Journal on Interactive Systems, 2026, 17:1
ISSN: 2763-7719 • doi: 10.5753/jis.2026.6030

Research Paper

Applying Feature Analysis and Process Simulation to Select an Interactive System for Legal Case Adjudication

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Abstract. Digital transformation in public administration can improve efficiency, transparency, and accessibility. This study evaluates the selection of software systems for judicial process management in a public institution by comparing the Electronic Process System (SPE) and the Electronic Information System (SEI). The study combines feature analysis and process simulation to compare performance, functionality, and fit to the institutional context. The results indicate that SEI, a government software platform shared free of charge with public institutions, better supports workflow automation, data security, document management, and system integration. Compared with SPE, SEI showed greater potential to improve legal case management and support institutional modernization. The paper contributes a comparative framework for evaluating software systems in public-sector settings and supports more evidence-based technology selection in public administration.

Keywords: Software Feature Analysis, Legal Process Simulation, Software Selection, SEI, e-Gov

Edited by: Roberto Pereira | **Received:** 14 May 2025 • **Accepted:** 01 May 2026 • **Published:** 23 May 2026

1 Introduction

Digital transformation in process management has become a strategic priority in public and private organizations, driven by the pursuit of greater efficiency, transparency, and accessibility [Haug *et al*., 2023; Yang *et al*., 2024]. The digitization of internal processes, the implementation of electronic process management systems, and the automation of their stages have proven essential for organizational advancement [Calegari and Delgado, 2018]. Public agencies, such as those of the Federal Government, and private companies increasingly depend on these processes to improve internal management and service delivery. For example, within the Federal Government, initiatives such as the Transparency Portal and the Gov.BR platform represent ongoing modernization efforts to ensure transparency and administrative efficiency [da Silva Brognoli and Ferenhof, 2020]. Without process digitization, achieving these advances would be impossible, given the complexity and volume of information that needs to be processed daily.

However, digital transformation also brings challenges, such as selecting the most appropriate system to manage these processes [Calegari and Delgado, 2018]. Organizations require solutions that not only optimize their workflows but also integrate efficiently with existing systems, meeting technical requirements and user expectations [Koster *et al*., 2010]. The decision on whether to adapt the current system or migrate to a new platform is a strategic choice. Adopting an inadequate solution can lead to integration failures, increased costs, loss of productivity, and user rejection. Therefore, conducting a comparative analysis of available alternatives is an essential step to ensure the choice aligns with organizational needs and long-term objectives [Koster *et al*., 2010].

Comparative studies are valuable because they go beyond mere evaluation of technical specifications, encompassing criteria such as scalability, interoperability, usability, technical support, and compliance with government regulations [Calegari and Delgado, 2018]. In the public sector, these concerns are even more pronounced due to budgetary constraints, information security requirements, and the need to ensure transparency and traceability in all processes [da Silva Brognoli and Ferenhof, 2020].

In the Brazilian context, the evaluation of systems such as Electronic Information System (SEI) is already an active research field, with recent studies investigating everything from organizational acceptance factors [Santos and Moura, 2025] to quantitative usability benchmarks, published by venues of the Brazilian Computer Society (SBC) [Júnior and Leite, 2024].

This work presents a study focused on the selection of an electronic system, using as a practical example the analysis between the Electronic Process System (SPE) and the SEI. SPE is a legacy system, developed and maintained internally by the institution under study for managing its audit processes, due to its internal and proprietary nature, it does not have citable public documentation. SEI, in contrast, is the solution widely adopted by federal public institutions.

Contributing to the ongoing dialogue, our approach fills a specific gap: a comparative functional analysis, combined with process simulation, to contrast SEI with a legacy system, SPE, in the specific context of case adjudication. As

digital transformation advanced in the public sector, SEI, a government software solution shared free of charge with public institutions through cooperation arrangements, offered functionalities comparable to those of SPE at a lower direct acquisition cost [Alvarenga *et al*., 2020]. We highlight that while this study discusses aspects of efficiency and system interaction, it does not constitute a formal user-centered usability evaluation. Rather, any interaction-related findings are indirect inferences derived strictly from our workflow and functionality analysis.

The approach adopted in this study illustrates a systematic process of evaluation and decision-making for system selection, which proved effective in supporting the strategic definition of the solution that best meets institutional needs. This practice can be adapted by other organizations facing similar challenges when deciding on the adoption of new technologies. Thus, the study reinforces the importance of in-depth and evidence-based analyses in the selection of technological alternatives, especially in public contexts where institutional resources, user experience, and service quality are at stake [Haug *et al*., 2023].

This paper is structured in four main parts: Section 2 presents the theoretical foundations supporting the study; Section 3 is dedicated to the discussion of related works; Section 4 details the analysis applied to the practical case and discusses the results; and, finally, Section 5 presents the conclusions and discusses possible future developments of the study.

2 Background

This section presents the theoretical foundation that supports this study. It addresses concepts related to the historical context of SEI, cost reduction in public administration, and specific methodologies for system evaluation, with the aim of supporting the comparative analysis that guides the selection of the most appropriate solution for the institutional context.

2.1 Public Administration and Cost Reduction Solutions

The search for free solutions has become a resource rationalization strategy in public administration [Brasil. Governo Digital, 2025]. Before adopting SEI, the institution under study used SPE, developed internally, which required high investments in maintenance, technological infrastructure, specialized personnel, and constant updates.

With the advancement of digital transformation in the public sector, it was observed that SEI, a government software solution shared free of charge with public institutions, offered functionalities equivalent to those of SPE, but at a significantly reduced direct acquisition cost [Alvarenga *et al*., 2020].

The adoption of SEI represented a resource rationalization measure, as it eliminated the need for large investments in internal development and enabled the use of an already consolidated system, widely used by various federal agencies. According to a study by the National School of Public Administration (ENAP), institutions that migrated to SEI reported gains in agility, efficiency, and substantial reductions in costs with paper, postal services, and physical document storage [Saraiva, 2018].

Furthermore, the collaborative nature of SEI promotes the standardization of processes among public agencies, simplifying integration and information exchange between different institutions [Junior *et al*., 2024].

2.2 Electronic Information System (SEI)

SEI was developed in 2009 by TRF4 to modernize and digitize administrative document workflows, replacing traditional paper-based workflows with a digital document management platform [Saraiva, 2018]. Initially implemented at TRF4, SEI was progressively adopted by other Federal Justice agencies and subsequently expanded to various public institutions at federal, state, and municipal levels, as part of efforts to modernize Brazilian public administration [Brasil. Ministério do Desenvolvimento e Assistência Social, Família e Combate à Fome, 2026].

Notably, SEI's institutional sharing model and configurable architecture allow adaptations to the needs of public institutions and facilitate integration with pre-existing systems. Its modular structure enables electronic management of documents, processes, protocols, dispatches, and opinions.

The adoption of SEI eliminated paper use, resulting in significant reductions in operational costs, workflow optimization, and increased transparency in administrative processes [Saraiva, 2018]. The standardization provided by the system also fosters integration between different agencies and inter-institutional collaboration.

Currently, SEI is used by several public agencies in different branches and spheres of public administration, with a growing number of institutions joining [Brasil. Ministério do Desenvolvimento e Assistência Social, Família e Combate à Fome, 2026]. More broadly, digital transformation initiatives in public service delivery have been associated with improvements in efficiency, transparency, and accountability [Latupeirissa *et al*., 2024].

2.3 Software Selection Methodologies

The selection of a system for public administration requires rigorous evaluation considering factors such as functionality, cost, usability, security, and alignment with institutional needs [Calegari and Delgado, 2018]. Comparative analysis of available alternatives is a fundamental step to ensure the decision aligns with organizational objectives and technical requirements [Koster *et al*., 2010].

Various methodologies can be applied in software selection. Frameworks for evaluating Business Process Management products support the comparison of systems according to their functional and technical capabilities [Koster *et al*., 2010]. ISEM (Information Systems Evaluation Methodology) evaluates the quality of information systems considering factors such as usability, functionality, performance, security, and maintainability.

The Technology Acceptance Model (TAM) is used to predict user acceptance of systems, focusing on perceived ease of use and perceived usefulness [Davis, 1989]. Multi-Criteria Decision Analysis (MCDA) allows the evaluation of alternatives based on multiple criteria, such as cost, security, functionality, and compliance with government standards, supporting a more rational choice aligned with organizational objectives [Saaty, 1990; Belton and Stewart, 2012].

Finally, the ISO/IEC 25010:2023 standard, which is part

of the Systems and Software Quality Requirements and Evaluation (SQuaRE) series, is widely used as a reference for software quality evaluation. The ISO/IEC 25010 model succeeds the quality-model tradition established by ISO/IEC 9126 and updates the previous ISO/IEC 25010:2011 version, providing a comprehensive model for specifying, measuring, and evaluating product quality. The 2023 version defines nine product quality characteristics: functional suitability, performance efficiency, compatibility, interaction capability, reliability, security, maintainability, flexibility, and safety. Its application supports the assessment of whether the selected system offers robustness, security, and long-term efficiency according to current software engineering quality models [ISO/IEC, 2023].

Having presented these concepts, the next section reviews related works to identify previous studies and experiences that inform the proposed comparative analysis.

3 Related Works

The selection of systems for judicial process management involves rigorous analysis of options available in the market and their suitability to the specific needs of the organization. Several studies address methodologies for software selection, with emphasis on multi-criteria analysis methods, such as the Analytic Hierarchy Process (AHP). In Yontar's (2019) study, the comparison between ERP systems SAP and LOGO was performed using the AHP method. The evaluation criteria were based on twelve factors, including cost and ease of use, but the method does not include simulation of the organization's actual workflow [Yontar, 2019]. Similarly, Fumagalli et al. (2019) propose a framework for evaluating industrial simulation software, also using AHP, but the evaluation is based solely on static criteria [Fumagalli *et al.*, 2019].

While the mentioned studies focus on generic methodologies or international contexts, specific research on e-Gov systems in Brazil is crucial for this work, given the country's regulatory and administrative complexity. The contemporary scenario is dominated by large-scale web-based platforms, such as SEI, requiring updated contextual analyses.

Recent Brazilian research published in SBC venues has investigated SEI from multiple perspectives. A key contribution comes from Resende Júnior and Leite [Júnior and Leite, 2024], who evaluated SEI through the System Usability Scale (SUS) and heuristic evaluation. The authors reported a SUS score of 59.78 and identified 99 potential usability problems, pointing to limitations in interaction clarity and interface consistency.

However, usability is not the only determining factor in the adoption of public electronic process systems. Institutional documentation from the Brazilian Federal Government emphasizes that SEI integrates the National Electronic Process initiative and supports electronic management of documents and administrative processes across public organizations [Brasil. Ministério do Desenvolvimento e Assistência Social, Família e Combate à Fome, 2026]. More recent information on SEI 5.0 also indicates that the platform has evolved with improvements in usability, security, infrastructure components, and user experience, reinforcing the need to evaluate the system as a continuously maintained public platform rather than as a static interface artifact [Brasil. Ministério da Gestão e da Inovação em Serviços Públicos, 2025].

Complementing this perspective, Carvalho et al. [Carvalho *et al.*, 2024] investigated the perception of civil servants and faculty members at the Federal University of Ceará, Campus Russas, regarding SEI usability. Their survey indicates that users' perceptions provide relevant evidence for identifying points of improvement in the system, especially when the evaluation considers the real institutional context in which SEI is used.

In a complementary vein, Santos and Moura [Santos and Moura, 2025] investigated the acceptance and use of SEI in a public agency in Piauí, using constructs such as information quality and perceived benefits. This work shifts the focus from technical usability to perceived value and user adoption, which is consistent with the idea that system selection must consider not only interface metrics, but also perceived utility, organizational fit, and process support.

In the judicial domain, studies on electronic judicial processes also reinforce that digitalization alone does not automatically guarantee efficiency; the organizational, procedural, and technological conditions of use must be considered when assessing the impact of electronic process systems [Santanna and Limberger, 2018; Tomio *et al.*, 2015]. Therefore, instead of treating automation as an isolated feature, this study evaluates how the available functionalities support the simulated workflow and the prospective operational scenario.

In contrast to purely static methodological studies and complementing Brazilian research focused on usability and acceptance, our method adopts a hybrid approach. We combine multi-criteria analysis with practical workflow simulation, addressing the need for evaluations that consider both system usability and the organizational conditions of electronic process systems [Júnior and Leite, 2024].

Thus, our study represents a significant advance in software selection methodologies for judicial environments, by integrating not only technical and usability criteria but also usage simulations and prospective scenarios, offering a more robust and realistic evaluation of the organizational impact of each solution. The next section details the methodology applied in the comparative analysis between the evaluated systems.

4 Comparative Analysis

The methodology adopted for system selection focused on detailed functionality analysis and practical simulation of operational scenarios, seeking to evaluate the alignment of solutions with the institutional workflow. The objective was to ensure that the selected system not only met technical requirements but was also effective in optimizing the organizational process as a whole.

Within this context, SPE and SEI were considered as the main candidates. The decision not to include other systems resulted from the strategic need to adopt a solution developed by the organization itself (SPE) or a solution consolidated by the federal government (SEI), facilitating integration with existing public administration systems. SEI, presenting indications of being a viable government-supported solution, was evaluated to confirm its applicability and its ability to adapt to the organization's case management process.

4.1 Procedures Performed

The methodological process adopted in this work was conducted systematically and rigorously, starting with interviews with the organization's civil servants. This initial phase was essential to obtain a clear and precise diagnosis of the main characteristics of the problem, as well as to map the current workflow and identify the information systems available for potential adoption. The interviews, conducted with various team members, provided valuable insights into the practical needs of each department, the main operational challenges, and the perceived limitations in the solutions used until then. From this active listening, it was possible to build a solid understanding of the organizational context, which led to the creation of a preliminary list of systems considered relevant for evaluation and subsequent comparison.

Next, an external survey was conducted to analyze how other organizations in the same sector were dealing with similar demands. This investigation aimed to identify successful experiences, recommended practices, and technological solutions already in use in other Courts of Auditors. By observing this external panorama, it became possible to identify trends and viable alternatives that could inform or support the choice of the best solution for the organization under study.

Based on the internal and external information collected, the methodology for evaluating candidate systems was defined. This methodology focused primarily on comparing the functionalities offered by each system and conducting practical simulations, in which the organization's workflow was replicated in different systems, in order to observe the degree of adequacy of each system to the identified needs. To ensure that the simulations were consistent and comparable, a generic flowchart representing the organization's typical work process was developed. This flowchart served as a reference for subsequent steps and allowed the standardization of tests performed on each evaluated system.

The simulations were first performed in SPE, with the objective of analyzing the impacts of its possible adaptation to the organization's context. Simultaneously, targeted research began on the application of SEI, a solution developed by TRF4 and widely adopted by various public institutions. In this case, the focus was to observe how SEI was being used by other public organizations and determine how it could be configured to meet the specific requirements of the organization in question.

In a second phase, practical simulations of the workflow in SEI were also performed, in order to understand its actual operation and identify potential limitations in its application. This dual simulation in SPE and SEI allowed for a detailed comparative analysis of the two solutions, taking into account not only their functionalities but also their usability, compatibility with internal processes, and ease of implementation.

Thus, the methodological flow followed can be described in the following steps: (1) interviews with the organization's civil servants; (2) survey of solutions adopted by other institutions; (3) development of a generic flowchart representing the work process; (4) simulations in SPE; (5) simulations in SEI; and (6) comparative evaluation and selection between the two systems. This process supported a systematic analysis, based on real data and experiences, culminating in the recommendation of SEI as the solution most aligned with the organization's needs. As illustrated in **Figure 1**, this flowchart details the entire step-by-step procedure performed.

It is essential to clarify that the assignment of classifications "Fully Met" ("T"), "Partially Met" ("P"), and "Not Met" ("N"), presented in the comparative tables, was the result of an iterative qualitative and contextual evaluation. This evaluation was conducted by the analysts and civil servants of the organization itself, including participants from the interviews, through internal work meetings and structured workshops that occurred after the execution of the simulations. The classification did not follow a rigid mathematical normalization process, nor was it based solely on a generic functionality checklist. Instead, the classifications were thoroughly debated based on expert judgment about the adequacy of each system to the mapped workflow, as shown in **Figure 4**, until a consensus was reached among the evaluators. However, it should be noted that while the final classifications were agreed upon collectively, no formal granular documentation was recorded to define the explicit boundaries or standardized thresholds of the "Partially Met" (P) status for each individual item, which remains a qualitative characteristic of this study's baseline assessment.

The criteria for assignment were defined as follows:

- **T (Fully Met):** The functionality exists and operates as expected within the organization's workflow, without the need for significant manual interventions or workarounds.
- **P (Partially Met):** The functionality exists but presents limitations in the context of the workflow. This includes scenarios where the functionality is restricted (e.g., limitations in file types), requires complementary manual steps, or does not fully integrate with other process steps.
- **N (Not Met):** The functionality is non-existent, non-functional, or completely inadequate to meet the organization's workflow requirements.

For more abstract attributes, such as the security and validity attributes demonstrated in **Table 7**, the evaluation combined practical verification during simulations (e.g., attempted unauthorized access), analysis of available technical documentation, and analysts' judgment regarding compliance with legal and institutional requirements.

4.2 Evaluation of the Organizational Reality

The first step of the methodology adopted in this work consisted of conducting an in-depth survey of the organization's workflow, with special attention to the steps involved in case adjudication within the Court of Auditors. This phase was fundamental to ensure an accurate understanding of how procedures are currently executed, from initial processing to the final decision of cases. For this purpose, structured interviews were conducted with the main system users, including secretaries, rapporteurs, counselors, and presidents, all directly involved in adjudication activities. The central objective of these interviews was to obtain a realistic and practical view of the system's daily operation, based on the experience of those who deal directly with processes. Due to the dynamic nature and varying focus of the alignment meetings and workshops, the total number of participants fluctuated

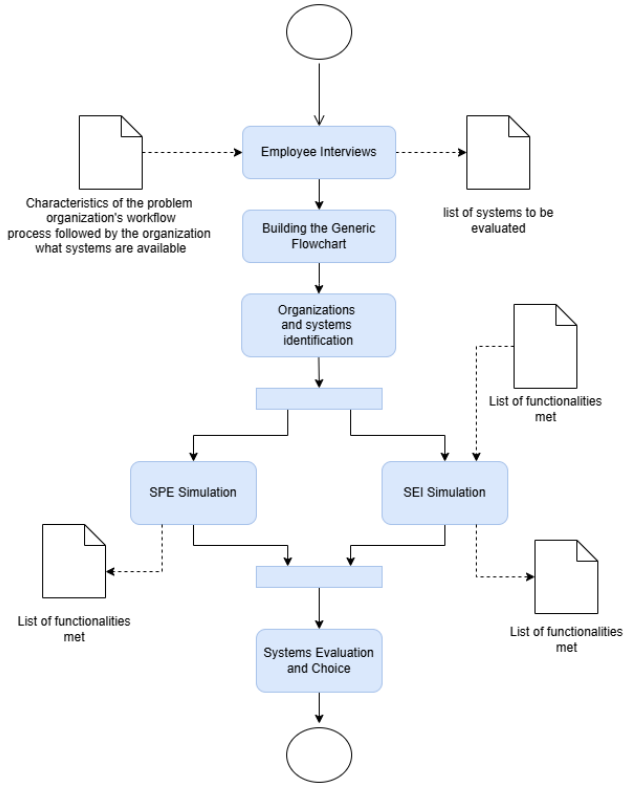

Figure 1. Flowchart of the procedures performed in the study

across sessions rather than remaining static. Nevertheless, a baseline of at least four individuals was strictly maintained in every meeting to ensure methodological consistency. The core profile of attendees consisted of the team leader, the department head (who acted as the primary informant providing domain-specific procedural data), and two IT team members responsible for the workflow mapping. Additionally, other stakeholders, including interns and operational staff tasked with executing the daily workflow within the legacy system (SPE), participated in relevant sessions to provide grassroots insights into practical system limitations. During the interviews, the aim was to identify not only the formal steps of the workflow but also critical points and operational bottlenecks that hinder or delay the progress of processes.

One of the focuses was to detect which of these steps are still performed manually and therefore have potential for automation through a more efficient electronic system. Additionally, interviewees were asked about functionalities they consider indispensable or desirable in a new system, with the aim of aligning technological solutions with the real demands of the institution's daily life.

As a result of this investigation, it was possible to map the workflow in detail and obtain a broad and structured view of organizational needs. This mapping was crucial for guiding the next steps of the study, especially regarding the definition of system evaluation criteria. Based on the information collected, a comprehensive list of functionalities that the system to be adopted should include to fully meet the organization's requirements was prepared.

This list was carefully organized into thematic categories to facilitate its future analysis and implementation. The defined categories were as follows:

- Adjudication-related functionalities;
- Additional productivity functionalities;
- Process management functionalities;
- System administration functionalities;
- Electronic process validity requirements;
- Non-functional requirements and quality attributes.

4.3 Analysis of Practices in Similar Organizations

Parallel to the internal survey, an investigation was conducted on how other institutions in the same sector, particularly Courts of Auditors, have faced similar challenges related to digitization and modernization of their judicial processes. This comparative analysis played a strategic role in the project, as it allowed observing different technological solutions adopted in similar institutional contexts and provided insights into the approaches being followed by agencies with functions and structures similar to those of the organization under study.

During this phase, it was identified that several state Courts of Auditors, such as those of Acre, Paraná, Pernambuco, Piauí, Rondônia, Roraima, São Paulo, and Tocantins, had adopted SEI as their main platform for adjudication and processing of judicial and administrative cases. This finding reinforced SEI's relevance as a viable and consolidated alternative in the public sector, especially among external control institutions.

In addition to identifying the systems used, the external research yielded valuable practical materials that contributed significantly to understanding SEI's operation in real environments. User manuals produced by some of these courts were collected; these manuals detailed the practical application of the system in their workflows. These documents provided a concrete view of the functionalities employed, the implemented operational routines, and any applied customizations, offering a clear picture of the system's potential in different organizational realities.

Another important resource accessed was a training video produced by the National Telecommunications Agency (ANATEL)[de Telecomunicações , ANATEL], which presented various SEI functionalities, along with guidance on best practices for its use. The audiovisual content complemented the documentary analysis, offering a practical and accessible demonstration of the system's operation. These materials thus served as valuable external benchmarks, as they allowed comparing the organization's reality with already established experiences and provided technical and operational parameters that served as reference for the project.

The incorporation of these benchmarks directly contributed to validating the insights obtained internally, acting as a counterpoint that helped confirm or adjust the needs initially raised in the interviews with civil servants. This convergence between the internal perspective and external experience allowed the refinement of evaluation criteria for candidate systems, making the analysis more robust and aligned with the sector's best practices.

With this consolidated view of the organization's internal context and the experiences observed in other institutions, it became possible to draw a more precise comparison between available solutions, detailing more clearly the relationship between the analyzed systems and deepening understanding

of the strengths and limitations of each alternative.

4.4 Relation of "Candidate" Software

Based on the internal diagnosis conducted with the organization's collaborators and the external benchmarks collected from other institutions in the sector, two systems were identified as most suitable for an in-depth comparative evaluation: SPE, already in use and representing the organization's operational baseline, and SEI, a federal solution widely adopted by Courts of Auditors. The selection of these two systems was based on the premise of prioritizing solutions of institutional origin, meaning systems developed or authorized by the organization itself or by the federal government, which would facilitate integration with existing systems and compliance with legal and administrative requirements of the public sector.

It is important to note that the scope of this analysis focused on administrative process management systems and external control, not on final judicial systems. For this reason, robust platforms such as eproc or e-Proc, although relevant in the Judiciary, were not included, as the organization's workflow aligns more directly with SEI's administrative process paradigm, which was the direct alternative to modernizing the internal SPE.

Among the two analyzed, SEI was selected as the main candidate for evaluation, mainly because it already presented favorable indicators regarding its ability to meet the organization's demands. Its consolidated adoption in similar institutions suggested that the system could offer a solid foundation for modernizing internal processes, with lower operational risks.

However, the objective was not to automatically assume SEI's viability, but rather to rigorously validate its applicability. It was essential to demonstrate, in a practical and evidence-based manner, that the system could support the adjudication process workflow without major structural adjustments or negative impacts on institutional performance.

This initial comparison allowed a deeper understanding of the functionalities, limitations, and degree of adequacy of each solution in relation to the previously mapped needs. The analysis was not restricted to theory or system reputation but sought to clearly understand the real capabilities of each within the specific organizational context.

From this stage, the study advanced to the next phase: the development of a detailed workflow mapping, which served as a practical reference for conducting the simulations.

4.5 Workflow Mapping and Simulation

The main motivation for creating a generic flowchart was to obtain a better understanding of how activities are performed within the organization. This diagram was essential for visualizing and analyzing the end-to-end process, offering a clear representation of the steps involved in case adjudication, identifying interactions between different roles, and potential improvements.

After creating the initial version, the flowchart was presented to interviewees, who validated whether the graphical representation correctly reflected the steps and decisions taken in the process. This validation was crucial to ensure the analysis was accurate and that the organization's real needs were addressed. The flowchart also allowed identifying manual steps that could be automated, providing a solid foundation for the simulations.

Figure 4 details the flowchart generated after the interviews, mapping the four main roles involved: the Counselor, the Court President, the Rapporteur, and the Sessions Secretariat (SESES). To facilitate readability, the diagram uses a color code: unfilled boxes represent automated actions in the system, while blue boxes indicate external or manual activities.

This validated flowchart served as the basis for subsequent simulations in SPE and SEI. The simulation used realistic scenarios to observe how each system handles adjudication steps and identify limitations. Each scenario included role-based walkthroughs to observe how the systems supported the mapped workflow. The evaluation focused on functional adherence, process support, and the presence or absence of required capabilities, rather than on formal quantitative usability metrics.

The workflow simulation and functionality evaluation were conducted by the study's analysts, acting as evaluators. Given the nature of the test environment and permission restrictions to create multiple users with distinct profiles (Counselor, Rapporteur, etc.) in the SPE and SEI sandbox environment, a simulation based on scenarios and controlled alternation of functions within the evaluation team was chosen.

To ensure comparability of results between the two systems (SPE and SEI) and mitigate interpretation bias as requested by the review, the same group of analysts performed the evaluation sequentially on both platforms.

During the sessions, analysts alternated between the roles of Counselor, Court President, Rapporteur, and Sessions Secretariat (SESES), following the generic process flowchart, presented in **Figure 4**. This role alternation approach, although not replicating simultaneous real-world collaboration, allowed each analyst to experience the functionalities and system views (screens, permissions, documents) specific to each function.

The simulated interactions were anchored in observations of the internal process and functionalities demonstrated in external benchmarking materials, such as ANATEL's training video [de Telecomunicações , ANATEL] on SEI Adjudication. This role alternation simulation method was fundamental for collecting screenshots and documenting system-specific views for each function at key moments in the flow, providing the visual basis for requirements evaluation. We emphasize that this role-based simulation was designed specifically to evaluate functional capability and process adherence. Although the methodological structure resembles task simulations commonly used in Human-Computer Interaction (HCI), our approach was exclusively focused on technical and workflow validation, not on measuring classic user-centered metrics.

Figure 2 presents an example of simulation of a critical functionality in SEI Adjudication (Vote Submission), and **Figure 3** shows a simulation of process creation, using Traditional SEI.

The methodological consistency, which included using the same group and the same role alternation, was the main tool to mitigate potential interpretation bias, focusing the

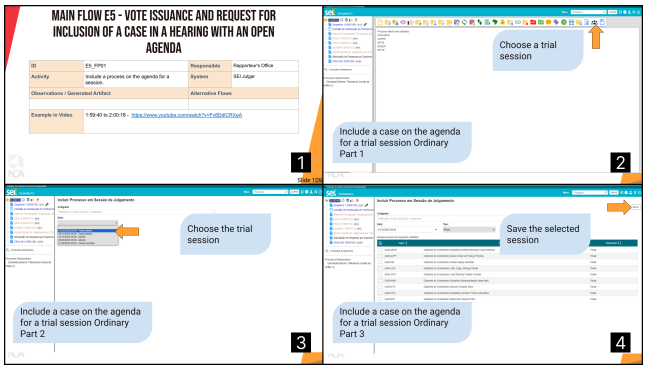

Figure 2. Simulation of the Judgment process in SEI Julgar, showing the Vote Issuance screen.

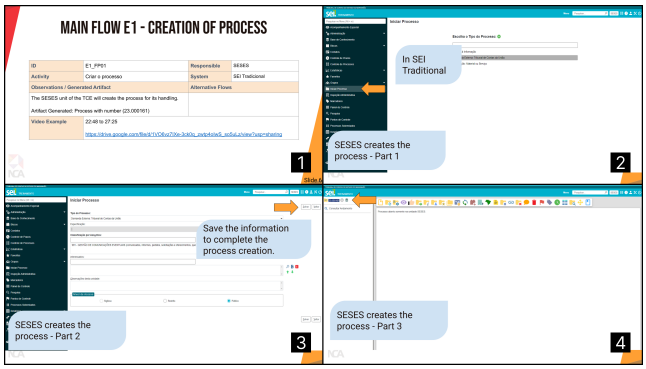

Figure 3. Simulation of a basic functionality in the Traditional SEI (System) – process creation.

evaluation on the intrinsic capabilities of the systems.

4.5.1 Simulation in SPE

SPE is currently used by the organization to monitor administrative and audit processes. During the simulation, the workflow was recreated to represent adjudication sessions, from case distribution to its closure. However, one of the main limitations observed was the lack of automation in monitoring adjudication sessions, which is currently done manually, requiring civil servants to record session details independently, leading to various challenges.

The manual process presents several critical points. First, the significant effort required for these records increases the workload, which can result in delays both in data entry and analysis. Second, manual data entry is prone to human errors, which can cause inaccuracies, inconsistencies, and omissions in recorded information. These errors can directly compromise the accuracy and reliability of data used for analysis and decision-making within the organization.

To illustrate the analyzed points, **Figure 5** shows the flowchart of SPE simulation, detailing the steps of an adjudication session within the system. It distinguishes four main roles involved in session management: Counselor (analyzes cases, prepares opinions, participates in sessions, and votes on decisions); Court President (presides over sessions, maintains order, facilitates dialogue, votes in case of tie, and coordinates administrative aspects); Rapporteur (conducts initial case analysis, prepares summaries and recommendations, and interacts with involved parties); and Sessions Secretariat (SESES), which schedules sessions, records procedures, manages files, and provides administrative support.

A specific color code was used for clarity: unfilled boxes represent automated actions within the system, while blue boxes indicate external or manual activities. The figure provides a clear view of how the workflow is distributed among different roles and interactions within the system.

Additionally, SPE simulation included an evaluation of various quality attributes. During the process, several system functionalities that needed improvement were identified. The results indicated that, although SPE meets some needs, it is not sufficient to ensure the necessary efficiency, especially regarding process automation.

Table 1 presents the functionalities identified in the adjudication simulation and their correspondence with system requirements. As shown, SPE partially met or did not meet some essential requirements. For example, while functionalities such as “Create case", “Add documents to case", and “Create adjudication session" are fully met (“T”), the system fails in critical areas, such as recording specific adjudication events, document version control, and generating session minutes, which were not met (“N”). Some functionalities, such as “Forward case between departments" and "Attach document to case", were partially met (“P”). This highlights the need to improve system automation and accuracy.

The limitations found, especially in process automation, document version control, and event recording during adjudication sessions, justify considering other solutions or developing a new system that better meets the organization’s needs.

Given the challenges identified in SPE, we now proceed to analyze how SEI can address these gaps and verify whether it offers the necessary functionalities to optimize the adjudication process.

4.5.2 Simulation in SEI

The workflow simulation in SEI was conducted with the objective of evaluating its ability to integrate and automate adjudication process steps effectively, addressing the gaps identified in SPE simulation. In SEI, scenarios were configured that replicated the organization’s actual process, allowing observation of system behaviors and evaluation of its efficiency and effectiveness in relation to required functionalities.

As mentioned earlier, SEI already includes resources aimed at workflow optimization, especially regarding process automation and data integration, unlike SPE, which required manual entry at various steps. Specifically, in SEI, tasks such as reopening an adjudication session, previously performed manually and by phone, can now be initiated directly in the system, eliminating the need for external interventions and improving efficiency.

Figure 6 illustrates the workflow simulated in SEI, highlighting the operational steps that comprise the adjudication process within the system. The figure shows how essential functionalities such as electronic creation of new cases, automatic distribution according to pre-configured rules, electronic document attachment, and digital signature contribute to the agility and standardization of activities. The graphical representation also demonstrates the interaction between system modules and different user profiles, providing a clear view of the distribution of responsibilities and the logical sequence of tasks.

During the simulation, the main roles involved in adjudication sessions were identified and analyzed. The Counselor

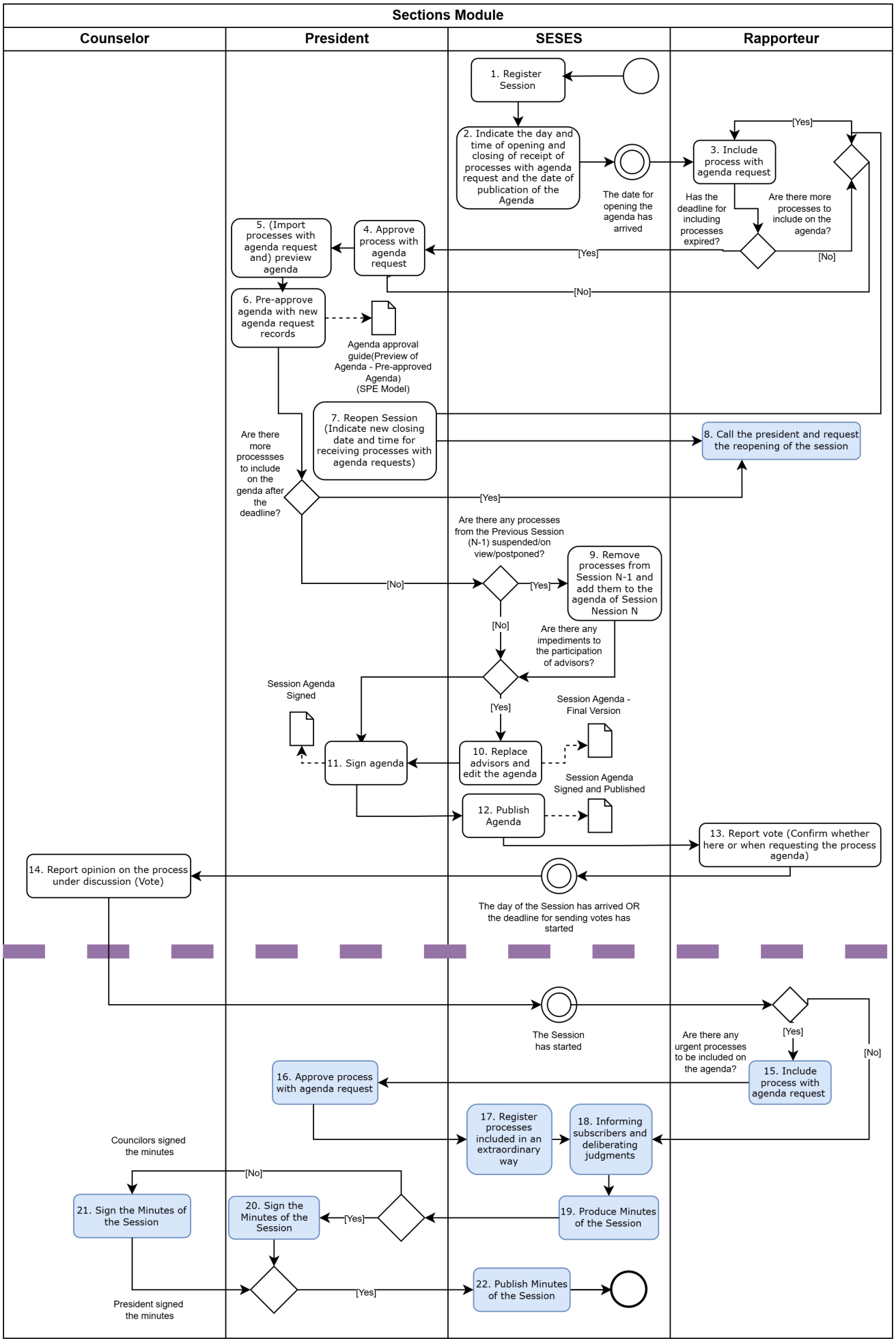

Figure 4. Generic flowchart of the adjudication process.

is responsible for technical analysis of cases, preparation of opinions, and vote submission. The Court President organizes sessions, ensures compliance with procedures, and resolves deadlocks through tie-breaking votes. The Rapporteur conducts preliminary analysis, prepares reports, and interacts with involved parties. Finally, the Sessions Secretariat (SESES) plays a fundamental role in process logistics, being responsible for creating and managing agendas, recording deliberations, and providing documentary support.

For clarity, a specific color code was used in the flowchart: unfilled boxes represent automated actions within the system, while blue boxes indicate external or manual activities.

The simulation demonstrated that SEI offers functionalities not present in SPE, such as recording specific adjudication events, document version control, and session minutes generation. These resources are supported by SEI but absent in SPE, representing a significant improvement in adjudication process automation and efficiency.

Table 2 presents the functionalities identified in SEI simulation and compares them with functionalities not supported by SPE. As can be seen, SEI fully supported various essential functionalities, including recording specific adjudication events, document version control, and session minutes generation, while SPE did not. Additionally, SEI also supported document signing, which SPE was unable to provide.

This comparison indicates that SEI performed better than SPE in automation and efficiency. SEI ensured greater accuracy and reliability in the adjudication process, offering tools that save time and reduce errors.

The analysis of identified functionalities indicates that SEI performs better than SPE in automation, accuracy, and efficiency. The implementation of features such as recording specific adjudication events, document version control, and session minutes generation in SEI are crucial improvements not met by SPE, reflecting a significant enhancement in overall system reliability and performance.

4.6 SPE vs. SEI Evaluation

The comparative evaluation between SPE and SEI revealed substantial differences in functionality, efficiency, and adaptability to the organization's needs. During simulations, it was observed that SPE's main limitation lies in the lack of automation at various adjudication stages, especially in monitoring adjudication sessions, which is performed manually and in a fragmented manner. Manual data entry, a characteristic of SPE, creates operational challenges, such as increased completion times for routine tasks, greater susceptibility to human errors, and inconsistencies in recorded data. These factors directly impact the reliability of information used for decision-making, compromise procedural integrity, and require rework from civil servants.

Furthermore, SPE's difficulty in handling simultaneous workflows or high process volumes demonstrates a structural limitation that may worsen as institutional demand grows. This rigidity makes it difficult to meet deadlines and makes it harder to maintain an efficient work environment, particularly in contexts that require agility and precision in case processing.

In contrast, SEI performed better in terms of automation and process support. Its main advantage lies in the automation of operational steps, eliminating the need for repetitive, error-prone manual tasks. In SEI, session monitoring is automated, supporting more accurate data collection, better event traceability, and fewer failures related to manual intervention. Functionalities such as electronic case creation, digital signatures, automated distribution via weighted algorithms, and integration with complementary modules enable more agile, standardized, and secure process management.

Detailed functionality analysis demonstrated that SEI offers superior performance in almost all evaluated aspects, especially in automation, interoperability, and decision support. The system fully met 55 functional requirements, covering all essential quality attributes, such as security, scalability, reliability, and usability. In contrast, SPE met only 18 of these requirements, proving to be less prepared to deal with the organization's growing complexity.

Another highlight is SEI's flexibility to adapt to different workflows. Designed with a modular and configurable architecture, the system allows targeted adjustments without deep structural modifications. This characteristic was decisive for its selection, as it ensures the institution can customize the tool according to its internal specificities, promoting a smoother and more efficient transition.

In the simulations, SEI proved to be more effective in supporting task execution and generating reports and documents. Automated issuance of certifications, minutes, and other critical documents, without manual intervention, translates into real productivity gains, rework reduction, and increased institutional credibility.

Finally, the comparison showed that SEI is more scalable and better prepared for future institutional demands. This assessment is supported by criteria such as modularity, interoperability, technical documentation, and maintainability. SEI's modular architecture and compliance with the National Electronic Process support its integration with other systems and its potential for expansion. Additionally, its adoption by large-scale institutions and the availability of technical documentation indicate greater capacity to evolve with organizational needs. SPE, on the other hand, has a more limited structure and may become an operational bottleneck, requiring future restructuring.

At the end of the evaluation, the tables presented throughout the study consolidated a comprehensive view of functionalities supported and not supported by each system, highlighting their capabilities, limitations, and degree of alignment with the organization's needs, and serving as technical and strategic basis for selecting the most appropriate solution for modernizing the organization's internal workflows.

4.7 Discussion of Results

The joint analysis of data, as detailed in **Tables 3 through 7**, establishes that SEI offers broader support than SPE, both in functional terms and in quality and validity requirements. The following discussion is structured to address methodological nuances, functional evidence, strategic requirements, and the study's positioning in scientific debate.

4.7.1 Methodological Note and Ethical Considerations

Before discussing quantitative and qualitative results, it is essential to contextualize the evaluation methodology. The

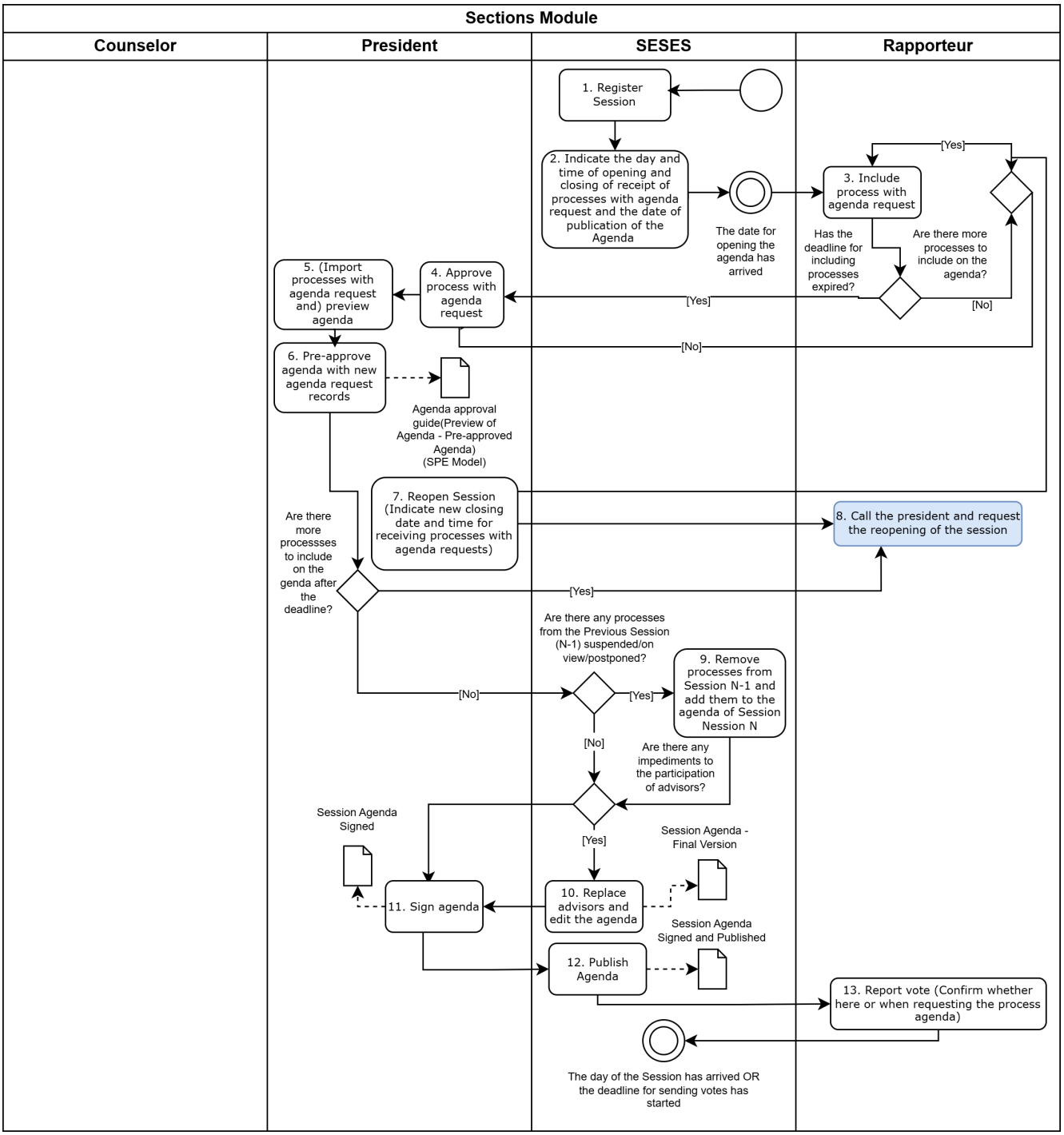

Figure 5. Flowchart of the adjudication session simulation in the Electronic Process System (SPE), highlighting the process steps and the main roles involved.

Table 1. Adjudication process-related functionalities identified in the SPE simulation.

Adjudication Process-related Functionalities	**SPE**
Create case.	T
Add documents to case.	T
Forward case between departments.	P
Attach document to case.	P
Create adjudication session.	T
Record specific adjudication events for a case.	N
Log events of adjudication sessions.	N
Document version control.	N
Sign documents.	N
Generate session minutes.	N

study did not propose to conduct a formal and quantitative usability test (such as applying heuristic questionnaires or the System Usability Scale - SUS). The evaluation of attributes such as “Ease of search", “Ease of access" and “Time savings”, as shown in **Table 8**, was performed indirectly and qualitatively.

These classifications derive from comparative observation during process simulations. For example, “Time savings” was inferred by the notable elimination of manual steps in SEI compared to SPE, as observed by analysts. These attributes were evaluated based on the Quality Models defined by ISO/IEC 25010:2023, where “Time savings” and “Agility in processing” were mapped to the concept of Performance Efficiency, while “Ease of access” and “Better content organization” reflected perceived Interaction Capability and Functional Suitability. Therefore, although the vocabulary used throughout the text, such as efficiency, ease of use, and usability models, may resemble HCI terminology, the scope of this work should be clearly delimited. Our interaction-related findings are indirect inferences derived primarily from our workflow mapping and functional analysis, rather than results obtained through classical user-centered evaluation methods.

However, it is necessary to acknowledge the limitations of this analyst-led simulation approach. The absence of real-world users in this stage means that the findings may not capture the full range of human variability, tacit knowledge, and specific difficulties encountered in daily operations. Furthermore, because the simulations were performed by the research team, there is an inherent risk of confirmation bias, as the evaluators possess prior technical knowledge of the systems. These factors indicate that while the functional analysis is robust, the interaction findings should be viewed as a preliminary diagnostic rather than a definitive assessment of user experience.

In an effort toward transparency and open science, the simulation materials and evaluation data that comprise this study’s evidence are publicly available in a repository for future reuse, as detailed in the Materials section.

Although the study classifies as a systems evaluation and focuses exclusively on functionalities and technical adequacy (not involving sensitive personal data, clinical experimentation on human beings, or invasive procedures), rendering formal approval from a Research Ethics Committee (CEP) unnecessary, ethical principles were strictly upheld throughout all research stages. During the data collection phase (interviews and workflow mapping), all civil servants and collaborators participated voluntarily, with the explicit consent and support of the organization. Participants were clearly informed about the study’s objectives and that their contributions would be used solely for institutional improvement and academic purposes. In the data analysis and simulation phases, information was systematically aggregated; the mapped workflows and simulated scenarios were abstracted to deliberately omit any identifiable personal characteristics or confidential specifics of real legal cases. Finally, in the reporting and data sharing stages, the anonymity of all individuals who participated in the interviews and walkthroughs was strictly ensured, and the confidentiality of the organization’s internal administrative data was fully preserved at all times.

4.7.2 Functional Superiority and Productivity Gains

A central finding of our study, as detailed in **Table 9**, is that SEI presented much superior functional and quality performance compared to SPE, achieving 87.3% total compatibility with evaluated requirements, more than three times the 28.6% achieved by SPE. This high compliance rate underscores that SEI covers a broader spectrum of ready-to-use requirements and aligns more effectively with institutional workflows, minimizing the need for adaptations or custom development.

As demonstrated in **Table 3** and **Table 4**, the capability difference is more pronounced in the adjudication process. SEI not only fulfills a greater number of functionalities essential to the adjudication process but also incorporates crucial mechanisms for productivity and governance, such as document version control, document signing, recording specific case adjudication events, and generating adjudication session minutes, all of which were classified as not met (“N”) by SPE. Additionally, it incorporates mechanisms aimed at institutional productivity, such as maintaining dashboards and creating forms, reinforcing its adequacy for more complex scenarios, with high process throughput demands and session management.

As presented in **Table 5**, SEI provides more comprehensive support for critical process management and administrative operations. It fully covers (“T”) all phases of the process lifecycle, including listing, filtering, suspension, conclusion, and annotation, while also offering advanced features such as special monitoring and checkpoint control. These mechanisms not only ensure standardization and complete recording of each step but also allow configuration of alerts and checkpoints, reducing dependence on parallel controls and minimizing the risk of losses or delays.

Regarding system management, as presented in **Table 6**, SEI stands out by offering a wide range of configuration and customization tools: from defining fields, types, and categories to maintaining an integrated knowledge base, unit-level statistics, and favorite templates. These elements provide the flexibility to quickly adapt the environment to internal rules and workflows of each institution, reducing training costs and external customization needs. Features such as internal and meeting signature blocks, as well as deadline control, further reinforce document governance and compliance with legal requirements.

In contrast, SPE demonstrates limited coverage, effectively restricting itself to basic case listing and issuing some specific certifications (final and unappealable judgment certificate, individual certificate, and executive title certificate), which may be useful in isolated scenarios but do not compensate for the absence of essential monitoring, annotation, and analysis controls. Thus, adopting SPE requires dependence on auxiliary systems and manual procedures, increasing the likelihood of errors and rework.

4.7.3 Non-Functional Requirements, Validity, and Scientific Contextualization

SEI’s superiority is not restricted to operational functionalities, extending to non-functional and validity requirements, which are pillars for the sustainability and legal compliance of a public system.

Based on the comparisons shown in **Table 7**, SEI clearly

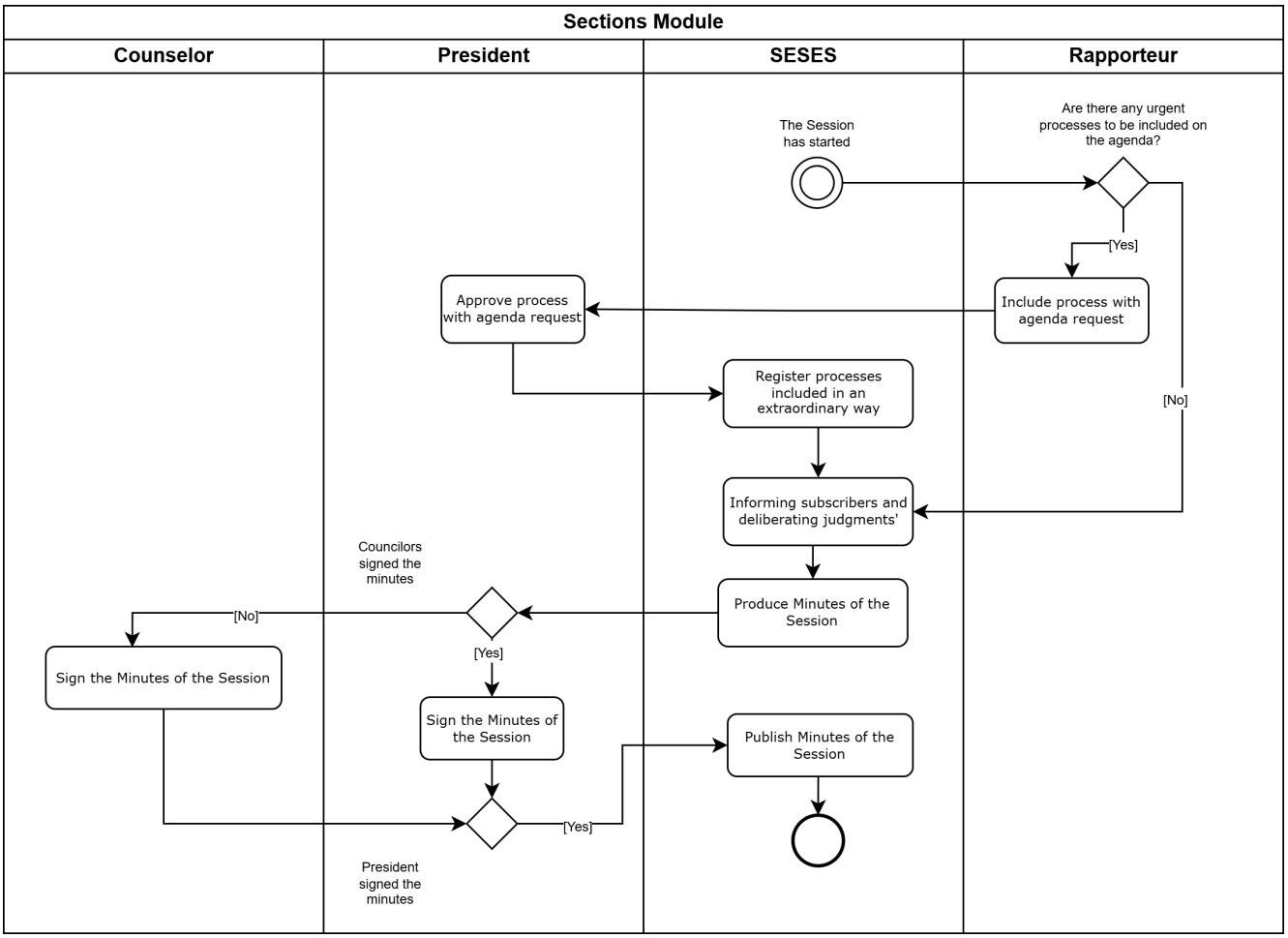

Figure 6. Flowchart of the adjudication session simulation in the Electronic Information System (SEI), highlighting the process steps and the main roles involved.

Table 2. Comparison of adjudication process-related functionalities identified in SPE and SEI.

Adjudication Process-related Functionalities	**SPE**	**SEI**
Create case.	T	T
Add documents to case.	T	T
Forward case between departments.	P	T
Attach document to case.	P	T
Create adjudication session.	T	T
Record specific adjudication events for a case.	N	T
Log events of adjudication sessions.	N	T
Document version control.	N	T
Sign documents.	N	T
Generate session minutes.	N	T

surpasses SPE in all central dimensions of security and compliance. Although both platforms support Authentication (“T”), SEI offers broader privacy safeguards, refined authorization controls, data integrity mechanisms, and non-repudiation support. SPE’s lack of non-repudiation (“N”) makes it unsuitable for high-risk environments, where regulatory audits and proof of action authorship are essential. By incorporating these requirements directly into the platform, SEI simplifies governance and risk management.

SEI appears better prepared to support future institutional demands in terms of non-functional requirements and quality attributes, present in **Table 8**. SEI meets all evaluated criteria (“T”), including Maintainability, Available technical documentation, Additional modules, and Compliance with the National Electronic Process standard (Interoperability). This high compliance is the fundamental evidence of its scalability, based on modular architecture, documentation for continuous support, and adherence to PEN for large-scale integration. The absence of these resources in SPE (“N”) implies that any improvement or integration will require reverse engineering or custom development, increasing total cost of ownership and hindering scalability. Our qualitative findings also indicate high “Agility in case processing", "Ease of search" and "Better organization", reinforcing its role as a facilitator of lean and audit-ready workflows.

SEI’s comprehensive integrity mechanisms ensure that

Table 3. Comparison of adjudication process-related functionalities between SEI and SPE.

Functionality	**SEI**	**SPE**
Create case.	T	T
Add documents to case.	T	T
Forward case between departments.	T	P
File case.	P	T
Distribute case.	T	T
Attach document to case.	T	P
Create adjudication session.	T	T
Manage adjudication session agenda.	T	T
Include case in session agenda.	T	T
Submit vote for case on session agenda.	T	T
Request oral argument for case.	T	T
Define order of case adjudication.	P	T
Record specific adjudication events of the case.	T	N
Log events of adjudication sessions.	T	N
Document version control.	T	N
Sign documents.	T	N
Publish in the official journal.	P	P
Deadline countdown for actions related to a specific case item.	P	N
Annul published deliberation in the official journal.	T	T
Generate adjudication session minutes.	T	N

Table 4. Additional productivity functionalities in SEI and SPE.

Functionality	**SEI**	**SPE**
Maintain adjudication panels, session types, case types, etc.	T	N
Maintain session reasons (absence, distribution, etc.).	T	N
Create form.	T	N
Create tag.	T	T

Table 5. Process management functionalities in SEI and SPE.

Functionality	**SEI**	**SPE**
List / Filter cases.	T	T
Update progress.	T	N
Suspend case.	T	N
Conclude case.	T	N
Make annotations.	T	N
Special monitoring.	T	N
Manage control points.	T	N

Table 6. System management functionalities in SEI and SPE.

Functionality	**SEI**	**SPE**
Special monitoring.	T	N
Manage fields, types, categories, entities.	T	N
Maintain knowledge base.	T	N
Signature blocks (internal and meeting).	T	N
Consult contacts.	T	N
Deadline control.	T	N
Unit statistics.	T	N
Favorite templates.	T	N
Manage groups.	T	N
Minimum signature control for publication.	N	T
Issue final and unappealable judgment certificate.	N	T
Issue individual certificate.	N	T
Issue executive title certificate.	N	T

each modification is evident in case of violation, while its non-repudiation features (digital signatures, audit logs) provide stronger evidence of who performed each action and when. These capabilities are essential for legal and administrative processes where contested decisions or regulatory audits are common. In contrast, SPE's lack of non-repudiation ("N") means it cannot, by itself, prove that a specific user executed a particular operation, thus undermining its suitability for high-risk environments.

By incorporating these validity requirements directly into the platform, SEI reduces the need for security layers and custom development, accelerating deployment and decreasing total cost of ownership. Organizations adopting SPE would have to invest in additional tools or custom integrations to achieve a comparable level of assurance, introducing complexity, integration risks, and ongoing maintenance burdens. Therefore, SEI's end-to-end compliance framework not only strengthens its technical credibility but also simplifies governance and risk management for governments.

Additionally, based on comparative data from **Table 8**, SEI appears better prepared to support future institutional demands in terms of non-functional requirements and quality attributes. SEI meets all evaluated criteria ("T"), while SPE does not support fundamental attributes such as maintainability, technical documentation, additional modularity, or interoperability with the PEN standard, all of which are important for large-scale digital transformation initiatives.

First, SEI's full support for maintainability and availability of technical documentation ensure that development teams can extend and update the system with minimum friction. In contrast, the absence of these resources in SPE ("N") implies that any improvement or correction will require reverse engineering or custom analysis, increasing both deployment time and total cost of ownership.

Second, SEI's modular architecture ("Additional modules") and its interoperability ("Compliance with the National Electronic Process standard") enable integration with other government systems and incremental deployment of new capabilities. The lack of these resources in SPE traps institutions in a monolithic configuration, hindering scalability and data exchange between systems.

SEI offers observable gains in operational efficiency, including agility in case processing, ease of search, viewing and access, and better content organization ("T" vs. "P"). In contrast, SPE still depends on manual workarounds or third-party tools to achieve comparable results.

Finally, SEI's support for resource and space savings, elimination of repetitive tasks, transparency in case progress, and loss prevention reinforces its role as a facilitator of lean and audit-ready workflows. Although SPE offers these benefits only partially ("P"), institutions seeking to optimize costs and ensure robust governance will find SEI's comprehensive coverage indispensable.

Considering the functional compatibility rates shown in **Table 9**, SEI demonstrates a total compliance rate of 87.3% across all evaluated functionalities, more than three times the 28.6% achieved by SPE. This gap underscores that SEI not only covers a broader spectrum of ready-to-use requirements but also aligns with workflows and user expectations, minimizing the need for adaptations or custom development.

Specifically, SEI's coverage of maintainability, technical documentation, additional modules, and interoperability with the National Electronic Process standard ensures that institutions can evolve their digital infrastructure in line with regulatory changes and user demands. In contrast, SPE's lack of support for these fundamental attributes forces organizations to resort to manual and reactive solutions.

Furthermore, SEI offers operational efficiencies: end-to-end agility in case processing, intuitive search and viewing interfaces, and optimized content organization contribute to faster decision cycles. SPE's partial support in these areas may generate marginal improvements but still requires supplementary tools to achieve comparable performance.

SEI's support for resource and space savings, elimination of repetitive tasks, transparent case tracking, and loss prevention strengthens its practical value in the evaluated context. The high compliance rate indicates that SEI may require less adaptation than SPE in the evaluated context, while SPE's low coverage portends significant investments in custom processes, integrations, and personnel training. Consequently, for public administrations seeking to optimize costs, accelerate digital transformation, and align more effectively with institutional workflows, SEI appears to be the more suitable option in the evaluated context.

Contrast and Convergence with Literature. This finding about functional adequacy contrasts with part of the debate about SEI in Brazil. Our high compliance results (87.3%) appear to diverge from the quantitative usability benchmark of 59.78, classified as "Unacceptable", reported by Resende Júnior and Leite . This difference suggests that SEI should not be evaluated from a single perspective. While the low usability score reported by Resende Júnior and Leite focuses on the interaction layer, our analysis, centered on feature analysis and process simulation, suggests that the system's underlying functional structure is more complete for the workflow evaluated in this study.

On the other hand, our findings on "agility", "Time savings" and "transparency" align with research focused on SEI acceptance. Santos & Moura explored acceptance constructs, including "perceived benefits" and "user satisfaction". Our results provide a functional explanation for the satisfaction and perceived benefits reported by Santos and Moura.

Implications for Adoption and Change Management. Although SEI's functional superiority and compliance are evident, the analysis reinforces the importance of the human dimension in digital transformation. The system's technical robustness does not automatically guarantee its adoption. Therefore, even with the favorable decision for SEI, implementation must be accompanied by a change management and stakeholder engagement process. It is crucial that the organization defines a clear communication and training strategy focused on direct benefits for end users, ensuring that functional investment translates into real acceptance and effective use by civil servants.

Based on the evidence presented in the tables, we now proceed to the Conclusion section, where we will discuss the implications of this analysis for selecting the most appropriate system.

Table 7. Comparison of validity requirements between SEI and SPE.

Validity Requirement	**SEI**	**SPE**
Authentication.	T	T
Privacy.	T	P
Authorization.	T	P
Data integrity.	T	P
Non-repudiation.	T	N

Table 8. Quality attributes and non-functional requirements in SEI and SPE.

Quality Attribute / Non-Functional Requirement	**SEI**	**SPE**
Maintainability.	T	N
Technical documentation available.	T	N
Additional modules.	T	N
Compliance with National Electronic Process (Interoperability).	T	N
Agility in case processing.	T	P
Ease of search.	T	P
Ease of viewing.	T	P
Ease of access.	T	P
Better content organization.	T	P
Resource savings.	T	P
Space savings.	T	P
Time savings and elimination of repetitive tasks.	T	P
Transparency of case progress.	T	P
Loss prevention.	T	P

Table 9. Distribution of requirement classifications between SEI and SPE.

Compatibility	**SEI (%)**	**SPE (%)**
T (Fully Met)	87.3	28.6
P (Partially Met)	6.4	25.4
N (Not Met)	6.3	46.0

Percentages are rounded to one decimal place.

5 Conclusion

This study presented a comprehensive evaluation of the SEI and SPE systems, with the objective of identifying the solution that would most effectively meet the needs of judicial process management in a Court of Auditors. The analysis, combining functionality mapping and process simulation, demonstrated that SEI proved to be more suitable for this specific context, standing out for its greater adherence to requirements, automation capability, and information reliability.

It is crucial, however, to contextualize this conclusion. SEI, as a central component of the PEN, has been adopted by a diverse range of public institutions, including universities, municipal administrations, and regulatory agencies, whose workflows and operational demands differ significantly from the adjudication environment analyzed here. Therefore, the SEI adequacy identified in this study should not be interpreted as a universal recommendation or a "one-size-fits-all" solution.

The main contribution of this work, beyond the specific use case, lies in the hybrid evaluation methodology itself. The approach of combining functionality analysis with practical workflow simulation proved essential to avoid selection based only on requirements lists, validating system adequacy to the real operational context. In this sense, and given SEI's widespread adoption in the public sector, we strongly encourage other institutions to conduct their own customized evaluations. The methodology presented in this article serves as a reference framework to guide such analyses.

However, it is necessary to explicitly discuss the limitations of the analyst-led simulation approach. First, the simulation relied on a standardized workflow mapped from user interviews. While real users might execute slightly different, more complex, or highly specific process variations that our simulation did not capture, this limitation is mitigated by the fact that the simulation strictly followed the explicit flows reported by the users themselves, which already encompassed several alternative paths. Furthermore, since the original process was not fully automated, confirming that the new system could successfully execute this baseline workflow provided a crucial early validation of its viability.

Second, the simulation was not conducted *a priori* with end-users providing real-time feedback on usability and workflow fluidity. The focus was strictly on verifying whether the mapped workflow could be functionally executed within the tools. Although the absence of real users is a limitation, conducting such an evaluation with end-users at this preliminary stage would demand significantly more time and resources. The analyst-led approach provided a much faster, yet reliable, overview to support immediate strategic decision-making.

Based on this contextualized evaluation, SEI was selected for implementation in the organization. The subsequent process involved customizations to adjust specific functionalities, followed by a testing and validation phase with users. With positive validation, implementation was formally approved and accompanied by training and support actions, aiming to ensure an efficient transition.

As a proposal for future work, and aligned with this vision of continuous adequacy, we suggest monitoring system

use over time to evaluate whether customizations remain adequate. Additionally, we recommend systematic collection of user feedback to guide future improvements, ensuring the solution continues to evolve according to institutional needs.

To address the limitations of the analyst-led simulation, future studies should conduct formal user-centered usability evaluations involving a representative sample of civil servants. This would help verify if any specific interaction aspects or operational nuances were overlooked by our functional comparative method. We recommend a methodological triangulation approach, combining the qualitative functional analysis presented here with quantitative usability metrics and longitudinal field observations.

Finally, a specific limitation identified in this evaluation methodology was the generality of the "Partially Met" ("P") classification. As future work, we suggest refining this classification, perhaps with a descriptive field detailing the identified gaps.

Declarations

Authors' Contributions

Vitor Sousa contributed to the conceptualization, methodology, writing – original draft, writing – review and editing, data curation, and investigation of this study. Vitor Sousa is the main author of this manuscript. Carlos Castro, Renan Oliveira, Ricardo Mendonça, Luiz Muniz, Simara Rocha, and João Almeida contributed to data curation, investigation, and writing – review and editing. Luis Rivero contributed to supervision, conceptualization, methodology, and writing – review and editing. All authors read and approved the final manuscript.

Competing interests

The authors declare that they have no conflicting interests or personal relationships that could have influenced the work reported in this article.

Availability of data and materials

The datasets and evaluation materials generated and analyzed during this study, including simulation tables, evaluation criteria, and functional compatibility data, are openly available in Zenodo (DOI: `https://doi.org/10.5281/zenodo.18202527`).

Further relevant information

Use of Artificial Intelligence Tools: The authors acknowledge the use of generative Artificial Intelligence tools, including ChatGPT, to support grammar refinement, academic writing improvement, LaTeX consistency checking, and preliminary verification of bibliographic references during the preparation of this manuscript. These tools were not used to collect empirical data, conduct interviews, perform the workflow simulations, assign the evaluation classifications ("T", "P", and "N"), analyze confidential institutional information, or make methodological decisions. All AI-assisted suggestions were critically reviewed, validated, and edited by the authors, who take full responsibility for the final content, arguments, results, and references presented in this manuscript.

Ethical Considerations: This study evaluated institutional software systems through workflow mapping, interviews with organizational collaborators, document analysis, and controlled process simulations. The research did not involve clinical procedures, invasive interventions, sensitive personal data, or experiments that could expose participants to risk. The collaborators who contributed to interviews, workflow mapping, and validation activities participated voluntarily and were informed about the academic and institutional purposes of the study. The information used in the analysis was aggregated and abstracted to avoid identifying individual participants or confidential details of real cases. Based on the nature and scope of the study, the authors understood that formal approval by a Research Ethics Committee was not required. Nevertheless, the study followed ethical principles of voluntary participation, confidentiality, anonymity, and responsible handling of institutional information.

Citation Diversity Statement: In compiling the references for this work, we sought to include a diverse and relevant set of sources, combining international literature on software evaluation, business process management, technology acceptance, multi-criteria decision analysis, and software quality models with Brazilian studies and institutional sources related to digital government, SEI, public administration, and electronic process systems. We also included sources from Brazilian venues and repositories, especially those associated with the Brazilian Computer Society, to situate the study within the national research context. The selection of references was guided primarily by relevance, verifiability, methodological adequacy, and direct connection to the claims made in the manuscript. We recognize that citation practices may reproduce broader academic biases, especially regarding geographic, institutional, gender, and racial representation. No automated inference of author gender, race, or ethnicity was performed, since such procedures may introduce misclassification and do not reliably capture authors' identities. Future versions of this work may include a more systematic quantitative assessment of citation diversity.

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