Frankfurt University of Applied Sciences

Faculty of Computer Science and Engineering

Implementation and Evaluation of an Enterprise Architect Chatbot
Using a RAG-Based Approach

Thesis to Obtain the Academic Degree

Master of Science (M.Sc.)

Submitted by

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DECLARATION

I hereby assure that I wrote the present work independently and that I did not use any other sources than those given in the bibliography.

All passages that are taken verbatim or correspondingly from published or not yet published sources are marked as such.

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Frankfurt, 28. February, 2026

Hendrik Gruber

ABSTRACT

Lorem ipsum ...

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ACRONYMS

AI   Artificial Intelligence

AR   Action Research

EA   Enterprise Architect / Architecture

EAM   Enterprise Architecture Management

GenAI   Generative Artificial Intelligence

IT   Information Technology

PAR   Participatory Action Research

RAG   Retrieval-Augmented Generation

USAGE OF GENERATIVE AI

OpenAI GPT-5 (OpenAI, 2025) was used in order to find sources and summarize them.

Part I

THESIS

INTRODUCTION

1.1 MOTIVATION AND THESIS QUESTION

In the field of define that we are building a RAG system which will be referred to as a chatbot. it is not an agent, as it is not executing anything.

1.2 RESEARCH METHOD

Action Research (AR) was applied in order to gain scientific value out of the developed prototype. The advantage of this research method is that it is very supportive of the development process for information systems. According to Baskerville (1999), all types of action research have the following four characteristics in common: An orientation towards developing, a focus on a specific problem, an iterative process, and a collaboration amongst participants. This is applicable to the work at hand because a prototype is being developed for a specific problem. The development cycle is conducted iteratively and collaboratively with different stakeholders. More details on this are described in chapter 4.1 [2]

TERMINOLOGY AND TECHNOLOGY

This chapter goes in detail on the terminology and technology that will be relevant for the reader to have a foundational understanding of the rest of this thesis. Later chapters will build upon these concepts and pieces of technology.

2.1 TERMINOLOGY

2.1.1 *Enterprise Architecture Management*

Enterprise Architecture Management (EAM) can be summarized as being the bridge between the business and IT departments of an enterprise. The goal is to implement information technology that is aligned with the business needs of the company. This is in contrast to the IT department implementing information technology for the sake of implementing information technology, which people in IT are often fond of doing [1]. An unwanted situation would then be when the IT department falls into a siloed way of thinking where they are decoupled from the rest of the company. EAM helps to ensure that the implemented information technology is achieving the right things, namely supporting the business capabilities and processes. [11, pg. 2-3]

Enterprise Architecture can benefit a company in various ways.

Diese Quelle hierfür vielleicht verwenden: [10] Die Quelle hat vor allem eine Menge Fragen aus der echten welt, was EAs sich im alltag fragen. diese liste kann als referenz dienen für meinen copilot. Diese Quelle hilft da vielleicht auch nochmal um in die Tiefe zu gehen. [3]

2.1.2 *Enterprise Architect*

A common challenge for an EA is dealing with the heterogenous nature of an application landscape [11, pg. 6]

Erwähnen, dass eine Herausforderung des EAs es ist, dass die vorzunehmenden Änderungen zwar von einem high-level POV einfach aussehen, aber in den details viele herausforderungen stecken. zB stakeholder management (jede Applikation hat einen eigenen verantwortlichen, viele schnittstellen der applikationen, etc.)

2.1.3 *Capabilities*

2.1.4 *Value Streams*

2.1.5 *Architecture Diagrams*

2.1.5.1 *Application Landscape*

2.1.5.2 *Capability Support Matrix*

2.1.6 *Large Language Models*

LLMs are capable of supporting in language-related tasks where text needs to be generated, translated, summarized, analysed, or questions answered [9].

2.1.7 *Graph Database*

2.1.8 *Retrieval Augmented Generation*

2.1.9 *neo4j*

2.1.10 *Model Context Protocol*

Also explain (maybe in the SOTA) how it is able to understand the schema of the graphdatabase (by calling get-schema when initializing the MCP it knows how my graph database is setup).

CURRENT STATE OF THE ART

Briefly explain why a literature analysis is important. Define the scope (what fields you looked at, which databases, what keywords). Define the research method and how you narrowed it down from x sources to y sources.i

3.1 ENTERPRISE ARCHITECTURE MANAGEMENT

theories, digital twin efforts, EA tool landscapeStandards or frameworks (e.g., TOGAF, ArchiMate, IATA ONE Record, LeanIX). Theoretical foundations (auch auf prozessmanagment eingehen, wie der aktuelle Prozess aussieht, wenn die Landschaft geändert werden soll) Current tools and methods Research prototypes in EA

Authors Jung and Fraunholz 2021 [11] lay foundational work from which many EAM concepts can be derived.

3.2 LARGE LANGUAGE MODELS, CONVERSATIONAL AGENTS, AND RETRIEVAL-AUGEMENTED GENERATION

strengths, hallucination issues, graph-RAG enhancements Theoretical foundations Current tools and methods

This paper covers how ai tools are more scalable than manual expertise analysis of things. The source is highly relevant. Look at the summary in notebookLM. 05.10.25 [8]

This 2025 paper has ideas on how changing knowledge-graphs (e.g. through updates) can be handled [12]. It looks at temporal data and how to handle it. This might be relevant since addressing how a changing application landscape can be handled will probably be a challenge.

This paper gives an overview on how to control the dialog sequence and also notes 4 types of dialog options for chatbots in the related works section: [13].

This paper [16] covers how a chatbot can support in task-planning and output generation. Might be helpful in understanding how my chatbot can tell the EA how to conduct changes in the application landscape.

This paper [5] states how proactive dialogue systems work and can be improved. It goes into detail on 3 types of dialogue systems: clarification, target-guided, and non-collaborative dialogues. All 3 of these have a certain relevance for the EAM Chatbot.

RAG: Geh darauf ein, was es für unterschiedliche Chunking methoden gibt, wie man ein Buch runterbringt, und was das alles für vor und nachteile hat. auch welche tools es gibt (neo4j) ist wichtig.

3.3 COMPARABLE PROJECTS AND PROTOTYPES

Proof-of-concepts, research prototypes, industry whitepapers, GitHub projects.

Tools like ChatEA, LeanIX AI features, or Microsoft Copilot integrations in architecture/governance.

A prototypical graph-based RAG approach for text-summarization has been created by Microsoft: y[6]. The accompanying paper is here: [7]

3.4 EVALUATIONS AND LIMITATIONS

Studies analyzing strengths/weaknesses of RAG, embedding quality, hallucination mitigation.

Papers about user interaction with EA tools, chatbot evaluation frameworks, usability challenges

This paper [15] gives a standardized method and framework for evaluating coversational AI agents.

This paper [14] proposes a benchmark for open-ended multi-turn conversational agents. I think this paper focuses more on evaluating agents and comparing their results, but maybe i can copy their evaluation methods and benchmarks?

METHODOLOGY

This chapter describes how the chatbot "Masuta" (Japanese for "Master") was developed. It gives more insight into the applied research method and how the prototype came to be.

Sequenzdiagramm, projekt plan (timeline), herangehensweise, etc.

4.1 ACTION RESEARCH

Action Research (AR) is a research method which is highly applicable when developing an information system such as the one presented in this paper. The advantage of AR is that a large focus can be laid on the development of a system while still achieving an academic benefit.

Cyclical phases are central to the concept of Action Research. Baskerville [2] describes Action Research as an iterative process consisting of five steps within a single cycle. Other sources, such as Cornish et al. [4], propose variations with fewer phases within a cycle; however these models also boil down to the same concepts. Across the literature, Action Research cycles follow the same structure: planning what should be done in the new cycle, taking action, and evaluating the outcome of the completed cycle before moving on to the next one [2, 4].

Todo: describe action research in more detail here [2] Also this source is good: [4]

As mentioned in section 1.2, the Action Research method was applied to gain scientific value from the development of the chatbot. Action Research

4.2 PRECONDITIONS

4.2.1 *Development Cycles*

4.2.1.1 *Cycle 1*

4.2.1.2 *Cycle 2*

4.2.1.3 *Cycle 3*

4.2.1.4 *Cycle 4*

4.3 DATA USED

4.4 FINISHED PROTOTYPE

Explain here, what the finished prototype is (including architecture diagram, sequence diagram, etc.). or should this be an entirely separate chapter? de-

scribing this somewhere here makes sense though before moving on to the experiments done with the prototype.

EXPERIMENTS

What we did with the finished prototype and how we tested it. Prompts we used, cases we built, edge cases, etc.

EVALUATION OF THE RESULTS AND CHALLENGES

CONCLUSION AND FUTURE WORK

Todo

7.0.1 *Conclusion*

7.0.2 *Future Work*

Some ideas for future work: how to improve the challenges mentioned. what other areas this could find utility in. how could access management be handled? e.g. if the database contains customer-information that not every user should be able to see, how can that be differentiated? real-world scenarios that could use my prototype and try out a pilot phase?

Part II

APPENDIX

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