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A Dynamic AI Maturity Model for Agile Audit: A Roadmap for Enhanced Effectiveness and Innovation

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Abstract: The intersection of Artificial Intelligence (AI) and agile methodologies is transforming information systems audit by enabling real-time risk assessment, anomaly detection, and automated control testing. These capabilities enhance the security, efficiency, and reliability of IT environments. This article introduces a dynamic AI maturity model for agile audit, structured into five levels of AI integration. Each level reflects increasing AI capabilities and outlines key transition points. The model supports strategic AI adoption across various audit domains, including data analysis, cybersecurity, compliance monitoring and fraud detection. We validate this model using interviews and a case study in a public-sector audit institution. Ethical concerns such as transparency, fairness, and accountability are integrated, recognizing the potential impact of AI on privacy, compliance, and governance. By applying this maturity model, organizations can systematically strengthen their agile audit practices while maintaining control over their information systems.

Keywords: Artificial Intelligence (AI), Agile Audit, Maturity Model and Information Systems Audit

Introduction

Today's business world is fast, complex, and constantly evolving. Organizations face growing pressure from rapid technological change, increasing data volumes, and shifting regulations. Traditional audit methods often rigid and periodic struggle to keep up with this pace.

AI offers new possibilities. It allows auditors to move beyond repetitive tasks and focus on activities that add real value, like analysis, strategic planning, and decision-making. Studies show a strong link between the intention to adopt advanced audit technologies and actual AI implementation (Almaqtari et al., 2024).

New tools powered by AI and data analytics are reshaping how audits are done. These technologies can process large amounts of information faster and more accurately than ever before. In the field of information systems, researchers have explored how to design and deploy AI in responsible ways that minimize risks (Li and Goel, 2025). They also shed light on a critical issue: AI in auditing is not just about deploying smart tools, but also about ensuring their auditability and the readiness of auditors to engage with them meaningfully.

Still, there are barriers that limit adoption. Some audit teams face challenges related to outdated systems, lack of training, or cultural resistance (Torroba et al., 2025). Legacy audit processes are often too rigid to support the flexibility needed in today's dynamic environment.

To stay relevant, audit functions must become more agile. They need to respond quickly to change, make better use of data, and adapt continuously. Embracing AI is no longer optional it's becoming essential for effective, forward-looking audit.

Agile audit is an increasingly appealing alternative to conventional audit methodologies. In today's swiftly evolving, time-pressed environment, agility in audit refers to fostering collaboration, flexibility, and brief, iterative work intervals. One of the core strengths of Agile audit lies in its capacity to maintain the audit backlog continuously updated and aligned with fluctuating priorities (Wang et al., 2021). Agile brings the audit function into the contemporary era by endorsing responsiveness and adaptability.

However, the real breakthrough arises when Agile is coupled with Artificial Intelligence (AI). This combination enhances agility by automating routine tasks, allowing auditors to focus on more strategic and value-adding activities (Kokina et al., 2025). Among the most powerful

attributes of AI is its ability to detect hidden patterns, uncover anomalies, and process vast volumes of data well beyond human capabilities. With these attributes, auditors are better equipped to make informed decisions, reduce risk exposure, and deliver deeper, more actionable insights. AI not only boosts efficiency; it also strengthens transparency and improves audit quality (Huang and Liu, 2024).

Yet, the effective use of AI in audit is not just about deploying tools. It also necessitates auditors to cultivate a deeper understanding of how to manage and govern AI responsibly in real-world audit settings. While the potential is substantial, so are the challenges. To fully harness this potential, audit functions must combine Agile thinking with prudent AI adoption. The goal is evident: To build audit practices that are swifter, more focused, and future-ready.

Machine learning has empowered auditors in extraordinary ways. By identifying patterns in massive datasets and building algorithms based on those patterns, AI improves its own performance over time using feedback. Artificial intelligence also expedites tedious tasks like examining documents by quickly spotting anomalies and advancing the precision of risk assessments.

Recently, more focus has turned to agile audit an approach where audit projects are constantly revised in a dynamic backlog, adapting instantly to evolving risks and priorities (Han et al., 2023).

The Big Four firms, Deloitte, EY, PwC, and KPMG, have all committed to deploying AI and other intelligent technologies in their audit processes. They're applying these tools to domains like audit planning, risk assessment, transaction testing, data analytics, and even preparing audit documents. The objective is obvious: Work more efficiently, be more accurate, provide better insights and ultimately deliver more value to clients (Munoko et al., 2020).

But while the benefits are exciting, AI also raises serious ethical issues. These include algorithmic bias, data ownership, privacy and lack of transparency in decision-making. There is also a risk of reduced trust in professionals and the potential deskilling of auditors. As Eisikovits et al. (2024) argue, the only way to control these concerns is with clear ethical standards and solid governance.

In spite of these challenges, the potential is difficult to disregard. AI can automate repetitive tasks, enhance analytical power and reinforce fraud detection. But we'll only unlock these benefits if we also invest in auditors training not just in how to utilize the tools, but in how to use them responsibly. That means strong ethics, good data administration, and a commitment to doing things correctly (Zhou and Liu, 2024).

AI is about to transform the audit landscape. Its predictive capabilities give auditors the ability to anticipate risks, before they turn into real problems. This helps teams act faster and make smarter decisions.

This paper addresses a clear gap: The lack of a unified framework for agile audit in the age of AI which brings together AI and agile audit. While many audit teams are starting to use AI within agile workflows, academic research on this topic remains very limited. Most studies treat AI and agile audit as separate topics. Few offer a practical, integrated approach. Others rely on static maturity models that don't reflect the evolving nature of AI or the fluidity of agile workflows.

Traditional maturity models, often static, also struggle to capture how AI and flexible structure of agile audit processes grow over time. As a result, they quickly become outdated.

To overcome this, the paper introduces a dynamic AI maturity model built specifically for agile audit environments. This model provides a step-by-step structure to help audit organizations adopt AI in a thoughtful and progressive way.

Importantly, the model recognizes that AI adoption is not a one-time change. It's a continuous journey that evolves both technology and the audit profession. It's not about reaching a finish line, it's about growing, adapting and improving over time.

This paper introduces a Dynamic AI Maturity Model for Agile Audit. The model defines clear levels of maturity and outlines how organizations can move from one level to the next one. It offers a practical framework for assessing current AI capabilities, identifying areas for improvement and building a strategic roadmap aligned with agile audit principles.

The model addresses the growing need for adaptability and efficiency in audit. It reflects real-world challenges and opportunities by combining lessons from professional practice and academic thinking. It shows how AI can support smarter, faster and more responsive audit processes.

Overall, the model helps audit teams navigate the complexity of AI adoption while staying focused on their core mission: Delivering high-quality, value-driven audit work in a rapidly changing environment.

Problem Identification and Motivation

Today, public sector audit institutions face a world that is ever more complex and data-heavy. Where digital transformation is going faster than ever before, demands for transparency and efficiency overlap.

Agile audit frameworks are advertised as offering hope through continuous, adaptive audit cycles (Erasmus and Kahyaoğlu, 2024), but the integration of AI has become fragmented, often confined to siloed pilot initiatives inside the funds spending department without strategic governance or ongoing supervision (Waltersdorfer et al., 2024; Schmitz et al., 2025). Specifically, the AI audit tools in use tend to be monolithic and manual, failing to mix with Agile audit

processes (Waltersdorfer et al., 2024).

Meanwhile, although conceptual models have been created that outline AI's potential for transformation in audit (Leocádio et al., 2024), a Dynamic AI Maturity Model for Agile Audit within public-sector audit environments - without falling into the same trap of traditional audit methodology-is still missing. This gap, both conceptual and practical, hinders public sector audit bodies from evolving systematically. For example, from doing something that is in no way systematic or conventional to full-scale, AI-boosted audit transformation.

Materials and Methods

This research uses a scientific and multi-method methodology to develop the presented Dynamic AI Maturity Model for Agile Audit and to validate it. It synthesizes literature theory, empirical practitioner comments and field testing in a public audit context.

First of all, a comprehensive examination of literature was conducted to uncover relevant constructs and dimensions of maturity regarding AI adoption, agile audit and organizational capability models. This part was indeed necessary in order to set a theoretical frame to organize the five levels and the dynamic process included in the model.

Second, data were collected in the field using semi-structured interviews with 18 audit actors in a public financial audit organization in Morocco. These interviews gave qualitative insights into operational limitations, strategic factors and aspiration goals for the integration of AI in agile audits. Results were employed to iteratively improve the model and to assure its contextual validity.

Finally, the model was tested and validated via an example in a public sector audit organization. In using it in practice we have received helpful feedback and confirmation around the structure and utility of the model, and additional value when audit regulators are resource constrained and hold higher expectations of audit agility and digital transformation.

Agile Methodologies in Audit

Agile methods have reshaped the way organizations work by encouraging flexibility, adaptability and continuous progress. First introduced in software development, Agile has since spread far beyond IT. At its core, it's about working in small steps, staying responsive to change, and focusing on what matters most to customers and stakeholders. Popular frameworks like Scrum, Kanban, Lean and Extreme Programming (XP) each bring their own approach to achieving these goals.

Scrum is well known for helping teams manage complex projects. It breaks work into short, focused cycles called sprints and assigns clear roles like the Scrum Master, Product Owner, and Development Team. Kanban is a visual tool that helps teams track progress and deliver work continuously. It's especially useful in fast-changing environments (Ahmad et al., 2018). XP, on the other hand, emphasizes code quality and customer satisfaction. It uses practices like pair programming and test-driven development to stay agile and deliver better results.

Today, Agile practices extend far beyond software development and are now applied in construction (Moreno et al., 2024), healthcare (Desai et al., 2024 education (López-Alcarria et al., 2019), and public administration (Neumann et al., 2024), reflecting their adaptability to environments with shifting people, budgets, and deadlines. These new contexts have given rise to hybrid models, combining Agile with more traditional ways of working (Leocádio et al., 2024).

In audit, this shift has been especially important. The Agile Audit Framework (AAF) was developed to bring Agile thinking into audit processes making them more flexible, responsive, and better aligned with stakeholders' needs. The push for more adaptable audits actually began in the late 1990s, driven by the growing complexity of IT systems. Since then, Agile has moved beyond IT audits and into the broader internal audit function (Waltersdorfer et al., 2024).

Agile audit is now seen as a mindset. It helps audit teams focus on what matters most, respond quickly to emerging risks and deliver useful insights faster. It also ensures that audit resources are used more effectively (KPMG, 2019).

Perhaps most importantly, Agile makes it easier to move forward even when requirements aren't fully clear from the beginning. With values like collaboration, transparency and adaptability, Agile offers exactly the kind of approach needed in today's unpredictable and very fast-moving world. Implementing the Agile approach has transformed several aspects of internal audit, including audit objectives, resource involvement, audit usefulness, planning and communication. (Shaikan et al., 2024). The Table 1 provides a comparison of the two approaches, the traditional audit and the agile approach.

As mentioned in the Table 1, traditional audits are structured, linear and documentation-heavy, while agile audits focus on flexibility, speed and continuous collaboration. Agile methodologies allow for quick adaptations through iterative planning phases (sprints), along with frequent communication and a strong emphasis on value delivery. Documentation is streamlined, and findings are shared incrementally, making the process more dynamic and responsive to change. In summary, the agile approach better meets the needs of today's fast-paced and complex organizational environments.

Agile methodology is significantly transforming the conduct of audits. Scrum is particularly effective for audits characterized by evolving requirements, employing short, structured sprints and clearly defined roles to sustain focus.

Table 1: The proposed AI maturity model in audit

Level	Focus	Characteristics	Agile Audit Practices	AI Integration	Dynamic Elements	Key Metrics
1. AI Exploration	Awareness and early experimentation	No formal AI strategy; basic tools used	Informal, manual processes	Isolated use of basic AI tools	Knowledge sharing; use case identification	Training hours; use cases identified
2. AI Prototyping	Testing AI for specific audit tasks	Pilot projects on limited scopes	Structured sprints and roles	Prototype models for targeted tasks	Prototype evaluation; skills development	Number of prototypes; efficiency gains
3. AI Integration	Embedding AI in core audit processes	Formal AI strategy; multiple tools used	Consistent agile practices across teams	AI enhances audit execution	Model refinement; performance tracking	% of audits using AI; accuracy metrics
4. AI Optimization	Using AI for continuous improvement	AI insights guide audit planning	Agile driven by data and feedback	AI used strategically and at scale	Governance and innovation pipeline	ROI from AI; audit quality impact
5. AI Transformation	Full AI-driven innovation	AI embedded in audit culture	Highly adaptive and predictive audits	Real-time and predictive AI	Responsible AI; external collaboration	Innovative audit practices; thought leadership

Kanban proves advantageous in contexts where tasks frequently change, utilizing visual boards to facilitate the management of a continuous workflow. Lean, originally developed for the manufacturing sector, emphasizes the reduction of waste and the maximization of value. This approach is frequently integrated with Agile methodologies, particularly within large organizations.

Recent scholarly investigations have concentrated on the integration of Agile methodologies, including Scrum and Kanban, to augment flexibility in project management. Numerous comparative studies have assessed the influence of these approaches on financial performance and project outcomes, particularly within the realm of information technology projects. Additionally, researchers have examined the adaptability of Agile practices to diverse project types and the contextual factors that enhance the efficacy of Agile team building and development processes.

Agile methods have become popular tools for managing projects, mostly because they're good at handling change and dealing with risks. Originally created for software development, these approaches are now being adopted in many other areas, including audit. Over time, researchers have started exploring how the core ideas of agility can be applied to improve audit processes by making them more efficient and flexible.

These ideas are consistent with the values outlined in the Agile Manifesto, as noted by Catlin and Watkins (2021).

More recently, Shaikan et al. (2024) showed that adding agile practices to internal audit procedures helps organizations respond more quickly to stakeholder needs, cut down on the time spent on audits, save resources, and improve teamwork (Fig. 1).

Traditional audit	Agile approach
Establishing guidelines for internal audit audit objectives	
audit objectives	value expectations
Involvement of resources for internal audit	
approved the head and composition of the audit group, limitations in labour resources	collective work, lack of restrictions in the recruitment of labor resources
Usefulness of internal audit	
during its conduct, rather, certain problems are considered, based on the identified key risks and management needs	no restrictions in connecting to problem solving, focus on identifying the organization's opportunities
The sequence of internal audit operations	
linear cycle	work cycle
Internal audit planning	
drawing up a step-by-step plan for conducting an internal audit and performing audit studies	unplanned, quick actions (sprints)
Organization of communications during internal audit	
communication upon completion of analytical work and reporting	frequent communication, daily meetings
Monitoring of internal audit results	
as necessary or in accordance with the organization's internal audit methodology	daily and incrementally with key stakeholders
Reporting on the results of achieving the goal of the internal audit	
a single report issued after an internal audit is completed, often requiring a time-consuming review process	small summaries built throughout the internal audit process, with an emphasis on value and visualization
Documentation of internal audit results	
a significant amount of documentation	streamlined short document flow

Fig. 1: Key changes in internal audit concepts under the influence of the Agile approach (Shaikan et al., 2024)

All of this emphasizes just how useful agile methods are becoming in helping modernize the audit world and make it more responsive to change. The scholars, however, expressed no specific organizational cycle addressing the implementation of agile methods for audit. Although these and other works indicate a burgeoning interest in agile principles in the audit context and potential for improvements in relevance, efficiency and value (Catlin and Watkins, 2021), the literature is still developing. More investigation, particularly research on the audit environment, is required to fully comprehend the benefits as well as the limitations of agile audit. These studies tend to be positive, emphasizing that agile audit values cooperative work, effective communication, and constant adjustment to change, which might result in the more frequent discovery of emerging risks, stakeholder information that is more relevant to existing risks, and more efficient audits by eliminating non-essential tasks and focusing efforts on the most important areas.

Agile audit has advantages, but there are also

limitations that are audit-specific. These difficulties arise from the distinctive needs and limitations in audit in contrast to software development projects, the domain for which agile methods were developed. Key limitations include.

Regulations and Legal Constraints: External audits are highly regulated. There are thousands of regulations that dictate the various documents, format, information, and standards (e.g. ISAs) which must be adhered to. Agile iterative and lightweight documentation approach can clash with these needs, making it difficult to prove compliance to regulators and stakeholders. Hence, auditors need to weigh agile principles against these obligatory processes discriminately.

Independence and Objectivity: External auditors have to comply with the ethics, independence and objectivity. The source of this concern is that the close involvement and intensive discussions that is a fundamental part of agile approaches might be considered to be at the expense of auditor independence, if the interaction is perceived to be too much in line with the client organization's management.

Scope and Complexity: External audits generally encompass large, complex enterprises. It's very difficult to apply this scale of methodologies to large and diverse contexts. It may take some effort to define achievable sprints and ensure agile is applied across diverse audit areas.

Client resistance: There may be resistance from clients to agile audit, especially if clients do not understand agile audit or think it is not as rigorous as traditional methods. Clients need to be educated as to the advantages of agile audit and for their concerns to be consider in order to make it work.

Auditor Training and Soft Skills: Agile audit requires auditors have more than just a technical skill set, and be able to communicate, collaborate, and be adaptable. Finding, and developing, auditors possessing this rounded range of skills can be difficult. Classical audit training often focuses on compliance and paperwork, which make auditors less apt for the agile era.

Documentation Challenges: While agile prioritizes working software over extensive documentation in software development, external audits require substantial documentation to support the audit opinion. Striking the right balance between agile principles and documentation requirements is crucial. Auditors must find efficient methods to document their work without compromising the flexibility and speed inherent in agile processes.

Time limitations: External audit work is usually performed under very pressing time constraints. Even though agile practices can improve efficiency, the time required to get set up and accustomed to these practices can be lengthy. To meet the requirements of the audit, the auditors need to manage their time prudently.

Lack of Standardized Frameworks: In contrast with internal audits (where the IIA has the IPPF), there is no standardized framework available for external audits that focus exclusively on operating in an agile environment. This bridge can prevent businesses become fully agile and achieving the agility they could.

Resistance to Change: Audit profession has been rather conservative in its approach all through. Countering this resistance to change, and the evolution of a culture that is willing to welcome the agile approach, represents a great challenge.

In conclusion, however much agile audit is full of potential for improving the effectiveness and efficiency of external audits, it is vital that we recognize those limitations inherent to such action ourselves. The successful implementation of an agile audit requires careful preparation, strong leadership, good training and the reconciliation of agile principles with those concrete conditions to be faced in an external audit. For its part, further research is needed as are tailored agile frameworks specifically designed for external Auditors.

A Dynamic AI Maturity Model for Agile Audit

The increasing acceptance of agile methodologies and AI as change agents in the audit profession also finds support in the literature. Researches have considered the benefits of being an agile auditor, which includes more efficiency, in-depth participation from the stakeholders and being more reactive to changing risks. At the same time, studies have shown the transformative impact of AI in a variety of audit areas such as risk analysis, fraud detection, continuous audit and predictive analytics. The fusion of these two mega-trends, agile and AI is also investigated and few studies have focused on the potential for synergic benefits. But the detail and dynamic infrastructure of AI maturity explicit in their integration with agile audit and the vital movements between levels have not been detailed by previous studies. The goal of this paper is to fill that gap.

AI has become a central focus for both professionals and the general public, emerging as a transformative force. Interest in its potential to reshape management practices is rapidly growing, and AI is already permeating all aspects of business operations.

The integration of AI in audit is no longer a future vision but a current and pressing shift, particularly in the public sector where calls for transparency, performance, and responsiveness continue to rise. Several recent studies offer valuable insights into this changing environment. Li and Goel (2025) address the major issue of auditor readiness in evaluating AI systems, while Torroba et al. (2025); Almaqtari et al. (2024) provide empirical evidence on the drivers and barriers of AI adoption, especially in public and developing country contexts. These initiatives reflect a combination of eagerness and circumspection, in line with voices of concern from

Munoko et al. (2020); Schmitz et al. (2025) regarding ethical risk and governance tools to support the safe deployment of AI.

On the methodological side, studies by Huang and Liu (2024), Zhou and Liu (2024) and Wang et al. (2021) provide empirical approaches to applying AI tools in audit practice with emphasis on enhanced analytical capabilities and managing complexity. The potential integration of AI with agile frameworks is also noted by Shaikan et al. (2024); Daraojimba et al. (2024), postulating that flexibility and responsiveness are the key drivers of value creation in modern audit processes. Practical guides on agile audit by Catlin and Watkins (2021), also outline the foundational directions while Erasmus and Kahyaoğlu (2024) discuss how recurring AI-based audit systems can be organized to address the needs of public governance.

Maturity models such as those proposed by Fukas et al. (2021) and elaborated upon by Aras and Büyüközkan (2023), have emerged as key diagnostic tools to assess institutional readiness and create a path toward capacity development. Our proposed model is based on these findings, and it offers a dynamic and adaptive AI maturity model tailored for the agile audit function in public institutions. This approach is reinforced by evidence provided by Leocádio et al. (2024); Eulerich et al. (2021) and Erasmus and Kahyaoğlu (2024) that emphasize that successful AI uptake in audit relies on more than technology it requires strategic vision, robust governance, and an innovative culture. As there is greater emphasis on risk management (Leocádio et al., 2024), ethical governance (Schmitz et al., 2025), and change leadership (Eisikovits et al., 2025), the literature increasingly refers to the significance of systematic, iterative, and context-sensitive models such as ours that will guide audit functions through substantive change to the age of AI.

In an era where social media is a dominant lifestyle, AI is becoming increasingly important. Not only does it have a dramatic, potentially Transformative impact on how companies are managed, but interest in shifting existing routines for the better through AI is gathering unstoppable momentum. AI is now infiltrating all aspects of enterprise management. The impact of these latest technologies will also be felt in the internal audit function, both in their use as part of the audit process and in certain areas where they will increasingly become something that auditors need to assess." However, in today's complex world, conducting the reasonable assurance of risk management that internal auditors need to do can be pursued with cutting-edge risk assessment and investigative techniques. Thus, internal audit is integrating more technology advancements such as data analytics, data mining and process mining software applications (as well as AI systems-specifically including machine learning and process automation (Eulerich et al. 2021)).

Fukas et al. (2021) described a static model for audit maturity which proposed the concept as an evolution from its static form. They described transitions between stages of the model, added weights to reflect relative importance of different levels, and clearly articulated excellence (or not) could be achieved at each of these transitions in such detail that they avoided any hint that preaching might also apply here too.

This model describes five degrees of maturity. If the various capabilities of an audited organization are capable to practice agile audit, if its AI integration policies meet contemporary standards and if all elements supplying help all can grow stronger, then there's good potential for it not just to keep but raise its prior level in terms of competence. That's imperative, because both AI technology as well as best practices in its application to audit are constantly evolving.

Level 1: AI Exploration (Ad Hoc): This level emphasizes the importance of fostering awareness and a foundational understanding of AI within the audit team. Currently, a formal AI strategy has yet to be developed. The team engages in exploratory activities using straightforward tools such as spreadsheet macros and basic data visualizations through small-scale, informal experiments. The potential of AI as a tool for auditing remains unclear.

Agile audit practices are in the early stages of development. Their adoption is inconsistent and primarily informal. Workflows are mainly manual, collaboration tends to be casual and the principles of sprint logic are often misapplied or not utilized at all.

The integration of AI is marked by fragmentation. Experiments occur in isolation, lacking a cohesive framework, and the available tools are used with limited understanding of their operational mechanisms.

To advance, teams are encouraged to share resources, including the maintenance of an updated shared repository of AI tools, practices, and illustrative examples through internal wikis, training sessions and discussions with experts and peers.

Furthermore, the team begins establishing a fundamental process for identifying potential AI use cases. These use cases are evaluated in terms of value, feasibility, and their alignment with audit objectives and internal controls.

Level 2: AI Prototyping (Repeatable) emphasizes the systematic development and evaluation of AI prototypes designed for specific audit tasks. These initiatives are typically limited in scale and focus on well-defined areas, such as the identification of anomalies in expense reports or the analysis of client feedback through text analytics. Some projects advance by integrating AI-generated outputs directly into audit deliverables.

The agile audit practices at this level increasingly

exhibit structured methodologies. Teams initiate their work with explicitly defined sprint objectives, assigned roles, and fundamental Agile ceremonies, including planning sessions and retrospectives. Unlike traditional audits, which set fixed objectives from the outset, Agile methodologies permit the evolution of goals throughout the audit process.

The incorporation of AI is facilitated through pilot tests encompassing anomaly detection, predictive modeling, and text analytics. Teams are acquiring practical experience in utilizing AI tools within real audit contexts under controlled conditions.

At this level, it is essential to establish clear success criteria for the implementation of AI. This includes evaluations of accuracy, time efficiencies, and the relevance of insights generated by AI. Training continues to be a pivotal focus, particularly in foundational programming, data analysis, and machine learning concepts that are directly applicable to auditing processes.

Level 3: AI Integration (Defined) signifies the stage at which AI becomes an integral component of the audit process. At this level, the audit department has established a formal AI strategy that is fully aligned with agile audit methodologies. AI tools are seamlessly incorporated into daily audit activities.

Audit teams benefit from access to specialized AI experts, whether they are internal data scientists or external partners with expertise in AI. Agile audit practices are standardized and consistently implemented across the organization. Teams adhere to defined methodologies, utilize structured data sources, and engage in regular retrospectives at the conclusion of each sprint.

AI enhances core audit functions by automating routine tasks and providing deeper insights. It also facilitates continuous risk monitoring and enables auditors to make more proactive decisions.

Dynamic elements include the ongoing evaluation of AI model performance. Teams assess the accuracy with which models reflect real-world conditions and regularly update them with current data. This process ensures precision, system stability, and an optimal user experience.

Level 4: AI Optimization (Managed) emphasizes the strategic deployment of AI to enhance agile audits continuously. At this stage, audit processes are informed by insights derived from AI-generated data.

Audit teams leverage these insights to influence scheduling, optimize resource allocation, and refine risk management strategies. Each sprint begins with data input and concludes with feedback analysis, ensuring that decisions are based on empirical evidence.

Agile audit methodologies are fundamentally data-driven. Metrics are integrated into each sprint, and feedback mechanisms are consistently active. Teams conduct small-scale, low-risk experiments to test innovative concepts. This culture of experimentation fosters the rapid and efficient identification of effective practices while highlighting those that are less successful.

AI tools are carefully aligned with audit objectives, enabling more intelligent resource allocation and targeted audit activities. To maintain quality and consistency, teams adhere to stringent standards for the development, testing, deployment, and maintenance of AI models, including version control, comprehensive documentation, and regular updates.

Organizations also adopt a forward-looking approach, actively exploring new opportunities in AI, particularly advanced methodologies such as deep learning, natural language processing, and reinforcement learning.

Level 5: AI Transformation (Optimized) signifies the comprehensive integration of AI into the audit function. At this level, AI transcends its role as a mere instrument; it is intricately embedded within the organization's audit culture and strategic framework. AI catalyzes innovation, informs decision-making processes, and promotes the development of novel audit methodologies.

The audit team actively engages in the creation of AI tools and techniques, thereby positioning itself as leader in the application of AI to enhance audit capabilities both within the organization and in the broader context.

Agile audit practices at this level exhibit a high degree of adaptability. Teams are equipped to respond promptly to shifts in risk or opportunity, enabling them to recalibrate their strategic direction in real-time while ensuring continuous alignment with stakeholder requirements and emerging priorities.

AI fundamentally reconfigures the audit process by facilitating real-time monitoring, continuous assurance, and predictive risk management, thereby yielding insights that were previously unattainable.

Dynamic components include a robust commitment to the ethical and responsible utilization of AI. This commitment entails ensuring fairness, transparency and accountability in all AI-driven audit activities. Moreover, the audit team actively participates in industry collaborations and knowledge-sharing initiatives to establish best practices and future standards in the fields of AI and audit.

On the other hand, creating a dynamic framework for AI integration in agile audit means that Agile Audit really works at five different levels; each level builds on the one before it and adds capacity and power to the next. By progressing through these levels, organizations can move toward an agile and flexible audit function that makes full use of AI while continually improving itself to respond to emerging risks and opportunities.

Transitioning from one level to another in the dynamic framework for AI integration in agile audit involves several key steps.

From Level 1 to Level 2

- Build AI Awareness: Equip the audit team with a sufficient understanding of AI functionalities and possible applications
- Experiment with AI Tools: Undertake small scale trial implementations across essential AI tools and technology to see where they might be applied
- Develop Prototypes: Develop and test pilots of AI for specialized, clearly defined audit activities

From Level 2 to Level 3

- Formalize AI Strategy: Establish a strategy for AI that is in sync with the company's overall strategic plan
- Integrate AI Tools: Leverage commercial off-the-shelf AI solution in several key audit activities
- Access AI Expertise: Make sure the audit team has access to dedicated AI expertise, whether internally or from an outside source

From Level 3 to Level 4

- Optimize AI Usage: Monitor and measure performance of AI models in production on a continuous basis
- Leverage AI Insights: Prepare for audits and allocate resources based on AI insights that guide your risk management approach
- Refine Agile Processes: Evolve agile audit processes based on data and feedback

From Level 4 to Level 5

- Drive AI Innovation: Instill AI in the DNA of the audit function and drive innovation and the creation of new audit methodologies
- Become Thought Leaders: Contribute to AI tool and approach development, serving as thought leaders in the application of AI to audit
- Focus on Ethics and Collaboration: Emphasize ethics and responsible AI practices, and actively engage with industry efforts and best practices

To improve the suitability of the proposed Dynamic AI Maturity Model for Agile Audit operationally in practice and for effective modeling of future levels, we have pinpointed the issues in moving from one level to another (challenges) and the indicators for the move between levels (success). Although the model is a logical one, there are some organizational, technical and cultural challenges at each transition phase which may cause resistance. A summary of these common implementation issues and success indicators for the stages is summarized in Table 2, offering a more practical, applied perspective for what to look for at transition points.

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- Access AI Expertise: Make sure the audit team has access to dedicated AI expertise, whether internally or from an outside source

From Level 3 to Level 4

- Optimize AI Usage: Monitor and measure performance of AI models in production on a continuous basis
- Leverage AI Insights: Prepare for audits and allocate resources based on AI insights that guide your risk management approach

Refine Agile Processes: Evolve agile audit processes based on data and feedback

From Level 4 to Level 5

- Drive AI Innovation: Instill AI in the DNA of the audit function and drive innovation and the creation of new audit methodologies
- Become Thought Leaders: Contribute to AI tool and approach development, serving as thought leaders in the application of AI to audit
- Focus on Ethics and Collaboration: Emphasize ethics and responsible AI practices, and actively engage with industry efforts and best practices

Table 2: Transition challenges and success indicators between maturity levels

Transition Phase	Implementation Challenges	Success Indicators	Role of Stakeholders	Data Governance	Change Management	Example (Public Sector)
From Level 1 to 2	Absence of AI strategy, skills gap, lack of awareness of AI potential, resistance to change, low digital readiness	Basic AI literacy programs launched, completion of AI training, identification of relevant use cases, initial pilots of automation tools	Identify AI use cases; assign champions from audit and IT; promote awareness	Begin defining data sources; basic access control and privacy checks.	Communicate vision; initiate basic training; reduce fear of AI.	Ministry of Finance creates a cross-functional AI taskforce to experiment with RPA for invoice reviews.
From Level 2 to 3	Lack of governance, limited scaling of pilots, fragmented initiatives, lack of coordination, insufficient governance frameworks	Formal AI strategy adopted, creation of a centralized AI steering committee, defined agile-AI audit processes	Formalize steering committee; align audit objectives with AI capabilities; involve data scientists	Establish clear policies for data quality, access, and model validation	Provide role-specific training; adjust audit workflows; manage resistance	Court of Auditors adopts anomaly detection models into standard risk assessments
From Level 3 to 4	Data silos, integration issues between audit systems, competency gaps	AI tools used in multiple audits, cross-functional audit teams trained on agile + AI, Continuous AI performance monitoring, audit planning informed by AI	Expand stakeholder roles to include risk officers and ethics advisors; promote cross-unit collaboration	Implement enterprise-level data standards; create audit trail for model decisions.	Institutionalize continuous improvement loops; reward early adopters	Tax audit department implements automated alerts for risk scoring, supported by continuous model tuning
From Level 4 to 5	Maintaining innovation momentum, balancing automation with professional judgment	Continuous improvement loop implemented, AI-supported planning, recognized leadership in AI adoption and risk analysis institutionalized	Foster leadership in AI ethics and innovation; collaborate with regulators and academia	Monitor data and models for bias, drift, and compliance; embed explainability.	Build a culture of experimentation and learning; update job roles and metrics	National Audit Office publishes AI audit standards and leads training across government bodies

To improve the suitability of the proposed Dynamic AI Maturity Model for Agile Audit operationally in practice and for effective modeling of future levels, we have pinpointed the issues in moving from one level to another (challenges) and the indicators for the move between levels (success). Although the model is a logical one, there are some organizational, technical and cultural challenges at each transition phase which may cause resistance. A summary of these common implementation issues and success indicators for the stages is summarized in Table 2, offering a more practical, applied perspective for what to look for at transition points.

In order to facilitate smooth transition across the different phases of the Dynamic AI Maturity Model for Agile Audit, certain organizational enablers must be in place. Most specifically, stakeholder engagement, data governance, and change management are critical for

facilitating each transition. How these three dimensions contribute to the successful evolution from one maturity level to the other and some examples drawn from public sector audit settings are given in Table 2. By following these steps, organizations are able to move through the levels, mature the capability of their audit function, and leverage AI to its fullest.

In a nutshell, Figure 2 presents the Dynamic AI Maturity Model for Agile Audit, which outlines five progressive levels of AI integration within agile audit functions. The model begins with Level 1: AI Exploration, where audit teams start building awareness and experimenting with AI tools. At Level 2: AI Prototyping, these efforts become more structured, with early-stage prototypes and the emergence of a repeatable process. Level 3: AI Integration marks a shift toward formalizing strategy, integrating tools into core processes, and refining agile practices using AI-generated insights. Level 4: AI Optimization goes further by focusing on performance, innovation, and ethical usage, while encouraging collaboration and thought leadership. Finally, Level 5: AI Transformation represents a fully mature state where AI is embedded across audit processes, driving continuous improvement and supporting predictive, real-time decision-making. This model is dynamic in nature, emphasizing that AI and agile audit evolve continuously, and that progression across levels is iterative, context-specific, and dependent on organizational learning.

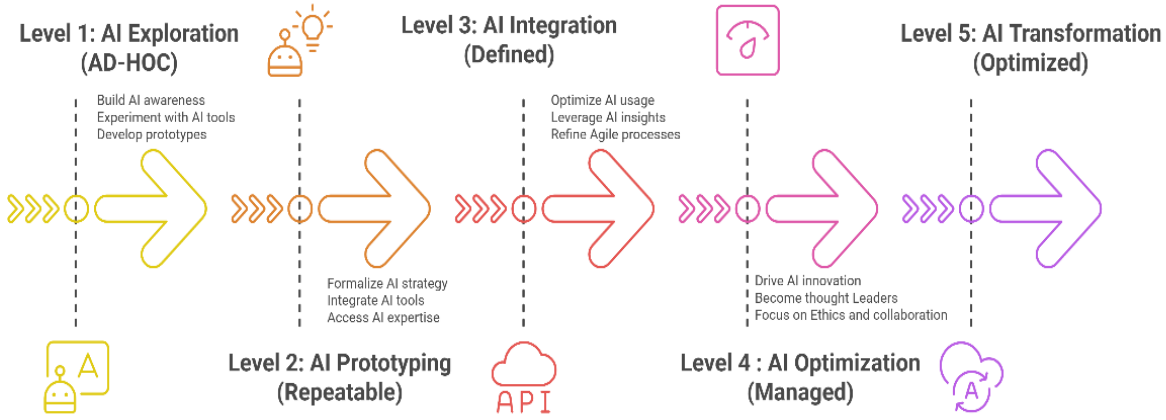

Fig. 2: Dynamic ai maturity model for agile audit

Results

In order to test the proposed AI maturity model, we conducted an empirical validation within a public financial audit institution in Morocco. This field study aimed to assess how the model resonates with the day-to-day realities of public auditors and to refine its components based on real-world feedback. Semi-structured interviews with 18 senior audit professionals revealed a strong consensus on the relevance of AI integration into agile audit practices. Participants identified key barriers such as lack of training, limited resources, and organizational resistance, but also expressed optimism about AI's potential to enhance audit agility, efficiency, and strategic alignment.

The model was subsequently evaluated using real-world audit scenarios to assess its practical usability and adaptability. The results demonstrate that it enhanced roadmap clarity, enabled the detection of maturity gaps, and supported iterative improvements across audit planning and execution. Moreover, the incorporation of agile sprints combined with AI-supported decision-making significantly improved the prioritization of audit missions and the early identification of emerging risks.

What emerged was a clear interest in AI and its potential to modernize audit work. Auditors saw it not as a threat, but as a natural evolution something that could improve the precision of their analyses, automate repetitive tasks, improve anomaly detection and help detect risks more efficiently. Yet, they also voiced their frustrations: Fragmented systems, outdated tools, limited access to quality data, and a lack of strategic direction from institutions.

Beyond technical constraints, auditors expressed cultural and psychological resistance. Many feared a redefinition of their professional role in the face of AI and were uncertain about their continued value in a more automated environment. Nevertheless, there was a strong consensus on the need for capacity-building and practical training in AI, tailored to real audit tasks.

The empirical phase thus underscores a significant gap between the perceived potential of AI and its actual

implementation. It also validates the need for a dynamic, stage-based model that accounts for organizational readiness, ethical considerations, and cultural factors. These results directly informed the model architecture and the practical recommendations provided, reinforcing the importance of an agile, adaptable, and context-aware roadmap for AI integration in public sector auditing. 83% of participants expressing interest in integrating AI tools into their audit processes. However, only 11% reported having access to a well-defined institutional strategy, and over 70% noted a lack of operational tools or technical infrastructure to support AI adoption. While almost all participants (94%) identified a strong need for targeted training and only 17% had already experimented with AI-based solutions in their audit work.

These interviews helped us also validate and enhance the model in very concrete ways. The model's structure, built around progressive levels of maturity, now better reflects the dynamic challenges faced in the field. It shows how moving from one level to the next involves not only adopting new tools, but also building key capabilities, changing mindsets, and ensuring the right support is in place. Rather than offering a one-size-fits-all solution, the model provides audit institutions with a flexible path forward, one that allows for adaptation, anticipation, and continuous learning.

In fact, when confronted with the AI maturity model, 72% of respondents recognized themselves at the initial or emerging levels, indicating limited use of AI and absence of structured strategies. Only 11% positioned their audit units at an intermediate maturity level, with some experimentation but without integration into core audit workflows. None of the participants reported reaching the advanced or dynamic stages, underscoring a significant maturity gap. Moreover, 89% confirmed the absence of formalized AI governance or resource planning, which are prerequisites for progressing through the model's levels. These insights validate the relevance of the proposed maturity framework and highlight its potential as a diagnostic and guiding tool for public audit institutions.

By grounding the model in the lived experience of auditors, this research ensures that it remains relevant, actionable, and sensitive to institutional contexts. It also highlights its broader purpose: To serve as a practical guide for those navigating the transition toward a smarter, more agile form of public audit one that combines human expertise with technological intelligence in the service of transparency and good governance

Discussion

The innovative aspect of our model resides in its dynamic and adaptive structure, which sets it apart from static AI maturity frameworks traditionally employed in audits. For instance, Fukas et al. (2021) propose a five-level Auditing AI Maturity Model that adheres to a predefined and linear progression of AI adoption, exhibiting limited flexibility and minimal integration of feedback mechanisms. Similarly, Eulerich et al. (2021) focus on integrating Robotic Process Automation (RPA) and AI into audit processes, primarily emphasizing efficiency and automation. However, their approach lacks a structured, phased roadmap and does not incorporate continuous learning or stakeholder-driven evolution.

In contrast, our model is iterative, flexible, and rooted in agile audit principles. It facilitates continuous learning, iterative improvement, and agility attributes that are increasingly essential in contemporary digital audit environments.

Recent research underscores the significance of flexible, evolving frameworks in the management of digital transformation. Aras and Büyüközkan (2023) emphasize the necessity for holistic and responsive maturity models that accurately reflect the rapid pace of technological and organizational change. Similarly, Cabrero-Daniel (2023) advocates for the integration of AI with agile methodologies through dynamic architectures that enable real-time decision-making and model adaptation concepts that we incorporate within our proposed framework. Furthermore, (Leocádio et al., 2024; Erasmus and Kahyaoğlu, 2024) provide empirical evidence that the amalgamation of agile methods with AI can substantially enhance audit responsiveness, resource allocation, and strategic value.

By embedding agile principles into each level of AI maturity, our model not only offers a practical roadmap for implementation but also ensures the flexibility to evolve over time. This comparative analysis illustrates how our approach more effectively addresses the needs of modern audit organizations, as it balances structure with adaptability and promotes sustained progress rather than reliance on static benchmarks. This holistic and dynamic approach enhances the model's originality and relevance in a rapidly changing audit landscape.

To sum up, what makes this model unique is its dynamic and flexible nature. Instead of following a rigid path, it evolves over time just like the technologies and audit environments it's meant to support. By combining agile thinking with continuous feedback, it helps audit teams stay responsive, learn quickly, and adapt as they grow in their use of AI.

Limitations

Two of the major problems in applying AI to agile audit are: Data dependencies and the lack of explicability which thoroughly impact the technology's success. The efficiency of AI algorithms depends heavily upon large amounts of high-quality, pertinent data. If organizations have only bits and pieces of data stored in integrated

systems with no connections between them, or if they have some but it is not uniform and random enough from various sources then using AI to implement solutions becomes a difficult task. Indeed, this is called "garbage in, garbage out," meaning that flawed or incomplete data will inevitably produce unreliable or misleading results which make any value added by AI-driven insights illusory.

In addition, the 'black box' or inscrutable nature of some AI models, particularly those employed in high-stakes Deep Learning systems, provides another strong barrier to implementation. These models are able to make accurate predictions and classifications without making it clear how they arrived at them. Such opacity means that auditors cannot see how a conclusion came together which ultimately thwarts their ability to verify results properly. It prevents them from ensuring compliance with necessary laws and standards, and so yes, placing faith in the output of an AI machine does turn out for acceptance. Auditors need to know why AI yields the results it does just as much as they must know what those findings are to render self-reinforcing feedback through the agile audit process.

Accordingly, the use of explainable AI (XAI) techniques that elucidate models decision-making processes is advisable for accounting professionals. Such approaches allow auditors to leverage AI-generated insights with an appropriate level of confidence, while upholding due professional skepticism and complying with established industry standards.

Conclusion

This dynamic AI maturity model gives audit teams a clear and practical way to bring AI into their agile practices. It breaks down the journey into levels, showing what each stage involves and the challenges that may come with it. By doing so, it helps organizations build a realistic plan for AI adoption; one that makes the most of their resources and strengthens the impact of AI on audit performance.

What makes this model especially useful is its flexible and forward-looking approach. It doesn't just describe where you are, it helps you think ahead. Each step between levels is mapped out with the skills, tools, and planning needed to move forward smoothly. This let audit teams prepare in advance, stay on track and avoid surprises.

Importantly, the model isn't static. It grows with technology. As new AI tools and standards emerge, the model stays relevant, helping audit functions adapt and stay effective. In a world where change is constant, this adaptability is key to staying agile, making better decisions, and continuously improving how audits are done.

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Author's Contributions

Soumaya Amraoui: Contributed to the conceptualization of the study, development of the methodology, validation activities, formal analysis, investigation, and provision of resources. Also prepared the original draft of the manuscript.

Mina Elmaallam: Contributed to the validation process and to the review and editing of the manuscript.

Mahmoud Nassar: Provided supervision throughout the research and writing process.

All authors have read and approved the final version of the manuscript.

Ethics

This research drew on semi-structured interviews with audit professionals. In line with the authors' institutional policies, the project did not require formal review by an ethics committee because it posed minimal risk. Nevertheless, the research was conducted with full respect for established ethical principles. Participants were clearly informed about the purpose of the study, the voluntary nature of their involvement, and their right to withdraw at any time. Participants were assured of strict anonymity and confidentiality. All collected data were handled carefully and used exclusively for academic and research purposes.

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