

# OntoNaviERP: Ontology-supported Navigation in ERP Software Documentation

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# ERP: Enterprise Resource Planning

**MRP:** Material  
Requirements Planning

**MRP-II:**  
Manufacturing Resource  
Planning

**CIM:** Computer  
Integrated  
Manufacturing



**Comprehensive -->**  
**Complex**

# SAP Help Files

SAP Help Portal | SAP Library - Inventory Manag...

**SAP** | SAP Documentation

Advanced Search | Help on Search  
SAP Library | Getting Started | Glossary | Copyright | Disclaimer

Expand All | Close All  
Back | Forward | Synchronize

Inventory Management and Physical Inventory (MM-IM)

- Integration of Inventory Management in the Logistics System
- Goods Movement
- Goods Receipt
- Goods Issue
- Return Delivery
  - Subsequent Delivery
- Stock Transfer and Transfer Posting
- Reservation
- Physical Inventory
- Batch Handling
- Stock Determination
- Print Functions
- Archiving
- Reporting in Inventory Management
- Storing Documents

## Inventory Management and Physical Inventory (MM-IM)

### Purpose

This component deals with the following tasks:

- Management of material stocks on a quantity and value basis
- Planning, Entry, and Documentation of all Goods Movements
- Carrying out the [Physical Inventory](#)

### Features

#### Managing Stocks by Quantity

All transactions that bring about a change in stock are entered in real time, as are the stock updates resulting from these changes. You can obtain an overview of the current stock situation of any given material at any time. This, for example, applies to stocks that:

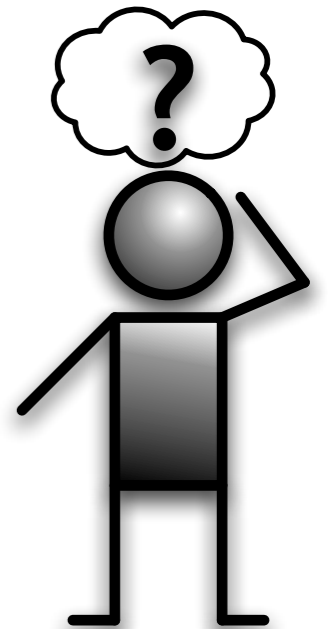
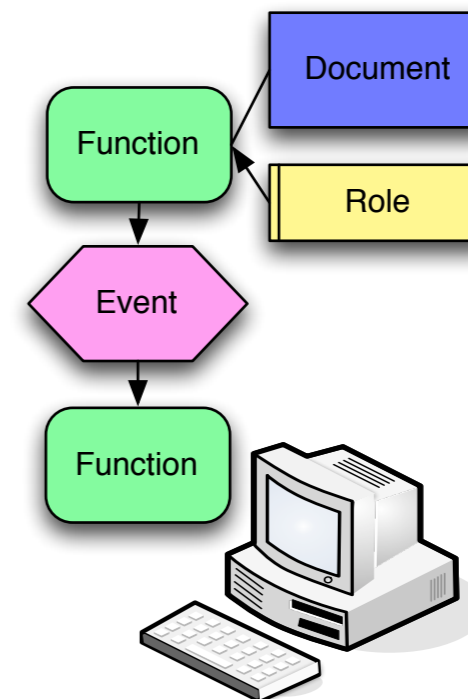
- Are located in the warehouse
- Have already been ordered, but have not yet been received
- Are located in the warehouse, but have already been reserved for production or a customer
- Are in quality inspection.

If a further subdivision by lots is required for a material, one batch per lot is possible. These batches are then managed individually in the stock.

Done

# Search is important, because ...

- Users must align their mental models of processes and data with those underlying the ERP software
- Intensive usage
- More efficient usage of ERP documentation means more efficient business operations.

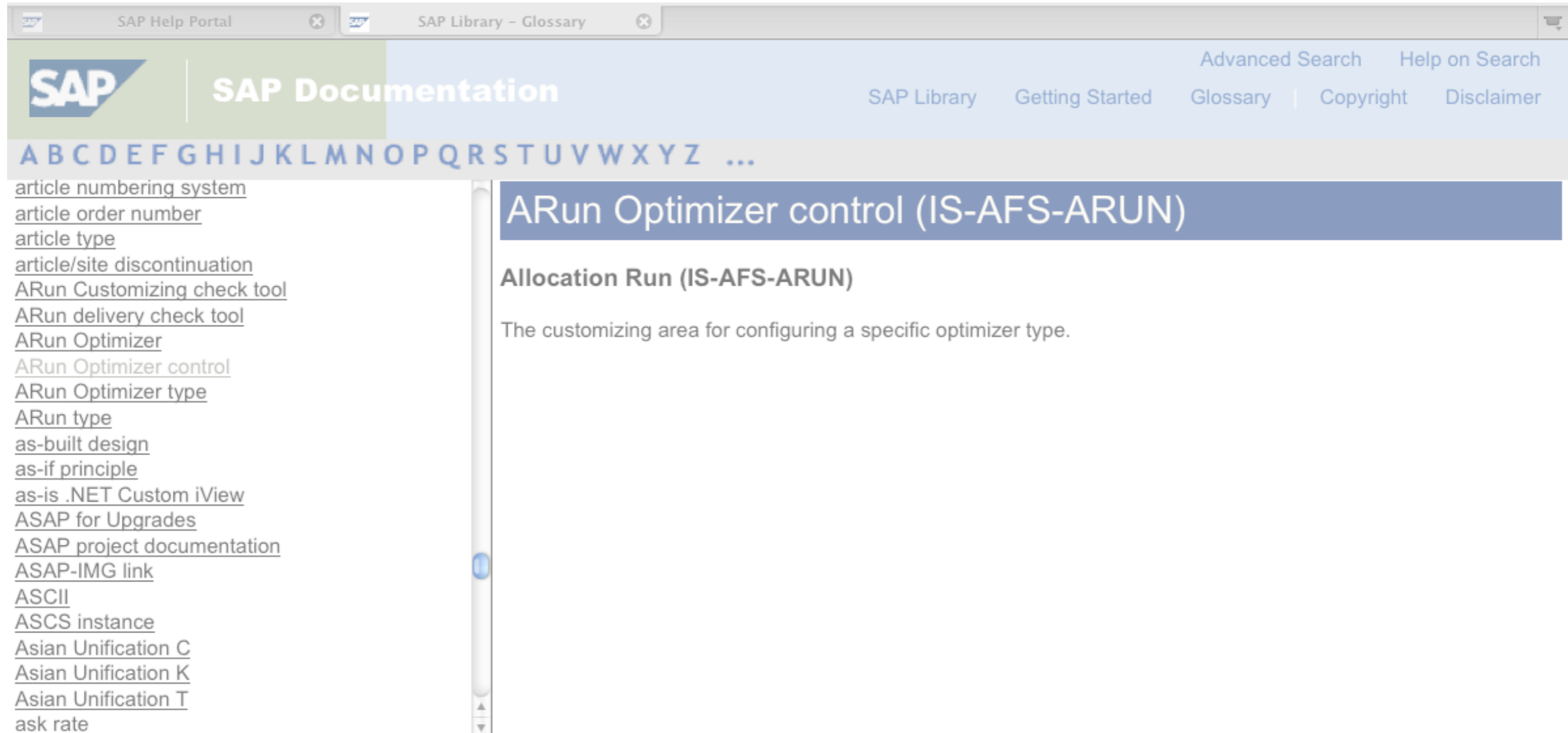




# Search is difficult, because ...

The screenshot shows the SAP Help Portal interface. At the top, there are two browser tabs: 'SAP Help Portal' and 'SAP Library - Glossary'. The main header features the SAP logo and 'SAP Documentation'. Navigation links include 'Advanced Search', 'Help on Search', 'SAP Library', 'Getting Started', 'Glossary', 'Copyright', and 'Disclaimer'. A search bar at the top left contains the text 'ARun Optimizer control (IS-AFS-ARUN)'. Below the search bar, a list of search results is displayed, with the selected result highlighted in blue. The selected result is 'ARun Optimizer control (IS-AFS-ARUN)', with a sub-heading 'Allocation Run (IS-AFS-ARUN)' and a description: 'The customizing area for configuring a specific optimizer type.' The left sidebar shows a list of search results, including 'article numbering system', 'article order number', 'article type', 'article/site discontinuation', 'ARun Customizing check tool', 'ARun delivery check tool', 'ARun Optimizer', 'ARun Optimizer control', 'ARun Optimizer type', 'ARun type', 'as-built design', 'as-if principle', 'as-is .NET Custom iView', 'ASAP for Upgrades', 'ASAP project documentation', 'ASAP-IMG link', 'ASCII', 'ASCS instance', 'Asian Unification C', 'Asian Unification K', 'Asian Unification T', and 'ask rate'.

# Search is difficult, because ...



The screenshot shows a web browser window with two tabs: 'SAP Help Portal' and 'SAP Library - Glossary'. The main content area is the SAP Documentation site. The SAP logo is on the left, and 'SAP Documentation' is in the center. On the right, there are navigation links: 'Advanced Search', 'Help on Search', 'SAP Library', 'Getting Started', 'Glossary', 'Copyright', and 'Disclaimer'. Below the navigation is a search bar with a dropdown menu showing the alphabet 'A B C D E F G H I J K L M N O P Q R S T U V W X Y Z ...'. The search results list various terms, with 'ARun Optimizer control (IS-AFS-ARUN)' highlighted in a blue bar. Below this, the text reads 'Allocation Run (IS-AFS-ARUN)' and 'The customizing area for configuring a specific optimizer type.'

# Search is difficult, because ...

The screenshot shows the SAP Help Portal interface. The search results list includes: article numbering system, article order number, article type, article/site discontinuation, ARun Customizing check tool, ARun delivery check tool, ARun Optimizer, ARun Optimizer control, ARun Optimizer type, ARun type, as-built design, as-if principle, as-is .NET Custom iView, ASAP for Upgrades, ASAP project documentation, ASAP-IMG link, ASCII, ASCS instance, Asian Unification C, Asian Unification K, Asian Unification T, and ask rate. The selected result is 'ARun Optimizer control (IS-AFS-ARUN)'. The diagram overlaid on the screenshot shows a cloud containing four ovals: 'Textbook Business Terminology' at the top, 'SAP Business Terminology' on the left, 'SAP IT/System Terminology' on the right, and 'Industry Domain Terminology' at the bottom. Red double-headed arrows connect all four ovals to each other, indicating a complex, interconnected relationship between these different terminology sets.

In other words: An ideal  
showcase for semantic  
technology...



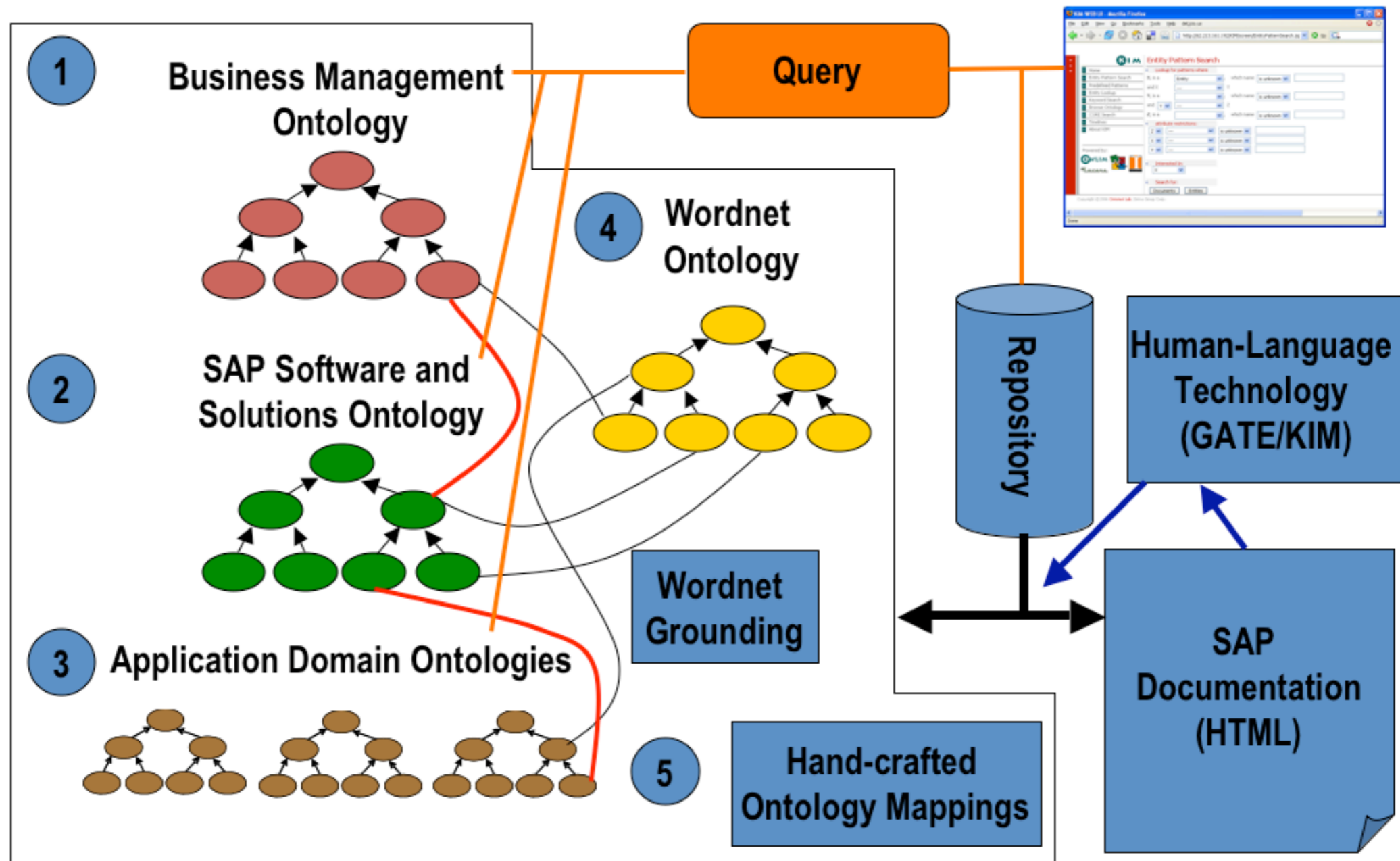
# Requirements

- **Cost-efficient Ontology Construction**
- **Cost-efficient Annotation**
- **Speed**
- **User Interface**

# Competency Question

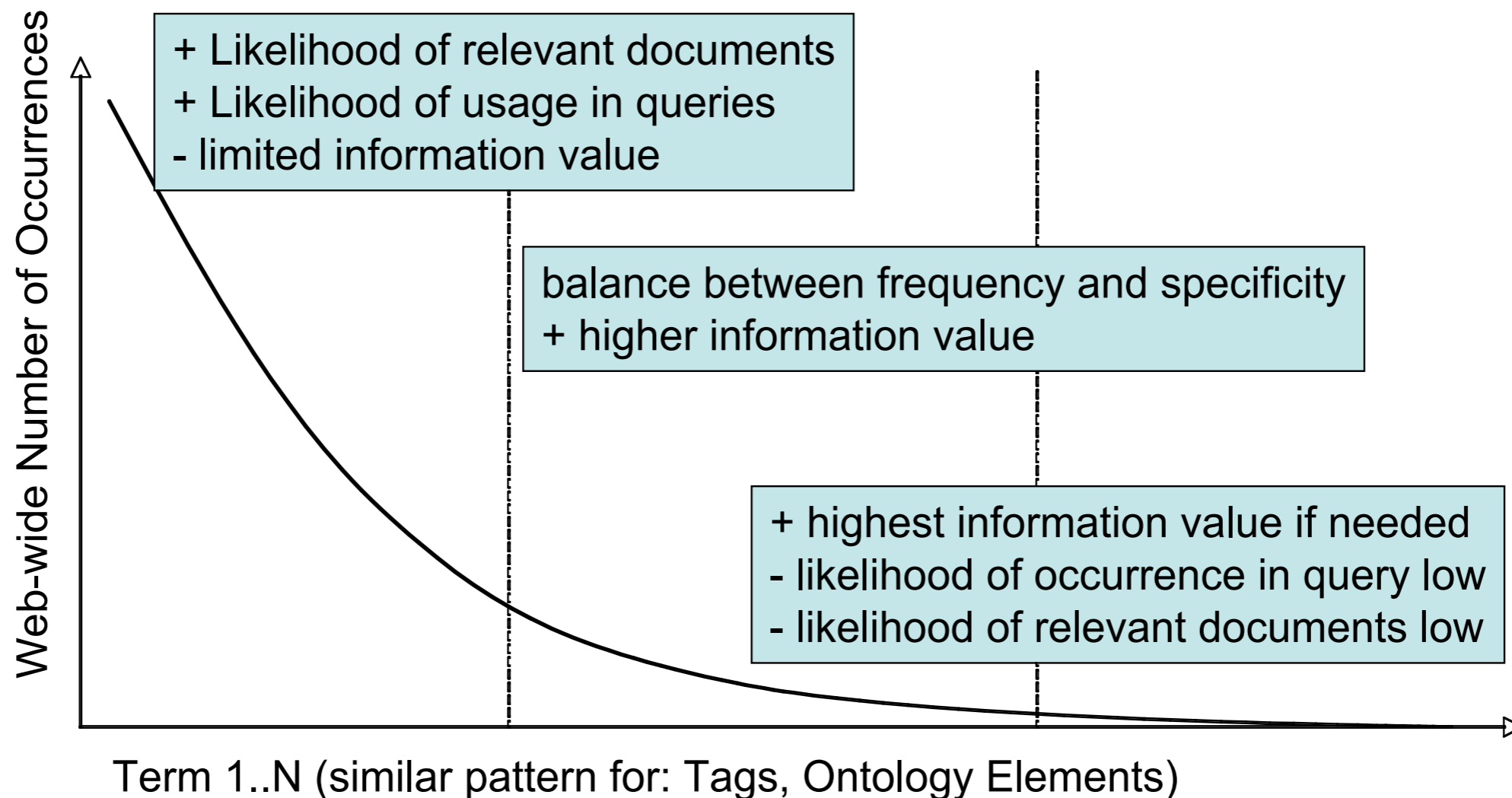
**CQ:** *Which [document | part of a document] is relevant as [instruction | term definition | reference] for a software user who wants to [create | modify | retrieve | delete | carry out a certain business function on] a certain business object?*

# Overview: OntoNaviERP



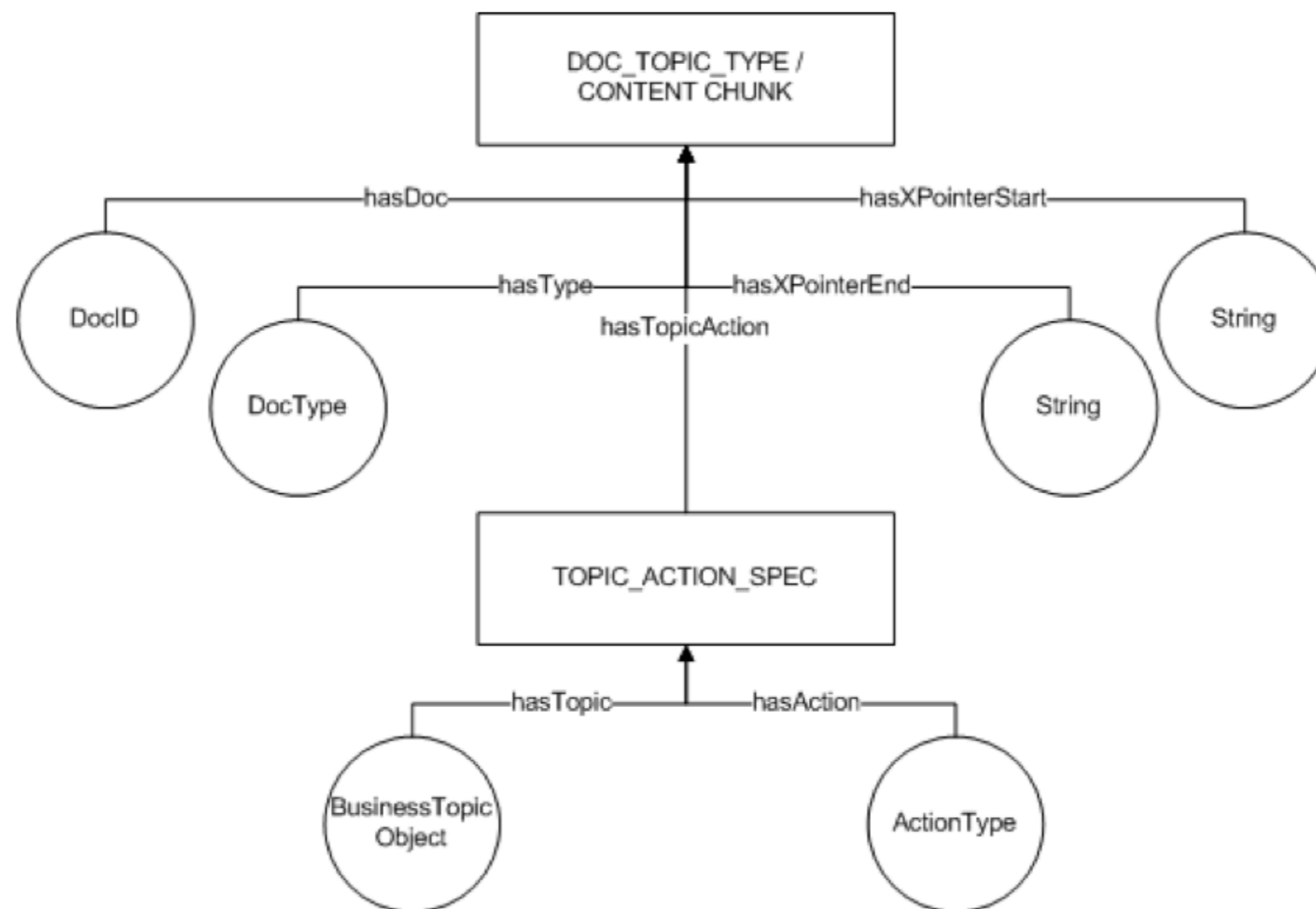
# Which Terms Are Most Valuable - The Most Popular, the Frequent, or the Rare?

## Frequency vs. Information Value vs. Likelihood of Relevance

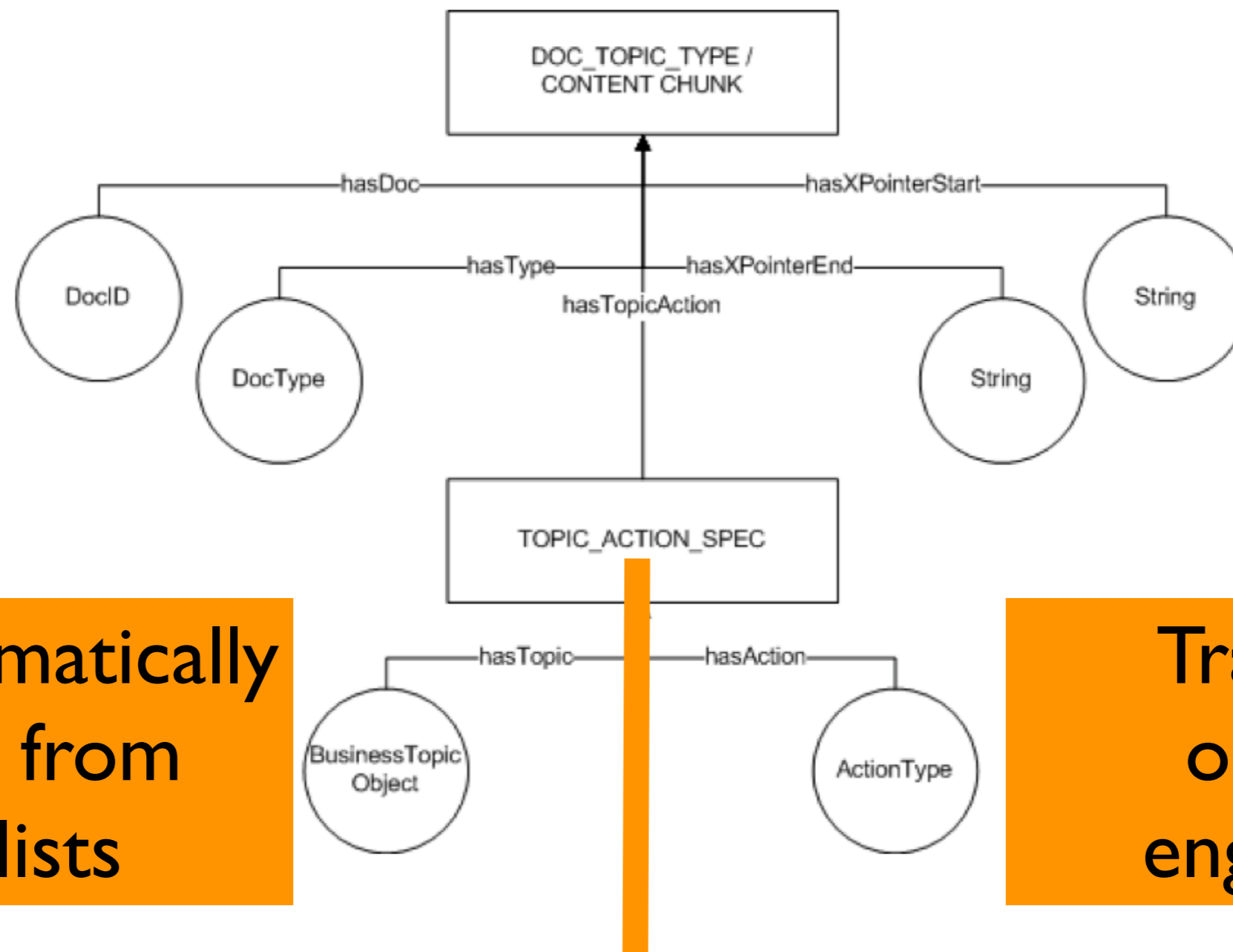




# Approach: Conceptual Model



# Approach: Conceptual Model



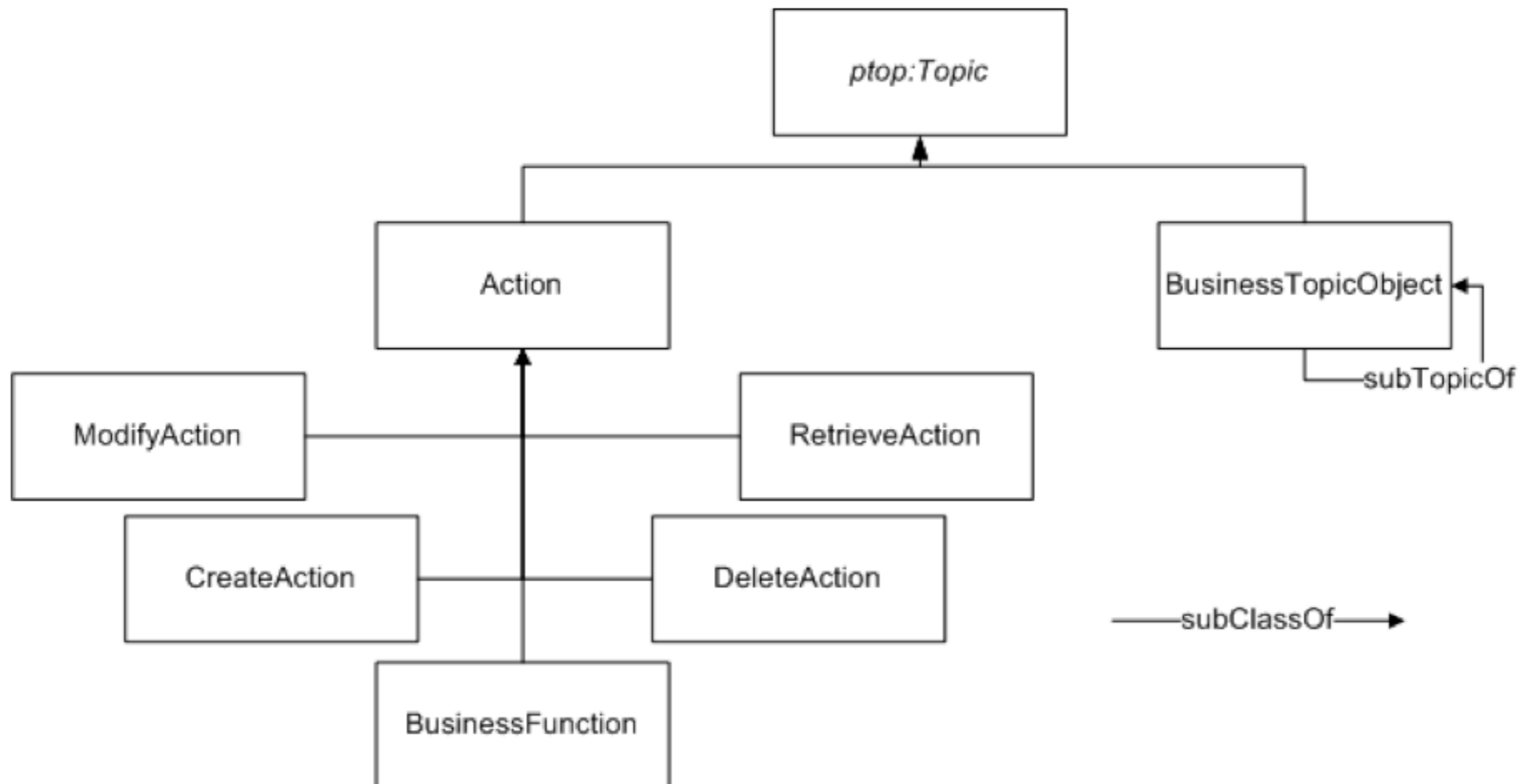
Semi-automatically  
derived from  
term lists

Traditional  
ontology  
engineering

# Approach: Ontology Construction (I)

- Script
- Protégé
- WordNet Plug-In
- OWL Annotation Property
- .NT Generator

# Approach: Ontology Construction (2)





# Approach: Ontology Construction (3)

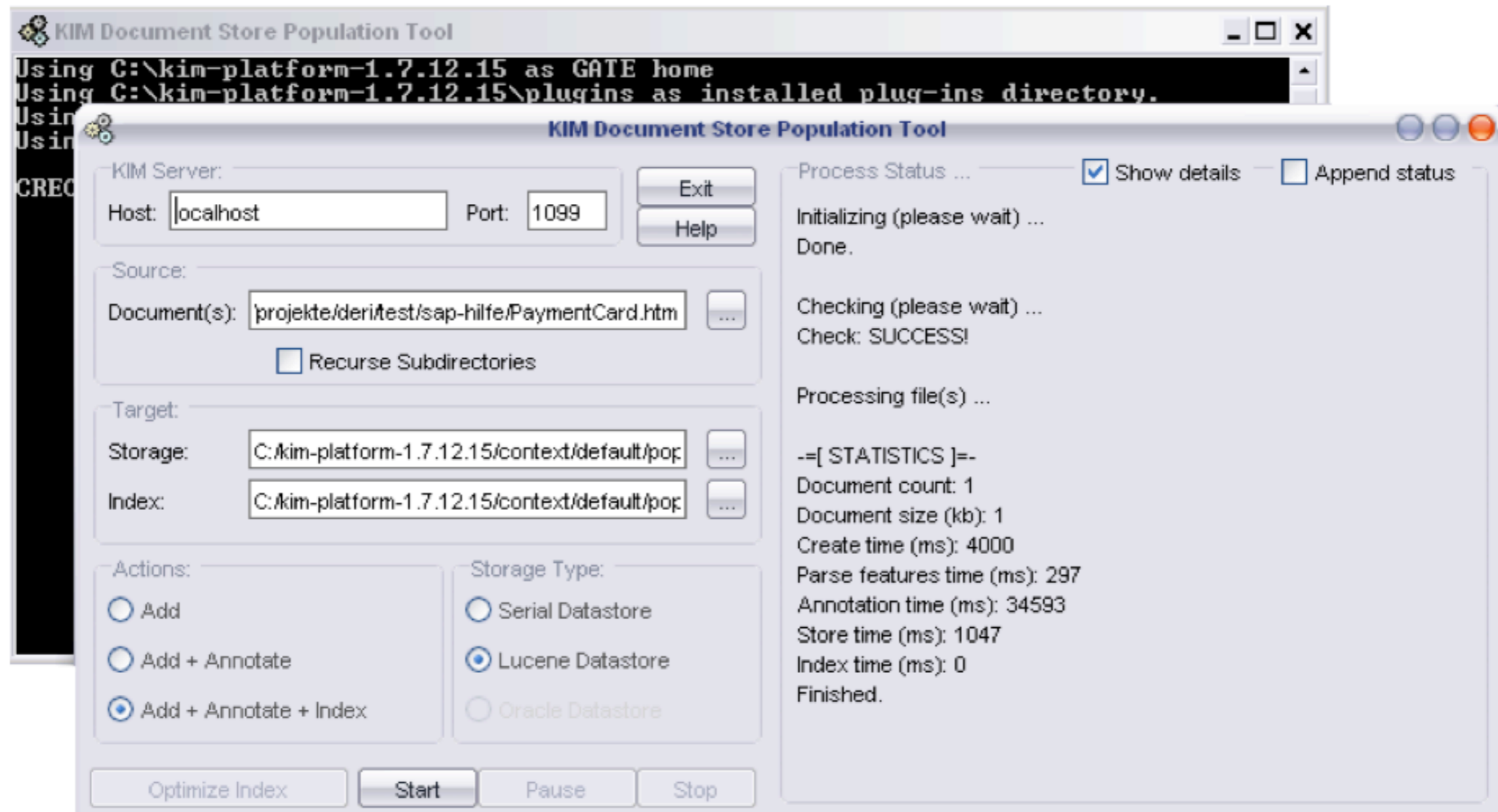
Table 1: Metrics of the OntoNaviERP SAP Logistics Ontology

Classes		132
Conceptual level	Action classes	5
	Topic classes	127
	Concept pairs: All	635
	Concept pairs: Subset of pairs that appear in at least one document	415
	Subconcept pairs: Subset of pairs that appear in at least one document	268
Lexical level	Synonyms	383
	Synonyms for actions	126
	Synonyms for topics	257
	Term pairs: All	32382
	Term pairs: Subset for which the respective concept pairs appear in at least one document	27500
Properties	Total	3
	Object	2
	Datatype	0
	Annotation	1

$$5 * 127 = 635$$

$$126 * 257 = 32,382$$

# Approach: Annotation (I)



# Approach: Annotation (2)

The screenshot displays the KIM interface with a sidebar on the left containing navigation options like Home, Entity Pattern Search, and Keyword Search. The main area is titled 'Document Detail' and shows a table of features for a document titled 'PaymentCard'. Below this, the 'Document Content' section contains text about payment cards, with several terms highlighted in orange boxes: 'Credit cards', 'Customer cards', 'Debit cards', 'Procurement cards', and 'Walking cards'. An arrow points from the 'Debit cards' highlight to a separate window showing an ontology browser for 'DebitCard'. This browser lists various properties and values for the 'DebitCard' entity, such as 'type: Product', 'label: "DebitCard"', and 'hasAlias: debit cards'.

Feature Name	Feature Value
Title	PaymentCard
Date	30/01/2007 08:36
URL	C:\Dateien\projekte\deri\test\sap-hilfe\PaymentCard.htm

Property	Value
type	Object
type	Product
type	BankCard
type	Topic
type	Entity
type	Abstract
type	FinancialInstrument
type	DebitCard
label	"DebitCard"
generatedBy	ontoNaviERPГазetteer
hasMainAlias	Debit card
hasAlias	debit cards
hasAlias	debit card
hasAlias	Debit cards
hasAlias	Debit card
producedBy	Bank
URI	http://ontoNaviERP/nt#Financial_Instrument_T.1



# Approach: User Interface and System

**ontoNaviERP** ontology supported navigation in ERP documentation

CreateAction  
MaterialMaster

instruction  
 term definition  
 reference

distance ranking  
 standard ranking

start navigation

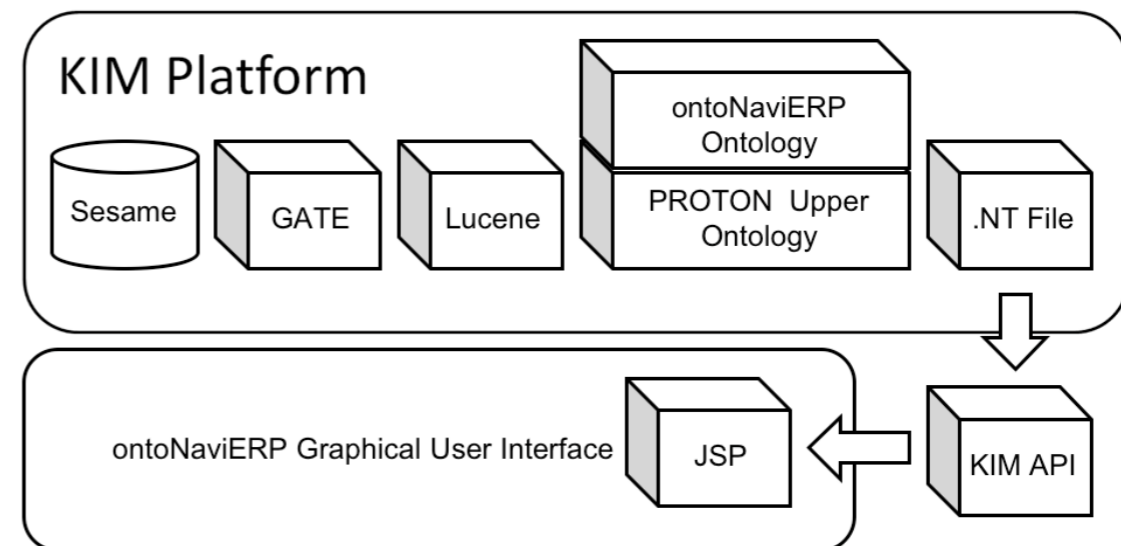
concept specific information  
concept name: CreateAction  
comment: make, create (make or cause to be or to become)  
subConceptOf: Action  
synonyms: create, creates, creating, created, Create, Creates, Creating, Created, make, makes, making, made, Make, Makes, Making, Made, produce, produces, producing, produced, Produce, Producing, Produces, Produced

ready for further queries...

76 documents found

1 1861.0 [Material Master LO-MD-MM Material Master Records Creating Material Master Records Creating a Material Master Record](#)  
Creating a Material Master Record Prerequisites Before you create (not extend) a material master record, check that one does not already exist for this material. You can check this using the s (...)

2 1809.0 [Material Master LO-MD-MM Material Master Records Material](#)





# Evaluation Methodology

- Technique 1:** Number of documents containing both terms in its exact lexical form (we of course ignore capitalization, since that has been standard in keyword-based retrieval for decades).
- Technique 2:** Same as T1, but only those containing both terms within a 50-words range (25 words left and right)
- Technique 3:** Number of documents including either combination of a) the given topic term, its synonyms, its subconcepts, or the synonyms of the subconcepts and b) the given action term or its synonyms.
- Technique 4:** Same as T3, but only those documents containing the relevant named entities reflecting actions and business objects within a 50-words range.

# Results (I)

## Impact of OntoNaviERP on retrieved documents and precision

	Technique 1: Term -based			Technique 2: Term -based with 50 words range			Technique 3: OntonaviERP			Technique 4: OntoNaviERP with 50 words range		
	Retrieved	Relevant(*)	Precision(*)	Retrieved	Relevant(*)	Precision(*)	Retrieved	Relevant(*)	Precision(*)	Retrieved	Relevant(*)	Precision(*)
Avg	0.38	0.16	0.44	0.02	0.02	1.00	11.46	3.46	0.63	5.96	2.90	0.65
Min	0.00	0.00	0.00	0.00	0.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00
Max	6.00	3.00	1.00	1.00	1.00	1.00	72.00	10.00	1.00	50.00	10.00	1.00
Median	0.00	0.00	0.42	0.00	0.00	1.00	5.50	2.00	0.55	3.00	1.00	0.80
STD	1.10	0.55	0.43	0.14	0.14	n/a	14.93	3.04	0.33	8.62	3.03	0.37

\* Of the first ten results retrieved

### Median of retrieved documents

- Term-based: 0  
 $\geq 50\%$  of the action-topic pairs yield no result
- OntoNaviERP: 5.5  
 $50\%$  of the action-topic pairs return at least 5 result pages, of which 2 are relevant



## Results (2)

<b>Effectivity: Number of additional, relevant documents found by OntoNaviERP</b>				
	<b>Additional, relevant documents by technique 3</b>	<b>Comparison: Relevant retrieved documents with technique 1</b>	<b>Additional, relevant documents by technique 4</b>	<b>Comparison: Relevant retrieved documents with technique 2</b>
	T3-T1	T1	T4-T2	T2
<b>Avg</b>	3.30	0.16	2.88	0.02
<b>Min</b>	0.00	0.00	0.00	0.00
<b>Max</b>	10.00	3.00	10.00	1.00
<b>Median</b>	2.00	0.00	1.00	0.00
<b>STD</b>	2.90	0.55	2.99	0.14

# Findings and Lessons Learned

- Understanding of ontology engineering and annotation under economic constraints
- In our setting, consolidation of synonyms and lexical variants does a great deal of the job



# Future Extensions

- Task and Context
- Annotate individual sections of resources
- Skills / Users' Competencies vs. Target Audience of a Resource
- Hybrid Search: Combining term-based and conceptual search  
E.g. see Bhagdev/Chapman/Ciravegna, Vitaveska Lanfranchi, Daniela Petrelli: *Hybrid Search: Effectively Combining Keywords and Semantic Searches*, ESWC 2008

# Reference and Links

Hepp, Martin and Wechselberger, Andreas: OntoNaviERP: Ontology-supported Navigation in ERP Software Documentation, in: A. Sheth et al. (eds.): ISWC 2008. Proceedings of the 7th International Semantic Web Conference, Germany, October 26-30, 2008, Karlsruhe, Germany, Springer LNCS, Vol. 5318, pp. 764-776.

This paper and other papers are available at

<http://www.heppnetz.de/publications/>

The .NT Generator for KIM/GATE Gazetteer Lists is at:

<http://ebusiness-unibw.org:8180/ntfilegenerator/>



Online tool for generating .NT Files from OWL/RDF ontologies.  
Developed by [Andreas Wechselberger](#) and [Martin Hepp](#).

1 - Start 2 - Upload Information 3 - Modify Parameters 4 - Download .NT File

This tool generates the corresponding .NT file from an OWL ontology file by applying your defined parameters.

You can now **upload a local OWL ontology file** using the form below.

Upload Ontology

choose your OWL ontology file

(open the file dialog and choose your OWL ontology)

# Thank you!

Martin Hepp and Andreas Wechselberger  
{[mhepp@computer.org](mailto:mhepp@computer.org) | [andreas.wechselberger@unibw.de](mailto:andreas.wechselberger@unibw.de)}

<http://www.unibw.de/ebusiness/>