UNIVERSITÄT KOBLENZ · LANDAU

IWVI

BUSINESS PROCESS MANAGEMENT

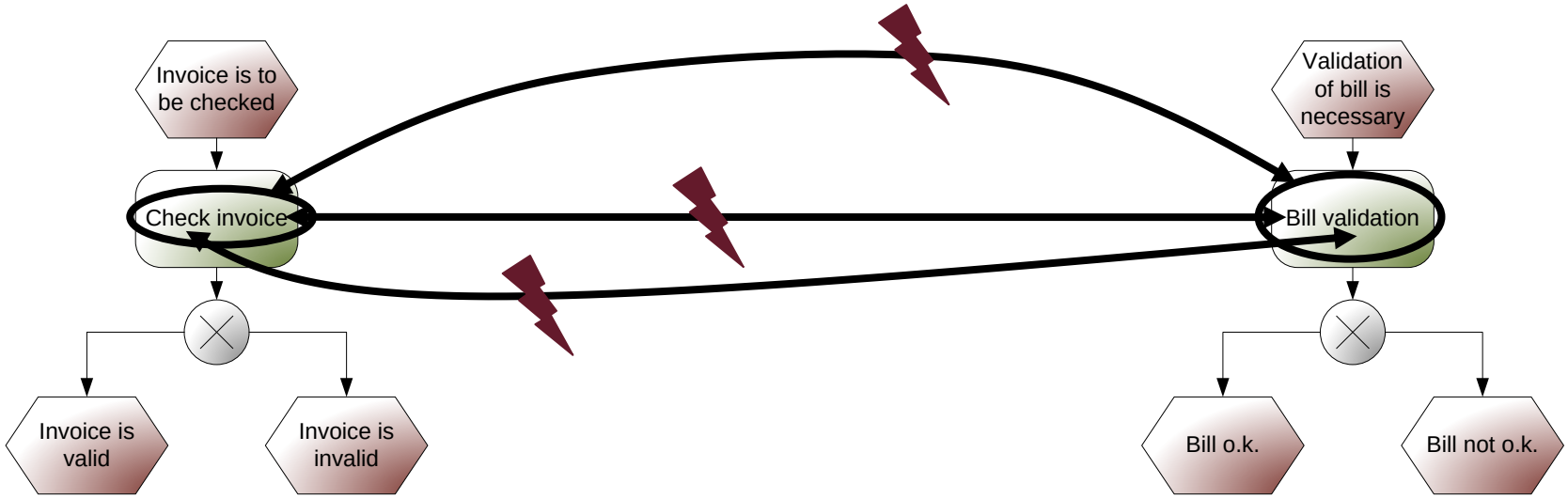
UNAMBIGUOUS PROCESS MODELS

AGENDA

- Terminological Ambiguity and Disambiguation
- Framework
- Conceptual Specification
- Procedure Model
- Application

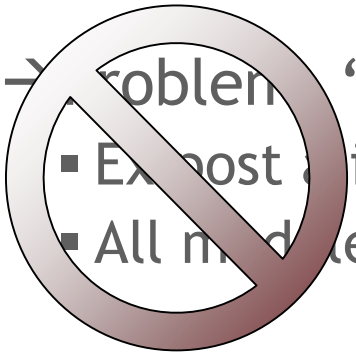
TERMINOLOGICAL AMBIGUITY

- Scenario
  - Large business process modeling projects
  - Distributed construction of models
- Precondition for usefulness of models
  - Comparability
  - Common understanding of terms



SEMANTIC AMBIGUITY

- Scenario
  - Large business process modeling projects
  - Distributed construction of models
- Precondition for usefulness of models
  - Comparability
  - Common understanding of terms



→ Problem: “Naming Conflict”

- Ex post alignment of models is costly
- All modelers have to be involved

SOLUTION APPROACHES

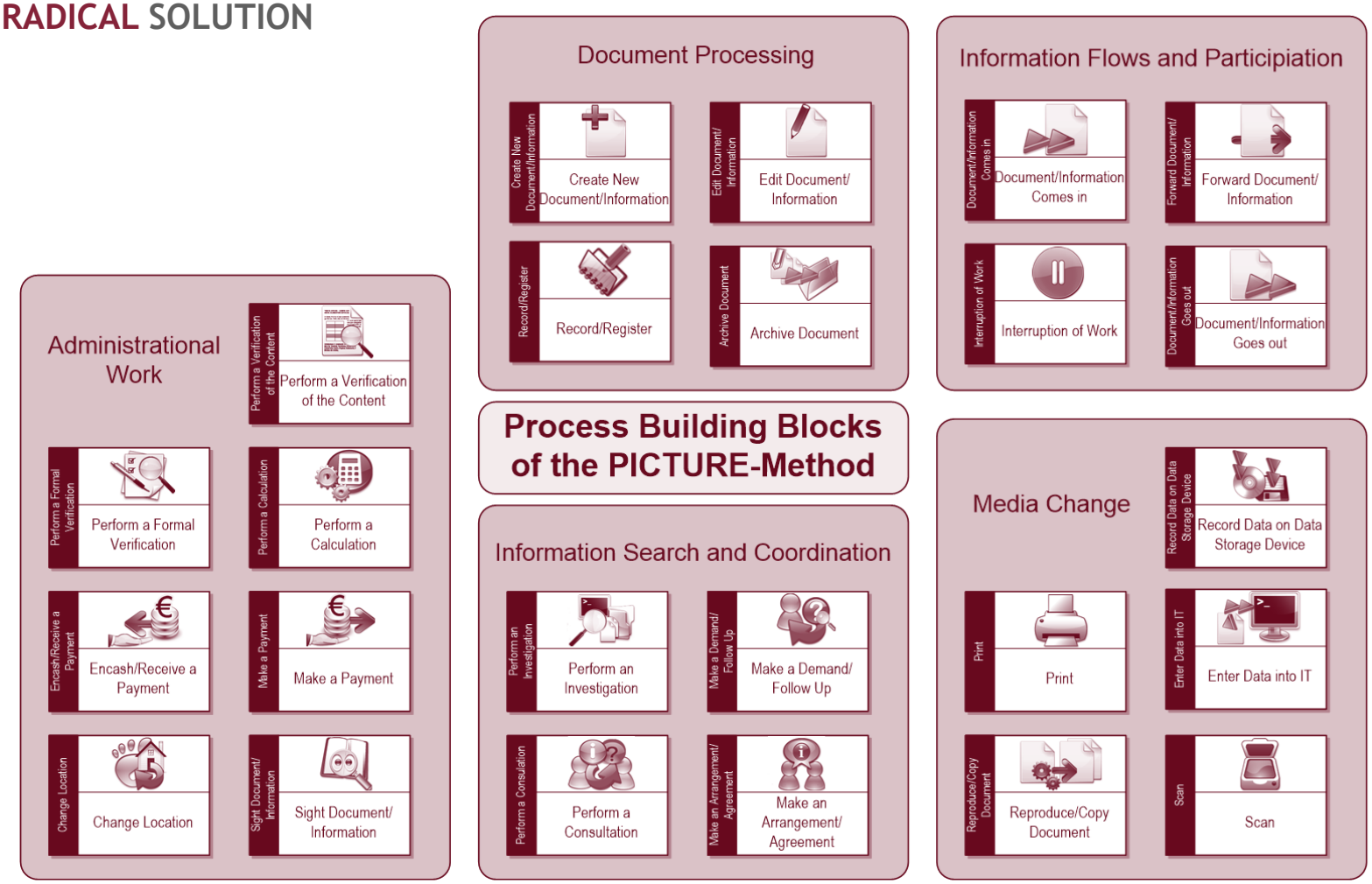
THE RADICAL SOLUTION

- Dissallow individual naming!
- Names of process activities are preset and cannot be modified
- IT, Data and Organization are modelled as unique attributes

- This is only possible if applied to a fixed business domain
- The PICTURE approach: Public Administration

SOLUTION APPROACHES

THE RADICAL SOLUTION



[Becker et al. 2007]

SOLUTION APPROACHES

A NOT-SO-RADICAL SOLUTION

- Names must be composed out of a
  - business object and an
  - execution
- Both business object and execution terms must be predefined before modeling starts
- The modeler can choose from these terms during modeling and form phrases of the style

  <business object><execution>

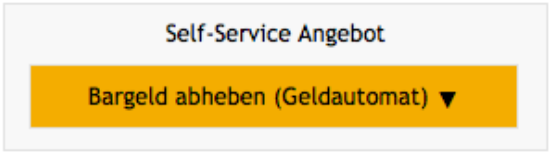
  e.g., “grant credit”

- but nothing else!

SOLUTION APPROACHES

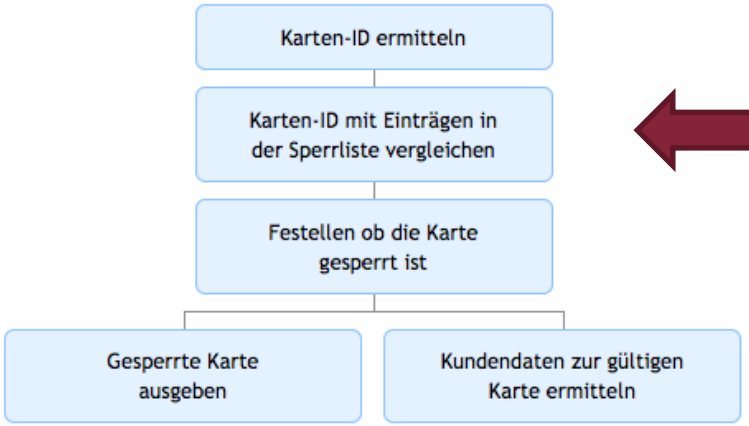
A NOT-SO-RADICAL SOLUTION

- The icebricks Approach



(1) main processes

(2) detailed processes



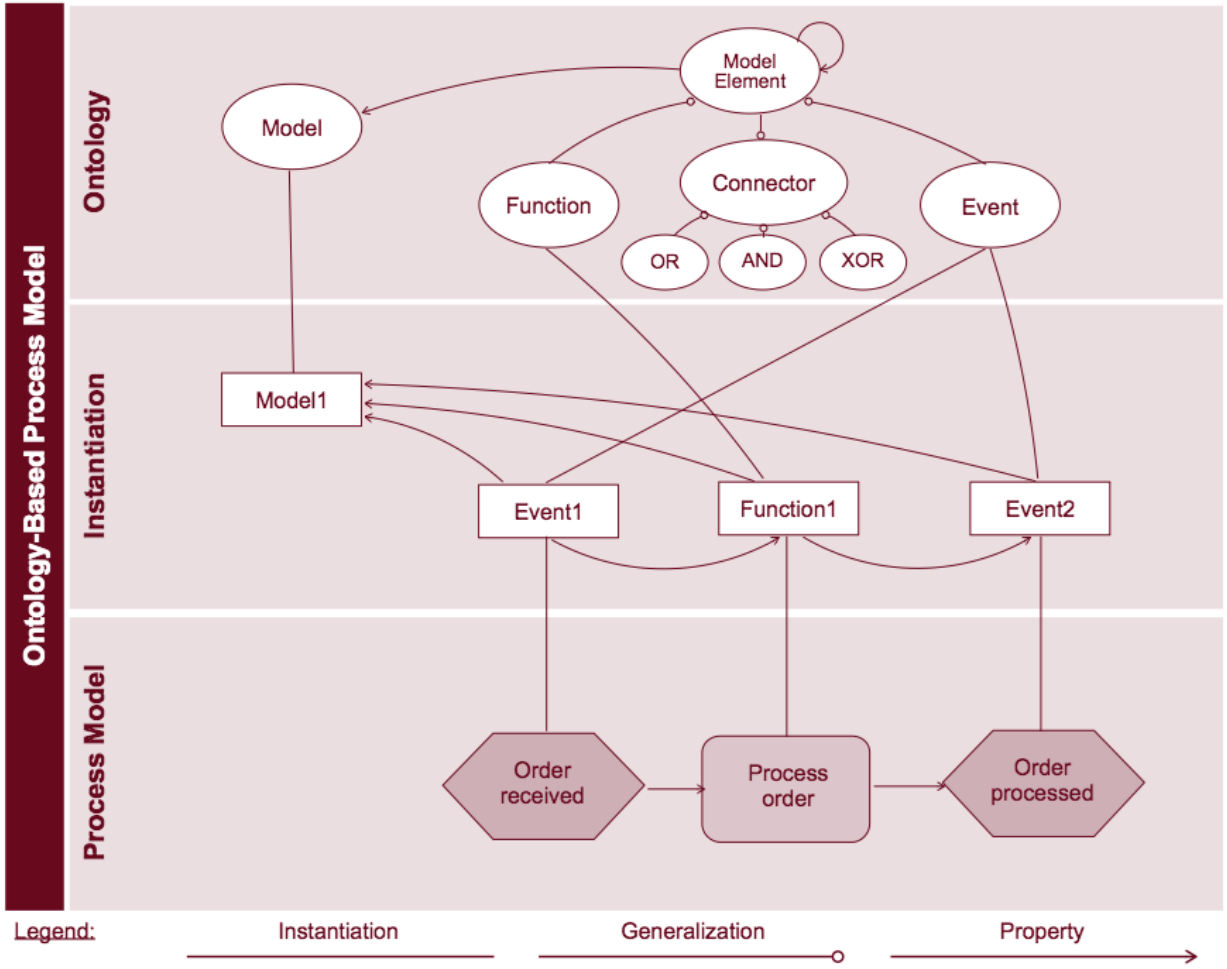
(3) process bricks

[Clever 2016]

SOLUTION APPROACHES

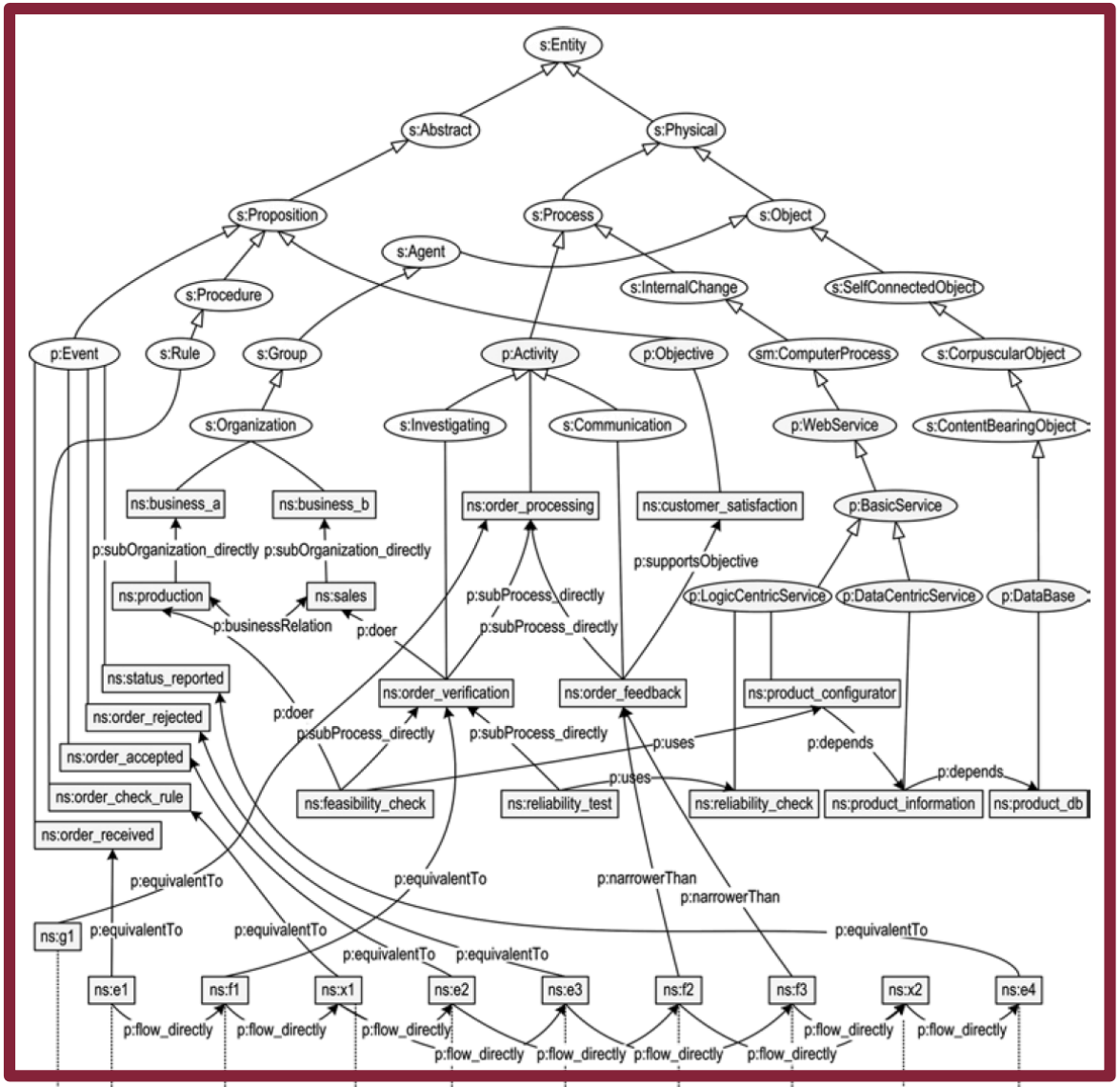
ONTOLOGY-BASED SOLUTIONS

- Utilize ontologies to define semantics of model elements



SOLUTION APPROACHES

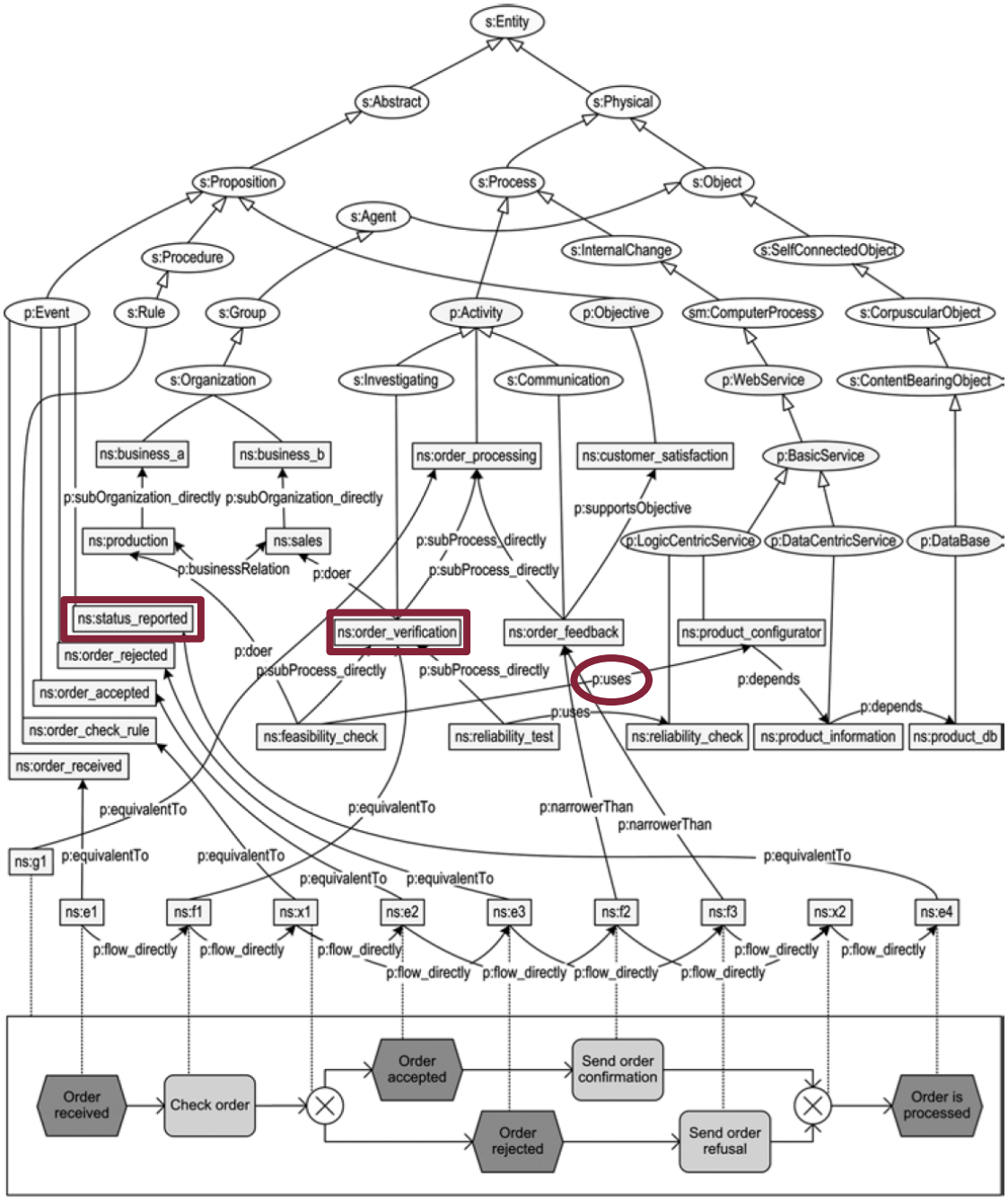
- Semantic annotation of process models
- Ontologies
- Describe the terminological semantics of process models in a machine-readable way



Cf. Thomas, Fellmann (2009)

SOLUTION APPROACHES

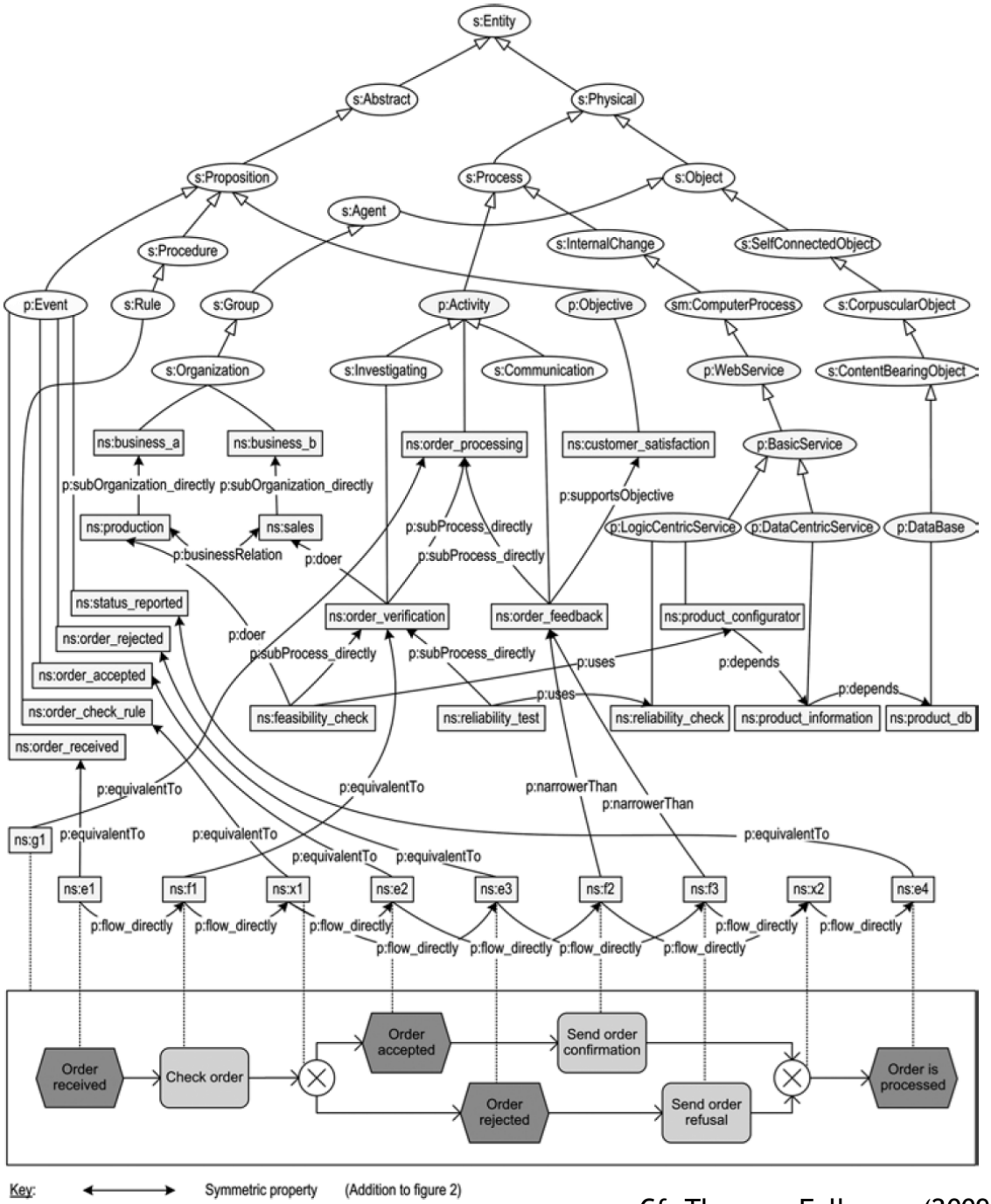
- Ontology elements describe corporate concepts, define their meaning and how they can relate to other concepts
- Annotation of ontologies to process models can help establishing a common understanding of a model's semantics



Cf. Thomas, Fellmann (2009)

SOLUTION APPROACHES

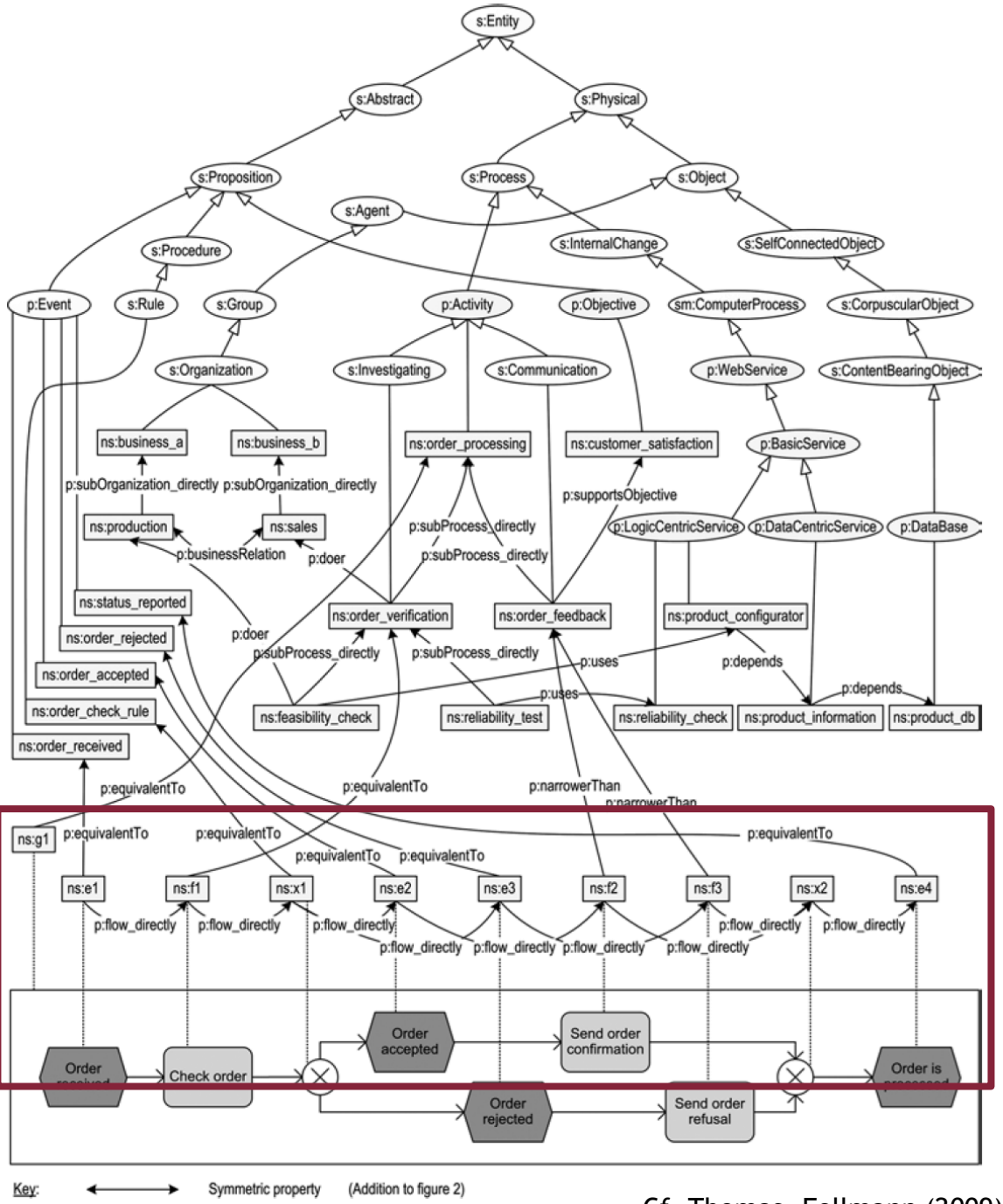
- Benefits
- The exact meaning of every process model element is known
- No ambiguity
- Through (standard-based) formalization recommender and analysis capabilities



Cf. Thomas, Fellmann (2009)

SOLUTION APPROACHES

- Two preconditions:
- There actually is an ontology that we can use (!)
- Annotation is performed properly
- Is this a problem?



Cf. Thomas, Fellmann (2009)

A STRICT, BUT FLEXIBLE SOLUTION

- Avoid naming conflicts already during modelling

- Preset naming conventions (enterprise language)
  - Conventions of single terms (nouns, adjectives, and verbs)
  - Conventions of sentence phrase types that are allowed to be used as model element labels

- Enforce naming conventions through automated guiding during modelling
  - i.e., the naming conventions are used during modelling

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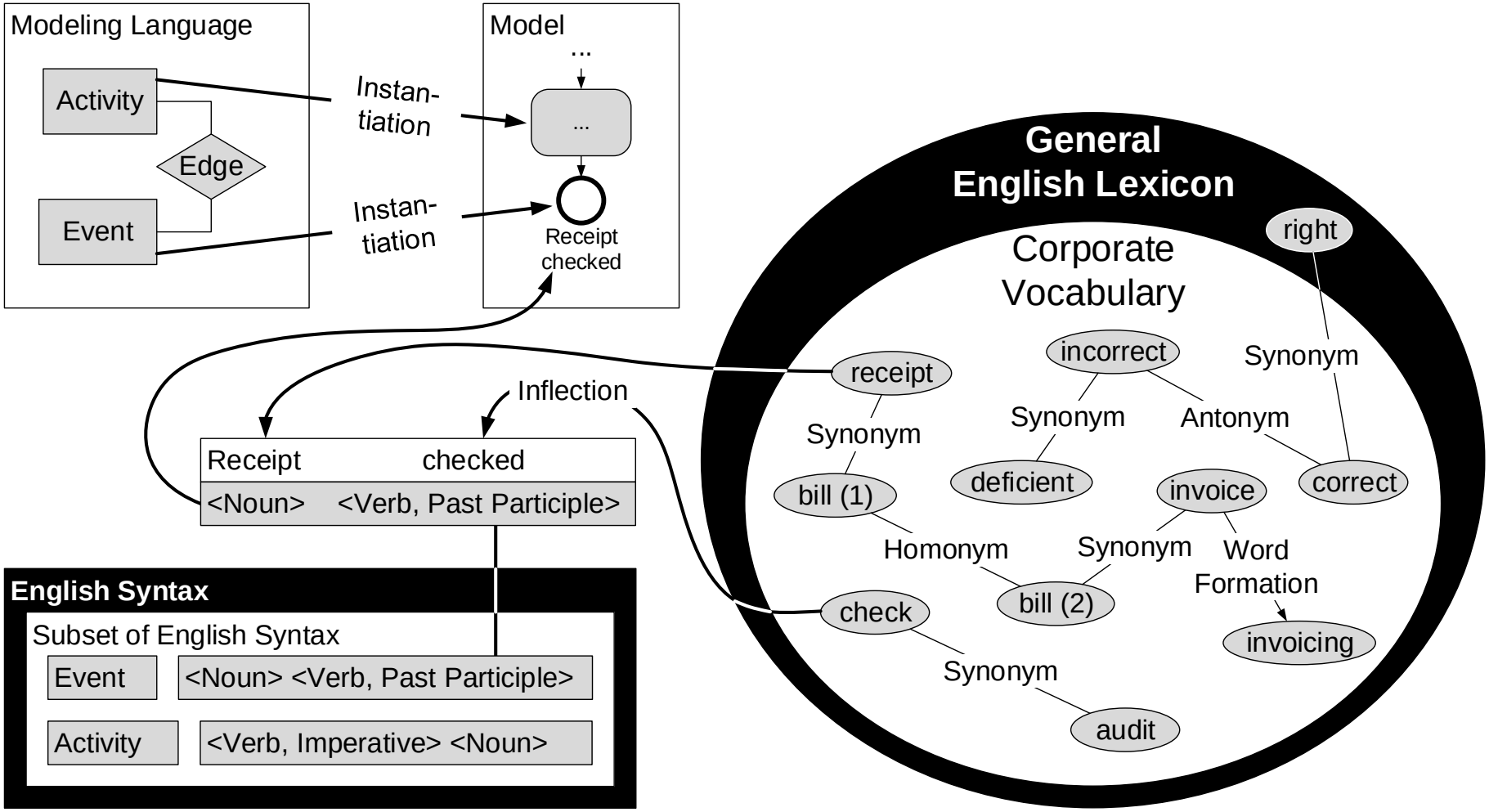
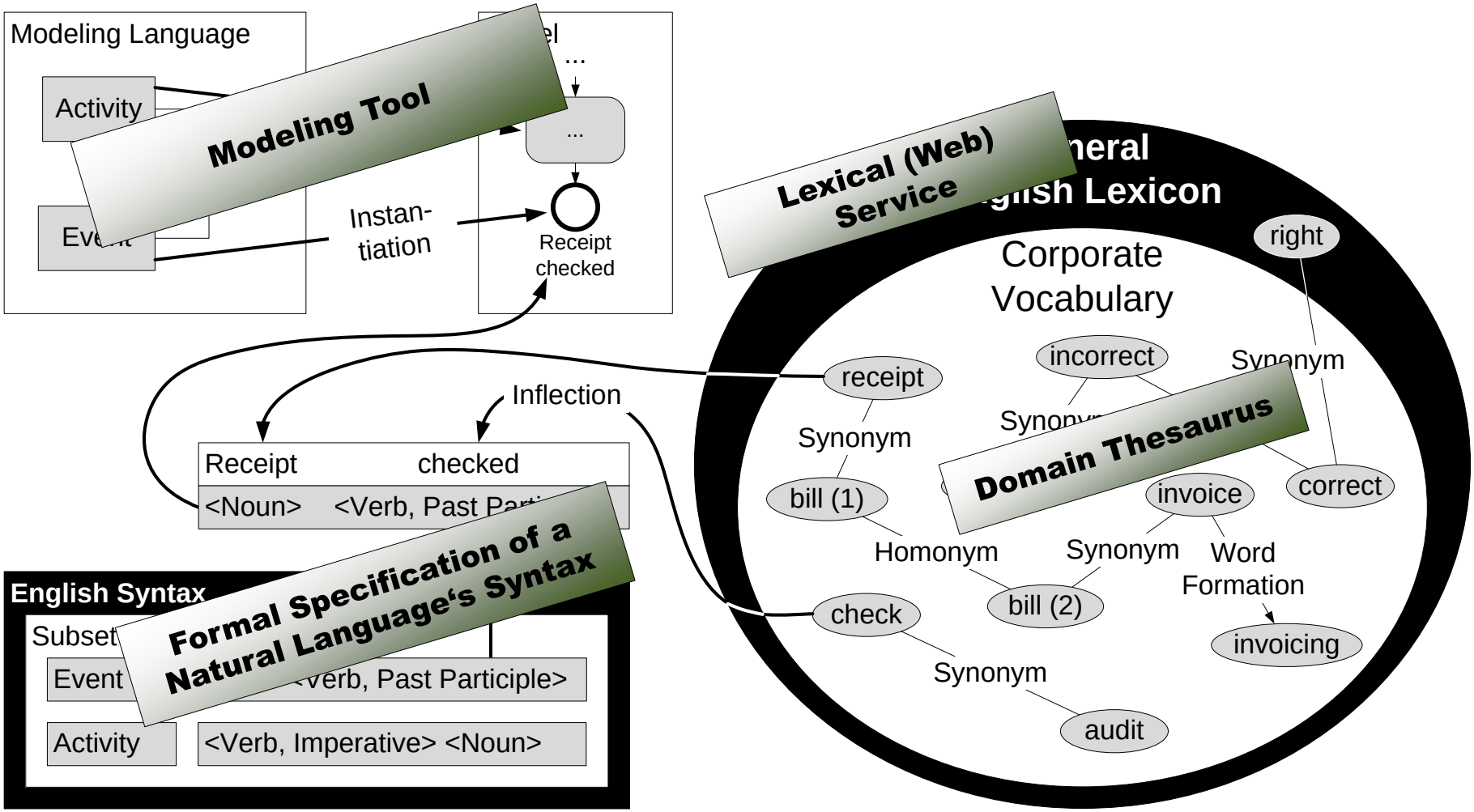
FRAMEWORK


Modeling Language
Activity
Edge
Event
Instan-
tiation
Instan-
tiation
Model
...
...
Receipt
checked
General
English Lexicon
Corporate
Vocabulary
right
incorrect
Synonym
receipt
Synonym
Synonym
Antonym
Synonym
deficient
correct
bill (1)
invoice
Homonym
Synonym
Word
Formation
bill (2)
check
invoicing
Synonym
audit
Inflection
Receipt checked
<Noun> <Verb, Past Participle>
English Syntax
Subset of English Syntax
Event
<Noun> <Verb, Past Participle>
Activity
<Verb, Imperative> <Noun>

FRAMEWORK


Modeling Language
Activity
Event
Instan-
tiation
...
Receipt
checked
Modeling Tool
Lexical (Web)
Service
Corporate
Vocabulary
right
incorrect
Synonym
receipt
Synonym
Domain Thesaurus
bill (1)
invoice
correct
Homonym
Synonym
Word
Formation
bill (2)
check
invoicing
Synonym
audit
Inflection
Receipt
checked
<Noun>
<Verb, Past Participle>
Formal Specification of a
Natural Language's Syntax
English Syntax
Subset
Event
Activity
<Verb, Imperative> <Noun>

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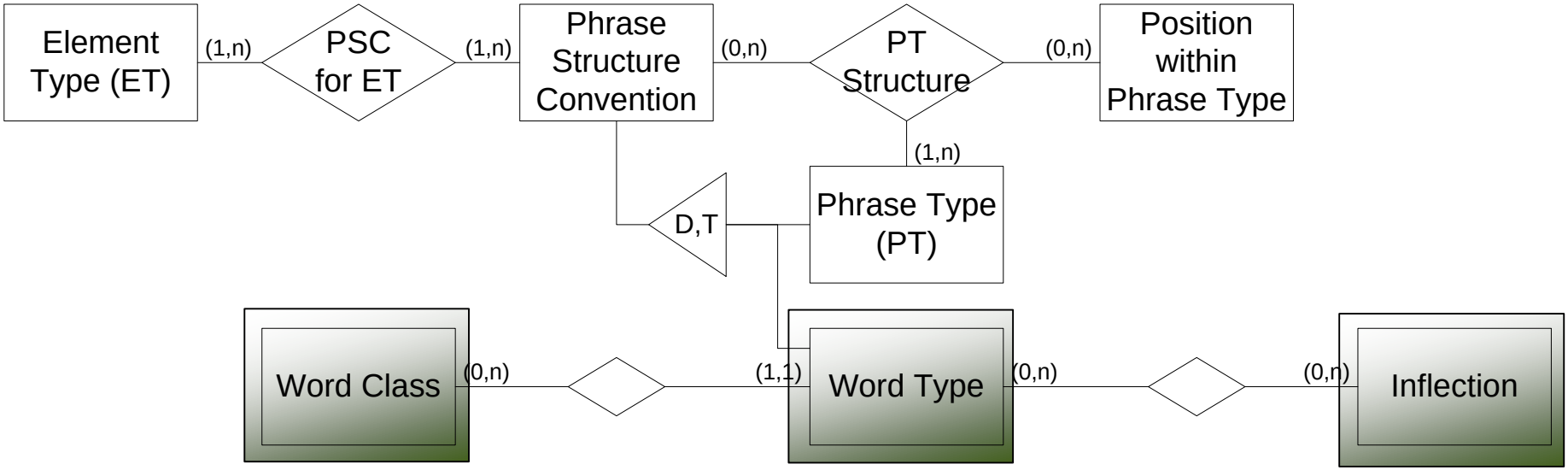
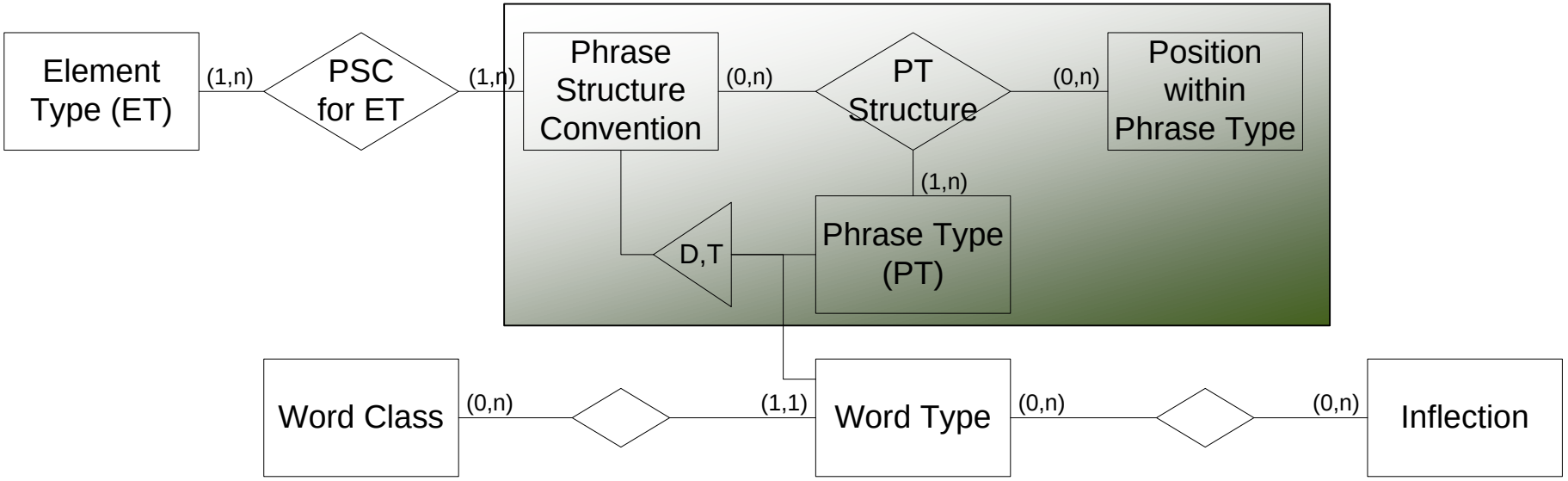
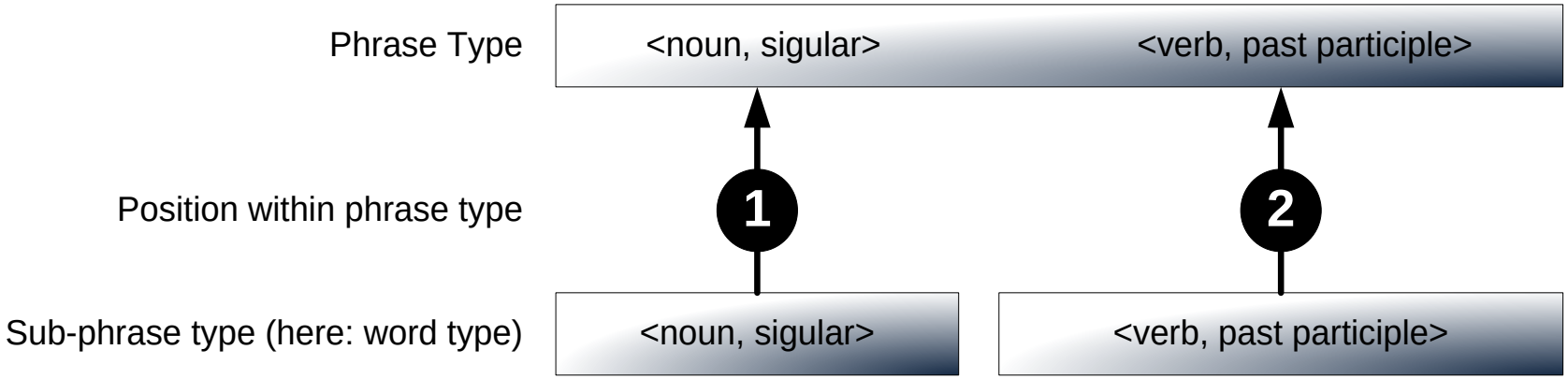
PHRASE STRUCTURE CONVENTIONS



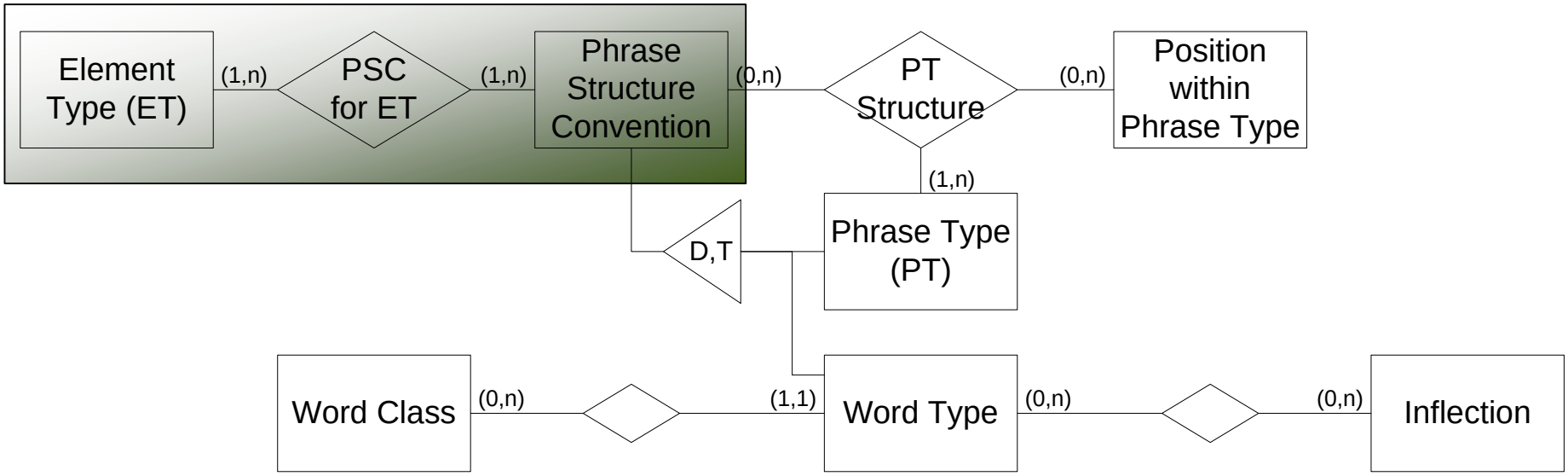
- Noun; verb; adjective; …
- 2nd person; singular …
- Verb 2nd person plural past active

PHRASE STRUCTURE CONVENTIONS



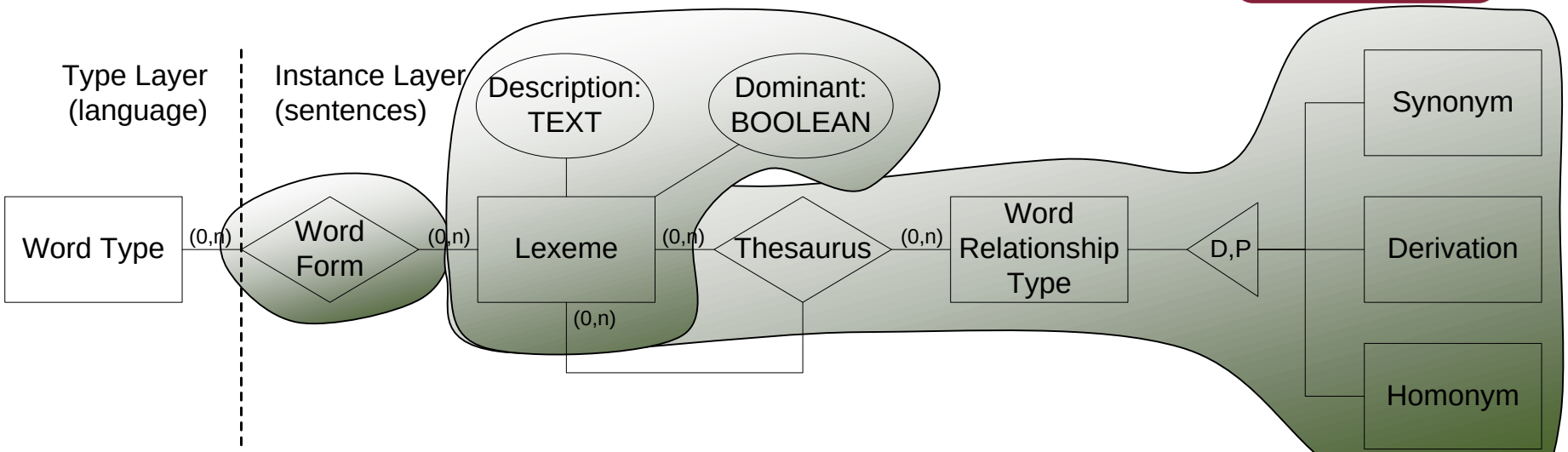


PHRASE STRUCTURE CONVENTIONS



Event	<noun, singular, object case> <verb, past participle>
Function	<verb, imperative> <noun, singular, object case>
Entity Type	<noun, singular, subject case>
Relationship Type	<noun, singular, subject case>

DOMAIN VOCABULARY



- Uninflected word belonging to an arbitrary word form
  - Description to specify its particular meaning
  - Dominant if lexeme is part of the domain vocabulary
- Entire lexicon
  (domain thesaurus and natural language vocabulary)
- Inflection according to word type

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POSSIBLE SOLUTION

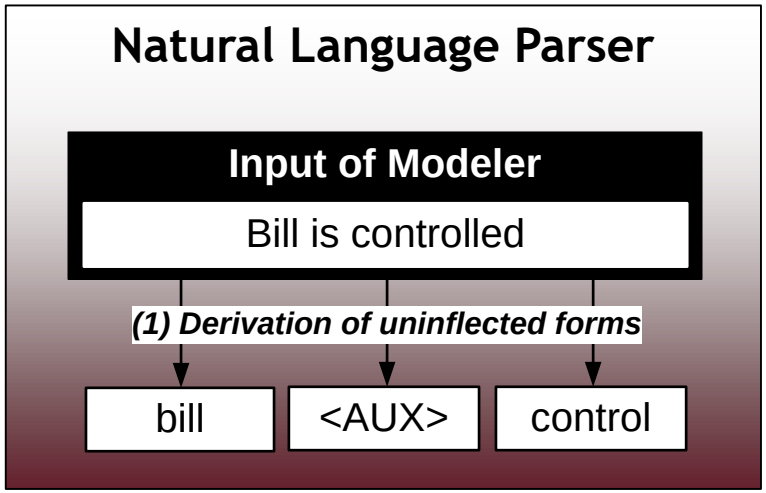
1. Modeler chooses an appropriate phrase type
2. Modeler chooses appropriate lexemes from the domain thesaurus…
3. … and inserts them into the phrase

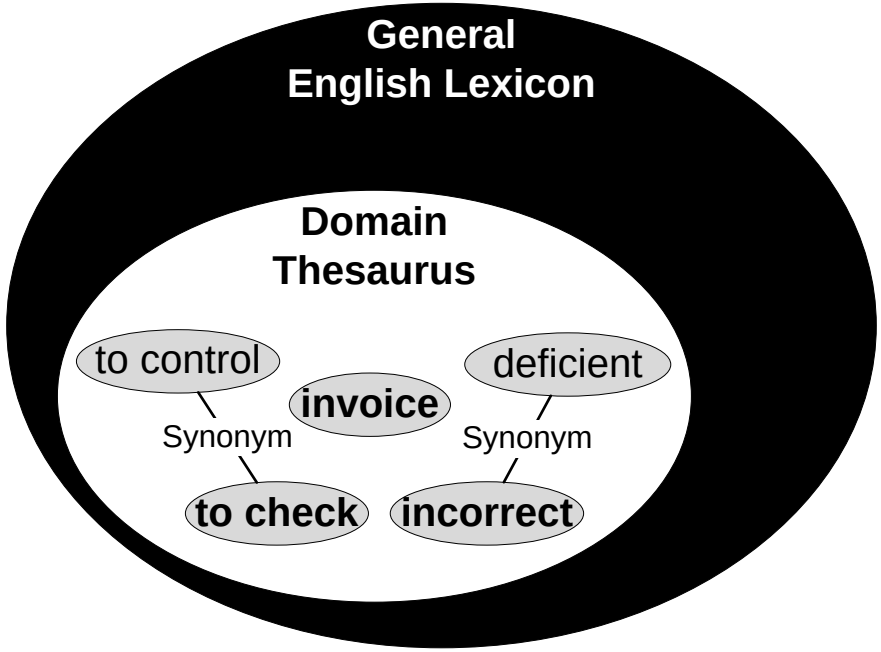
Convenience & Efficiency?

- Modeling “as usual“ should not be made too complicated

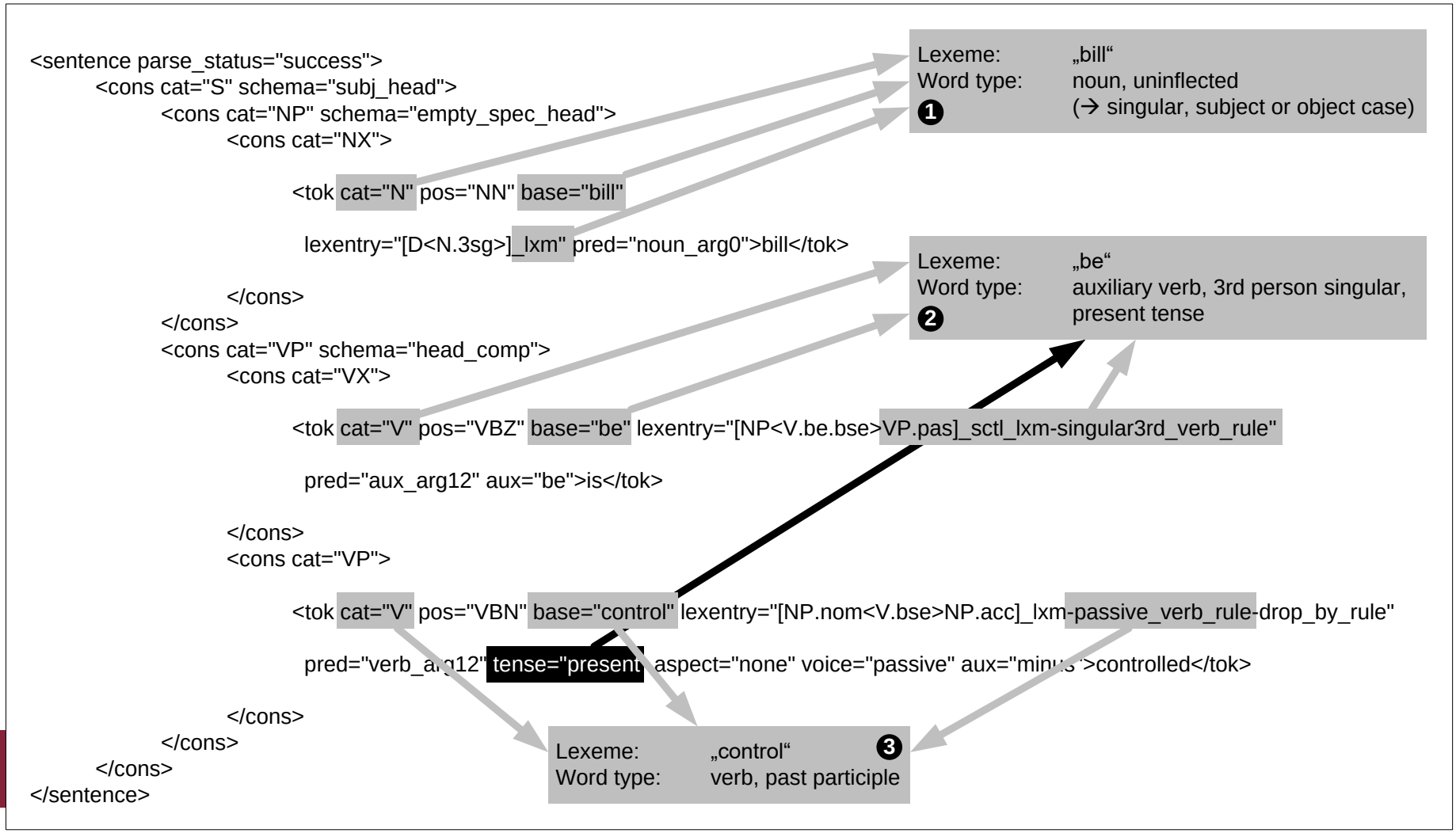
ENFORCE COMPLIANCE WITH NAMING CONVENTIONS

Structure Conventions	
Event	<Noun> <Verb, Gerundive>
Event	<Noun> <Verb, Past Participle>





EXEMPLARY PARSING RESULT



ENFORCE COMPLIANCE WITH NAMING CONVENTIONS

Structure Conventions	
Event	<Noun> <Verb, Gerundive>
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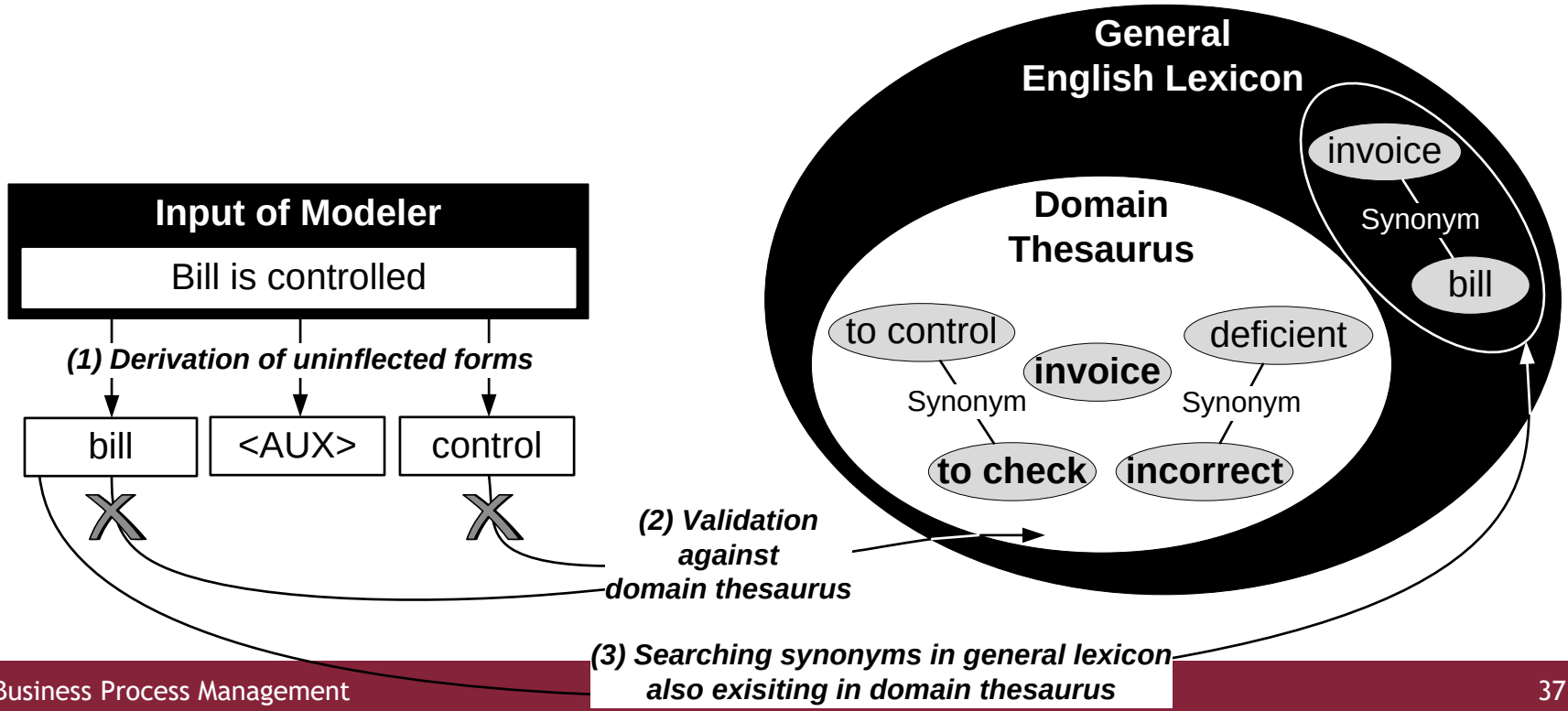
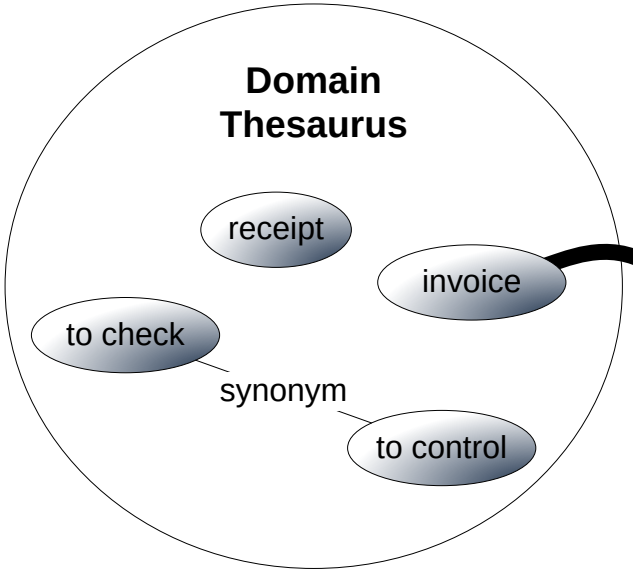
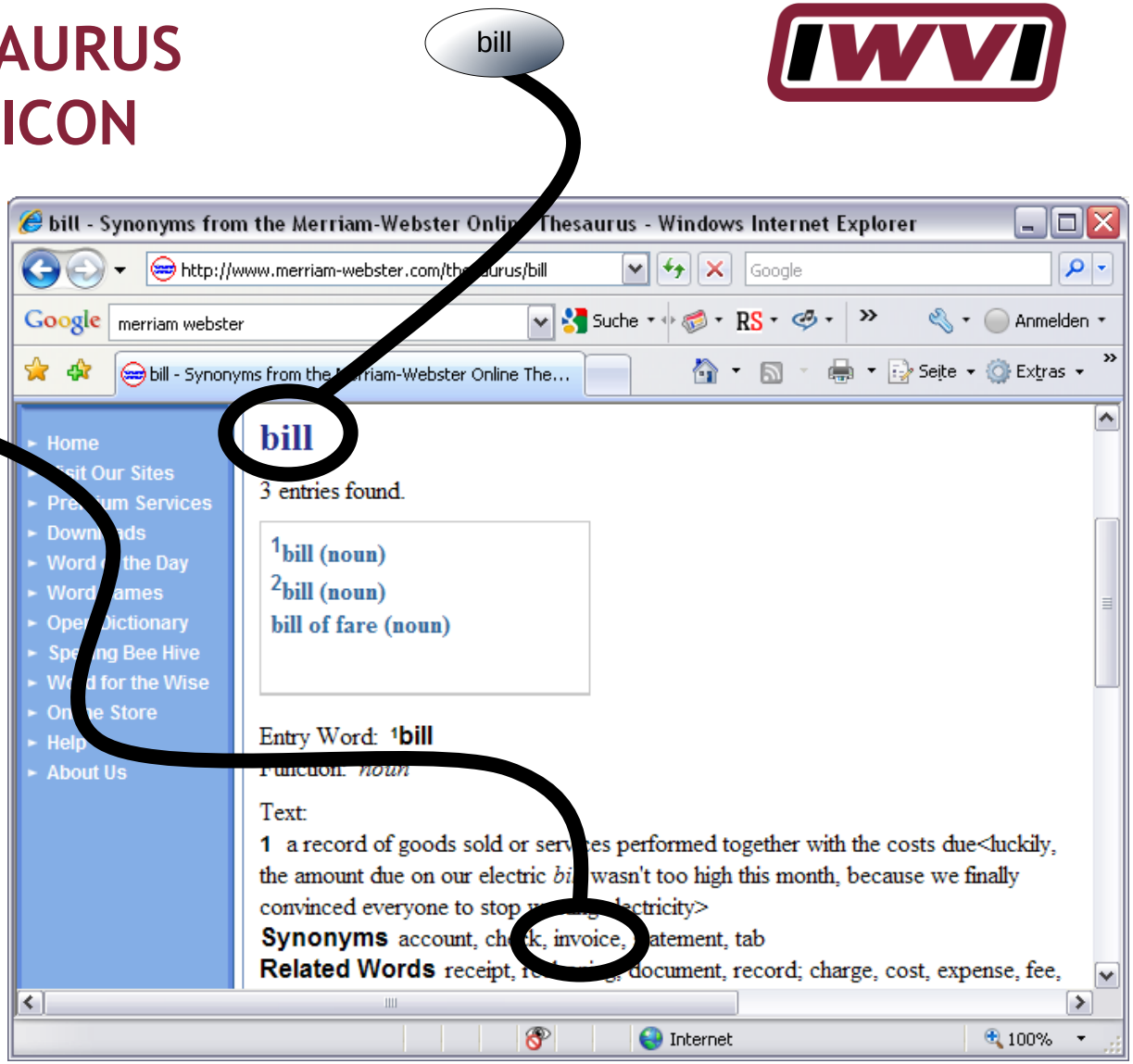


JOIN DOMAIN THESAURUS WITH COMMON LEXICON

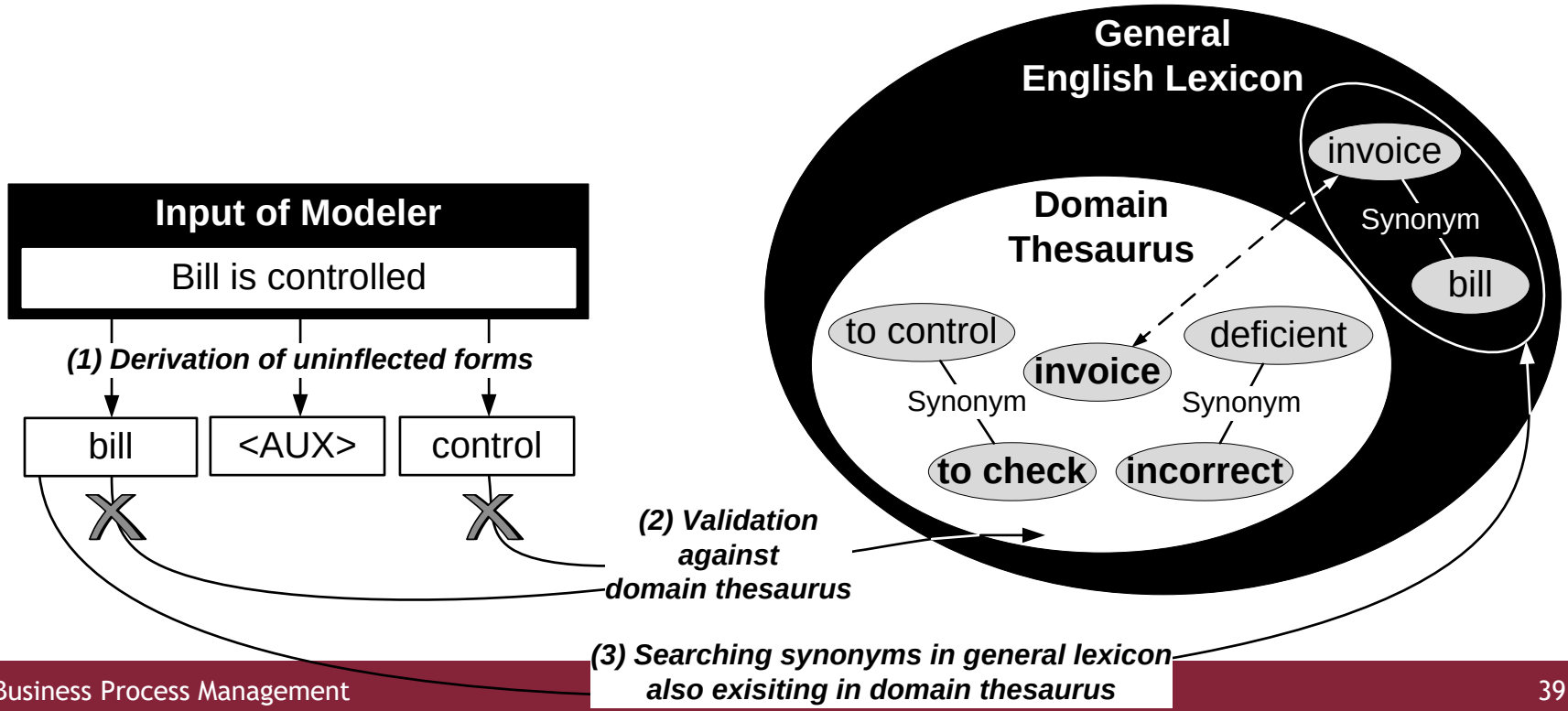




- Establish the connection between valid and non-valid lexemes

ENFORCE COMPLIANCE WITH NAMING CONVENTIONS

Structure Conventions	
Event	<Noun> <Verb, Gerundive>
Event	<Noun> <Verb, Past Participle>



BUILD VALID PHRASES

- Original phrase: “bill is controlled”

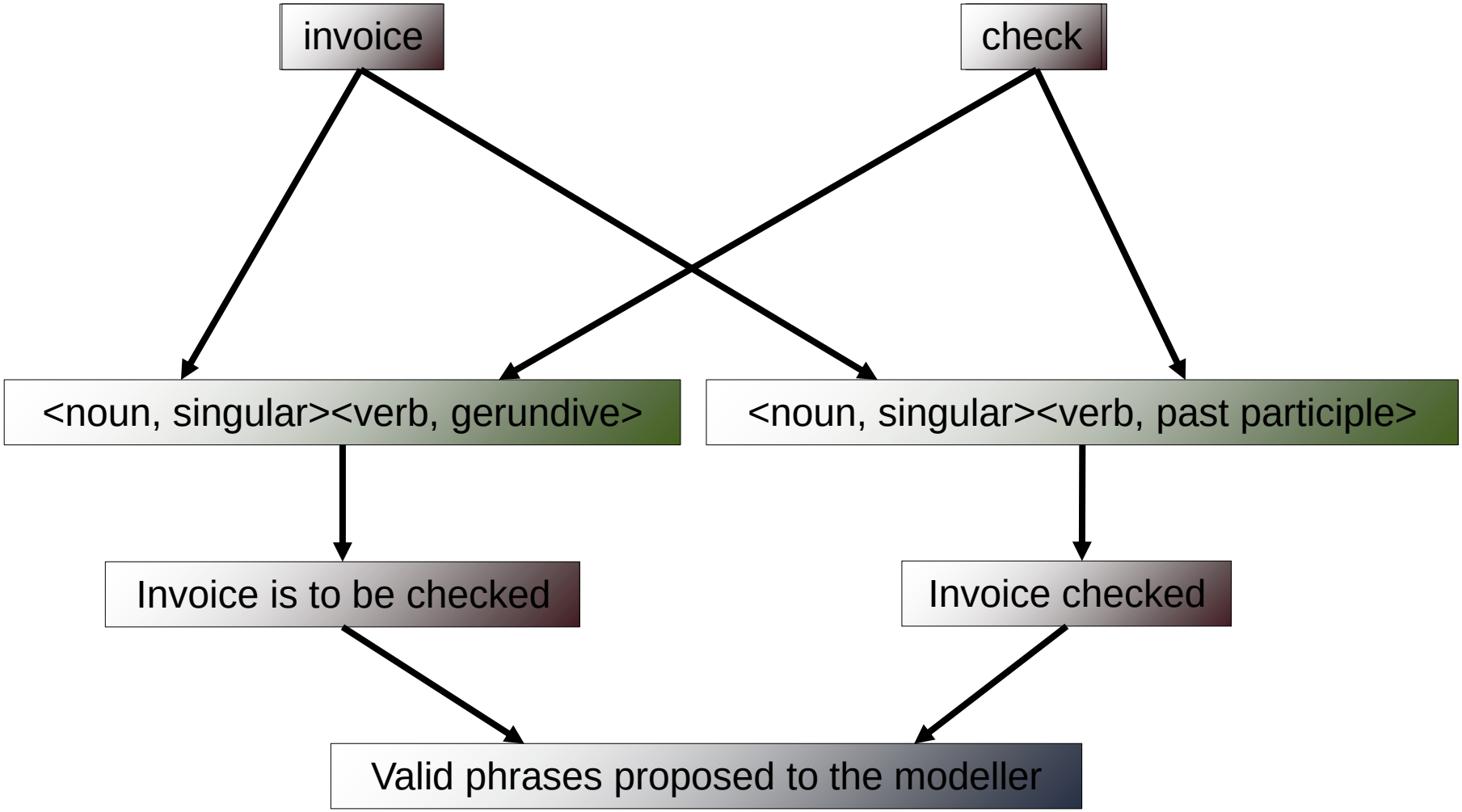
→Phrase type:
<noun, singular>
<verb, 3rd person, singular, present tense, passive>

- Valid phrase types
  - <noun, singular><verb, gerundive>
  - <noun, singular><verb, past participle>

→Original phrase type not valid!

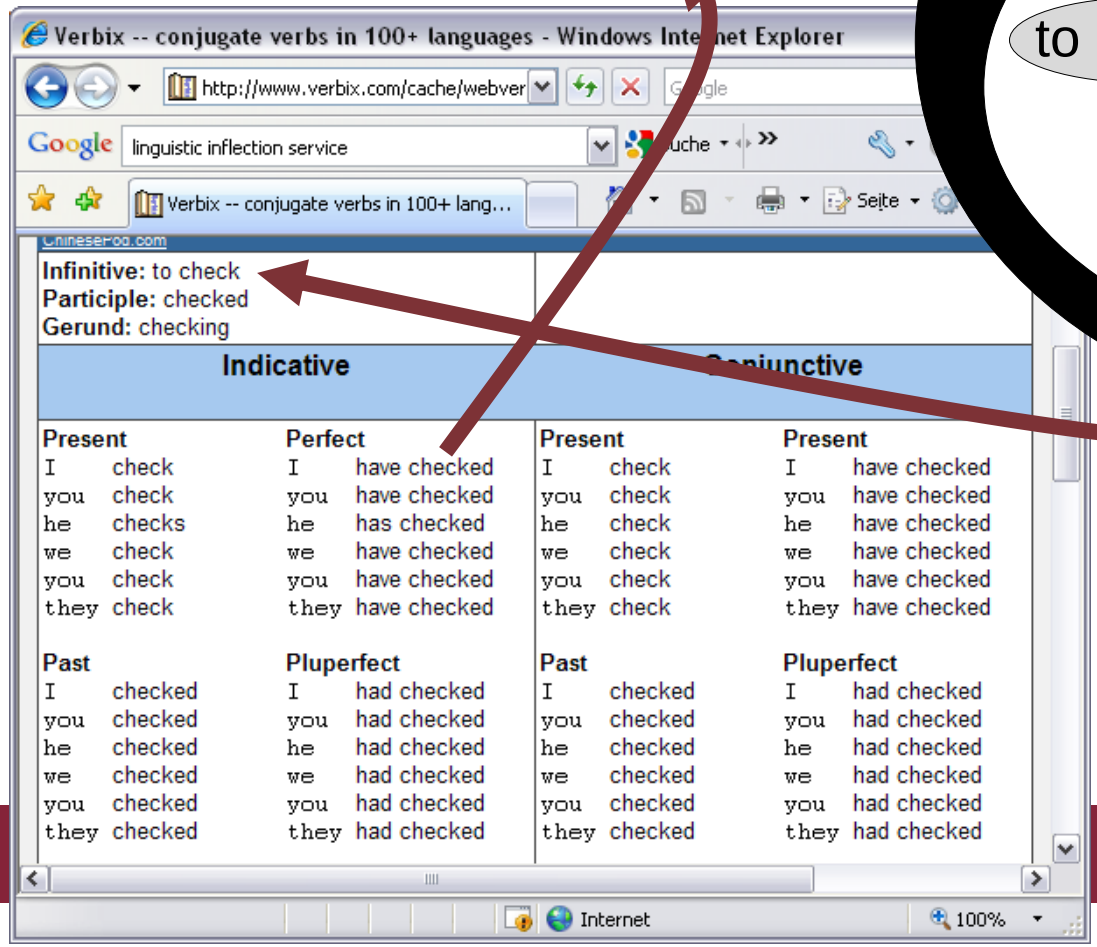
- Lexemes determined: invoice, check

BUILD VALID PHRASES



AUTOMATIC INFLECTION

<noun, singular, object case>	<verb, past participle>
Invoice	checked



Infinitive: to check
Participle: checked
Gerund: checking

Indicative

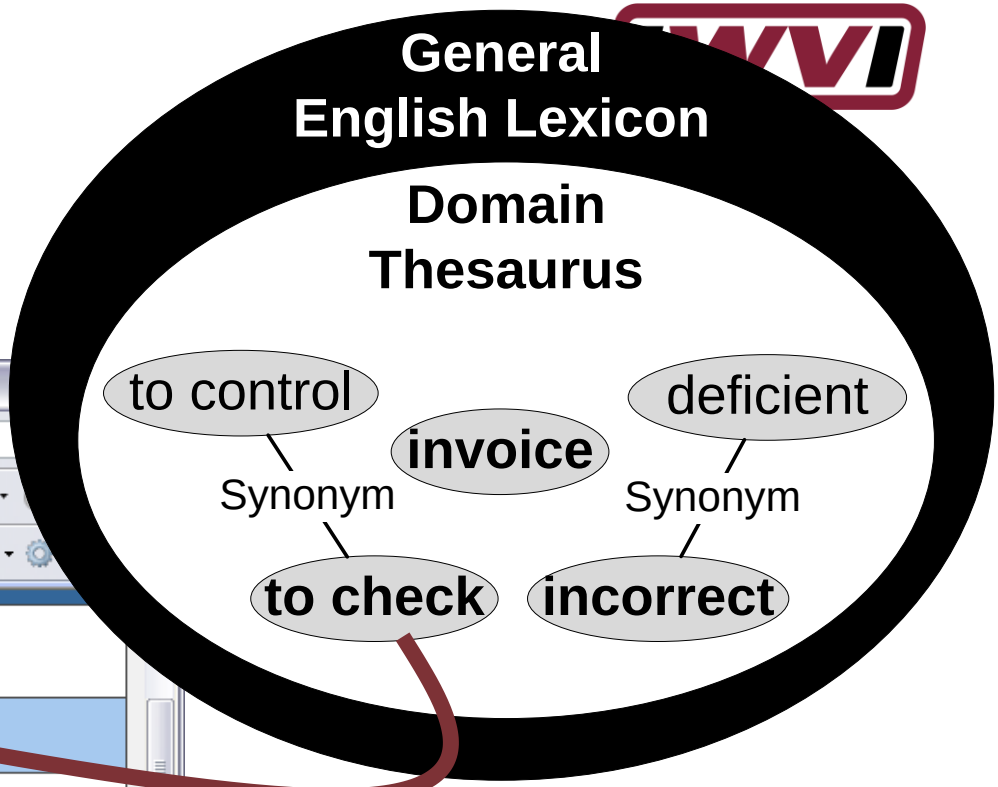
Present		Perfect	
I	check	I	have checked
you	check	you	have checked
he	checks	he	has checked
we	check	we	have checked
you	check	you	have checked
they	check	they	have checked

Past		Pluperfect	
I	checked	I	had checked
you	checked	you	had checked
he	checked	he	had checked
we	checked	we	had checked
you	checked	you	had checked
they	checked	they	had checked

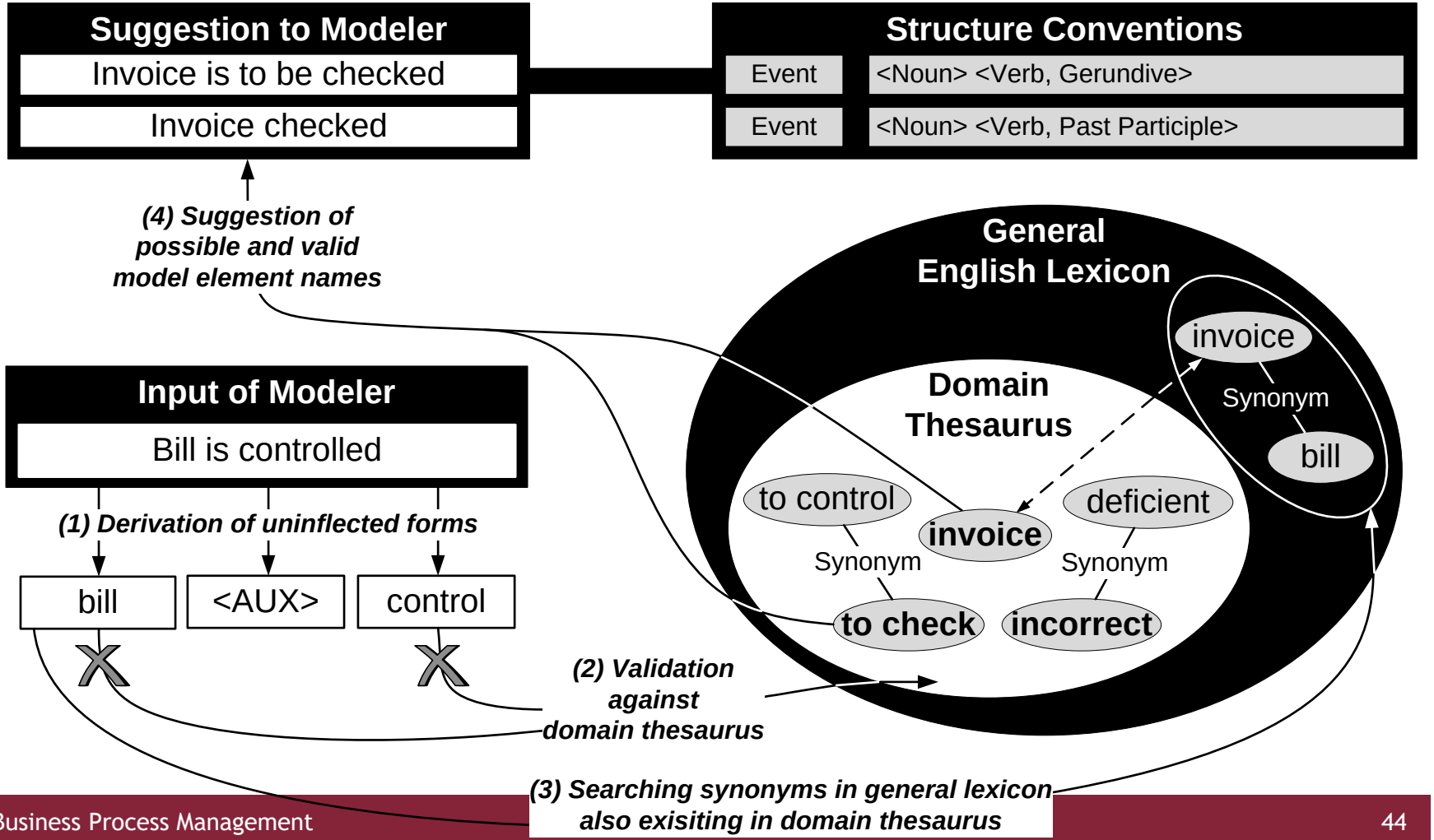
Conjunctive

Present		Present	
I	check	I	have checked
you	check	you	have checked
he	check	he	have checked
we	check	we	have checked
you	check	you	have checked
they	check	they	have checked

Past		Pluperfect	
I	checked	I	had checked
you	checked	you	had checked
he	checked	he	had checked
we	checked	we	had checked
you	checked	you	had checked
they	checked	they	had checked



ENFORCE COMPLIANCE WITH NAMING CONVENTIONS



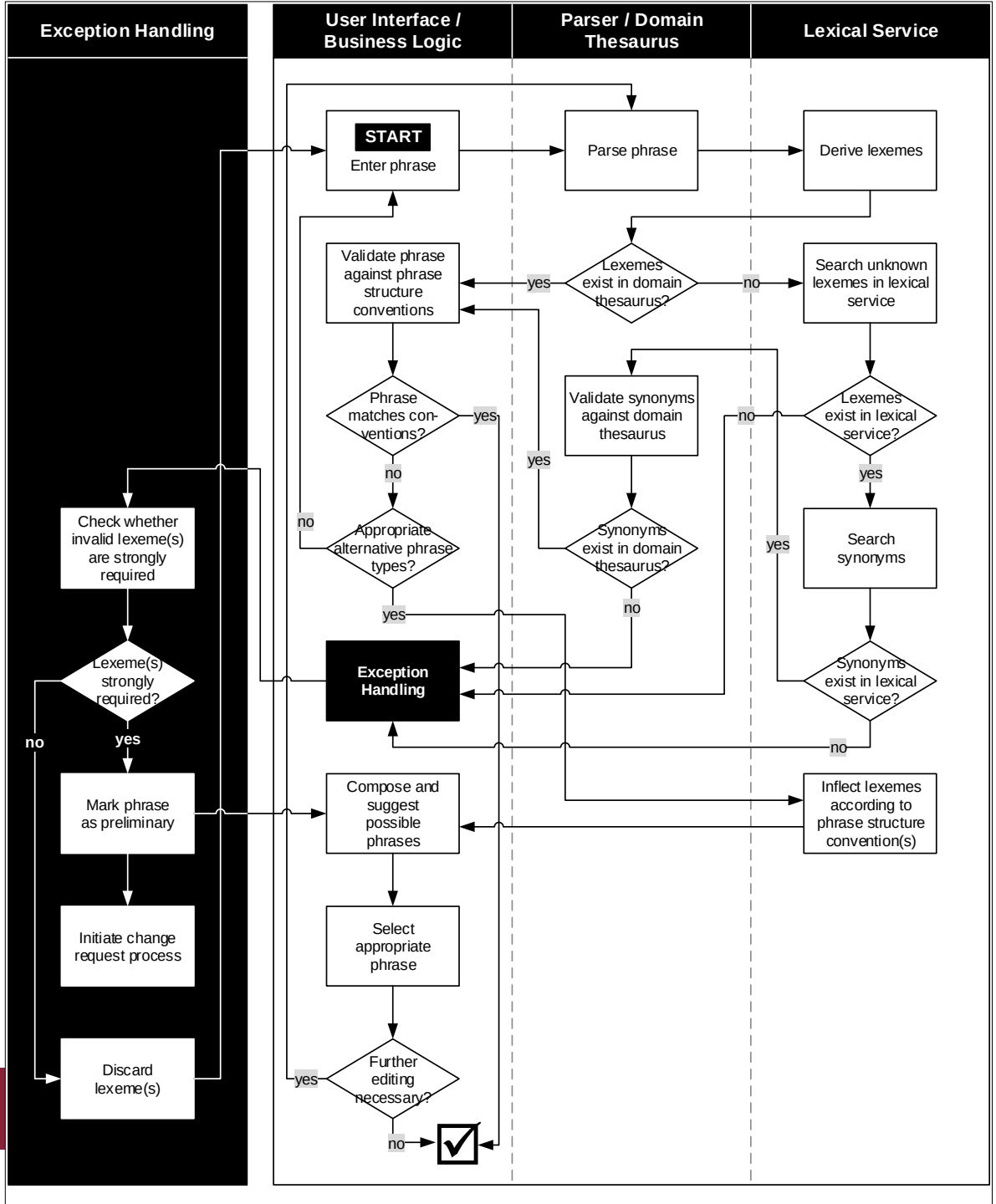
EXCEPTION HANDLING

- What happens if the suggestions do not meet the modeler‘s intentions?

- E.g., a lexeme is unknown…
  - … to the Parser
  - … to the domain thesaurus
  - … generally

- E.g., the predefined phrase structures are not sufficient to express the modeler‘s intentions

EXCEPTION HANDLING



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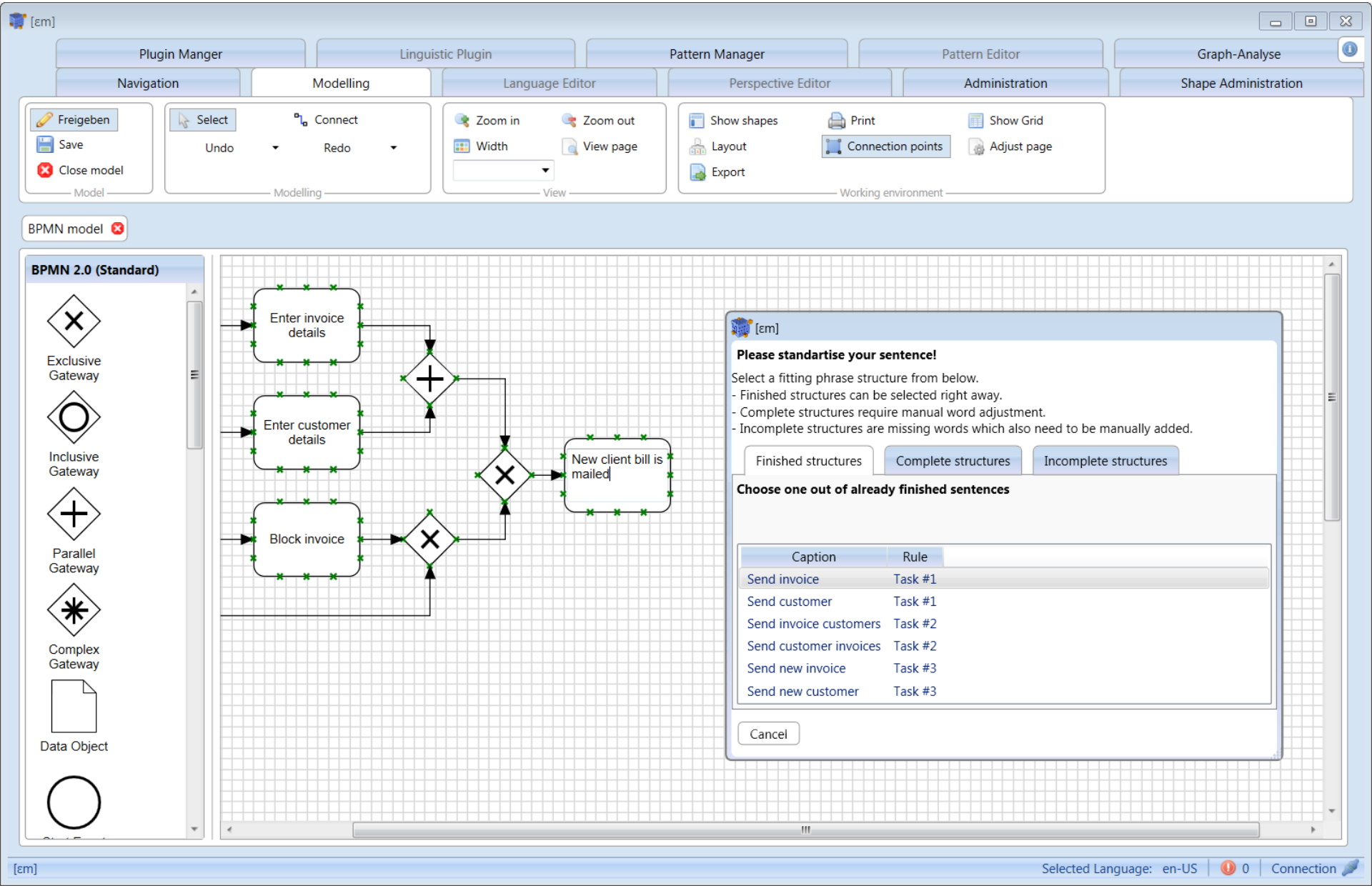
MODELING TOOL



READING

- Semantic Annotation
  Thomas, O.; Fellmann, M.: Semantic Process Modeling – Design and Implementation of an Ontology-based Representation of Business Processes. *Business & Information Systems Engineering 1 (2009) 6*, pp. 438-451.

- Terminological Standardization
  - Concept
    Delfmann, P.; Herwig, S.; Lis, L.: *Unified Enterprise Knowledge Representation with Conceptual Models – Capturing Corporate Language in Naming Conventions*. In: Proceedings of the 30th International Conference on Information Systems (ICIS 2009). Phoenix, USA 2009.
  - Tool
    Havel, J.-M.; Steinhorst, M.; Dietrich, H.-A.; Delfmann, P.: *Supporting Terminological Standardization in Conceptual Models – A Plugin for a Meta-Modelling Tool*. In: Proceedings of the 22nd European Conference on Information Systems (ECIS 2014). Tel Aviv, Israel 2014.

RELATED APPROACHES

- Bögl, A.; Kobler, M.; Schrefl, M.: Knowledge Acquisition from EPC Models for Extraction of Process Patterns in Engineering Domains. In: Bichler, M.; Hess, T.; Krcmar, H.; Lechner, U.; Matthes, F.; Picot, A.; Speitkamp, B.; Wolf, P. (eds.): *Proceedings der Multikonferenz Wirtschaftsinformatik 2008 (MKWI 2008)*. Munich 2008.

- Born, M.; Dörr, F; Weber, I.: User-Friendly Semantic Annotation in Business Process Modeling. In: *Web Information Systems Engineering – WISE 2007 Workshops. LNCS 4832*. Berlin 2007, pp 260-271.

- Leopold, H.; Meilicke, C.; Fellmann, M.; Pittke, F.; Stuckenschmidt, H.; Mendling, J.: Towards the Automated Annotation of Process Models. In: *Proceedings of the Conference on Advanced Information Systems Engineering (CAISE)*. Berlin 2015, pp. 401-416.

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