Building the SISE

an environmental ontology

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Motivation

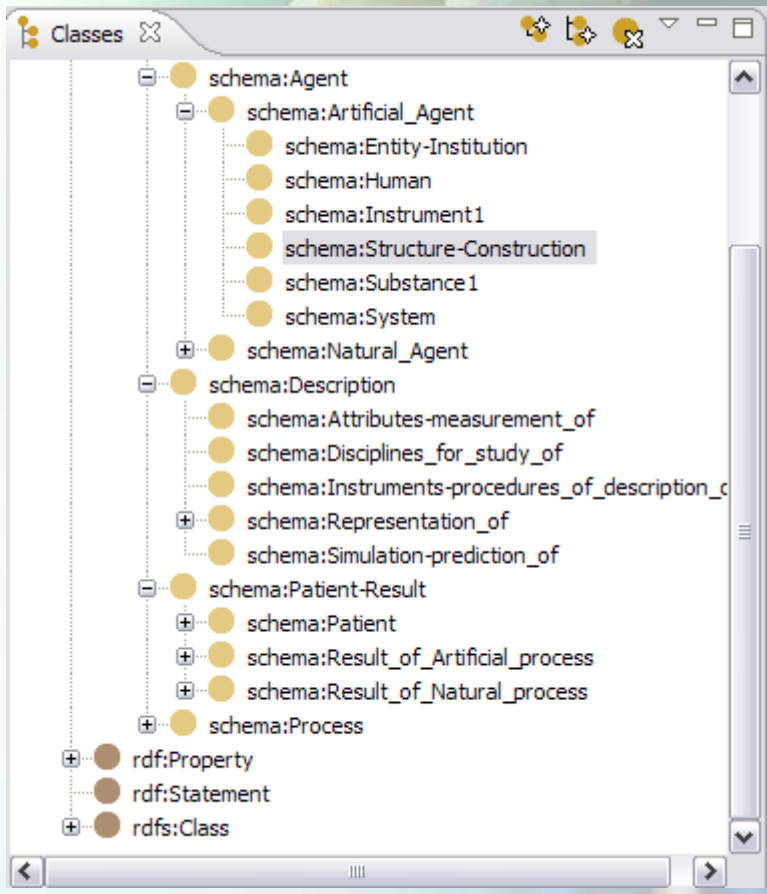
- **SISE project: “to provide some sort of integrated environmental information space”**
- **EcoLexicon approach:**
  - enhances knowledge exchange
  - offers easy access to the conceptual structures underlying the environmental domain
  - facilitates learning and communication
  - eliminates conceptual and terminological confusion
- **eEnvironment community can benefit from Semantic Web technologies**

Semantic Web

- **Knowledge needs to be represented by ontology modelling**
- **Problem:**
  - Many projects have not been conceived as such from the beginning
  - As EcoLexicon, mostly come from relational databases
- **Proposal of integration**
  - useful for projects with similar purposes
- **Terminological resources can find in ontologies a powerful representational model**

Terminological Knowledge Base

- **Environmental Event**
  - provides underpinnings for conceptual sub-hierarchies
- **Upper-level classes are based on frames and semantic roles**
- **Process-oriented overview of the domain**
- **Ontological classes fed from stored information in the database (D2RQ)**



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Relationships between concepts

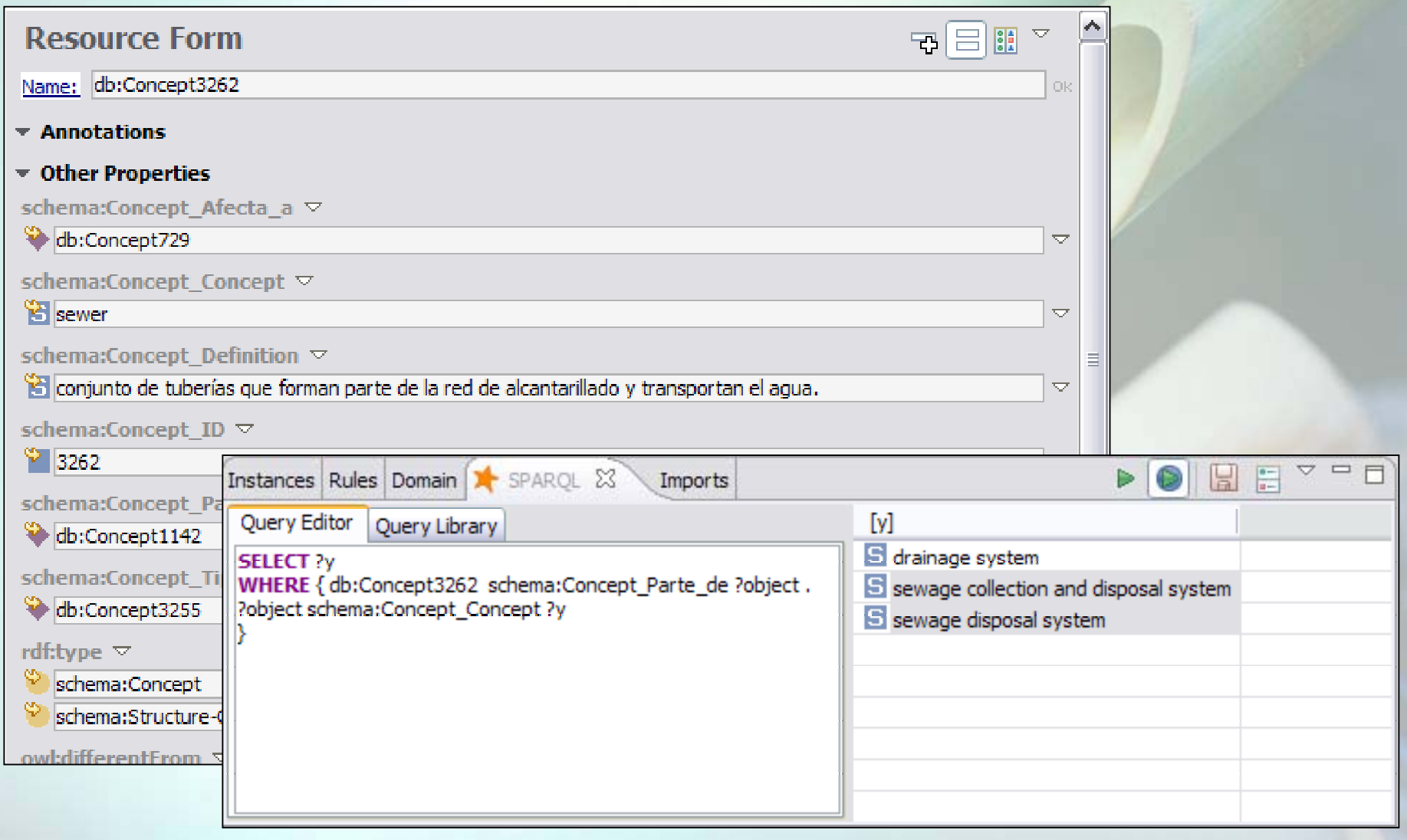
- Concepts are linked through both vertical and horizontal relations
- Some are domain-specific and show their own internal hierarchical structure.
- Determination of non-taxonomic conceptual relationships is not well-researched
- Relations largely depend on the type of entity being described, its nature, and its own relational power

Relationships

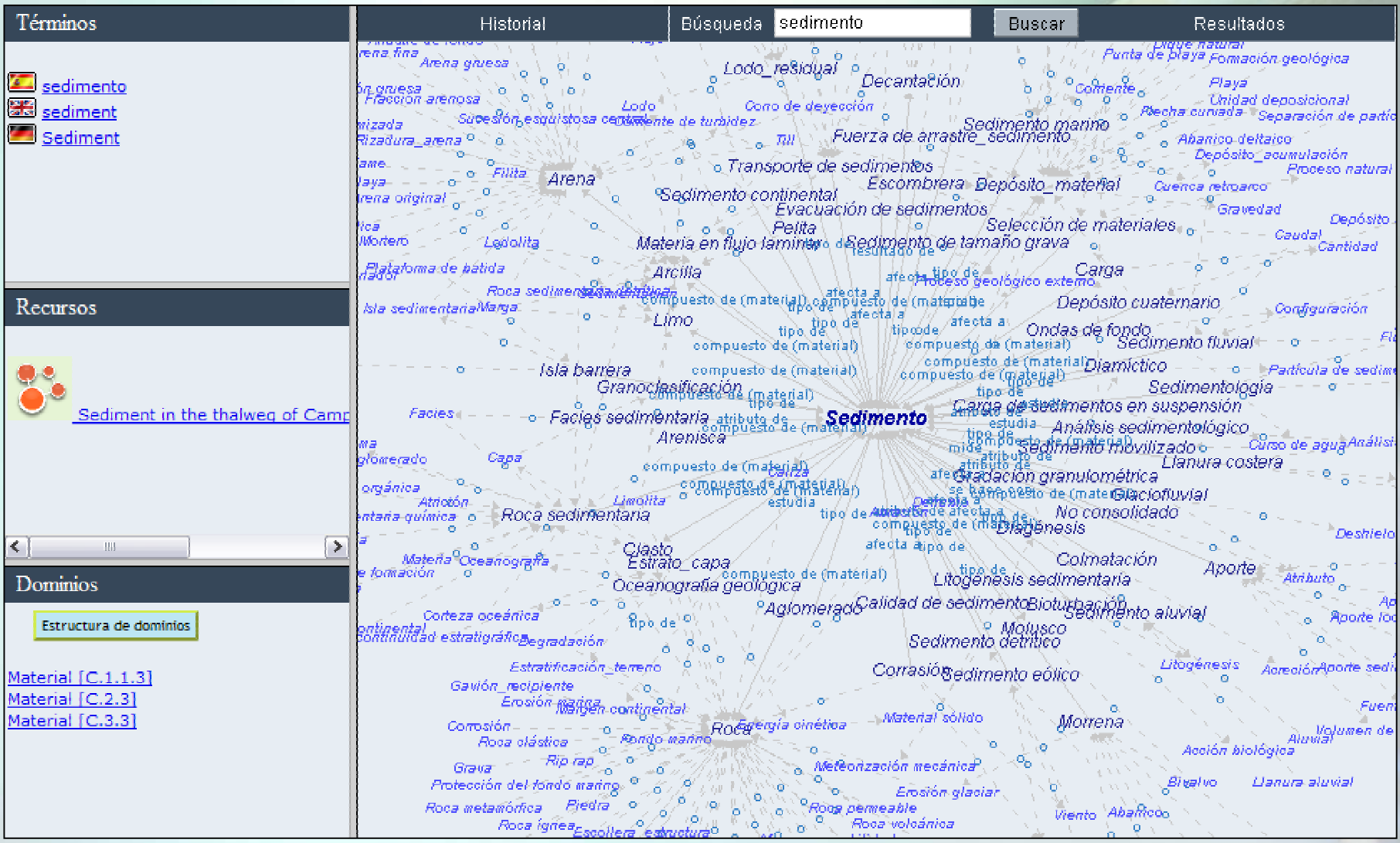
	examples
is_a	MAIN TRUNK SEWER -> SEWER PIPE -> PIPE -> INSTRUMENT -> AGENT (semantic role)
part_of	SCREENING *part_of* PRELIMINARY TREATMENT
made_of	WASTEWATER *is made of* CONTAMINANTS
delimited-by	WASTEWATER TREATMENT PLANT *is delimited by* THE END OF THE SEWAGE SYSTEM
located-at	BREAKWATER *located at* THE COAST
takes-place-in	THERMAL LOW *takes place in* SUMMER

	examples
attribute-of	ISOTROPIC, ALLUVIAL, ABYSSAL
result-of	EFFLUENT *is the result-of* WASTEWATER TREATMENT (process)
affects	SEWER PIPE *affects* WASTEWATER
has-function	WATER *has-function* IRRIGATION
represents	HYDROGRAPH *represents* RATE OF WATER FLOW
effected-by	SAND TRAPPING *is effected* BY A SAND FILTER

Ontology


Resource Form
Name: db:Concept3262
OK
Annotations
Other Properties
schema:Concept_Afecta_a
db:Concept729
schema:Concept_Concept
sewer
schema:Concept_Definition
conjunto de tuberías que forman parte de la red de alcantarillado y transportan el agua.
schema:Concept_ID
3262
db:Concept1142
db:Concept3255
rdf:type
schema:Concept
Instances
Rules
Domain
SPARQL
Imports
Query Editor
Query Library
SELECT ?y
WHERE { db:Concept3262 schema:Concept_Parte_de ?object .
?object schema:Concept_Concept ?y
}
[y]
drainage system
sewage collection and disposal system
sewage disposal system

Overinformation



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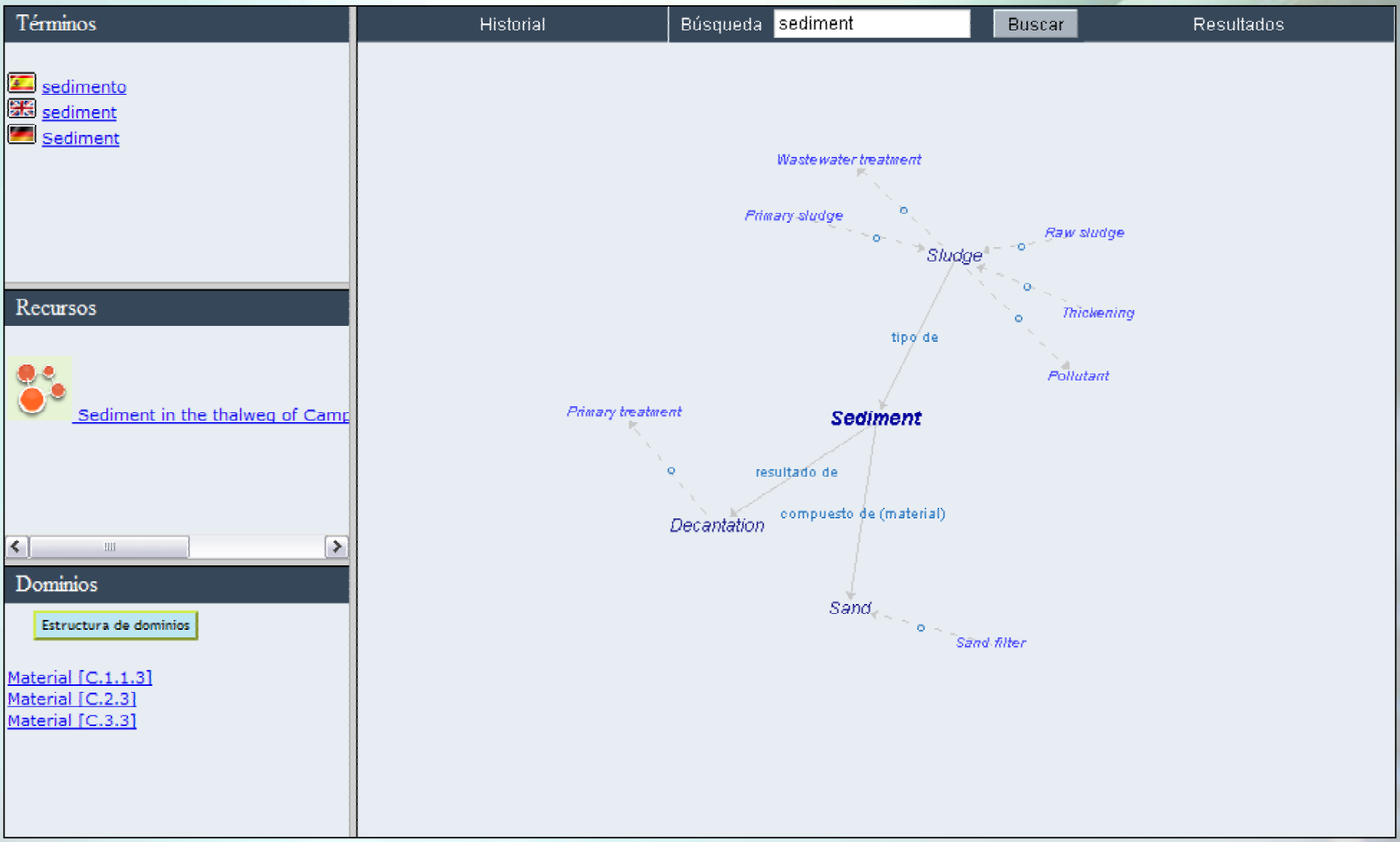
Constraints

- **Relational constraints according to concept types, multidimensionality and contextual factors**
  - At a broad level
    - concepts are described in a prototypical way and relational constraints only depend upon the main properties of each concept type (*entity*, *process*, etc) and the semantic role they possess (although, due to multidimensionality, one concept may have several roles).
  - At a more specific level
    - concepts appear in more fine-grained representations, where context-dependent dimensions are added, restricted or highlighted

Contextual network



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Conclusions

- **Legacy systems and ontologies can be integrated in a common framework by following a set of appropriate criteria**
  - Linguistic semantics stored in the database can be enriched with OWL expressiveness
- **Contextual restrictions have been proven to be a viable solution for managing overinformation**

Future work

- **Extending the procedure followed in the WASTEWATER TREATMENT context to other domains in the relational database**
  - Efficiency is an issue that deserves special attention at this stage
- **Interconnection with outside sources of information**
  - methodologies of ontology mapping and matching can be applied

Questions?

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