



EXPERIENTIAL-BASED REASONING

CASE-BASED REASONING

(Part V - Reflective Reasoning)

Miquel Sànchez-Marrè

Intelligent Data Science and Artificial Intelligence Research Centre (IDEAI-UPC)

Knowledge Engineering and Machine Learning Group (KEMLG-UPC)

Computer Science Dept.

Universitat Politècnica de Catalunya · Barcelona**Tech**

miquel@cs.upc.edu

<http://www.cs.upc.edu/~miquel>

Course 2020/2021

<https://kemlg.upc.edu>



PART 5 – REFLECTIVE REASONING IN CBR



Case Base Maintenance / CBR Maintenance



Case Base Maintenance (1)

- “The process of refining a CBR system's Case Base to improve the system's performance” [D.B. Leake & D.C. Wilson, 1998]
- CBM focuses on developing methods for **reducing the size of the case base** while **maintaining competence**
- Case Base maintenance implements policies in order to facilitate future reasoning for a particular set of performance objectives:
 - Revising the organization of the Case Base
 - Revising the contents of the Case Base:
 - ◆ Representation
 - ◆ Domain content
 - ◆ Accounting information
 - ◆ Implementation



Case Base Maintenance Framework (1)

- Data Collection
 - Data collecting method
 - ◆ None (i.e, always storing new solved cases) [Non introspective]
 - ◆ Synchronic (a snapshot of the CB) [Introspective]
 - ◆ Diachronic (several CB snapshots over time) [Introspective]
 - Timing (when to collect ?)
 - ◆ Periodic
 - ◆ Conditional
 - ◆ Ad-hoc
 - Integration
 - ◆ On-line (during a CBR cycle)
 - ◆ Off-line (in a pause reasoning)



Case Base Maintenance Framework (2)

- Execution
 - Triggering
 - ◆ Timing (when to trigger ?)
 - ◆ Periodic [Proactive]
 - ◆ Conditional [Reactive]
 - Space-based
 - Time-based
 - Result-based
 - ◆ Ad-hoc
 - ◆ Integration
 - ◆ On-line
 - ◆ Off-line



Case Base Maintenance Framework (3)

- Execution
 - Operation types
 - ◆ Target Type
 - ◆ Indexing Structures
 - ◆ Domain Contents
 - ◆ Accounting information
 - Utility measures
 - ◆ Revision Level
 - ◆ Implementation level
 - Changing indexation schemes
 - Changing case representations
 - Changing Case Base structure
 - ◆ Representation level
 - Managing inconsistent case formats (different sources, etc.)
 - ◆ Knowledge level
 - Correcting erroneous values
 - Generalising Case values
 - Fusing Cases
 - Adding / Removing Cases



Case Base Maintenance Framework (4)

- Execution
 - Scope of maintenance
 - ◆ Narrow
 - ◆ One case
 - ◆ A few cases
 - ◆ Broad
 - ◆ A large set of cases
 - ◆ The whole Case Base

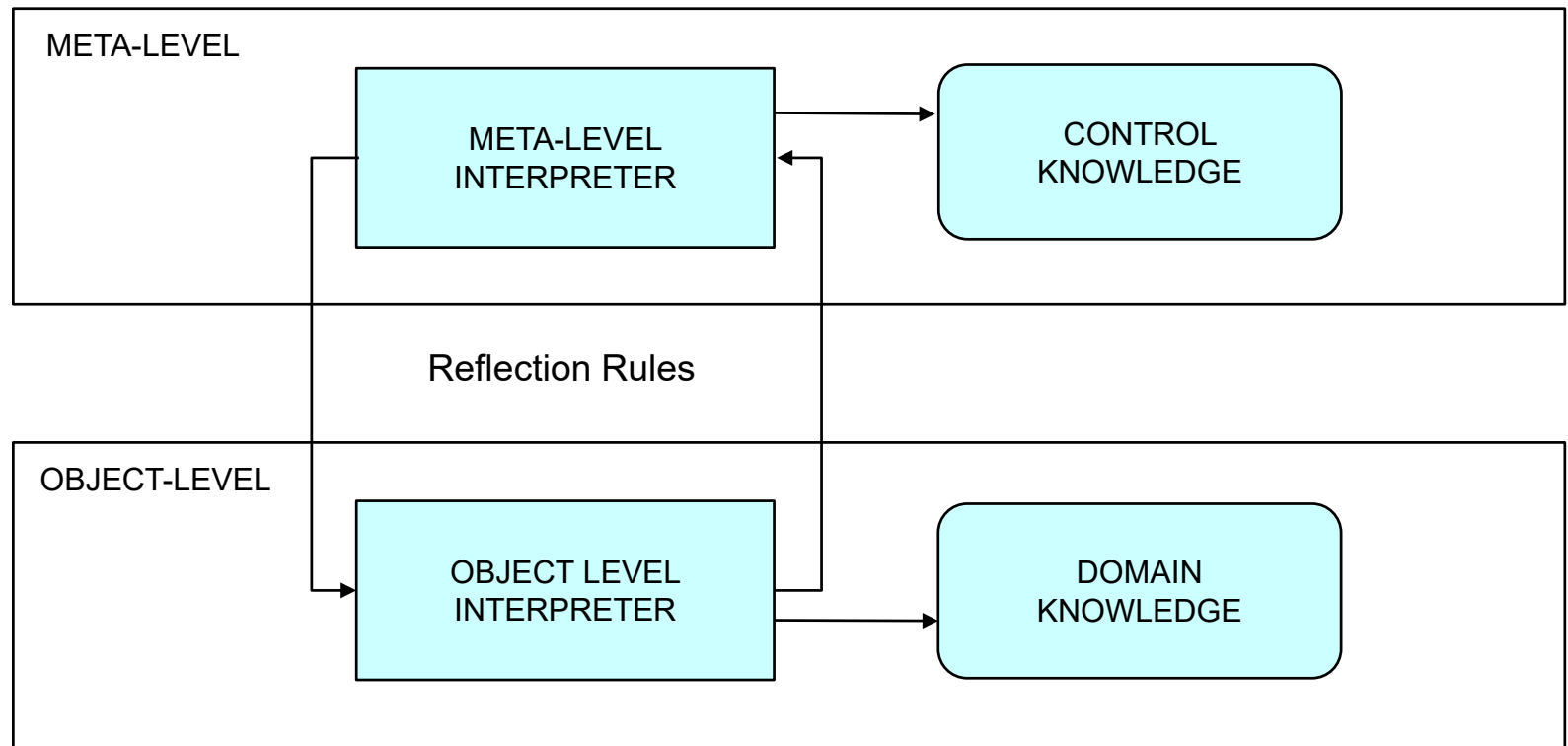


Reflective Reasoning in CBR



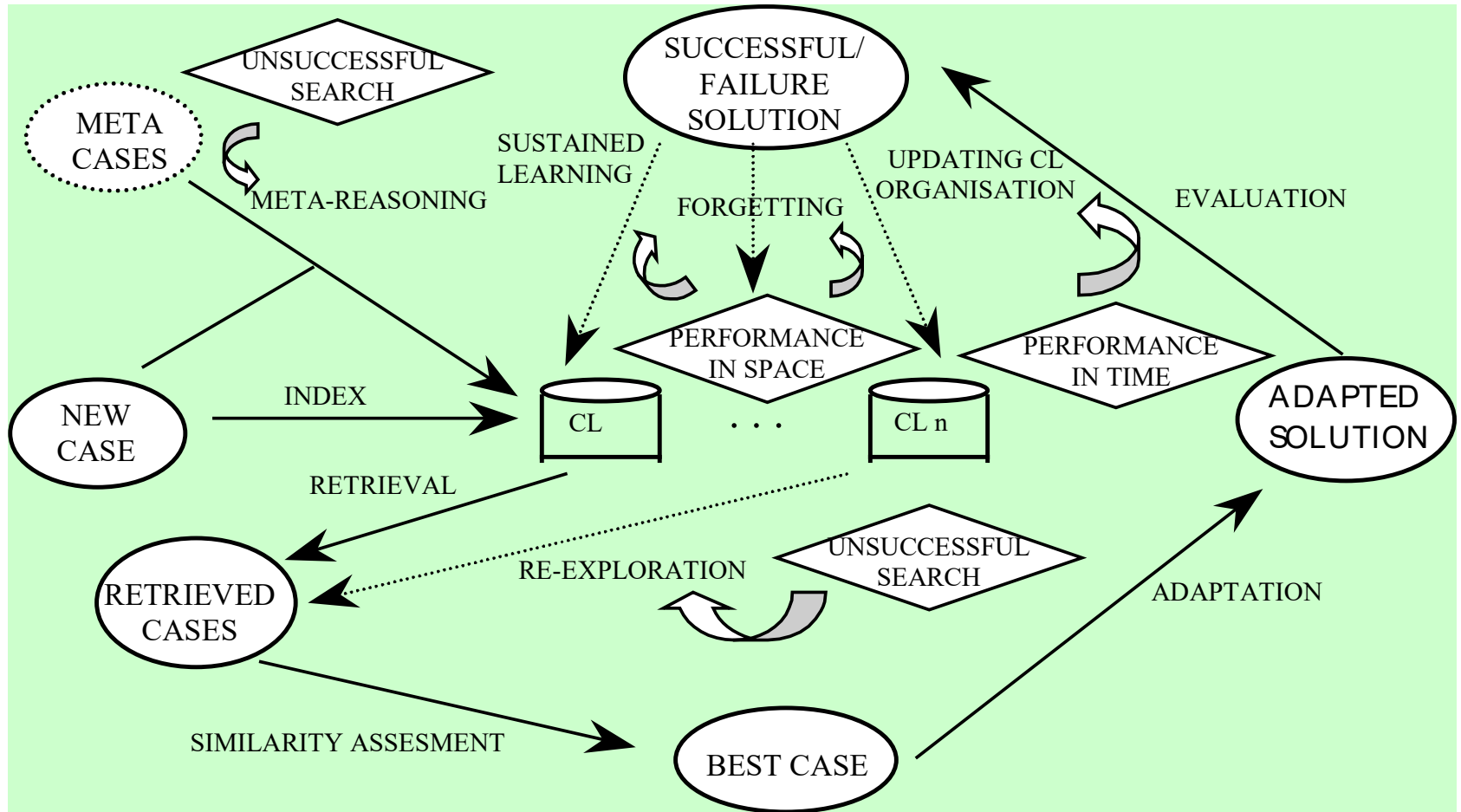
Meta-Level Reasoning Architectures

[Van Harmelen, 1991]





Reflective CBR Reasoning





Conclusions

- Reflective tasks
 - Forgetting
 - Learning
 - Updating the CL organisation
 - Re-exploring the CL
- Overcoming troubles in CBR reasoning
 - Lazy learning
 - Meta-Cases/Meta-reasoning



Intelligent Data Science and Artificial Intelligence (IDEAI-UPC)

Miquel Sànchez-Marrè
miquel@cs.upc.edu



Knowledge Engineering and Machine Learning Group
UNIVERSITAT POLITÈCNICA DE CATALUNYA

<https://kemlg.upc.edu>