

Intelligent Requirement Review using Retrieval-Augmented Generation

Aristi Christoforou*

June 2026

Abstract

This thesis studies the use of Retrieval-Augmented Generation (RAG) for requirement review in large-scale engineering systems. Requirement management platforms such as Polarion contain thousands of interconnected requirements, making manual review time-consuming, subjective, and difficult to scale.

In this work, requirements are converted into vector representations, and retrieval is treated as a ranking task based on similarity. Building on this, a RAG-based system is used to support requirement analysis by identifying relationships, inconsistencies, and missing constraints between requirements.

A central part of the thesis is the evaluation framework. Retrieval performance is treated as an estimation problem, where metrics such as Precision@k, Recall@k, and MRR@k are analyzed using bootstrap confidence intervals and uncertainty-aware comparison.

The results indicate that the retrieval component behaves as a high-recall candidate generator, while the RAG-based system extends this pipeline by adding structured interpretation of the retrieved requirements. At the same time, the findings show that evaluation design has an impact on the conclusions and that uncertainty must be taken into account when interpreting performance.

*Postal address: Mathematical Statistics, Stockholm University, SE-106 91, Sweden.
E-mail: christoforouaristi1@gmail.com. Supervisor: Martina Favero.