AM-QuICk : a measurement-based framework for agile methods customisation

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AM-QuICK: Agile Methods Quality-integrated Customisation framework

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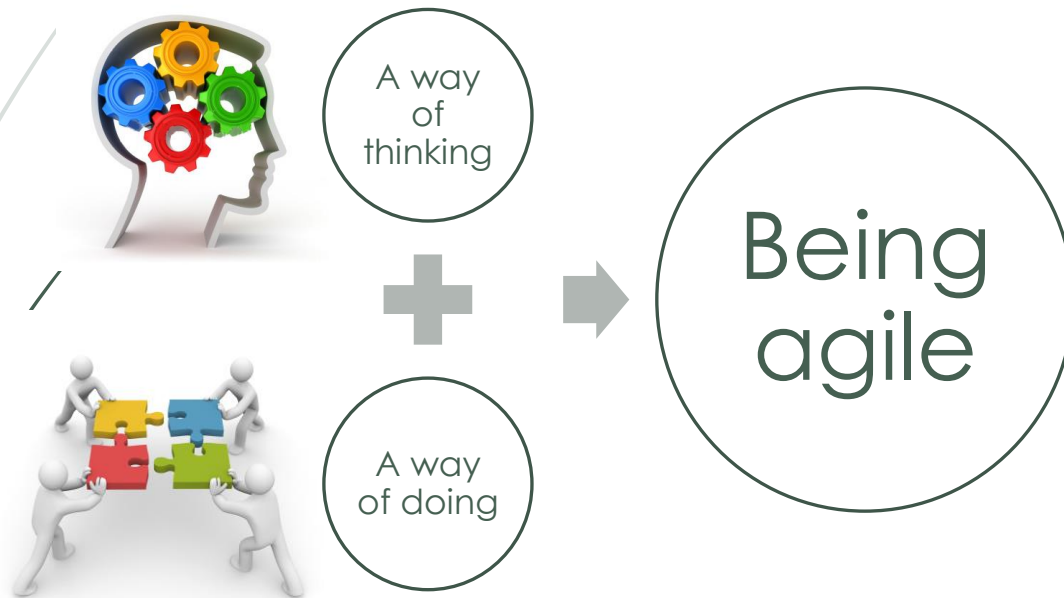
Overview

1. Agile adoption challenges
2. Research objectives
3. Related works
4. AM-QuICK Overview
5. Case study
6. Future works

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1. Agile adoption challenges

1.1 Agile adoption in a nutshell

1.2 Common issues

1.3 Keys for adressing agile adoption challenges

1.1 Agile adoption in a nutshell ...


A way of thinking

+

A way of doing

Being agile

- A way of thinking : Values + Principles
  - **Individuals and interactions** over processes and tools
  - **Working software** over comprehensive documentation
  - **Customer collaboration** over contract negotiation
  - **Responding to change** over following a plan

- A way of doing : Methods + Practices
  - Iterative, Incremental and adaptive development
  - Self-organized, cross-functional teams
  - Time-boxed, iterative approach, etc.

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1.2 Common agile adoption issues

- **No assessment of the readiness of the organisation :**
  - Why to go for agile?
  - Is the environment favourable (culture, organisation structre …) ?
- **Lack of objective decision making indicators / tools :**
  - The organisation diagnosis is often based on external consultant non-quantified experience instead of team intrinsinc knowledge and neutral quantitive elements
- **No tailoring and no suitabilty assessement of the chosen method :**
  - Unused or non applicable subset practices
- **No capitalisation on the previous agile adoption experiences / tailoring attempts**
- **No assessment of the process / product quality**
  - Quality is largely assumed to be a natural and obvious outcome of the enacted agile process
- **Agile processes are often monolithic : they rarely evolve with environment change**
  - Paradoxically, agile practitioners promote the evolution of the software but do not focus enough on the changes that may affect the agile process itself

1.3 Important keys to keep in mind …

- Understanding **the readiness of the organisation** is crucial to minimize failure risk

- Agile methods should be **customised** and **continously assessed** in order to fit the specific context

- Agile customisation experiences should be **capitalised**

- Change is inevitable : The **enacted agile process should evolve incermentaly**, just like the software evolve
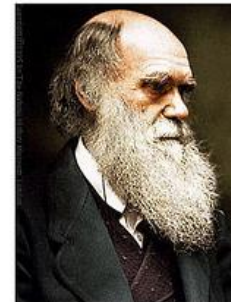
It is not the strongest of the species that survives, nor the most intelligent that survives. It is the one that is the most adaptable to change.

- Charles Darwin

2. Literature references and related works

- **Agile Customisation studies :**
  - Most of the studies are not reusable / generalisable : no automation techniques are provided
  - No assessment and refinement after the initial customisation :
    - **e.g., [mikulenas et al., 2011]**
- **Situational ME :**
  - « Constructing development methods tuned to the situation or the project and organisation at hand by selecting, tailoring and assembling appropriate components »
  - Existing SME metamodels : SPEM, SMSDM, OPF, etc.
- **Model-driven process evolution :**
  - In order to enable the evolution of the process over time and the co-evolution with the software, we need to be able to capture the interactions between the modelled process and the enacted process
    - Need to raise the abstraction level : an agile metamodel

3. Research objectives

- **Enlarging the scope** of existent agile methods customisation studies
- Investigate **a high-level / generic** approach for :
  - organisation specific-context study :
    - Identification of agility needs
    - Readiness
    - Risk analysis …
  - the design of a context-specific agile method
  - suitablity assessment
  - refinement overtime
- … thanks to decision making assistance, process and product quality indicators and metrics feedbacks

4. AM-QuICK Overview

4.1 AM-QuICK overview

- The **A**gile **M**ethods **Q**uality **I**ntegrated **C**ustomisation **F**ramework

- A framework based on the **QIP** and on **Situational ME**

- **AM-QuICK** aims at continuously assist during :
  - **Design of the customised method** by elements composition
  - **Design of the Product and Process quality indicators** and the **related metrics**
  - Design of the **refinement rules** that will allow evolution and co-evolution
  - Design of the **assessment rules**

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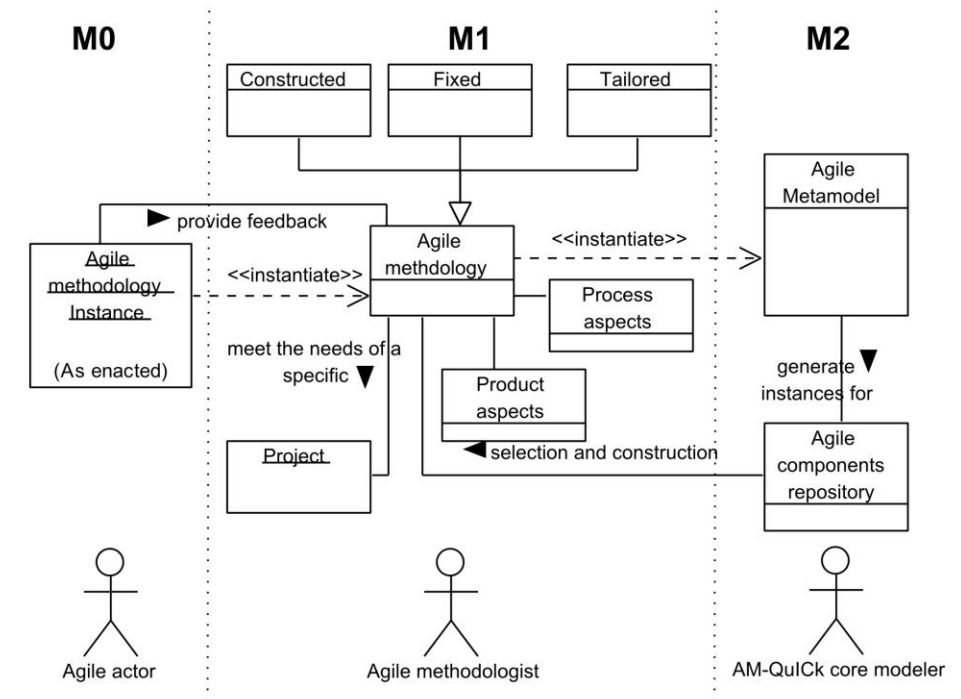
# 3.2 AM-QuICK Life-cycle
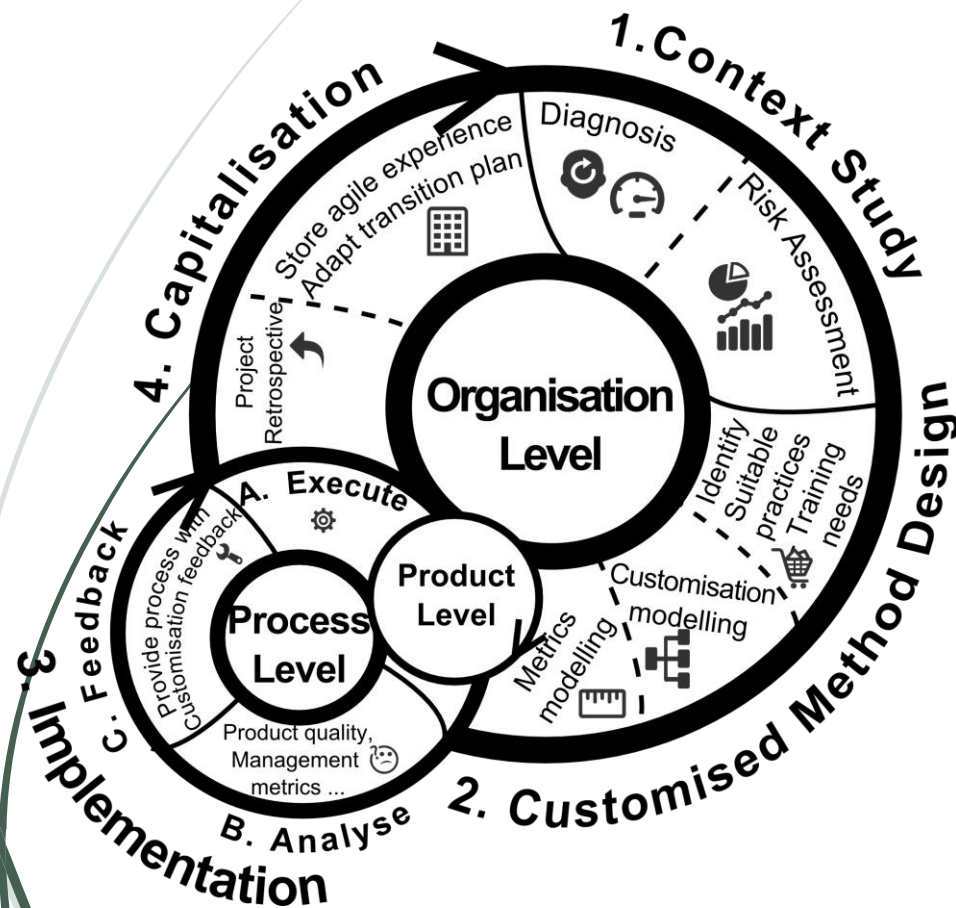
- 3 levels :
  - Organisation strategy level
  - Process enactement level
  - Working product level

- Any effort taken in a product may result in a revision of the process for the next iteration => co-evolution

- The main cycle consists of the following steps :
  - **Context analysis** : understanding the context through interviews, GQM-based diagnosis, risk assessment tools, etc.
  - **Customised agile method design** : Identification of suitable practices, design of the method elements, identification of evolution rules and assessment rules, design of correspond quality factors and metrics
  - **Implementation :** Execution of the designed process, analysis of the metrics feedback to allow later adjustments
  - **Capitalisation** : Future incoming projects have to profit from the gained experience

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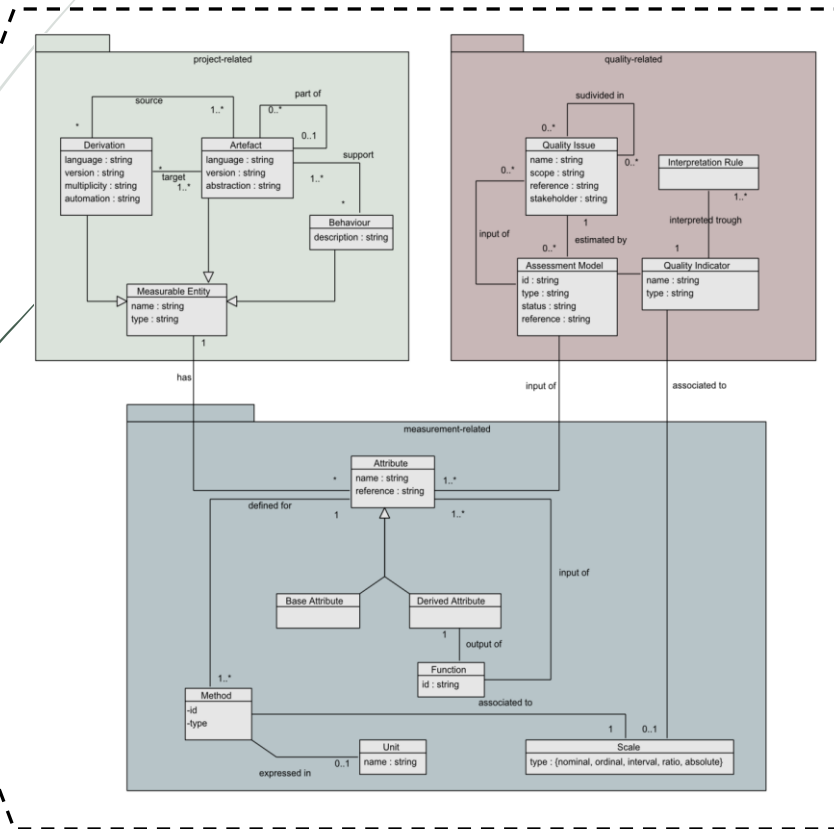# 3.3 AM-QuICK agile metamodel
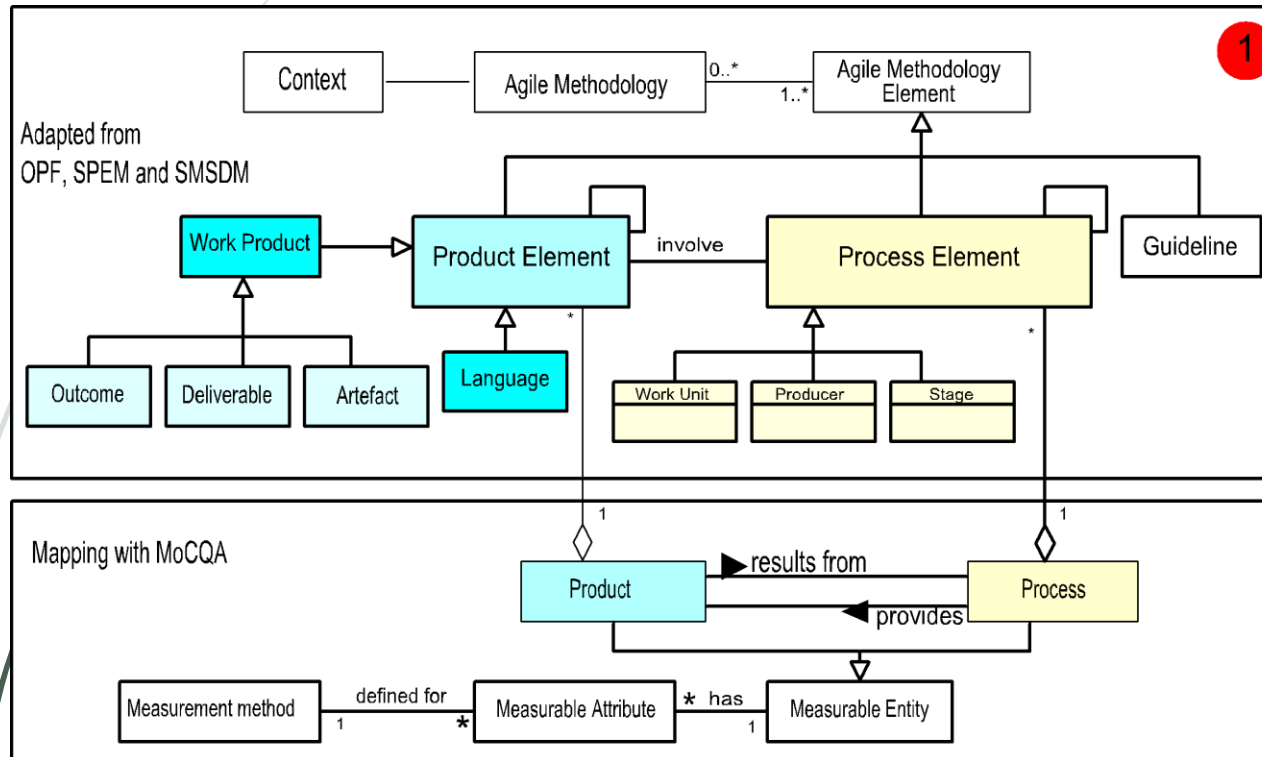
- AM-QuICK requires a metamodel which serves as a guide for agile methods design
- Adapted from SPEM and SMSDM
- Integrated a quality assessment metamodel (MoCQA)

4.4 AM-QuICK mapping with MoCQA

MoCQA
quality
metamodel

- The Model-Centric Quality Assessment approach :
  - theoretical framework
  - based software measurement principles
  - quality model approach
  - continued quality assessment of software
- Generation of customised quality models
  - rely on a quality metamodel
- Quality-related
  - Definition or reuse of a hierarchy of quality factors
- Measurement-related
  - Definition or reuse of measurement method
  - Associated to the quality factors
- Project-related concepts
  - Project vs product
  - Software ≠ black-box
  - Scope = project ≈ ecosystem

4.5 AM-QuICK measurement levels

- **Product level metrics :**
  - Code metrics :
    - o Cyclomatic complexity, coding standards violation, number of defects, number of refactors , code coverage …
  - Design metrics
    - o Code dependencies, abstractness …
  - Testing metrics
    - o Percentage of test coverage, number of automated test cases, ….

- **Process level metrics :**
  - Team management :
    - o Product ownership health, team technical health, agile knowledge degree, …
  - Work progress :
    - o Actual velocity, planned velocity, number of stories planned, number of accepted stories …
    - o Backlog size, feature business value estimation, work unit estimation, …

4. AM-QuICK implementation : Case study

4.1 Organisation context

- A middle-sized organisation of 2,300 employees

- IT service : 84 peple, mainly focused on the IT activities of the wallon payement agency in Belgium

- 5 entities, 2 entities covered by the study : DEV and PAD

- DEV has to units : project teams unit (CePRO) and Maintenance unit (CeSAM)

- PAD : Five units organised by business roles : Architecture, Quality insurance, Developers, Project managers, analysis

- 15 projects in progress

4.1 Organisation context : transformation roadmap

① **Context study**

- A- Agile awareness and communication

- B- Current process analysis : interviews and work groups

- C- Risk assessment

Diagnosis

② **Customised method design**

- A- Training sessions

- B- Suitable method and customisation needs identification

- C- Method and quality assessment modelling

③ **Implementation**

- A- Pilot project and team choice

- B- Project execution

- C- Iterations retros-pectives and Quality assessment feedback

Project retrospective

④ **Capitalisation**

- A- Agile spread to other projects

- B- Agile spread to business process

4.2 Data collection

- Interviews :
  - 1h – 2h per. Buisiness role unit
  - Aim :
    - Identify strenghs and weaknesses of the current process
    - Identify improvement opportunities by implementing agile
    - bulding urgency, detecting change reluctance …
- 2 questionnaires :
  - 15 project teams
  - 1st : Analyse tge current process in terms of agility degree :
    - Team organisation
    - Project managament
    - Specification / requirements analysis
    - Development practices
  - 2nd : Indentify the desired and/or applicable agile practices
- Project retrospective using the affinity diagram (KJ diagram)

4.2 Data collection : questionnaires construction methodology

- Based on literature review, the basic agile characteristics were extracted and classified into 4 sections ;

  - Team organisation

  - Project management

  - Specification / requirements analysis

  - Development practices

- Each section include from 3 to 7 characteristics

- A set of questions are asked to assess the team's score on each characteristic

- Questions are aswered based on the four point likert scale ; Strongly agree, agree, disagree, strongly disagree

4.3 Current process diagnosis

- Interviews outcome (Projet IDEES) :
  - Lack of involvment of the business units : their life-cyle is not aligned with team iterations
  - Lack of guiding tools and indicators to assess the agile effectiveness
  - Roles ambiguities
- Agility degree matrix :

1. Degree of customer satisfaction
2. Total cost due to quality problems
3. Time consuming in identifying potential quality problems
4. Respond time to customers' orders
5. The productivity of the enterprise

Traditional Approach · · · · · ■

With IQES ───●

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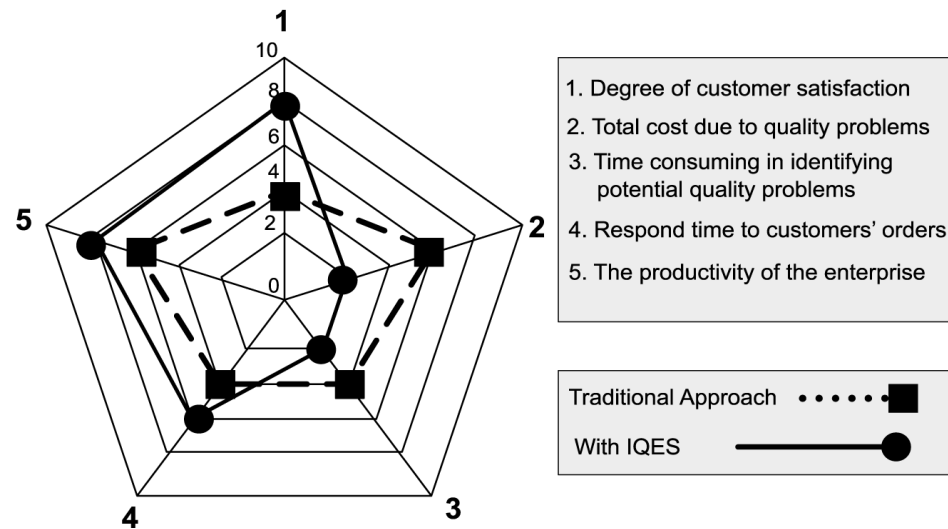
4.4 Risk analysis

Helpful to achieving the objective	Harmful to achieving the objective
Internal Origin • Team autonomy (Q1-1.2.1, Q1-1.2.3) • Team problems management (Q1-1.3.2) • Good technical practices (Q1-4, Q2-3) • Iterative lifecycle (Q2-2.5), (I) • High-level architecture (Q1-3.1, Q1-3.2, Q2-2.12), (I)	• Lack of process visibility (Q1-2.2.3) • Inflexibility to change (I) • Long iterations (Q1-2.1.4) • Inter-team communication (Q1-1.1.3) • Tasks estimation (Q1-2.2.1, Q1-2.2.2) • Business and technical stakeholders cooperation (Q1- 3.1, ..) • Non-collective specification and task estimation (Q1-2.2.1) • Organisation structure (Q1-1.1.1 , Q1-1.1.2) and (I) • Agile knowledge (Q2-1, Q2-2)
External Origin • Awareness of the need to change Q2-2, (I) • IDéES agile experience (I) • Management enthousiasm (I) • Management enthusiasm (I)	• Customer implication (Q1-2.2.4) and (I) • Business stakeholders implication (I) • Contract negociation (I) • Budget management (I) • Some business units reluctance (I)

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Conclusion and Future works

- AM-QuICK :
  - A general approach developed to help agile methods adoption, customisation and refinement through improvement cycles
  - Relies on SME and QIP

Future works

- AM-QuICK case study – next steps :
  - Pilot project selection
  - Suitable agile practices identification
  - Customised agile method design
- Enrich the AM-QuICK metamodel :
  - In order to be able to capture the organisation context
  - In order to include dynamic behaviour between its elements so that it will be able to represent the interaction between product / process elements , and theirfore their co-evolution
  - Establishment of the catalogue of reusable agile product and process elements, metrics, practices, tools …
  - This catalogue (actually under construction), will be used as an input for effective and informed methodological decisions
  - => Knowledge data base to use in the construction of the refinement and assessment rules

Thank you !

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