



Global Technology & Solutions

**AI Modernization
Product Family**

SHARE
EDUCATE • NETWORK • INFLUENCE

TECH548:



Modernizing Application Development & Delivery at TD: A Case Study

Ted Maniacco – Sr Engineering Manager,



Vaughn Marshall – Endeavor Product Manager,



Agenda



- About TD Bank Group
- FORRESTER: Mainframe Application Developer Survey
- Modern Mainframe Tooling
- TD's Journey: The Case for Modernization
- TD's Mainframe Modernization Strategy
- Mainframe Accelerated
- Mainframe Modernization Roadmap
- Lessons Learned
- Questions
- Session Evaluation Feedback



About TD Bank Group



TD at a glance

6th largest

bank in North America by assets

28.1M

clients served through financial centres around the globe

13M+

active mobile users in Canada and the U.S.

\$2.1T

assets as of April 30, 2026

“TD”

listed on the TSX and NYSE

The Toronto-Dominion Bank and its subsidiaries are collectively known as **TD Bank Group** (“TD” or the “Bank”). TD serves clients through four key businesses operating in a number of locations in financial centres around the globe.

Four key businesses

1. Canadian Personal and Commercial Banking — Including TD Canada Trust and TD Auto Finance Canada.

2. U.S. Banking — Including TD Auto Finance U.S. and TD Wealth (U.S.).

3. Wealth Management and Insurance — Including TD Wealth (Canada), TD Direct Investing, and TD Insurance.

4. Wholesale Banking — Including TD Securities and TD Cowen.

Digital banking: TD ranks among North America’s leading digital banks, with more than 13 million active mobile users in Canada and the U.S.



Global Technology & Solutions
DevSecOps (DSO)
Product Family



FORRESTER:

Mainframe Application Developer Study



Forrester Mainframe Application Developers Study



Download Report: mainframe.broadcom.com/devops/devsurvey

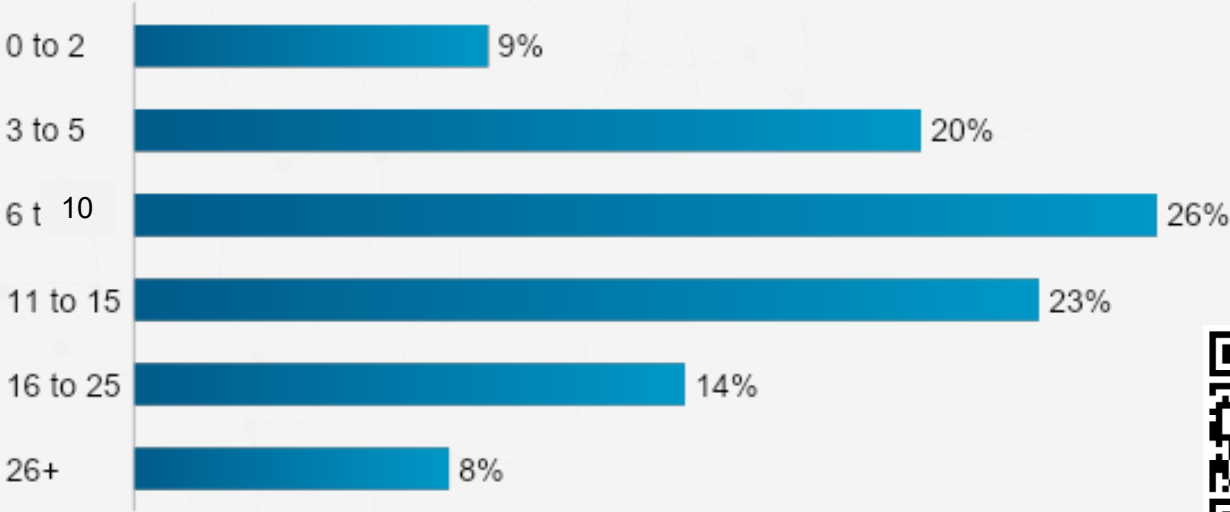
Source: *Forrester Mainframe Application Developer Study, August 2024*, a commissioned study conducted by Forrester Consulting on behalf of Broadcom."



838

z/OS application developers participated in the survey

Mainframe Experience (years)



Key findings: The developer reality

56%

Have professional experience on other platforms (hybrid skillsets are the norm).

16%

Time actually spent coding (despite being their primary function).

3+ Days

Time required to understand where to make code changes (1 in 3 say apps are >5M LoC).

74%

Believe Git (74%) and VS Code (70%) would have a major productivity impact.

#1 Productivity Barrier cited: Outdated tools & frameworks.

Source: *Forrester Mainframe Application Developer Study, August 2024*, a commissioned study conducted by Forrester Consulting on behalf of Broadcom."



Study Recommendations



Prioritize the **z Developer Experience**



Adopt **hybrid development** tools and practices



Automate while staying connected to key **AI** initiatives

Source: *Forrester Mainframe Application Developer Study, August 2024*, a commissioned study conducted by Forrester Consulting on behalf of Broadcom."





Global Technology & Solutions
DevSecOps (DSO)
Product Family



Modern Mainframe Tooling

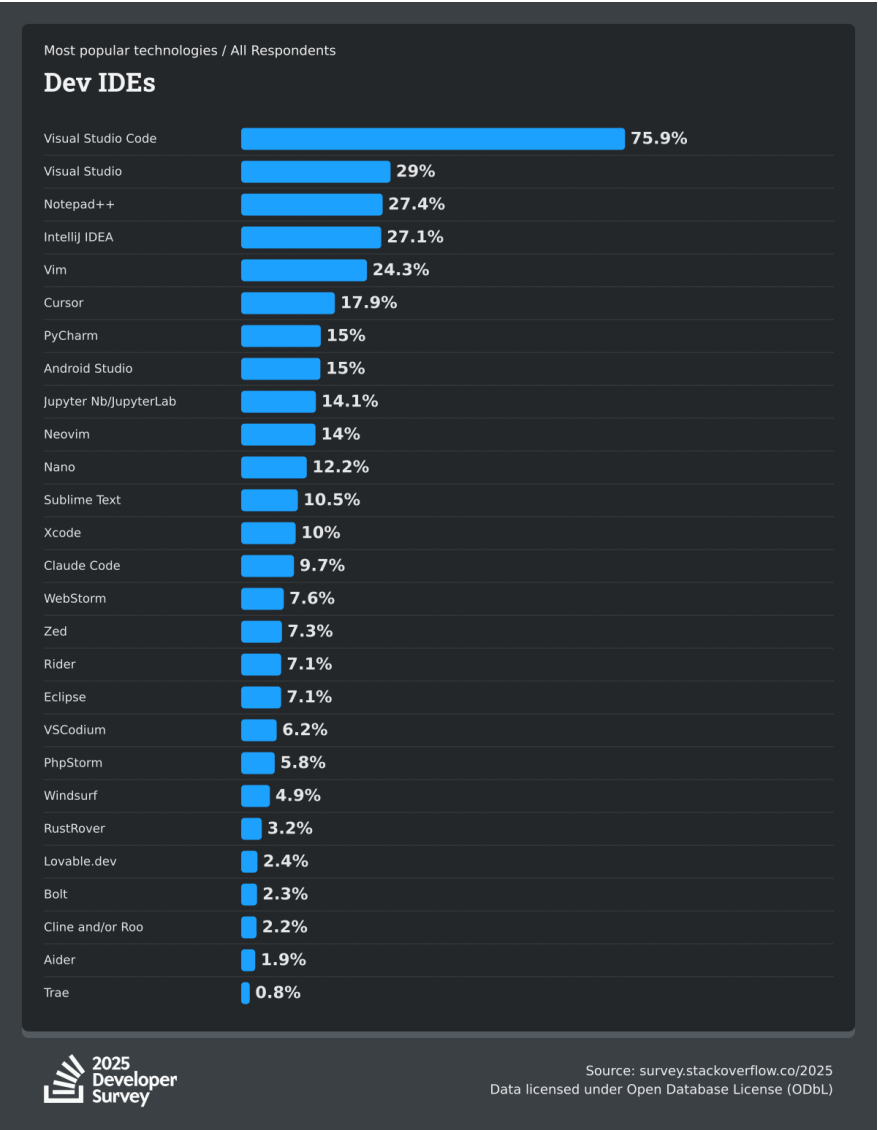
Developer IDEs



Subscription-based, AI-enabled IDEs weren't able to topple the dominance of Visual Studio and Visual Studio Code this year. Both maintained their top spots for the fourth year while relying on extensions as optional, paid AI services.

Reference:

<https://survey.stackoverflow.co/2025/technology#most-popular-technologies>



Streamlined DevX: Code4z

The Experience Developers LOVE

Git Ready

Endevor & Zowe Explorers

Extension Library

Script Libraries (e.g., NPM)

Intellisense, etc. w/ z languages

Monolith Navigation

20 Million VS Code Users!

Desktop or Browser

Terminal Commands w/ Zowe CLI Plug-ins

Eliminates slow paging; jump anywhere



Handling the “*Inner loop*”

Access



Zowe Explorer

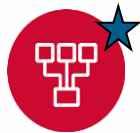


Explorer for Endeavor



Data Editor for Mainframe

Analyze



Code4z Static Analysis



COBOL Control Flow



Code4z Endeavor MCP

Edit



PL/I



COBOL



HLASM



JCL



Easytrieve



Rexx



COBOL for IDMS

Database Access



DBM-Db2 Schema Management



Database API Generator

Build



Endeavor



Team Build

Testing and Diagnostics



Debugger



Abend Analyzer



JCL Check

Integrations



Hostbridge



Debugger



- Actively testing the IBM Debugger within VS Code to enable a modern, IDE-native debugging experience for mainframe applications
- Successfully validated on Batch, IMS and DB2 programs, demonstrating real-world effectiveness
- Developing a custom VS Code extension to work in conjunction with IBM z Open Debug Extension
- Early-stage initiative that represents a key step toward a fully modernized mainframe developer experience



IBM



**TD z/OS
Debug Tool**



Visual Studio Code



Global Technology & Solutions
DevSecOps (DSO)
Product Family



TD's Journey:

The Case for Modernization

Our Journey: The Case for Modernization



**Unfamiliar
Technology Interfaces
for Next-Gen Developers**



TSO / ISPF (3270 Terminal)

**Attract, Engage
AND Retain
New Talent**



**Need to Build
Standardized Tools
Across Platforms**



**Slow Response Time
to Changing
Business Needs**





Global Technology & Solutions
DevSecOps (DSO)
Product Family



TD's Mainframe Modernization Strategy

Our Mainframe Modernization Strategy



Augmenting Existing Mainframe Tooling, Ensuring We Preserve Proven Capabilities while Introducing Innovative Enhancements.



Explore modern day technologies



Include Scripting languages to Dev Process



Enable Mainframe Engineers to Leverage Automation



Code Coverage in Git Using SonarQube



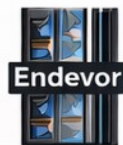
Exploring Containerization

Original State



Rob - Traditional 3270 Developer

ISPF



Endevor

SCM



Endevor

Build



Endevor

Binary Repository



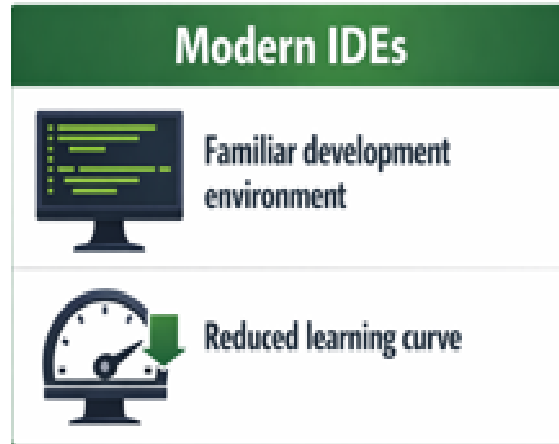
Endevor

Deploy

Building New Talent for Our Mainframe Development



Empowering the next generation of mainframe engineers



"It has been a great learning experience, and I have gained an understanding of the Mainframe world I would not have been able to achieve otherwise."

Kamil

Bridging Our Seasoned & New to Mainframe Developers



Building a collaborative and inclusive environment



From Strategy to Delivery: Executing on Our Strategy



- **Validated & Adopted Modern Mainframe Tooling**

by delivering a successful B4G POC & VS Code/Zowe pilot, demonstrating clear business value & feasibility

- **Drove Change & Upskilling**

via hands-on training, drop-in support sessions & continuous enablement to accelerate adoption

- **Standardized Modern Developer Workflows**

through enterprise tooling rollout, B4G TD Universe mappings, and application onboarding to support platform -practice sharing

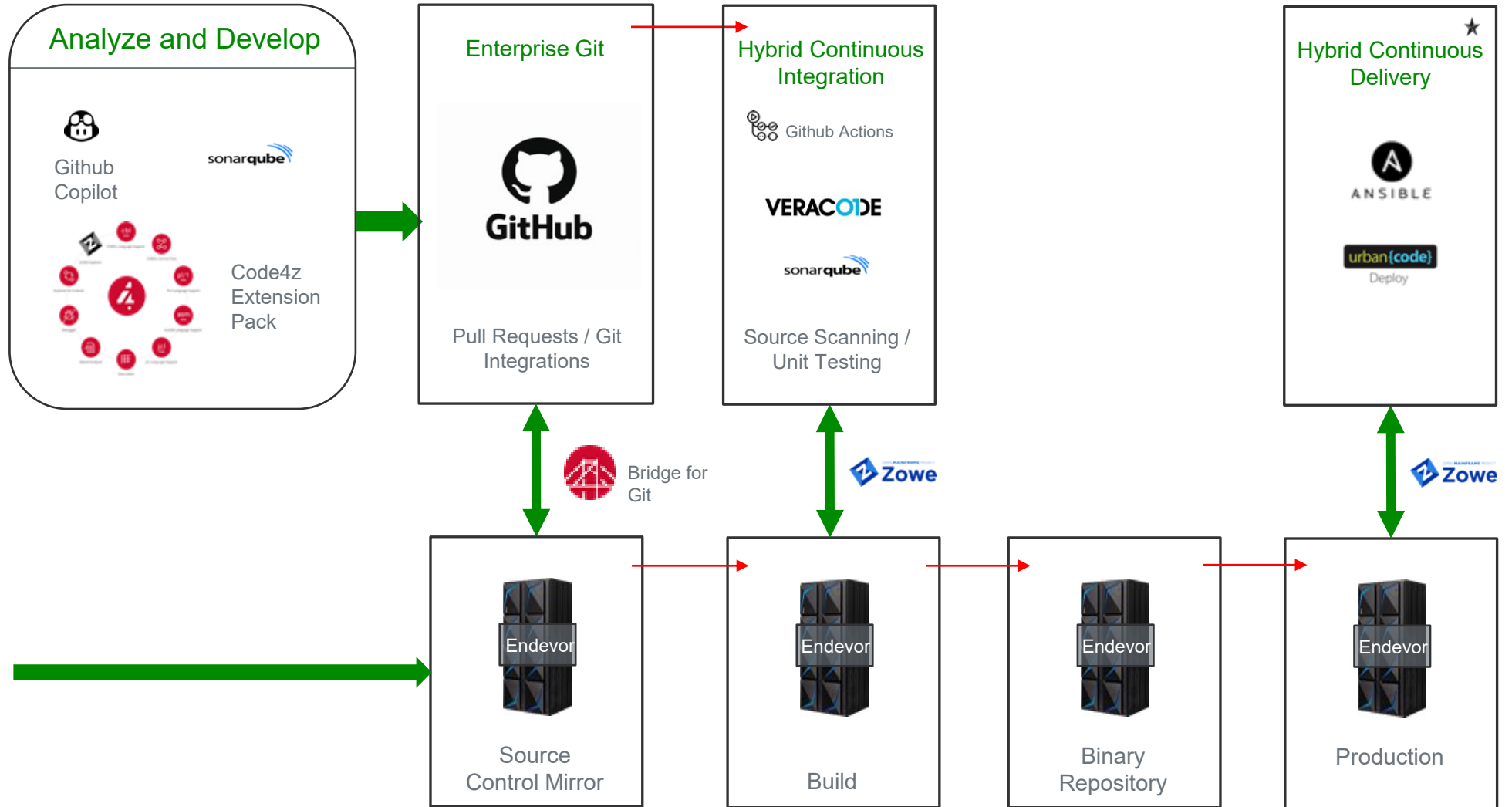
- **Built Advocacy & Momentum**

through the Mainframe Community of Interest & Innovation Days, encouraging experimentation and best-practice sharing

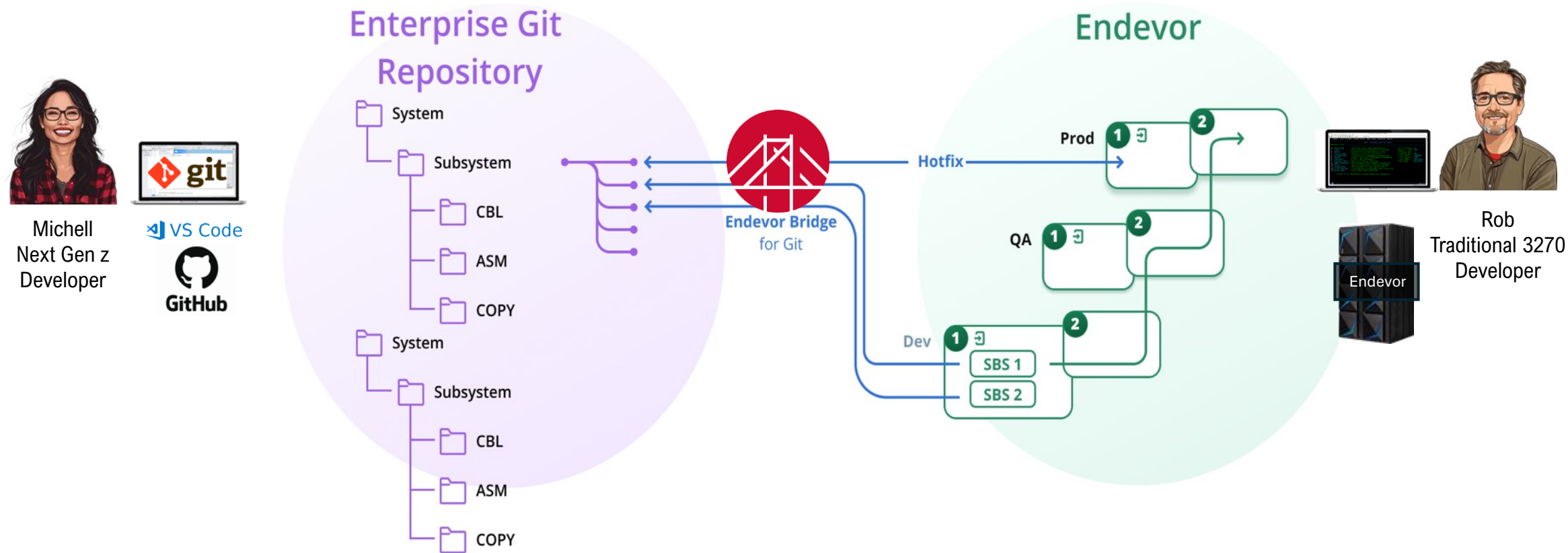
TD Hybrid CI/CD Automation



Michell
Next Gen z
Developer



Risk-managed Git Adoption





Global Technology & Solutions
DevSecOps (DSO)
Product Family



Mainframe Accelerated

Onboarding Automation



Smooth Onboarding Experience Through Task Automation



Automated Onboarding

Solution Using VSCode
To Facilitate Zowe Explorer,
Zowe CLI Adoption



Prioritized Automation

To Reduce Manual Onboarding
Tasks And Mitigating User Errors



Minimized Time Required

For Engineers To Adopt
New Tooling

AI Powered Development



Incorporating GitHub Copilot to support Mainframe Engineers by boosting productivity through AI-powered code suggestions, automating repetitive tasks, and enabling real-time solving—allowing engineers to focus on complex logic, system optimization, and higher-value engineering work.



Global Technology & Solutions
DevSecOps (DSO)
Product Family



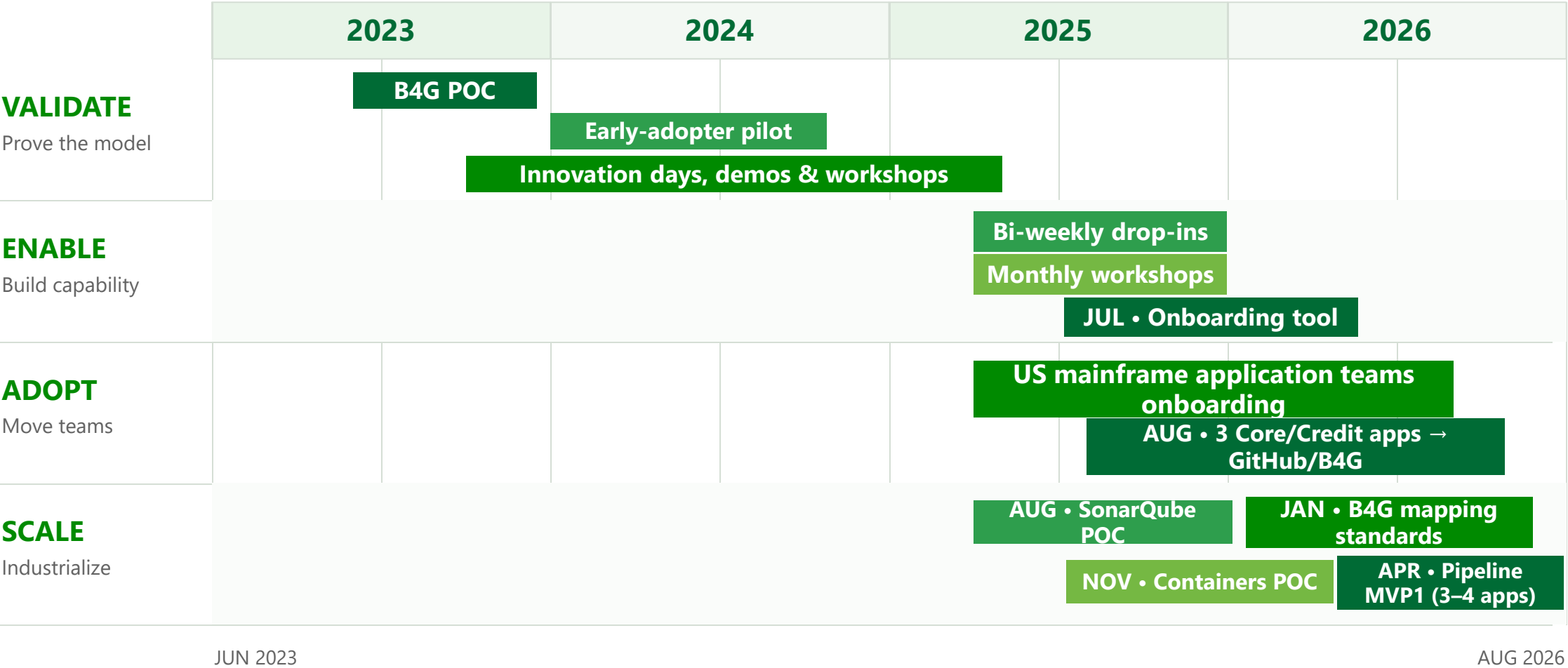
Mainframe Modernization Roadmap

Mainframe Modernization - roadmap



Tooling Pod accomplishments | Jun 2023–Aug 2026

Bars = programs ■ = deliverables

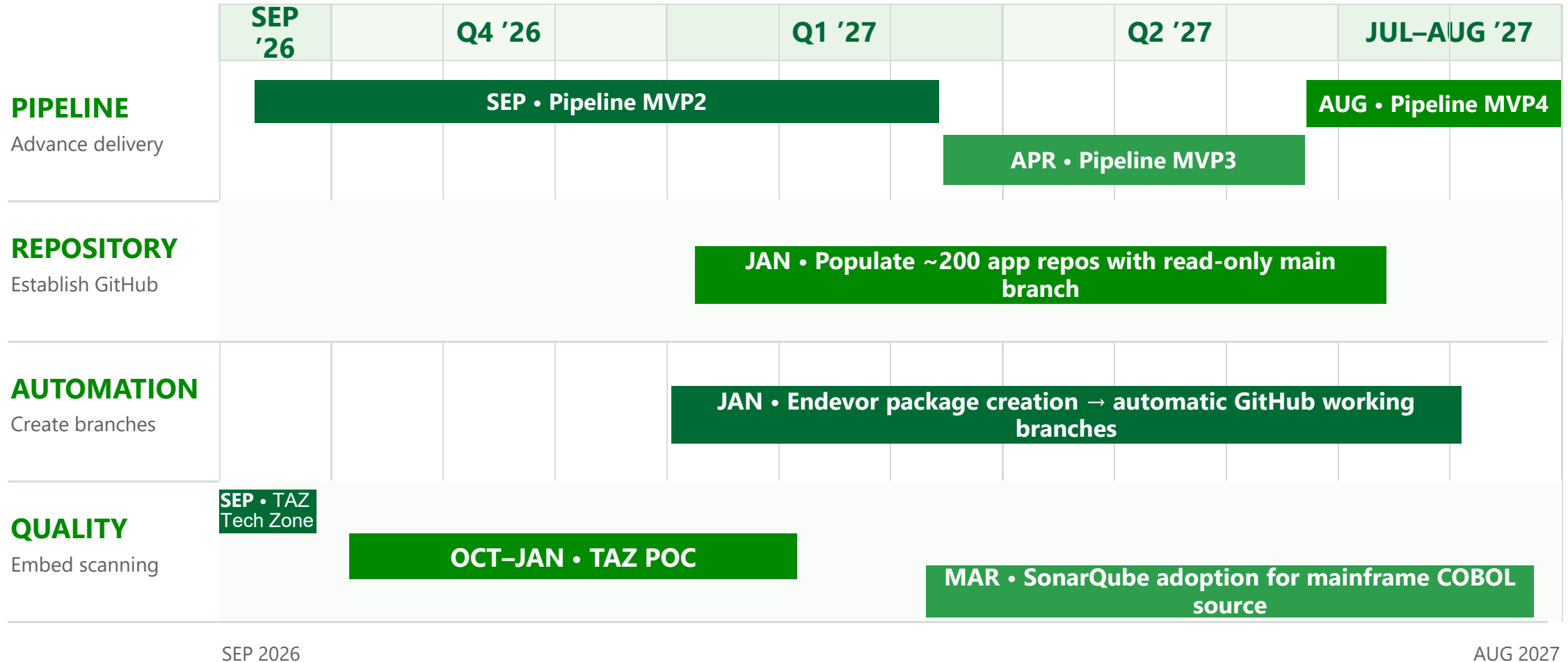


Mainframe Modernization – Road Ahead



Tooling Pod roadmap | Sep 2026–Aug 2027

■ = planned milestone





Global Technology & Solutions

AI Modernization Product Family



Lessons Learned

Five lessons for sustainable modernization



What the journey taught us about adopting—and sustaining—modern tooling

- | | | |
|---|---------------------------------|---|
| 1 | Plan for iteration | Legacy dependencies and complex integrations make modernization a non-linear journey. |
| 2 | Remove adoption friction | Automated onboarding helps teams overcome unfamiliar interfaces and learning curves. |
| 3 | Stay adaptable | Technology evolves quickly; keep evaluating emerging tools and platforms, including AI. |
| 4 | Design for flexibility | Balance immediate value with long-term choice—today's solution may not remain the best fit. |
| 5 | Reassess the stack | Review tools regularly to avoid lock-in and stay aligned with changing business needs. |



Global Technology & Solutions

AI Modernization Product Family



Questions?

Your feedback is important!

Submit a session evaluation for each session you attend:

www.share.org/evaluation





Global Technology & Solutions

AI Modernization Product Family



Thank You!