



## Improving Emerging Technology Federal Acquisition Outcomes

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*Reducing Lag Times Within the Federal Acquisition and Procurement Lifecycles to Provide Emerging Mission Capabilities and Solutions with Emerging Technologies Using a Shared National Use Case and Solutions Library to Drive U.S. Competitiveness With Nation State Actors*

### **Emerging Technology Community of Interest**

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#### **Synopsis**

Emerging technologies are at the forefront of driving U.S. competitiveness and the U.S. cannot risk falling behind to other countries investing in research and development for these technologies. This paper outlines how government, academia, and industry can collaborate to accelerate innovation around emerging technologies through shared use cases and recommendations using an online national use case library. The intent is to provide a neutral place where both government and industry can share, search, and learn about emerging technologies used across the Federal government, saving time, resources, and funding.

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*Accelerating Government Mission Outcomes Through Collaboration, Leadership and Education*

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## Introduction and Executive Summary

Emerging technologies are at the forefront of driving U.S. competitiveness and the U.S. cannot risk falling behind to other countries investing in research and development for these technologies. This paper outlines how government, industry, and academia can collaborate to accelerate innovation around emerging technologies through shared use cases and recommendations using an **online national use case library**. The intent is to provide a neutral place where both government and industry stakeholders can share, search, and learn about emerging technologies used across the Federal government, saving time, resources, and funding. This use case library will serve a critical role in: 1) accelerating acquisition and adoption of emerging technologies by providing a checkpoint for agencies to verify whether one or more emerging technologies has been piloted or implemented within their agency or other government agencies, 2) maintaining information and data on emerging technology use cases and recommendations across the government, 3) convening the emerging technology stakeholder community and encouraging development of emerging technologies by public and private sectors, and 4) streamlining policy and regulatory requirements and procedures within and across Federal agencies.

### *Overarching Recommendations*

The four overarching recommendations to establish a national use case library includes:

1. Updating implementation guidance around agency requirements to recommend the use of shared services during acquisition planning activities.
2. Establishing authorities around acquisition planning including the designation of a Chief Technology Officer (CTO) or other government representative to maintain a repository of emerging technology use cases and agency solutions.
3. Mandating submission of agency-wide successful emerging technology use cases to a shared library.
4. Designating a lead organization or a federation of organizations such as the Department of Veterans Affairs (VA) National Artificial Intelligence Institute (NAII), the National Institute of Standards and Technology (NIST), the Cybersecurity and Infrastructure Security Agency (CISA), or the Joint Artificial Intelligence Center (JAIC) to drive adoption of platform standards for interoperable Federal use case libraries.

## Problem Statement

Agencies today are not only faced with increasing lag times and costs around the implementation of emerging technologies. Agencies must also determine the proper areas to direct research and development funding to solve our nation's most critical problems (e.g., cybersecurity). This year (2022), the National Defense Authorization Act (NDAA) directed \$117 billion to "finding new science and tech breakthroughs" with \$57 million of this total directed to the Department of Defense's (DoD's) Artificial Intelligence and Data Accelerator Initiative.<sup>1</sup> To effectively use this funding, the government must provide tools to agencies which address lag times associated with researching, validating 'fit for use', and procuring emerging technologies, as well as reduce the potential for improper technology selections and duplicative procurements.

The lag in Federal acquisitions is one symptom of a greater problem surrounding how agencies acquire, pilot, and implement emerging technologies to meet mission objectives. While the DoD has implemented several programs and initiatives for spurring innovation around emerging technologies, agencies and industry partners are continually challenged with matching solutions to organizational needs and accelerating processes around innovation, acquisition, and implementation. But, "few of these efforts have been able to cross the 'valley of death' (see [Exhibit 1.1](#)), the gap between developing a successful prototype and being able to produce a system and field it at scale".<sup>2</sup>

As government and industry grapple with significant lag times around procuring and implementing emerging technologies at scale, the U.S. also faces mounting challenges regarding cybersecurity and infrastructure. In December 2021, the Government Accountability Office (GAO) released a report which listed "ensuring the security of emerging technologies" as one of the critical actions government agencies must take today to effectively execute a "comprehensive national cyber strategy."<sup>3</sup> Lag times for implementing industry proven emerging technologies in conjunction with cybersecurity challenges, which are becoming more and more complex, are some of the contributing factors to the excess costs associated with building and maintaining a variety of technologies throughout the government.

Addressing these challenges is critical to driving U.S. competitiveness in emerging technologies, as well as ensuring the more than \$100 billion spent annually on government cybersecurity and IT investments is used effectively.<sup>4</sup> The Alliance for Digital Innovation released a report in 2019 outlining that between 2010 and 2016, the GAO shared "no less than 800 reports" urging agencies to improve the efficacy and efficiency of their IT spending.<sup>5</sup> The report also estimates that "ignoring commercial innovation leaves over \$300 billion in research and development on the table every year" for government organizations.<sup>6</sup>

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<sup>1</sup> Barnett, J. (2021, December 15). *Congress passes defense policy bill with boosts to R&D and cybersecurity*. FedScoop. Retrieved January 4, 2022, from <https://www.fedscoop.com/fiscal-2022-ndaa-it-and-cybersecurity-provisions/>

<sup>2</sup> *America's military risks losing its Edge*. Center for a New American Security (en-US). (n.d.). Retrieved December 15, 2021, from <https://www.cnas.org/publications/commentary/americas-military-risks-losing-its-edge>

<sup>3</sup> Office, U. S. G. A. (n.d.). *Cybersecurity: Federal actions urgently needed to better protect the nation's critical infrastructure*. Cybersecurity: Federal Actions Urgently Needed to Better Protect the Nation's Critical Infrastructure | U.S. GAO. Retrieved December 29, 2021, from <https://www.gao.gov/products/gao-22-105530>

<sup>4</sup> Office, U. S. G. A. (n.d.). *Cybersecurity and Information Technology: Federal agencies need to strengthen efforts to address high-risk areas*. Cybersecurity and Information Technology: Federal Agencies Need to Strengthen Efforts to Address High-Risk Areas | U.S. GAO. Retrieved January 4, 2022, from <https://www.gao.gov/products/gao-21-105325>

<sup>5</sup> *New report from Adi – a message from John Wood*. Alliance for Digital Innovation. (2020, January 23). Retrieved December 29, 2021, from <https://alliance4digitalinnovation.org/blog/2019/05/18/new-report-from-adi-a-message-from-john-wood/>

<sup>6</sup> Ibid.

## Background

Emerging technologies are at the forefront of driving U.S. competitiveness and the U.S. cannot risk falling behind to other countries investing in research and development for these technologies. Government, industry, and academia must collaborate to accelerate innovation around emerging technologies through shared use cases and recommendations via a [National Use Case and Solutions Library \(NUCSL\)](#), an online national use case library. A NUCSL provides a common place where stakeholders can share, search, and learn about emerging technologies used across the Federal government, saving time, resources, and funding. A NUCSL serves a critical role in: 1) accelerating acquisition and adoption of emerging technologies by serving as a checkpoint for agencies to verify whether one or more emerging technologies has been piloted or implemented within their agency or other government agencies, 2) maintaining information and data on emerging technology use cases and recommendations across the government, 3) convening the emerging technology stakeholder community and encouraging development of emerging technologies by public and private sectors, and 4) streamlining policy and regulatory requirements and procedures within and across Federal agencies.

## Proposed Solution

A NUCSL serves as a critical solution for addressing the 1) lag time between when an agency identifies the near term acquisition of an emerging technology to fulfill a mission need and 2) lag time for when the technology is procured and implemented at scale. In order to effectively reduce this lag time, Federal Acquisition Regulation (FAR) Part 7 should require agencies to assess their emerging needs against the applicable use cases and recommendations provided via a NUCSL to determine whether a similar or the same product has been piloted or implemented within their agency or other government agencies.<sup>7</sup> Incorporation of a NUCSL into FAR Part 7 is supported by the GAO's *Framework for Assessing the Acquisition Function at Federal Agencies*.<sup>8</sup> A NUCSL could also serve as an authoritative source of emerging technology use cases for public and private industry via sponsorship of a NUCSL by a lead Federal agency or a federation of agencies (see [Exhibit 1.2](#)). This lead agency would oversee use case submissions, ensure the design and architecture of a NUCSL platform meets customer needs, and verify a NUCSL's structure and approach follows best practices and industry standards.

Along with this, sponsorship of a NUCSL by a lead agency could drive standard setting for emerging technology adoption throughout the government. The sponsoring agency could also lead efforts around technology road mapping exercises, use case development approaches, as well as verify adherence to policies, regulations, and legislative requirements of emerging technologies, most especially as they relate to security. A NUCSL's model inherently drives translational research to support government-wide labs for a diverse set of innovations. Data and information hosted on a NUCSL builds on the National Institute of Health's (NIH's) All of Us Research Program<sup>9</sup> and similar efforts such as the grantee agreements pioneered in the NIH's Environmental Influences of Children's Health Outcomes Program.<sup>10</sup> With a sponsoring agency conducting monitoring and maintenance

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<sup>7</sup> Far. Acquisition.gov. (n.d.). Retrieved January 12, 2022, from <https://www.acquisition.gov/far/part-7>

<sup>8</sup> Office, U. S. G. A. (n.d.). *Framework for assessing the acquisition function at federal agencies*. U.S. GAO. Retrieved January 5, 2022, from <https://www.gao.gov/products/gao-05-218g>

<sup>9</sup> U.S. Department of Health and Human Services. (n.d.). *All of us research program*. National Institutes of Health. Retrieved January 21, 2022, from <https://allofus.nih.gov/>

<sup>10</sup> U.S. Department of Health and Human Services. (n.d.). *Environmental influences on Child Health Outcomes (ECHO) program*. National Institutes of Health. Retrieved January 22, 2022, from <https://www.nih.gov/research-training/environmental-influences-child-health-outcomes-echo-program>

as the platform host, a NUCSL could serve as a standard exchange between disparate sources of raw data by providing open connectivity for consumption of data for both public and private sectors.

## Related Initiatives

The Office of Management and Budget's (OMB's) Category Management initiative is a proven example of how government can reduce duplicative spending and increase information sharing around products and services by identifying similar services and coordinating between agencies to facilitate bulk purchases, as well as ensure the quality of the services being acquired. It is estimated that OMB's Category Management initiative has saved the government "\$194 million by buying only what it needed".<sup>11</sup> Today, agencies require strategic frameworks and tools, such as OMB's Category Management initiative, to efficiently select, pilot, and implement emerging technologies. A NUCSL can serve as one of these tools for assessing emerging technologies before acquisition.

Congress has also acted to support agencies in adopting emerging technologies, as well as approaches for Federal acquisition of such technologies. Most recently, Congress passed a bill through the Senate, the *Artificial Intelligence and Training for the Acquisition Workforce Act*, to help prepare the Federal acquisition workforce in understanding both the threats and opportunities inherent to working with Artificial Intelligence.<sup>12</sup> This will not only help inform cost cutting measures but provide Federal acquisition professionals with the information they need to ensure emerging technologies are not used improperly or in ways which compromise our national security.

Similar initiatives are not limited to Federal agencies. For example, the FY22 NDAA mandated that the Pentagon assess its Cybersecurity Maturity Model Certification (CMMC) to verify defense contractors receive clear communications around cybersecurity requirements and cyber controls.<sup>13</sup> Measures outlined in this bill will help address acquisition lag times by proactively informing potential and current vendors on key considerations when developing products for market fit, including thorough assessment of security guidelines and regulations, government contracting procedures, etc.<sup>14</sup>

In a similar vein, the General Services Administration's (GSA's) Lightweight Security Authorization Process (for non-DoD agencies) defines levels of maturity at which systems can obtain an Authority to Operate (ATO).<sup>15</sup> This approach can reduce lag times and use cases incorporating this or similar approaches could be shared in a NUCSL. Overall, the efforts outlined above are just a few examples which illustrate the criticality of a NUCSL for agencies in 1) providing key information on Federal acquisition of emerging technologies, 2) informing stakeholders of how to accelerate product market fit, and 3) sharing security validation approaches which evolve with the technology over time to help move products from pilot to implementation.

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<sup>11</sup> Office, U. S. G. A. (n.d.). *Federal Buying Power: OMB can further advance category management initiative by focusing on requirements, data, and training*. Federal Buying Power: OMB Can Further Advance Category Management Initiative by Focusing on Requirements, Data, and Training | U.S. GAO. Retrieved January 4, 2022, from <https://www.gao.gov/products/gao-21-40>

<sup>12</sup> Jones, J. H. (2021, December 20). *Legislation to improve federal workforce understanding of AI passes Senate*. FedScoop. Retrieved January 4, 2022, from <https://www.fedscoop.com/federal-workforce-artificial-intelligence-peters-portman/>

<sup>13</sup> Barnett, J. (2021, December 15). *Congress passes defense policy bill with boosts to R&D and cybersecurity*. FedScoop. Retrieved January 4, 2022, from <https://www.fedscoop.com/fiscal-2022-ndaa-it-and-cybersecurity-provisions/>

<sup>14</sup> Rodriguez, S. (2020, October 8). *How do you bridge the 'valley of death'? bring a ladder*. Defense News. Retrieved January 12, 2022, from <https://www.defensenews.com/opinion/commentary/2020/10/08/how-do-you-bridge-the-valley-of-death-bring-a-ladder/>

<sup>15</sup> General Services Administration Office of the Chief Information Security Officer. (2021, September 17). *IT Security Procedural Guide: Lightweight Security Authorization Process CIO-IT Security-14-68*. Washington.



## Intended Outcomes

By confirming whether an emerging technology has been piloted or implemented at scale within the government, using a NUCSL, agencies can determine: 1) the feasibility of the identified product to meet their needs, 2) who to contact for additional questions, 3) the potential terms and verbiage to use for acquisition of an emerging technology, and 4) whether an interagency agreement (IAA) can be established to acquire emerging technologies in order to reduce cost, duplicative contracts, and time from pilot to implementation. For technologies being procured for the first time at an agency or within the government, agencies can leverage a NUCSL to identify challenges, risks, best practices, and lessons learned. Furthermore, agencies may utilize a NUCSL to identify and contact government and industry representatives to discuss the specifics of their solutions.

In order to increase information sharing around the piloting and implementation of emerging technologies, as well as maintain a NUCSL's data and information, a CTO or other representative from each agency should be appointed. These individuals will be responsible for reviewing and maintaining use cases submitted to incorporate records management functions and retention and disposition requirements into the information life cycle of their agency's emerging technologies.<sup>16</sup> Appointment of such representatives will support agencies in leveraging a NUCSL's structure and guidance to potentially inform internal governance, technology road mapping, and data and information management of emerging technologies.

Submission of use cases to a NUCSL could also be encouraged by setting a time frame for agency appointment of a government representative to oversee use case submissions from their agency. This time frame would not require agencies to submit use cases or recommendations to a NUCSL, but rather encourage government, academia, and industry to participate in submitting use cases and recommendations. This dynamic will accelerate the acquisition process, foster knowledge sharing around emerging technologies, and further spur innovation and awareness.

Along with this, agencies should be required to submit successful emerging technology use cases to a NUCSL. Inventorying and public publishing of emerging technology use cases is supported by Executive Order (EO) 13960, *Promoting the Use of Trustworthy Artificial Intelligence in the Federal Government*, which requires agencies to inventory Artificial Intelligence use cases.<sup>17</sup> This EO also requires agencies to "share their inventories with other agencies, to the extent practicable and consistent with applicable law and policy".<sup>18</sup> Incorporating use cases into a NUCSL will help agencies meet these requirements.

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<sup>16</sup> *Policies & priorities*. CIO.GOV. (n.d.). Retrieved January 12, 2022, from <https://www.cio.gov/policies-and-priorities/circular-a-130/>

<sup>17</sup> *Promoting the use of trustworthy artificial intelligence ...* (n.d.). Retrieved January 12, 2022, from <https://www.federalregister.gov/documents/2020/12/08/2020-27065/promoting-the-use-of-trustworthy-artificial-intelligence-in-the-federal-government>

<sup>18</sup> Ibid.

## Benefits

This set of recommendations and supportive actions to use collaborative tools such as the NUSCL, developed using public-private partnerships (PPPs), could address the root problems outlined above. First, by requiring agencies to reference an authoritative and agency agnostic tool such as a NUCSL, it will help reduce lag times by ensuring an emerging technology has not already been procured by their agency and, if it has been procured by another agency, determine whether collaboration can occur to reduce cost and risk, as well as address the different challenges posed by piloting a technology versus implementing it. Second, by instituting a sponsoring agency or a federation of agencies, as well as government representatives to oversee and maintain a NUCSL to support its sustainability, this will ensure successful solutions are incorporated in a NUCSL.

The benefits of incorporating these recommendations include:

- 1) Decreasing the lag time between procuring and implementing emerging technologies by simplifying and accelerating the acquisition lifecycle.
- 2) Ensuring emerging technology use cases and recommendations are stored and maintained in a single use case library which is publicly accessible and offers a layered approach for security and privacy of data and information.
- 3) Encouraging the emerging technology stakeholder community to share information around challenges, risks, successes, best practices, and lessons learned.
- 4) Increasing awareness around policy, regulatory, and legislative requirements for emerging technologies especially regarding security.
- 5) Incentivizing the emerging technology community to submit use cases to a NUCSL.
- 6) Supporting creative approaches for how agencies identify, select, procure, pilot, and implement emerging technologies based on their unique needs and mission objectives.

Conversely, there are items within these recommendations which require future dialogue with key stakeholders to resolve questions such as:

- 1) Establishing a time frame for when agencies should identify and appoint a government representative to serve as their point of contact for a NUCSL;
- 2) Verifying the quality of the data and information collected via a NUCSL; *and*
- 3) Assessing the budget for hosting a NUCSL.

## Implementation of Recommendations

In alignment with the key findings and recommendations outlined in this document to provide agencies with the critical information they need to effectively acquire emerging technologies, the Office of Federal Procurement Policy may consider issuing a policy letter using one or more of these recommendations to include:

1. FAR Part 7 requiring Federal agencies to assess an emerging technology or technologies they are conducting acquisition planning and market research for with the applicable use cases and recommendations provided via a NUCSL to determine whether the same or a similar product has been piloted or implemented within an agency.<sup>19</sup>
2. A CTO or other government representative from each agency being appointed to maintain use cases submitted by their agency to incorporate records management functions and retention and disposition requirements into the information life cycle of their agency's emerging technologies.<sup>20</sup>
3. Agencies requiring the submission of successful use cases to a NUCSL.
4. A lead Federal agency or federation of agencies, such as the VA NAII, NIST, CISA, or JAIC sponsoring a NUCSL to drive standard-setting for acquisition of emerging technologies throughout the government.

## Conclusion

Through establishing a NUCSL as a foundational component of acquisition planning and market research for emerging technologies, Federal agencies will move ahead of identifying challenges, risks, and successful approaches shared by stakeholders of a NUCSL. This will provide Federal agencies an advantage in not only piloting and implementing emerging technologies, but in using these technologies as opportunities to drive innovation throughout their organizations as well.

With oversight of a NUCSL from a sponsoring agency and an Executive Steering Committee (see [Exhibit 1.2](#)), a NUCSL will serve as a forum where stakeholders can meet to set standards and provide feedback for policies, regulations, and legislation related to emerging technologies. This document outlines the initial recommendations needed to drive this effort forward and increase awareness for how a NUCSL can be used by agencies, as well as public and private stakeholders. Through instituting these recommendations, agencies will move toward further adherence with EO 13960, OMB Circulars A-123, A-11, and A-130, as well as the GAO's recommendations for reaching a comprehensive national cyber strategy and the GAO's *Framework for Assessing the Acquisition Function at Federal Agencies*.

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<sup>19</sup> Far. Acquisition.gov. (n.d.). Retrieved January 12, 2022, from <https://www.acquisition.gov/far/part-7>

<sup>20</sup> Policies & priorities. CIO.GOV. (n.d.). Retrieved January 12, 2022, from <https://www.cio.gov/policies-and-priorities/circular-a-130/>

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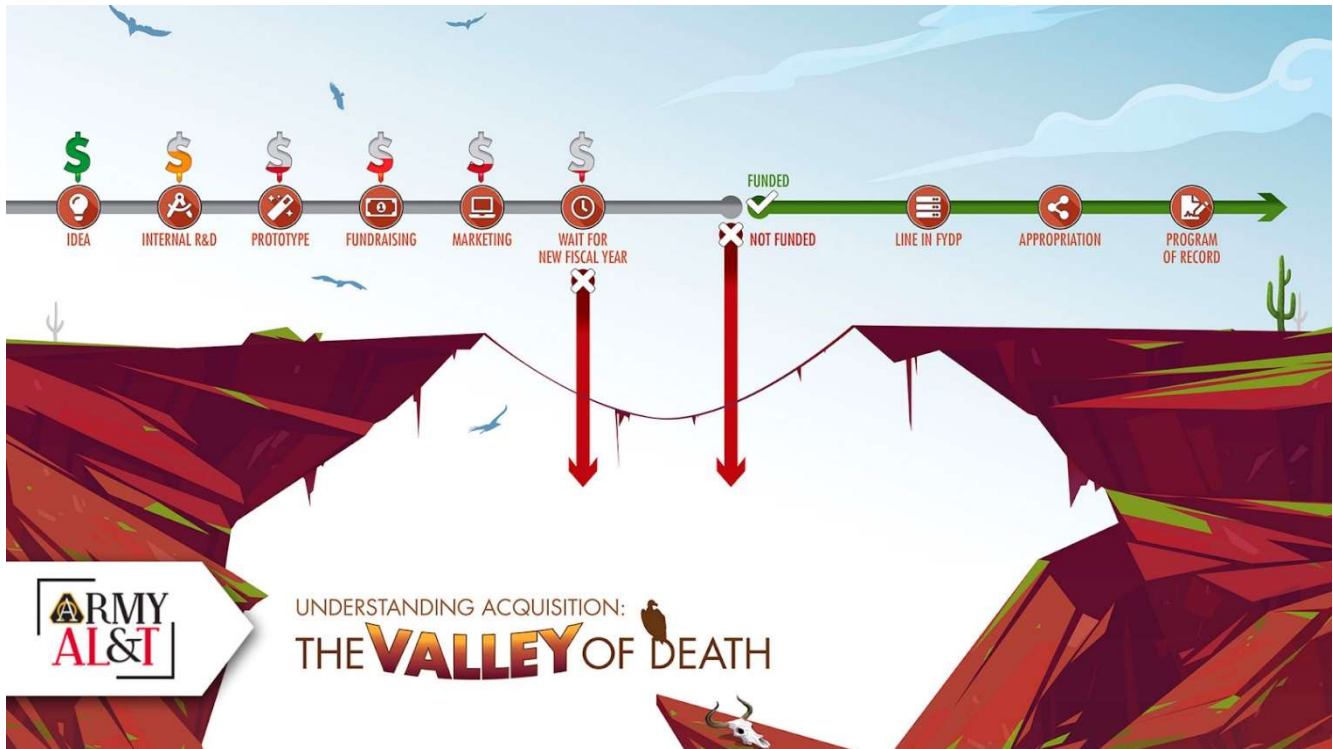
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**Exhibit 1.1**<sup>21</sup>



<sup>21</sup> *Understanding acquisition: The Valley of Death*. USAASC. (2021, October 6). Retrieved January 14, 2022, from <https://asc.army.mil/web/news-understanding-acquisition-the-valley-of-death/>

**Exhibit 1.2**

