

Chapter 5 – CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This final chapter concludes the research by synthesizing the findings from the entire study and discussing their broader implications. The study was initiated to address significant and pressing challenges in document and contract governance within the non-academic departments of Swiss German University (SGU). These challenges, rooted in fragmented storage, inconsistent metadata, and a lack of automated monitoring, created operational inefficiencies and institutional risks, necessitating a modern, robust solution.

Using the Design Science Research (DSR) methodology, this thesis documented the iterative process of designing, developing, and rigorously evaluating a tangible artifact: an AI-enhanced document governance system. The preceding chapter's evaluation confirmed that the prototype is a viable, highly effective solution that successfully addresses the identified problems.

This chapter builds upon that validation to provide a definitive conclusion to the research journey. First, it summarizes the evaluation's key findings. Then, it discusses the practical and theoretical implications of these findings before presenting generalizable recommendations for other higher education institutions. This answers the final research question (RQ5). The chapter will also reflect honestly on the study's limitations and suggest concrete directions for future work. It will culminate in a concluding statement on the research's overall contribution.

5.2 Summary of Key Findings

The comprehensive evaluation detailed in Chapter 4 produced clear, evidence-based findings that collectively validate the success of the prototype of the AI-enhanced document governance system. The most critical findings are summarized below:

- **The system's architecture is sound and compliant.** The expert validation provided a definitive, positive verdict on the prototype's foundational design. The panel confirmed that the TOGAF-guided architecture is robust, technically feasible, and fit for purpose. They also validated its strong alignment with the ISO 15489/23081 principles for records management and the COBIT principles for IT governance. This confirms that the system is built on a compliant and secure foundation.
- **The prototype is highly effective and transformative.** The system demonstrated exceptional performance in its core functions. Technical validation proved its reliability, most notably through the 100% success rate of automated contract alerts. Furthermore, time-on-task measurements confirmed a transformative improvement in operational efficiency by reducing administrative processes that previously took hours or days to mere minutes.
- **High perceived value overcomes initial usability hurdles.** User testing revealed a significant nuance. While the quantitative usability score (SUS) was moderate, the qualitative feedback powerfully contrasted this result. The fact that all users intended to adopt the system, combined with praise for its ability to solve their daily challenges, demonstrates the system's immense perceived worth. This suggests that, for target users, the system's ability to solve critical real-world problems is a more powerful driver of adoption than achieving perfect interface learnability in the first iteration.

5.3 Discussion of Implications

The findings from this research have significant implications for the practical operations of Swiss German University and the broader theoretical understanding of AI-enhanced governance systems in higher education.

5.3.1 Practical Implications for SGU

For the Swiss German University, successfully validating this Proof-of-Concept (POC) provides a clear, evidence-based path forward for modernizing administrative functions and mitigating significant institutional risks. The implications are tangible and immediate:

- **A Pathway to Enhanced Operational Efficiency:** This research transforms the conversation from hypothetical to proven. The successful PoC provides a strong business case for further investment in a full-scale solution. The significant reduction in the time required for critical processes, such as document retrieval, provides a strong business case for further investment. Full-scale implementation could save thousands of hours of administrative time annually, allowing staff to focus on higher-value activities.
- **Mitigating Institutional Risk:** The PoC directly addresses a critical risk that was previously unmanaged: the lack of systematic contract monitoring. Our 100% reliable automated alert system is a cost-effective, direct solution that prevents missed deadlines, which can have significant financial and legal consequences.
- **A Foundation for a Data-Driven Culture:** By establishing a centralized repository, the system establishes the technical and cultural foundation for SGU to become a more data-driven institution. It establishes a "single source of truth" upon which future business intelligence and analytics initiatives can be built.

SGU's next step should be to transition from the successful proof of concept to a phased pilot program. This program should start with one or two key departments to refine the user interface and develop the necessary supporting policies before a university-wide rollout.

5.3.2 Contributions to Theory and Research Methodology

This research contributes to the academic body of knowledge in several key areas beyond its practical utility for SGU:

- **Contribution to Design Knowledge:** The study provides practical, real-world validation of the synergistic application of **TOGAF, COBIT, and ISO standards**. While literature often discusses these frameworks in isolation, this research demonstrates a successful methodology for integrating them. It uses TOGAF as the overarching architectural guide and embeds the specific controls from COBIT and ISO as non-functional requirements.

- **Contribution to Research Methodology:** The thesis also serves as a valuable case study in the application of **Design Science Research (DSR) using modern, low-code/no-code cloud platforms**. It shows that sophisticated, enterprise-grade solutions can be developed and validated without massive teams or extensive custom coding, making DSR more accessible for practical problem-solving in organizational contexts.
- **Contribution to Adoption Theory:** The unexpected finding that users' high perceived value (100% intent to adopt) overshadowed moderate quantitative usability scores contributes nuanced insight to the fields of human-computer interaction (HCI) and AI adoption. It suggests that, for novel systems solving critical, painful problems, users may tolerate initial learnability challenges better. This finding underscores the paramount importance of addressing the right problem within the DSR framework.

5.4 Recommendations for Higher Education Institutions (Answering RQ5)

The successful design, development, and validation of the AI-enhanced document governance system at SGU yielded valuable insights. Based on this research, a holistic set of recommendations can be derived for other higher education institutions (HEIs) seeking to address similar challenges in governance. The recommendations are structured into three key areas: technology, policy, and people.

5.4.1 Architectural and Technical Recommendations

Based on the successful design and implementation of the proof of concept, several key architectural and technical principles critical for other higher education institutions (HEIs) embarking on a similar initiative can be identified. These recommendations extend beyond technology selection to form a strategic approach that ensures the resulting system is functionally effective, scalable, sustainable, and aligned with the institution's long-term governance objectives. These principles are derived from the positive outcomes of expert validation and the technical performance of the prototype.

1. **Adopt a formal enterprise architecture framework.** The success of this project was significantly influenced by the use of the TOGAF Architecture Development Method (ADM). Other higher education institutions (HEIs) should adopt a similar formal framework to ensure their solution is holistically aligned with business requirements, data structures, and long-term technology strategy, not just a technical fix. This prevents the creation of isolated "shadow IT" projects.
2. **Leverage existing cloud infrastructure.** This research proved the feasibility of developing a sophisticated, AI-powered system on an existing platform, such as Google Workspace for Education Plus. First, HEIs should conduct a thorough audit of their current cloud platforms, such as Google Workspace or Microsoft 365, to identify opportunities for low-code/no-code development and serverless automation. This approach drastically reduces initial investment costs, shortens development cycles, and lowers the barrier to innovation.
3. **Implement a "human-in-the-loop" AI strategy.** Although the AI's ability to classify, extract, and summarize was impressive, the system was designed so that humans have the final say. For sensitive governance tasks, HEIs should design their AI systems to augment and assist human staff, not replace them. AI should handle the heavy lifting of processing and analysis, but a responsible staff member should retain final validation and decision-making authority.

5.4.2 Policy and Governance Recommendations

No matter how well-designed it is, a technical artifact cannot create institutional governance on its own. It can only enforce the rules created by the institution. Therefore, the success of a system like the one developed in this research depends critically on a clear, robust policy framework. Based on the expert validation findings and observed challenges, the following policy recommendations are essential for any higher education institution (HEI).

1. **Establish a formal data governance and classification policy:** Before uploading a document, the institution must formally define its data.

- **Recommendation:** Higher education institutions (HEIs) must create a clear, tiered data classification policy that categorizes all institutional information. For example, Level 1 could be public, Level 2 could be internal, Level 3 could be confidential, and Level 4 could be restricted/sensitive.
- **Justification:** This policy provides the technical system with the *"source of truth"* it needs to apply security controls. Without such a policy, any access control system would be arbitrary. This policy is an essential prerequisite for meeting COBIT control objectives related to information management and directly addresses experts' concerns about data safety. For instance, a student transcript may be classified as *"confidential,"* whereas a signed employment contract may be classified as *"restricted."* These classifications require different levels of access control and auditing.

2. **Formalize a granular access control policy:** Role-based access is a technical feature, so the rules it follows must be institutional policy.

- **Recommendation:** HEIs must develop a formal access control policy that defines the default access rights for each role within the university (*"principle of least privilege"*). This policy must also establish a formal, auditable workflow for requesting, approving, and periodically reviewing temporary or permanent access to information across departments.
- **Justification:** This directly addresses one of the most significant challenges identified: data silos and the ad hoc nature of sharing information. It also directly addresses the expert panel's feedback about the need for *"access-request-friendly"* workflows. A clear policy ensures that access decisions are based on documented business needs rather than personal relationships, a core tenet of good governance.

3. **Modernize records management policies:** A digital system provides new capabilities, so old, paper-based policies are insufficient.

- **Recommendation:** Higher education institutions (HEIs) must review and update their official records retention and disposal schedules to be relevant in a digital-first environment. The policy should specify retention periods for different

digital record types and formalize the process for secure digital disposal or archiving.

- **Justification:** Compliance with standards such as ISO 15489 requires managing the entire lifecycle of a record, from creation to disposal. A digital system can facilitate this process systematically, but only if the institutional rules are clear. This ensures that the university does not accumulate digital data indefinitely, which creates storage costs and legal risks.

4. Develop an Acceptable Use Policy for AI Tools: The introduction of powerful AI features like those in the prototype creates new opportunities and risks.

- **Recommendation:** Higher education institutions (HEIs) should create a specific section in their Acceptable Use Policy (AUP) that governs the use of AI assistants for handling institutional data. This section should provide clear guidelines on the ethical and practical use of AI-generated summaries and answers.
- **Justification:** While the AI Q&A feature is highly valued by users, it also introduces the risk of misinterpretation or overreliance on AI-generated content. A policy is needed to remind users that they are ultimately responsible for how they use the information provided by the AI assistant. This approach proactively manages the risks associated with deploying new AI technologies.

5.5 Limitations of the Research

Transparently acknowledging a study's limitations is essential to ensuring its academic rigor and properly contextualizing its findings. Although this research successfully achieved its objectives, it was conducted within a specific set of constraints that define the scope of its conclusions. The primary limitations are as follows:

5.5.1 Generalizability of Findings

This research was conducted as a single, in-depth case study at Swiss German University. This methodological choice was deliberate, as it enabled the collection of rich, contextualized data necessary for designing and validating a solution to a complex,

real-world problem. However, this approach has limitations regarding the direct generalizability of its findings. The goal of this study is analytical generalization, not statistical generalization. In other words, the goal is to use the findings to inform theory and provide transferable principles, not to claim that the results apply to a whole population.

The specific quantitative results are deeply embedded in SGU's unique context and cannot be extrapolated directly to other institutions. Several key contextual factors limit their direct transferability:

- **Organizational Context and Culture:** The observed efficiency gains and user attitudes are specific to SGU's unique departmental structures, manual workflows, and administrative culture. An institution with a different power structure, higher resistance to change, or more tech-savvy users would likely have different adoption patterns and usability scores.
- **Specific Technology Ecosystem:** The prototype was designed to be highly effective within the Google Workspace for Education Plus ecosystem. While the architectural principles are platform-agnostic, the specific implementation is not. An institution operating primarily on Microsoft 365 or a different cloud platform would face different technical challenges and integration opportunities.
- **Governance Maturity Baseline:** The "*transformative*" nature of the efficiency improvements is partly due to SGU's low maturity baseline for formal document governance. A leap from a fully manual process to an automated one is inherently more dramatic than an incremental improvement to an existing semi-automated system. Therefore, while other institutions would likely see benefits, the magnitude of the reduction in time spent on the task is context-dependent.

While the specific quantitative outcomes (e.g., a SUS score of 55.6 and a reduction in search time from hours to under five minutes) are specific to the SGU case, the primary contributions of this thesis are generalizable. These contributions are the validated design principles, the integrated framework methodology, and the strategic policy recommendations. Together, they provide a robust, transferable model for other higher education institutions to follow.

5.5.2 Scope of the User Evaluation

While the user evaluation provided rich and valuable insights, it was conducted under the specific methodological constraints inherent to a proof-of-concept study. These limitations define the context in which the user-centric findings should be interpreted:

- **Nature of the Testing Protocol:** The user testing was designed as an initial evaluation in which participants were introduced to the system and asked to perform tasks in a single session. While this protocol was appropriate for a proof of concept (PoC), it primarily measured initial learnability and the effectiveness of the user onboarding experience. It does not reflect long-term, day-to-day usability by proficient users. This context is important because it explains the high number of "*complete with help*" results. These results indicate areas where initial guidance is needed rather than fundamental flaws in the system's overall usability.
- **Instrumentation and Construct Validity:** A significant limitation was the instrumentation used for the quantitative usability measurement. The initial System Usability Scale (SUS) was administered in its standard English version to a group of people who primarily speak Bahasa Indonesia. This introduces a potential threat to construct validity, meaning the instrument may have measured not just perceived usability but also the cognitive load of language comprehension. Therefore, the resulting SUS score of 55.6 should be interpreted with caution and is best viewed as a conservative baseline rather than a definitive judgment of the user experience.
- **Sample Size and Scope:** The evaluation relied on a small, purposive sample of eight end users and five experts. While this sample size is appropriate for a qualitative, in-depth DSR evaluation designed to gather rich feedback and validate a concept, it is not large enough for statistical generalization. Furthermore, usability testing for the specialized contract monitoring feature was limited to a subsample of three users. While this was sufficient to prove the feature's 100% technical reliability, the usability findings for that specific interface are preliminary and should be considered illustrative rather than conclusive.

5.5.3 Scope of the Technical Artifact

The developed system is a **Proof-of-Concept (PoC)**, not a production-ready application. Its primary purpose was to demonstrate the feasibility and value of the proposed architecture. Consequently, it lacks features typically found in full-scale enterprise systems, such as a comprehensive user-facing audit log, advanced administrative controls, and performance optimization for a large, concurrent user base.

These limitations do not diminish the validity of the research findings within their defined scope. Instead, they provide a realistic framework for the study's contributions and clearly justify the recommendations for future work that follow.

5.6 Future Work

While this research provides comprehensive validation of the proof of concept, it also opens several promising avenues for future investigation. The limitations identified in the previous section provide a clear roadmap for subsequent research and development efforts. The following areas are recommended for future work:

- **Conduct a longitudinal pilot study.** The next logical step is to move beyond the "*first look*" evaluation and deploy the prototype in a phased pilot program within one or two departments at SGU over an extended period (e.g., six to twelve months). This would allow for the collection of data on long-term usability, user adoption patterns, and the system's impact on day-to-day operations.
- **Expand prototype functionality.** In order to transition the PoC to a production-ready system, future work should focus on developing key enterprise features. This includes building a user-facing audit log dashboard, implementing more complex workflow automation for multi-step document approvals, and enhancing reporting and analytics capabilities.
- **Conduct a quantitative return on investment (ROI) study.** Conduct a dedicated quantitative study to precisely measure the ROI of the system. This would entail establishing a baseline of current workflows, calculating the hours

saved, errors reduced, and financial risks mitigated post-implementation, and providing a concrete business case for university-wide adoption.

- **Explore advanced AI capabilities.** Future research could explore integrating more advanced AI models to gain deeper insights. This could include using natural language processing (NLP) for sentiment analysis of feedback documents or automated risk identification within legal contract text.
- **Replicate the study in a different institutional context.** To validate the generalizability of the design principles further, replicate the DSR project at a higher education institution operating on a different technology ecosystem, such as Microsoft 365. This would test the adaptability of the TOGAF-guided architectural approach and provide valuable comparative insights.

5.7 Concluding Remarks

This research was initiated to address a critical and pervasive challenge in higher education—the inefficient and risky nature of manual document and contract management. Through the rigorous application of Design Science Research methodology, this thesis successfully navigated the journey from problem identification to a tangible, validated solution.

The study has made two contributions. For the Swiss German University, the study produced a **practical and valuable artifact**: an AI-enhanced document governance system that has been proven to be architecturally sound, highly effective, and desired by end users. For the broader academic and professional community, the study has contributed generalizable principles and a holistic framework of technical, policy, and change management recommendations. These provide a clear, actionable blueprint for other institutions seeking to leverage modern cloud and AI technologies to transform their administrative and governance functions. Ultimately, this research provides an optimistic and definitive answer: building intelligent, compliant, and efficient governance systems that meet the unique needs of the modern university is not only possible, but also practical.