From models to data: a prototype Query Translator for the cadastral domain

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Overview

- Introduction
- Information integration
- Query Translator prototype
- Evaluation
- Conclusions
- Recommendations

Introduction

- This paper
  - ‘Query Translator’ between cadastral data models
  - Practical tests with ‘real’ Dutch and Greek cadastral data (spatial and legal)
  - Use the core cadastral model as ‘mediator’ model
- Work in progress, first conclusions
- Aim: be able to access a cadastral database in another country with a query interface based on one’s own national system

Information integration

- One of the challenges of the European and global SDI
- Also true for the cadastral domain
- At present
  - No (easy) information exchange between national cadastral systems
  - E.g. finding the real estate of some person in another country, or his/her mortgage debts

Cadastral domain

- EULIS (web portal)
  - access to different cadastral registrations/databases ‘as they are’ (as first step)
- ArcCadastre (desktop application)
  - standardized storage model
- ‘Core cadastral domain model’ initiative (other presentations)
  - ‘Core’ information model for common classes, attributes etc. in cadastral systems

‘Pan’-European selection queries

- Ultimate goal: ‘parallel’ selection queries over different national cadastral databases from one (Web) application

“select all real estate property owned by person with this name and birth date in Greece, Italy, Switzerland, Holland”

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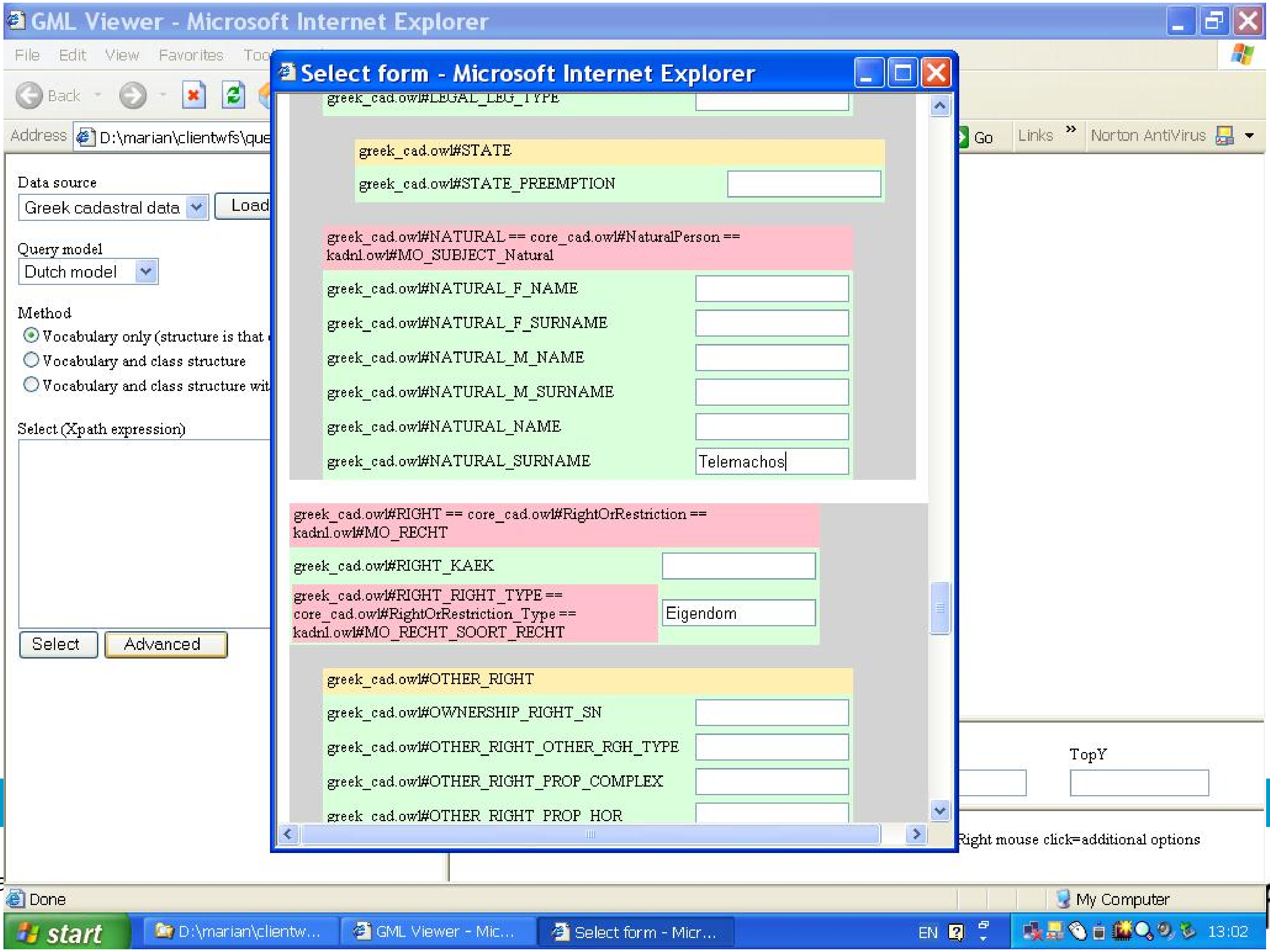
Query Translator prototype



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Data source: Greek cadastral data

Query model: Dutch model

Method
- ● Vocabulary only (structure is that
- ○ Vocabulary and class structure
- ○ Vocabulary and class structure wit

Select (Xpath expression)

greek_cad.owl#LEGAL_LEG_TYPE	
greek_cad.owl#STATE	
greek_cad.owl#STATE_PREEMPTION	
greek_cad.owl#NATURAL == core_cad.owl#NaturalPerson == kadnl.owl#MO_SUBJECT_Natural	
greek_cad.owl#NATURAL_F_NAME	
greek_cad.owl#NATURAL_F_SURNAME	
greek_cad.owl#NATURAL_M_NAME	
greek_cad.owl#NATURAL_M_SURNAME	
greek_cad.owl#NATURAL_NAME	
greek_cad.owl#NATURAL_SURNAME	Telemachos
greek_cad.owl#RIGHT == core_cad.owl#RightOrRestriction == kadnl.owl#MO_RECHT	
greek_cad.owl#RIGHT_KAEK	
greek_cad.owl#RIGHT_RIGHT_TYPE == core_cad.owl#RightOrRestriction_Type == kadnl.owl#MO_RECHT_SOORT_RECHT	Eigendom
greek_cad.owl#OTHER_RIGHT	
greek_cad.owl#OWNERSHIP_RIGHT_SN	
greek_cad.owl#OTHER_RIGHT_OTHER_RGH_TYPE	
greek_cad.owl#OTHER_RIGHT_PROP_COMPLEX	
greek_cad.owl#OTHER_RIGHT_PROP_HOR	

Query Translator prototype

- Translation between
  - ‘query model’ (as presented to user)
  - and ‘local’ storage model of data source
- Query model can be
  - The core cadastral model (one step)
  - or other national cadastral model (two step, via core model)
- Options
  - Only ‘lexical’ translation (synonyms)
  - Also structural translation (type/subtype, attributes, associations)

Uses cases / selection queries

- Simple case (class and attribute names, ‘lexical’)

Greek model

```
Select * from natural where lname = …
```

Dutch model

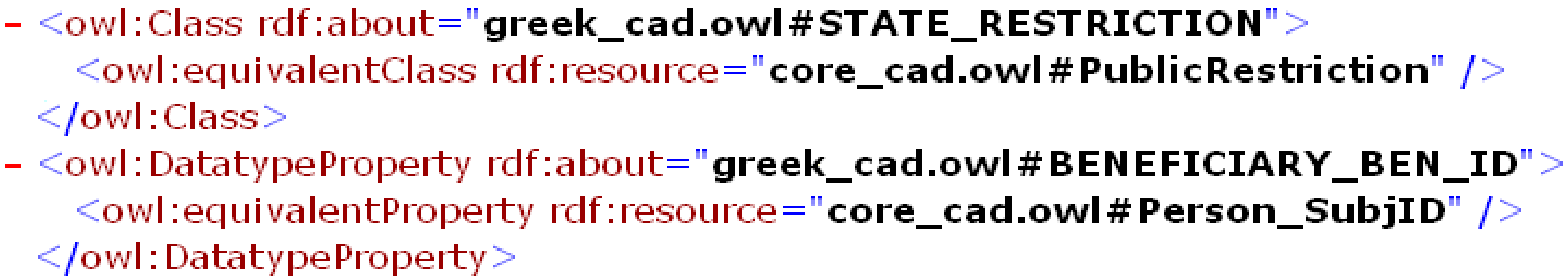
```
Select * from mo_subject
where gesl_naam = …
```

Use cases / selection queries

- More complicated (associations between classes)

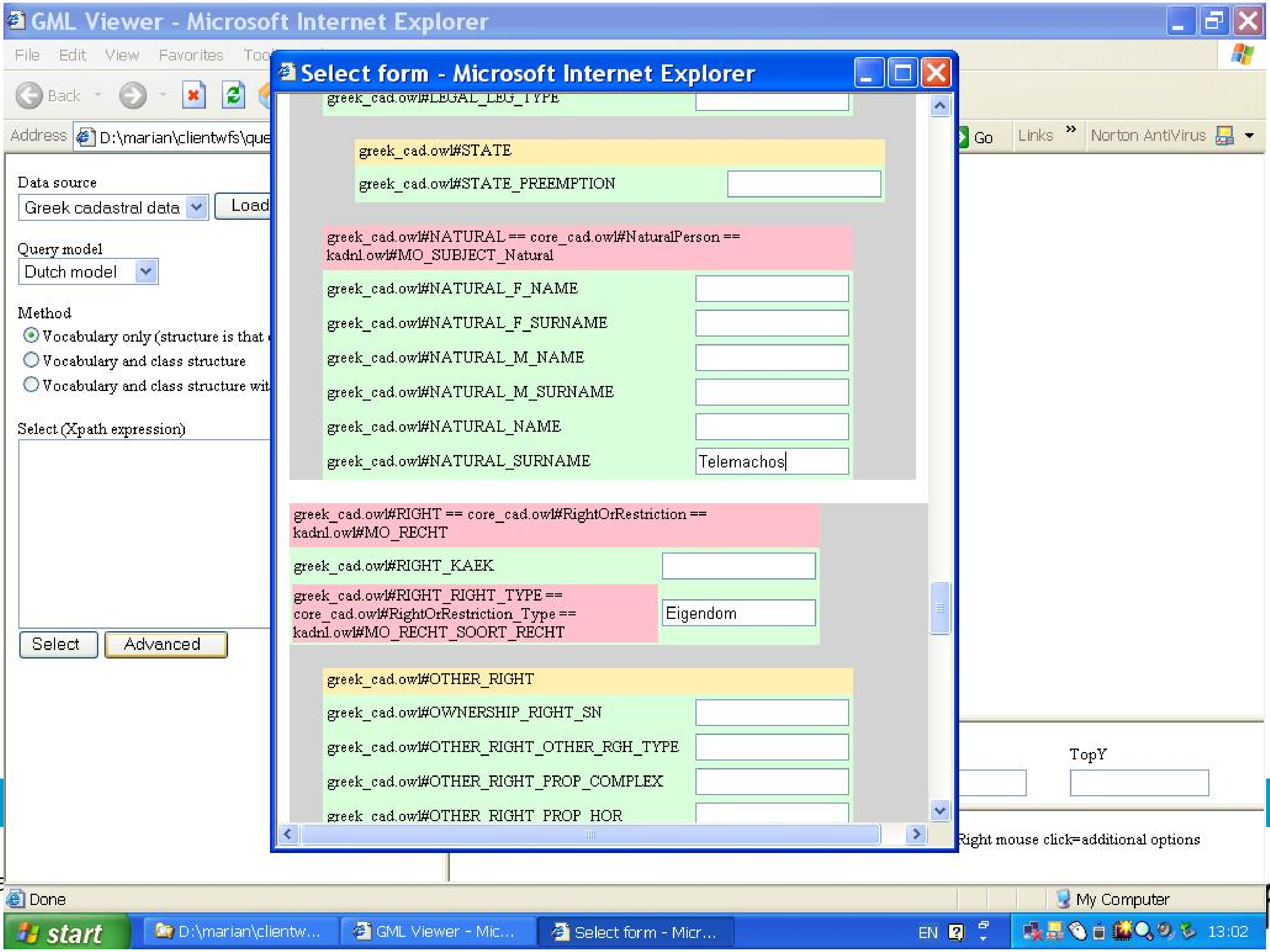
```
select name, address, type_of_right
  from person, right
  where person.id = right.person_id
    and municipality = …
```

Define ‘equivalence’ between concepts in both models (with OWL)



```
- <owl:Class rdf:about="greek_cad.owl#STATE_RESTRICTION">
    <owl:equivalentClass rdf:resource="core_cad.owl#PublicRestriction" />
  </owl:Class>
- <owl:DatatypeProperty rdf:about="greek_cad.owl#BENEFICIARY_BEN_ID">
    <owl:equivalentProperty rdf:resource="core_cad.owl#Person_SubjID" />
  </owl:DatatypeProperty>
```

Query Translator prototype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Data source
Greek cadastral data ▾ Load

Query model
Dutch model ▾

Method
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Select (Xpath expression)

Select Advanced

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Right mouse click=additional options

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greek_cad.owl#NATURAL_F_SURNAME

greek_cad.owl#NATURAL_M_NAME

greek_cad.owl#NATURAL_M_SURNAME

greek_cad.owl#NATURAL_NAME

greek_cad.owl#NATURAL_SURNAME: Telemachos

greek_cad.owl#RIGHT == core_cad.owl#RightOrRestriction == kadnl.owl#MO_RECHT

greek_cad.owl#RIGHT_KAEK

greek_cad.owl#RIGHT_RIGHT_TYPE == core_cad.owl#RightOrRestriction_Type == kadnl.owl#MO_RECHT_SOORT_RECHT: Eigendom

greek_cad.owl#OTHER_RIGHT

greek_cad.owl#OWNERSHIP_RIGHT_SN

greek_cad.owl#OTHER_RIGHT_OTHER_RGH_TYPE

greek_cad.owl#OTHER_RIGHT_PROP_COMPLEX

greek_cad.owl#OTHER_RIGHT_PROP_HOR

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Evaluation

- Easy
  - Terms/concepts that are synonyms
- More difficult, but can be solved
  - Associations (-> joins between tables)
  - Different (super)type – subtype hierarchies
- Fundamental issues
  - System boundaries of the models
  - Conceptual versus Technical models
  - ‘Real word’ differences: Name, Address

Conclusions

- Core model offers a good starting point for cadastral data integration
- Get the priorities right
  - What are the most important selection attributes ?
  - First concentrate on these classes and attributes
- There are ‘real world’ differences
  - Look at ‘localization’ theory and technology
  - Incorporate other standards (‘Address’)

Recommendations

- Core model should also contain ‘administrative’ classes
  - Address, PostalAddress, VisitorsAddress
  - Name, NaturalPersonName, OrganizationName
- Or ... incorporate classes from other standards (European and global Address-standardization, Name conventions)
- These can be ‘Abstract’ classes without attributes as placeholders in model structure

Recommendations #2

- Not only standardize ‘structure’ but also ‘content’
  - ‘enumeration types’ for important selection attributes -> drop-down lists to assist user
  - ‘hidden’ subtypes can be found and solved this way
- Capture the legal process in UML or work flow language (e.g. property transactions)
- Not only test in countries, but also between countries