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Accreditation Repository Architecture for Higher Education Document Management

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Abstract

Accreditation in higher education requires reliable document governance, traceability, accountability, and systematic evidence management to support quality assurance processes. This study aimed to analyze and develop a web based accreditation repository architecture for managing Laporan Kinerja Program Studi documentation in higher education institutions. An empirical applied software engineering approach was employed through literature review, observation, interviews, document analysis, business process mapping, Unified Modeling Language modeling, Extreme Programming based prototyping, black box testing, and scenario based functional validation. The study identified critical limitations in spreadsheet based document management related to duplication, fragmented collaboration, unclear version control, and limited monitoring capability. The proposed SIPADOK repository architecture integrates user, interface, application service, data and document, and output layers into a unified framework that supports authentication, role based access control, document management, review workflows, progress monitoring, and report generation. Functional validation demonstrated that all documented operational scenarios performed according to expected requirements. The findings indicate that effective accreditation document management depends on the integration of architecture, workflow governance, access control, traceability mechanisms, and reporting services rather than digital storage alone. The proposed architecture provides a replicable framework for strengthening accreditation readiness and institutional quality assurance.

Keywords : Accreditation Repository, Document Management, Higher Education, Software Architecture, Quality Assurance.



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INTRODUCTION

The rapid digital transformation of higher education has fundamentally reshaped institutional approaches to quality assurance, governance, and evidence based accountability, particularly in the context of accreditation processes that increasingly require transparent, traceable, and systematically managed documentation. Across diverse higher education systems, accreditation has evolved from a periodic compliance exercise into a continuous mechanism for demonstrating institutional performance, educational quality, and organizational effectiveness through verifiable records and structured performance indicators. Contemporary developments in records management emphasize that accreditation evidence must not only be digitally stored but also maintained throughout its lifecycle in a manner that ensures authenticity, reliability, integrity, and accessibility under evolving organizational and regulatory conditions (International Organization for Standardization, 2016). Simultaneously, advances in software engineering have encouraged educational institutions to adopt integrated information systems capable of supporting complex organizational workflows, stakeholder collaboration, and long term information governance (Sommerville, 2016; Pressman & Maxim, 2020). Within this broader transformation, accreditation repositories have emerged as a critical infrastructure component because they connect accreditation data, institutional documents, user responsibilities, and reporting mechanisms into a unified digital environment capable of supporting sustainable quality assurance practices.

Existing studies consistently demonstrate that digital accreditation systems contribute to greater efficiency in accreditation preparation, document collection, monitoring activities, and institutional decision making. Research on the Sistem Penjaga Akreditasi Unggul revealed that digital platforms can

strengthen strategic accreditation planning by facilitating the organization and accessibility of accreditation related information across academic units (Trisnapradika et al., 2023). Similar findings were reported in the development of web based accreditation information systems that successfully improved data management and evidence organization for study program accreditation processes through integrated web technologies and centralized databases (Utami et al., 2025). Complementary evidence from vocational education contexts further indicated that repository systems can support accreditation activities by enhancing document availability, stakeholder coordination, and information retrieval efficiency throughout evaluation cycles (Sidhimantra et al., 2024). At the same time, broader investigations into higher education records management have emphasized that effective institutional governance increasingly depends on digital infrastructures capable of preserving institutional memory while ensuring accountability and regulatory compliance across multiple organizational functions (Simwaka et al., 2025). Collectively, these studies suggest that accreditation effectiveness is closely associated with the capacity of information systems to manage large volumes of evidence and coordinate interactions among diverse institutional stakeholders.

Despite these advances, the current body of literature remains characterized by a notable imbalance between application oriented development and architecture oriented inquiry. Most accreditation related studies focus predominantly on system implementation outcomes, interface functionality, operational benefits, or administrative efficiency, while providing limited examination of the architectural structures that govern information flow, document traceability, workflow integration, and long term repository sustainability (Trisnapradika et al., 2023; Utami et al., 2025; Sidhimantra et al., 2024). This limitation is significant because accreditation repositories differ fundamentally from conventional document storage applications. Effective repository environments require the integration of role based access mechanisms, document lifecycle controls, metadata management structures, review workflows, audit trails, reporting services, and governance policies that collectively determine the reliability and accountability of accreditation evidence. The absence of explicit architectural perspectives in existing research restricts theoretical understanding regarding how repository components interact to support institutional accreditation requirements and limits the transferability of implementation experiences across organizational contexts.

The unresolved architectural dimension becomes increasingly important when viewed through contemporary records management and software architecture frameworks. Records management standards emphasize that institutional documents must remain trustworthy and usable throughout their lifecycle, requiring systematic controls over creation, storage, access, revision, and preservation activities (International Organization for Standardization, 2016). From a software engineering perspective, system architecture serves as the foundational structure through which stakeholder concerns, design decisions, functional relationships, and quality attributes are translated into operational systems capable of adaptation and long term maintenance (ISO/IEC/IEEE, 2022; Sommerville, 2016; Pressman & Maxim, 2020). Architectural inadequacies can therefore undermine accreditation readiness by producing fragmented repositories, inconsistent document versions, weak accountability mechanisms, and limited monitoring capabilities. The challenge is particularly relevant in higher education environments where accreditation standards, reporting requirements, and institutional evidence continuously evolve. Under such conditions, architectural rigor becomes not merely a technical consideration but a prerequisite for organizational resilience, governance effectiveness, and accreditation sustainability.

Addressing these challenges requires a research perspective that extends beyond application functionality toward the systematic examination of repository architecture as an integrated socio technical framework. UML based modeling provides a suitable mechanism for this purpose because it enables the formal representation of stakeholder interactions, workflow processes, structural relationships, and system behavior within a coherent design framework (Object Management Group, 2017). Recent developments in decision support systems and institutional information management have further demonstrated the importance of structured system design for supporting organizational performance, information quality, and process standardization (Ramsari & Firmansyah, 2022). Equally important, rigorous validation procedures are necessary to ensure that architectural designs are translated into reliable system behavior. Black box testing and boundary value analysis have been recognized as effective approaches for evaluating whether implemented functionalities conform to operational requirements and expected system responses under diverse usage scenarios (Putri &

Susanto, 2024). These methodological foundations provide an opportunity to bridge the gap between conceptual architecture design and practical accreditation repository implementation.

This study positions itself within this unresolved architectural domain by analyzing and formulating a web based accreditation repository architecture designed to optimize higher education document management. The research proposes a layered architectural model consisting of user, interface, application service, data and document, and output components that collectively support document collection, review, monitoring, traceability, access control, and reporting activities within accreditation workflows. Through the integration of software engineering principles, UML based modeling, repository governance requirements, Extreme Programming oriented prototyping, and functional validation mechanisms, the study seeks to provide a comprehensive architectural framework that advances both theoretical understanding of accreditation repository design and methodological approaches for developing sustainable digital infrastructures for higher education quality assurance.

RESEARCH METHODS

This study employed an empirical applied software engineering approach to analyze and develop an accreditation repository architecture for higher education document management. The research object was a web based accreditation repository prototype named SIPADOK that was designed to support the management of Laporan Kinerja Program Studi documentation. Data collection involved literature review, observation of existing accreditation practices, interviews with key stakeholders, documentation analysis, and examination of current document workflows. The development process began with problem identification and requirement analysis focusing on document traceability, user responsibilities, review procedures, reporting needs, and operational risks associated with spreadsheet based management. Business process mapping and Unified Modeling Language were utilized to represent use cases, activity flows, sequence interactions, and data structures before implementation. The repository architecture was subsequently formulated according to architectural description principles and records management requirements, resulting in a layered structure consisting of user, interface, application service, data and document, and output layers. Prototype development followed the Extreme Programming framework through iterative planning, design, coding, and testing cycles to ensure alignment between stakeholder requirements and system functionality. This methodological design enabled the integration of document governance, workflow control, role based access management, and reporting services into a unified accreditation repository architecture that supports organizational quality assurance processes (ISO/IEC/IEEE, 2022; International Organization for Standardization, 2016; Bass et al., 2021; Singagerda et al., 2022).

The validation phase focused on assessing the functional feasibility and architectural consistency of the developed prototype through black box testing and scenario based functional evaluation. Validation scenarios covered authentication processes, LKPS category management, document upload and preview functions, reviewer assignment procedures, progress monitoring mechanisms, status management, and PDF or Excel report generation. Evaluation was conducted by comparing observed system responses with predefined functional requirements across all user roles including program leaders, lecturers or document compilers, reviewers, and administrators. The primary evaluation metrics consisted of functional correctness, workflow conformity, role based access consistency, document status accuracy, report generation capability, and successful execution of operational scenarios. Testing results demonstrated that all documented scenarios performed according to expected behavior, indicating that the proposed architecture successfully supported centralized document management, traceability, accountability, and accreditation workflow integration. The methodological robustness of the study lies in the combination of architecture driven design, iterative prototyping, workflow based validation, and functional testing evidence, providing a replicable framework for the development of accreditation repositories within higher education institutions.

RESULTS AND DISCUSSION

Analysis of Existing Accreditation Document Management Conditions

The empirical findings revealed that accreditation evidence management was predominantly conducted through spreadsheets and locally stored folders that were distributed across multiple users. This condition created operational fragmentation because document ownership, update responsibility, and evidence availability were not systematically coordinated. Interviews and workflow observations

indicated that accreditation teams relied heavily on manual communication to confirm document completeness and reporting readiness. Similar challenges have been identified in higher education quality assurance environments where decentralized document management limits institutional responsiveness and administrative efficiency (Acevedo De los Ríos & Rondinel Oviedo, 2022).

The observed workflow demonstrated that spreadsheet based management was able to record LKPS categories, responsible personnel, and completion status. Practical limitations emerged when accreditation activities involved multiple contributors who simultaneously modified documents and supporting evidence. Several participants reported difficulties in identifying the most current document version during preparation and review activities. Comparable findings were reported in accreditation information system studies that highlighted the inefficiency of manual document coordination in quality assurance processes (Asis et al., 2024; Utami et al., 2025).

The existence of scattered storage locations reduced document visibility across organizational units. Program leaders frequently required additional verification activities to determine whether evidence had been uploaded, revised, or approved. This condition increased administrative overhead because progress monitoring depended on manual checking rather than system generated information. From a records management perspective, fragmented storage environments weaken the reliability and traceability of institutional records throughout their lifecycle (International Organization for Standardization, 2016).

The qualitative analysis also showed that collaboration barriers emerged because document files were distributed across personal devices and separate folders. Accreditation activities require synchronized interaction among lecturers, reviewers, administrators, and academic managers who contribute different forms of evidence. The absence of centralized coordination mechanisms limited the capacity of stakeholders to maintain consistent documentation standards. Similar governance challenges have been discussed in higher education information management studies that emphasize the importance of integrated repositories for institutional accountability (Simwaka et al., 2025).

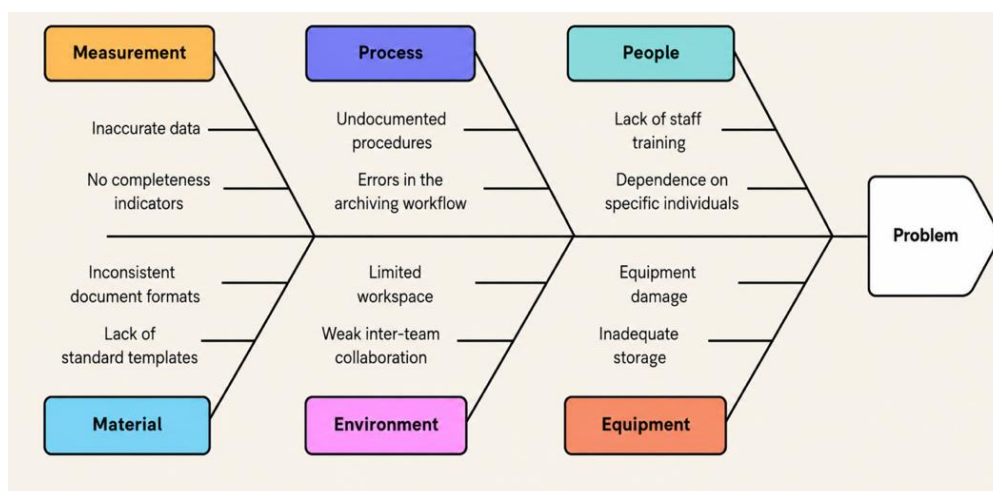


Figure 1. Fishbone Diagram of Accreditation Document Management Problems

Source: Research documentation and business process analysis, 2026.

The fishbone analysis demonstrated that the identified problems originated from multiple organizational dimensions rather than from technological limitations alone. Root causes were distributed across people, process, equipment, material, environment, and measurement factors that collectively influenced accreditation document governance. Human resource related issues included limited training, inconsistent understanding of accreditation procedures, and unclear allocation of responsibilities among stakeholders. These findings indicate that repository development must address organizational readiness together with technological improvement to achieve sustainable quality assurance outcomes (Singagerda et al., 2022).

The equipment and material dimensions further revealed structural weaknesses that affected information quality and accessibility. Existing practices lacked centralized server infrastructure,

systematic backup procedures, and controlled access mechanisms capable of protecting accreditation evidence. Document templates, metadata standards, and validation procedures were also inconsistently applied across accreditation categories. Comparable observations have been reported in studies of institutional information governance where technological infrastructure and documentation standards significantly influence organizational performance and accountability (Bhoi et al., 2023; Arif et al., 2024).

The findings generated a set of architectural requirements derived directly from operational problems identified during observation and document analysis. These requirements established the foundation for the subsequent repository architecture design process. The relationship between operational constraints and architectural responses is summarized in Table 1. The table demonstrates how each observed deficiency was translated into a corresponding architectural requirement intended to strengthen document governance and process control.

Table 1. Manual Problems and Architecture Requirements

Problem	Initial Evidence	Operational Impact	Architecture Requirement
Data duplication	Documents and entries were copied repeatedly across spreadsheets and folders	Duplicated records and file conflicts could emerge	Centralized database and unique document identity
Limited collaboration	Files were stored locally or distributed across users	Team coordination became slow and fragmented	Web dashboard with role based access
Unclear document version	Latest file version was not consistently identified	Difficulty confirming valid documents	Version control and audit trail
Manual status checking	Document completeness checked manually	Monitoring became inefficient	Submit approved and revision indicators
Weak standard procedure	Archiving depended on specific individuals	Work standards varied across users	Standardized workflow embedded in the system

Source: Observation results and document workflow analysis conducted in this study, 2026.

The results presented in Table 1 indicate that the identified problems were interconnected rather than isolated operational deficiencies. Data duplication originated from the absence of centralized governance mechanisms that regulate document creation and storage. Unclear version management emerged because files circulated through independent communication channels without systematic tracking. These findings support software architecture principles that emphasize structured information control as a prerequisite for organizational scalability and maintainability (Bass et al., 2021).

The architecture requirements derived from the analysis extend beyond technical functionality and reflect governance needs associated with accreditation processes. Accreditation evidence serves as institutional proof of performance and therefore requires mechanisms that preserve authenticity and accountability. Repository environments must support traceable workflows capable of recording document ownership, revision history, and validation status. Such requirements align with contemporary approaches to educational quality management and digital governance in higher education institutions (Biloshchytskyi et al., 2024).

The analytical results suggest that accreditation document management should be interpreted as an integrated governance challenge rather than a simple file storage problem. The interaction among

people, processes, technology, and information resources creates complex dependencies that affect document quality and accreditation readiness. Research on repository systems and institutional knowledge management similarly argues that sustainable quality assurance depends on the integration of governance structures, information architecture, and digital collaboration mechanisms (Sidhimantra et al., 2024, Jayaram et al., 2022). The empirical evidence obtained from the current study established a strong justification for developing a structured repository architecture capable of addressing these multidimensional challenges through centralized control, traceability mechanisms, and workflow standardization.

User Interaction Modeling and Repository Workflow Design

The workflow analysis revealed that the proposed accreditation repository was structured around four principal actors consisting of Program Leader, Lecturer or Compiler, Reviewer, and Administrator. Each actor was assigned a distinct set of responsibilities derived from observations, interviews, and business process mapping conducted during the requirement analysis phase. This role differentiation was necessary because accreditation activities involve multiple stakeholders who contribute different forms of evidence and validation throughout the document lifecycle. Similar governance oriented information systems have been recognized as important instruments for supporting quality assurance processes in higher education institutions (Biloshchytskyi et al., 2024).

The Program Leader occupied a strategic position within the repository workflow because this role supervised accreditation progress and coordinated document preparation activities. The findings indicated that monitoring capabilities and assignment management were essential functions required to maintain alignment between accreditation targets and operational execution. Effective oversight mechanisms allow decision makers to identify incomplete submissions and allocate responsibilities more efficiently. Comparable findings have been reported in accreditation support systems that emphasize managerial visibility and performance monitoring within academic quality assurance frameworks (Trisnapradika et al., 2023).

The Lecturer or Compiler role represented the primary contributor of accreditation evidence within the repository environment. This actor was responsible for uploading documents, updating supporting files, and maintaining the completeness of LKPS related information according to assigned categories. The workflow analysis demonstrated that repository effectiveness depends heavily on the accuracy and timeliness of evidence preparation activities. This observation aligns with the view that institutional knowledge repositories require active content contributors to sustain data quality and organizational memory (Ramsari & Firmansyah, 2022).

The Reviewer function introduced a formal validation mechanism into the accreditation process through document assessment and status verification activities. Repository observations showed that review activities generated an additional layer of quality control before evidence could be accepted into the final accreditation dataset. The existence of a dedicated reviewer role strengthened accountability because every decision became traceable through documented evaluation procedures. Structured validation mechanisms are consistent with software engineering principles that emphasize verification before system outputs are accepted as reliable organizational assets (Pressman & Maxim, 2020).

The Administrator role was responsible for maintaining operational continuity through user management, access regulation, and configuration control. Analysis of system requirements indicated that centralized administrative authority was necessary to ensure consistency across repository operations and user interactions. Administrative governance also supports compliance with organizational policies regarding information access and data management. Effective system administration has been recognized as a fundamental component of sustainable information system implementation in complex institutional environments (Sommerville, 2016).

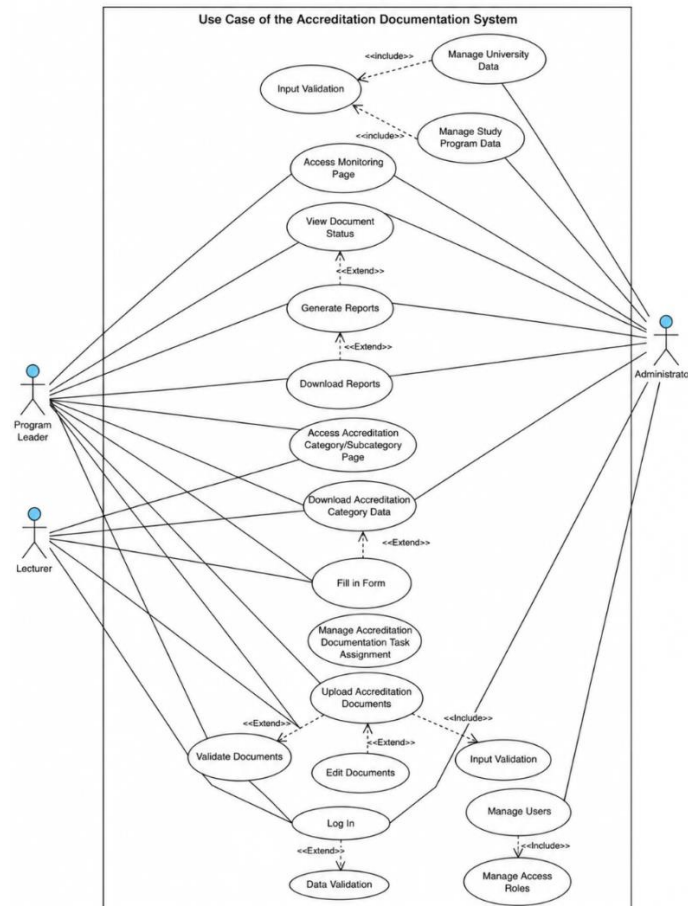


Figure 2. Use Case Model Of The Accreditation Repository

The use case model illustrated how the four actors interacted with repository functions through a coordinated service environment. The diagram demonstrated the integration of authentication, document upload, review activities, monitoring mechanisms, reporting functions, and user management processes. Unified Modeling Language was employed to visualize these interactions because it provides a standardized representation of stakeholder requirements and system behavior (Object Management Group, 2017). The resulting model established a clear relationship between organizational responsibilities and software functionality.

The interaction structure identified in the use case model reflected principles of role separation and controlled system access. Each actor was granted permissions according to operational responsibilities, reducing the likelihood of unauthorized actions and maintaining procedural integrity. This arrangement corresponds with architectural design recommendations that advocate explicit allocation of stakeholder concerns and responsibilities across system components (ISO/IEC/IEEE, 2022). The repository therefore functioned not only as a storage platform but also as a governance mechanism that embedded accountability into routine accreditation activities.

Workflow mapping further revealed that accountability was strengthened through the sequential coordination of actor interactions. Every repository action generated a traceable record associated with a specific user role and process stage. Such traceability supports transparency and facilitates future audits because document ownership and approval history can be reconstructed systematically. Similar governance structures have been recommended in UML driven system development approaches that prioritize process clarity and stakeholder responsibility (Mahardika et al., 2023).

Table 2. User Roles and Functional Responsibilities in SIPADOK

User Role	Main Functions	Governance Contribution
Program Leader	Monitoring and assignment	Strategic control

Lecturer	Upload and update documents	Evidence preparation
Reviewer	Validation and assessment	Quality assurance
Administrator	User and system management	System governance

Source: Research data processed from workflow analysis, 2026.

The role mapping presented in Table 2 confirms that repository governance emerged through the interaction of complementary responsibilities rather than isolated system functions. Strategic oversight was concentrated within the Program Leader role, while evidence preparation and validation activities were distributed among operational actors. The Administrator maintained system stability and ensured that procedural rules remained enforceable across all interactions. This distribution of authority reflects established principles of organizational control within information systems and accreditation management environments (Biloshchytskyi et al., 2024).

The activity workflow model provided a process oriented perspective of repository operations from data preparation to review completion. Workflow analysis showed that repository actions followed a structured sequence beginning with administrative configuration and continuing through assignment, submission, review, revision, and approval stages. Such sequencing reduced ambiguity by establishing explicit transitions between operational states. Formal workflow structures are considered essential for maintaining consistency and predictability in software supported organizational processes (Pressman & Maxim, 2020).

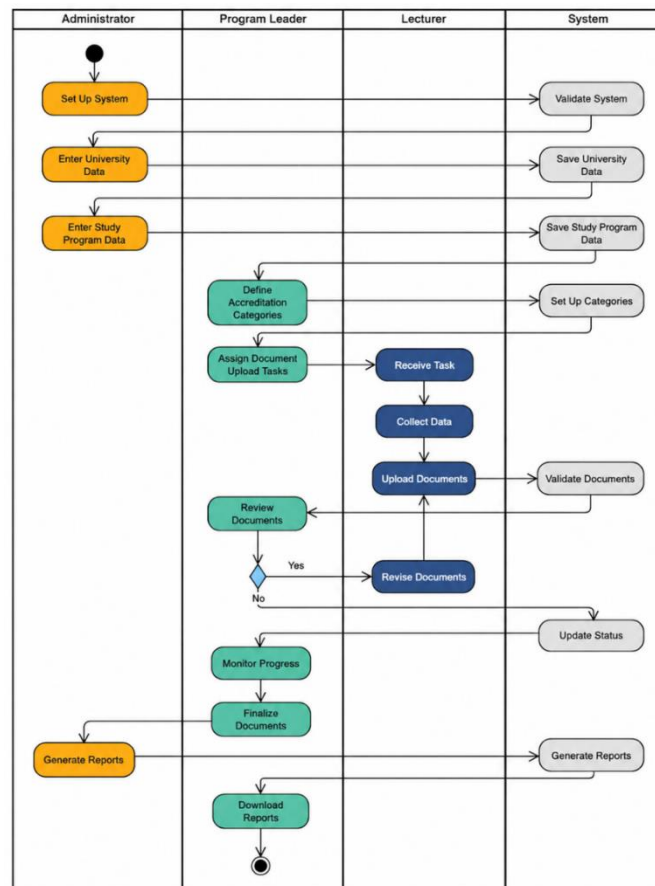


Figure 3. Activity Workflow Of The Accreditation Repository

The activity workflow illustrated an end to end accreditation management process that connected stakeholders through a unified repository environment. Documents moved through clearly defined stages while maintaining status visibility and accountability across all participants. The workflow also demonstrated how system driven coordination can support institutional quality assurance by integrating evidence preparation, review activities, and monitoring functions into a single operational framework.

This result supports previous findings that accreditation information systems become more effective when workflow governance is embedded directly within the system architecture rather than managed through separate administrative procedures (Trisnapradika et al., 2023).

Repository Architecture Implementation and Functional Validation

The repository architecture was implemented to translate accreditation governance requirements into an operational system structure capable of supporting document traceability, workflow control, and reporting activities. The architecture was derived from the requirement analysis and workflow models developed during the earlier stages of the study. Architectural implementation focused on integrating repository services into a unified environment that supports accreditation evidence management across multiple user roles. Architectural coherence is considered a critical factor in maintaining software quality, adaptability, and long term maintainability within complex information systems (Bass et al., 2021).

The resulting architecture consists of five interconnected layers that collectively support repository operations. These layers include the user layer, interface layer, application service layer, data and document layer, and output layer. The layered arrangement was designed to separate concerns while preserving communication among system components according to architectural description principles (ISO/IEC/IEEE, 2022). Similar architectural decomposition strategies are widely recommended for higher education information systems because they facilitate scalability and governance alignment (Isnaeni et al., 2025).

The implementation process followed iterative development cycles based on the Extreme Programming framework adopted in this study. Functional requirements obtained from observation, interviews, and document analysis were progressively translated into architectural services and prototype features. Iterative refinement enabled continuous alignment between stakeholder expectations and system behavior during development activities (Fenardi & Lee, 2023). This development approach reflects software engineering practices that emphasize responsiveness to evolving organizational requirements (Pressman & Maxim, 2020).

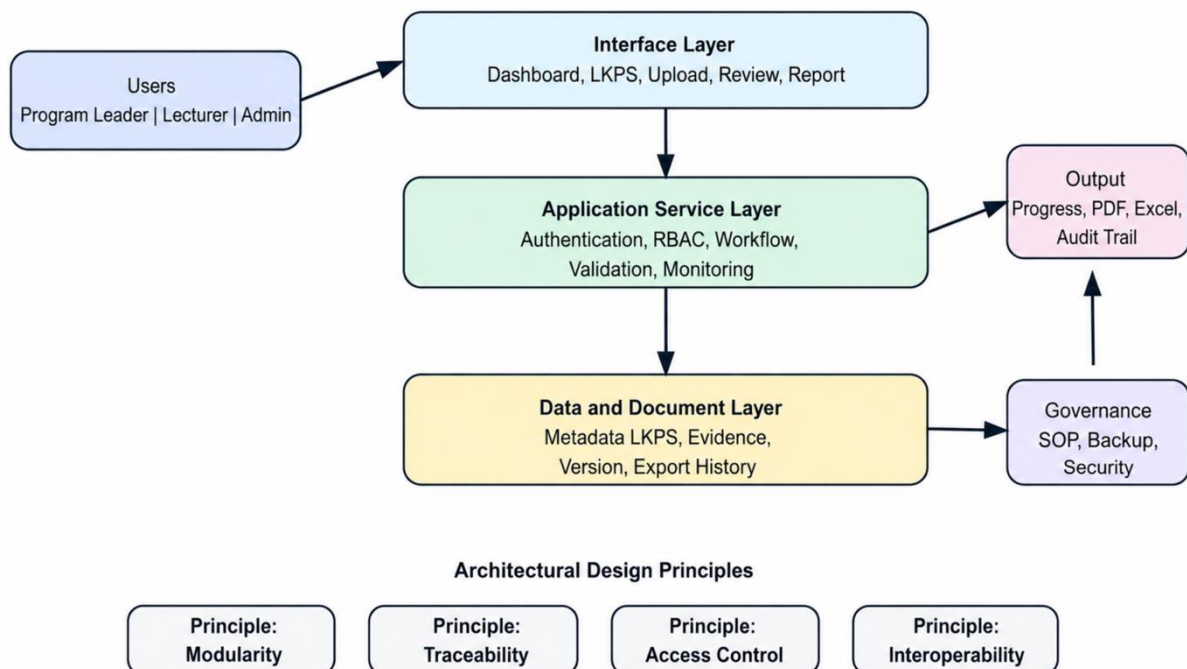


Figure 4. Conceptual Architecture Of The Accreditation Repository

The conceptual architecture demonstrates how repository services interact across organizational and technical domains. User requests originating from accreditation actors are processed through interface services before being handled by application logic and repository storage components. This

arrangement strengthens consistency between business processes and technological implementation while supporting auditability requirements prescribed in records management frameworks (International Organization for Standardization, 2016). Architectural transparency is particularly important in accreditation environments where evidence integrity and accountability directly influence quality assurance outcomes (Acevedo De los Ríos & Rondinel Oviedo, 2022).

The architecture also supports future institutional expansion through modular service separation. Repository functions can be extended without disrupting core accreditation workflows because each layer maintains distinct responsibilities and interfaces. Such modularity is frequently associated with sustainable digital transformation strategies in higher education environments (Jayaram et al., 2022). Architectural flexibility further supports emerging governance requirements involving intelligent information services and secure content management (Jayaram et al., 2024).

Table 3. Architecture Layers Of The Accreditation Repository

Architecture Layer	Main Content	Function
User	Program leader, lecturer or compiler, reviewer, administrator	Performs data entry, review, monitoring, and system administration
Interface	Dashboard, LKPS categories, upload page, review page, report page	Provides role based working access to accreditation tasks
Application Service	Authentication, role based access control, workflow, validation, monitoring	Controls process flow, access security, and system behavior
Data and Document	LKPS metadata, evidence files, status, version records, export history	Maintains traceability, consistency, and structured document records
Output	Progress summary, PDF, Excel, audit trail	Supports accreditation reporting, internal review, and audit needs

Source: Research data processed from repository architecture analysis, 2026.

The architectural layers presented in Table 3 reveal the integration of governance functions and technological services within a single repository environment. The user and interface layers facilitate operational interaction, while the application service layer coordinates business logic and workflow execution. The data and document layer preserves repository integrity through structured storage and version management mechanisms. Similar repository structures have been recognized as effective approaches for institutional information management and educational quality systems (Biloshchytskyi et al., 2024).

Repository implementation also produced operational interfaces designed to improve accreditation monitoring activities. The dashboard consolidates information regarding document progress, category completion status, and review outcomes into a centralized visual environment. Visibility of accreditation progress assists program leaders in identifying pending activities and prioritizing corrective actions. Enhanced monitoring capabilities contribute to more effective organizational decision making within quality assurance processes (Khairullah et al., 2025).

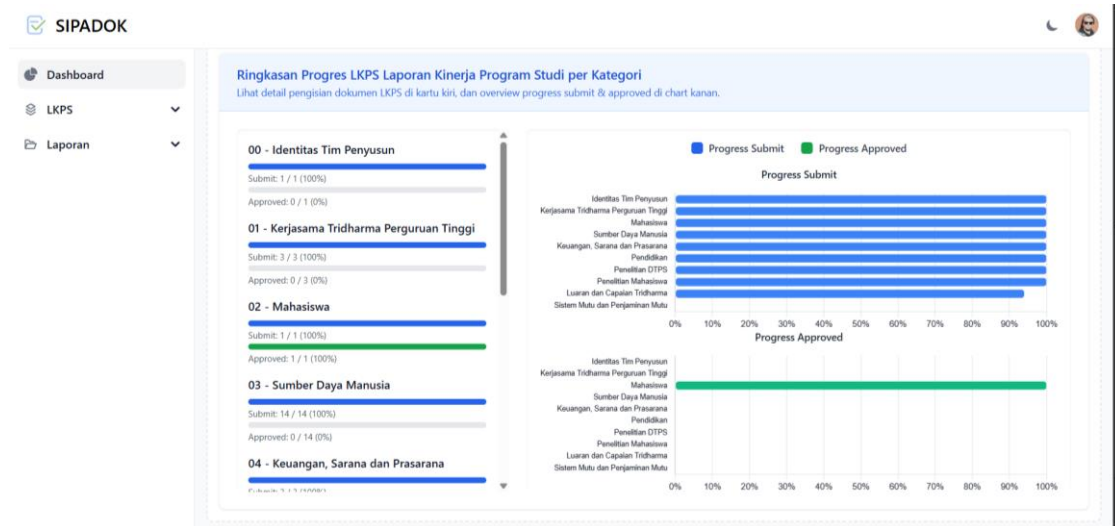


Figure 5. LKPS Progress Dashboard By Category

The dashboard interface shown in Figure 5 illustrates how repository data can be transformed into actionable management information. Visual representation of progress indicators supports continuous supervision and strengthens accountability among repository participants. Similar information visibility mechanisms have been associated with improved institutional performance monitoring and educational management effectiveness (Jayaram & Sundar, 2023). The interface therefore functions not only as a presentation layer but also as a governance instrument that supports accreditation readiness.

Another important implementation outcome is the report export facility that enables repository information to be converted into formal accreditation outputs. Users can generate PDF and Excel reports directly from repository records without requiring manual data compilation. Automated report generation reduces administrative workload and minimizes risks associated with inconsistent documentation practices. Digital document preservation studies emphasize that structured export capabilities strengthen information accessibility and long term usability (Amico & Felicetti, 2024).

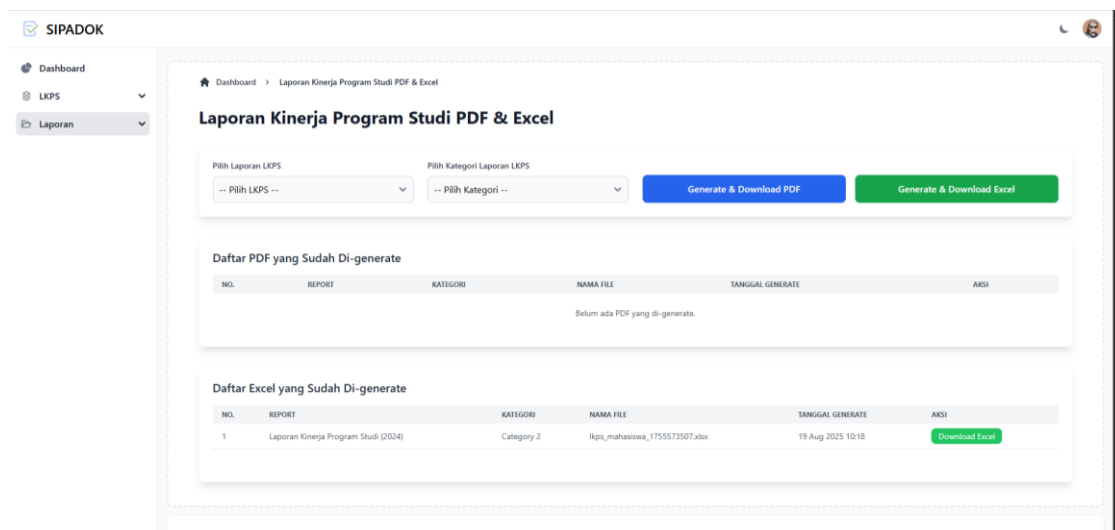


Figure 6. LKPS Report Export Interface

The report export interface presented in Figure 6 demonstrates the transition from repository storage to institutional reporting functionality. Accreditation evidence can be organized and retrieved through standardized output mechanisms that support audit preparation and internal evaluation

activities. Comparable digital governance approaches have been highlighted as essential for sustainable academic administration and information continuity (Brown, 2022). The integration of reporting services therefore extends repository value beyond document storage functions.

Table 4. Functional Testing Summary

Test Group	Number Of Scenarios	Example Scenario	Documented Result
Login	7	Valid account, empty field, invalid email, logout	As expected
LKPS management	10	Add, save, edit, required field validation, delete	As expected
Lecturer assignment	2	Select lecturer, select LKPS category, save assignment	As expected
Review and assessment	4	Update status, add comment, validate required status	As expected
PDF and Excel report	6	Generate PDF, generate Excel, view PDF, download Excel	As expected
Role based recap	Program leader 19, lecturer 17	Test cases grouped by user type	Scenario evidence only, formal UAT score not collected

Source: Research data processed from black box testing documentation, 2026.

The functional testing results summarized in Table 4 indicate that all documented scenarios performed according to expected behavior. Authentication, document management, assignment procedures, review functions, monitoring activities, and report generation processes successfully satisfied predefined operational requirements. The findings support the functional feasibility of the repository architecture and demonstrate consistency between architectural design and implemented services. Black box testing outcomes provide evidence that the repository can support centralized document management, workflow conformity, accountability, and accreditation governance in accordance with established software validation principles (Fajar, 2024; Putri & Susanto, 2024; Sommerville, 2016).

CONCLUSION

This study demonstrates that effective accreditation document management in higher education requires an integrated repository architecture that combines document governance, workflow coordination, access control, traceability, and reporting services within a unified digital environment. The analysis of existing practices revealed operational challenges associated with fragmented document storage, limited collaboration, inconsistent version management, and inadequate monitoring mechanisms. Through requirement analysis, UML based modeling, workflow design, and Extreme Programming based prototyping, the study developed the SIPADOK accreditation repository architecture consisting of user, interface, application service, data and document, and output layers. The architecture established clear interactions among program leaders, lecturers, reviewers, and administrators while supporting structured document submission, validation, monitoring, and reporting processes. Functional validation confirmed that authentication, document management, reviewer assignment, status management, progress monitoring, and PDF or Excel report generation operated according to expected requirements. The findings indicate that accreditation readiness is strengthened through the integration of architectural design, repository governance, and workflow transparency. The proposed architecture offers a practical and replicable model for higher education institutions seeking to improve accreditation evidence management, accountability, and quality assurance performance.

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