

## Chapter 1 - INTRODUCTION

This chapter lays the groundwork for the thesis by clearly defining the critical problem, the specific research objectives and questions, the scope and limitations of the study, and its overall significance for Swiss German University (SGU) and other higher education institutions.

### 1.1 Background of the Study

In the digital era, effective document and knowledge governance is a critical priority across industries. It is clear that knowledge management (KM) is essential for organizational competitiveness and performance (Mohaghegh *et al.*, 2024). Global trends make it clear: cloud technologies and artificial intelligence (AI) are the future of managing information assets. Cloud-based document management systems are set to soar, with a projected growth rate of 16.6% CAGR, reaching a staggering USD 24.34 billion by 2032. This signals an unmistakable shift toward digital document solutions (*Document Management System Market to Reach \$24.34 Bn*, 2025). At the same time, advanced AI-driven knowledge platforms are being adopted more and more to unlock data value, streamline operations, and enhance collaboration (Shehabat, 2020). A 2020 study by Shehabat (2020) confirms that KM practices, significantly boosted by technological advancements, are *"increasingly important for organizations to achieve their goals and stay competitive"*. This global momentum has encouraged even higher education institutions to modernize their document and knowledge governance practices.

In Indonesia, many higher education institutions still face challenges in adopting standardized document management. The implementation of knowledge management in Indonesian universities is often lacking in standardization, resulting in diverse and unstructured practices (Hidayat and Sensuse, 2022). While most universities use basic information systems, such as campus information systems or e-learning platforms, comprehensive document governance frameworks are often lacking. Swiss German

University (SGU), a private Indonesian university established through Indonesian-European collaboration in 2000, reflects this situation.

Fortunately, SGU's existing infrastructure presents a unique opportunity. The university's use of Google Workspace for Education Plus (GWS-E+) provides a secure and scalable cloud-based foundation. The platform's embedded AI services offer a powerful toolkit for automating classification, enriching metadata, and enhancing information retrieval.

Therefore, this thesis proposes designing and evaluating an AI-enhanced document and contract governance system that leverages SGU's existing GWS-E+ infrastructure. The research is scoped as a proof of concept (PoC)—a controlled prototype designed to demonstrate the proposed solution's feasibility, usability, and value. The PoC will serve as a validated model to inform a future, university-wide implementation that will address longstanding challenges in document lifecycle management and contract awareness.

## 1.2 Research Problem

This research applies the Ishikawa Root Cause Analysis (RCA) model—commonly visualized as a fishbone diagram—to comprehensively understand the inefficiencies in SGU's document and contract governance. Introduced by Kaoru Ishikawa in the 1960s and described in his seminal work *What is Total Quality Control? (Ishikawa | PDF | Causality | Six Sigma, 1985)*, helps identify the multifactorial causes of a central problem by categorizing them into key domains such as People, Process, Technology, and Data. In the context of document management and governance in higher education, the fishbone diagram is the tool of choice for classifying root causes of inefficiencies into broad impact areas.

Figure 1.1 presents the Ishikawa diagram of the root causes contributing to SGU's document and contract management problems. Each "bone" of the fish represents one of the four categories and its associated sub-issues.

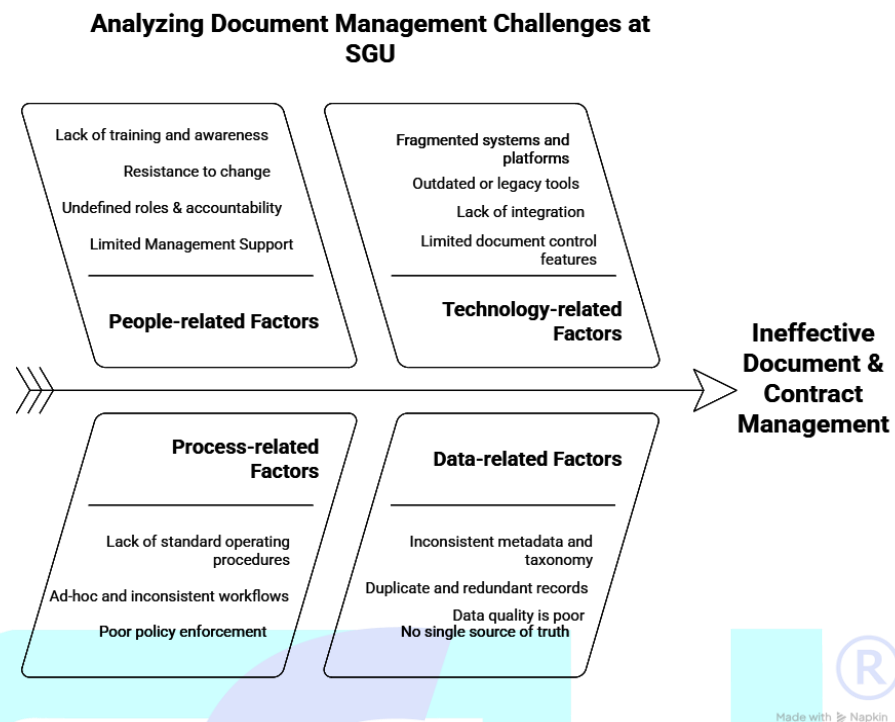


**Figure 1.1 Ishikawa (Fishbone) Diagram**

This research addresses the absence of a structured, integrated, intelligent system for document and contract governance within Swiss German University's (SGU) non-academic departments. Current practices are largely manual, decentralized, and inconsistent. This leads to significant operational inefficiencies, compliance risks, and a loss of institutional knowledge.

The analysis revealed that the challenges are not isolated incidents, but rather systemic problems stemming from weaknesses in four key areas: Methods (inconsistent processes), machines (fragmented technology), manpower (dependence on individual knowledge), and materials (inconsistent data and metadata). These weaknesses result in three primary, interlinked problems:

1. Fragmented and insecure document storage;
2. Inefficient information retrieval, and
3. A complete lack of proactive contract monitoring.

These issues create a compelling need for a new solution. A detailed, in-depth analysis of these root causes, which was conducted as part of the DSR Relevance Cycle, is presented in Section 3.3.1.

### 1.3 Research Objectives

This research will address the challenges in document and contract governance at Swiss German University (SGU) by achieving the following specific objectives:

- To Analyze SGU's current document governance state, identifying specific pain points and challenges across its people, processes, and technology to establish a clear basis for system requirements.
- To Design a comprehensive architectural framework for an AI-enhanced governance system, integrating established enterprise architecture principles (TOGAF), IT governance controls (COBIT), and international standards for records management (ISO 15489 & ISO 23081).
- To Develop a Proof-of-Concept (PoC) prototype on SGU's existing Google Workspace for Education Plus (GWS-E+) infrastructure, demonstrating key AI-driven functionalities including automated document classification, intelligent metadata extraction, and semantic information retrieval.
- To Evaluate the implemented PoC's usability, effectiveness, and alignment with institutional needs through rigorous expert validation and user testing within SGU's operational context.
- To Formulate actionable recommendations based on the evaluation findings, providing a strategic roadmap for a full-scale implementation at SGU and a generalizable model for similar higher education institutions.

This study's objectives are clear: to build a robust, AI-enhanced document and contract governance solution specifically tailored for SGU, and crucially, to contribute a generalizable model that similar institutions facing comparable document governance challenges can reuse or adapt.

## 1.4 Research Question

This research is guided by a set of specific questions that collectively address the identified challenges in document and contract governance at Swiss German University (SGU) and contribute to the broader body of knowledge in AI-enhanced document management in higher education:

1. **RQ1:** What are the primary challenges and root causes of inefficiency in document and contract governance within SGU's non-academic departments?
2. **RQ2:** How a cloud-based application architecture for an AI-enhanced document and contract governance system can be designed for SGU that aligns with established enterprise (TOGAF), IT governance (COBIT), and records management (ISO 15489 & 23081) standards?
3. **RQ3:** How a functional prototype of the AI-enhanced document and contract governance system can be developed using SGU's existing Google Workspace infrastructure to demonstrate the feasibility of the proposed architecture?
4. **RQ4:** How effective is the implemented prototype in addressing the identified challenges regarding usability, compliance, and efficiency?
5. **RQ5:** What generalizable recommendations can be derived from the SGU case study for other higher education institutions facing similar challenges?

Answering these questions will ensure the research stays focused on both diagnosing the problem and validating the proposed solution's efficacy.

## 1.5 Hypothesis

The following hypotheses have been formulated to guide the research and provide a framework for validation. Each hypothesis corresponds to a specific research question and will be addressed at an appropriate stage of the thesis:

1. **H1:** It is hypothesized that SGU's primary governance challenges stem from identifiable issues in its processes and technology, including fragmented storage, inconsistent metadata, and a lack of automated monitoring.
2. **H2:** It is hypothesized that a viable and coherent architecture can be designed by integrating principles from TOGAF, COBIT, and ISO standards, creating a

framework that is more effective than applying any single framework in isolation.

3. **H3:** It is hypothesized that a functional Proof-of-Concept demonstrating the core features of the designed architecture—including automated classification, metadata extraction, and contract monitoring—can be successfully developed and deployed on the existing GWS-E+ platform.
4. **H4:** It is hypothesized that the AI-enhanced prototype will demonstrate a significant improvement over current processes by achieving high user usability scores, enhancing compliance awareness, and increasing the efficiency of information retrieval.
5. **H5:** It is hypothesized that the findings and validated design principles from the SGU implementation can be synthesized into a set of practical, generalizable recommendations for other higher education institutions seeking to implement similar AI-driven governance systems.

## 1.6 Scope of the Research

This Proof-of-Concept (PoC) study is designed to demonstrate the feasibility and potential value of the proposed system. As such, its scope is intentionally limited. The boundaries and limitations of the research are defined as follows:

### 1.6.1 Institutional Scope

- **Case Study:** The research focuses exclusively on the Swiss German University (SGU), a private higher education institution in Indonesia. The solution is tailored to the university's specific workflows and needs.
- **Departmental Focus:** The prototype was implemented and evaluated within the Human Resources (HR) and Finance departments because they were identified as key areas with significant document governance challenges.
- **Document Types:** The scope is limited to non-academic administrative documents and contracts, such as policies, agreements, and internal memos. Academic documents managed by other dedicated systems are excluded.

### 1.6.2 Technological Scope

- **Platform:** The system was built exclusively within the Google Workspace for Education Plus (GWS-E+) ecosystem and leverages SGU's existing cloud infrastructure.
- **Development approach:** The solution emphasizes configuring and scripting existing Google tools and APIs rather than developing custom software from scratch.
- **Database:** For the proof of concept (PoC) phase, Google Sheets is used as the metadata database for rapid prototyping. It is acknowledged that a production system would require a more scalable database solution.

### 1.6.3 Functional Scope

- **Core Functionality:** The PoC showcases the core document governance (secure storage, access control, and metadata management) and key AI-enhanced features (automated OCR, semantic search, and a conversational AI assistant).
- **Document Lifecycle:** The system manages finalized and authorized documents. However, it does not cover the entire document lifecycle, including initial drafting, version control, and complex, multi-stage approval workflows.
- **Contract Management:** Functionality is limited to automated renewal and expiration alerts. Comprehensive contract lifecycle management (e.g., drafting and negotiation tracking) is not included.
- **Data:** To adhere to data privacy and ethical considerations, the prototype uses non-sensitive, mock, or publicly available documents for development and testing.

### 1.6.4 Evaluation Scope

- **Methodology:** The preliminary evaluation consists of expert validation and user testing with a limited group of users to assess usability and functional effectiveness.
- **Timeframe:** The assessment is conducted within the timeframe of this master's thesis. It does not include a longitudinal study of long-term impacts, such as sustained productivity gains or return on investment (ROI).

- **Rollout:** The research covers testing the prototype, but not a full organizational rollout. The latter would entail university-wide change management and extensive user training.
- **Evaluation of Human-AI Interaction:** It does not include a formal human-AI interaction (HAI) study. Although the system's usability will be tested, specific HAI metrics such as cognitive load, explainability (XAI), and long-term user trust are beyond the scope of this initial proof of concept (PoC).

In summary, this research is definitively focused on producing a working, evaluated solution for document and contract management in the SGU context using Google's Cloud Platform and AI tools. The intended users of the findings and artifacts (e.g., the architectural framework, the prototype, and the best-practice guidelines) are similar higher education institutions seeking to improve their document governance. Areas outside this scope, such as different industries, non-Google technology stacks, and broader institutional change efforts, are acknowledged but not directly addressed in this study.

## 1.7 Significance of the Research

This research is of immense significance. It delivers tangible benefits for Swiss German University and other institutions like it. It also contributes to scholarly discourse at the intersection of enterprise architecture, information governance, and artificial intelligence implementation in higher education.

### 1.7.1 Practical Significance

This thesis provides Swiss German University and similar institutions with a direct, cost-effective, and replicable model for modernizing document governance. The proposed system strategically leverages the existing Google Workspace for Education Plus (GWS-E+) platform to deliver immediate and tangible benefits without requiring significant new infrastructure investment.

The primary practical contributions include the following:

- ***A Blueprint for Modernization:*** This research provides university administrators with an actionable guide for transitioning from fragmented, manual processes to an integrated, automated governance solution, thereby improving efficiency and compliance.
- ***Enhanced operational efficiency:*** The system is designed to drastically reduce the time spent on manual data entry and document retrieval through AI-powered automation, including intelligent tagging and semantic search.
- ***Reduced institutional risk:*** The system minimizes the risk of human error by automating critical functions like contract renewal alerts, preventing potential financial penalties and legal liabilities from missed deadlines.
- ***Improved Decision-Making:*** The integrated conversational AI assistant enables administrators to swiftly extract accurate insights from complex documents, ensuring strategic planning and daily operations are informed by timely, precise information.

Ultimately, this research provides a scalable pathway for universities, particularly those in developing regions, to "leapfrog" traditional enterprise software and adopt agile, AI-driven document governance.

### 1.7.2 Academic Significance

This thesis contributes to the scholarly body of knowledge by bridging the gap between theory and practice in the context of digital transformation in higher education:

- ***An Integrated Framework in Practice:*** This research provides a rare, concrete case study of how high-level theoretical frameworks, such as TOGAF, COBIT, and ISO standards, can be successfully integrated and implemented to solve real-world organizational problems. The study moves beyond theory to offer a validated architectural blueprint.
- ***Empirical Insights on AI Adoption:*** The study generates valuable data on user acceptance of and effectiveness with advanced AI tools, such as semantic search and conversational assistants, for administrative tasks in a university setting. The evaluation, which includes usability metrics and user feedback, contributes

new insights to human-computer interaction (HCI) research in this specific domain.

- ***A User-Centric DSR Model:*** The thesis emphasizes a human-centred approach, demonstrating that successful technology deployment depends on integrating user experience (UX) considerations with robust technical design. The model balances technological capability with practical usability.

In summary, this research has a dual impact: practical utility and academic contribution. It offers SGU a tangible solution to reduce risk and improve decision quality, all while advancing scholarly knowledge on effectively integrating enterprise architecture, AI, and information governance in the modern university.

## 1.8 Thesis Structure

This thesis is organized into five chapters, each of which addresses a distinct phase of the research.

**Chapter 1 – Introduction:** This chapter lays the groundwork for the study. It outlines the research background, defines the problem statement at SGU, and presents the core research objectives, questions, and hypotheses. Finally, the chapter defines the scope, limitations, and significance of the research.

**Chapter 2 – Literature Review:** This chapter reviews the theoretical and technological foundations of the research. It examines foundational concepts in enterprise architecture (TOGAF), IT governance (COBIT), and information management standards (ISO 15489 and 23081). Additionally, it assesses the application of relevant AI technologies in document management to identify current research gaps.

**Chapter 3 – Research Methodology:** This chapter describes the systematic approach used for the research. It introduces the Design Science Research (DSR) methodology and describes the methods used for the system's architectural design, Google Workspace platform prototype development, and evaluation strategy.

**Chapter 4 – Results and Discussion:** This chapter presents the research outcomes. First, it introduces the implemented Proof-of-Concept prototype and its key features. Then, it details the empirical findings from the expert validation and user testing phases. It analyzes the quantitative and qualitative data in relation to the research questions and hypotheses.

**Chapter 5 – Conclusion and Recommendations:** The final chapter summarizes the research findings and reflects on their implications. It summarizes the key conclusions, acknowledges the study's limitations, and offers actionable recommendations for SGU's comprehensive implementation. Finally, the chapter discusses the study's broader contributions to the field and suggests avenues for future research.

