



WHITEPAPER

Modernizing Legacy .NET Applications

A disciplined, ATO-aware approach to upgrading the Microsoft .NET Framework for federal business systems.

KEY STATS

.NET Target

.NET 10 - Default target (LTS through Nov 2028)

30–50%

Throughput gain vs .NET baseline

Architecture Migration

Big-bang vs strangler-fig

5 Phases

Governance → Assessment → Plan → Migrate → Cutover

ATO

Preserved via phased, audit-ready execution

EO 14028

CycloneDX SBOM in every release pipeline

The Challenge: Aging .NET Stacks in Federal Systems

Federal business systems running older .NET Frameworks carry accumulating risk. A naive “lift to the newest .NET” rarely survives contact with reality.

Legacy Code, Legacy Risk

Many federal systems still run on .NET Framework 4.7.2 or older — code 10+ years old, increasingly hard to staff, accumulating risk with every CVE cycle.

Hidden Blockers

Commercial libraries lag, Windows Server versions vary, and WCF server hosting, WebForms, Windows Workflow Foundation, and .NET Remoting have no in-place modern equivalents.

ATO Is a First-Class Constraint

Authorizing Officials treat a framework jump as a significant change. SSP, SAR, POA&M, SBOM, and SCA artifacts must be sequenced alongside engineering, not bolted on at the end.

KC's Approach

Modernization is not a re-write. It is a sequenced, evidence-driven migration that leaves operations and security teams looking at a deployment that is indistinguishable from any other release — only the payload has changed.

Disciplined Agile (CMMI ML3) • Audit-ready ATO sequencing • DevSecOps gates in CI/CD • FIPS 140-3 across the stack

The Solution: Target Selection + Five-Phase Execution

Default to the newest .NET framework version; step down only when a hard constraint blocks it. Then execute through an ATO-aware, evidence-driven pipeline.

Constraint Funnel



Drivers: vendor & library support | hosting OS | blocked patterns | FIPS / FedRAMP posture | tooling & team readiness

Five-Phase Execution

- 0 Governance & ATO Strategy** — Engage COR, ISSO, ISSM, AO. Determine significant vs minor change. Sequence SSP/SAR/POA&M alongside engineering.
- 1 Assessment & Compliance Delta** — .NET Upgrade Assistant + Portability Analyzer; NIST 800-53 delta; FIPS 140-3 check; SCRM (800-161) on every NuGet.
- 2 Architecture & Migration Plan** — Big-bang vs strangler-fig. Map blockers: WCF→CoreWCF/gRPC, WebForms→Blazor/MVC, WIF→OIDC, EF6→EF Core.
- 3 Prepare Codebase & Pipeline** — SDK-style projects, PackageReference, test coverage. CI gates: CycloneDX SBOM, SAST, SCA, container scan, DAST. DISA STIG.
- 4 Migrate to Target** — Refactor config, DI, logging, hosting, auth (PIV/CAC per FIPS 201), data access. Secrets to Key Vault Gov / CyberArk.
- 5 Validation, ATO Update & Cutover** — Regression + load vs baseline. ISCA, pen test, 508 regression. Updated artifacts to AO. Canary / blue-green cutover.

Results: Proven on a Navy Defense Business System (DBS)

The same disciplined playbook KC used to modernize the ONR Contract Administration Management Information System (CAMIS) — a designated DBS with ATO on the DoD network.

33

Production releases with zero rollbacks

22.5

Average days between releases

100K+

Invoices/year via WAWF & EDA interfaces

2

Consecutive 3-year ATOs achieved

What KC Delivered on CAMIS

- **Architecture modernization** — Consolidated Oracle Forms, APEX, VB, ASP, and Java apps into an integrated C#/.NET suite on Oracle.
- **.NET framework upgrades** — Upgraded .NET framework, Windows OS, and Oracle DB while managing three concurrent releases.
- **Direct XML interfaces** — Built .NET XML web services to WAWF/PIEE and EDA — hundreds of files/hour with XSD validation.
- **ATO maintained throughout** — Two consecutive 3-year ATOs under NIST SP 800-53A. DASN kudos for software quality.

Key Risks & Mitigations

- **ATO timeline slippage**
Engage COR/AO at kickoff; sequence compliance with sprints.
- **Third-party rejection**
Clear dependencies through SCRUM in Phase 1 before designs.
- **Hidden framework-only APIs**
Build end-to-end target slice in Phase 1.
- **STIG / FIPS drift in dev**
Hardened images, IaC, FIPS-mode CI runners from day one.