

SecureFi Institute Special Brief

Shared Advanced Computing for the Federal Government

A Collaborative Framework for Federal Quantum, AI, and High-Performance Computing Experimentation

Date: March 2026
SecureFi Institute



Shared Advanced Computing for the Federal Government

A Collaborative Framework for Federal Quantum, AI, and High-Performance Computing Experimentation

SecureFi Institute Special Brief



Executive Summary

Federal agencies are increasingly investing in advanced computing technologies, including high-performance computing (HPC), artificial intelligence (AI) infrastructure, and emerging quantum systems. These investments are essential for national security, scientific discovery, and economic competitiveness.

However, many organizations face a recurring challenge. Advanced computing systems are often purchased and deployed within individual agencies or programs, resulting in isolated environments that limit collaboration and experimentation. When multiple agencies independently procure similar systems, the result can be duplicated costs, fragmented development efforts, and limited opportunities for cross-agency innovation.

A shared advanced computing test environment could address this challenge. By providing a collaborative environment where federal researchers, engineers, and program teams can experiment with emerging technologies before full-scale deployment, agencies could evaluate systems, develop applications, and share lessons learned across the federal ecosystem.

Such an environment would not replace agency-specific production systems. Instead, it would serve as a **pre-deployment innovation platform** where architectures and applications can be tested, tools can be developed, and capabilities can be evaluated before agencies invest in mission-specific infrastructure.

Global competition in advanced computing is accelerating. Nations are investing heavily in quantum technologies, artificial intelligence infrastructure, and next generation computing systems. Ensuring that federal agencies can rapidly evaluate and adopt emerging technologies will be essential for maintaining U.S. leadership in science, security, and economic innovation.

SecureFi Institute proposes that the federal community explore a collaborative model for advanced computing experimentation that prioritizes fiscal responsibility, cross-agency collaboration, and technology readiness.

This brief outlines a collaborative model for shared advanced computing environments that could allow federal agencies to experiment, evaluate, and learn together before committing to mission-specific infrastructure investments.

By separating experimentation from production deployment, federal organizations can test architectures, evaluate vendors, and develop applications in a lower risk environment. This approach helps ensure that mission-specific infrastructure investments are informed by real world experimentation rather than isolated pilot projects.

Key Takeaways for Leaders

Federal agencies should consider several principles when evaluating advanced computing investments.

1. Collaboration reduces duplication

Many agencies face similar computational challenges in areas such as simulation, optimization, data analysis, and artificial intelligence. Shared experimentation environments could allow agencies to learn from one another and reduce redundant investments.

2. Early experimentation improves procurement decisions

Testing systems and applications in a shared environment allows agencies to better understand which technologies align with their mission requirements before committing to major infrastructure purchases.

3. Open development frameworks accelerate innovation

Using open-source tools, shared development frameworks, and collaborative research environments can accelerate the development of applications across multiple agencies.

4. Security must be built in from the beginning

A collaborative environment designed for federal use should incorporate controlled access and compliance frameworks such as Controlled Unclassified Information (CUI) protections from the start.

5. Separation of environments maintains mission security

Production systems and mission-critical infrastructure will continue to require isolated environments. Shared innovation platforms should complement these systems rather than replace them.

The Current Challenge

Advanced computing systems are increasingly central to government operations. Agencies use these technologies to support scientific research, intelligence analysis, logistics optimization, cybersecurity operations, and advanced modeling.

However, advanced computing infrastructure is often deployed within organizational silos. When each agency independently develops similar computing capabilities, opportunities for shared learning and experimentation can be limited.

This fragmentation can result in

duplicated technology investments
limited cross-agency collaboration
repeated experimentation with similar technologies
longer adoption timelines for emerging computing systems

While some level of separation is necessary for mission security and operational control, the early stages of technology experimentation may benefit from more collaborative environments.

The Value of Shared Test Environments

A collaborative advanced computing test environment could allow federal teams to explore emerging technologies before committing to mission-specific infrastructure.

Such an environment could support experimentation in areas including

- Quantum computing applications
- Artificial intelligence and machine learning (AI/ML)
- High-performance computing (HPC) workloads
- Advanced simulation and modeling
- Cybersecurity and Post-Quantum Cryptography (PQC)

Researchers and engineers could evaluate tools, develop algorithms, and test interoperability across multiple computing platforms.

This collaborative approach could accelerate innovation while helping agencies make more informed procurement decisions.

One way to conceptualize this approach is through a layered collaborative computing environment designed to support federal experimentation while maintaining appropriate security boundaries, as illustrated below.



Figure 1. Conceptual architecture for a collaborative federal advanced computing test environment.

The model illustrates a layered approach that allows federal agencies to collaborate within a controlled environment while maintaining separation between government, contractor, and

broader research communities. The platform would support hybrid computing infrastructure capable of hosting high performance computing (HPC), artificial intelligence (AI) workloads, and emerging quantum computing systems.

Operational and Procurement Benefits

Advanced computing systems require significant investment. Individual high performance computing systems can cost tens to hundreds of millions of dollars when facilities, energy, cooling infrastructure, and long-term operational support are included.

A collaborative experimentation environment can improve the efficiency of these investments in several ways.

Reduced duplication of early experimentation

Many agencies independently explore similar technologies during early research phases. Shared experimentation environments allow agencies to test technologies collaboratively before making separate procurement decisions.

More informed procurement decisions

Testing systems across multiple agencies can generate broader operational insights, helping organizations identify which technologies align best with mission needs before committing to large-scale deployments.

Accelerated innovation

Shared environments enable engineers and researchers to exchange ideas, tools, and code more easily. This collaborative model can shorten development timelines for advanced computing applications.

Better vendor evaluation

A shared platform allows agencies to evaluate multiple technologies side by side, including hardware platforms, development frameworks, and emerging computing architectures.

Long term cost efficiency

Over time, agencies will still procure mission-specific systems. However, collaborative experimentation may reduce costly trial and error across multiple organizations.

Federal Budget and Infrastructure Considerations

Advanced computing infrastructure represents a significant investment across the federal government. High performance computing systems, artificial intelligence infrastructure, and

emerging quantum technologies require substantial capital expenditures as well as long term operational costs related to power, cooling, facilities, and specialized technical personnel.

Across the federal landscape, multiple agencies are exploring similar advanced computing technologies to support mission needs in areas such as scientific research, cybersecurity, logistics optimization, modeling and simulation, and data analytics. In many cases, agencies must independently evaluate technologies, develop applications, and experiment with emerging computing architectures before making procurement decisions.

While agency specific systems are necessary for operational environments, early stage experimentation often involves similar technical challenges across multiple organizations. When these activities occur independently across agencies, the result can be duplicated experimentation, fragmented learning, and inefficient use of federal research funding.

A collaborative advanced computing test environment offers a potential path toward more efficient technology evaluation. By enabling agencies to test emerging computing platforms in a shared environment before committing to mission-specific infrastructure investments, the federal government can improve the quality of procurement decisions while reducing redundant early stage experimentation.

Such an approach supports several fiscal objectives.

First, it can reduce the duplication of exploratory research efforts across agencies investigating similar technologies.

Second, it can allow agencies to benefit from shared lessons learned when evaluating emerging computing architectures.

Third, it can help ensure that large-scale infrastructure procurements are informed by broader federal experience rather than isolated experimentation.

Over time, agencies will continue to deploy mission-specific systems tailored to their operational requirements. However, collaborative experimentation environments may help ensure that these investments are guided by shared knowledge, technical validation, and cross agency insight.

In an era of rapidly evolving computing technologies, such collaboration may represent an important opportunity to strengthen both fiscal stewardship and technological readiness across the federal government.

Governance Considerations

Such an environment could potentially be implemented through existing federal collaboration frameworks, federally funded research centers, or interagency research initiatives.

A collaborative advanced computing environment would require a governance structure that balances openness for experimentation with appropriate security and operational controls.

Federal oversight

The platform could operate under a federal program or interagency collaboration framework that provides governance, funding oversight, and operational direction.

Participating agencies

Federal agencies could participate through research programs, innovation initiatives, or technology evaluation efforts. Each agency would retain responsibility for its own production systems and mission-specific infrastructure.

Access control

User access could be managed through tiered permissions that separate federal users, approved contractors, and research partners.

Security and compliance

The environment should incorporate federal cybersecurity frameworks from the beginning, including controls for Controlled Unclassified Information and other relevant compliance standards.

Vendor neutrality

The platform should remain technology neutral and support multiple computing architectures, allowing agencies to evaluate technologies from a range of vendors.

Lessons from Collaborative Research Models

Many scientific and research communities already rely on shared infrastructure models.

National laboratories operate shared research facilities that support researchers from universities, government agencies, and industry. Similarly, collaborative computing environments allow researchers to test new technologies before deploying them in production systems.

Healthcare institutions have also begun experimenting with accessible quantum computing environments. For example, Cleveland Clinic has partnered with IBM to host a quantum computing system as part of the Cleveland Clinic–IBM Discovery Accelerator, demonstrating how shared access to advanced computing infrastructure can accelerate collaborative research.

These models suggest that collaborative computing environments can play an important role in advancing new technologies.

A Concept for a Collaborative Federal Environment

A shared advanced computing test environment could be designed with several layers to support different types of users while maintaining appropriate security boundaries.

Federal Collaboration Environment

A controlled environment designed for federal employees to explore advanced computing tools, develop applications, and collaborate across agencies.

This environment could incorporate CUI protections and support both on-site and remote access for authorized government personnel.

Partner and Contractor Environment

A separate environment that allows approved contractors and research partners to collaborate with federal teams while maintaining appropriate access controls.

Commercial and Academic Exploration Environment

A third environment could support broader research collaboration with universities and commercial organizations exploring emerging computing applications.

Separating these environments helps maintain security while encouraging collaboration and innovation.

Fiscal and Strategic Benefits

Developing shared experimentation environments could produce several long-term benefits.

- Reduced duplication of early technology experimentation
- Improved cross-agency collaboration
- More informed procurement decisions
- Accelerated development of advanced computing applications
- Better alignment between research and operational deployment

Over time, agencies would still procure mission-specific infrastructure suited to their operational needs. However, early experimentation in shared environments could help ensure that those investments are informed by broader federal experience.

Leadership Considerations

For leaders across government and industry, the key question is not whether advanced computing technologies will shape future infrastructure. That transition is already underway.

The more important question is how organizations can evaluate and adopt these technologies responsibly while managing cost, security, and mission requirements.

Collaborative experimentation environments represent one potential model for balancing innovation with fiscal responsibility.

Conclusion

The rapid advancement of quantum computing, artificial intelligence, and high-performance computing is reshaping the technological landscape. Federal agencies will continue to require mission-specific computing systems tailored to their operational needs.

However, shared experimentation environments could play a valuable role in accelerating innovation and improving collaboration across the federal technology ecosystem.

By enabling agencies to test, evaluate, and learn from one another before committing to large-scale infrastructure investments, collaborative computing platforms may help strengthen both fiscal stewardship and technological readiness.

SecureFi Institute continues to explore models that support responsible adoption of advanced computing technologies across government and institutional environments.

As advanced computing technologies continue to evolve, collaborative experimentation models may play an important role in helping federal institutions responsibly evaluate and deploy next-generation computing infrastructure.

About SecureFi Institute

SecureFi Institute focuses on leadership awareness and governance readiness across emerging computing technologies, including artificial intelligence, cybersecurity, high-performance computing, and quantum systems.

The Institute works to help government and institutional leaders understand the security and strategic implications of these technologies before they become deeply embedded in critical infrastructure.

SecureFi Institute Special Brief No. 001

Shared Advanced Computing for the Federal Government

A Collaborative Framework for Federal Quantum, AI, and High-Performance Computing Experimentation

March 2026



Figures and Analytical Models

All figures, diagrams, and analytical models presented in this research brief were developed by SecureFi Institute as part of its research on emerging computing architectures and cybersecurity implications.

Research Disclaimer

This research brief is provided for informational and educational purposes and reflects analysis from SecureFi Institute on emerging computing technologies and cybersecurity trends. The views expressed are intended to support awareness and discussion of technology and infrastructure challenges and do not represent official policy positions.