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# Applying Ontologies and Intelligent Text Processing in Requirements Reuse

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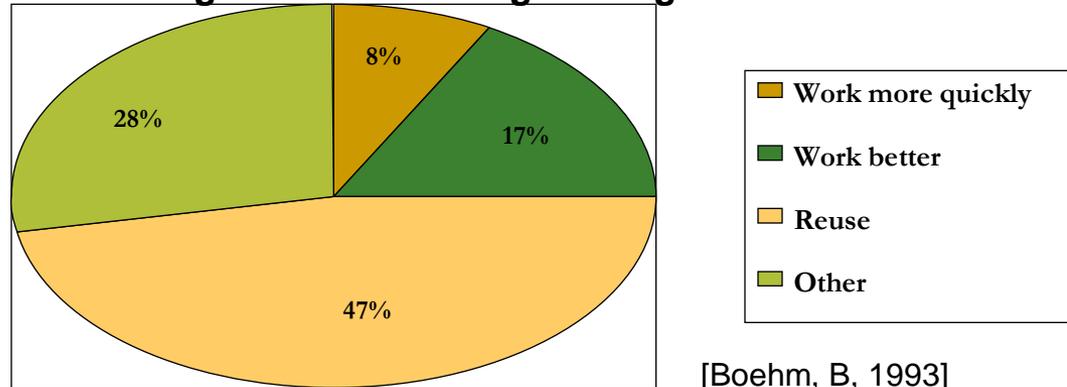


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# Reuse in Software Engineering...why?

**Cost savings in Software Engineering**



[Boehm, B, 1993]



**+ Abstraction level of artifacts**



**+ Reuse Benefits**

[Sommerville, 2001]

# Reusing Requirements Specifications

- **Quantitative benefits:**

- Reuse of requirements previously specified
- Reuse of artifacts linked to them

➔ **Improvement of development times (*Time to Market*)**

- **Qualitative benefits:**

- Proved quality
- Related information about the development (problems, solutions)

➔ **Reduce potential deviations on later developments**

- **Problems**

- Requirements written in natural language
- Enterprise environments

➔ **Integrated method, techniques and professional tools**

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# Requirement Reuse Approaches

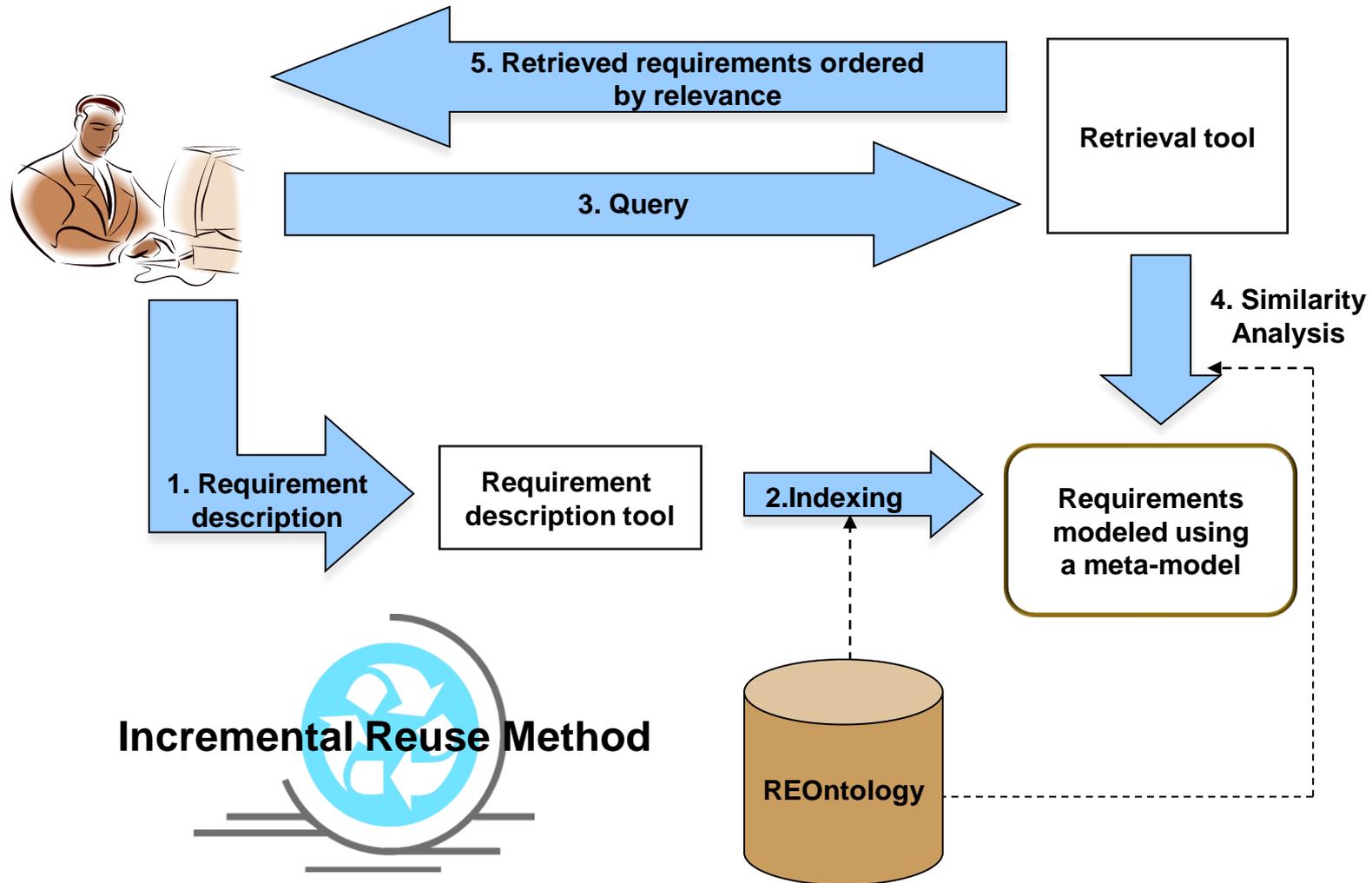
- Requirements patterns
- Parameterization
- Domain Models



➔ ...but no integrated proposals that can deal with:

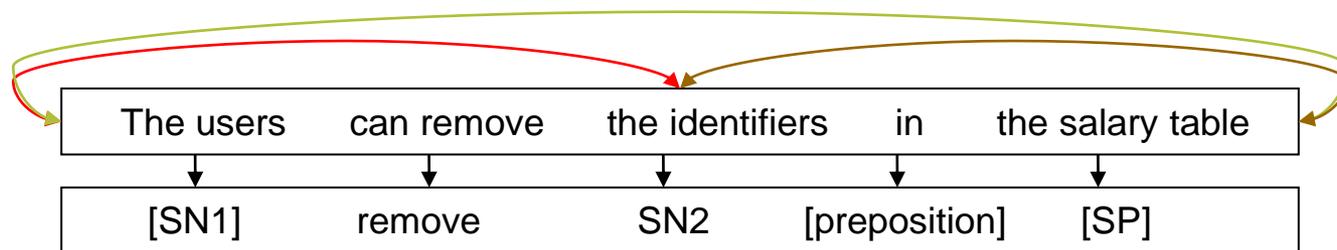
- Domain Modeling
- Requirements Modeling
- Flexibility in the modeling updates
- NLP systems for the analysis and retrieval
- Requirement management tools

# Reuse System Architecture



# Requirements Engineering Ontology

- Controlled vocabulary of the Requirements Engineering Domain
- Types of relationships
- Explicit relationships between the controlled vocabulary: static relationships
- Lexical-syntactic patterns: dynamic relationships



# Example

|             |   |
|-------------|---|
| Requirement | The <b>manager</b> could <b>remove</b> the <b>users</b> |
|-------------|---|

## ■ Query done without the Requirements Ontology

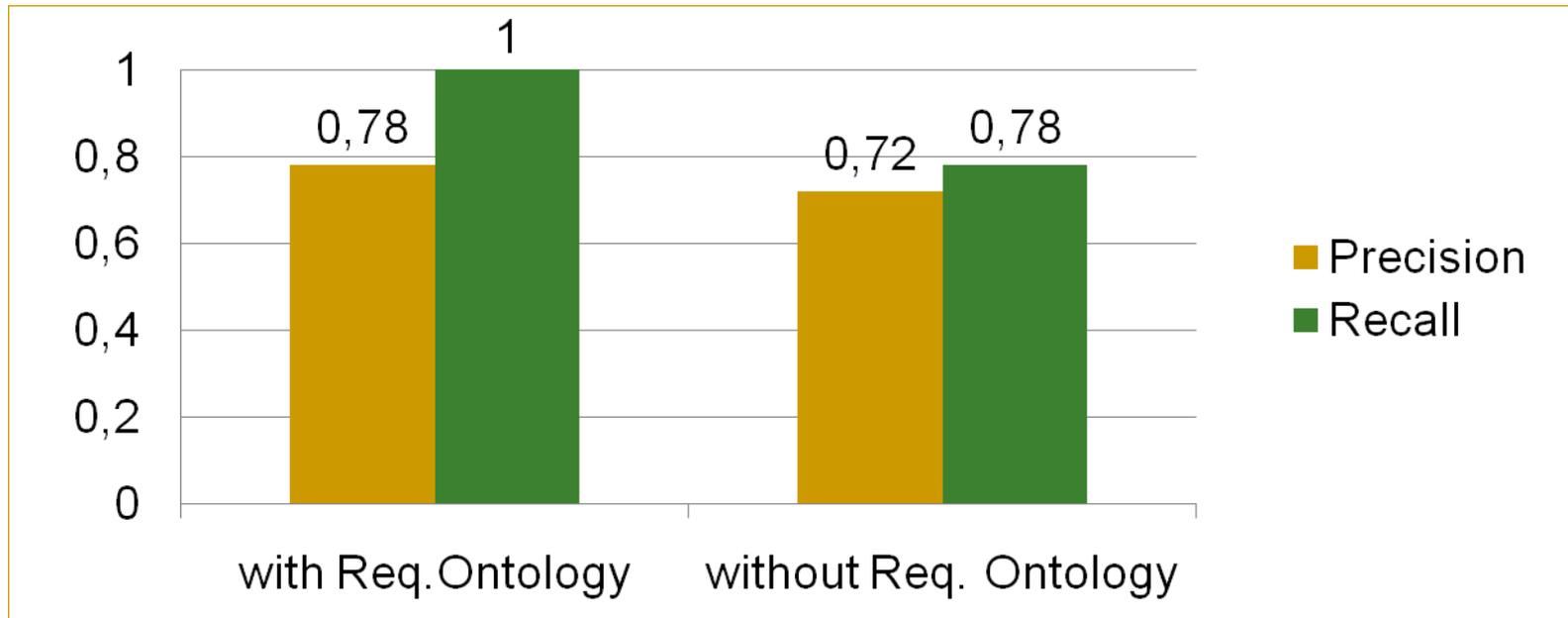
|      |   |
|------|---|
| Req3 | The <b>manager</b> may <b>manage</b> the <b>users</b> from the tables |
|------|---|

## ■ Query done with the Requirements Ontology support

|      |   |
|------|---|
| Req1 | The <b>administrator</b> could <b>unsubscribe</b> the <b>users</b>  |
| Req2 | User's table will be modifiable. The <b>administrator</b> could do the <b>elimination</b> of the <b>users</b> |
| Req3 | The <b>manager</b> may <b>manage</b> the <b>users</b> from the tables   |

# Results

## ■ Recall and precision rates



## ■ Ranking of the most relevant requirement in each question:

- With the Req. Ontology: **92%** are ranked first
- Without the Req. Ontology: **51%** are ranked first

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# Conclusions and Future lines

## ■ Conclusions

- ❑ **Applied research:** availability of professional tools to support the techniques and methods described.
- ❑ Useful in **any organization** dedicated to software development.
- ❑ **Interoperability** between diverse specific domains
- ❑ **Incremental** Reuse process

## ■ Future lines

- ❑ Measure parameters to support the real cost savings in companies
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