Building AI Engineering Capability For Federal Workforce Modernization

This case study references publicly discussed modernization efforts within U.S. federal agencies. Specific operational details have been generalized to respect security, procurement, and partnership considerations.

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Overview

Large federal institutions operate some of the most complex software systems in the world. Many of these systems were built decades ago and continue to support mission-critical services at national scale while processing enormous volumes of sensitive data.

As part of a broader modernization initiative, engineering leadership within the United States Department of the Treasury and the Internal Revenue Service have been exploring ways to strengthen internal engineering capability and accelerate the adoption of modern architectures and AI-enabled development practices.

To support this effort, technical leaders engaged with Codesmith to design workforce development approaches aimed at building advanced engineering capacity across teams responsible for large-scale taxpayer and financial systems.

The Challenge

Engineering leaders across Treasury and IRS systems face a unique combination of technical and organizational challenges common to large public infrastructure environments.

01

Modernizing Legacy Infrastructure

Many critical systems were built using legacy architectures that remain highly reliable but are difficult to evolve quickly. Modernization efforts must carefully balance innovation with the stability required for systems that support millions of citizens.

02

Expanding Internal AI Engineering Capability

Teams across the organization have begun experimenting with AI tools and automation. However, leadership is focused on building deeper internal expertise capable of integrating AI models into production systems responsibly within regulated federal environments.

03

Increasing End-to-End Engineering Ownership

Historically, engineering roles have often been specialized around maintaining individual components of large systems. Leadership initiatives increasingly emphasize developing engineers who can understand and design systems across the full stack— from data pipelines to application services and AI-enabled features.

04

Operating Within Secure Environments

All engineering work takes place within highly secure federal cloud environments governed by strict regulatory standards for privacy, security, and operational resilience. Modernization must integrate new tools and architectures without compromising these guardrails.

The Approach

Codesmith collaborated with technical leadership to design a capability-building program focused on developing AI-first engineering practices and modern systems architecture skills within internal engineering teams.

The program emphasizes learning through production-style engineering work. Rather than focusing on theoretical instruction, participants work through applied build cycles designed to mirror real engineering environments and modernization scenarios.

Core training areas include:

- Distributed systems architecture and microservices design
- Cloud-native application development
- AI-assisted software engineering workflows
- Integration of AI models into production systems
- Legacy system modernization strategies
- Automated testing and reliability engineering

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Program Structure

The workforce development initiative includes several training pathways designed to support engineers at different stages of modernization.

AI Acceleration for Modern Engineers

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Modernization Transition for Legacy Experts

Engineers with deep knowledge of legacy systems gain modern full-stack engineering capabilities while preserving the institutional expertise required to safely evolve existing platforms.

Full-Stack AI Engineering

Participants build the skills needed to design and deploy modern applications integrating backend services, user interfaces, and AI-powered capabilities.
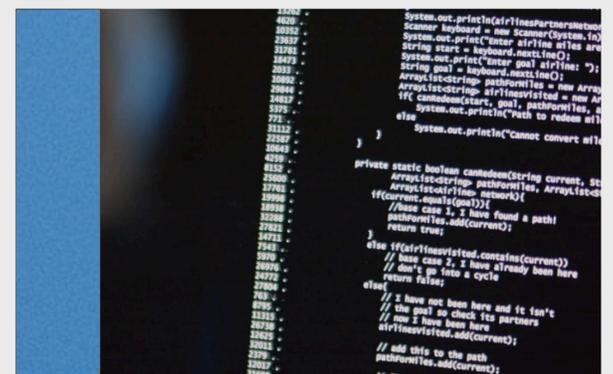
Engineering Leadership & Systems Thinking

Technical leaders and product owners strengthen their ability to govern complex engineering systems and guide modernization efforts across teams.

Impact

By focusing on engineering capability rather than individual tools, the initiative supports long-term modernization goals across the Treasury and IRS technology ecosystem.

Key **outcomes** include:
- Stronger internal capacity to design and operate modern distributed systems
- Increased ability to integrate AI-enabled services into production environments
- Improved engineering ownership of mission-critical platforms
- A sustainable pathway for evolving legacy infrastructure while maintaining operational stability

Why It Matters

Modernizing government infrastructure requires more than adopting new technologies. It requires engineers who understand both legacy systems and modern architectures deeply enough to evolve complex platforms safely.

Efforts to strengthen engineering capability across the United States Department of the Treasury and the Internal Revenue Service represent an important step toward building long-term technical capacity for public service systems that millions of people depend on every year.

Let's Work Together

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