International Journal of Scientific Research and Modern Technology (IJSRMT) ijsrmt.com
Volume 3, Issue 8, 2024
DOI: https://doi.org/10.38124/ijsrmt.v3i8.432

Agile Transformation in Public Sector IT Projects Using Lean-Agile Change Management and Enterprise Architecture Alignment

Tony Isioma Azonuche[1]; Joy Onma Enyejo[2]

[1] Department of Project Management Office, Amberton University, Garland Texas, USA
[2] Department of Business Management Nasarawa State University, Keffi. Nasarawa State Nigeria

Publication Date: 2024/08/28

Abstract

This review explores the strategic integration of Lean-Agile change management frameworks and enterprise architecture (EA) alignment in driving successful agile transformations within public sector IT projects. Unlike the private sector, public institutions often operate under rigid regulatory frameworks, legacy systems, and complex stakeholder landscapes, which pose significant barriers to agile adoption. This paper critically examines how Lean-Agile principles—such as incremental delivery, customer-centric value streams, and cross-functional collaboration—can be tailored to the public sector's unique operational constraints to enhance IT service delivery, transparency, and responsiveness. The study also evaluates the pivotal role of enterprise architecture in aligning business goals with agile practices by providing a structural blueprint that harmonizes governance, digital infrastructure, and evolving stakeholder needs. Key focus areas include the synchronization of EA layers with agile portfolios, the role of leadership in orchestrating agile governance, and the adoption of value stream mapping to eliminate bureaucratic inefficiencies. Through the synthesis of case studies, industry frameworks like SAFe (Scaled Agile Framework) and TOGAF (The Open Group Architecture Framework), and empirical findings, the review highlights best practices, implementation challenges, and metrics for evaluating transformation success. Ultimately, the paper provides a comprehensive roadmap for public organizations aiming to modernize IT delivery through scalable, sustainable agile transformation strategies rooted in enterprise alignment and lean governance principles.

Keywords: *Agile Transformation; Public Sector IT Projects; Lean-Agile Change Management; Enterprise Architecture Alignment; Digital Government Modernization.*

I. INTRODUCTION

- *Background of Digital Transformation in the Public Sector*

Digital transformation in the public sector is a paradigm shift that involves reimagining service delivery and organizational processes through the strategic application of digital technologies. Unlike conventional e-government models, digital transformation entails a fundamental overhaul of public sector structures, requiring new competencies, agile methodologies, and interoperable architectures. According to Mergel, Edelmann, and Haug (2019), digital transformation in government is characterized by the co-evolution of organizational change and technology adoption, encompassing cloud computing, open data, artificial intelligence, and user-centric service design. This reorientation aims to overcome long-standing bureaucratic inefficiencies, respond to citizens' rising expectations, and support policy agility in times of crisis—such as the widespread shift to remote digital services during the COVID-19 pandemic. Moreover, digital transformation efforts often confront institutional resistance rooted in legacy systems, fragmented infrastructures, and rigid governance models. Baiyere, et al., (2020) emphasize that achieving digital maturity in public administration requires holistic change management strategies that integrate technological deployment with cultural transformation and enterprise-wide vision alignment. This is especially relevant in cross-departmental digital programs where success depends on seamless data exchange, agile project governance, and citizen trust. As such, understanding the scope, enablers, and constraints of digital transformation in the public sector provides the foundational context for evaluating agile methods and enterprise architecture frameworks in later sections of this study.

Azonuche, T. I., Aigbogun, M. E., & Enyejo, J. O. (2024). Agile Transformation in Public Sector IT Projects Using Lean-Agile Change Management and Enterprise Architecture Alignment. *International Journal of Scientific Research and Modern Technology*, *3*(8), 21–39. https://doi.org/10.38124/ijsrmt.v3i8.432

➢ *Limitations of Traditional IT Project Management in Government*

Traditional IT project management approaches in government, often structured around linear models such as the Waterfall methodology, struggle to accommodate the dynamic and multi-stakeholder environment typical of the public sector. These frameworks assume fixed requirements, rigid hierarchies, and predictable outcomes, which are rarely reflective of the evolving needs of digital-era governance. Wynne and Whyte (2021) argue that traditional models lack the flexibility to respond to policy shifts, legal constraints, and public demand for real-time digital services. Moreover, the long project cycles associated with traditional methods often delay value delivery, increasing the risk of technological obsolescence before project completion. Another critical limitation lies in the resistance to innovation and the bureaucratic inertia entrenched in government structures. As de Vries, Tummers, and Bekkers (2018) highlight, the hierarchical nature of public agencies hinders knowledge flow, impairs cross-functional collaboration, and slows decision-making processes. These conditions make it difficult to iteratively test and refine IT solutions, thereby increasing the likelihood of failure in large-scale digital initiatives. For instance, projects such as national health databases or tax reform platforms frequently encounter scope creep, stakeholder misalignment, and integration issues, leading to cost overruns and delayed implementation. These constraints underscore the necessity of adopting adaptive, agile-oriented frameworks—backed by enterprise architecture alignment—to manage uncertainty and drive successful IT transformation in the public sector.

➢ *Need for Agile Transformation in Public Institutions*

The Need for Agile Transformation in Public Institutions arises from the growing demand for responsiveness, transparency, and user-centered service delivery in an era of rapid digital evolution. Traditional bureaucratic models, characterized by hierarchical command structures and procedural rigidity, no longer align with the fast-paced dynamics of digital governance. As Osborne, (2006) explain, the shift from administrative control to networked governance necessitates agile frameworks that emphasize collaboration, adaptability, and citizen engagement. Agile transformation enables public agencies to reconfigure their processes to deliver incremental value, manage complexity, and rapidly respond to emergent needs—traits increasingly critical during crises such as pandemics or cybersecurity threats. Agile governance not only improves time-to-value but also fosters a culture of innovation and iterative feedback, which are essential for co-creating public value. Luna-Reyes, Gil-Garcia, and Bertot (2020) emphasize that agile practices, including cross-functional teamwork, sprint planning, and continuous stakeholder engagement, are increasingly being embedded into public sector digital strategies. Governments adopting these practices report higher success rates in IT deployments, enhanced citizen satisfaction, and improved policy adaptability. For instance, digital tax platforms and online identity services in Estonia and Denmark reflect agile-led public service innovation. Thus, agile transformation represents a strategic imperative for public institutions aiming to modernize legacy systems, improve service outcomes, and align with evolving digital governance paradigms.

➢ *Objectives and Scope of the Review*

The primary objective of this review is to critically examine how agile transformation can be effectively implemented in public sector IT projects through the integration of Lean-Agile change management principles and enterprise architecture (EA) alignment. By addressing the structural and cultural constraints that traditionally hinder innovation in government institutions, the review aims to provide a strategic framework for adopting agile practices tailored to the complexities of public administration. It investigates how Lean-Agile approaches—characterized by iterative development, stakeholder collaboration, and value stream optimization—can be adapted to bureaucratic environments and institutional mandates. The scope of the review encompasses both theoretical and practical dimensions of agile transformation. It includes an exploration of foundational concepts such as agile and lean thinking, change management methodologies, and enterprise architecture frameworks relevant to public sector IT modernization. The review analyzes global case studies, evaluates governance challenges, and identifies critical success factors that influence transformation outcomes. It further assesses the compatibility of enterprise architecture models with agile delivery pipelines to enhance strategic alignment and operational efficiency. Ultimately, the review aims to support policymakers, IT leaders, and project managers in designing scalable, resilient, and citizen-centric digital services that comply with public sector constraints while embracing innovation and responsiveness.

➢ *Structure of the Paper*

This review paper is structured into seven comprehensive sections to provide a systematic exploration of agile transformation in public sector IT projects. Section 1 introduces the background of digital transformation in government, outlines the limitations of traditional project management methodologies, and establishes the rationale and scope of adopting Lean-Agile practices integrated with enterprise architecture alignment. Section 2 presents the theoretical foundations, offering a conceptual framework that links agile, lean, and EA principles to the unique demands of public institutions. Section 3 explores global trends and real-world case studies of agile adoption in government, drawing comparative insights to highlight best practices and common pitfalls. Section 4 delves into Lean-Agile change management within bureaucratic environments, focusing on the strategies needed to overcome organizational inertia and foster cultural agility. Section 5 addresses the technical and strategic alignment of enterprise architecture with agile delivery mechanisms, emphasizing interoperability, governance, and risk management. Section 6 critically evaluates challenges, limitations, and key success factors, providing a balanced perspective on implementation

feasibility. Finally, Section 7 synthesizes the findings, outlines strategic recommendations for public sector innovation, and identifies future directions for research and policy development. This structure ensures a comprehensive, multi-dimensional analysis suitable for academics, practitioners, and policymakers engaged in digital government reform.

II. THEORETICAL FOUNDATIONS AND CONCEPTUAL FRAMEWORK

➢ *Agile and Lean Thinking: Core Principles and Applications*

Agile and Lean Thinking: Core Principles and Applications are foundational to modernizing public sector IT management. Agile principles emphasize iterative development, continuous stakeholder engagement, and responsiveness to change, while Lean thinking focuses on eliminating waste, optimizing workflows, and maximizing value delivery. According to Moe et al. (2022), agile transformation extends beyond team-level agile practices to encompass organizational mindset shifts, leadership involvement, and governance evolution. This is particularly crucial in public sector settings where static project life cycles and inflexible command structures impede adaptability. Lean-agile approaches are now being applied in non-software domains, including public administration, to enhance efficiency and transparency. Conforto et al. (2016) argue that agile project management, when tailored to industry-specific contexts, delivers better performance in environments marked by uncertainty and dynamic requirements. For instance, adopting Kanban boards in municipal service delivery or utilizing Scrum in government innovation labs facilitates visual tracking, faster feedback loops, and stakeholder collaboration. These methodologies empower public institutions to deliver incremental value, adapt to citizen needs, and reduce bureaucratic delays. Thus, integrating agile and lean thinking is vital for achieving transformative outcomes in digital governance, making these principles essential for any scalable and sustainable public sector IT strategy.

➢ *Foundations of Lean-Agile Change Management*

The Foundations of Lean-Agile Change Management center on the principles of adaptability, decentralized decision-making, and value-driven transformation. This approach differs significantly from traditional change management models, which are often top-down and linear. Lean-agile change management emphasizes incremental evolution, continuous learning, and alignment across value streams. According to Kišš, & Rossi, (2018), successful lean-agile transformations rely on frameworks that support iterative feedback, empower cross-functional teams, and enable leadership to act as facilitators of cultural change rather than enforcers of rigid procedures. Such models are essential in the public sector, where legacy systems, siloed departments, and hierarchical structures pose significant barriers to change. Furthermore, resistance to innovation—both passive and active—can undermine transformation efforts in government settings. Heidenreich and Spieth (2013) identify cognitive, emotional, and behavioral forms of resistance that can be mitigated through transparent communication, stakeholder inclusion, and early demonstration of value. For instance, engaging public service employees in co-designing agile workflows fosters ownership and reduces fear of disruption. This participatory model enhances transformation outcomes by aligning organizational objectives with employee expectations. As such, lean-agile change management provides a dynamic, human-centered approach essential for managing uncertainty and driving sustainable reform in complex public institutions.

Table 1 Summary of 2.2 Foundations of Lean-Agile Change Management

Key Concept	Technical Description	Application in Public Sector	Expected Outcome
Iterative and Incremental Change	Lean-Agile change management emphasizes short cycles of delivery (iterations), with continuous evaluation and refinement of both processes and outcomes.	Used in policy implementation and digital service redesign to allow experimentation and stakeholder input before full-scale rollout.	Faster adaptability to evolving requirements and reduced resistance due to incremental exposure.
Empowered Cross-Functional Teams	Teams are composed of members from various departments or disciplines, with autonomy to make decisions within their domain and deliver end-to-end value.	Enables coordination between IT, legal, procurement, and service units for agile projects such as e-governance platforms or benefits systems.	Enhanced collaboration, faster decisions, and ownership of outcomes.
Value Stream Orientation	Focuses on optimizing the flow of value to the citizen or end-user, eliminating non-value-adding activities (waste), and aligning change efforts to outcomes.	Applied in process reengineering of licensing, permit issuance, or social service workflows using tools like value stream mapping.	Increased efficiency, reduced service delivery time, and improved citizen satisfaction.
Continuous Learning and Feedback	Embeds feedback mechanisms at all levels—individual, team, and organizational—to foster learning, adaptability, and innovation.	Feedback loops from service users, audit findings, and sprint reviews are institutionalized in public programs such as digital health records or tax services.	Organizational agility, informed decision-making, and responsiveness to stakeholder needs.

➢ *Overview of Enterprise Architecture Frameworks (TOGAF, Zachman, FEAF)*

The Overview of Enterprise Architecture Frameworks (TOGAF, Zachman, FEAF) highlights the structural role of enterprise architecture (EA) in aligning technology with organizational goals in public sector transformation. EA frameworks serve as standardized methodologies for visualizing, organizing, and optimizing complex IT ecosystems across multiple levels of governance. Tang, Han, and Chen (2004) provide a comparative analysis of TOGAF (The Open Group Architecture Framework), Zachman Framework, and the Federal Enterprise Architecture Framework (FEAF), noting that while each offers distinct modeling dimensions and levels of abstraction, they share a common purpose: enhancing enterprise coherence and agility. TOGAF emphasizes a process-oriented approach through its Architecture Development Method (ADM), which supports iterative planning, gap analysis, and governance. The Zachman Framework, by contrast, is a taxonomy-based model focused on different stakeholder perspectives and deliverables across rows (e.g., planner to technician) and columns (e.g., data, function, network). FEAF, primarily used by U.S. federal agencies, integrates performance reference models and cross-agency collaboration to support strategic planning. As Iyamu, (2022) observe, the choice of framework often depends on the maturity level of the institution, regulatory mandates, and the complexity of existing infrastructure. For agile transformation, integrating these EA models allows governments to manage interdependencies, ensure compliance, and facilitate digital innovation within a controlled architecture.

➢ *Synergizing EA with Agile Transformation Initiatives*

Synergizing Enterprise Architecture (EA) with Agile Transformation Initiatives is essential for balancing strategic coherence and operational adaptability in public sector IT modernization. While agile methods promote decentralized, iterative development, EA ensures structural integrity and alignment with long-term institutional goals as represented in figure 1. Hanschke, et al., (2015) argue that harmonizing EA with agile requires rethinking traditional governance models to allow for adaptive planning, minimal viable architecture, and continuous integration across architectural layers. This is particularly critical in government settings, where interdependencies between departments and regulatory constraints demand synchronized transformation. Jonkers et al. (2006) reinforce this view, highlighting that EA serves not only as a technical blueprint but also as a managerial tool that informs decision-making, reduces redundancy, and supports digital innovation. Agile transformation can be significantly enhanced by leveraging EA to define shared architectural principles, enable architectural runway planning, and align product increments with institutional value streams. For example, integrating ArchiMate modeling with agile sprint planning can streamline traceability from policy objectives to deployed functionalities. This synergy fosters a dual-speed IT environment where innovation flourishes without compromising compliance or enterprise stability, making it vital for public institutions transitioning toward agile governance models.

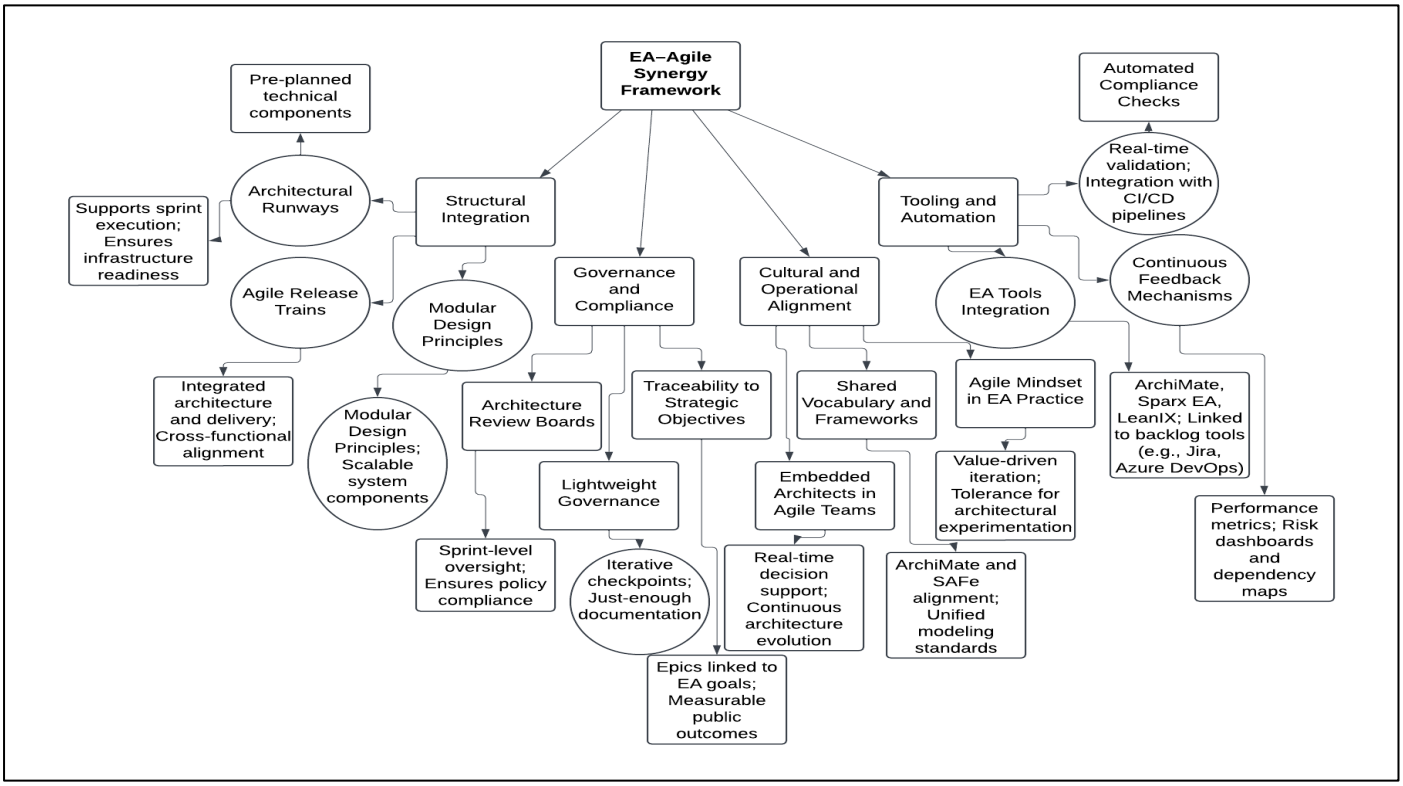

Fig 1 Diagram Illustration of Integrated Framework for Aligning Enterprise Architecture with Agile Transformation Initiatives

Figure 1 illustrates a comprehensive, multi-dimensional framework for aligning long-term architectural governance with agile delivery principles in public sector digital transformation. At its core, the model demonstrates how structural integration—through architecture runways, agile release trains, and modular design—lays the technical foundation for continuous delivery without compromising system stability. Governance and compliance are embedded through architecture review boards, lightweight controls, and traceability mechanisms that ensure agile workstreams align with strategic and regulatory mandates. Culturally, the framework emphasizes operational alignment by embedding architects within agile teams, fostering a shared language across disciplines, and promoting adaptive architecture practices. Tooling and automation form the technological backbone, incorporating EA modeling tools (e.g., ArchiMate, LeanIX), backlog integration (e.g., Jira), and real-time feedback systems for continuous validation and risk management. Each branch and sub-branch in the diagram represents critical enablers that, when integrated, allow EA to evolve from a static planning discipline into a dynamic, value-adding force within agile transformation. This approach ensures agility is scaled responsibly, aligning rapid iterations with enterprise coherence, cross-agency interoperability, and long-term public value creation.

- *Conceptual Integration Model for Public Sector Agile Transformation*

The Conceptual Integration Model for Public Sector Agile Transformation serves as a strategic framework that aligns agile delivery mechanisms with enterprise-wide architectural governance to facilitate scalable digital change in bureaucratic institutions. This model addresses a well-documented disconnect between enterprise architecture (EA) strategies and agile execution, particularly in large public agencies. Banaeianjahromi and Smolander (2019) emphasize that without a coherent integration model, conflicts emerge between long-term architectural planning and short-term agile iterations, resulting in fragmented systems, reduced interoperability, and governance breakdowns. A conceptual model designed for public sector transformation integrates three core pillars: iterative agile workflows, EA-driven value stream mapping, and continuous feedback loops from both internal stakeholders and citizens. Hobbs and Petit (2017) show that in large-scale government IT projects, success hinges on synchronized backlog prioritization across business units, modular EA blueprints, and leadership-enabled architectural oversight. For example, embedding agile teams within EA governance councils fosters shared accountability and dynamic architecture evolution. The proposed model enables a layered transformation—strategic, operational, and technical—while preserving compliance, scalability, and institutional coherence. Such integration allows public institutions to achieve digital responsiveness without undermining the structural integrity necessary for accountability and cross-sector coordination.

III. AGILE TRANSFORMATION IN PUBLIC SECTOR IT: GLOBAL TRENDS AND CASE STUDIES

- *Adoption Trends in Agile Governance*

The Adoption Trends in Agile Governance reflect a paradigm shift in public administration toward flexible, iterative, and collaborative policy and service delivery models. Governments worldwide are increasingly integrating agile practices into IT modernization strategies to overcome bureaucratic inertia, accelerate digital transformation, and improve responsiveness to citizens. Mergel, Ganapati, and Whitford (2021) emphasize that agile governance is not limited to software development but includes restructured workflows, modular policy implementation, and adaptive project management at the institutional level. Agile governance frameworks such as Scrum, Kanban, and SAFe (Scaled Agile Framework) are being localized to fit public sector contexts, allowing agencies to operate in short planning cycles while maintaining compliance with administrative mandates. However, the success of these practices often depends on organizational readiness and cultural adaptability. Luna-Reyes and Gil-García (2014) argue that deeply rooted hierarchical structures and risk-averse cultures in government institutions can inhibit agile adoption, despite formal training and methodological integration. Countries such as Estonia, Canada, and the United Kingdom have reported measurable improvements in public service delivery using agile methods in digital identity systems, tax platforms, and healthcare portals. These trends indicate that agile governance is evolving from experimental pilots into a foundational element of public sector innovation, highlighting its strategic relevance in long-term digital government initiatives.

- *Case Study: U.S. Digital Service (USDS)*

The Case Study: U.S. Digital Service (USDS) illustrates a transformative application of agile practices within federal governance aimed at revamping public-facing IT systems. Established in 2014, the USDS operates as a cross-functional agency embedded in high-priority government projects, applying agile development principles to modernize legacy systems and improve service delivery as presented in table 2. Oliver, (2023) detail how the USDS emphasized rapid prototyping, user-centered design, and iterative feedback loops to streamline services like healthcare enrollment and veterans' benefits, demonstrating agile's capacity to navigate federal bureaucracy. Altshuler, & Behn, (2010) highlights that the USDS also institutionalized lean documentation, modular development, and DevOps practices, reducing deployment times and aligning digital tools with policy outcomes. By integrating agile methodologies with federal compliance structures, the USDS serves as a benchmark for digital innovation in the public sector (Boh, & Yellin, 2006). Its success highlights how institutional agility can be strategically harnessed to enhance transparency, responsiveness, and digital equity across government agencies.

Table 2 Summary of 3.2 Case Study – U.S. Digital Service (USDS)

Aspect	Description	Application in USDS Projects	Impact and Outcome
Founding and Mission	Established in 2014 to modernize federal digital services by applying agile methods, user-centered design, and rapid iteration.	Embedded agile teams in high-impact federal agencies (e.g., Department of Veterans Affairs, USCIS) to fix failing or underperforming systems.	Improved digital service accessibility, reduced delivery time, and restored trust in government IT systems.
Agile Practices Applied	Emphasis on rapid prototyping, iterative development, continuous integration, and human-centered design principles.	Used in revamping Healthcare.gov, improving the VA disability claims system, and digitizing green card applications.	Achieved major usability improvements and increased system reliability across citizen-facing platforms.
Structural and Cultural Adaptation	Operates as a startup within the federal government, recruiting technical experts from the private sector and fostering a delivery-focused culture.	Created agile pods that functioned autonomously within rigid federal bureaucracies while aligning with mission goals and legal frameworks.	Enabled agility within hierarchical institutions without compromising compliance or accountability.
Governance and Policy Integration	Blended agile execution with federal oversight through modular contracting, lean documentation, and policy-compliant delivery pipelines.	Partnered with OMB and federal CIO councils to introduce digital service standards and modern IT procurement policies.	Institutionalized agile practices in policy, procurement, and performance frameworks for long-term sustainability.

➢ *Case Study: UK Government Digital Service (GDS)*

The Case Study: UK Government Digital Service (GDS) represents one of the most notable implementations of agile governance globally. Launched in 2011, GDS aimed to centralize digital capabilities and drive efficiency across UK government departments through agile service design, modular architecture, and open standards. Trischler, & Westman, (2022) emphasize that GDS leveraged agile methodologies—such as user story mapping, iterative prototyping, and multidisciplinary teams—to rapidly deliver digital services aligned with citizen needs and policy objectives. Koch and Fiedler (2020) describe how GDS also introduced the Digital Service Standard, a governance tool that embeds agile principles across procurement, development, and delivery stages. Projects like GOV.UK Verify and the transformation of government content portals illustrate the practical integration of agile with public sector constraints. GDS's institutional model underscores how agile delivery, when paired with strong leadership and architectural alignment, can achieve scalable, user-centered reform in legacy-bound government systems.

➢ *Comparative Analysis of Successes and Failures*

The Comparative Analysis of Successes and Failures in public sector agile transformation reveals a dichotomy between effective institutional integration and fragmented implementation. Gregory, Keil, Muntermann, and Mähring (2015) underscore that success often hinges on an organization's ability to manage ambidexterity—balancing agile experimentation with architectural stability. For example, the U.S. Digital Service and UK GDS succeeded by embedding cross-functional teams within policy structures and employing agile methods across procurement, design, and deployment. These initiatives fostered early stakeholder involvement, rapid feedback loops, and minimal viable product (MVP) delivery cycles that aligned with policy mandates. Conversely, failures typically stem from treating digital change as purely technological rather than service-oriented. Cordella and Paletti (2019) argue that projects driven by a manufacturing logic—focused on cost-cutting and rigid deliverables—often collapse under the weight of bureaucratic complexity and misaligned incentives. For instance, several EU digital identity platforms failed to gain adoption due to fragmented governance and lack of user-centric design (Igba, et al., 2024). These contrasts highlight that agile success in the public sector requires more than technical agility; it demands cultural readiness, architectural coordination, and policy-driven value co-creation.

➢ *Lessons Learned and Cross-National Insights*

The Lessons Learned and Cross-National Insights from agile transformation initiatives across countries underscore the importance of institutional adaptability, data maturity, and sustained leadership in public sector innovation as represented in figure 2. According to Ooijen, et al., (2019), nations that succeeded in embedding agile governance—such as Estonia, South Korea, and the United Kingdom—demonstrated a strategic commitment to becoming data-driven public sectors. These countries established centralized digital units, enabled cross-agency data sharing, and created agile policy feedback mechanisms that allowed continuous iteration based on real-time citizen needs. Conversely, jurisdictions that lacked coherent digital governance or robust data ecosystems struggled to scale agile practices effectively. Janssen, van der Voort, and Wahyudi (2017) emphasize that decision-making quality in agile environments is deeply influenced by data accessibility, integration, and analytical capacity. Countries that invested in open data infrastructures and enterprise-wide analytics were better positioned to align agile development with policy priorities. (Enyejo, et al., 2024) A critical insight is that while agile methods offer operational flexibility, their long-term success in government depends on systemic reforms, interdepartmental collaboration, and architecture-driven execution models that transcend isolated pilots and permeate institutional workflows.

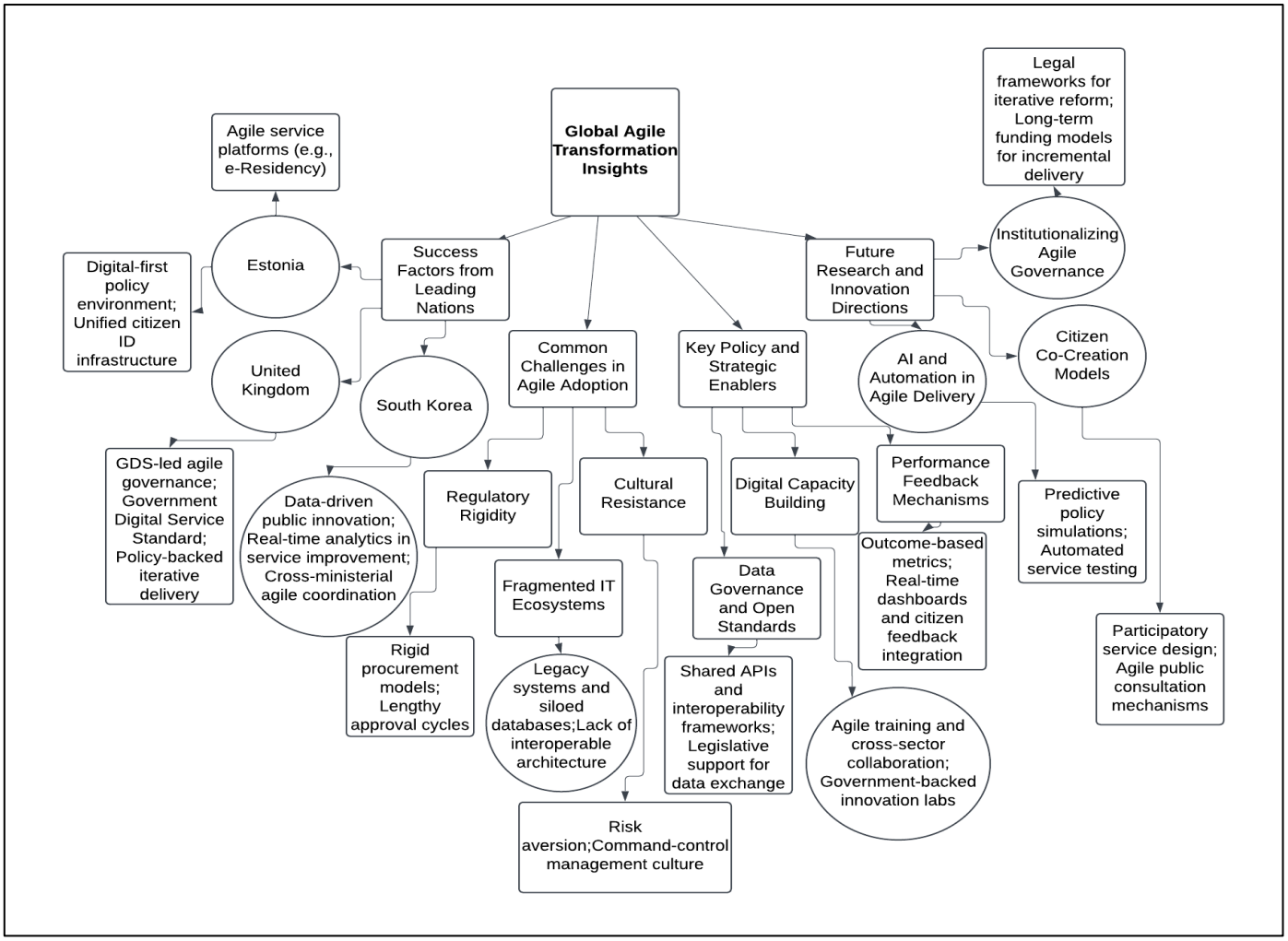

Figure 2: Diagram Illustrating Global Insights and Strategic Lessons from Agile Public Sector Transformation

Figure 2 presents a comprehensive overview of how diverse governments have navigated the complexities of agile implementation in digital governance. The first branch highlights success factors from leading nations—Estonia, the United Kingdom, and South Korea—demonstrating how policy alignment, unified digital identities, and real-time analytics have enabled agile maturity and citizen-centric innovation. The second branch outlines common challenges such as regulatory rigidity, fragmented legacy systems, and cultural resistance that impede transformation in many jurisdictions. The third branch focuses on strategic enablers including open data governance, agile workforce capacity building, and feedback loops that link citizen input directly to iterative service improvement. The final branch explores future research and innovation directions, such as leveraging AI to automate agile workflows, co-creating digital services with the public, and institutionalizing agile reform through legal and budgetary mechanisms. Each element in the diagram collectively reveals that while agile transformation is context-specific, success depends on an integrated strategy combining technological agility, regulatory support, institutional adaptability, and continuous citizen engagement. The diagram serves as a multi-layered roadmap for policymakers seeking to replicate global best practices while adapting to their own administrative ecosystems.

IV. LEAN-AGILE CHANGE MANAGEMENT IN BUREAUCRATIC ENVIRONMENTS

- *Tailoring Lean-Agile Principles for Government Contexts*

Tailoring Lean-Agile Principles for Government Contexts involves contextualizing agile methodologies to fit the bureaucratic, regulatory, and political realities of public sector organizations. While Lean-Agile practices originated in the private sector with a focus on customer satisfaction and rapid iteration, their translation to government requires recalibrating roles, workflows, and values to ensure both compliance and responsiveness. Kattel, et al., (2013) emphasizes that innovation in public governance is driven not only by procedural flexibility but also by the legitimacy of action, accountability mechanisms, and the alignment of institutional mandates with public value creation. Almahamid, (2013) propose that government agility must be adaptive rather than purely reactive. They suggest that Lean-Agile adoption in government should center around small-scale experiments, policy co-creation with citizens, and adaptive governance loops embedded in existing hierarchical structures. For example, establishing multi-disciplinary product teams within departments such as health or transportation allows policy implementation and IT

system delivery to occur concurrently, rather than sequentially. Techniques like backlog grooming and sprint reviews must also be interpreted through a regulatory lens, ensuring that iterative development aligns with transparency, security, and legal accountability (Ijiga, et al., 2024). Thus, tailoring Lean-Agile principles for public institutions necessitates a hybrid model—anchored in bureaucratic legitimacy but optimized for dynamic, citizen-centric outcomes**.**

➢ *Addressing Change Resistance in Hierarchical Structures*

Addressing Change Resistance in Hierarchical Structures is one of the most persistent barriers to implementing Lean-Agile transformation within public institutions. These structures, characterized by rigid chains of command and legacy decision-making protocols, often foster a culture of risk aversion and procedural rigidity. Fernandez and Rainey (2006) argue that overcoming resistance requires more than communication campaigns; it demands strategic interventions such as cultivating change champions within each administrative tier, empowering middle management to serve as transformation conduits, and aligning reforms with the organization's mission and incentives. Resistance can also be amplified when employees perceive change as externally imposed rather than collaboratively developed. Kuipers et al. (2010) highlight that participatory change processes—where civil servants are actively involved in agile transition planning, backlog creation, and performance reviews—can reduce inertia and improve buy-in. For example, incorporating agile rituals like sprint retrospectives and stand-up meetings into traditional reporting hierarchies enables gradual cultural adaptation without dismantling institutional order (Ayoola, et al., 2024). Structured feedback loops also support the realignment of accountability frameworks, ensuring that agility does not conflict with public sector transparency or auditability. Addressing change resistance thus requires a combination of political sensitivity, behavioral insight, and agile process integration tailored to the institutional anatomy of government systems.

➢ *Role of Leadership, Communication, and Training*

The Role of Leadership, Communication, and Training in agile transformation is pivotal for embedding sustainable change within public sector organizations. Transformational leadership, in particular, plays a critical role in redefining bureaucratic norms and fostering a shared vision around agile values as represented in figure 3. Van der Voet (2014) notes that transformational leaders who demonstrate strategic clarity, inspire staff through participation, and challenge the status quo are more effective in hierarchical settings where resistance to change is entrenched. Leaders must not only advocate for Lean-Agile principles but also model transparency, adaptability, and inclusive governance to drive institutional alignment. Effective communication strategies are equally essential. Farndale and Kelliher (2013) argue that communication must be continuous, multi-directional, and tailored to address employee uncertainties during agile implementation. Clear articulation of goals, feedback mechanisms, and recognition of iterative progress help establish psychological safety, a necessary condition for agile experimentation. Training, meanwhile, should extend beyond technical instruction to include agile mindset development, collaborative problem-solving, and scenario-based learning (Ebika, et al., 2024). Public institutions adopting agile must institutionalize ongoing learning through embedded training hubs, digital knowledge portals, and mentorship programs. Together, leadership, communication, and training form the cultural and structural scaffolding that supports the operationalization of agile governance in bureaucratic environments.

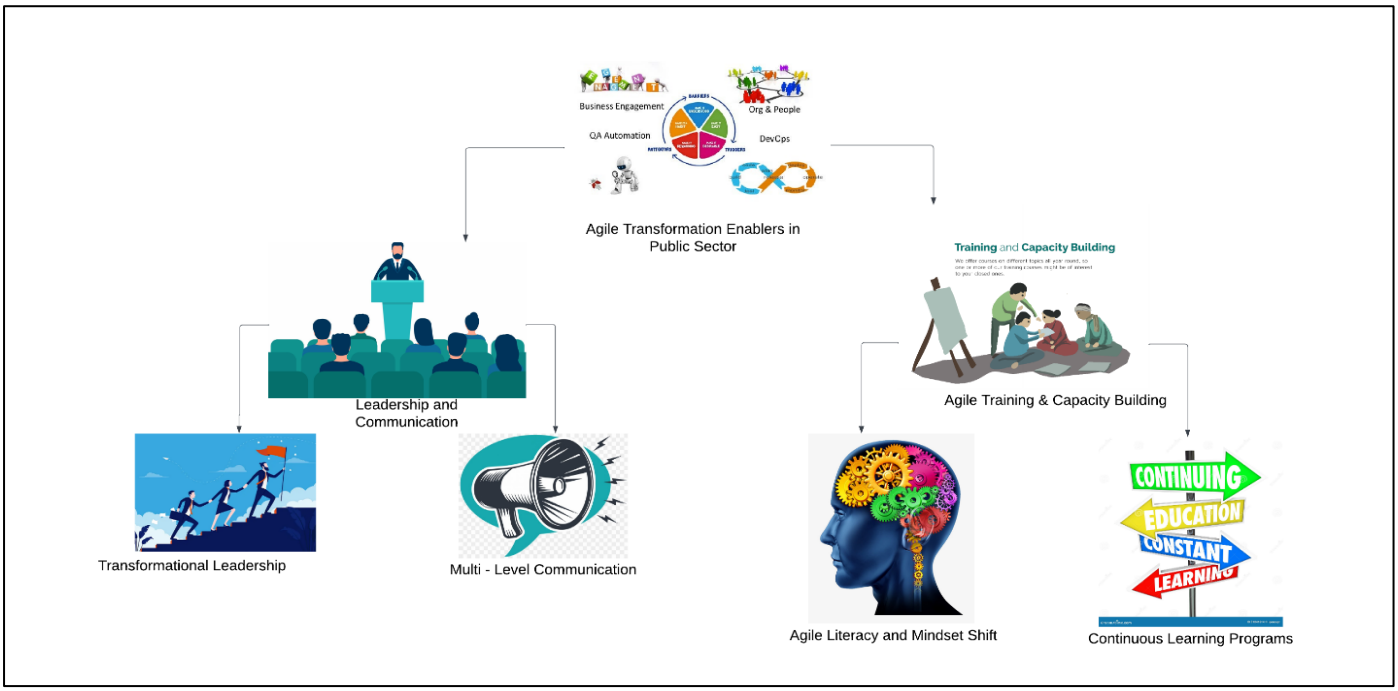

Fig 3 Diagram Illustration of Enabling Agile Transformation through Leadership, Communication, and Continuous Training

Figure 3 provides a focused visualization of two foundational pillars—Leadership & Communication and Agile Training & Capacity Building—that collectively enable successful agile adoption in government institutions. On the left, the Leadership & Communication branch highlights the importance of transformational leadership, which is essential for shifting rigid bureaucratic structures toward adaptive, empowered teams. Leaders act as change agents by articulating vision, removing systemic barriers, and encouraging autonomy across hierarchical layers. The sub-branch on multi-level communication emphasizes the necessity of transparent, consistent, and inclusive communication channels that connect decision-makers, implementers, and citizens. On the right, the Agile Training & Capacity Building branch underscores the need for agile literacy, not only in technical methods but in fostering adaptive thinking and collaborative behavior. This is supported by continuous learning programs, which institutionalize agile through structured curricula, on-the-job mentoring, and peer-led feedback loops. Each node is visually represented with intuitive clipart—such as a podium for leadership or gears for mindset transformation—to aid in quick comprehension and retention. Together, the branches demonstrate that sustainable agile transformation is not just about tools or processes, but about cultivating the right leadership behaviors, communication infrastructure, and learning ecosystems across the public sector.

- *Iterative Deployment and Continuous Feedback Mechanisms*

Iterative Deployment and Continuous Feedback Mechanisms are foundational to agile transformation in public sector IT environments, as they facilitate adaptive learning and user-centered delivery. Iterative deployment refers to the incremental release of functional components, enabling government agencies to pilot, refine, and scale services based on real-time insights. Lindgren, Henfridsson, and Schultze (2004) emphasize that this approach supports competence development through repeated cycles of testing, stakeholder evaluation, and solution refinement, thereby aligning digital services with evolving policy and user requirements. Continuous feedback loops further enhance agility by embedding mechanisms for responsiveness and error correction throughout the system development lifecycle. Mathiassen and Pries-Heje (2006) highlight the strategic role of embedded feedback—via daily stand-ups, retrospectives, and stakeholder demos—in enabling rapid decision-making and value-driven pivots. In government contexts, incorporating citizen feedback through open consultation platforms, in-app surveys, and frontline service reports ensures that iterative improvements are grounded in lived user experience. Moreover, digital governance structures must be designed to synthesize operational data into actionable insights, fostering a cycle of continuous improvement (Jok, and Ijiga, 2024). Together, iterative deployment and feedback mechanisms transform rigid administrative cycles into responsive service ecosystems, reinforcing agility as a sustainable operational strategy rather than a project-specific methodology.

Table 3 Summary of Iterative Deployment and Continuous Feedback Mechanisms

Component	Technical Explanation	Application in Public Sector	Strategic Outcome
Iterative Deployment	Involves releasing functional software in small, manageable increments, allowing frequent validation and adaptation of requirements.	Used in rolling out digital services such as online benefit applications, where MVPs are tested and expanded based on user and policy feedback.	Reduces delivery risk, enables incremental improvements, and ensures timely release of critical functionalities.
Embedded Feedback Loops	Incorporates mechanisms such as sprint reviews, retrospectives, and user feedback into every iteration to refine features and correct course rapidly.	Enabled through stakeholder demos, citizen satisfaction surveys, and front-line service feedback in areas like public health or taxation.	Enhances responsiveness, strengthens citizen trust, and drives evidence-based development cycles.
Real-Time Monitoring and Evaluation	Utilizes analytics dashboards, DevOps tools, and issue trackers to monitor system behavior, user engagement, and operational performance continuously.	Applied in digital identity platforms and e-procurement systems to detect system lags, usability issues, or regulatory breaches in real time.	Promotes transparency, performance tracking, and faster incident resolution.
Institutional Integration	Embeds feedback and deployment mechanisms within the governance model to support long-term learning and compliance alignment.	Integrated with change advisory boards and performance management units to ensure policy alignment and adaptive planning.	Supports agile maturity, fosters adaptive governance, and ensures compliance throughout the development lifecycle.

- *Evaluation Metrics and Change Success Indicators*

Evaluation Metrics and Change Success Indicators are critical for measuring the effectiveness of Lean-Agile transformation in public institutions, where transparency, accountability, and strategic alignment must coexist with innovation. Effective evaluation frameworks balance qualitative and quantitative indicators to assess progress, impact, and sustainability. Peters (2018) argues that in the public sector, success must be measured not only by efficiency and timeliness but also by interdepartmental coordination and the ability to align digital initiatives with broader policy goals. Metrics such as cycle time reduction,

policy response time, cross-agency collaboration index, and stakeholder satisfaction offer insight into the systemic health of agile adoption. Alahyari, Berntsson Svensson, and Gorschek (2017) further emphasize value-based metrics such as customer (or citizen) perceived value, delivery frequency, and backlog completion rate as reliable success indicators in agile environments. Public sector organizations should also implement outcome-focused KPIs including user adoption rates, error reduction in service delivery, and compliance performance. By integrating agile metrics with public accountability standards, agencies can quantify progress while maintaining mission integrity (Ihimoyan, et al., 2024). Visual management tools like agile dashboards and impact maps allow real-time monitoring and stakeholder engagement, ensuring that evaluation is not merely retrospective but continuously shapes the trajectory of transformation across public administration layers.

V. ALIGNING ENTERPRISE ARCHITECTURE WITH AGILE METHODOLOGIES

➢ *Mapping EA Layers to Agile Delivery Models*

Mapping EA Layers to Agile Delivery Models is essential for ensuring strategic coherence and interoperability across the architecture of public sector digital systems. Enterprise Architecture (EA) layers—namely business, application, data, and technology—must be harmonized with agile practices to enable synchronized transformation across multiple functional domains. Van Wessel, et al., (2021) argue that aligning EA with scaled agile frameworks such as SAFe or LeSS enables structured yet flexible delivery pipelines, where architectural decisions are continuously integrated with evolving product backlogs and sprint increments. In practice, the business layer of EA informs agile epics and user stories by identifying mission-critical capabilities and regulatory requirements, while the application and data layers guide component modularization and service integration. The technology layer supports deployment environments through DevOps automation, cloud infrastructure, and security protocols. Schmidt, Drews, and Schirmer (2020) emphasize that a tightly coupled EA-agile alignment enhances adaptability, reduces technical debt, and accelerates digital service innovation. By embedding architecture governance roles—such as system architects and enterprise solution leads—into agile teams, public institutions can facilitate ongoing architectural compliance while embracing iterative, cross-functional product delivery models tailored to citizen-centric outcomes.

➢ *Using Value Stream Mapping for Strategic Alignment*

Using Value Stream Mapping for Strategic Alignment provides public sector organizations with a structured method to visualize, analyze, and optimize the end-to-end processes that deliver value to citizens. Value Stream Mapping (VSM) is a Lean technique that identifies waste, streamlines flow, and improves efficiency by aligning every activity with strategic objectives as represented in figure 4. Rother and Shook (2009) explain that VSM enables institutions to create a shared understanding of how value is generated and where bottlenecks occur, making it ideal for bridging the gap between enterprise architecture and agile execution. In agile public sector environments, VSM helps align cross-functional teams with overarching policy goals by mapping value delivery from policy formulation to digital service deployment. Petersen, Wohlin, and Baca (2009) show that adopting VSM in transitioning from plan-driven to agile approaches improves visibility and coordination across project portfolios. For instance, mapping the delivery flow of social benefit services can highlight redundant approval steps, enabling teams to restructure workflows for faster citizen access. VSM also enhances backlog prioritization by ensuring that user stories are tied directly to measurable value outcomes. As such, value stream mapping acts as a strategic instrument that aligns agile delivery with institutional mandates, performance goals, and citizen-centric outcomes in government transformation initiatives.

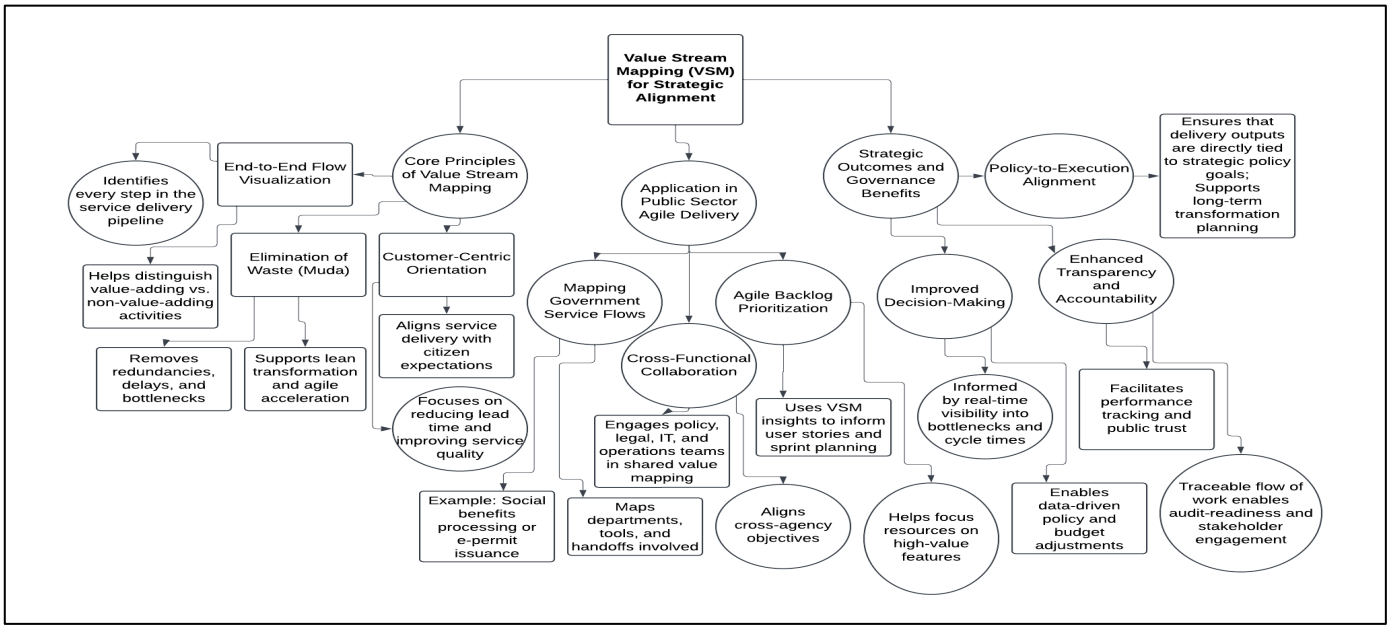

Fig 4 Diagram Illustration of Strategic Alignment of Agile Public Services through Value Stream Mapping

Figure 4 presents a structured visualization of how value stream mapping (VSM) functions as a strategic enabler within public sector agile delivery. The first branch outlines the core principles of VSM, emphasizing the need to visualize end-to-end workflows, eliminate non-value-adding activities (waste), and prioritize customer-centric outcomes such as reduced lead times and improved service quality. The second branch focuses on practical application in public sector environments, where VSM is used to dissect complex service flows—like social benefits distribution or permit processing—into measurable stages involving multiple departments. It facilitates cross-functional collaboration by aligning IT, policy, legal, and operations stakeholders around a shared understanding of the value chain, and informs agile backlog prioritization by spotlighting high-impact bottlenecks. The third branch highlights strategic outcomes, such as improved decision-making through real-time workflow visibility, increased transparency and accountability for audit and compliance, and stronger alignment between execution and policy objectives. Together, the diagram demonstrates that VSM is not merely a process optimization tool, but a strategic mechanism that supports agile governance, enables informed resource allocation, and drives transformation in public service delivery through evidence-based insights.

- *Architecture Runways and Agile Governance Integration*

Architecture Runways and Agile Governance Integration serve as foundational mechanisms for ensuring the scalability and sustainability of agile practices in public sector IT systems. The architecture runway concept refers to the preemptive architectural planning that enables agile teams to deliver features without being constrained by missing infrastructure or unresolved system-level decisions as presented in table 4. Bente, Bombosch, and Langade (2012) emphasize that a robust architecture runway ensures that evolving agile backlogs are supported by stable, reusable components and compliant interfaces, which is critical in high-stakes public systems such as taxation, healthcare, or identity management. In parallel, agile governance ensures that architectural decisions are not isolated from broader institutional oversight and policy constraints. Bosch (2014) notes that integrating governance mechanisms—such as architectural review boards, compliance checkpoints, and cross-functional governance councils—into continuous delivery pipelines helps balance innovation with control. In the public sector, this integration allows architecture and compliance frameworks to co-evolve with agile increments. For example, maintaining traceability from epics to policy directives ensures that every release aligns with regulatory mandates (Uzoma, et al., 2024). Together, architecture runways and agile governance establish a dual structure that supports speed and stability, allowing agile transformation to mature without sacrificing accountability, transparency, or architectural coherence in government environments.

Table 4 Summary of Architecture Runways and Agile Governance Integration

Element	Technical Definition	Application in Public Sector Projects	Strategic Outcome
Architecture Runways	Pre-planned architectural components and technical foundations that support upcoming agile development without delaying feature delivery.	Implemented in initiatives like national e-ID systems or integrated financial platforms to allow parallel sprint execution and architectural readiness.	Enables scalable development, reduces rework, and ensures technical stability across agile teams.
Agile Governance Mechanisms	Frameworks that integrate policy compliance, risk management, and strategic oversight into agile workflows using lightweight controls.	Applied through architectural review boards, backlog alignment with policy goals, and compliance gates in ministries like health or defense.	Maintains transparency, ensures policy alignment, and embeds accountability in agile execution cycles.
Role Integration	Embedding enterprise architects, security leads, and compliance officers within agile teams to maintain system integrity and real-time decision support.	Practiced in cross-agency digital transformation where architects participate in sprint planning and release reviews.	Improves communication, accelerates approvals, and ensures architectural consistency during iterative delivery.
Continuous Architecture Evolution	Ongoing refinement of architecture as systems evolve, avoiding rigid upfront designs and allowing for adaptability across changing requirements.	Used in multi-agency platforms like smart city infrastructure, where evolving citizen needs and regulatory standards demand architectural flexibility.	Facilitates long-term agility, future-proofing, and dynamic service reconfiguration without disrupting live systems.

- *Managing Compliance, Security, and Interoperability*

Managing Compliance, Security, and Interoperability in agile public sector projects requires embedding governance capabilities directly into iterative development cycles. As public agencies adopt agile delivery models, regulatory adherence and system trustworthiness must remain non-negotiable. Bannerman (2011) highlights that agile methods must be augmented with risk-aware practices that proactively address data protection, auditability, and legal obligations. In government contexts—such as health records, taxation, or defense—this involves integrating security and

compliance acceptance criteria into each sprint, ensuring release candidates meet statutory and institutional requirements before deployment. Interoperability further complicates public sector digital transformations, as legacy systems, multi-vendor ecosystems, and federated architectures must exchange data seamlessly. Sharma, Mithas, and Kankanhalli (2014) argue that adopting standards-based integration (e.g., RESTful APIs, data exchange ontologies) is essential for enabling real-time collaboration and service orchestration across departments. Agile teams must work closely with enterprise architects and compliance officers to co-develop modular, standards-compliant interfaces that facilitate secure and lawful data flows. For example, DevSecOps practices can embed security scans, vulnerability testing, and access control validations into continuous delivery pipelines (Enyejo, et al., 2024). These integrations ensure that agility does not undermine public trust or operational integrity, but instead reinforces resilient, compliant, and interoperable government systems aligned with policy mandates.

- *Tools and Practices for EA-Agile Coherence*

Tools and Practices for EA-Agile Coherence are instrumental in harmonizing enterprise architecture (EA) planning with the fast-paced execution of agile methodologies in public sector environments. Tamm, Seddon, Shanks, and Reynolds (2011) argue that EA adds measurable value when it is tightly integrated with decision-making processes and delivery tools as represented in figure 5. Tools such as ArchiMate for architectural modeling, Jira for agile task tracking, and Confluence for collaborative documentation create an ecosystem where architectural foresight and agile development can co-evolve. These tools support visualizing dependencies, maintaining traceability, and aligning product backlogs with high-level strategic goals. Coherence is also enabled through disciplined practices like architectural decision records (ADRs), which capture design choices iteratively within agile sprints. Li, et al., (2013) emphasize that embedding software architectural knowledge within EA governance structures ensures that system design remains responsive without fragmenting long-term planning. Agile ceremonies such as sprint reviews and system demos can incorporate architecture checkpoints, allowing real-time alignment between developers, architects, and policymakers. Furthermore, frameworks like SAFe encourage roles such as System and Enterprise Architects to work as part of agile release trains, ensuring constant dialogue between architecture layers and product teams (Enyejo, et al., 2024). These tools and practices are essential for sustaining architectural consistency and agility in complex, compliance-bound government ecosystems.

Figure 5 visually represents the multifaceted advantages of enterprise architecture (EA) tools and supports the discussion in Section 5.5: Tools and Practices for EA-Agile Coherence. It illustrates how EA tools enhance agility and adaptability by enabling organizations to respond rapidly to business changes—a core principle in agile environments. The image highlights improved decision-making, noting up to a 25% increase in effectiveness, which aligns with agile practices that require real-time data and rapid prioritization. EA tools also contribute to operational efficiency, with the potential to boost performance by 30% through streamlined workflows, echoing agile's emphasis on lean delivery. Furthermore, the image emphasizes risk mitigation by offering visibility into IT dependencies, allowing agile teams to proactively address threats during sprint planning and deployment. Cost savings of up to 20% underscore the financial viability of integrating EA with agile, especially through modular design and reusable architecture components. Finally, EA tools facilitate the alignment of IT initiatives with business strategies, which is critical in public sector agile frameworks where architecture governance ensures compliance and value delivery. Together, these elements depict how EA tools serve as an essential foundation for maintaining architectural integrity and strategic alignment within agile delivery ecosystems.

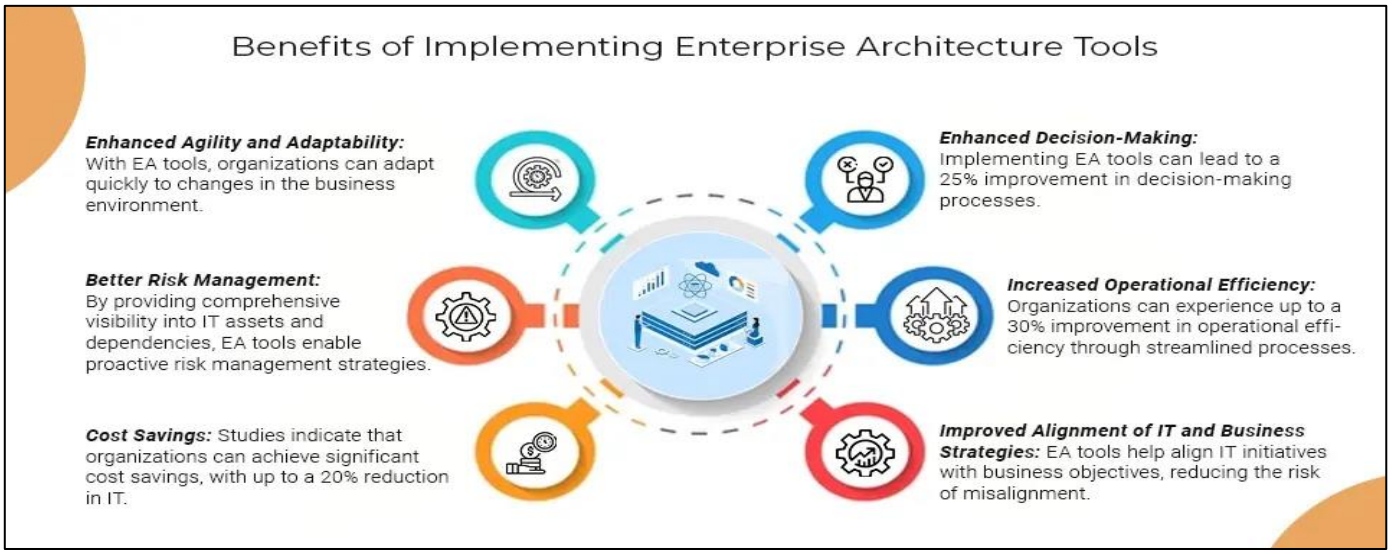

Fig 5 Picture of Enterprise Architecture Tools as Strategic Enablers for Agile-Coherent Governance and Delivery. (Choudh, A. 2024)

VI. CHALLENGES, LIMITATIONS, AND CRITICAL SUCCESS FACTORS

➢ *Institutional and Cultural Barriers to Agile Adoption*

Institutional and Cultural Barriers to Agile Adoption are among the most persistent impediments to the successful implementation of agile methodologies in public sector environments. Deep-rooted hierarchical governance structures and risk-averse administrative cultures frequently conflict with the flexibility, collaboration, and iterative experimentation that agile frameworks demand. Christensen, Baumann, Ruggles, and Sadtler (2006) argue that public institutions often resist disruptive innovation not due to a lack of technical capability, but because of embedded norms and rigid control mechanisms that prioritize stability over adaptability. Moreover, organizational learning and knowledge-sharing practices in government agencies tend to be fragmented, inhibiting cross-functional collaboration and continuous improvement—key tenets of agile thinking. McIver, Lengnick-Hall, Lengnick-Hall, and Ramachandran (2013) found that many U.S. public institutions exhibit a siloed approach to knowledge management, impeding the flow of information critical to agile decision-making. These barriers manifest in limited stakeholder engagement, slow approval cycles, and reluctance to devolve authority to multidisciplinary teams. For agile transformation to succeed, public institutions must undergo not only methodological change but also a fundamental shift in organizational mindset—toward transparency, empowerment, and a tolerance for failure as a pathway to institutional learning and innovation.

➢ *Complexity of Legacy System Integration*

Complexity of Legacy System Integration remains a formidable obstacle to agile transformation in the public sector. Government IT landscapes are often dominated by decades-old legacy systems characterized by monolithic architectures, proprietary technologies, and hard-coded business logic. Markosian, et al., (1994) note that these systems, while mission-critical, lack the modularity and interoperability required for agile practices such as continuous integration, rapid deployment, and iterative development. As a result, even minor feature changes can entail significant risk, delays, and cost overruns. The technical debt embedded in these legacy infrastructures hinders the adoption of agile principles, particularly in environments requiring real-time data exchange and cross-agency coordination. Biswas and Maheshwari (2020) present a public sector case study where legacy modernization through microservices architecture significantly improved integration flexibility and service responsiveness. However, the process involved comprehensive reverse engineering, data migration, and the encapsulation of business functions—efforts that are resource-intensive and organizationally disruptive. For agile delivery models to thrive, public institutions must adopt phased modernization strategies that decouple core services from legacy platforms while preserving data integrity and operational continuity (Ebenibo, et al., 2024). Effective integration demands robust middleware, APIs, and architectural governance to bridge the gap between legacy stability and agile scalability in complex governmental ecosystems.

➢ *Scaling Agile Practices in Large Public Organizations*

Scaling Agile Practices in Large Public Organizations presents unique challenges rooted in structural complexity, interdepartmental dependencies, and governance rigidity. While agile frameworks such as Scrum or Kanban are often effective at the team level, their impact may diminish in large-scale settings without structured coordination and cultural alignment. Hobbs and Petit (2017) demonstrate that successful scaling in large public sector organizations requires deliberate adaptation of agile methods to accommodate the size and bureaucratic nature of the institution. This includes integrating scaled frameworks like SAFe (Scaled Agile Framework) or LeSS (Large-Scale Scrum) to manage cross-team synchronization, architectural dependencies, and regulatory oversight. Agile portfolio management plays a critical role in institutionalizing agility beyond pilot teams. Stettina and Hörz (2015) emphasize the need for strategic alignment mechanisms, such as lean budgeting, value stream funding, and enterprise-wide visibility of backlogs, to ensure that agile initiatives contribute directly to public service outcomes. For example, ministries handling national welfare or transportation systems must coordinate dozens of agile teams delivering interdependent modules governed by strict legal and policy frameworks. As such, scaling agile in public institutions entails not only methodological rigor but also adaptive leadership, cross-functional integration, and a systemic approach to portfolio governance that ensures scalability without sacrificing control or accountability.

➢ *Key Enablers of Success: Teams, Training, and Policy Support*

Key Enablers of Success: Teams, Training, and Policy Support are foundational to the sustainable implementation of agile frameworks in public sector environments. Empowered, cross-functional teams are the cornerstone of agile success, particularly in large government organizations where traditional roles and silos must be redefined. Conboy and Carroll (2019) assert that agile transformation thrives when multidisciplinary teams are given autonomy, stable composition, and clearly defined value streams as presented in table 5. These teams must operate with clear mandates, shared goals, and continuous alignment with strategic outcomes to ensure effectiveness within bureaucratic systems. Training is another critical success factor, going beyond technical skills to encompass mindset change, agile literacy, and adaptive leadership. Equipping public sector employees with agile competencies through formal certification, peer mentoring, and experiential learning fosters institutional resilience. Yang and Holzer (2006) also highlight that trust in performance measurement systems is essential for public sector reform. This implies that supportive policies and incentives—such as flexible procurement regulations, agile-aligned compliance structures, and political sponsorship—must be institutionalized to reinforce

transformation (Akindote, et al., 2024). For example, national digital strategies that embed agile principles into civil service reform frameworks create an enabling ecosystem where agile practices are no longer experimental but codified into public governance norms. These enablers collectively underpin long-term agility and public value creation.

Table 5 Summary of Key Enablers of Success: Teams, Training, and Policy Support

Enabler	Technical Description	Application in Public Sector Contexts	Strategic Outcome
Empowered Cross-Functional Teams	Autonomous, multidisciplinary groups responsible for delivering end-to-end value with shared accountability and decision-making capabilities.	Deployed in national service programs (e.g., digital tax filing, health data systems) to ensure faster development and operational alignment.	Accelerates delivery cycles, improves service quality, and fosters collaboration across departments.
Continuous Agile Training	Ongoing capacity-building programs that equip staff with agile methodologies, adaptive leadership, and collaborative tools through formal and experiential learning.	Used in civil service academies, digital training portals, and in-house agile bootcamps for public officials and IT personnel.	Builds organizational agility, ensures skill readiness, and enhances cultural adoption of agile principles.
Policy and Regulatory Support	Institutional and legislative frameworks that enable flexible procurement, modular contracting, and performance-based funding mechanisms.	Reflected in agile-friendly procurement laws, lean compliance models, and digital strategy mandates in various government agencies.	Removes bureaucratic friction, enables rapid iterations, and aligns agile execution with statutory accountability.
Performance-Trust Mechanisms	Systems for measuring and reinforcing trust through transparent metrics, stakeholder engagement, and outcome-based assessments.	Implemented via dashboards, citizen feedback loops, and policy-aligned KPIs for programs such as e-governance and smart infrastructure.	Increases legitimacy, promotes transparency, and supports sustained agile transformation in public institutions.

- *Comparative Review of Agile-EA Integration Frameworks*

Comparative Review of Agile-EA Integration Frameworks reveals that while both agile and enterprise architecture (EA) aim to enhance organizational responsiveness, their integration requires deliberate coordination to manage long-term strategic coherence with rapid delivery cycles. Hanschke, et al., (2015) propose a method that emphasizes iterative architecture modeling and synchronized communication between architects and agile teams. Their framework recommends embedding architecture checkpoints within agile sprints to ensure that business and IT strategies remain aligned throughout the project lifecycle. This hybrid approach balances formal EA deliverables with the fluid nature of agile development, fostering traceability and architectural stability in complex environments like the public sector. Alternatively, Kurnia, et al., (2021) argue for a more decentralized model, where architectural governance is distributed across agile roles such as product owners, scrum masters, and solution architects. Their approach promotes agility by integrating EA standards into agile backlog prioritization and leveraging architectural decision records (ADRs) for lightweight governance. While both models support alignment, they differ in structure: Hanschke's model favors central architectural oversight, whereas Gartner's model emphasizes federated decision-making. For public institutions, the optimal framework depends on organizational maturity, regulatory context, and the scale of transformation. Comparative insights thus offer a foundation for customizing agile-EA integration to meet governance and innovation goals simultaneously.

VII. CONCLUSION AND FUTURE DIRECTIONS

- *Summary of Review Findings*

The review reveals that integrating Lean-Agile change management with enterprise architecture (EA) is a critical enabler for digital transformation in the public sector, particularly where legacy systems, rigid hierarchies, and regulatory demands create complex constraints. Agile methodologies alone are insufficient for sustained institutional reform unless they are strategically aligned with EA frameworks that guide structural coherence, data interoperability, and governance. Case studies from the U.S. Digital Service and the UK Government Digital Service illustrate how agile can be successfully tailored to public sector contexts when supported by modular architecture, policy-driven prioritization, and cross-functional collaboration. Key enablers identified include empowered teams, agile-capable leadership, iterative deployment models, continuous feedback mechanisms, and policy support for procurement and compliance flexibility. Tools such as value stream mapping, architectural runways, and architectural decision records (ADRs) provide operational pathways to align agile backlogs with enterprise strategy. The review also finds that overcoming barriers such as legacy integration, siloed knowledge, and change resistance requires deliberate investments in training, cultural transformation, and cross-agency coordination. Frameworks that blend agile agility with EA rigor—

whether centralized or federated—offer scalable models to deliver public value incrementally while safeguarding structural integrity. Collectively, the findings underscore that successful agile transformation in the public sector hinges on strategic architecture and institutional agility functioning in tandem.

➢ *Strategic Recommendations for Public Sector Leaders*

Public sector leaders aiming to drive agile transformation must prioritize strategic alignment between agile practices and enterprise architecture to ensure scalable, compliant, and value-driven outcomes. First, they should institutionalize cross-functional agile teams embedded within EA governance structures, ensuring architectural traceability and policy coherence throughout iterative development cycles. Establishing architecture runways and integrating architectural roles into agile release trains will bridge operational agility with strategic oversight. Second, leaders must champion cultural change by fostering an environment of psychological safety, continuous learning, and iterative experimentation. Investing in agile training programs that emphasize mindset transformation, not just tools, is critical for building internal capacity. This includes upskilling legacy system operators, policy analysts, and procurement officers in agile principles to create a unified delivery culture. Third, leaders should implement lean portfolio management structures to enable value stream funding, transparent prioritization, and rapid resource reallocation. This strategic control mechanism allows responsiveness to policy shifts while maintaining fiscal discipline.

Lastly, enabling agile-friendly procurement policies, modular service contracts, and federated governance models will help reduce bureaucratic friction. For example, a digital identity service platform can be decomposed into microservices, each owned by dedicated agile teams working under common interoperability and compliance standards. These recommendations ensure agile transformation is not a pilot initiative, but a systemic evolution embedded within the institution's operational DNA.

➢ *Policy Implications for Agile Government Reforms*

Agile transformation in the public sector necessitates a reconfiguration of traditional policy frameworks to support iterative development, rapid decision-making, and cross-functional collaboration. Conventional regulatory models often prioritize predictability, compliance, and procedural control, which conflict with the adaptive, decentralized nature of agile methods. To address this, policymakers must design agile-compatible regulations that encourage modular implementation, performance-based contracting, and dynamic budgeting mechanisms. For instance, shifting from rigid multi-year procurement cycles to incremental funding tied to demonstrable outcomes allows agile teams to deliver public value progressively without waiting for full project completion. Policy implications also extend to interoperability mandates, data governance, and security compliance. Legislators and regulatory agencies must embed API standards, data-sharing protocols, and cybersecurity requirements into digital legislation, enabling services across ministries to evolve collaboratively while preserving public trust and system integrity. Additionally, workforce policies should emphasize continuous reskilling and cross-domain mobility, allowing public servants to operate fluidly in multidisciplinary agile teams.

Furthermore, institutional frameworks must support adaptive governance models, where accountability is measured not only through outputs but through citizen satisfaction, system resilience, and innovation capability. Agile government reform, therefore, demands policy environments that are as flexible and responsive as the technologies and methodologies they seek to regulate and enable. These reforms will institutionalize agility as a core principle of public administration.

➢ *Research Gaps and Future Exploration Areas*

Despite growing adoption of agile and enterprise architecture (EA) integration in the public sector, several critical research gaps remain. First, there is a lack of empirical studies that quantitatively measure the impact of agile-EA synergy on long-term public sector performance indicators such as policy agility, citizen satisfaction, and service reliability. Future research should employ longitudinal designs to assess how iterative deployments aligned with architecture roadmaps influence governance outcomes over time. Second, most current frameworks assume a one-size-fits-all model, yet public institutions vary widely in structure, mandate, and digital maturity. There is a pressing need for adaptive models that account for sector-specific constraints—such as in justice, education, or healthcare—where compliance and accountability norms differ. Comparative studies across these domains can generate insights into contextual enablers and inhibitors of agile-EA alignment. Third, the role of artificial intelligence and data-driven decision-making within agile government contexts remains underexplored. Research should investigate how predictive analytics, AI-enabled architecture modeling, and autonomous feedback systems can enhance responsiveness without eroding transparency.

Finally, there is minimal literature on citizen co-creation in agile public systems. Future studies should explore how to embed participatory design and feedback loops into government architecture frameworks, ensuring digital transformation is not only efficient but democratic and inclusive.

➢ *Emerging Trends: AI-Augmented EA, Agile DevSecOps, and Digital Twins*

The future of agile transformation in the public sector will be shaped by the convergence of emerging technologies such as artificial intelligence (AI), DevSecOps, and digital twins, each enhancing the agility and architectural sophistication of government systems. AI-augmented enterprise architecture (EA) is enabling real-time architectural decision-making through intelligent modeling, anomaly detection, and predictive analytics. By

integrating machine learning algorithms with EA tools, public agencies can automate compliance checks, optimize resource allocation, and dynamically reconfigure services in response to policy or environmental shifts.

Agile DevSecOps extends traditional DevOps by embedding security and compliance directly into the agile software delivery pipeline. In high-stakes domains like defense or healthcare, this integrated approach allows for continuous delivery without sacrificing regulatory rigor. Through automated testing, vulnerability scanning, and policy-as-code mechanisms, DevSecOps ensures that every software increment adheres to both agile velocity and institutional accountability.

Digital twins—virtual replicas of physical systems or organizational processes—are revolutionizing public sector planning and monitoring. When linked with EA frameworks and agile delivery mechanisms, digital twins can simulate the impact of policy changes, infrastructure investments, or service redesigns before implementation. This predictive capability enables evidence-based iteration and risk mitigation, turning agile transformation from a reactive strategy into a proactive, data-driven governance model.

REFERENCES

[1]. Akindote, O., Enyejo, J. O., Awotiwon, B. O. & Ajayi, A. A. (2024). Integrating Blockchain and Homomorphic Encryption to Enhance Security and Privacy in Project Management and Combat Counterfeit Goods in Global Supply Chain Operations. *International Journal of Innovative Science and Research Technology* Volume 9, Issue 11, NOV. 2024, ISSN No:-2456-2165. https://doi.org/10.38124/ijisrt/IJISRT24NOV149.

[2]. Alahyari, H., Berntsson Svensson, R., & Gorschek, T. (2017). A study of value in agile software development organizations. *Journal of Systems and Software, 125*, 271–288. https://doi.org/10.1016/j.jss.2016.12.007

[3]. Almahamid, S. M. (2013). E-government system acceptance and organizational agility: theoretical framework and research agendas. *Business and Management*, *5*(1), 4-19.

[4]. Altshuler, A., & Behn, R. D. (2010). Innovation in American government: Challenges, opportunities, and dilemmas.

[5]. Ayoola, V. B., Idoko, P. I., Danquah, E. O., Ukpoju, E. A., Obasa, J., Otakwu, A. & Enyejo, J. O. (2024). Optimizing Construction Management and Workflow Integration through Autonomous Robotics for Enhanced Productivity Safety and Precision on Modern Construction Sites. *International Journal of Scientific Research and Modern Technology (IJSRMT)*. Vol 3, Issue 10, 2024. https://www.ijsrmt.com/index.php/ijsrmt/article/view/56

[6]. Baiyere, A., Salmela, H., & Tapanainen, T. (2020). Digital transformation and the new logics of business process management. *European journal of information systems*, *29*(3), 238-259.

[7]. Banaeianjahromi, N., & Smolander, K. (2019). Lack of alignment between enterprise architecture and agile development: Impacts and solutions. *Journal of Systems and Software, 157*, 110384. https://doi.org/10.1016/j.jss.2019.07.001

[8]. Bannerman, P. L. (2011). Risk and risk management in software projects: A reassessment. *Journal of Systems and Software, 81*(12), 2118–2133. https://doi.org/10.1016/j.jss.2008.11.015

[9]. Bente, S., Bombosch, U., & Langade, S. (2012). *Collaborative Enterprise Architecture: Enriching EA with Lean, Agile, and Enterprise 2.0 Practices*. Morgan Kaufmann. https://doi.org/10.1016/C2010-0-67710-3

[10]. Biswas, S., & Maheshwari, B. (2020). Legacy systems modernization using microservices: A case study in the public sector. *Journal of Systems and Software, 159*, 110452. https://doi.org/10.1016/j.jss.2019.110452

[11]. Boh, W. F., & Yellin, D. (2006). Using enterprise architecture standards in managing information technology. *Journal of Management Information Systems*, *23*(3), 163-207.

[12]. Bosch, J. (2014). Continuous software engineering and beyond: Trends and challenges. *Journal of Systems and Software, 95*, 85–90. https://doi.org/10.1016/j.jss.2013.12.029

[13]. Choudh, A. (2024). 13 Proven Steps for Choosing and Leveraging Enterprise Architecture Tools in 2025. https://www.a3logics.com/blog/steps-for-choosing-and-leveraging-enterpris architecture-tools/

[14]. Mergel, I., Edelmann, N., & Haug, N. (2019). Defining digital transformation: Results from expert interviews. *Government Information Quarterly, 36*(4), 101385. https://doi.org/10.1016/j.giq.2019.06.002

[15]. Christensen, C. M., Baumann, H., Ruggles, R., & Sadtler, T. M. (2006). Disruptive innovation for social change. *Harvard Business Review, 84*(12), 94–101. https://hbr.org/2006/12/disruptive-innovation-for-social-change

[16]. Conboy, K., & Carroll, N. (2019). Implementing large-scale agile frameworks: Challenges and recommendations. *IEEE Software, 36*(2), 44–50. https://doi.org/10.1109/MS.2018.2884863

[17]. Conforto, E., Salum, F., Amaral, D. C., da Silva, S. L., & de Almeida, L. F. M. (2016). Can agile project management be adopted by industries other than software development? *Project Management Journal, 47*(3), 21–34. https://doi.org/10.1177/875697281604700303

[18]. Cordella, A., & Paletti, A. (2019). ICTs and value creation in public sector: Manufacturing logic vs service logic. *Government Information Quarterly, 36*(4), 101389. https://doi.org/10.1016/j.giq.2019.101389

[19]. de Vries, H., Tummers, L., & Bekkers, V. (2018). The diffusion and adoption of public sector innovations: A meta-synthesis of the literature. *Perspectives on Public Management and Governance, 1*(3), 159–176. https://doi.org/10.1093/ppmgov/gvy001

[20]. Ebenibo, L., Enyejo, J. O., Addo, G., & Olola, T. M. (2024). Evaluating the Sufficiency of the data protection act 2023 in the age of Artificial Intelligence (AI): A comparative case study of Nigeria and the USA. *International Journal of Scholarly Research and Reviews, 2024, 05(01), 088–107.* https://srrjournals.com/ijsrr/content/evaluating-sufficiency-data-protection-act-2023-age-artificial-intelligence-ai-comparative

[21]. Ebika, I. M., Idoko, D. O., Efe, F., Enyejo, L. A., Otakwu, A., & Odeh, I. I., (2024). Utilizing Machine Learning for Predictive Maintenance of Climate-Resilient Highways through Integration of Advanced Asphalt Binders and Permeable Pavement Systems with IoT Technology. *International Journal of Innovative Science and Research Technology.* Volume 9, Issue 11, November– 2024 ISSN No:-2456-2165. https://doi.org/10.38124/ijisrt/IJISRT24NOV074

[22]. Enyejo, J. O., Adeyemi, A. F., Olola, T. M., Igba, E & Obani, O. Q. (2024). Resilience in supply chains: How technology is helping USA companies navigate disruptions. *Magna Scientia Advanced Research and Reviews,* 2024, 11(02), 261–277. https://doi.org/10.30574/msarr.2024.11.2.0129

[23]. Enyejo, J. O., Fajana, O. P., Jok, I. S., Ihejirika, C. J., Awotiwon, B. O., & Olola, T. M. (2024). Digital Twin Technology, Predictive Analytics, and Sustainable Project Management in Global Supply Chains for Risk Mitigation, Optimization, and Carbon Footprint Reduction through Green Initiatives. *International Journal of Innovative Science and Research Technology,* Volume 9, Issue 11, November– 2024. ISSN No:-2456-2165. https://doi.org/10.38124/ijisrt/IJISRT24NOV1344

[24]. Enyejo, L. A., Adewoye, M. B. & Ugochukwu, U. N. (2024). Interpreting Federated Learning (FL) Models on Edge Devices by Enhancing Model Explainability with Computational Geometry and Advanced Database Architectures. *International Journal of Scientific Research in Computer Science, Engineering and Information Technology*. Vol. 10 No. 6 https://doi.org/10.32628/CSEIT24106185

[25]. Farndale, E., & Kelliher, C. (2013). Implementing performance appraisal: Exploring the employee experience. *Human Resource Management, 52*(6), 879–897. https://doi.org/10.1002/hrm.21589

[26]. Fernandez, S., & Rainey, H. G. (2006). Managing successful organizational change in the public sector. *Public Administration Review, 66*(2), 168–176. https://doi.org/10.1111/j.1540-6210.2006.00570.x

[27]. Gregory, R. W., Keil, M., Muntermann, J., & Mähring, M. (2015). Paradoxes and the nature of ambidexterity in IT transformation programs. *Information Systems Research, 26*(1), 57–80. https://doi.org/10.1287/isre.2014.0565

[28]. Hanschke, S., Ernsting, J., & Kuchen, H. (2015). Integrating agile software development and enterprise architecture management. In *2015 48th Hawaii International Conference on System Sciences* (pp. 4099-4108). IEEE.

[29]. Heidenreich, S., & Spieth, P. (2013). Why innovations fail—The case of passive and active innovation resistance. *International Journal of Innovation Management, 17*(5), 1350021. https://doi.org/10.1142/S1363919613500217

[30]. Hobbs, B., & Petit, Y. (2017). Agile methods on large projects in large organizations: A multiple-case study. *Journal of Systems and Software, 122*, 245–257. https://doi.org/10.1016/j.jss.2016.09.008

[31]. Hobbs, B., & Petit, Y. (2017). Agile methods on large projects in large organizations: A multiple-case study. *Journal of Systems and Software, 122*, 245–257. https://doi.org/10.1016/j.jss.2016.09.008

[32]. Igba, E., Danquah, E. O., Ukpoju, E. A., Obasa, J., Olola, T. M., & Enyejo, J. O. (2024). Use of Building Information Modeling (BIM) to Improve Construction Management in the USA. World Journal of Advanced Research and Reviews, 2024, 23(03), 1799–1813. https://wjarr.com/content/use-building-information-modeling-bim-improve-construction-management-usa

[33]. Ihimoyan, M. K., Ibokette, A. I., Olumide, F. O., Ijiga, O. M., & Ajayi, A. A. (2024). The Role of AI-Enabled Digital Twins in Managing Financial Data Risks for Small-Scale Business Projects in the United States. *International Journal of Scientific Research and Modern Technology,* 3(6), 12–40. https://doi.org/10.5281/zenodo.14598498

[34]. Ijiga, A. C., Olola, T. M., Enyejo, L. A., Akpa, F. A., Olatunde, T. I., & Olajide, F. I. (2024). Advanced surveillance and detection systems using deep learning to combat human trafficking. *Magna Scientia Advanced Research and Reviews, 2024*, 11(01), 267–286. https://magnascientiapub.com/journals/msarr/sites/default/files/MSARR-2024-0091.pdf.

[35]. Iyamu, T. (2022). *Enterprise architecture for strategic management of modern IT solutions*. Auerbach Publications.

[36]. Janssen, M., van der Voort, H., & Wahyudi, A. (2017). Factors influencing big data decision-making quality. *Journal of Business Research, 70*, 338–345. https://doi.org/10.1016/j.jbusres.2016.08.007

[37]. Jok, I. S., & Ijiga, A. C. (2024). The Economic and Environmental Impact of Pressure Washing Services on Urban Infrastructure Maintenance and its Role in a Circular Economy. International Journal of Innovative Science and Research Technology. Volume 9, Issue 11, November– 2024.

ISSN No:-2456-2165. https://doi.org/10.38124/ijisrt/IJISRT24NOV1508

[38]. Jonkers, H., Lankhorst, M. M., Ter Doest, H., Arbab, F., Bosma, H., & Wieringa, R. J. (2006). Enterprise architecture: Management tool and blueprint for the organisation. *Information Systems Frontiers, 8*(2), 63–66. https://doi.org/10.1007/s10796-006-7970-3

[39]. Kattel, R., Cepilovs, A., Drechsler, W., Kalvet, T., Lember, V., & Tõnurist, P. (2013). Can we measure public sector innovation? A literature review. *LIPSE project paper*.

[40]. Kišš, F., & Rossi, B. (2018, September). Agile to lean software development transformation: A systematic literature review. In *2018 Federated Conference on Computer Science and Information Systems (FedCSIS)* (pp. 969-973). IEEE.

[41]. Koch, M., & Fiedler, M. (2020). Transforming public service delivery through agile methods: The case of the UK Government Digital Service. *Government Information Quarterly, 37*(3), 101474. https://doi.org/10.1016/j.giq.2020.101474

[42]. Kuipers, B. S., Higgs, M. J., Kickert, W., Tummers, L., Grandia, J., & Van der Voet, J. (2010). Managing change in public organizations: A review of the literature between 2000–2010. *Public Administration, 92*(1), 1–20. https://doi.org/10.1111/padm.12040

[43]. Kurnia, S., Kotusev, S., Shanks, G., Dilnutt, R., Taylor, P., & Milton, S. K. (2021). Enterprise architecture practice under a magnifying glass: linking artifacts, activities, benefits, and blockers. *Communications of the Association for Information Systems*, *49*(1), 34.

[44]. Li, Z., Liang, P., & Avgeriou, P. (2013). Application of knowledge-based approaches in software architecture: A systematic mapping study. *Information and Software technology*, *55*(5), 777-794.

[45]. Lindgren, R., Henfridsson, O., & Schultze, U. (2004). Design principles for competence management systems: A synthesis of an action research study. *MIS Quarterly, 28*(3), 435–472. https://doi.org/10.2307/25148681

[46]. Luna-Reyes, L. F., & Gil-García, J. R. (2014). Digital government transformation and bureaucratic structures: The role of organizational culture. *Government Information Quarterly, 31*(1), 90–98. https://doi.org/10.1016/j.giq.2013.09.005

[47]. Luna-Reyes, L. F., Gil-Garcia, J. R., & Bertot, J. C. (2020). Agile government: Systematic literature review and future research opportunities. *Government Information Quarterly, 37*(3), 101509. https://doi.org/10.1016/j.giq.2020.101509

[48]. Markosian, L., Newcomb, P., Brand, R., Burson, S., & Kitzmiller, T. (1994). Using an enabling technology to reengineer legacy systems. *Communications of the ACM*, *37*(5), 58-70.

[49]. Mathiassen, L., & Pries-Heje, J. (2006). Business agility and diffusion of information technology. *European Journal of Information Systems, 15*(2), 116–119. https://doi.org/10.1057/palgrave.ejis.3000616

[50]. McIver, D., Lengnick-Hall, C. A., Lengnick-Hall, M. L., & Ramachandran, I. (2013). Understanding work and knowledge management from a knowledge-in-practice perspective: A case study in the U.S. public sector. *Public Administration Review, 73*(2), 290–301. https://doi.org/10.1111/puar.12003

[51]. Mergel, I., Ganapati, S., & Whitford, A. B. (2021). Agile innovation management in government: A research agenda. *Government Information Quarterly, 38*(4), 101574. https://doi.org/10.1016/j.giq.2021.101574

[52]. Moe, N. B., Smite, D., Hanssen, G. K., & Barney, H. (2022). From agile software development to agile transformation: A review of agile change models. *Journal of Systems and Software, 186*, 111154. https://doi.org/10.1016/j.jss.2021.111154

[53]. Oliver, L. P. (2023). *Modernizing Local Governments: Lessons Learned from Modernization Initiatives in Public Service Delivery* (Doctoral dissertation, California State University, Northridge).

[54]. Ooijen, C. V., Ubaldi, B., & Welby, B. (2019). A data-driven public sector. *OECD Working Papers on Public Governance*.

[55]. Osborne, S. P. (2006). The new public governance? 1.

[56]. Peters, B. G. (2018). The challenge of policy coordination. *Policy Design and Practice, 1*(1), 1–11. https://doi.org/10.1080/25741292.2018.1437946

[57]. Petersen, K., Wohlin, C., & Baca, D. (2009). The effect of moving from a plan-driven to an incremental software development approach with agile practices: An industrial case study. *Empirical Software Engineering, 14*(6), 654–693. https://doi.org/10.1007/s10664-008-9105-5

[58]. Rother, M., & Shook, J. (2009). *Learning to See: Value Stream Mapping to Add Value and Eliminate MUDA*. Lean Enterprise Institute. https://www.lean.org/WhoWeAre/NewsArticleDocuments/Learning%20to%20See.pdf

[59]. Schmidt, C., Drews, P., & Schirmer, I. (2020). Digital transformation of business models: Best practices, enablers, and roadmap. *Information Systems and e-Business Management, 18*(4), 885–919. https://doi.org/10.1007/s10257-020-00489-0

[60]. Sharma, R., Mithas, S., & Kankanhalli, A. (2014). Transforming decision-making processes: A research agenda for understanding the impact of business analytics on organisations. *European Journal of Information Systems, 23*(4), 433–441. https://doi.org/10.1057/ejis.2014.17

[61]. Stettina, C. J., & Hörz, J. (2015). Agile portfolio management: An empirical perspective on the practice in use. *International Journal of Project Management, 33*(1), 140–152. https://doi.org/10.1016/j.ijproman.2014.03.002

[62]. Tamm, T., Seddon, P. B., Shanks, G., & Reynolds, P. (2011). How does enterprise architecture add value to organizations? *Communications of the Association for Information Systems, 28*, 141–168. https://doi.org/10.17705/1CAIS.02810

[63]. Tang, A., Han, J., & Chen, P. (2004). A comparative analysis of architecture frameworks. *Proceedings of the 11th Asia-Pacific Software Engineering Conference*, 640–647. https://doi.org/10.1109/APSEC.2004.47

[64]. Trischler, J., & Westman Trischler, J. (2022). Design for experience–a public service design approach in the age of digitalization. *Public Management Review*, *24*(8), 1251-1270.

[65]. Uzoma, E., Igba, E. & Olola, T. M. (2024). Analyzing Edge AI Deployment Challenges within Hybrid IT Systems Utilizing Containerization and Blockchain-Based Data Provenance Solutions. *International Journal of Scientific Research and Modern Technology*, *3*(12), 125–141. https://doi.org/10.38124/ijsrmt.v3i12.408

[66]. Van der Voet, J. (2014). The effectiveness and specificity of change management in a public organization: Transformational leadership and a bureaucratic organizational structure. *European Management Journal, 32*(3), 373–382. https://doi.org/10.1016/j.emj.2013.10.001

[67]. Van Wessel, R. M., Kroon, P., & De Vries, H. J. (2021). Scaling agile company-wide: The organizational challenge of combining agile-scaling frameworks and enterprise architecture in service companies. *IEEE Transactions on Engineering Management*, *69*(6), 3489-3502.

[68]. Wynne, R., & Whyte, A. (2021). Managing complexity and uncertainty in public sector IT projects: A stakeholder and lifecycle perspective. *International Journal of Project Management, 39*(6), 561–573. https://doi.org/10.1016/j.ijproman.2021.06.002

[69]. Yang, K., & Holzer, M. (2006). The performance–trust link: Implications for performance measurement. *Public Administration Review, 66*(1), 114–126. https://doi.org/10.1111/j.1540-6210.2006.00561.x