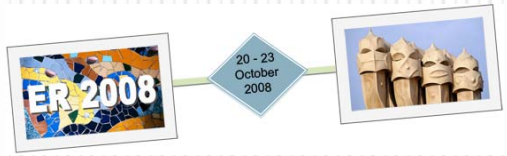

A Meta-Model Approach to the Management of Hypertexts in Web Information Systems

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Motivations

- Modern Web Information Systems (WIS) are called to manage a huge amount of information
  - difficult to develop and maintain
- Need for:
  - suitable design methodologies
  - effective Web site design tools
  - support for management and evolution

Web development approaches

- Common ingredients of the various approaches:
  - a support in all the activities involved in the process of Web development
    - from conceptualization to maintenance
  - a separation of the three main components:
    - content
    - navigation
    - presentation
  - a model-driven approach
    - conceptual
    - logical
- But:
  - a large variety models, formalisms, and methods

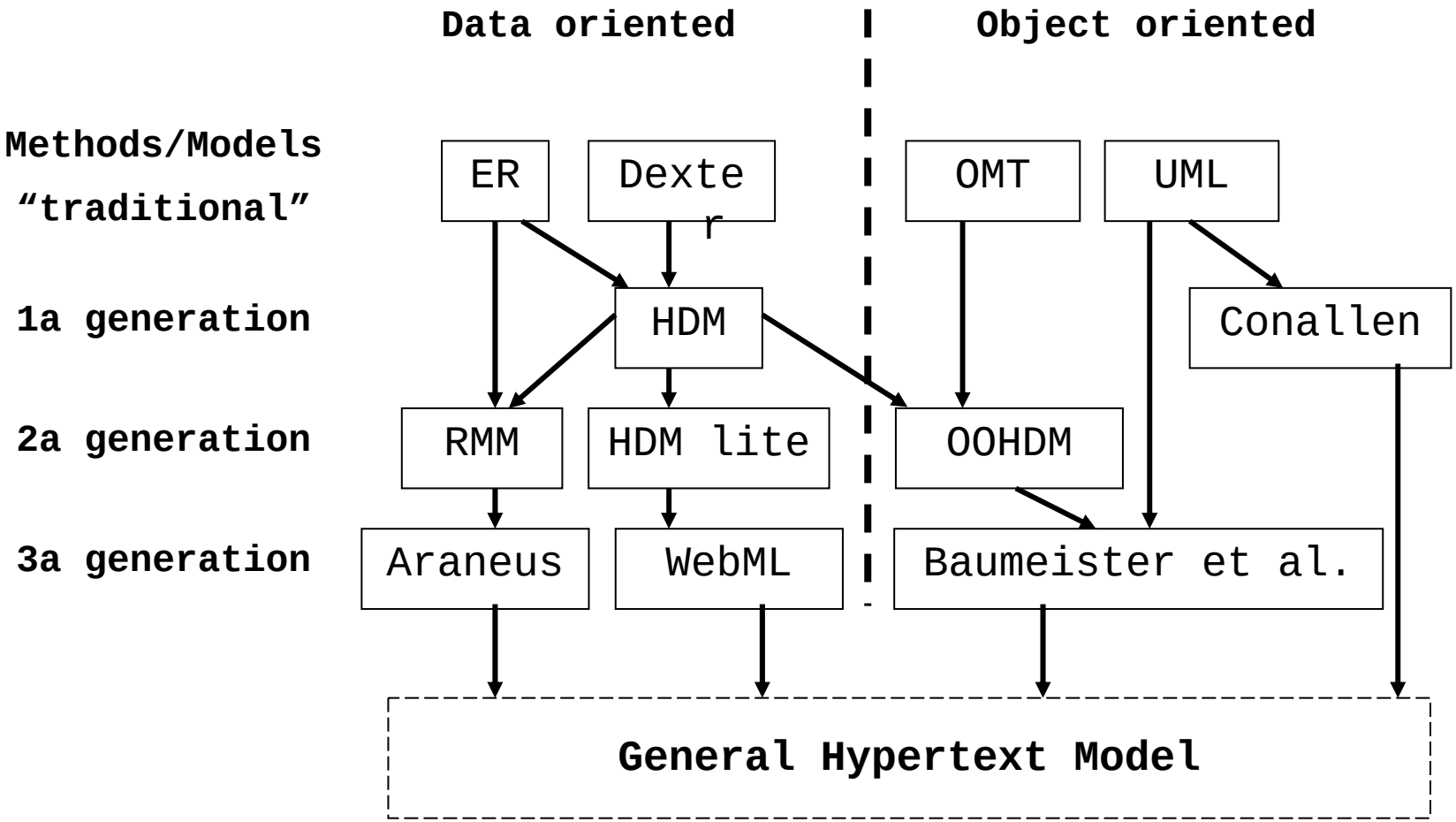
Goal

- Definition of a comprehensive metamodel for Web models
  - A unified framework for the definition of different models
  - A support for:
    - translation
    - integration
    - evolution
- Development of a tool supporting the interoperability between different Web applications
- We focus here on the navigation layer of a WIS

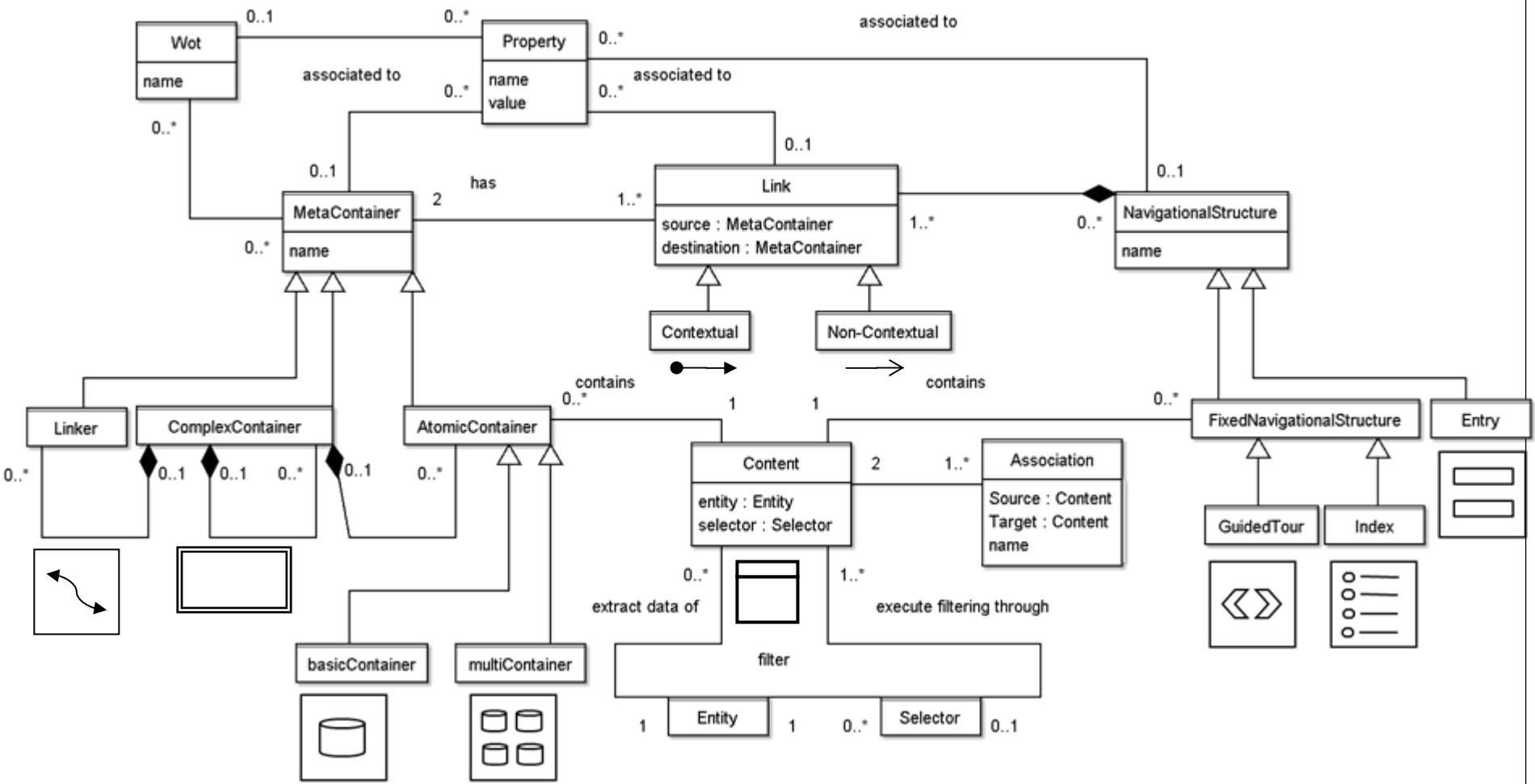
Building a metamodel

- Classification of similar constructs adopted by the various navigational models
  - Atomic page component
    - *unit* in WebML
    - *attribute* in Araneus
- Metamodel: set of metaconstruct (primitives), one for each class of constructs
- Pattern: combination of primitives
- A model is defined by means of:
  - set of primitives
  - a set of patterns over the given primitives

Navigation Models



General Hypertext Model



The main components of GHM

- Containers: homogeneous components of a page
  - atomic
  - composite
- Links: connection between containers
- Navigational structures
  - Indexes
  - Guided Tours
  - Entries
- Content objects, Associations
- WOTs

Definition of models

- Simple mapping between a model and GHM
- Each construct is associated with a primitive of GHM
- Patterns over GHM describe how constructs can be combined

Representation of Web models in GHM

	HDM	RMM	WebML	OOHDM	Baumeister	GHM
Content Modeling	o entity o relationship			o class o oo-relationship		o content o association

Representation of Web models in GHM

	HDM	RMM	WebML	OOHDM	Baumeister	GHM
Navigation Modeling	•Structural link •Application •perspective	•Unidirectional link •Bidirectional link	•Contextual link •non-contextual link	o link	o link	o **link**: •contextual •non-contextual
	o node o component	o slice	o site view, area, page o unit (data, multi)	o navigation class o navigation context	o navigational class o navigational context	o **container** (complex, atomic, basic, multi, linker)
	o collection • index • guided tour	• grouping •index • guided tour • indexed guided tour	oindex • scroller • filter • direct	oindex • guided tour	oindex • guided tour • menu	o **navigation structure** o index o guided tour o entry

Representation of Web models in GHM

	HDM	RMM	WebML	OOHDM	Baumeister	GHM
Presentation Modeling	o slot o frame			o Abstract Data View o inContext		o Wot

Applicative scenarios

- Model translation
  - going through an intermediate format
- Integration
  - sharing an uniform representation
- Evolution
  - keeping track of the steps
- Adaptation
  - supporting context awareness

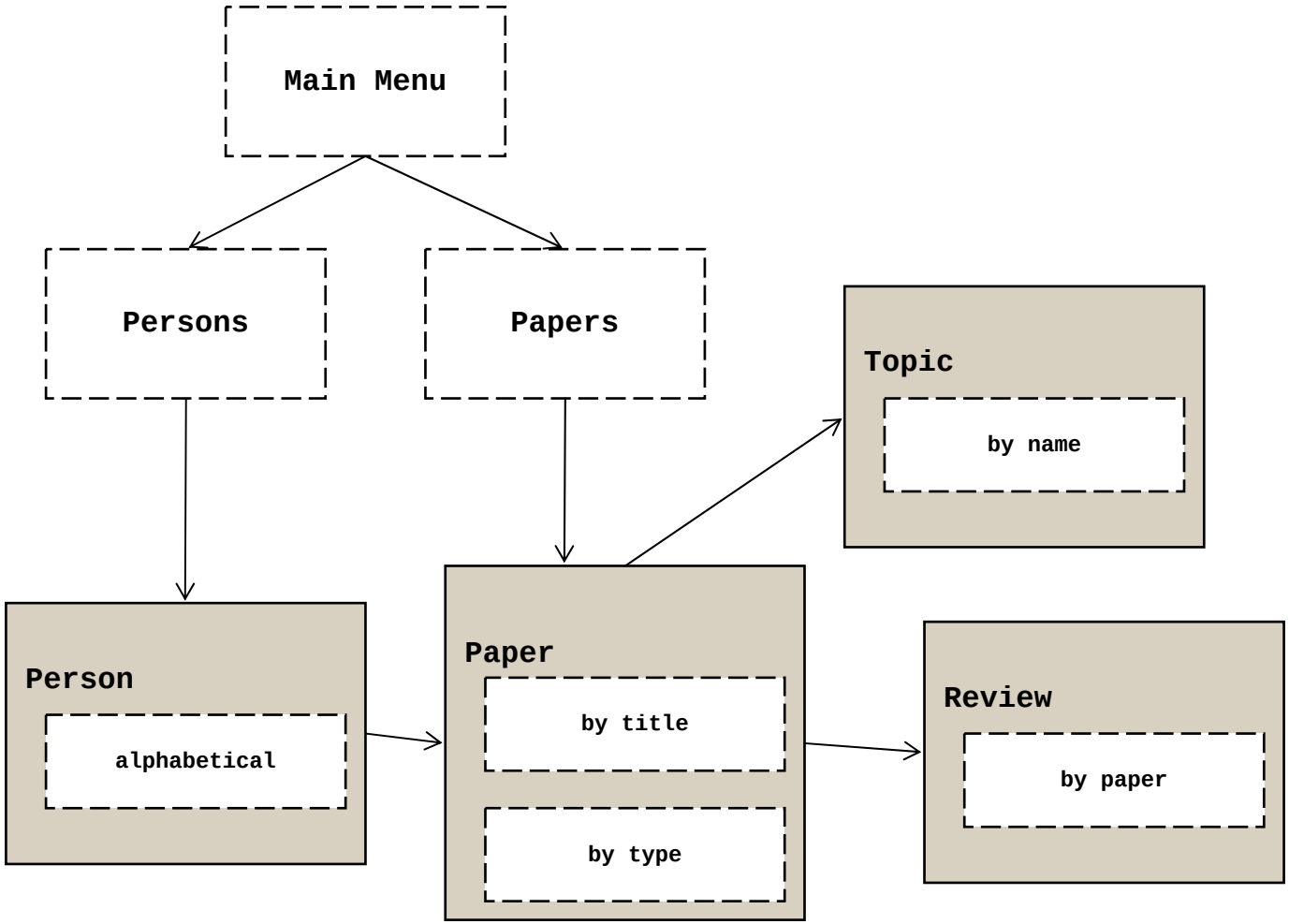
Translation process

- copy the source schema into the metamodel format;
- possibly reshape the schema using some predefined operators
  - this work can be supported by a “built-in” set of elementary transformations implementing standard translations between primitives
- copy the reshaped schema into the target system

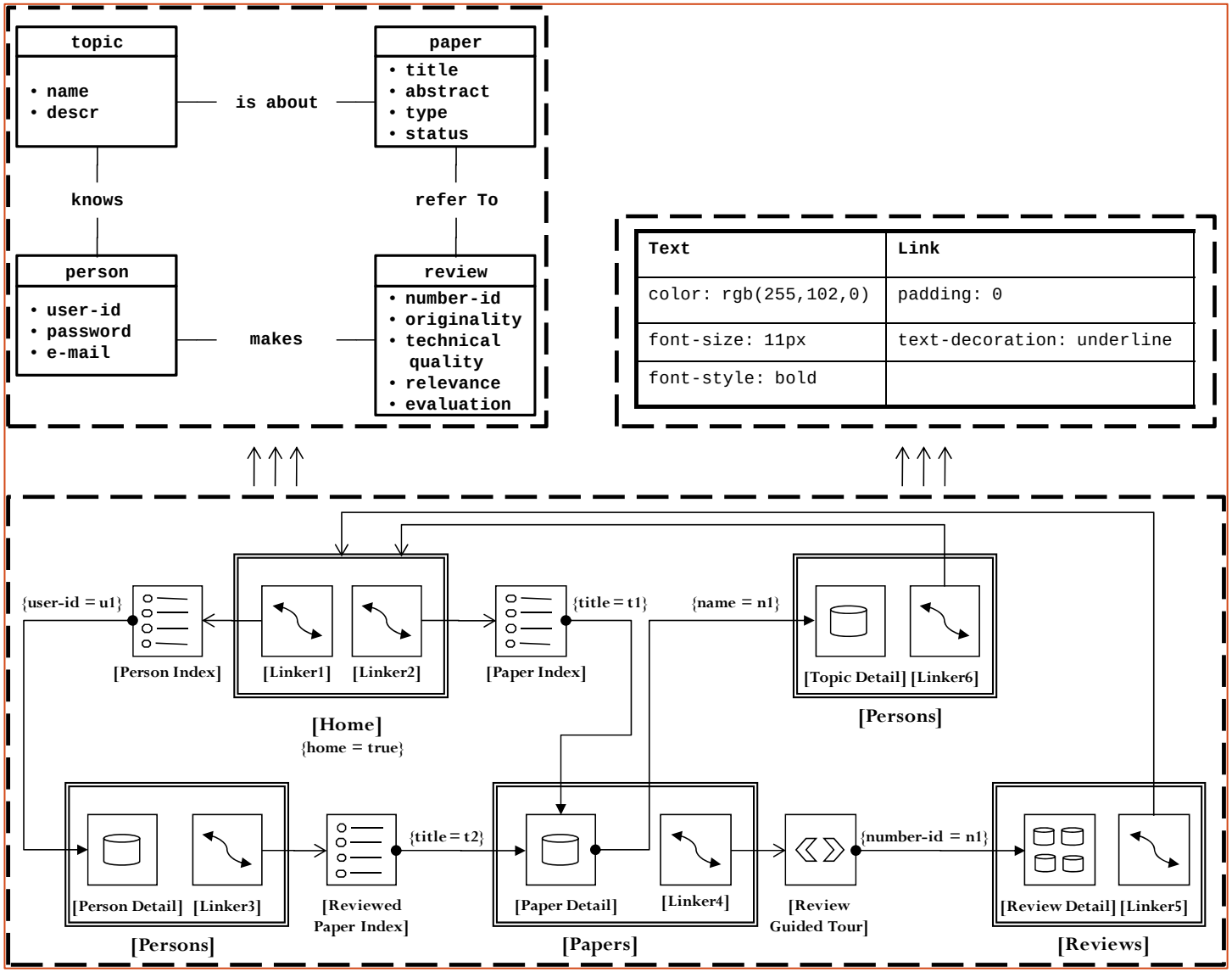
An example of use

- A Web application for the reviews of papers
  - described according to an OO formalism
  - implemented in given system
- We would like to:
  - represent the application in WebML
  - migrate the whole application to another system

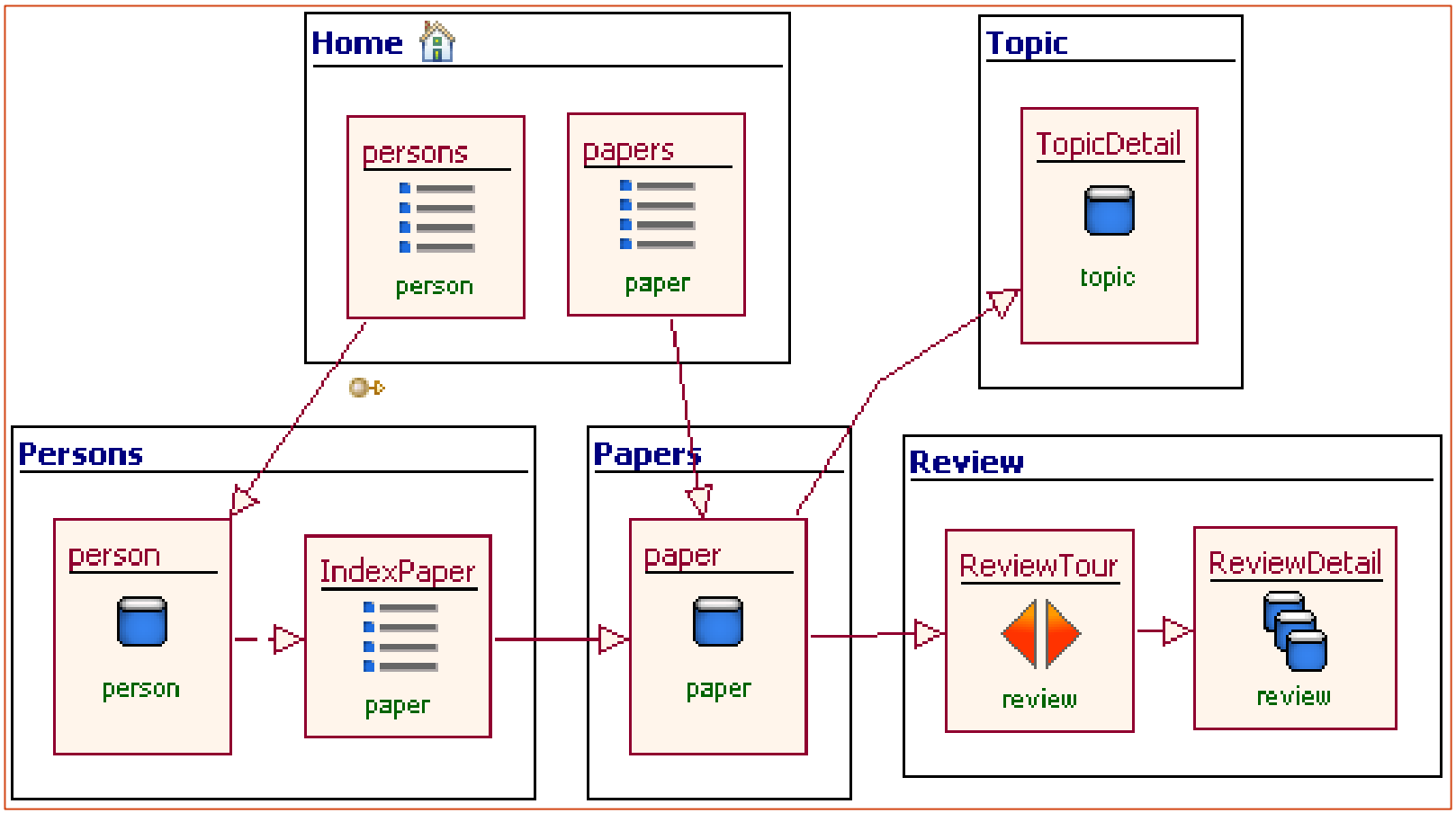
Documentation in the Bumeister model



Representation in GHM



Transformation in WebML



Conclusion and Future Works

- A metamodel approach to the uniform representation of navigation models:
  - useful in several contexts and applications
  - flexible
  - extensible
- Translations process based on:
  - use of the metamodel as an intermediate representation
  - decomposition in basic transformations
- Future work
  - Extending the approach to complete Web models
  - Building a system