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SAMADHAN AI: An AI-Assisted Smart Grievance Redressal Framework for Interoperable Public Services

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***Abstract*—** Digital grievance platforms have simplified complaint registration, but effective grievance redressal requires accurate routing, priority-based handling, responsible assignment, escalation, resolution, and transparent status tracking. This study presents **Samadhan AI**, a student-developed grievance redressal prototype, as a practical model for exploring the integration of Artificial Intelligence (AI), workflow automation, and system interoperability in digital governance. The existing prototype supports structured complaint submission, categorization, departmental information, validation, and complaint reference generation. The proposed framework extends Samadhan AI with an **interoperability layer** capable of connecting different departmental systems through common case structures, APIs, reusable connectors, event-based status updates, controlled data sharing, audit mechanisms, and error handling. AI is used primarily as a decision-support mechanism for complaint classification and priority suggestion, while critical decisions remain under authorized human oversight. The workflow covers the complete complaint lifecycle from validation and classification to routing, assignment, execution, escalation, resolution, and citizen feedback, aligning with the interoperability requirements of **SIH26129** and relevant Indian e-governance principles. Rather than making unverified claims regarding accuracy, response time, or deployment, the study proposes an evaluation framework based on routing accuracy, priority prediction, processing time, successful inter-system data exchange, reduction in duplicate data entry, escalation compliance, synchronization reliability, and citizen experience. Overall, Samadhan AI is presented as an evolving research model for a **connected, transparent, and accountable grievance redressal ecosystem**.

Keywords: Artificial Intelligence; Grievance Redressal; Smart Automation; Interoperability; E-Governance; Workflow Automation

I. INTRODUCTION

Digital transformation has led government departments to adopt a wide range of digital platforms for delivering services, managing applications, maintaining records, and handling citizen interactions.

However, these systems are often developed independently and may differ in their data formats, identifiers, authentication mechanisms, APIs, and workflow definitions. As a result, information that should move smoothly between departments can remain confined within individual systems. This fragmentation can make public service delivery less efficient and may require citizens to provide the same information repeatedly, use multiple portals, or follow up with different departments to understand the status of a service or complaint.

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This challenge is the central focus of **Smart India Hackathon 2026 Problem Statement SIH26129**, proposed by the **Government of Maharashtra**. The problem statement identifies the need for secure, standards-based interoperability among existing government digital platforms without requiring those systems to be completely replaced. It specifically envisions an interoperability framework, middleware layer, or federated service delivery architecture capable of supporting API-based data exchange, common data standards, consent-based sharing, federated identity, event-driven notifications, unified tracking, workflow orchestration, reusable connectors, audit logs, access control, data-quality validation, exception handling, and system monitoring.

The impact of such fragmentation becomes particularly evident in citizen-facing processes such as grievance management. A grievance may originate through one platform but require information, action, or verification from multiple departments and administrative systems before it can be resolved. When these systems are not interoperable, the complaint may become disconnected from the subsequent actions taken by different stakeholders. Citizens may have limited visibility into the progress of their cases, while officials may lack a consolidated view of the information required for timely resolution.
Therefore, grievance management provides a practical context in which the benefits of interoperability can be demonstrated.

Samadhan AI was developed as a prototype around this citizen-facing grievance management context.
The study makes four practical contributions. **First**, it presents grievance management as a representative use case for demonstrating government-system interoperability. **Second**, it proposes an interoperability layer that can connect existing departmental platforms without requiring complete system replacement. **Third**, it incorporates AI-assisted classification and workflow automation within the interoperable architecture while retaining human oversight. **Fourth**, it defines an evaluation direction for measuring factors such as successful data exchange, reduction in duplicate information submission, consistency of case records, processing time, traceability, and service-level compliance.

The work is therefore positioned primarily as an **interoperability and system-integration approach**, with grievance management serving as the practical application context.The current prototype demonstrates the user-facing experience and intended scope; it is not a live integration with government platforms. The research instead provides an architectural foundation for developing and evaluating a secure, standards-based interoperability layer capable of connecting fragmented government digital services.

2. Problem Context and Research Gap:-

Existing digital grievance platforms have demonstrated the value of structured mechanisms such as centralised complaint submission, registration numbers, status tracking, feedback, and appeal facilities.
For instance, the **Centralised Public Grievance Redress and Monitoring System** (CPGRAMS) provides a common interface through which citizens can submit grievances to ministries, departments, and states. It also generates a registration number for tracking and provides an appeal mechanism when citizens are dissatisfied with the disposal of a grievance (DARPG, n.d.).[3]Similarly, the Department of

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Administrative Reforms and Public Grievances (DARPG) guidelines emphasize grievance categorization monitoring, nodal responsibility, priority handling, and escalation as important elements of an effective grievance lifecycle (DARPG, 2024)[2]. These mechanisms make grievance handling more structured, transparent, and traceable.

However, the availability of a centralized grievance interface does not necessarily mean that the underlying departmental systems are integrated. Different government departments may continue to operate independently, using different data formats, identifiers, authentication mechanisms, APIs, workflows, and system architectures. This creates a significant interoperability challenge. Citizens may be required to provide the same information repeatedly for different services, while application and grievance-related information can remain distributed across multiple systems.

The proposed direction includes common data standards, consent-based sharing, federated identity, event-driven notifications, unified tracking, reusable connectors, audit logging, role-based access, and system monitoring (Smart India Hackathon, 2026)[14].

The importance of this interoperability-oriented approach is further supported by Maharashtra's State Data Policy 2024, which recognises departmental data silos and emphasises standardisation, data quality, inter-departmental data sharing, reduction of duplication, and interoperability. The policy also treats data governance as an organisational responsibility involving data custodianship and access control (Government of Maharashtra, 2025)[6].At the national level, India's e-Governance Standards and API-related initiatives similarly encourage common data definitions and governed information exchange between digital systems (Ministry of Electronics and Information Technology [MeitY], n.d.-a, n.d.-b)[8,9]

Within this context, the research gap addressed by SamadhanAI extends beyond the development of another platform for submitting and tracking complaints. The key gap lies in bringing together three capabilities that are often considered separately: AI-assisted complaint understanding, smart workflow automation, and interoperability across heterogeneous government systems. AI-assisted classification and priority recommendation can support the identification and routing of a case, but these capabilities become significantly more useful when the receiving departmental system can reliably accept the required information and continue the workflow. Similarly, an interoperability layer can facilitate controlled information exchange, but it cannot independently determine the urgency of a grievance, make consequential decisions, or decide when escalation is appropriate. These capabilities therefore need to be considered as connected components of a broader case lifecycle.

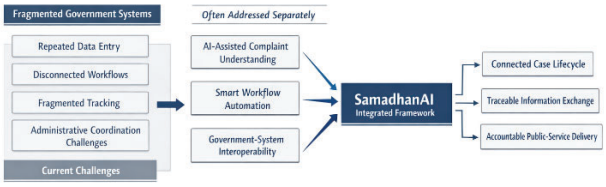

Figure 1. Conceptual relationship between AI-assisted grievance handling, smart workflow automation, and government-system interoperability.

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Based on this research gap and the proposed direction, the study is guided by the following research questions:

1. How can AI-assisted classification and priority recommendation be incorporated into a grievance

workflow while keeping final decision-making under authorized human oversight?

2. How can an interoperability layer reduce repeated data entry and fragmented tracking while

allowing departments to retain ownership of their operational systems?

3. Which metrics can be used to evaluate routing accuracy, workflow performance, interoperability

reliability, data efficiency, and citizen experience?**3. Related Work and Conceptual Foundation:-**

3.1 Digital Grievance Redressal

Digital grievance systems have gradually moved beyond basic online complaint submission toward more structured and trackable service workflows. For example, CPGRAMS provides features such as online grievance submission, registration-based tracking, citizen feedback, and appeals. Similarly, DARPG guidelines emphasize proper categorization, monitoring, assigned responsibility, time-bound handling, priority cases, and escalation mechanisms (DARPG, n.d.; DARPG, 2024)[3,2]

These existing practices provide a useful foundation for treating a grievance as a case with a complete history, rather than as only a form submitted by a citizen. Samadhan AI follows this approach by viewing the grievance as a process that moves through multiple stages from submission to final resolution.

3.2 AI-Assisted Complaint Classification

Machine learning has also been explored for improving the distribution and classification of government complaints. Chen et al. (2022)[1] studied complaint records as a text-classification problem to predict appropriate handling categories and also examined methods for dealing with inconsistently labelled classes.

This work indicates that complaint descriptions can provide useful information for supporting routing decisions. However, Samadhan AI takes a cautious approach to the use of AI. Instead of allowing the system to make an irreversible decision, AI is proposed as a recommendation and assistance mechanism. The final decision can remain with an authorized official, particularly in cases where incorrect classification or prioritization could affect the delivery of a public service.

3.3 Interoperability, Common Data, and System Integration

Interoperability between government systems involves more than simply connecting different applications. For systems to exchange information reliably, they must also follow common definitions and understand the exchanged data in a consistent manner. India's Metadata and Data Standards guidance highlights the importance of standardized data elements, common definitions, code directories, and metadata for reliable information exchange across e-governance applications (MeitY, n.d.-b)[9].

The e-Governance Standards portal also includes standards related to interoperability as well as the use of Open Application Programming Interfaces for government systems (e-Governance Standards & Guidelines, n.d.)[4]. These resources support the idea that government applications can benefit from common standards and well-defined interfaces when exchanging information.

API Setu further promotes an API-based approach to information exchange between e-governance applications. Its documentation identifies fragmented APIs, proprietary protocols, and the absence of common data standards as important barriers to interoperability and presents standardised interfaces as a way to improve system integration (MeitY, n.d.-a)[8].

Research on e-government interoperability also suggests that successful integration is not only a technical challenge. Organizational structures, governance practices, ownership, and coordination between institutions can also affect interoperability (Santos & Reinhard, 2012)[12]. Therefore, the proposed Samadhan AI interoperability layer considers both the

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technical exchange of information and the need for controlled access, accountability, and coordination between departments.

3.4 Trustworthy AI and Privacy

A digital grievance platform may handle personal information, location-related details, photographs, and records associated with public-service activities. Therefore, privacy and responsible data handling are important considerations in the proposed system. The Digital Personal Data Protection Act, 2023 provides a legal framework for the processing of digital personal data in India, while the Digital Personal Data Protection Rules, 2025 provide further implementation provisions and phased commencement details (Government of India, 2023; MeitY, 2025)[5,7].

From an AI perspective, the NIST AI Risk Management Framework identifies characteristics such as validity and reliability, safety, security and resilience, accountability and transparency, explainability and interpretability, privacy enhancement, and fairness as important aspects of trustworthy AI (National Institute of Standards and Technology [NIST], 2023)[11].

These principles are relevant to Samadhan AI because AI-assisted routing and prioritization should not operate as an unchecked automated decision-making process. The proposed framework therefore gives importance to human oversight, controlled data sharing, privacy-aware processing, and audit logging, particularly when AI recommendations or inter-departmental data exchange are involved.

4. Research Methodology :-

This study follows a design-oriented case-study approach, using the Samadhan AI prototype as the practical artefact and the SIH26129 interoperability challenge as the broader problem context. The study does not present the current prototype as a fully deployed production system. Instead, it examines the existing prototype, studies the requirements created by fragmented public-service systems, and uses these findings to develop a proposed framework for AI-assisted grievance management and system interoperability.

4.1 Research Approach

The research began by examining the challenges created by fragmented government services, particularly the difficulties citizens may experience when grievance and public-service processes are handled through separate departmental platforms. Relevant research literature, government guidelines, and interoperability standards were then reviewed to understand existing approaches to digital governance, system integration, data exchange, and coordinated service delivery.

The findings from this review were considered together with the requirements of the SIH26129 problem statement. This helped identify the functional and operational requirements that should be addressed through the proposed extension of Samadhan AI.

4.2 Requirement Analysis

The requirements for the proposed framework were identified from four main sources: the existing Samadhan AI prototype, the intended grievance-management workflow, the SIH26129 interoperability requirements, and relevant government standards and governance guidelines.

4.3 Prototype Assessment

The existing Samadhan AI prototype was examined to identify the functionality currently demonstrated through its interface and available implementation evidence. The prototype provides a structured citizen-facing complaint process that includes complaint categories, information collection, required-field validation, and generation of a complaint reference identifier. It also represents the intended process for complaint tracking and departmental handling.

The assessment clearly separates the functionality demonstrated by the prototype from the proposed extensions. Features such as advanced AI-based routing, live integration with departmental systems, and automated cross-system data exchange are treated as proposed or under-development capabilities rather than completed functions. This distinction helps ensure that conceptual features are not presented as experimentally validated results.

4.4 Proposed Framework Design

Based on the identified requirements, a proposed framework was developed around three major components:

- AI-assisted classification

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- Smart workflow automation
- An Interoperability layer.

The AI component is intended to assist with the classification and prioritization of incoming cases. The workflow component connects activities such as routing, task assignment, status updates, escalation, resolution, and citizen feedback into a continuous process. The interoperability layer provides a controlled communication boundary between Samadhan AI and different departmental systems.

The framework also considers supporting mechanisms such as authentication, authorization, data validation, event processing, exception handling, audit logging, and system monitoring. Together, these mechanisms aim to make information exchange more secure, and traceable.

4.5 Evaluation Framework

The evaluation framework is defined prospectively because the present study does not include a validated benchmark dataset or a live multi-department integration environment. Therefore, the study does not claim numerical performance results at this stage. Instead, it identifies measurable criteria that can be used for future controlled evaluation of the proposed framework.

The quality of AI-assisted routing can be evaluated using measures such as accuracy, precision, recall, and macro-F1 score, supported by confusion-matrix analysis where appropriate. Priority recommendation can be evaluated separately using measures such as precision, recall, calibration, and false-negative rate. Particular attention should be given to false-negative cases because failing to identify an urgent case may have more serious consequences than an ordinary classification error.

The workflow can be evaluated using indicators such as median case-processing time, service-level compliance, and escalation rate. Similarly, the interoperability layer can be assessed using measures including transaction success rate, API response

latency, schema-validation failures, retry recovery, synchronization delay, and connector availability.

The possible reduction in unnecessary data duplication can be examined by measuring repeated fields, repeated document requests, and duplicate records created during controlled multi-system scenarios. Citizen experience can also be evaluated through task-completion time, usability measures, clarity of status information, and post-resolution satisfaction.

These measures provide a structured basis for future experimental testing. Actual performance values will only be reported after the proposed framework has been tested under controlled conditions.

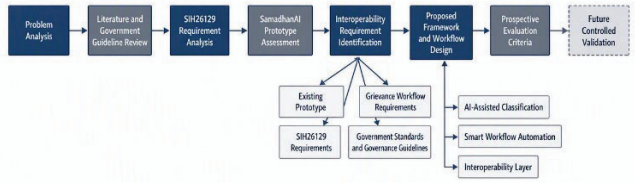

Figure 2. Design-oriented research methodology and proposed validation pathway

5.Proposed Interoperable Grievance Framework:-

The proposed Samadhan AI framework extends the existing grievance-management interface into an AI-assisted and interoperable workflow. It is designed to connect citizens, administrative processes, and different departmental systems through a common case-management structure. The current prototype demonstrates the citizen-facing aspects of the system, including complaint submission, categorisation, required-field validation, and generation of a complaint reference ID. The proposed framework extends this foundation by introducing AI-assisted classification and priority recommendation, workflow automation, interoperability middleware, controlled data exchange, and governance mechanisms. These additional components are presented as proposed research and development directions and are not claimed as fully validated production capabilities.

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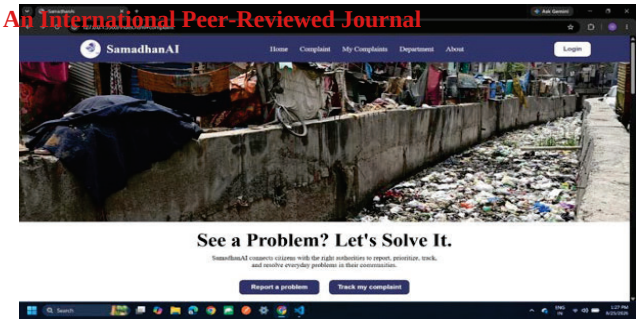

Figure 3. Existing Samadhan AI prototype interface demonstrating citizen-facing grievance submission, categorisation, validation, and case-reference functionality

Table 1. Demonstrated prototype capabilities and proposed research extensions.

Capability	Current Prototype	Proposed Extension
Complaint submission	Implemented	—
Complaint categories	Implemented	—
Required-field validation	Implemented	Enhanced
Reference ID generation	Implemented	—
AI-assisted classification and Priority recommendation	—	Proposed
Controlled data sharing	—	Proposed
Workflow automation	Basic / partial	Proposed
Interoperability middleware	—	Proposed
API-based exchange	—	Proposed
Event-driven synchronization	—	Proposed

The proposed workflow starts with structured complaint intake. Mandatory fields are checked before a case is created, while supporting evidence can be made compulsory depending on the complaint category and operational requirements. For example, a photograph may be useful for reporting a pothole or damaged public asset, whereas some other types of grievances may not require visual evidence. This configurable approach allows the validation process to match the actual requirements of different services.

After the required information is validated, Samadhan AI generates a unique case identifier and creates a structured case record. The AI component can then analyse the complaint description and other permitted information to recommend a service category, responsible department, and priority level. For example, a complaint about a pothole may be associated with road maintenance, while a complaint about overflowing garbage may be routed towards sanitation or waste management. The purpose of this AI assistance is to reduce repetitive manual interpretation and support more consistent routing, rather than to replace administrative decision-making.

Priority management can combine AI-generated recommendations with predefined service rules. Safety-related or time-sensitive cases may need faster attention than routine requests. The interface can therefore display an urgency indicator, target response time, and the reason supporting the recommendation. The recommended priority should remain subject to review by an authorised officer, who can confirm or modify it. This human-in-the-loop approach is important because an incorrect classification or priority recommendation could affect how quickly a grievance receives attention (DARPG, 2024; NIST, 2023)[2,11].

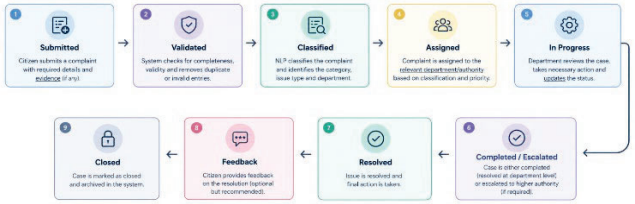

Figure 4: Proposed End-to-End Workflow for AI-Assisted Management and Resolution.

Each stage can record information such as the timestamp, responsible role, current status, and relevant event details. This creates a consistent case history even when different departments use different

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internal processes or terminology. After departmental approval, the case can be assigned to the appropriate officer, worker, or operational unit. For complaint categories where completion evidence is relevant, the assigned worker can submit the required evidence. The department can then verify the action before the case is marked as resolved.

Escalation can be triggered automatically when a configurable service deadline is exceeded. The resulting escalation event can contain the case identifier, current status, responsible assignment, elapsed time, previous actions, and relevant evidence references. This information can then be forwarded to an authorised supervisory level. Since service requirements may differ between departments and complaint categories, response deadlines should remain configurable rather than using one fixed limit for every case.

The final stage of the workflow is citizen feedback after resolution. Connecting feedback with the case record creates an accountability loop: the citizen reports the issue, the department records the action taken, the system maintains the case history, and the citizen provides feedback on the outcome. This structure can also help identify delayed, unresolved, or repeatedly reopened cases without requiring citizens to use multiple departmental portals.

5.2 Interoperability Middleware and System Architecture

The main research extension of Samadhan AI is the proposed interoperability middleware, which is positioned between the Samadhan AI case-management layer and existing departmental systems. Its purpose is to exchange authorised case information and status updates without requiring departments to replace their existing portals, databases, registries, or workflow applications. This approach reduces direct dependency between the citizen interface and individual departmental systems and provides a practical path for gradually connecting different systems.

The proposed architecture consists of five functional layers: the citizen interaction layer, Samadhan AI application layer, interoperability middleware, departmental systems layer, and governance and monitoring layer.

The citizen interaction layer manages complaint submission, case tracking, and status communication. The SamadhanAI application layer creates cases, validates information, invokes AI assistance, and manages workflow states. The interoperability middleware handles the translation and transfer of authorised information through APIs and reusable connectors. The departmental systems layer contains existing portals, workflow applications, registries, and operational databases. Finally, the governance and monitoring layer supports access control, audit trails, service-level monitoring, and administrative oversight.

An important principle of this architecture is that interoperability should work as an integration boundary, not as a replacement for existing departmental systems. Departments can continue using their existing applications and internal processes, while the middleware manages data translation, policy checks, event exchange, and integration monitoring. This reduces system dependency and allows departments to be connected progressively rather than requiring a complete replacement of their current infrastructure.

5.3 API Exchange, Canonical Data Model, and Event Synchronisation

The interoperability layer can provide versioned APIs for activities such as case creation, assignment notification, status updates, evidence-reference exchange, escalation notification, and resolution confirmation. Each API should clearly define its required fields, data types, authentication requirements, versioning rules, error responses, and idempotency requirements. Standardised acknowledgements can also help the system distinguish between a successfully accepted transaction, a validation error, a temporary communication failure, and an unavailable departmental service.

Different departments may store similar information using different field names and formats. To address this issue, Samadhan AI proposes a canonical case model that provides a common structure for information exchanged between systems. For example, one department may use complaint id, another may use application number, while another may use service request id. The canonical model can therefore maintain a global Samadhan AI case identifier separately from the local identifier used by each

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department.

Only the information needed for a particular service interaction should be exchanged. This may include the case ID, citizen reference or token, category, location, department, priority, service deadline, status, timestamps, assignment details, evidence references, and closure or feedback information. Common definitions and standardized data elements are important for maintaining consistent meaning when information is exchanged between different systems (MeitY, n.d.-b)[9].

Reusable connectors can act as adapters between the canonical case model and individual departmental systems. A connector can map field names and category or status values, authenticate with the target system, submit transactions, process responses, and return a standardized success or failure result to the middleware. This reduces the need to redesign Samadhan AI whenever a new department is connected and makes it possible to support both legacy and modern systems.

Changes such as assignment, approval, completion, rejection, escalation, and resolution can be represented as events. Instead of continuously checking individual departmental databases, the interoperability layer can receive and propagate authorised status events to the Samadhan AI case timeline. This can provide citizens with a unified view of their case while allowing each department to remain responsible for its own internal process state. Event-based processing can also provide a basis for handling retries, preventing duplicate events, maintaining event order, and recovering from communication failures.

5.4 Security, Privacy, and Responsible Interoperability

Security and privacy are important throughout the proposed architecture because grievance records may contain contact details, addresses, photographs, service information, and other personal data. The interoperability layer should therefore use authenticated API communication, least-privilege access, encrypted data transmission, server-side validation, controlled evidence storage, structured logging, and clearly separated operational roles. Access should be checked at the middleware level so that each connected department receives only the information required for its authorised task.

Interoperability should not lead to unrestricted copying of citizen information across multiple departmental systems. Data exchange should instead be controlled according to the user's authorisation, purpose, service requirement, role, and applicable policies. The system can maintain an audit record containing information such as the requesting system, type of information exchanged, time of exchange, authorisation status, and transaction outcome. Similarly, evidence files should be shared or referenced through controlled mechanisms rather than being openly available to every connected department. These practices are consistent with the broader principles of governed digital information exchange and India's data-protection framework (MeitY, n.d.-a; Government of India, 2023)[8,5].

The same principles should apply to the AI component. Data used for model development and evaluation should avoid unnecessary personal identifiers, with de-identification or pseudonymisation applied where appropriate and feasible. AI recommendations should also retain relevant confidence or explanation information and identify uncertain or high-impact cases for human review. This is important because incorrect routing may send a grievance to the wrong department, while incorrect priority assignment may delay attention to a more serious issue. The proposed framework therefore treats AI validity, reliability, explainability, accountability, privacy, security, and fairness as ongoing considerations throughout the system lifecycle rather than as one-time implementation checks (NIST, 2023)[11].

Overall, the proposed framework brings together structured case processing, AI-assisted decision support, automated workflow management, API-based interoperability, a canonical data model, reusable departmental connectors, event-driven synchronisation, and controlled governance mechanisms. The existing prototype provides the citizen-facing foundation, while the AI and interoperability components represent the main research extensions currently under development. The overall aim is to provide citizens with a more unified grievance experience while allowing departments to retain their existing systems and gradually participate in a common and governed digital service ecosystem.

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6. Proposed System Architecture and Evaluation Framework

Architectural Workflow and Interoperability Boundary
The interoperability middleware connects this workflow with departmental systems while avoiding unnecessary sharing of the complete case record with every connected application. Instead, it identifies the information required for a specific service interaction and checks whether the requested exchange is permitted. The required information can then be transformed into a format understood by the receiving system and the exchange can be recorded for future auditing.

Once a case is approved for departmental processing, workflow automation can move it through a defined sequence of states:

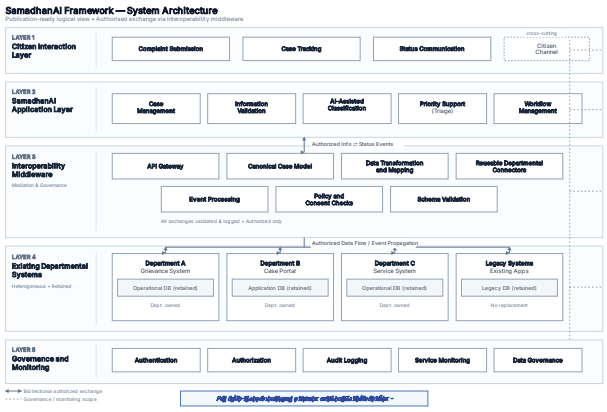

Figure 5. Proposed layered architecture for AI-assisted grievance processing and government-system interoperability.

The architecture also supports event-based status synchronization. For example, when a department assigns a case, changes its status, completes an action, or raises an escalation, the relevant event can be communicated back to Samadhan AI and reflected in the citizen's case timeline. The department remains responsible for its internal operational status, while Samadhan AI provides a unified view of the overall case journey.

In this way, the proposed architecture separates case coordination from departmental execution. Samadhan AI manages the citizen-facing journey and coordination across connected systems, while individual departments continue to carry out their operational activities through their existing

7. Discussion:-
The case-oriented approach also has an important effect on the citizen experience. Instead of requiring citizens to understand which department handles each stage of a service, Samadhan AI aims to provide a single case view with a clear timeline. This can make the process easier to follow while reducing the need to repeatedly check different departmental portals. At the same time, the same case history can support internal monitoring by recording important events such as case creation, classification, assignment, progress, escalation, resolution, and feedback. This creates a common record that can support both transparency for citizens and accountability within the workflow.

Another important implication is that interoperability does not require all departmental information to be stored in one central database. The proposed approach follows a federated model, where departments can continue to maintain ownership and authority over their own operational records while Samadhan AI provides a common case view and controlled information exchange. This approach can reduce unnecessary duplication while supporting principles such as data minimisation, role-based access, and purpose-specific data sharing.

The proposed design is also consistent with the broader direction of data-governance initiatives in India. Maharashtra's data policy highlights areas such as data standardisation, data quality, sharing, interoperability, and reducing duplication. Similarly, the national data-governance framework published in 2026 promotes the standardisation of data, metadata, and APIs, along with a federated approach to government data sharing and the use of platforms such as API Setu (Government of Maharashtra, 2025; National e-Governance Division, 2026)[6,10]. In this context, Samadhan AI treats interoperability as more than a technical API connection. It is considered part of a wider system of data governance, access control, ownership, and accountability.

Finally, the discussion highlights an important distinction between automation and autonomy. Automating repetitive workflow activities can improve consistency and reduce manual effort, but this does not mean that every decision should be made

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automatically. Public grievances may involve essential services, safety concerns, or information that can significantly affect citizens. Therefore, an efficient system must also be designed to manage the risks associated with incorrect or unexplained decisions. For this reason, Samadhan AI places emphasis on human verification, understandable AI recommendations, controlled data exchange, and auditability. These safeguards should be considered as part of the system design from the beginning rather than treated as additional features after implementation.

8. Limitations and Future Scope:-

The present study has some limitations that also provide directions for future development. First, Samadhan AI is currently a student-developed prototype and has not yet been deployed in a real environment involving multiple government departments. The current work mainly demonstrates the web interface, workflow logic, and proposed system architecture. Therefore, it does not establish actual AI performance, live API reliability, or production-level security. The study also does not use a representative labelled dataset of government complaints for statistical evaluation. Hence, claims about classification accuracy, priority recommendation, routing performance, processing time, or citizen satisfaction are not presented as confirmed results.

The proposed interoperability layer is also still under development. It has not yet been tested with real legacy departmental systems, authentication mechanisms, operational data standards, or live government APIs. For this reason, the interoperability architecture is presented as a proposed framework rather than as evidence of completed large-scale integration. Although the proposed approach may help reduce repeated data entry and unnecessary duplication of information, the study does not assume that these changes will automatically reduce processing time, system load, synchronization issues, or escalation delays. Such improvements would need to be demonstrated through controlled evaluation.

Future work can address these limitations through systematic testing and gradual implementation. A representative and appropriately governed complaint dataset can be developed to evaluate the AI component across different service categories, locations, and writing styles. Such a dataset would allow future studies to examine classification performance, priority recommendations, confidence levels, and common error patterns. Multilingual complaint handling should also be explored so that the system can better support users from different linguistic backgrounds and levels of digital literacy.

The interoperability layer can be further developed into a versioned service gateway with features such as schema validation, authentication, authorisation, reusable connectors, audit logging, retry mechanisms, exception handling, and connector-health monitoring. Before connecting to real government systems, controlled experiments can be conducted using two or more simulated departmental systems. These experiments could measure transaction success, response time, synchronization behaviour, and the amount of duplicate data entry. Further research can then explore event-driven communication, federated identity, configurable workflow orchestration, stronger consent management, and master-data management according to the requirements of the deployment environment.

Future research can also improve the explainability and human oversight of AI-assisted routing. Instead of displaying only a recommended department or priority level, the system could provide authorised officials with a simple explanation of the complaint terms, categories, or rule-based signals that influenced the recommendation. This could make the AI output easier to verify and help officials identify incorrect recommendations. It would also support better error analysis and more transparent use of AI in public-service workflows.

A human-centred evaluation of the system would be another important area of future work. This evaluation could consider accessibility, multilingual interaction, low-bandwidth environments, assisted service channels, and the clarity of citizen feedback mechanisms. These factors are particularly relevant for public-service platforms because the effectiveness of a digital system depends not only on its technical capabilities but also on how easily citizens can use it.

Finally, a controlled comparative study would provide stronger evidence of the practical value of the proposed framework. Such a study could compare a

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fragmented workflow, in which citizens and officials interact with separate departmental systems, with the Samadhan AI workflow based on a common case structure and controlled information exchange. The comparison could measure factors such as repeated data entry, processing time, synchronization gaps, transaction failures, and escalation delays. This would help determine whether the proposed interoperability layer produces measurable improvements in practice, rather than assuming its benefits only from the architectural design.

9. Conclusion:-

Samadhan AI provides a practical foundation for studying how AI-assisted grievance management, smart workflow automation, and interoperability can work together to improve public-service delivery. The current prototype demonstrates key citizen-facing functions such as complaint submission, structured information collection, categorisation, validation, departmental handling, and reference-ID generation. Building on these existing features, the proposed framework treats a complaint as a continuous case that can move through classification, prioritisation, routing, task assignment, monitoring, escalation, resolution, and citizen feedback instead of ending at the point of submission.

An important part of the proposed framework is the interoperability layer. It extends Samadhan AI from a grievance-management platform toward a more connected public-service system by allowing authorised information to be exchanged between existing departmental systems. The proposed layer uses a common case structure, API-based communication, reusable connectors, event-based status updates, controlled data sharing, and audit mechanisms. This can help reduce repeated data entry and unnecessary re-submission of information by citizens, while allowing departments to continue using their existing systems rather than replacing them completely. In this way, the framework addresses the broader need for interoperable digital governance highlighted by the SIH26129 problem context.

The framework also gives importance to security, privacy, monitoring, and human accountability. AI is proposed mainly as a support mechanism for tasks such as complaint classification and priority recommendation, while important decisions remain under authorised human supervision. Similarly, information shared between departments is intended to be exchanged through controlled and auditable processes.

This study clearly separates the features demonstrated by the current prototype from those that are still under development or require further testing. Therefore, the study does not claim performance results that have not yet been experimentally verified. Instead, the proposed architecture and evaluation framework provide a foundation for future evaluation of the AI components, workflow automation, and interoperability layer under controlled conditions.

Overall, Samadhan AI presents a research-oriented approach to combining intelligent grievance management with secure system integration. The proposed framework aims to make public services more connected and efficient while reducing unnecessary effort for citizens and supporting better coordination between government departments.

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