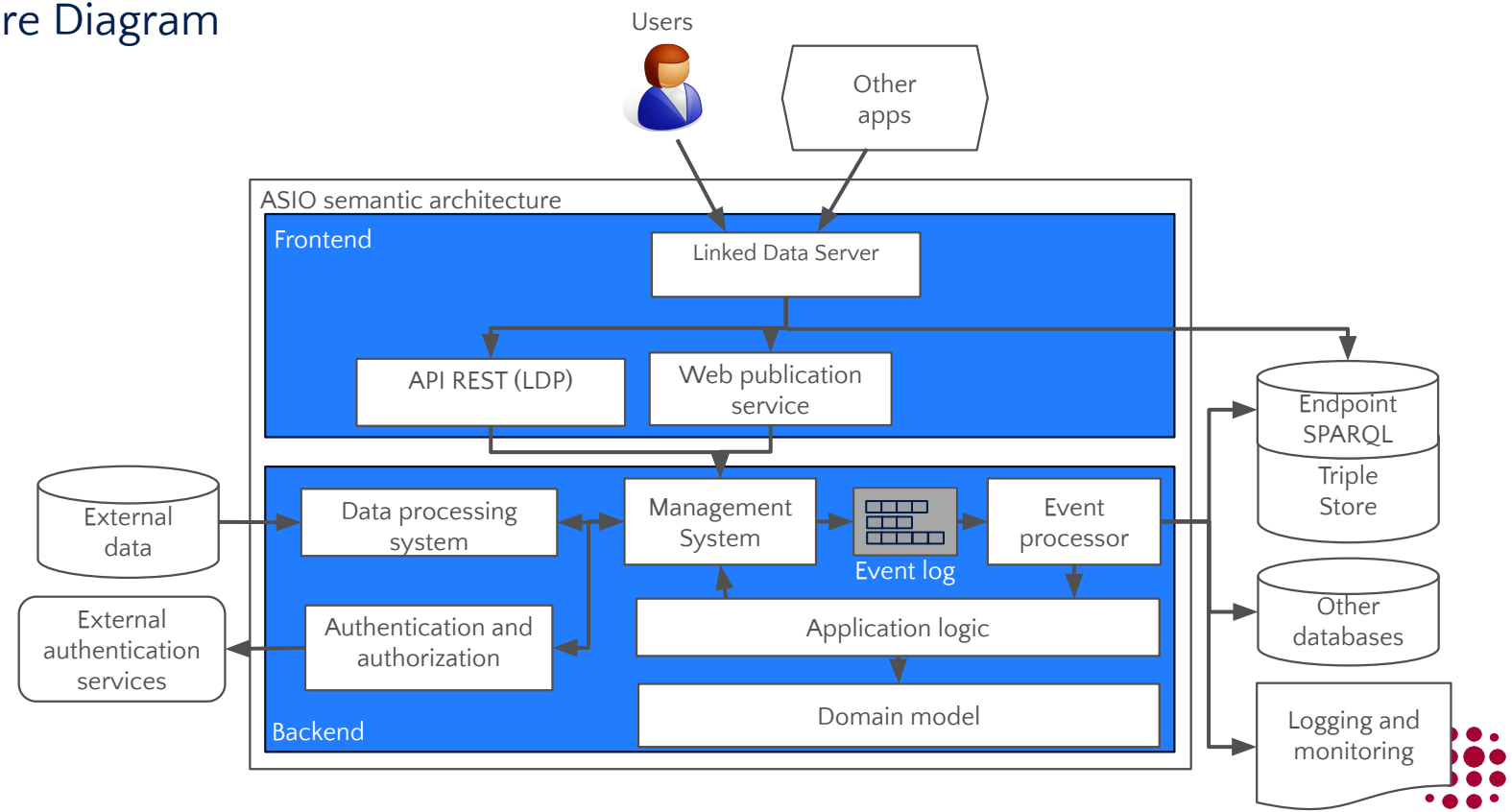
2 Event processor generate 2 serving data stores

- Trellis + Apache Jena TDB
- Wikibase

URI factory

ASIO Backend diagram

Architecture Diagram



Ontological infrastructure

Modular ontology

Core

- Research concepts

Vertical modules

- Different domains like geographical names, human resources, univ. systems, etc.

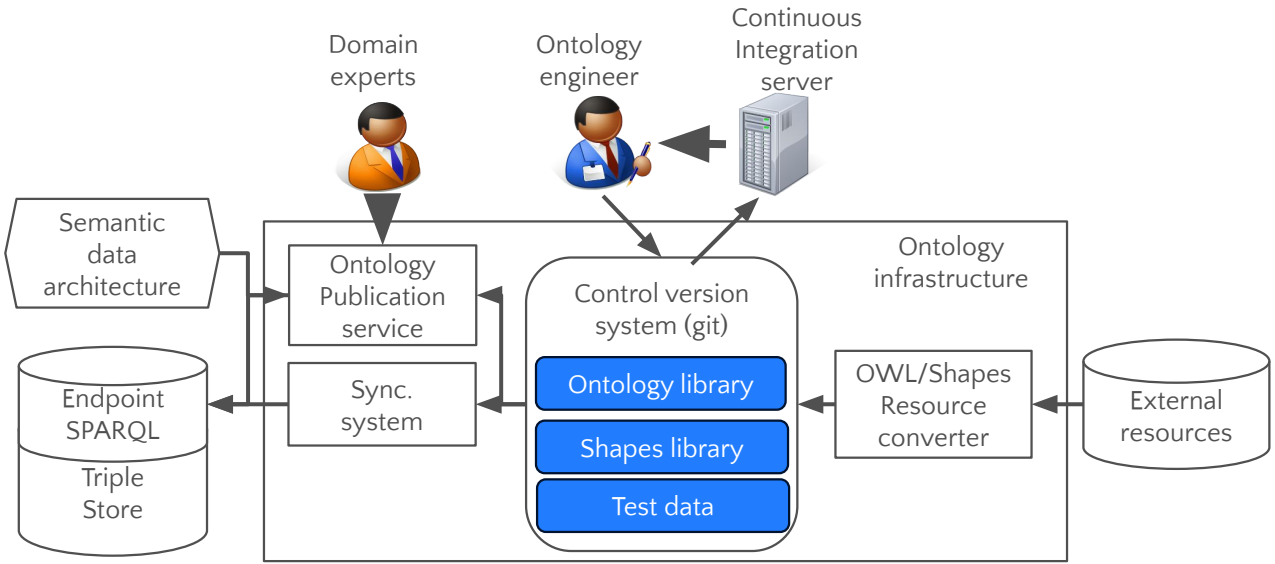
Shape expressions

Describe & validate the content

Continuous integration with test data

Ontological infrastructure

Architecture diagram



Application logic and domain model

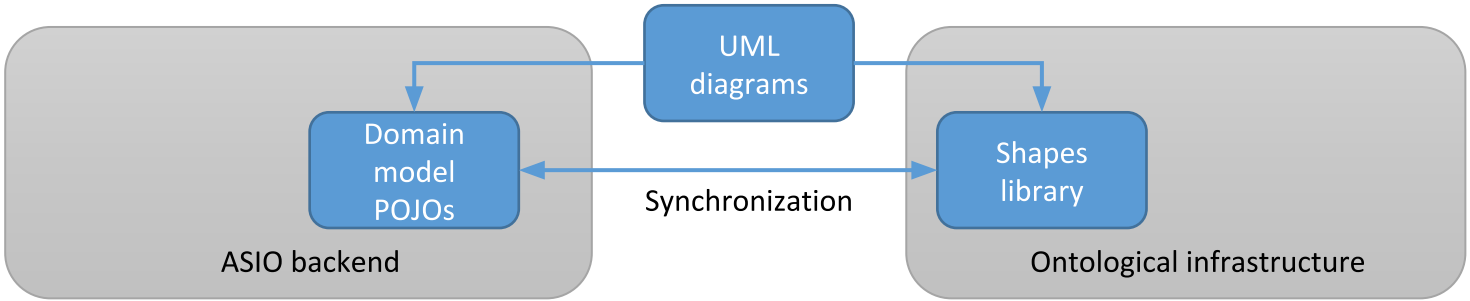
Clean architecture pattern

Domain model as the central element

Plain Old Java Objects (POJOs)

Synchronization between Shapes from Ontological infrastructure

Application logic and services over domain model



WESO

Example of POJO generation

ShEx

```
# Prefixes ...
:Researcher {
 :name xsd:string ;
 :surname xsd:string ;
 :orcid xsd:xstring ;
 :publications :Publication *
 ...
}
```

Java

```
// Imports ...
public class Researcher {
 private String name ;
 private String surname ;
 private String orcid ;
 private Publication [] publications ;
 ...
 // Constructor ...
 // Getters and Setters ...
 ...
```


ShExLite processor: https://github.com/weso/shex-lite

Ontological infrastructure

Automatic Synch between github repo and wikibase instance

Github: https://github.com/weso/hercules-ontology

Wikibase ontology: https://herc-core.wiki.opencura.com/wiki/Main_Page

Competency questions

Wikibase instance: https://hercules-demo.wiki.opencura.com

Continous integration using Shapes

https://github.com/weso/ontolo-ci

Conclusions

ASIO presents a new architecture proposal for a semantics-based research management system

We prioritized the following quality attributes

- Interoperability
- Scalability
- Reusability

Further work

ASIO started its development in Nov. 2019

Ontology = 1st version published

- http://purl.org/hercules/asio/core
- Currently working on aligning the ontologies from the 2 contractors

ASIO backend = work in progress

- Repos available at https://github.com/HerculesCRUE/ib-asio