

# **GRAIL/KAOS: An Environment for Goal-Driven Requirements Analysis, Integration and Layout**

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The KAOS methodology provides a language, a method, and meta-level knowledge for goal-driven requirements elaboration. The language provides a rich ontology for capturing requirements in terms of goals, constraints, objects, actions, agents, etc. Links between requirements are represented as well to capture refinements, conflicts, operationalizations, responsibility assignments! etc.

The KAOS specification language is a multi-paradigm language with a two-level structure: an outer semantic net layer for declaring concepts, their attributes and links to other concepts, and an inner formal assertion layer for formally defining the concept. The latter combines a real-time temporal logic for the specification of goals, constraints, and objects, and standard pre-/postconditions for the specification of actions and their strengthening to ensure the constraints.

The method roughly consists of (i) identifying and refining goals progressively until constraints that are assignable to individual agents are obtained, (ii) identifying objects and actions progressively from goals, (iii) deriving requirements on the objects and actions to meet the constraints, and iv) assigning the constraints, objects and actions to the agents. Meta-level knowledge is used to guide the elaboration process; it takes the form of conceptual taxonomies, well-formedness rules and tactics to select among alternatives.

GRAIL is an environment under development to support the KAOS methodology. The GRAIL kernel combines a graphical view, a textual view, an abstract syntax view, and an object base view of specifications. The current version integrates a graphical editor, a syntax-directed editor, an hypertext navigator, and a LaTeX report generator. GRAIL has been used for the requirements reengineering of a large, complex telecommunication system.

The presentation of the tool will be accompanied by a brief presentation of the KAOS methodology that is necessary to understand it. Tool functionality will be illustrated with extracts from an industrial case-study. The presentation will conclude by discussing current limitations of the tool together with ongoing and future developments.

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