



Loan Monitoring: Artificial Intelligence, Machine Learning, and Beyond

White paper series (part 3 of 4)

Date: October 2025

Prepared by: Summit
777 6th St. NW, Suite 520
Washington, DC 20001 | www.summitllc.us



For more information, please contact:

- **Katie Janik**, Subject Matter Expert (coauthor)
katie.janik@summitllc.us | 202-407-8300 (Tel)
- **Michael Rodriguez**, Subject Matter Expert (coauthor)
michael.rodriguez@summitllc.us | 202-407-8300 (Tel)
- **Anthony Curcio**, Senior Partner
anthony.curcio@summitllc.us | 202-407-8303 (Tel)

Table of contents

Introduction	1
The Role of Artificial Intelligence and Machine Learning.....	1
What Predictive Models Require	1
Preparing Federal Credit Programs for the Next Decade	3
Closing Thoughts	4

List of figures

Figure 1: Predictive modeling integrates key components for a powerful assistant that enhances the workforce rather than replaces it.....	2
--	----------

Introduction

One of the most exciting and transformative parts of loan monitoring are intelligent systems that can help agencies anticipate risk, reduce workload, and make faster, smarter decisions.

AI and ML enable a proactive, predictive approach to reshaping loan portfolio management in the federal space.

The Role of Artificial Intelligence and Machine Learning

Artificial intelligence (AI) and machine learning (ML) can fundamentally reshape the way federal loan portfolios are managed. Right now, loan monitoring is mostly reactive in catching issues after they occur. With AI, we can shift to a proactive—and even predictive—monitoring approach. Modern systems feature the following:

- Flag risks early based on borrower behavior or sector data.
- Identify patterns that humans might miss across several loans.
- Automate fraud detection.
- Continuously track loan covenant compliance.
- Draft the first version of a risk report or summary memo.

This innovation is already being tested in areas like private or commercial lending, and Summit is seeing early adoption in government as well. AI and ML go beyond risk alerts. The future is about using historical data and real-time inputs to forecast outcomes—so federal credit programs can intervene before a loan becomes high-risk.

What Predictive Models Require

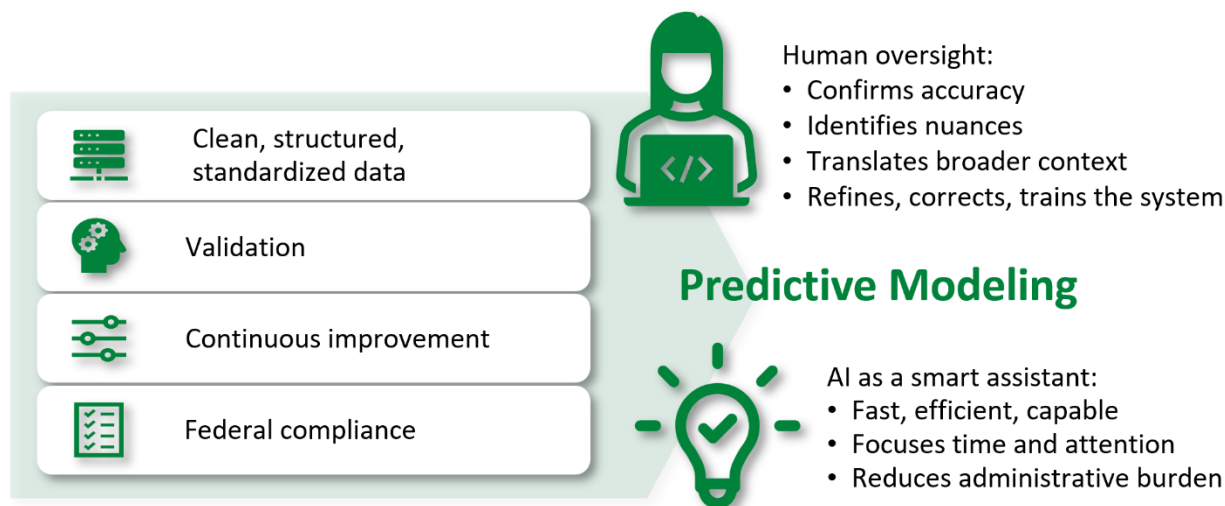
Predictive modeling requires a few key ingredients:

- **Three to five years of clean, structured, and standardized data.** Modeling risk is difficult when the data is locked in PDFs or stored in inconsistent formats.
- **Human validation.** AI systems learn from humans. Program teams still need to review outputs, catch errors, and retrain the model as needed.
- **Continuous improvement.** These systems improve over time. The models get smarter the more they are used—but the models also need regular tuning to avoid “drift.”
- **Compliance with federal AI governance.** Governance includes transparency, fairness, data protection, and auditability. Programs want to know how a model led to a recommendation.

Think of AI as a smart assistant—it is fast, efficient, and capable of processing a large amount of data in a short time. As shown in Figure 1 below, AI requires human direction, judgment, and review to make the right calls. AI can flag a risk, draft a summary, or surface trends a human might not have seen, but it does not understand the nuance of a complex borrower relationship or the broader policy context. Human intervention is essential.



Figure 1: Predictive modeling integrates key components for a powerful assistant that enhances the workforce rather than replaces it



You would not task a spreadsheet with decision-making—the same applies to AI. It should enhance the workforce, not replace it. AI can help the program team focus time and attention, but human expertise is still necessary to validate, adjust, and improve outputs. Human oversight also leads to a better system by entering feedback that refines the model, corrects false positives, and trains the system to make smarter suggestions.

Emerging Technologies and Trends

Some of the newer tools or platforms include the growing use of cloud-based AI services. The big players in this space are platforms like Amazon Web Services (AWS), Microsoft Azure, and Google Cloud.

These platforms offer pretrained machine learning tools that agencies can use without needing a team of data scientists or years of development. They bridge the gap between traditional systems and modern AI-driven oversight. The following AWS tools are especially relevant:

- **Textract** automatically scans and processes unstructured documents like PDFs, scanned images, and tables. For example, if a borrower submits a compliance report as a PDF, Textract can pull out critical fields—like revenue figures, disbursement amounts, or due dates—and convert them into structured, machine-readable data.
- **Comprehend** uses natural language processing to understand the narrative content in documents. It can analyze text to detect tone, sentiment, and even key themes or inconsistencies.

If a borrower includes a narrative section explaining a delay in project milestones, Comprehend can flag phrases that indicate uncertainty, risk, or evasiveness such as “unexpected issues,” “to be determined,” or “still under review.”

Together, these tools dramatically reduce manual effort. Instead of a portfolio manager opening a report, searching for numbers, and interpreting dense paragraphs, the system completes the following:

- ✓ Extracts data automatically
- ✓ Analyzes narrative context
- ✓ Compares results to previous reports or covenant benchmarks
- ✓ Presents a summary or flags issues—often within seconds

These tools do not just speed things up—they standardize and elevate the level of analysis that every portfolio manager can perform, even with limited resources. Because these tools are built on secure, FedRAMP-compliant cloud environments, they are well-suited for federal agencies looking to modernize safely and quickly. When integrated into a loan platform, these tools can provide the following outputs in minutes:

- ✓ Flags for risk parameters
- ✓ Pre-filled compliance trackers
- ✓ Suggested actions for portfolio managers

The tools can analyze data, detect compliance breaches, and generate summaries. All as a baseline for portfolio managers to use.

Preparing Federal Credit Programs for the Next Decade

Federal agencies should be considering the following key features:



Automated Data Extraction. AI pulls information out of PDFs, spreadsheets, and reports—no more copying and pasting by hand. It extracts numbers, dates, key clauses, and more.



Intelligent Rule-Based Validation. Agencies can automate compliance checks by encoding business logic into the system (for example “if this ratio falls below X, flag it” or “if payment is late by 10 days, trigger follow-up”).



Risk Narrative Generation. AI writes the first draft of a risk memo summarizing key changes, red flags, and recommendations. This initial draft speeds up the reporting process for analysts and improves the consistency of reporting for portfolio managers.



Real-Time Dashboards and Alerts. Dashboards auto-update as new data comes in, showing trends over time. Alerts flag changes in borrower risk profiles or noncompliance in real time.



Centralized Data Storage and Querying. All program data should live in a single, secure, searchable data warehouse. A centralized warehouse ensures consistency, enables historical trend analysis, and simplifies audit prep.

These features give agencies the tools to scale oversight, even as loan portfolios grow more complex.



Case Study: Risk Reports and AI Automation

A good example of a case study is drafting periodic risk reports. Today's workflow for periodic risk reports includes the following manual steps:

- Collect data from various sources and locations, including borrower reports.
- Analyze data.
- Write summary of analysis.
- Select risk score based on guidance definitions.
- Determine follow-up actions or enhanced monitoring.

With these manual efforts, errors happen and analysis is missed. The entire process depends on the bandwidth and memory of a single portfolio manager.

In contrast, with an AI-enabled workflow, the borrower uploads their report through a secure portal, and the system automatically completes the following steps:

- ✓ Extracts key data and identifies relevant sections using language models trained on past covenant clauses.
- ✓ Compares the data against preset thresholds (minimum EBITDA level, debt service ratio).
- ✓ Immediately flags anything is out of range.
- ✓ Recommends a risk score based on preset guidance.
- ✓ Creates a draft risk summary in the dashboard for the portfolio manager to review.

Benefits of Automation

The benefits of automation with AI and ML are clear—

- Almost-instant processing of borrower submissions
- Dramatic reduction in manual review effort
- Real-time flagging of exceptions
- Consistent and audit-ready compliance tracking
- Increased scalability with the ability to monitor 100 loans or 10,000 loans (without adding staff)

Whether tracking environmental covenants for an energy loan or revenue targets for a small business loan, the workflow is the same. Rules and thresholds may differ, but the process is universal.

Closing Thoughts

The key to getting started—start small, start focused:

- Begin with one use case (like covenant tracking or risk scoring).
- Make sure the data is clean and structured.
- Partner with IT and program teams to define business rules.
- Keep the human in the loop. AI should enhance human judgment, not replace it.