

Towards a Guide to Architecting RAG Systems for Knowledge-Intensive Tasks within the Actuarial Domain

BJORN VAN BRAAK, University of Twente, The Netherlands

[Note: Generated + Adjusted] Actuaries in pension funds and insurance companies face increasing challenges in calculating technical provisions amid evolving regulatory landscapes, such as Solvency II and IFRS 17. Key issues include process fragmentation, reporting burdens (consuming 14% of time), and navigating complex regulations. This thesis explores the feasibility of Large Language Models (LLMs) to enhance actuarial productivity, motivated by prior studies showing up to 40% improvements in task completion speed and quality for knowledge workers.

The primary contribution is a methodological framework for designing, implementing, and assessing production-grade Retrieval-Augmented Generation (RAG) systems tailored to actuarial tasks. Through problem investigation via interviews, experiments evaluating LLM performance on domain-specific math problems, and a deep dive into incorporating actuarial knowledge (e.g., via RAG for verifiability), the framework addresses key RQs on LLM applicability, use cases, and reliability. A Proof-of-Concept for Solvency II regulatory search demonstrates its practical validation within EU-regulated actuarial organisations.

Results highlight LLMs' potential to reduce regulatory complexity and documentation overhead, enabling actuaries to focus on core calculations. <further highlight complete results>

Additional Key Words and Phrases: Large Language Models, Retrieval-Augmented Generation, Actuarial Science, Solvency II, Productivity Enhancement