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GOVASSIST-RDC: Design, Instantiation and Analytical Demonstration of an Inclusion-Oriented Retrieval-Augmented Architecture for Digital Public-Service Access Under Connectivity Constraints

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Abstract:

- ***Background:***

In the Democratic Republic of the Congo (DRC), access to digital public services is constrained by fragmented administrative information, uneven digital infrastructure, heterogeneous interfaces, and unequal access to reliable connectivity. Policy evidence indicates that universal digital access, digital public infrastructure, and digital skills remain foundations that require consolidation.

- ***Objective:***

This study designs and instantiates GOVASSIST-RDC, a mediation architecture through which citizens can search by administrative need, receive answers accompanied by identifiable public sources, and reach a human channel when automation is insufficient.

- ***Method:***

Following Design Science Research, the study connects documentary problem analysis, requirements engineering, architectural design, instantiation, and analytical demonstration. Evaluation is anchored in FEDS through artificial, predominantly formative episodes that inspect requirement coverage, architectural traceability, and visible component instantiation while excluding unmeasured effectiveness claims.

- ***Results:***

The documented architecture integrates a RAG-oriented assistance layer together with a centralized service catalogue, intent-oriented retrieval, visible provenance, human escalation, content administration, and analytics. Four requirements are visibly instantiated, three remain specified or technically unverified, and one has mixed evidence. Seven design principles are derived: intent-based access, visible provenance, safe abstention, human–AI continuity, inclusion by design, non-substitutive interoperability, and governed traceability.

- ***Contribution:***

The article defines administrative mediation as a non-adjudicative sociotechnical capability that translates citizen-expressed needs into discoverable services while preserving authority attribution, documentary inspectability, safe non-answer, and human continuity. It contributes a documented prototype, a reference architecture, a formal model, seven

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derived design principles, boundary conditions, and testable propositions without conflating interface evidence with backend execution or public-service outcomes.

Keywords: *Architecture; Artificial Intelligence; Democratic Republic of the Congo; Design Science Research; Digital Government; Digital Inclusion; Public Services; Retrieval-Augmented Generation.*

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I. INTRODUCTION

Digital government transformation cannot be reduced to converting administrative procedures into online forms. Citizens must be able to identify the appropriate service, understand requirements, verify the authority behind information, and obtain assistance when a pathway becomes ambiguous. International digital-government frameworks therefore emphasize user-centredness, openness, inclusion, and institutional coherence [1]–[3].

In the DRC, access barriers extend beyond interface design. The World Bank [4] identifies persistent weaknesses in universal access, affordable and reliable connectivity, digital public infrastructure, and digital skills; the subsequent regional initiative likewise prioritizes inclusive connectivity and digitally enabled public-service foundations [5]. These constraints intensify the search cost imposed on users who must navigate dispersed portals, unclear mandates, inconsistent terminology, and bandwidth-intensive pages.

Conversational assistants offer a promising unified entry point, but a fluent response may remain unsupported. In public administration, unsupported claims can affect trust, accountability, and citizens' ability to exercise rights. RAG can condition generation on an external documentary corpus [6], yet retrieval alone does not guarantee faithfulness, valid citation, or appropriate abstention [7], [8].

GOVASSIST-RDC was designed and instantiated in response to this combined problem. The artifact integrates a public-service catalogue, need-based search, a source-aware RAG assistant, visible evidence, referral to a public agent, content administration, and analytical functions. This article does not claim that the platform has already improved efficiency or adoption, because no user study has yet been conducted. Its purpose is to formalize the implemented architecture, document design decisions, and delimit what the available evidence can support.

The guiding question is: How can an inclusive RAG architecture be designed and instantiated to reduce structural friction in access to digital public-service information while preserving provenance, institutional accountability, and human continuity? Four subsidiary questions address requirements, architecture, observable instantiation, and transferable design principles.

II. THEORETICAL FOUNDATIONS AND RELATED WORK

➢ *Digital Government and Administrative Mediation*

Contemporary digital government extends beyond isolated process automation. The OECD Digital Government Policy Framework highlights digital-by-design, government-as-a-platform, user-driven delivery, openness, and proactiveness [2]. This position aligns with public-value research, in which access, transparency, equity, and trust are distinct from internal efficiency [9]. Here, administrative mediation denotes the layer that translates a user intention into a pathway toward the appropriate information, institution, or support channel. It does not replace the legally responsible authority or its operational system. In this study, administrative mediation denotes a non-adjudicative sociotechnical capability that translates a citizen-expressed need into candidate public services, makes the responsible authority and documentary basis inspectable, and preserves continuity toward a human or transactional channel. It does not determine eligibility, issue an administrative act, authenticate a document, or replace the legally competent authority. The construct is therefore narrower than automation, broader than information retrieval, and institutionally distinct from a conversational interface: its theoretical object is the accountable passage from an expressed need to an actionable and contestable administrative pathway.

Administrative mediation is analytically distinguishable from four adjacent constructs. A chatbot supplies an interaction modality; a search engine ranks information objects; interoperability exchanges data or invokes services; and administrative automation executes or supports a decision or transaction. Administrative mediation coordinates these elements while preserving legal attribution, evidentiary inspectability, and recourse. This distinction supplies the central theoretical lens used to derive the requirements, formal model, design principles, and evaluation boundaries.

➢ *Government Assistants, RAG, and Trust*

Government chatbots can offer continuous access and reduce information-search effort, but their acceptability depends on accuracy, transparency, and the communication of limitations [10]–[12]. Trust should therefore be supported by verifiable provenance, calibrated language, and human recourse rather than by an appearance of certainty. A governed RAG pipeline must control source authority,

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version, validity period, institutional scope, retrieval, citation, and logging.

➢ *Inclusion Under Constrained Connectivity*

Digital inclusion includes device access, connectivity cost, language, literacy, disability, content comprehension, and the practical ability to complete a procedure. WCAG 2.2 provides a reference for web-content accessibility [13], but an inclusive architecture must also minimize payloads, prioritize mobile access, tolerate interruption, and reduce interactional burden. These are design constraints; they are not evidence of formal WCAG conformance or measured 2G/3G performance.

➢ *Research Gap*

The research gap must now be stated against a rapidly maturing field rather than against the mere absence of public-sector RAG. Work published in 2025 compares public-service chatbot architectures and finds hybrid RAG comparatively balanced across functionality, safety, ethics, and adaptability [17]. ARGUS combines graph-path and textual retrieval for government-service question answering [18]; SVEA examines a shared national assistant and the organizational conditions of public-sector LLM adoption in Sweden [19]; and RAGOps formalizes architecture views, data lifecycles, and operational governance for retrieval-augmented systems [20]. In 2026, sovereign on-premises RAG was evaluated against the Portuguese gov.pt assistant [21], LegalCheck combined retrieval, case context, and expert review for municipal legal drafting [22], and RAG-generated service labels improved the association of citizen submissions with Brazilian federal services [23]. These studies establish that public-sector RAG, hybrid retrieval, sovereign deployment, expert oversight, and service association are active research areas; they also reinforce the need for controls aligned with the NIST AI RMF and OWASP guidance [24]–[26].

The unresolved problem is different: the reviewed systems primarily optimize architecture selection, domain question answering, internal assistance, operational lifecycle management, sovereign deployment, legal drafting, or service classification. They do not jointly theorize and instantiate the accountable transition from a citizen-described need to a discoverable service, an identifiable authority, inspectable documentary support, safe non-answer, and human continuation under constrained connectivity. GOVASSIST-RDC addresses this narrower gap through administrative mediation. Its contribution is not a claim of superior RAG performance, but an evidence-bounded reference architecture and design theory for connecting citizen intent, public-service structure, institutional responsibility, documentary presentation, and human continuity.

Table 1 Recent Public-Sector and Operational Rag Architectures

Study	Setting and architecture	Evaluation evidence	Unresolved relative to GOVASSIST-RDC
Papadopoulos et al. (2025) [17]	Four public-service chatbot architectures; hybrid RAG favored	Fifteen public-value and technical criteria	Architecture selection, not an instantiated mediation chain
ARGUS (2025) [18]	Government-service QA; graph-path plus text retrieval	Retrieval/generation experiments on government records	Domain QA; no citizen-to-authority continuity
SVEA (2025) [19]	Shared Swedish public-sector LLM assistant	Qualitative design, adoption, sovereignty, and legitimacy evidence	Employee-facing context; retrieval chain not fully documented
RAGOps (2025) [20]	Generic RAG architecture and integrated data/LLM lifecycle	Conceptual 4+1 views and use-case analysis	Operations-centered; no administrative-mediation construct
Branco et al. (2026) [21]	On-premises sovereign RAG for Portuguese public services	Technical and cost comparison against gov.pt	Portal QA; limited institutional handoff modeling
LegalCheck (2026) [22]	Municipal legal drafting; RAG+CAG and expert review	Real-setting quantitative and professional evaluation	Internal drafting, not cross-service citizen orientation
da Silva et al. (2026) [23]	Sparse/dense retrieval with RAG-expanded service labels	Operational complaint-service association benchmark	Association rather than end-to-end mediation
GOVASSIST-RDC	Intent access, catalogue, source presentation, abstention, human continuation	FEDS-bounded architecture/interface episodes; no backend benchmark	Mediation and constrained access; effectiveness remains untested

Table 2 Positioning of GOVASSIST-RDC Across The Principal Research Streams

Research stream	Primary contribution	Residual gap addressed here
E-government adoption	Trust, usefulness, acceptance	Does not specify a governed RAG mediation chain
Public-sector chatbots	Citizen–administration interaction	Often treats human escalation and provenance as secondary
RAG evaluation	Faithfulness and retrieval metrics	Does not allocate public-sector authority and accountability
Accessibility and inclusion	Access and interface requirements	Rarely integrated with provenance and abstention
Responsible public-sector AI	Governance and accountability	Requires an executable service architecture

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III. RESEARCH METHOD

➢ *Design Science Research*

Design Science Research is appropriate for constructing and studying an artifact intended to solve a relevant problem [27]. The process follows Peffers et al. [28]: problem identification, definition of objectives, design and development, demonstration, evaluation, and communication. The artifact comprises four complementary objects: the instantiated platform, a reference architecture, a formal mediation model, and derived design principles.

➢ *Evaluation Strategy Under FEDS*

Evaluation is designed through the Framework for Evaluation in Design Science (FEDS) [29]. First, the evaluation goal is to determine whether the documented artifact is structurally coherent with the derived problem and whether each claim can be bounded by an inspectable evidence type. Second, the selected strategy is a technical-risk-and-efficacy-oriented sequence of early artificial episodes; no naturalistic or summative episode is represented. Third, the evaluated properties are requirement coverage, architectural traceability, visible component instantiation, provenance presentation, human-continuity representation, and explicit separation between demonstrated and unverified behavior. Fourth, the episodes are documentary problem derivation, architecture/interface inspection, reconstructed scenario walkthroughs, and a requirement-coverage assessment.

This FEDS anchoring fixes the admissible inference. The episodes can reveal design inconsistency, absent mechanisms, or unsupported claims and can provide formative feedback on the reference architecture. They cannot establish causal impact, retrieval accuracy, answer faithfulness, security, accessibility, usability, adoption, or public value. Those properties require later artificial benchmarks and naturalistic evaluations with users, administrators, and operating systems.

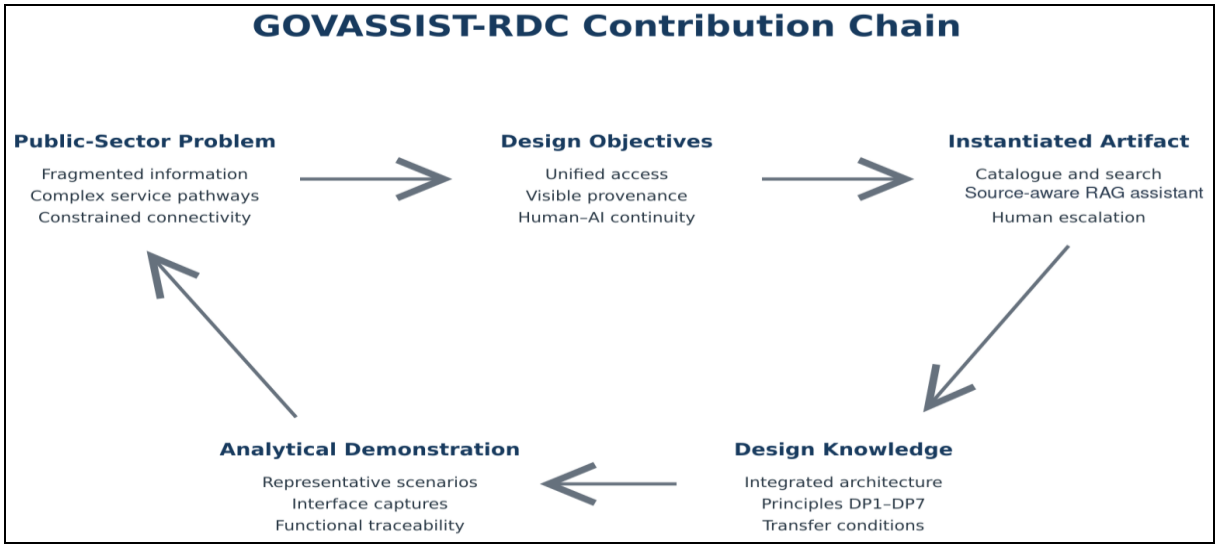

Fig 1 Contribution Chain of GOVASSIST-RDC Under Design Science Research.
Source: Authors' Design.

➢ *Unit of Analysis and Evidence Protocol*

The unit of analysis is GOVASSIST-RDC as a sociotechnical mediation system, not its users. The evidence corpus comprises the logical architecture, the interfaces reproduced in Figures 3–8, documented modules, and requirement-traceability relations. It does not contain execution logs, a RAG benchmark, a source-code audit, or user data. Consequently, the evaluation is an analytical demonstration rather than an effectiveness, usability, accessibility, or adoption study.

The protocol is reproducible in four steps: (1) extract frictions from documentary sources; (2) translate them into numbered requirements; (3) associate each requirement with an architectural mechanism; and (4) assign an ordinal evidence status. Status 0 means absent, 1 means specified, and 2 means observably instantiated. A requirement is never described as validated when its evidence is limited to a specification or screenshot. For composite requirements, component-level evidence statuses are reported separately and are not averaged.

Table 3 Problem-to-Requirement Traceability

ID	Documented friction	Design requirement	Evidence boundary
R1	Fragmented information	Unified service catalogue	Catalogue capture; visible presence only.
R2	Institutional terminology	Intent-based search	Search capture; ranking and accuracy untested.
R3	Unsupported answers	Source-aware response with inspectable source presentation	Assistant and source-presentation captures; retrieval-to-answer execution unverified.
R4	Opaque provenance	Visible, inspectable sources	Source cards and source view; authenticity and

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			currency require independent validation.
R5	Insufficient evidence	Explicit abstention policy	Architectural specification only; abstention execution unmeasured.
R6	Automation limits	Human escalation	Referral capture; downstream service completion untested.
R7	Connectivity and literacy barriers	Inclusive, lightweight interaction	Design specification; WCAG and constrained-network performance untested.
R8	Content and security risks	Governed administration, audit, and access control	Administration/dashboard captures; security and audit controls unverified.

➢ *Scope and Claim Discipline*

Low-level implementation choices—generative model, embedding model, retrieval depth k, abstention threshold, corpus volume, and hosting configuration—are not treated as stable scientific results because they were not included in the preserved evidence package. This omission prevents irreproducible performance claims but does not prevent analysis of the architectural responsibilities and invariants embodied by the prototype.

IV. REQUIREMENTS AND DESIGN OBJECTIVES

The requirements translate the documented access problem into properties against which the artifact can be inspected. They distinguish access, evidence, continuity, inclusion, and governance. The resulting objective is not a fully autonomous administrative agent, but a bounded mediation layer that assists discovery and comprehension while keeping the responsible institution visible.

Table 4 Requirements, Mechanisms and Admissible Evidence

Req.	Mechanism	Admissible evidence
R1	Centralized catalogue	Catalogue interface
R2	Intent and keyword search	Search interface
R3	Source-aware response with inspectable source presentation	Assistant interface and source-presentation view; retrieval-to-answer execution not independently verified.
R4	Source presentation	Source cards and source view
R5	Answer/abstain decision	Specification; benchmark pending
R6	Referral workflow	Agent-referral interface
R7	Mobile-first, clear-language design	Specification; audit pending
R8	Role-based administration and analytics	Visible modules; security audit pending

V. FORMAL MODEL OF ADMINISTRATIVE MEDIATION

Let the mediation system be M = (U, I, C, S, A, D, E, H, P, L), where U is the set of users, I the set of expressed intentions, C the access contexts, S the public services, A the responsible administrations, D the governed documents, E the retrieved evidentiary passages, H the human channels, P the response policy, and L the audit log. A mediation request is x = (u, i, c). Service selection is represented by $s^* = \arg\max_s \text{score}(i, c, s)$, subject to eligibility and availability constraints.

For a selected service s*, the documentary candidate set is D(s*, a), where a is the legally responsible administration. Retrieval produces $E_k = \text{TopK}(q(i,s^*), D(s^*,a))$. The response policy chooses one of three actions: answer with evidence, provide a limited clarification, or abstain and escalate. Formally, $P(E_k,c)$ = answer when evidence sufficiency is at least threshold τ and source-validity constraints hold; otherwise $P(E_k,c)$ belongs to {clarify, abstain/escalate}.

Five normative invariants constrain the artifact. I1—Provenance: every material administrative claim must be linked to identifiable evidence. I2—Responsibility: the responsible administration remains visible and is not replaced by the platform. I3—Abstention: insufficient evidence cannot yield an unqualified answer. I4—Continuity: an unresolved or high-risk request must expose an appropriate human channel. I5—Auditability: governed content and consequential system operations must be attributable and reviewable.

VI. GOVASSIST-RDC DESIGN AND IMPLEMENTATION

➢ *Design Principles*

- DP1—Intent-based access: users express a need without knowing the administrative organization.
- DP2—Visible provenance: administrative answers are associated with identifiable, inspectable sources.
- DP3—Safe abstention: a limited response or referral is preferred to an assertion unsupported by verified evidence.
- DP4—Human–AI continuity: the public agent is an explicit component of the digital service.
- DP5—Inclusion by design: mobile access, literacy, accessibility, and connectivity are architectural constraints.

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- DP6—Non-substitutive interoperability: the platform connects and directs users without obscuring legal authority.
- DP7—Governed traceability: content is versioned, roles are controlled, and relevant operations are auditable.

Table 5 Derivation and Validation Matrix for DP1-DP7

DP	Problem/requirement basis	Design mechanism	Current evidence boundary	Testable validation
DP1	R1-R2: fragmented, institution-first access	Need expression and intent-oriented service discovery	Catalogue/search interfaces only	Compare discovery time and correct-service selection with institution-first navigation
DP2	R3-R4: unsupported or opaque answers	Identifiable source cards and document inspection	Presentation visible; retrieval-to-answer execution unverified	Measure citation correctness, evidence coverage, and user error detection
DP3	R5: insufficient documentary support	Abstention and insufficiency explanation policy	Specified; execution unmeasured	Measure unsupported-action and appropriate-refusal rates under corpus gaps
DP4	R6: unresolved needs and channel breaks	Explicit referral to a responsible public agent	Referral interface visible; resolution untested	Measure successful handoff, resolution rate, and time to human assistance
DP5	R7: literacy, accessibility, and connectivity constraints	Mobile priority, plain language, low-load pathways	Specified; WCAG/network tests absent	Test task success, payload, interruption recovery, and accessibility compliance
DP6	R1/R4/R6: fragmented authority and systems	Non-substitutive links to competent authorities and channels	Architecture/source views; interoperability untested	Measure authority attribution and completion across institutional boundaries
DP7	R8: content drift, security, and accountability risk	Versioned content, roles, logging, analytics, and audit controls	Administration/analytics visible; controls unverified	Audit update latency, authorization violations, log completeness, and source expiry

➢ *Logical Architecture*

The architecture is organized into six layers: users; user interface; application services; intelligence and processing; data and knowledge; and interoperability, infrastructure, and security. This separation prevents the citizen experience, assistance logic, documentary governance, and institutional responsibility from being conflated.

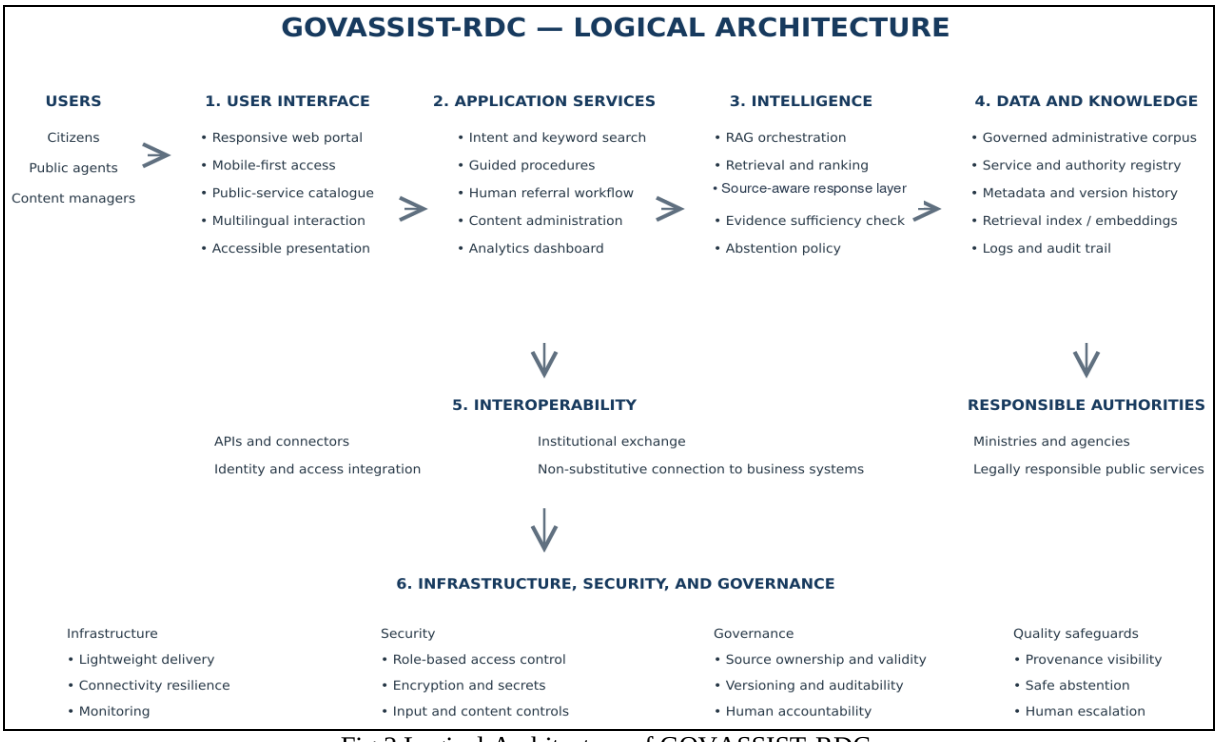

Fig 2 Logical Architecture of GOVASSIST-RDC.
Source: Authors' Design and Implementation.

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➢ *Instantiated Modules*

The prototype visibly instantiates the unified entry point, service catalogue, assisted search, source-aware assistant, document consultation, agent referral, administration, and analytics. Figures 3–8 are treated as evidence of visible instantiation only; they do not establish backend behavior or measured quality.

General interface-data note. Unless a source is independently identified in the manuscript, every personal name, date, count, percentage, score, response-time value, trend, status, document label, and analytical indicator visible in Figs. 3–8 is illustrative prototype content. Such values demonstrate interface structure only; they are not observations, benchmark outputs, backend logs, administrative records, or evidence of operational performance.

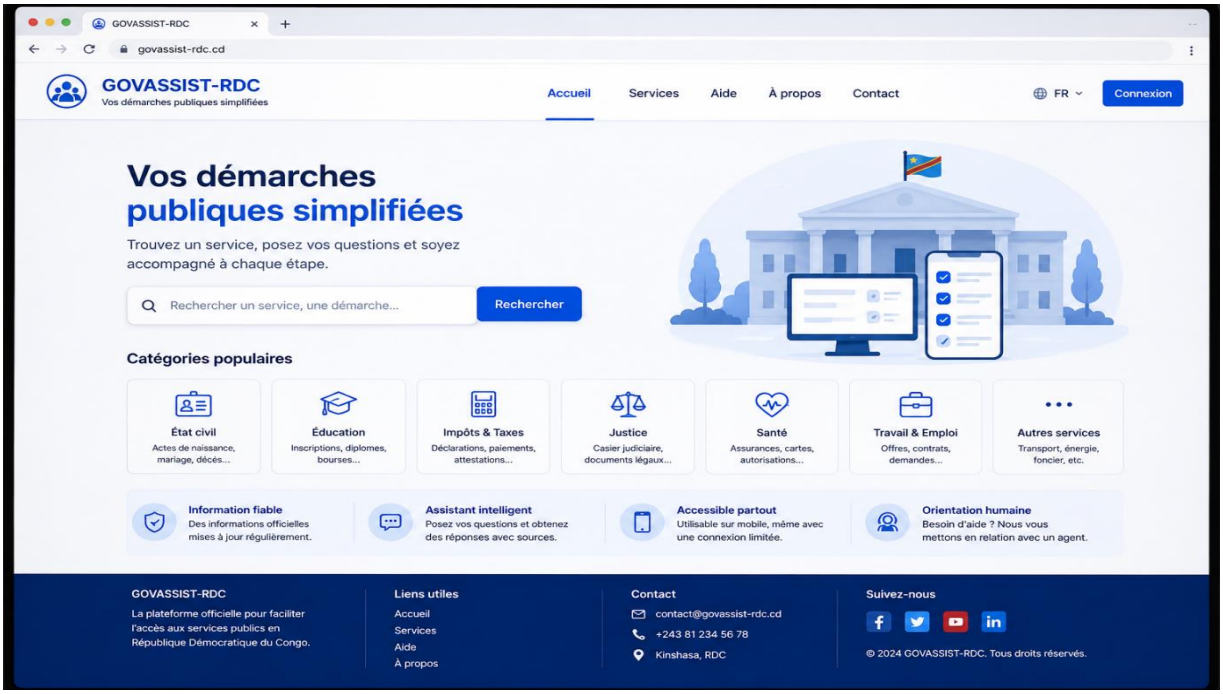

Fig 3 Home Interface and Unified Entry Point.
Source: GOVASSIST-RDC Interface; No Backend Performance is Inferred.

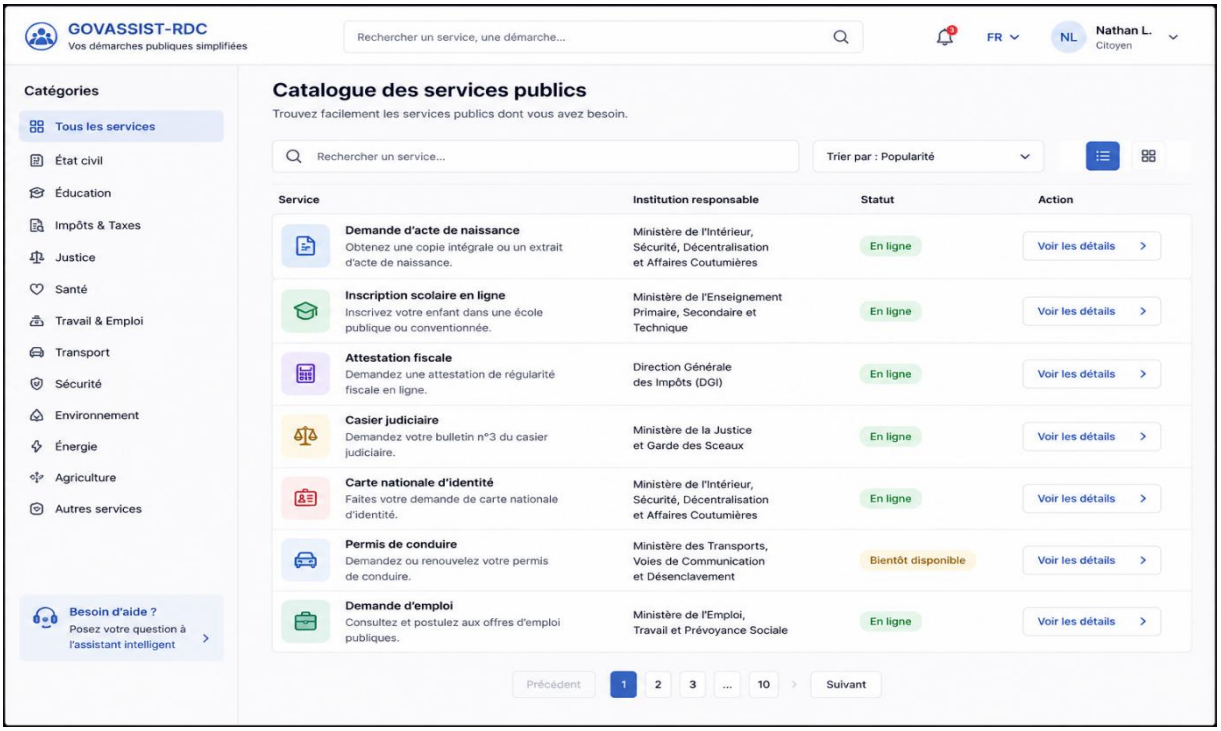

Fig 4 Public-Service Catalogue.
Source: GOVASSIST-RDC Interface; No Backend Performance is Inferred.

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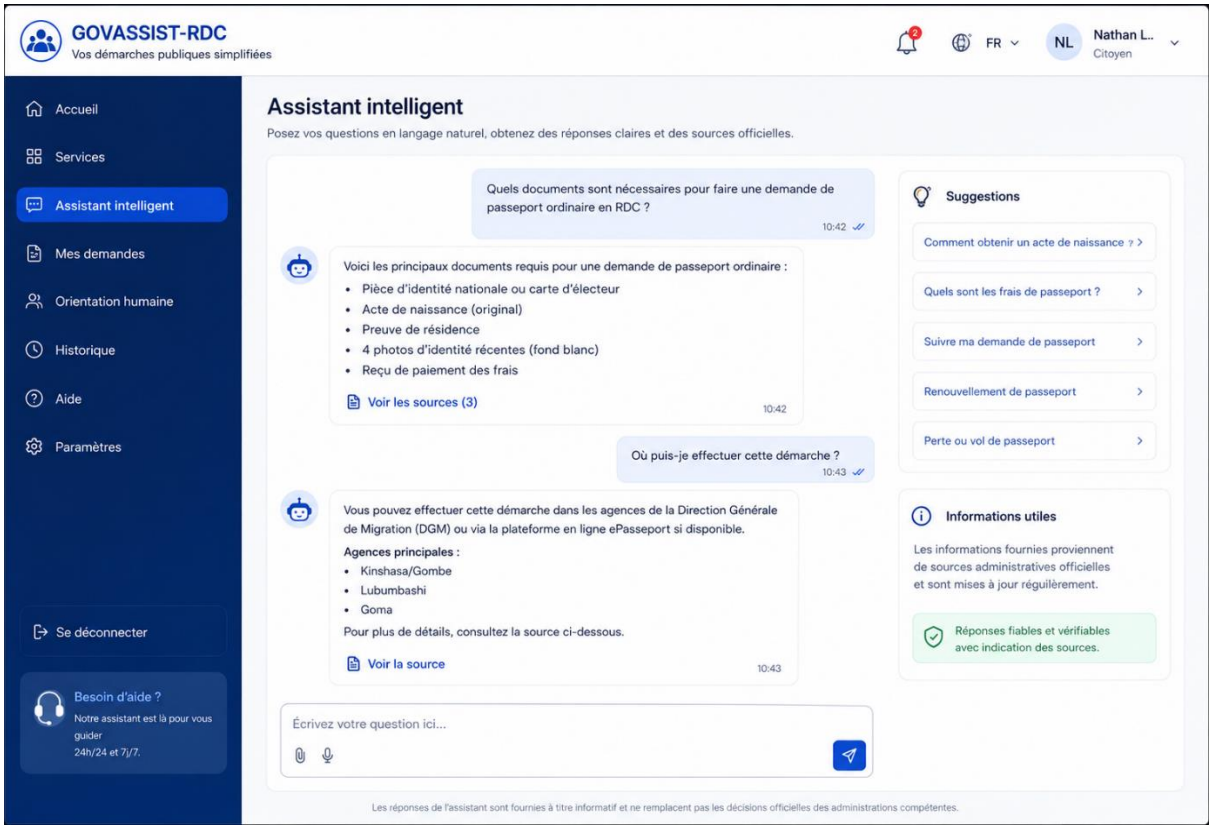

Fig 5 Intelligent Assistant and Source Presentation.
Source: GOVASSIST-RDC Interface; Retrieval-to-Answer Execution and Backend Performance Remain Unverified.

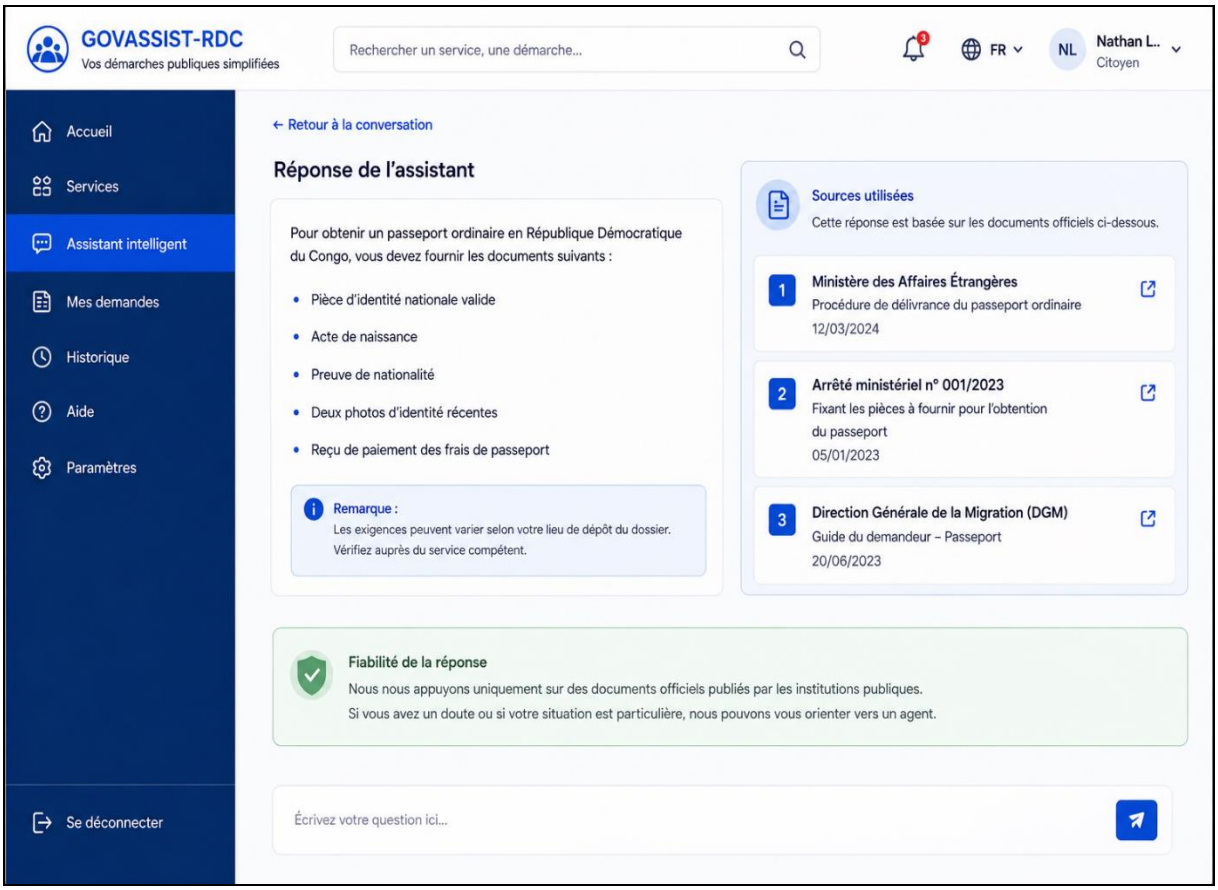

Fig 6 Administrative-Source Consultation Interface.
Source: GOVASSIST-RDC Interface; No Backend Performance is Inferred.

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Source-verification note. The institutional domains represented in Fig. 6 can be identified through the official Ministry of Foreign Affairs passport service and FAQ pages [31], [32] and the official DGM website [33]. However, the screenshot-specific labels "Passport issuance procedure—12 March 2024" and "Ministerial Order No. 001/2023" could not be independently matched to a publicly accessible official document. They are therefore treated as illustrative prototype metadata, not as validated or currently applicable legal authorities.

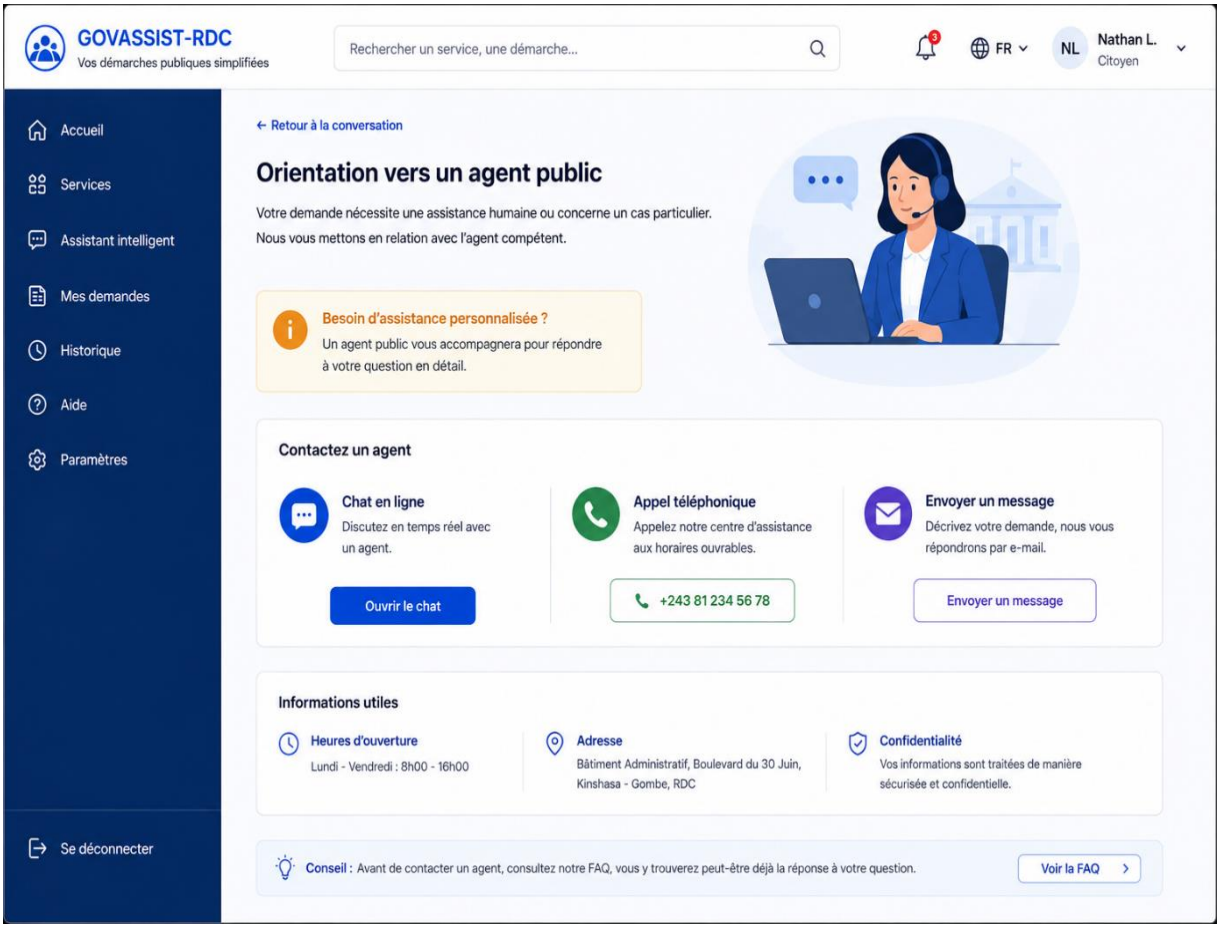

Fig 7 Referral to a Public Agent.
Source: GOVASSIST-RDC Interface; No Backend Performance is Inferred.

➢ *RAG, Provenance, and Abstention*

At the architectural level, the pipeline comprises a governed documentary base, query formulation, specified retrieval, context-constrained generation, source presentation, and logging. Execution of this chain is not independently verified here. Administrative value depends on corpus governance: source authority, effective date, version, institutional scope, and updating procedure. Abstention is a service decision. When the corpus cannot support an answer, the architecture must limit the assertion, explain the insufficiency, and offer human assistance.

➢ *Inclusion, Security, and Governance*

Inclusion is treated as a design constraint through mobile priority, clear language, coherent navigation, reduced heavy resources, and comprehensible pathways. Because no dedicated test was performed, these choices do not establish WCAG conformance or low-bandwidth performance. The platform may process requests that reveal personal information; governance must therefore address lawfulness, minimization, access control, security, and retention under the DRC Digital Code [34]. Generative-application risks—including prompt injection, corpus poisoning, leakage, and overreliance—also justify controls aligned with the NIST AI RMF and OWASP guidance [24]–[26].

VII. ANALYTICAL DEMONSTRATION AND EVALUATION

➢ *Demonstration Cases*

Six reconstructed cases inspect whether the documented interfaces and mechanisms correspond to the stated requirements: discovering a service by need, browsing the catalogue, obtaining an answer accompanied by source presentation, opening an administrative source, requesting human assistance, and reviewing activity through the dashboard. These are not user tests or performance trials. The admissible conclusion is limited to mechanism presence and architectural coherence.

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Table 6 Analytical Demonstration Cases

Case	Observed pathway	Supported inference
C1	Need → search → service	Intent-oriented access is visibly instantiated
C2	Catalogue → service record	Centralized discovery is visibly instantiated
C3	Question → answer → sources	Source presentation is visibly instantiated
C4	Source card → document view	Evidence inspection is visibly instantiated
C5	Unresolved need → agent	Human continuity is visibly instantiated
C6	Activity → dashboard	Analytical presentation exists; values are illustrative

➢ *Traceability Assessment*

Table 6 Analytical Coverage of Requirements

Requirement	Status	Interpretation
R1	2	Catalogue visibly instantiated
R2	2	Need-based search visibly instantiated
R3	1	Source-aware assistant and source presentation are visibly instantiated; retrieval-to-answer execution remains unverified.
R4	2	Sources visibly presented and inspectable
R5	1	Abstention specified; execution unmeasured
R6	2	Human referral visibly instantiated
R7	1	Inclusion specified; compliance unmeasured
R8	2 / 1	2 for visible administration/analytics components; 1 for security and audit controls not independently verified.

➢ *Dashboard and Interpretive Caution*

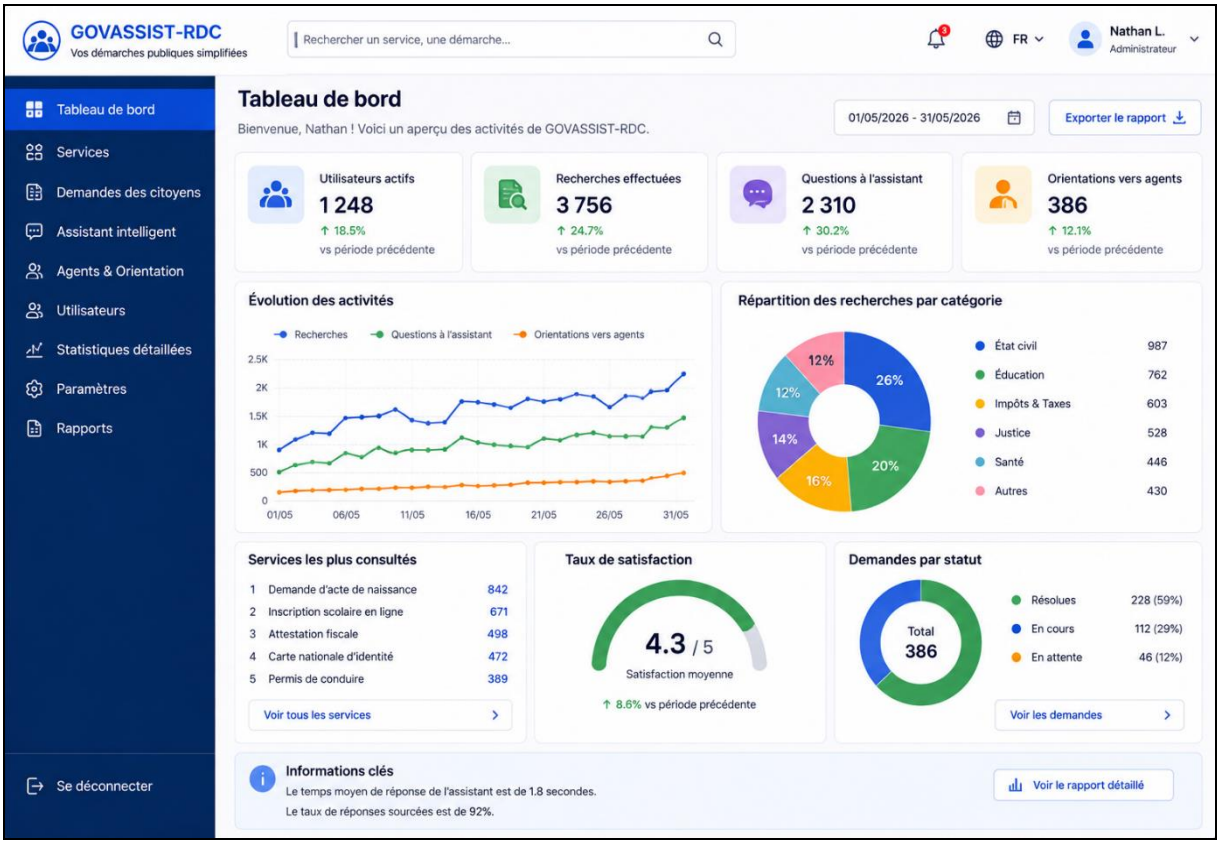

Fig 8 GOVASSIST-RDC Analytical Dashboard. All Displayed Values are Illustrative Interface Data, Not Scientific Observations.

The dashboard demonstrates the existence of a monitoring space and the intended presentation of indicators. Because the provenance of displayed values is not documented in this study, they are neither reproduced as empirical results nor interpreted as real observations.

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➢ *Evaluation Result*

Under FEDS, the reported episodes remain artificial and predominantly formative. The analysis establishes an explicit correspondence between eight requirements and documented components. R1, R2, R4, and R6 reach status 2 because their visible instantiation is documented. R3, R5, and R7 remain at status 1 because retrieval-to-answer execution, abstention execution, and inclusion compliance are specified or technically unverified. R8 is reported component by component: status 2 for visible administration and analytics components, and status 1 for security and audit controls not independently verified. The analysis therefore supports architectural coverage and traceability, not naturalistic effectiveness, usability, security, accessibility, or adoption.

➢ *Threats to Validity*

Construct validity is bounded by the evidence type: interface captures establish the visible presence of components but do not establish retrieval faithfulness, response quality, backend execution, security, accessibility, or operational performance. Internal validity is correspondingly limited because no causal relationship between GOVASSIST-RDC and citizen, organizational, or service outcomes is claimed.

External validity is analytical rather than statistical: the architecture and design principles may be transferable to comparable constrained-connectivity administrative settings, but no population-level generalization is warranted. Reproducibility is partial: the architecture, requirements, traceability matrices, and interface evidence are preserved, whereas execution parameters, model configuration, backend logs, and benchmark artifacts were not preserved and therefore cannot be independently reproduced from this evidence package.

VIII. DESIGN RESULTS

The first result is the instantiated artifact: a platform that combines service access, search, conversational assistance, provenance, and human referral within one experience. The second is the integrated mediation architecture, which separates interface, application services, intelligence, data, interoperability, and security. The third is formal model M, which connects intention, context, service, responsible administration, evidence, response decision, and human continuity. The fourth is a set of seven transferable design principles whose applicability remains conditional on institutional governance, corpus quality, language, connectivity, law, and maintenance capacity.

IX. DISCUSSION

➢ *Research Contribution*

GOVASSIST-RDC shifts the analytical centre of gravity from the chatbot to the service architecture. The contribution lies not in a conversational interface alone but in the governed articulation of intent-based discovery, documentary evidence, provenance, abstention, human escalation, and institutional responsibility. This provides a design response to administrative fragmentation and clarifies why an AI assistant should remain only one component in a broader accountability chain.

The study also distinguishes four Design Science outputs: technical instantiation, reference architecture, formal model, and design principles. This separation prevents screenshots from being interpreted as effectiveness evidence. It complements established adoption, citizen-trust, information-systems-success, and e-government-chatbot research [14]–[16]: trust, system quality, information quality, use, and benefits remain empirical questions for subsequent research, whereas the current contribution concerns architecture and traceable design knowledge.

➢ *Implications for Public Administrations*

Administrations should treat the platform as access and orientation infrastructure, not as an autonomous administrative authority. Sustainable deployment requires designated content owners, updating and expiry rules, recourse mechanisms, log governance, clear allocation of responsibility, security testing, and a monitored human-escalation capacity. The legally responsible institution must remain identifiable at every consequential step.

➢ *Boundary Conditions and Testable Propositions*

The design theory is bounded to informational orientation and assisted navigation before an authoritative transaction or decision. It presupposes an identifiable service catalogue, designated institutional content ownership, minimally maintainable source metadata, a reachable human or official channel, and sufficient connectivity for at least intermittent interaction. It does not cover adjudication, entitlement determination, document authentication, payment execution, emergency response, or autonomous issuance of administrative acts. Benefits should therefore weaken when service ownership is ambiguous, sources are stale or non-authoritative, handoff capacity is absent, or language, accessibility, and connectivity constraints exceed the implemented adaptations.

- P1—Intent mediation. When institutional ownership is opaque to citizens, an intent-oriented entry point will reduce time to identify the correct service and lower wrong-service selection relative to institution-first navigation.
- P2—Inspectable provenance. When authoritative and versioned sources are available, answers accompanied by inspectable source presentation will improve users' detection of unsupported administrative statements and calibration of trust relative to answer-only assistance.
- P3—Safe continuity. Under incomplete documentary coverage, an enforced abstention-plus-human-referral policy will reduce unsupported administrative actions without increasing unresolved cases relative to generation without an explicit handoff policy.
- P4—Governance contingency. The effects predicted in P1–P3 will be positively moderated by source currency, authority attribution, content ownership, and human-channel availability, and negatively moderated by connectivity interruption and accessibility mismatch.

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➢ *Limitations and Future Work*

The principal limitation is the absence of empirical data. This article does not measure search time, task success, answer faithfulness, network performance, accessibility, satisfaction, or adoption. Interface captures establish visible instantiation but cannot audit backend services, APIs, exact RAG configuration, access controls, or corpus quality. Generalization is analytical rather than statistical.

Future work should proceed through separate validation streams: a versioned RAG benchmark for retrieval and faithfulness; controlled usability testing under ISO 9241-11 [30]; WCAG 2.2 auditing; mobile and 2G/3G performance measurements; security and privacy assessment; and a field study of adoption and public value. Reporting these streams separately will preserve claim validity and reveal whether architectural feasibility translates into citizen benefit.

X. CONCLUSION

This research transformed a fragmented-access problem into a mediation architecture and then into an instantiated artifact. GOVASSIST-RDC combines a unified catalogue, intent-oriented search, a RAG-oriented assistance layer, abstention policy, human referral, content administration, and analytics. Its defensible scientific contribution is at the design level: a contextualized architecture, a formal mediation model, a problem-to-mechanism traceability chain, and seven conditionally transferable principles.

The study deliberately does not claim an impact that it has not measured. This boundary strengthens the contribution by specifying what was built, the logical rules intended to govern it, the rationale for each design decision, and the empirical work still required. Under these conditions, GOVASSIST-RDC provides a credible foundation for subsequent technical, usability, accessibility, security, and field validation.

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- Ethics: No human participants or personal user data were included in the reported analytical demonstration.

- Data and Materials: The evidence used in this article consists of the documented architecture, traceability tables, and archived interface captures.

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