

Evaluating the Effectiveness of a Goal-Oriented Requirements Engineering Method

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Introduction

“Evaluating the Effectiveness of a Goal-Oriented Requirements Engineering Method”

- ❑ Regarding :
 - RE Objectives (REOs).
 - The method’s & the tool’s self-defined objectives.
- ❑ Using: two target problems as a basis for the evaluation.
- ❑ This talk will only cover :
 1. The steps of the evaluation using the **first** target problem regarding the REOs.

Evaluation steps

1. Selecting the method & the tool.
2. Identifying the evaluation purpose.
3. Selecting the type of the evaluation.
4. Deciding the scope of the evaluation.
5. Identifying the criteria.
6. Developing a measurement system.
7. Prioritising the criteria.
8. Selecting the evaluation methodology.
9. Analysing the study to produce raw data.
10. “Scoring” the criteria.
11. Combining the results of the two target problems.

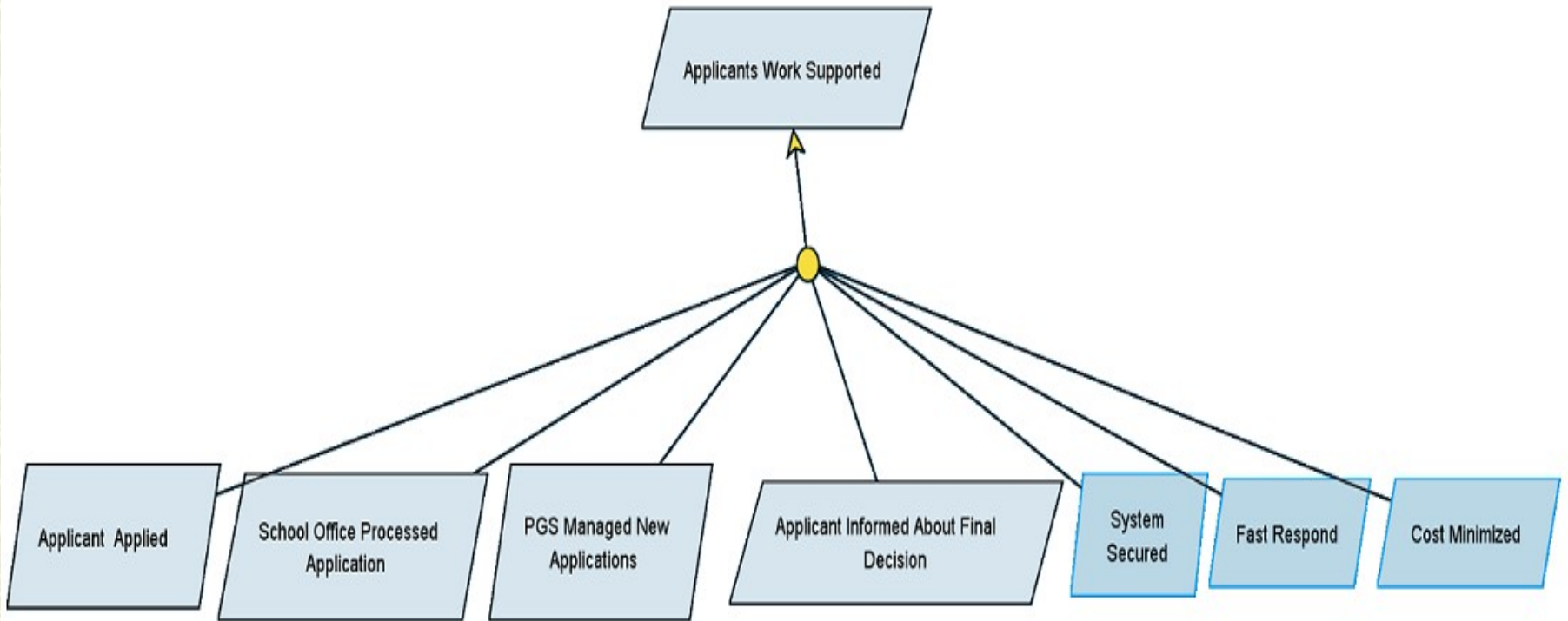
Step 1: Selecting the method & the tool(1).

- ❑ The **KAOS** method has been chosen.
 - A GORE method designed by Prof. Axel van Lamsweerde (Belgium)
 - It provides :
 1. A graphical language for system modelling.
 2. An optional temporal logic for model analysis.
 3. A systematic method for model elaboration.
 4. Techniques for :
 - ✓ Goal refinement and operationalizations.
 - ✓ Conflict management.
 - ✓ Agent responsibility assignment.
 - ✓ Obstacle management.

Step 1: Selecting the method & the tool(2).

- ❑ The **Objectiver** tool has been selected.
 - It is developed by Cediti Centre (Belgium).
 - Supports KAOS semi-formally.
 - has been applied to a number of industrial case studies.

Step 1: Selecting the method & the tool(3).



KAOS Model for the 1st target problem

Step 2: Identifying the evaluation purpose.

- ❑ To judge KAOS and Objectiver regarding:
 - the level of support they actually provide for:
 - ✓ REOs.
 - ✓ KAOS's & Objectiver's self-defined objectives.
- ❑ To :
 - Understand KAOS and Objectiver.
 - Improve their support for the REOs.

Step 3: Selecting the type of the evaluation

- ❑ Qualitative evaluation
 - To provide qualitative information based on the evaluator's observations.
- ❑ It is based on two target problems.
- ❑ Not an experimental study in the sense that it produces a dataset that can be analysed statistically.

Step 4: Deciding the scope of the evaluation.

- ❑ Concentrate on the issues that contribute to:
 - Understanding KAOS and Objectiver.
 - Improving their support for the REO.

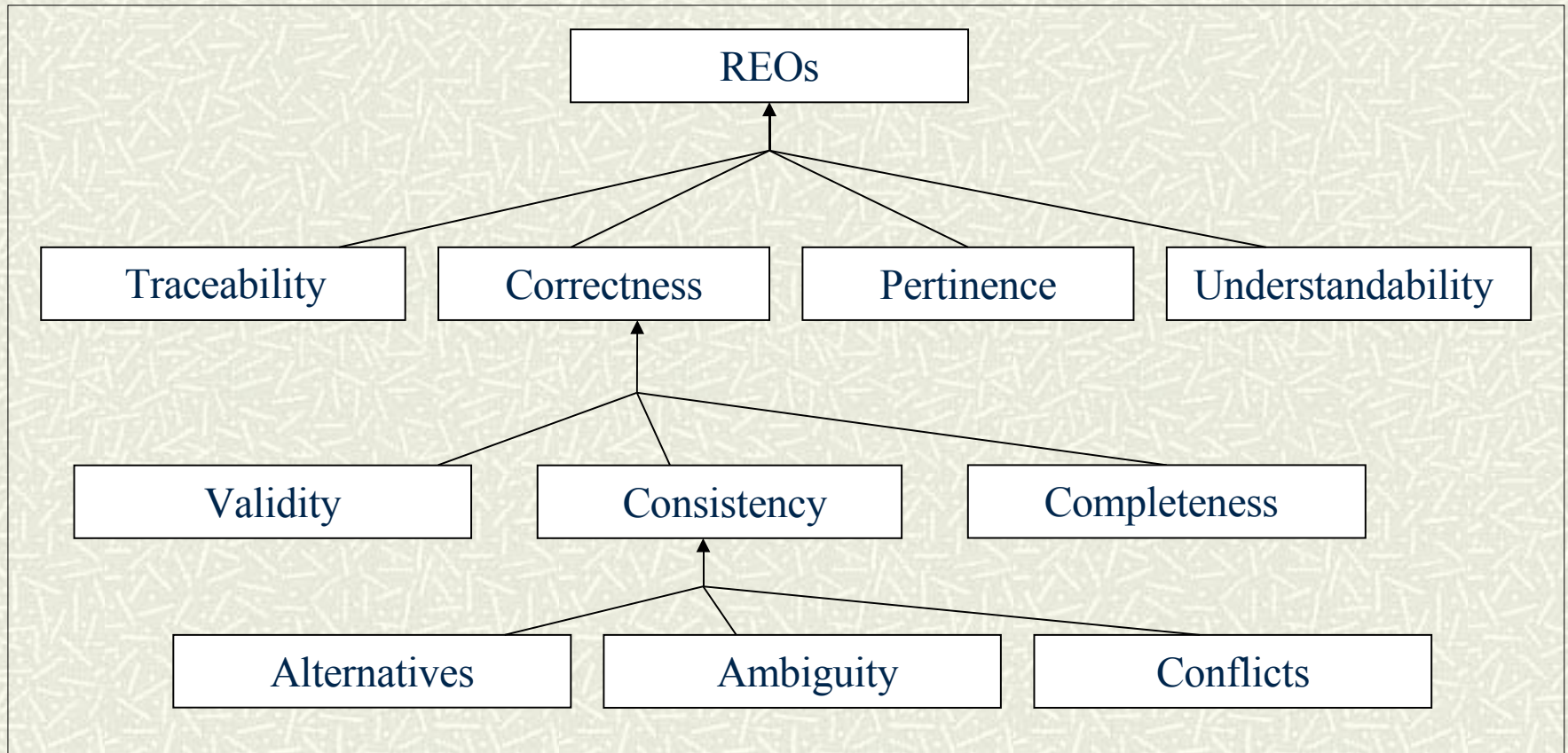
- ❑ Issues that were not included:
 - Management issues, such as price and marketing.
 - Teamwork issues.
 - ...

Step 5: Evaluation Criteria (1)

- ❑ REOs.
- ❑ KAOS's & Objectiver's self-defined objectives.

Step 5: Evaluation Criteria (2)

REOs



Step 5: Evaluation Criteria (2)

KAOS' self-defined Objectives

1. Create problem descriptions using predefined concepts.
2. Analyse the problem through a systematic technique for eliciting, discovering, and structuring goals .
3. Identify the roles of the stakeholders.
4. Provide formal definition of the R.
5. Establish efficient stakeholder communication.

Objectiver's self-defined Objectives

1. Support KAOS semi-formally.
2. Improve: validation process, quality of R documents, and stakeholder communication.

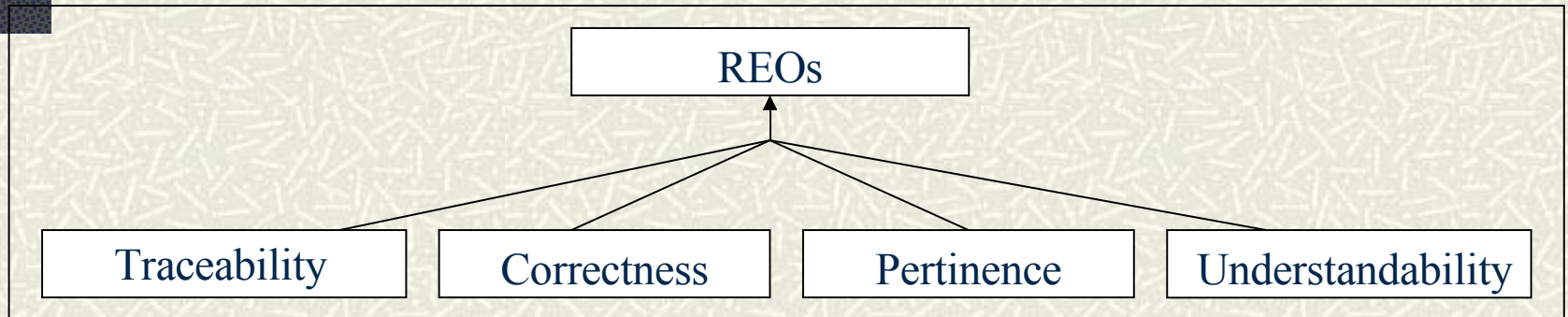
Step 6: Developing a measurement system(1)

- ❑ To provide a subjective scale that can be applied to each criterion.

For example:

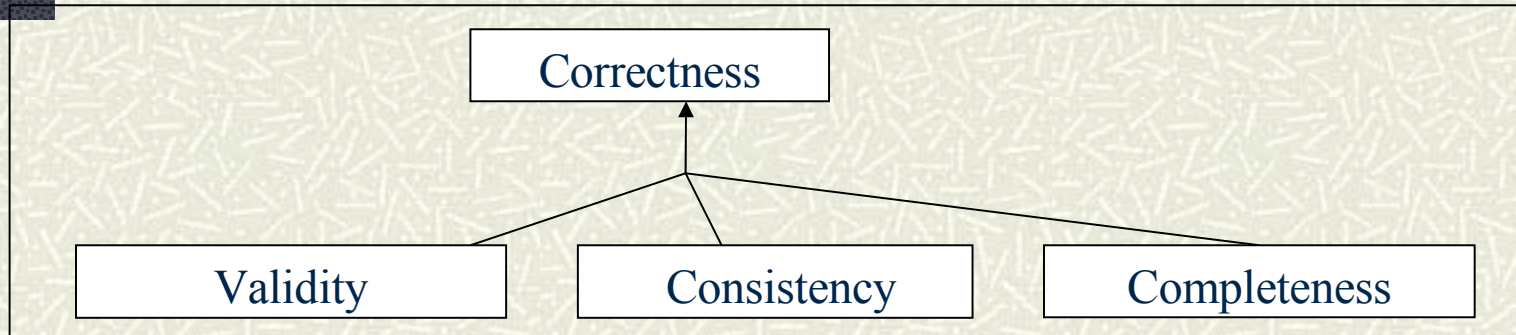
- ❑ An objective is “**fully achieved**” by KAOS or Objectiver (if):
 1. KAOS or Objectiver provides :
 - Step-by-step assistance to the developer.
 - Explicit and full discussion in the literature of the objective and its achievement.
 2. All aspects of the objective are covered:
 - No error reports mapped to this particular objective.
 - No negative observations mapped to the objective.

Step 7: Prioritising the criteria (1)



- ❑ Weighting the REOs:
 - Primary REO:
 - ✓ R are not acceptable unless this objective is satisfied.
 - Secondary REO:
 - ✓ Would enhance the R, but the R are not unacceptable if this objective is not fully achieved.
- ❑ Errors or limitations that map to primary objectives have more importance affecting the requirements' quality.

Step 7: Prioritising the criteria (2)



- ❑ Primary objective is **correctness**.
- ❑ Secondary objectives are **traceability, pertinence and understandability**.

Step8:Selecting the evaluation methodology

Participant-observer method

- ❑ It is field research method in which the researcher essentially becomes part of the team and participates in key activities.
- ❑ It provides a high level of :
 - Familiarity and trust with all stakeholders.
 - Domain knowledge.
- ❑ In the 1st target problem, a single user participated full time for 24 weeks on the evaluation and the development of the R.

Step 9: Analysing the study to produce raw data (1)

- ❑ Questions about what data to keep and record (decision).
- ❑ Raw data consists of :
 - Error reports.
 - Log book (observation).

Step 9: Analysing the study to produce raw data (2)

- ❑ Eliminating double counting by:
 - Identifying multiple occurrences of the ‘same’ error in different error reports.

Step 9: Analysing the study to produce raw data (3)

- Eliminating irrelevant problems:
 - Problems to do with being a novice.
 - Problems to do with incomplete target problem.

Step 10: “Scoring” the criteria

- ❑ Obtaining “scores” for each criterion using the ordinal scale.
- ❑ The scale used **A** to **E** represents ascending levels of achievement which can be associated with the degree to which the method and the tool meet the objectives.

- ❑ For example:
 - The objective that is “**fully achieved**” by KAOS or Objectiver is scored **A** on the scale for it.
 - The objective that is “**fail to be achieved**” is scored **E** on the scale for it.

Step 1 1: Combining the results of the two target problems.

- To present an overall measurement by:
 - Deciding on relative weights of the criteria.
 - Combining (in some way) the “scores” obtained for the two target problems.

Future work

- ❑ Complete the second target problem.
- ❑ Decide on relative weights of REOs.
- ❑ Evaluate the raw data generated over the two target problems.
- ❑ Combine the results of the two target problems.

Feedback and Questions

Thank You

Feedback & Questions

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